UNIVERSITY OF
GUELPH

Design & Construction Standards

Version 25-01
2025/09/01

UNIVERSITY OF GUELPH

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards

Version	25-01
Effective Date	September 1, 2025
Approved By	Justin Selby, Director, Campus Planning, Design & Development
Signature	

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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – General

Version	Effective Date	Approved By	Signature
25-01	September 1, 2025	Kristiana Schuhmann, Associate Director, Campus Planning & Asset Management	

1 General

.1 Version Control Summary
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.4 Maintaining the Standards
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.6 Compliance Criteria
.7 Matrices & Responsibilities

1 Introduction

1.1 General

.1 The standard includes version control as a way for UofG to make changes over time.

2 Version Control Summary

2.1 Standard and Section Versioning

.1 There are 2 locations for versions:

.1 The first is a versioning summary table for the entire Standard, located in this section with a statement indicating what kind of changes were made. It will stay up front at the very beginning of the document, so users can see a history of the changes made over time. Refer to table below

.2 At the end of each section will be a version summary of the updates made into the sections themselves. [Add sample table.]

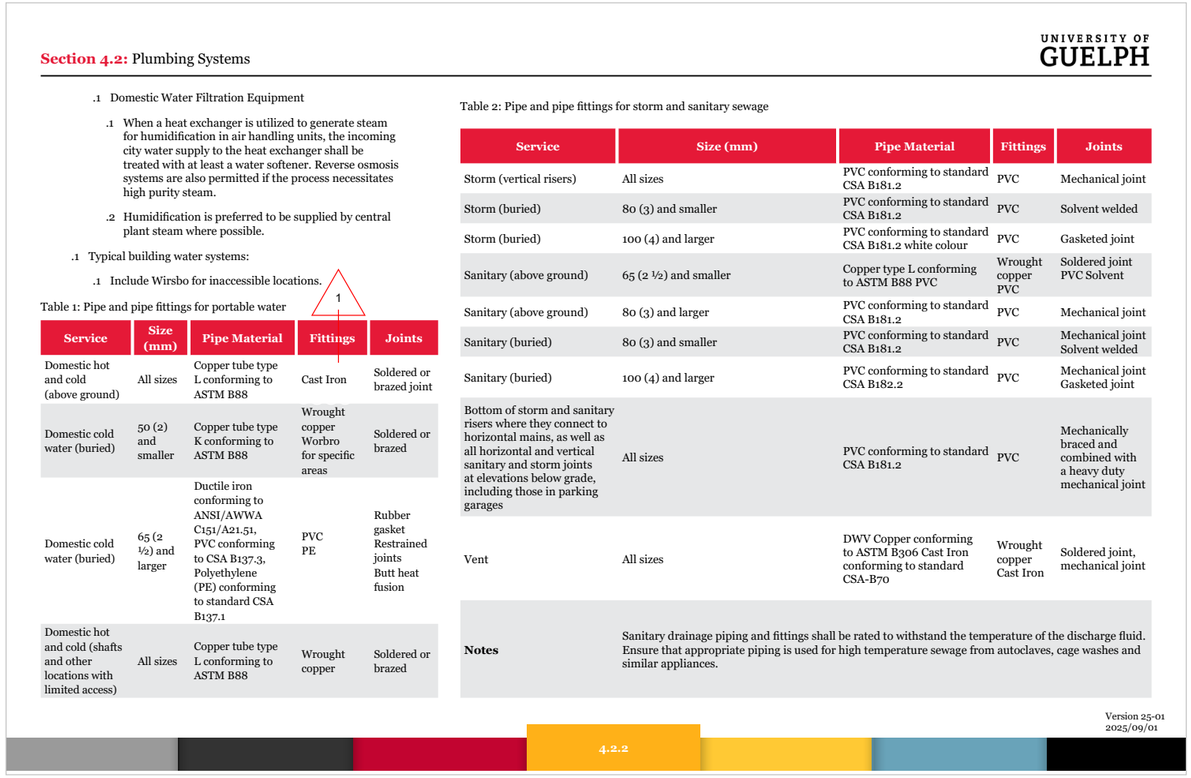
.2 An example page of Revisions is listed below. Each revision will be highlighted and / or struck through in red, along with a red revisions. Refer to the sample table. Please note that changes to the standards have been made and implemented into the standard as of September 1, 2025, and include the following revisions.

.3 An example end of section table is listed below:

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1	09/01/2027	Page 4.2.2	Deleted wrought copper pipes and added cast iron
2			
3			
4			

.4 An example list of Revisions is listed below:

Version	Date	Section/ Page	Brief Description of Revision	Reason
25-01	09/01/2025	ALL	Design and Construction Standards Modernization	N/A
27-01	09/01/2027	ALL	Updated Mechanical Section 4.2.	Deleted wrought copper pipes and added cast iron



Section 4.2: Plumbing Systems

UNIVERSITY OF GUELPH

.1 Domestic Water Filtration Equipment

.1 When a heat exchanger is utilized to generate steam for humidification in air handling units, the incoming city water supply to the heat exchanger shall be treated with at least a water softener. Reverse osmosis systems are also permitted if the process necessitates high purity steam.

.2 Humidification is preferred to be supplied by central plant steam where possible.

.1 Typical building water systems:

.1 Include Wirsbo for inaccessible locations.

Table 1: Pipe and pipe fittings for portable water

Service	Size (mm)	Pipe Material	Fittings	Joints
Domestic hot and cold (above ground)	All sizes	Copper tube type L conforming to ASTM B88	Cast Iron	Soldered or brazed joint
Domestic cold water (buried)	50 (2) and smaller	Copper tube type K conforming to ASTM B88	Wrought copper Worbro for specific areas	Soldered or brazed
Domestic cold water (buried)	65 (2 ½) and larger	Ductile iron conforming to ANSI/AWWA C151/A21.51, PVC conforming to CSA B137.3, Polyethylene (PE) conforming to standard CSA B137.1	PVC PE	Rubber gasket Restrained joints Butt heat fusion
Domestic hot and cold (shafts and other locations with limited access)	All sizes	Copper tube type L conforming to ASTM B88	Wrought copper	Soldered or brazed

Table 2: Pipe and pipe fittings for storm and sanitary sewage

Service	Size (mm)	Pipe Material	Fittings	Joints
Storm (vertical risers)	All sizes	PVC conforming to standard CSA B181.2	PVC	Mechanical joint
Storm (buried)	80 (3) and smaller	PVC conforming to standard CSA B181.2	PVC	Solvent welded
Storm (buried)	100 (4) and larger	PVC conforming to standard CSA B181.2 white colour	PVC	Gasketed joint
Sanitary (above ground)	65 (2 ½) and smaller	Copper type L conforming to ASTM B88 PVC	Wrought copper PVC	Soldered joint PVC Solvent
Sanitary (above ground)	80 (3) and larger	PVC conforming to standard CSA B181.2	PVC	Mechanical joint
Sanitary (buried)	80 (3) and smaller	PVC conforming to standard CSA B181.2	PVC	Mechanical joint Solvent welded
Sanitary (buried)	100 (4) and larger	PVC conforming to standard CSA B182.2	PVC	Mechanical joint Gasketed joint
Bottom of storm and sanitary risers where they connect to horizontal mains, as well as all horizontal and vertical sanitary and storm joints at elevations below grade, including those in parking garages	All sizes	PVC conforming to standard CSA B181.2	PVC	Mechanically braced and combined with a heavy duty mechanical joint
Vent	All sizes	DWV Copper conforming to ASTM B306 Cast Iron conforming to standard CSA-B70	Wrought copper Cast Iron	Soldered joint, mechanical joint
Notes	Sanitary drainage piping and fittings shall be rated to withstand the temperature of the discharge fluid. Ensure that appropriate piping is used for high temperature sewage from autoclaves, cage washes and similar appliances.			

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4.2.2

1 Purpose and Scope

1.1 General

.1 This University of Guelph's Design and Construction Standards (the Standard) have been developed to establish the University's minimum expectations and requirements for renovations and new construction on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of site layout & landscaping, building fit and forms, space planning, materials and finishes, building performance, accessibility, security, and sustainability.

2 The Modernization Process

2.1 Purpose

.1 The purpose of modernizing the Standard is to introduce more graphics, include some additional information, remove discrepancies, and provide alignment on campus-wide initiatives. These include design briefs for accessibility, security, and sustainability / energy targets among others.

.2 The Standard includes guidance on what metrics apply to different project types, from new construction, to building additions, through to renovations of all scales.

2.2 Format

.1 The Standards format has been redesigned and reorganized to provide readers with the following experience:

.1 It has a horizontal format to be more easily read on screens.

.2 It provides more graphics and tables to aide in reading information.

.3 There are sample plans and Room Data Sheets included for spaces that appear in buildings across the campus.

.4 It is a searchable, expandable PDF, self-linking and navigating, as a downloadable PDF.

.5 By clicking any of the colours at the bottom of the page, you will navigate to the Table of Contents for that Section and can follow the link from the Table of Contents to the specific section pages you want to read. Clicking on the University of Guelph Icon in the top right corner will take you back to the central Navigation Page.

.2 In the beginning, the Standard is wide-reaching, incorporating items that apply toall projects, before going into greater detail on building elements and systems. Then the Standards go deeper into the building levels, before getting to the systems and detail levels at the end.

2.3 Sections

.1 The Standard has been organized into the following structure:

.1 Section 1 – General: This starts with the Version Control Summary, then includes the general requirements for the standard, how to use it, and including Guelph processes for deviations. It also includes information on Guelph initiatives, maintaining the standards, rules for exemptions and deviations, compliance criteria and matrices outlining responsibilities.

.2 Section 2 – Common Requirements: This is where campus-wide and common building requirements for the standard are identified. It contains the newly developed design briefs and references other campus initiatives that may affect the design of campus buildings and its infrastructure. The items in this section include the Sustainability / Energy Design Briefs, Historic Buildings, Accessibility briefs, but also include standards like metering, road works, and elevators.

.3 Section 3– Architectural Requirements: These are the architectural standards, that include finishes, and building envelope, but also refer to layout, organization and planning of the campus and programming the buildings themselves. It begins with the general requirements of the architectural components, then contains information on specific areas that might deviate from the Standards listed earlier in the section.

.4 Section 4 –Mechanical Requirements: These are the mechanical standards, broken down by system. It begins with the general requirements of the mechanical systems, then contains information on specific areas that might deviate from the Standards listed earlier in the section.

.5 Section 5 –Electrical Requirements: These are the electrical standards, broken down by system. It begins with the general requirements of the electrical systems, then contains information on specific areas that might deviate from the Standards listed earlier in the section.

.6 Section 6 – IT & Communication Systems Requirements: These are the information technology and communication systems standards, broken down by system.

.7 Section 7 – Appendix Items: This section contains information to facilitate coordination for consultants and Physical Resources staff and stakeholders for the projects, outlining Matrices for responsibilities, and including general layouts for common spaces, and their respective Room Data Sheets for ease of use.

2.4 Stakeholder Sessions

No.	Name	Date
1	Capital Development & Delivery Department (PR Capial Planning, Design & Development)	07/25/24
2	Mechanical & Electrical Design Group (PR CPDD)	07/26/24
3	Architectural Group (PR CPDD)	08/26/24
4	Door Hardware & E-Access (PR Maintenance and Energy Services, PR Business Operations & Spyder)	09/10/24
5	Maintenance Group (PR Maintenance and Energy Services)	09/11/24
6	Environmental Operations & Sustainability (PR Business Operations)	09/23/24
7	Grounds & Transportation Services (PR Business Operations)	09/24/24
8	Commissioning (PR Mechanical & Electrical Design Groups, PR Maintenance Group and WSP)	10/15/24
9	Athletics & Ancillary Group (Student Housing, Hospitality & Parking)	10/16/24
10	Environmental Health Services, Occupational Health and Wellness & Student Accessibility Services	11/12/24
11	Accessibility Audits Consultant (Human Space)	12/02/24
12	Central Utilities Plan, Tunnels & Site servicing (PR Mechanical & Electrical Design Groups, PR Maintenance Group)	12/04/24
13	Campus Safety Office	12/11/24
14	Controls (PR Mechanical & Electrical Design Groups, PR Maintenance Group & GL Controls)	12/12/24
15	Computing and Communication Services, School of Continuing Studies & Library	01/08/25
16	Vendor of Record Consultants (RJC, Grinham, Workshop, WalterFedy, Smith and Anderson & mCCallum Sather)	01/09/25
17 & 18	Metering (PR Mechanical & Electrical Design Groups, PR Maintenance Group, QMC)	01/09/25 03/17/25
19	Flood Control & Risk Mitigation (Treasury & Investment Operations, PR Mechanical & Electrical Design Groups, PR Maintenance Group)	01/10/25
20	Vendor of Record Contractors (MTL, Paulsan, GenPro, P&S Electric, Comrade, Jay Stewart)	01/14/25
21	Decarbonization Plan & Energy Audits (PR Mechanical & Electrical Design Groups, PR Maintenance Group, Arup & WalterFedy)	01/30/25
22	Campus Classroom Committee (University Leadership, Registrar, PR Leadership, Workshop, Classroom Technical Services)	02/03/25
23	Campus Security Audit & Digital Security Control (Campus Safety Office, PR Mechanical & Electrical Design Groups, PR Maintenance Group, Business Operations, BPA)	02/04/25
24	Outdoor Infrastructure, Finishes & Entrances (Athletics, PR Architectural Design Group, PR Maintenance Group)	02/03/25
25-27	Lab & Vivarium Standards (PR Mechanical & Electrical Design Groups, Maintenance Group, PR Business Operations, School of Engineering, College of Biological Science, PR EHS Compliance & Continuous Improvement, Environmental Health Services, Research Service Office)	03/31/25 02/02/25 02/24/25
28	Electrical Design Group (PR CPDD)	04/11/25

2.5 Acknowledgements

Organization	Name	Position
Univeristy of Guelph	Kristiana Schuhmann, M.Arch, OAA Architect	Interim Associate Director, Campus Planning & Asset Management
Kearns Mancini Architects	Heather Button	Senior Associate | M.Arch, B.ES., OAA, MRAIC, PMP, LEED AP
	Susana Garzon	Associate | B.Arch, WELL AP
Quasar Consulting Group	Barry Dempsey	Sector Lead
	Eddie Gandolf	P.Eng, Sector Lead
	Ali Nakhaei-Zadeh	P.Eng, Mechanical Team Lead

1 Other Campus Initiatives

1.1 General

.1 The University of Guelph has completed several initiatives to establish its growth over the next decades. The University of Guelph Design and Construction Standards are intended to build upon these initiatives, tying them together to create a safe, inspiring space for students, faculty and staff members alike.

.2 Consultants are to review the Design Standards with the following Initiatives to meet the University's requirements.

1.2 Campus Master Plan

.1 UofG is undertaking a strategic update to our Campus Master Plan (CMP) that will work in conjunction with the Design and Construction Standards.

.2 The CMP will provide an integrated framework for the planning, renewal, and development of the University's core campus and University-owned and managed Heritage Trust properties.

.3 This project is a key institutional initiative that aligns with the Our Time Strategic Plan and is intended to support informed decision-making. It will address current and emerging needs such as climate action, accessibility, housing, infrastructure renewal, and academic and operational needs to support a responsive, inclusive, and future-ready campus. The CMP will support the University's mission to "Improve Life" by fostering a compact, sustainable, and inclusive campus that incorporates historical assets, enhances identity, leverages opportunity for innovation, and delivers implementable strategies aligned with institutional priorities.

.4 In the meantime, you can reference the current 2013 University of Guelph Campus Master Plan by clicking here. https://www.pr.uoguelph.ca/projects-planning/master-planning.

.5 For information on what aspects apply to your specific project, refer to the Project RFP, and the PR Project Manager before the completion of Schematic Design.

1.3 Building Energy Audits

.1 UofG has recently completed energy audits on many of our existing buildings. Where practical, energy retrofit projects identified within the energy audit reports should be considered in project scope development. For information on what aspects apply to your specific project, refer to the Project RFP, and the PR Project Manager before the completion of Schematic Design.

1.4 Sustainability Goals and Targets

.1 UofG is developing a decarbonization plan that takes a holistic look at the campus main infrastructure and provides guidance on renovations. The Design Standards provides both an Energy and Sustainability Design Brief (Section 2.2), and an infrastructure of Compliance Criteria for how to meet these targets.

.2 All new buildings developed on campus should be NetZero ready per the NetZero Carbon Building Standard, v.4, however the campus is still working on creating a clean energy grid. Refer to Section 2.2 for more detailed energy targets for all projects.

1.5 Security Audit

.1 The University has recently completed security audits on many of our existing buildings and provided guidance for construction and renovations. Additional information may be found in Section 2.4 but have been incorporated throughout the Standard.

1.6 Accessibility Audits

.1 The University has recently completed accessibility audits on many of our existing buildings and provided guidance renovations and new construction. Additional information may be found in Section 2.3 but accessibility has been incorporated throughout the Standard.

1.7 Campus Classroom Study

.1 The University has completed a utilization study to assess the impact of projected enrolment growth on requirements for classrooms, particularly larger capacity classrooms and lecture theatres / halls. The study assessed the utilization rates of all centrally booked as well as departmentally controlled classrooms.

.2 The utilization analysis was based on digital room scheduling data for the prior two academic years provided by the Registrar's Office for all recurrent and one-off (ad-hoc) academic delivery activities. The findings of the study were used to produced proposals for physical changes to the classroom inventory to greater align the match between program delivery requirements and available instructional space. The proposals considered modifications to room capacities by combining adjacent smaller classrooms into a single larger classroom, and the creation of new large-capacity lecture halls. This study continues to be used to support ongoing classroom space management and campus planning initiatives.

1.8 Campus Lab Study

.1 UofG is studying its teaching and research lab spaces, to better understand current and future facility needs. The exercise involves the collection of data on research and instructional lab spaces within each College, with attention to usage and allocation. The University's existing teaching and research laboratory facilities are important, sometimes "mission-critical" assets in high demand. This demand is expected to increase as the University continues to grow. The collected data is intended to yield high-level results indicating shortfalls or surpluses of laboratory space when evaluated against COU guidelines, and when comparing one user group of the University relative to others. The review's findings will be one of many inputs considered by the University when deciding and prioritizing the allocation of laboratory space.

1 Maintaining the Standards

1.1 Responsibilities and Locations

.1 It is the responsibility of the University of Guelph Physical Resources – Campus Planning, Design and Development (CPD&D) department to supply any additional existing information they have to consultants, or to outline what else might be required as part of the pre-planning work.

.2 It is the responsibility of the Consultants to perform their due diligence and document the existing conditions of the project to the extent possible. This may need to include destructive testing in order to validate design presumptions and/or reduce the amount of unknown site conditions. Any destructive testing must be coordinated with the PR Project Manager. It is recommended that Consultants request more information.

.3 Where there might be a perceived conflict in the standards and their application on a project, it is up to the Consultant to flag it to the Physical Resources Project Manager, to validate and confirm the direction.

.4 The various campus departments, stakeholders and users start with the following list, and may be referred to throughout the entire Standard.

.1 Physical Resources (PR)

.2 Campus Planning, Design & Development (CPD&D)

.3 University of Guelph (UofG, OR University)

1.2 Updating the Standard

.1 The standard will be reviewed and re-issued yearly with new and updated information brought forward based on project experience, lessons learned, changes in the industry, and other campus initiatives.

.2 Requests for updates or modifications to the standard are to be requested through the appropriate PR CPD&D Manager who will review the content change for validity, and then suggest revisions to the Associate Director Campus Planning and Asset Management, who is responsible for overall maintenance and issuances of the Standards

.3 The Standards are to be released on January 1st of every other year (i.e year ending in an odd number). If there are no substantial changes in that year, then the Standards do NOT need to be re-issued and can wait for the next year (i.e. even numbered year) for consideration.

.4 An exception that would warrant release mid-cycle would be a change that has a deep monetary impact or detrimental to the campus and needs to be corrected.

1 Standards Exemptions and Deviations

1.3 Standards Deviations Process

.1 The Standard has been developed with new construction and major additions in mind. When dealing with existing buildings, deviations are expected to occur, depending on the size and scope of the project.

.2 The Project Team is responsible for identifying the expected deviations that may be required at the start of the project.

.3 After performing a thorough review of the project site, including all systems and items that are required to meet the design goals for the campus, Consultants are expected to bring any possible requests for deviation to the Project Team.

.4 Consultants are expected to track deviations and their approvals throughout the project using a spreadsheet the University's deviations tracker, and review it with the University and its various stakeholders. This should be reviewed per the stakeholder and trade input chart in Section 8.1 of the Standard.

.5 The University deviations tracker is included on the next page.

1.4 How to use the Deviations Tracker

.1 The deviations tracker is an excel spreadsheet. It is meant to be flexible, easy to use, and a living document that can be shared via cloud means (SharePoint, OneDrive, etc.). It should be shared between all parties for the duration of the project, from Feasibility through Project Takeover and Closeout.

.2 On the top right of the spreadsheet includes the relevant project information. This should be filled out before any deviations are tracked.

.3 The first Black columns represent the list of items included within the design standards.

.4 The second Red columns represent the requirement and location within the project. The reasoning or description of the deviation, or why it cannot be accommodated should be followed by the Consultant's proposed solution. These may include conflicts of interest between stakeholder groups.

.5 The third Yellow columns are for stakeholder signoff on the proposed solutions.

.6 Consultants may add rows if more than one line is insufficient for the project, specifically on projects with buildings of historic significance.

.7 Consultants are responsible for reviewing deviations in a timely manner as not to delay the project. At a minimum, the deviations tracker must be reviewed by all consultants at their biweekly meetings, and between Consultants and UofG PR Project Managers at weekly / biweekly touchpoints.

.8 Items reviewed and signed off by UofG Departments may be locked once signed off for ease of tracking.

2 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

UofG | Physical Resources

Deviations Tracker

Location: *[bld#, floor, department]*
Project Type: *[New, addition, major reno, etc.]*
Project #: *[UofG Project #]*

University of Guelph PM: *[List PM here]*
Consultants: *[List Consultants here]*
General Contractors & Trades: *[List Contractor / Trade here]*

Category	Referenced Section	Requirement & Location	Reasoning / Description for Deviation	Proposed Solution	Decision	Approval Departments	Approval Initials	Approval Date
Common								
Design Standards								
General Requirements	2.1							
Sustainability & Energy Design Brief	2.2							
Accessibility Design Brief	2.3							
Campus Security Design Brief	2.4							
Site Servicing	2.5							
Campus Metering	2.6							
Landscaping	2.7							
Roads, Walkways & Parking	2.8							
Elevators	2.9							
Architectural								
Design Standards								
General Requirements	3.1							
Building Envelope	3.2							
Space Planning & Interior Design	3.3							
Painting	3.4							
Signage	3.5							
Vivarium	3.6							
Laboratory	3.7							
Classrooms	3.8							
Custodial	3.9							

*PDF example of Excel spreadsheet

1 Consultant and Contractor Compliance Criteria

1.1 General Compliance Criteria

.1 The compliance criteria outlined below is to guide Consultants and Contractors with additional requirements that are required above and beyond standard OAA and CCDC contracts. These requirements are mandatory in any project.

1.2 Consultant and Contractor Engagement

.1 Consultants are expected to hire or coordinate with the following Consultants on a project. These Consultants will be identified in the RFP Process.

.2 The Vendor Of Record list for University Consultants and trades can be found here: https://www.pr.uoguelph.ca/projects-planning/consultant-and-contractor-information

Hazardous Materials/Asbestos – Various – Hired by the University

Guelph Required Consultants	Contact Information	Hired by Guelph	Hired by Consultant
Commissioning (Cx)	WSP	X	
Hardware	Spyder		X
Radon	Lex Scientific		X
Surveys	Van Harten Surveying Inc	X	

.3 Tender Requirements for General Contractors and Trade Engagement will follow the RFP process for the individual projects.

1.3 Documentation & Communication

.1 Communication procedures and expectations are outlined in the RFP for Consultant Services. Communication should be professional, clear and via email or other approved means. Phone calls where decisions have been made should always be followed up with email correspondence to formalize the decisions.

.2 General Contractors should rely on Contract Administration software Kahua. All project documents and processes will be administered on this platform, including but not limited to design reviews, contracts, shop drawings, meeting minutes, RFIs, invoicing, change documentation, site review reports, deficiency lists, and daily site logs among others. There is no cost to users as the University hosts the Kahua platform and its use for a given project. At the start of a project, team members will receive an invitation to access Kahua and the credentials to perform the duties of their role. The use of the Kahua platform is mandatory as projects will not be administered using any other software platform or traditionally via email.

.3 Invoices must go through the Kahua platform. For training on how to use this, please contact the PR Project Manager for the link.

.4 Refer to section 1.7 – Matrices & Responsibilities for the relevant Stakeholder Engagement Matrix to identify which Guelph stakeholders to engage on the project. Coordinate reviews and meetings with the Stakeholders through the PR Project Manager.

1.4 Design Process

.1 UofG has a wide variety of projects of varying size, scale and complexity. The following are definitions Physical Resources uses to determine the full scope, scale and implementation requirements for a given project.

Project Type	Definition
New Construction	Any new building constructed on a green or brownfield site, regardless of whether an existing building is demolished to accommodate the new construction.
Building Addition	Any new construction built adjacent to and connecting to another building on campus. Systems may or may not be separated from the existing building.
Major Renovation	Where more than 50% of the existing buildings and systems are being removed, to the extent that Part 11 of the Ontario Building Code no longer applies. This includes: • Building wings • Major system updates within a building.
Medium Renovation	Where less than 50% of the existing building in a targeted specific area is being renovated. This includes: • A departmental renovation, • A floor within a building, • A suite within a floor.
Minor Renovation	Small renovations that don't require closing off entire building zones, or possibly permits and/or obtaining a building permit.

.2 For all projects regardless of size, the standard scope of services is outlined within the OAA 600-2021 (V1.2) Contract and the University's associated schedules:

.1 Schedule 1: Supplementary Conditions Ontario Association of Architects Standard Form of Contract for Architect's Services OAA 600-2021A, and

.2 Schedule 2: Basic Services to the OAA 600-2021 University of Guelph Architectural Services Contract.

.3 In addition to the requirements outlined in the procurement documents and/or the Consultant's contract, the following items must be included in the Consultant's Scope:

Phase	Scope
Pre-Design	• For an addition or renovation: Provide an existing building assessment, including the creation of existing plans, RCP, and demolition drawings. • For an addition or renovation: Provide existing building service connection drawings to map panels, sprinklers, and other systems to the central locations within the building, and where necessary, the campus. • For an addition or renovation: Provide a review of existing metering.
General Services	• For all projects: Provide Energy Modelling. • For all projects: Provide a Life Cycle Analysis of embodied carbon for the project as a whole and the for the individual components. • Provide CAD and BIM files at project completion as outlined in Section 3.1 for the Contractors use in creating their as-builts.
Permits and Approvals	• For heritage designated projects: provide documents required for the City of Guelph. • For new Construction and major elevation changes: Provide SPA documents as required by the City of Guelph.
Construction	For all projects: Coordinate with the Campus Commissioning Agent to meet Campus Commissioning Requirements.
Post-Construction	For all projects: provide 2 sets of record drawings in both PDF and AD formats CAD files per UofG's naming conventions. These will be used for our record keeping and to develop the following in house drawing sets • Life Safety Diagrams • Future project updates • Base plans

.4 For small projects, confirm with the PR Project Manager which requirements must be met.

1.5 Compliance Criteria

.1 General

.1 This University of Guelph's Design and Construction Standards (the Standard) have been developed to establish the University's minimum expectations and requirements for renovations and new construction on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of site layout & landscaping, building fit and forms, space planning, materials and finishes, building performance, accessibility, security, and sustainability.

.2 Compliance Criteria

.1 Deviations from the minimum requirements outlined in this Standard must be approved by the applicable CPDD discipline Manager, before the completion of Schematic Design.

.3 Responsibility of the Designer

.1 The Designer remains responsible for ensuring proposed design solutions are in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Conflicts between applicable Codes & Standards and this Standard shall be identified and presented to the PR Project Manager, together with proposed measures for addressing the conflict before completing the Schematic Design.

.3 The PR Project Manager will consult with the applicable CPDD discipline Manager on a proposed resolution. This consultant may include the Consultant.

.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an innovative approach to design. However, it remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed design innovation shall be tabled for consideration by the PR Project Manager, before the completion of Schematic Design.

Project Type	Guelph Standard Requirements	Comments
New Construction	Mandatory	Innovation is recommended. Deviations must be approved by PR.
Building Addition	Mandatory	Innovation is recommended. Deviations must be approved by PR.
Major Renovation	Mandatory where practical & feasible.	Innovation is recommended. Deviations must be approved by PR.
Medium Renovation	Recommended to extent practical & feasible.	Innovation is recommended. Deviations must be approved by PR.
Minor Renovation	Recommended to extent practical & feasible.	Innovation is recommended. Deviations must be approved by PR.

.5 Reference Documents

.1 All reference documents should be read with the most current edition. Should conflicts arise, for example between the latest standard issued and the Codes which reference specific editions, they shall be identified and presented to the Manager, Architectural Design, CPD&D, together with proposed measures for addressing the conflict.

.2 Reference documents include, but are not limited to the following:

.1 Ontario Building Code (OBC)

.2 Accessibility for Ontarians with Disabilities Act (AODA)

.3 University's Campus Master Plan

.4 University's Accessibility Audits

.5 University's Energy Audits

.6 University's Learning Environments Design Standard – AV Technology

.7 ASHRAE

.8 OCAD University's FADS

.9 Handbook of the Canadian Roofing Contractors Association.

.10 CSA B651 - Accessible design for the built environment.

.11 Crime Prevention through Environmental Design (CPTED).

.12 City of Guelph Bird Design Guidelines

.13 National Fire Protection Association (NFPA) as required for design and by OBC.

.14 Canadian Green Building Council (CaGBC) Zero Carbon Building – Design Standard version 4.

.3 Additional standards and reference documents are listed in various sections, but consultants should always consult additional standards for the building program requirements.

1.6 Penalties

.1 Consultants:

.1 The Consultant remains responsible for ensuring proposed design solutions are in full compliance with applicable Codes & Standards in force at the time of the design.

.2 The Consultant is responsible for performing due diligence on the project and making every effort to review existing conditions and to ascertain the scope of work through the Design, and to escalate issues with the PR Project Manager.

.3 The Consultant is responsible for rectifying issues that could have reasonably been foreseen without UofG incurring additional costs.

.4 All measures in OAA 600 contracts are in place.

.5 Clauses 1.6.2.4 & 1.7.2.4 note: Should any losses, costs, damages or other amounts suffered, sustained or incurred by the University arising from or in connection with the failure of the Consultant/Contractor to apply the Design and Construction Standards as set-out herein, the University may deduct from or set-off against any amount payable by the University to the Consultant/Contractor under their Contract.

.2 Contractors:

.1 The Contractors are responsible for immediately bringing information from the site directly to the PR Project Manager during construction.

.2 Except with new construction, contractors should assume asbestos may be contained throughout. Except for new construction, contractors should assume asbestos may be present. Obtain detailed building asbestos inventory from the University prior to starting work. Comply with applicable legislation regarding asbestos. Should the Contractor encounter asbestos or material that is suspected to contain asbestos during the course of the Work, report same to the PR Project Manager. The University will advise means of confirming or denying asbestos is present and will advise regarding process for removal. No person shall apply or install or cause to be applied or installed, any material containing 0.1 per cent or more asbestos by dry weight that can become friable.

.3 The Contractor is responsible for rectifying issues that could have reasonably been coordinated in advance of any conflicts.

.4 All measures in CCDC-2 contracts are in place.

1.7 Tender & Contract Language

.1 The Design and Construction Standards use contract language throughout. Defined parties such as Owner, Consultant, Contractor, are capitalized as they would be with OAA and CCDC contracts.

.2 Terms like must and shall are to be read as mandatory.

1.8 Integration and Process Improvement

.1 The Design and Construction Standards includes a number of Responsibility Matrices to help users navigate various UofG stakeholders, their responsibilities, requirements, and when to engage them. Consultants are to work with the PR Project Manager to engage stakeholders in a timely manner.

.2 Where sections indicate trade responsibility matrices, for example, in the commissioning section, the Consultant should include this information as part of the tender sets, to coordinate with the relevant parties as needed on site.

1.9 Process Checklist

.1 The University has included process checklists, [link to locations]. These should be referred to by Consultants and Contractors, and included as necessary in the Construction Contract Documents.

1.10 Standard Room Types

.1 Included the Design and Construction Standard's appendix are a section of standard room layouts and Room Data Sheets that apply to the majority of buildings anywhere on Campus. Please refer to that Section 7 for their use.

1.11 Campus Design Review Process

.1 Consultants are to coordinate with the PR Project Manager, for which UofG departmental and external stakeholders are to be engaged as part of the project:

.1 Campus Planning, Design & Development (CPD&D)

.2 Campus Safety Office (CSO)

.3 Fire Prevention Services

.4 Maintenance and Energy Services

.5 Grounds

.6 Physical Security Infrastructure, Electronic Access Group

.7 Parking Services

.8 Environmental Operations and Sustainability (Custodial)

.9 Classroom Technical Support (CTS)

.10 Computing & Communications Services

.11 Materials Handlers

.12 Hospitality Services

.13 Occupational Safety and Health (OSH)

.14 Environmental Safety and Health (EHS)

.15 Campus Classroom Committee

.16 Landscape Advisory Committee

.17 Space Advisory Committee

.18 Student Accessibility Services

.19 Client User Group

.20 Other Stakeholders as required (ie. Students Association)

.2 These consultants should be consulted based on the responsibilities' matrix at in Section 8.

.1 For new construction and additions, refer to page 1.7.2.

.2 For building renovations, refer to page 1.7.3.

1.12 Campus Construction Review Process

.1 These consultants should be consulted based on the responsibilities matrix at in Section 1.7.

.1 For new construction and additions, refer to page 1.7.2.

.2 For building renovations, refer to page 1.7.3.

2 Version Control Summary

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1 How to Read this Section

.1 These are the recommended times for engaging campus stakeholders within a project. Consultants should discuss this with the University of Guelph Project Managers at the start of the project and align to the requirements of the RFP.

.2 Please note that the final three columns are to be edited on a project-by-project basis, to make sure any additional stakeholder feedback is received.

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	Stakeholder Engagement Matrix - New Construction & Major Additions Deliverable Stage	Campus Planning Design & Development (CPD&D) Leadership	CPD&D - Energy, Mechanical & Electrical Managers	CPD&D - Architectural Manager & Inerior Designer	Maitenence & Energy Services Group (incl. Central Utilites	Environmental Operations and Sustainability (Custodial)	Physical Security Infrastructure Team	Computing & Communications Services (CCS)	Parking & Vehicle Services	Classroom Technical Support & School of Continuing Studies	Campus Classroom Committee	Grounds & Campus Landscape Committee	Commissioning (Cx) WSP	Campus Safety Office & Fire Prevention Office	Door Hardware (Spyder)	Hospitality Services	Occupational Safety and Health (OSH)	Environmental Safety and Health (EHS)	Client & User Group	Central Student Association	Project Specific Stakeholder 2	Project Specific Stakeholder
Design Phase	Feasibility	●	●	●	○		○		○			○		○					●			
	Schematic Design	●	●	●	●	●	●	●	●	●	●	●	●	●		●	○	●	●			
	Design Development 50%		●	●	○		○		○	○		○	○	○					●			
	Design Development 100%	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●			
	Construction Documents 50%		●	●	○	○	●		●	○		●	●	●	○	●	○		●			
	Construction Documents 75%		●	●	○	○	○	●	○		○	○	○	○	●		●	○	○			
	Integrated Systems Test Planning		●	●	●					●			●						○			
	Construction Documents 100%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
	SPA / Authorities Having Jurisdiction (as required)	●			●																	
Construction Phase	Submittal Reviews		○	○			●			●			●		●		○					
	Integrated Systems Testing		●		●								●									
	Maintenance & Site Review				●				●				●				●					
	IT /AV Implementation						●	●		●												
	Security Review						●	●														
	Commissioning (Cx)		●	●	○	●	○	○	○	○	○	○	●	●	●				○			
	Training				●	●	○	○	○	●			●			○	○	○	○			

● Mandatory
○ Non-mandatory

	Stakeholder Engagement Matrix - Renovations & Small Projects Deliverable Stage	Campus Planning Design & Development (CPD&D) Leadership	CPD&D - Energy, Mechanical & Electrical Managers	CPD&D - Architectural Manager & Inerior Designer	Maitenence & Energy Services Group (incl. Central Utilites	Environmental Operations and Sustainability (Custodial)	Physical Security Infrastructure Team	Computing & Communications Services (CCS)	Parking & Vehicle Services	Classroom Technical Support & School of Continuing Studies	Campus Classroom Committee	Grounds & Campus Landscape Committee	Commissioning (Cx) WSP	Campus Safety Office & Fire Prevention Office	Door Hardware (Spyder)	Hospitality Services	Occupational Safety and Health (OSH)	Environmental Safety and Health (EHS)	Client & User Group	Central Student Association	Project Specific Stakeholder 2	Project Specific Stakeholder
Design Phase	Feasibility	●					○		○			○		○					●			
	Schematic Design	●	●	●	●	●	●	●	●	●	●	●	●	●		●	○	●	●			
	Design Development 100%	●	●	●	●	●	●	●	●	●	●	●	●	●		○	●	●	●			
	Construction Documents 50%		○	○		○	●		●	○		●	●	●	●	●	○		●			
	Integrated Systems Test Planning		●		●					●			●						○			
	Construction Documents 100%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
	SPA / Authorities Having Jurisdiction (as required)	●			●																	
	Fire Protection Study		●	●	●																	
Construction Phase	Submittal Reviews		○	○			●			●			●		●		○					
	Integrated Systems Testing		●		●								●									
	Maintenance & Site Review				●				●				●				●					
	IT /AV Implementation						●	●		●												
	Security Review						●	●														
	Commissioning (Cx)		●		○								●	●					○			
	Training				●	●			○	●			○	○		○			○			

● Mandatory
○ Non-mandatory

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Common

2 Common

.1 General Requirements
.2 Sustainability & Energy Design Brief
.3 Accessibility Design Brief
.4 Campus Security Design Brief
.5 Site Servicing
.6 Campus Metering
.7 Landscaping
.8 Roads, Walkways & Parking
.9 Elevators

1 How to Read this Section

.1 This section should be read in conjunction with the other sections in this Standard.

.2 This section outlines both the Sections in the Design and Construction Standard that apply directly to more than one consultant. Each of the sections in here apply to two or more Consultants, which is why they were brought forward. For more detailed information, refer to the other sections.

.3 The Sections included here are the following:

- .1 Sustainability & Energy Design Brief.
- .2 Accessibility Design Brief
- .3 Campus Security Design Brief.
- .4 Site Servicing.
- .5 Campus Metering
- .6 Landscaping
- .7 Road Works and Parking.
- .8 Elevators.

.4 None of these standards relieve the Consultant of doing their due diligence, nor of the contractor to make sure that all construction is meticulously planned.

.5 Codes, Standards and Guidelines written into this document are considered required by the University and must comply with the most recent versions. Where discrepancies are found, the most legally binding document takes precedence. If there are still discrepancies, they must be brought to the attention of the PR Project Manager, in conjunction with their respective departments, to determine which ones take precedence.

2 Version Control Summary

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UNIVERSITY OF GUELPH

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Common Sustainability & Energy Design Brief

Version	25-01
Effective Date	September 1, 2025
Approved By	Natalie Hope, Manager, Energy Engineering
Signature	

1 Introduction

1.1 General:

.1 This Sustainability Standard has been developed to establish the University's minimum expectations and requirements for Renovations and new Construction on campus.

.2 This Standard is based on current ZCB Design Standard-V4 or most current version, Industry Best Practices and the University's preferred approach to standardizing decarbonization practices from the perspective of renewable energy integration, ZCB transition and carbon offsets.

1.2 Definitions:

.1 NetZero / NetZero Carbon: designed to meet the requirements of the latest CaGBC Zero Carbon Building Design standard.

.2 NetZero Ready / NetZero Carbon Ready: designed to meet the requirements of the latest CaGBC Zero Carbon Building Design standard with the exception of running on the existing district energy system, and include measures to ease the transition at the Central Utility Plant (CUP).

1.3 Compliance Criteria:

.1 New Construction projects and additions: Full compliance is mandatory. New construction projects should meet the performance targets set out by the current version of the CAGBC Zero Carbon Building Design Standard. Certification may be mandated for certain projects through the RFP projects.

.2 For non-standard NetZero buildings, it is up to the consultants to review the requirements and identify where the carbon reductions might take place. For lab specific buildings, consider the following:

.1 Increase insulation.

.2 Reduce air changes where possible.

.3 Opt for using heat / energy recovery where possible.

.3 Major Renovations: Full compliance is mandatory for major renovation projects to evaluate and optimize materials and mechanical systems through comprehensive energy audits and embodied carbon assessments. Adhere to the Zero Carbon Building Design Standard V4 or most current version, and prepare buildings to be NetZero Ready by minimizing embodied carbon and optimizing energy efficiency. Major renovation projects must conduct a feasibility energy and carbon study to evaluate pathways to achieve CAGBC ZCB certification. The study must include Life Cycle Cost Assessment to allow the University to make an informed decision about pursuing certification.

.4 Minor Renovations: Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework towards energy efficiency, carbon balance and renewable energy integration. Refer to the latest CaGBC Zero Carbone Building Design Standard to determine minimum program requirements for eligibility.

.5 Historic Building Renovations: Compliance is recommended to the extent practical and feasible for all historic projects towards improving the energy efficiency ensuring careful consideration and consultation with a Heritage Building Specialist.

For project types, refer to section 1.6 for the description and compliance of the standards in this application.

1.4 Responsibility of the Designer:

.1 Energy modelling and life cycle analyses are required for new construction, building additions, and major renovations, and may be required for medium renovations and minor renovations.

.2 The designer is responsible for engaging a Sustainability and Net-Zero Consultant, before the completion of schematic design to ensure that:

.1 A sustainability strategy is in place to understand the detailed requirements of a performance-based standard to achieve maximum energy efficiency and low operational carbon. The designer must also provide energy calculations required for IESO and Enbridge incentives, as directed by the Energy Engineering Manager.

.2 The embodied carbon of proposed materials shall meet or exceed the minimum threshold requirements as outlined in the Zero Carbon Building Design Standard V4 or most current version. This will be achieved by conducting a whole-building life cycle assessment (wbLCA) in accordance with the National wbLCA Practitioner's Guide (https://nrc-publications.canada.ca/eng/view/object/?id=533906ca-65eb-4118-865d-855030d91ef2), ensuring that the embodied carbon intensity is at or below the established target or demonstrates a percentage reduction compared to baseline building.

.3 Should the building not achieve NZC, a zero-carbon transition plan shall be developed, outlining how the new building will gradually eliminate combustion from its operations, thereby reducing the need for carbon offsets to mitigate annual emissions.

.3 The designer, with guidance from the Sustainability and Net-Zero Consultant, is responsible for educating and emphasizing to the entire team—before the schematic design phase—that the new build will be a high-performance building. Additionally, all relevant trades should be familiar with or trained accordingly.

.4 The designer is responsible for engaging a Heritage Building Specialist when the scope of work involves a building with historic character.

1.5 Design Innovation:

.1 This Standard is not intended to preclude or constrain an innovative approach to energy efficient design. However, it remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed design innovation shall be tabled for consideration by the Manager, Energy Engineering, before the completion of Schematic Design.

1.6 Reference Documents

.1 All reference documents should be read with the most current edition. Should conflicts arise, for example between the latest standard issued and the Codes which reference specific editions, they should be identified and presented to the Manager, Energy Engineering, Sustainability and Net-Zero Consultant, together with proposed measures for addressing the conflict.

.2 Reference documents include, but are not limited to the following:

.1 Zero Carbon Building Design Standard V4 or most current version.

.2 National whole-building life cycle assessment practitioner's guide

.3 Passive House Guideline**

.4 LEED v5 Building Design and Construction Guide**

.3 Reference standards with ** are not considered mandatory, but contain useful information for creating high-performance buildings.

2 Design Standards

2.1 Overarching Principles

.1 The requirements outlined in the following clauses is applicable to all new construction.

.2 Overarching Design Principles

.1 Building design shall support the intended principles and exceed the metrics of the performance-based design standard for energy efficiency through energy modelling demonstrating compliance and achieve low operational carbon.

.3 The selection of low-carbon materials shall be guided by the Life Cycle Assessment (LCA) Report and compliance with the Zero Carbon Building Design Standard V4 or most current version. This process will ensure that the embodied carbon intensity is at or below the established target or meets the percentage reduction target compared to a baseline building. Preference will be given to materials that are manufactured in Canada and readily available, to an extent feasible. Any materials not readily available in Canada must be identified and submitted for approval by the Manager, Energy Engineering prior to the completion of the Schematic Design phase as part of the Compliance Checklist process

.4 A mandatory energy model shall be developed to demonstrate compliance with the chosen energy efficiency standard's requirements following either the prescriptive or performance path as applicable.

2.2 Building Envelope

.1 Refer to Section 3.2.

2.3 Mechanical Ventilation

.1 Include ventilation commissioning and monitoring by the University's Commissioning Agent to verify the efficiency of the ERV/HRV which includes balancing airflows and setting optimal ventilation rates and installation of sensors to continuously monitor system performance. Refer to the section on Commissioning for the process.

.2 Where permitted by code, projects shall include a high-efficiency mechanical ventilation system (ERV or HRV) with a sensible heat recovery efficiency of 75% or greater. In cases where cross-contamination risks preclude the use of ERV/HRVs, alternative ventilation air recovery strategies, such as run-around loops or active exhaust cooling, should be evaluated and documented. Implement demand-controlled ventilation (DCV) strategies using CO_2 or relative humidity sensors to optimize ventilation rates in applicable areas such as offices, classrooms, and meeting rooms. For laboratory and animal holding spaces, DCV approaches should be based on space-specific requirements, including occupancy, fume hood operation, and air quality considerations, and should be coordinated with safety and ventilation best practices for lab environments. Refer to Mechanical and Electrical sections.

2.4 Energy Usage and Monitoring

.1 Metering and Monitoring

.1 It is mandatory for consultants to install comprehensive metering systems to track and publicly report energy usage, for real-time monitoring and data analysis to optimize building performance. Refer to the Metering Section 2.6.

.2 It is mandatory to implement metering at both the building level for continuous monitoring and to provide detailed insights into energy consumption patterns.

.3 Provide comprehensive metering per the Metering Section 2.6.

.4 The metering section of the Standard outlines compliance guidelines for project validation.

.5 Energy Modeling and Performance Tracking:

.1 It is mandatory to develop an Energy model and conduct Life Cycle Assessment to inform future energy efficiency initiatives, assess operational carbon and optimize performance.

.2 Results should be used for tracking, reporting, and public disclosure (except Net-Zero) to demonstrate sustainability commitments.

2.5 Decarbonization

.1 Energy Audits & Central Utility Plant

.1 The Energy audits for existing buildings are complete to provide further information for assessing decarbonization possibilities

.2 The existing plan aims to decarbonize energy sources

at the Central Utility Plant (CUP) and integrate these changes with building systems to achieve Net Zero. This phase will occur alongside existing infrastructure, with a staggered approach to equipment upgrades. However, there is no clear timeline for these improvements, and future plans will be updated as technology advances and funding becomes available. As technology evolves, the carbon reduction plan will need regular updates, and changes at the CUP will influence updates to Design and Construction Standards. The CUP changes will not directly affect building envelope design.

.3 The University's plan is to maintain a district energy system. All new mechanical systems shall be designed with future compatibility in mind, to allow connection to a decarbonized central plant. This includes the use of low-temperature heating systems (e.g., 50–55°C supply water) and equipment selections that can operate efficiently with future electrified heating sources such as air- or water-source heat pumps. Designers shall prioritize system flexibility and adaptability to support long-term decarbonization goals.

.4 The decarbonization roadmap for the Central Utilities Plant, developed from the audit findings, will be released in late spring, 2026. It will outline strategies to reduce carbon emissions from energy systems and will be integrated into the sustainability design standards.

.2 Historic Buildings Energy and Envelope Considerations: Refer to Section 2.2.4.

2.6 Zero Carbon Transition Plan

.1 New buildings and additions are to be energy efficient and low carbon ready with provisions for integrating mechanical systems with owned on-site or off-site renewable energy resources including solar panels and potential geothermal.

.2 Evaluate a proposed design's ability to maintain thermal comfort in a representative future year and make provisions for future upgrades to enhance resilience against more extreme weather conditions.

.3 Consider additional measures to reduce peak demand and improve grid citizenship including onsite renewable energy, electrical and/or thermal energy storage and demand-response capabilities.

.4 Document energy models and prepare them according to the ZCB-Design Standard, along with invoices and meter readings at both the building and equipment level, to support completed certification under Zero Carbon Design Standard V4 or most current version.

.5 New buildings, additions and major renovations should be designed to meet the requirements of the latest CAGBC Zero Carbon Building Design Standard without certification Standard. This is to ensure data provided can be measured and determine if the University's metrics are meeting their targets.

.1 Attached buildings can, but are not required to pursue certification independently if they are physically distinct and have a separate identity.

.2 New additions to existing buildings can, but are not required to also be certified if they are physically distinct and have separate systems.

.6 If project scope includes parking, each parking spot must include an energized outlet capable of providing Level 2 charging or higher to the parking space. Projects located in climate zone 5 (Climate Zone for University of Guelph) must demonstrate a space heating Seasonal Coefficient of Performance (SCOP) of at least two to minimize energy consumption and peak demand.

.7 Research if a new building or retrofit is aiming for Net-Zero status, it may qualify for incentives and programs (e.g. The Deep Retrofit Accelerator Initiative) to help support these efforts. Consultants are to provide any required energy calculations or modelling for any incentives identified.

3 Existing Buildings

3.1 Existing Buildings Renovations

.1 Though building renovation scope and size vary from project to project, the guidelines below should be followed:

.1 A reduction of energy consumption should occur regardless of project size. Minimize power draws to equipment, lights, controls, etc. by choosing products that require less power overall.

.2 Implement new or update existing outdated electrical and mechanical meters as part of the project scope as required. Consultants should review all existing meters and create a plan with the UofG Energy Engineering team for updates that reflect the appropriate scale of the campus.

.3 If the envelope is part of the renovation scope, through a large renovation or by addition, the focus on the envelope should be to maintain an airtight seal, preventing air leakage, which will help minimize the heating requirements, therefore reducing the power. However, should the existing building be of historic significance, refer to the next section. Refer also to the Envelope Section 3.2.

4 Buildings of Historic Significance

4.1 References

.1 Authorities Having Jurisdiction:

.1 City of Guelph Official Plan Section 4.8 Cultural Heritage Resources.

.2 Ontario Heritage Act 2010.

.2 Guidelines:

.1 Ontario: Standards and Guidelines for Conservation of Provincial Heritage Properties 2010

.2 Canada: Standards and Guidelines for Conservation of Historic Places in Canada 2nd Edition

.3 International Council on Monuments and Sites: ICOMOS Charter 2003 – Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage

.3 Professional Associations:

.1 Canadian Association of Heritage Professionals (CAHP), Ontario Chapter

.2 Association for Preservation Technology International, Eastern Great Lakes Chapter

4.2 Historic Buildings of Significance on Campus

.1 Per the details below, there are 3 generalized historic building groups at U of G:

.1 Designated: 100-170+ yrs - Masonry and timber or solid masonry – no insulation.

.1 There are three Heritage Designated Buildings on Campus: the President's Residence, Alumni House and Massey Hall.

.2 Listed 80 – 100 yrs: Masonry and concrete or steel or both – no original insulation.

.3 Listed 60 – 80 years: concrete and precast concrete with steel and concrete frame – marginal to no original insulation.

.2 In renovating these projects, the methodology below should be used to preserve the existing buildings to the extent possible.

.3 Where scope of work involves a building with historic character, attention to how project scope restores and/or aligns with the original character of building is required. Scope of work, need for Heritage Consultant and Heritage impact assessment must be reviewed with the PR Project Manager.

4.3 Historic Buildings Energy and Envelope Considerations.

.1 For existing building stock and other requirements, please see sections 4.2.3 & 4.2.4 below.

.2 Decarbonizing existing historic buildings is difficult since the building has an imbedded carbon debt spent during a time when carbon dioxide expenditure of building construction wasn't a consideration, and the manufacture and construction methods were much more carbon dioxide intensive (coal). It has no means, like a new building, to build with net zero result. The only available targets for net zero would be energy and any interventional construction that improved the envelope performance and building usage.

.3 Careful consideration is needed when deciding to decarbonize a historic building, as its embedded carbon debt and lack of net-zero construction options make energy efficiency and envelope improvements the primary focus. Additionally, historic buildings' longevity and durability should be included in carbon assessments, but current net-zero frameworks lack clear methods for measuring embedded carbon, highlighting the need for detailed energy analysis and functional program evaluation.

.4 In targeting energy usage, there needs to be a detailed analysis of energy usage over a full year of the existing building performance. Historic buildings, especially bearing masonry envelopes have surprising energy performance in the warm months and this often shows better overall energy performance than simple modelling of envelope thermal resistance.

.5 Historic buildings, often uninsulated masonry, have historically maintained durability through heat loss, which stabilized the envelope but conflicts with net-zero goals. Any intervention, such as added insulation or air and vapor control must be carefully analyzed with the assistance of a Heritage Building Specialist to avoid disrupting mechanisms that preserved the building's longevity, especially since the envelope is often central to its historic designation.

4.4 Historic Building Renovation Methodology

.1 Campus Goals:

.1 The University of Guelph's goals for the buildings on campus of historic significance include the following intents:

.1 Maximize their usage

.2 Ensure their longevity

.3 Improve the ease of their maintenance

.4 Improve their thermal energy performance

.5 Capitalize on the embedded carbon and energy the buildings and their longevity contain.

.2 Projects should enhance the cultural heritage and architecture of the overall Campus responding to the presence and materiality of the existing heritage building buildings by:

.1 Limiting the palette of exterior materials for minor renovations to those amenable to the historic fabric to create an architectural consistency while maintaining distinction of the heritage stock.

.2 Larger additions may use contemporary materials.

.3 Enhancing view corridors within the Campus with historic focal points

.2 To apply the Campus goals above, use Consultants are to apply the following methodology:

.1 Work with a Heritage Consultant accredited through the CAHP for projects with exterior work to an existing building with historic significance.

.2 Survey historic building stock for:

.1 Overall condition and health.

.2 Programmatic usage and efficiency.

.3 Energy usage and efficiency.

.4 Maintenance efficiency.

.5 Embedded energy and carbon.

.3 Work with the Facility Condition Index (FCI) & Current Replacement Value (CRV) of the buildings and which can be obtained from the Campus Planning department.

.4 Include the following Survey checklist items in a detailed report included in both the feasibility study and schematic design phases of the project.

.3 Consultant Survey Checklist:

.1 Survey and Research to include:

.1 Create an as-built model using LiDAR scan and/or BIM model.

.2 Research archives of original design/construction records.

.3 History & Lineage: create a chronology of use, renovations and additions

.4 Functional records: Pull maintenance logs and servicing records

.5 Review current condition and functionality visually on site.

.6 Review past interventions evaluation, checking for deterioration.

.7 Review the Asset Management report listing all the deferred capital and (major) maintenance items in the building, which can be obtained from the Campus Planning department.

.2 Testing and modelling:

.1 Perform Envelope sampling and borehole investigation verifying construction, envelope materials and hidden conditions

.2 Review as-built energy model, energy audit, and energy performances during each season for one year.

.3 Current Use – Program review.

.1 Review occupancy at current and potential capabilities and code requirements for updates.

.2 Review the current accessibility audit and requirements to meet compliance of codes. Refer to the accessibility design brief in Section 2.3.

.3 Review program pressure (if any) for change and improvement.

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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Common Accessibility Design Brief

Version	25-01
Effective Date	September 1, 2025
Approved By	Kristiana Schuhmann, Associate Director, Campus Planning & Asset Management
Signature	

1 Introduction

1.1 How to Use this Document.

.1 The requirements outlined in the following clauses are applicable to all new construction; Application Specific requirements are outlined under part 2 of this section. For whether the elements within this section are considered Mandatory, refer to Section 3.

.2 General Use of the Accessibility Design Brief

.1 The Accessibility Design brief is a mandatory portion of the standard that addresses accessibility requirements for the design and construction of projects throughout the Guelph Main Campus, leased or operated by UofG.

.2 This brief includes the following:

.1 Building design shall support the intended functional program.

.2 Addresses the needs of persons with disabilities of all kinds, including mobility, hearing and visual impairments, environmental sensitivities, neurological and psychological impairments, and perceptual impairments, persons who have any combination of the above, persons with limited stamina or dexterity and other non-visible disabilities.

.3 Is intended to encompass the intent of the Ontario Human Rights Code, specifically respecting the dignity of persons with disabilities.

.4 Incorporates the belief that Universal Design is for all people, to the greatest extent possible, without the need for adaptation or specialized design.

.5 Reflects minimum dimensional criteria required for adult persons. Special considerations should be given for the type of users for any project.

.3 If there is a conflict between this brief and legislation enacted by the federal, provincial or municipal governments, the requirements that will result in the most accommodating environment will be used. But the minimum requirements of the Ontario Building Code (OBC) and the Accessibility for Ontarians with Disabilities Act (AODA) must be met.

.3 How to use this document.

.1 This brief should be read in conjunction with the rest of the UofG's Design and Construction Standards. The entire document has been written with a lens for accessibility in mind, including providing layouts as a basis of design to highlight where the University would go above and beyond the minimum OBC and AODA requirements.

.2 Section 7 of this document contains an appendix that contains common room layouts for spaces that exist throughout the campus. These layouts include the accessibility requirements within them, including, dimensions for general circulation space, accessories, lighting controls, seating locations, etc. for common spaces which often go above and beyond the OBC and AODA requirements. There is also a set of elevations for various spaces indicating mounting heights. These should be used as a starting point for the design process.

.3 UofG conducted extensive campus wide accessibility audit from 2022-2024 in the majority of campus buildings (6.5 million SF). When working on an existing building on the campus, Consultants should request the applicable accessibility audit report and checklist from the UofG Project Manager, review any recent code updates, then implement the additional measures required by the current OBC and the additional requirements set in this standard.

.4 Reference Standards / Codes used in the audit include two minimum accessibility requirements and two additional better practice recommendations with the intent to bridge the gap within post-secondary education environments that the minimum requirements do not sufficiently cover.

.5 Minimum Reference Standard / Code:

.1 The Accessibility for Ontarians with Disability Act (AODA) 2005, Ontario Regulation 191/11: Integrated Accessibility Standards, Part IV.1 Design of Public Spaces Standard (DOPS)

.2 Ontario Building Code (OBC) Compendium 2024 with amendments.

.6 Better Practice Standards:

.1 OCAD University – 2017 Facility Accessibility Design Standards (FADS)

.2 CAN/CSA B651-23: Accessible Design for the Built Environment

.7 Reports include three prioritization levels for items within the buildings:

.1 Priority One: Critical Items (elements that affect health, life, and safety or personal dignity).

.2 Priority Two: Poor Conditions (elements that are usable, but may not be compliant to current codes).

.3 Priority Three: Fair Conditions (elements require high capital investment to modify).

.8 All projects should review all the priority levels if the scope falls within the project requirements. Consultants are to work with the PR Project Manager to determine which are practical elements in include in the project.

.9 Confirm with Campus Planning department, via the PR Project Manager, what priority level the building is within the campus wide implementation strategy. The strategy takes into account how each building is being used, frequency of use, and who the building mainly serves. Buildings with higher utilization rates will have different, and often more intensive, accessibility needs that infrequently used buildings.

1.2 Principles of Universal Design

.1 The principles of Universal Design, as created by the NC State University, The Center for Universal Design in 1997, state that the universal design is to be used by all people, to the greatest extent possible, without the need for adaptation or specialized design. The following principles should be used to evaluate existing buildings, in addition to the studies above.

- .1 Equitable Use
- .2 Flexibility in Use
- .3 Simple and Intuitive Use
- .4 Perceptible Information
- .5 Tolerance for Error
- .6 Low Physical Effort
- .7 Size and Space for Approach and Use.

1.3 Scope, Application, and Enforcement (Compliance)

.1 UofG will not be prescriptive about what better practice standard should be used on a project. Consultants should have experience and have practiced with OBC, AODA, and CSA B651 standards to confidently apply them to different scenarios, such as:

- .1 where the situation is not covered by the OBC (i.e. lab millwork, office kitchenettes)
- .2 where one standard works better over another, to suit existing conditions (i.e. installing washrooms in a retrofit project where space is limited)
- .3 where it's required, or not required, by a programmatic element/need (i.e. designing a student classroom vs a staff maintenance facility)

.2 General

- .1 Section 1.3 contains a table referencing the different building and project types on campus and what portions of the standard are considered mandatory for each type of project. Accessible design, OBC and AODA is considered mandatory for each project. Best practices are listed below.

.3 Obligation to Remediate:

- .1 The standards and regulations prescribe a level of accessibility for new construction and renovations to interior and exterior spaces. These standards and regulations are not retroactive and there is no obligation to remediate existing spaces to comply with current legislation where no renovation is being completed. Accessibility standards are ever evolving and existing conditions are "grandfathered", whereby the University is not mandated to correct identified deficiencies. However, this obligation to remediate does not relieve the University from the obligations under the Ontario Human Rights Code. Barriers preventing access and meaningful use of the physical spaces should be remediated.
- .2 Exceptions: This standard does not apply to Buildings of Group F1, or G, as defined by the Ontario Building Code.
- .3 Other exceptions may apply if there is a justifiable reason for which it might not be relevant. Any questions should be directed to the Associate Director, Campus Planning & Asset Management at the University of Guelph.

.4 Application Based on Facility Use

- .1 Where a campus building contains more than one used covered by a special application section, each section must comply with the requirements of that section in addition to the accessible design provisions.

.5 Work Areas and Employee Designated Areas

- .1 All facilities must be accessible for students, employees and the general public.

.6 Temporary Facilities

- .1 The accessible portion of the Design and Construction Standards applies to all temporary facilities in addition to the permanent facilities.

.7 Temporary alternate paths of travel as a part construction work should also be accessible and provide appropriate wayfinding signage (in addition to the required health, life & safety signs).

.8 Retrofitting, Alterations, and Additions

- .1 Additions to existing buildings are considered Alterations (Part 11) but should be fully accessible, consider better practice standards, and comply with this brief.
- .2 If existing spaces are altered, they must meet updated accessibility requirements.
- .3 Do not reduce accessibility for any building on campus.
- .4 If alteration work is primarily mechanical or electrical systems based (ie. sprinklers, plumbing, or abatement) or for maintenance, accessibility requirements do not apply.
- .5 Refer to signage section for additional wayfinding requirements for additions.

.9 Exceptions

- .1 For the buildings of historic significance, exceptions maybe be permitted, where it might be technically infeasible to comply with some or all of the requirements, or constraints prohibit modifications.
- .2 Any exception must be brought forward for evaluation with the Associate Director, Campus Planning & Asset Management for approval prior to completing the Schematic Design.

.10 Equivalent Facilitation

- .1 Provide equivalent facilities where the requirements of this section are technically infeasible and cannot be met.

.11 Enforcement

.1 The Accessibility Design Brief and the accessibility standards within the document are enforced by CPD&D, and reviewed with their accessibility team for each project. The schedule for their review can be found in Section 1.7.

2 General Guidance

2.1 Areas of focus

.1 General Guidance

.1 Provide 2500 mm turning circles and wider corridors to effectively allow people to circulate within spaces. Provide them both on the exterior and interior of buildings.

.2 All spaces throughout campus should be considered accessible.

.3 All drawings should include an accessible design summary page, that indicates reach ranges, turning circles, clearances, etc.

.4 Classrooms layouts, seating, and furniture should all be reviewed for accessibility, both in location and type..

.5 Kitchenettes should all contain accessible counters and sinks.

.6 Though not every space can be accessible in locations outside of campus, effort should be made to provide accessible labs, and vivarium (animal care) spaces where feasible and with alignment to the programmatic requirements and needs. When conflicts emerge with safety and security (i.e. containment showers) then the design team shall seek direction from the PR Project Manager, who will coordinate with the client and other stakeholders.

.7 All controls should be mounted per OBC requirements.

.2 Visual Accessibility and Wayfinding

.1 Signage: similar to Level AA of the Web Content Accessibility Guidelines (WCAG) 2.0, signage should have a colour contrast of 70% for fine details.

.2 Doors, Walls, and floors: should have a colour contrast of 40-50% and be used at key transitions, and 70% for tactile warning surface indicators.

.3 Where feasible, update fire alarms and systems to include visual alarms. Student residences can consider vibration alarms for sleeping areas.

.4 Digital wayfinding should be provided at all major interior entries and lobbies.

.5 Provide an accessible tactile building address in addition to the visual one.

.6 The BlindSquare system should be modified or added when there are major renovations. At a minimum, all main entries are to have a beacon and any Universal Washrooms are to have a QR code. Additionally, all main corridor intersections, all entries in a building would have a beacon. For buildings that need a higher level of accessibility, QR codes should be used on all room signs.

.7 When new additions add complexity to the existing building layout/floorplan, accessibility wayfinding signage is to be installed to assist in locating major point of interest such as elevators, building connections, departments, or classrooms.

.3 Physical Accessibility

.1 Automatic Doors Operators (ADOs): optimize timing for the doors without compromising other users' experiences. Review ADO placement based on campus foot traffic patterns. ADOs should be easily accessible but avoid the main path of travel if they remain open due to traffic. Consideration of energy use and internal thermal comfort (for those sitting close to an entrance) should be taken into consideration.

.2 Provide an ADO with the correct force to deal with wind gusts or heavy wood doors without being onerous to push.

.3 ADO are to be wired on flat wall surfaces. Avoid mounting on window walls / curtain wall mullions or glass.

.4 Pedestals, securely mounted to exterior floor surfaces, are acceptable. If using a pedestal, colour contrast strips are to be installed on the edges of the pedestal surface adjacent to the push button for guide dogs and those with low vision.

.5 Timing on ADO door opening is recommended to be around 9-10 seconds.

.6 Confirm e-access requirements with the PR Physical Security infrastructure department before replacing or installing an ADO.

.7 Review wave-to-open vs. push button locations with the PR Project Manager to ensure doors are not triggered when privacy is warranted.

.8 Minimize jostling and frost heave in exterior pathways by using broom swept concrete or smoother pathways.

.9 Review implementation of fixed Adult Change Tables with PR Project Manager. Coordinate controls and power requirements with their use.

.4 Teaching Spaces

.1 Seating: Provide a variety of accessible seating locations throughout classrooms that accommodate all body types and sizes (including larger body sizes).

.2 Audio: Provide assistive listening on campus where microphones are used. An RF system is used in each space.

.5 Emergency Response and Safety

.1 Elevators: All new and upgraded elevators to have visual messaging boards alongside existing audible notifications. Refer to Section 2.9.

.2 Emergency Assistance Areas:

.1 Provide enlarged areas of rescue assistance (landings) in exit stairwells.

.2 Provide fire alarm pulls in all buildings, regardless of sprinkler systems.

.3 When retrofitting existing spaces, consider locating protected rooms adjacent to stairs with rated walls, such as lounges, or quiet rooms, for emergency assistance.

.4 Staff and students are provided with individualized rescue plans that are sent to the Campus Safety & Fire Safety Office, but all buildings should provide these spaces for an emergency.

.6 Accessibility Close Out Documentation

.1 Consultants are to provide closeout documents, including updated digital signage, fire safety plans, and life safety items as part of their accessibility report.

.7 Exterior Spaces

.1 Provide exterior rest areas beside exterior furniture.

.2 Provide pet relief areas for service animals.

.3 Per Ontario Regulation 413/12: Integrated Accessibility Standards, provide accessible parking as close to building entrances as possible, along with curb cuts and accessible paths of travel to the main entrances.

.1 Type A requirements: 3400 mm wide, located adjacent to a designated access aisle, with signage specifying “Van Accessible” parking.

.2 Type B requirements: 2700 mm wide, located adjacent to a designated access aisle.

.3 Incorporate pavement markings containing the International Symbol of Access, with a blue background, white markings with a white 1525 x 1525 mm border.

.4 Review the quantity of parking spaces required with Parking Services.

.4 Locate ticketing machines and electric vehicle charging stations near accessible parking.

.5 Provide adequate lighting along all exterior routes.

.6 Locate emergency push buttons per OBC and CSA Standards

2.2 Specific Design Requirements

.1 Materiality

.1 In addition to the materiality outlined in Section 2.2, the following requirements will apply.

.2 Provide transition strips that meet OBC requirements between materials.

.3 Grilles & Gratings: Avoid in paths of high travel. Per CSA B651, minimize gaps in gratings and grilles to 13 mm max and run the long direction of the gaps perpendicular to the path of travel.

.4 Minimize glare by reducing high polished or reflective flooring.

.5 Review acoustics with hard surfaces in larger open areas to minimize noise and confusion for those who are hard of hearing.

.6 Provide tactile walking surface indicators to alert pedestrians to potential hazards. Provide ‘Attention’ indicators (flat-top or truncated dome) at walkways, top and bottom of curb ramps, depressed curbs, interior stairs, exit stairs, exterior stairs, elevated platforms, escalators and potential hazards. Provide also at decision-making points where used with direction or guidance indicators and around unprotected edges at ground level.

.7 Provide tactile direction indicators with linear bar surface design in the direction of common travel, per CSA B651.

.8 Doors at entrances or exits or through corridors, should be fully glazed or have fully glazed sidelights with vision strips per OBC, to identify allow persons to see others on the other side of the door.

.2 Physical Items

.1 Interior ramps: meet CSA B651 where feasible in new building and larger renovations, and code requirements elsewhere.

.2 Exterior ramps: meet CSA B651 where feasible outside new building and as a part of larger landscaping renovations, and code requirements elsewhere.

.3 Universal washrooms are required on every floor of a new building or major renovation. Washrooms are to be located in visible or public areas such as near entrances wherever possible as to limit the travel distance requirements for used in mobility devices. Refer to Section 7.1 for washroom design.

.3 Lighting

.1 Provide accessible controls for all lighting, and design lighting systems to reduce glare. For other requirements, refer to Section 5.

3 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Common Campus Security Design Brief

Version	25-01
Effective Date	September 1, 2025
Approved By	David Lee, Director, Campus Safety Office
Signature	

1 Introduction

1.1 How to Use this Document.

.1 The requirements outlined in the following clauses are applicable to all new construction; Application Specific requirements are outlined later in this section. Elements within this section are considered Mandatory, refer to Section 1.

.2 General Use of the Security Design Brief

.1 The Security Design Brief is a mandatory portion of the standard that addresses general security requirements for the design and construction of projects throughout the Guelph Campus, leased or operated by the University of Guelph.

.2 This brief includes the following:

.1 Building Design shall support the intended Functional Program.

.2 Physical and Digital security requirements for the entire campus.

.3 Guidance for Security Zones for buildings and departments.

.3 If there is a conflict between this brief and legislation enacted by the federal, provincial or municipal governments, the requirements that will result in the most secure environment will be used. But the minimum requirements of the Ontario Building Code (OBC) must be met.

.3 How to use this document.

.1 This brief should be read in conjunction with the rest of the University of Guelph's Design Standards.

.2 Section 8 of this document contains an appendix that contains common room layouts for spaces that exist throughout the campus. These layouts include the standard security requirements within them, including, dimensions for general access These should be used as a starting point for the design process.

.3 UofG conducted extensive campus wide security audit to identify areas of improvement and proposes a strategic plan for the University that establishes levels of risk.

.4 Reference Standards / Codes used in the audit include two minimum accessibility requirements and two additional better practice recommendations with the intent to bridge the gap within post-secondary education environments that the minimum requirements do not sufficiently cover.

.5 This document will focus on 2 types of security requirements for the campus:

.1 Physical Security (referenced in greater detail in this section).

.2 Digital Security (referenced in greater detail in this section).

.4 Minimum Reference Standard / Code:

.1 All projects should review all the priority levels if the scope falls within the project requirements. Consultants are to work with the Project Manager, CPD&D to determine which are practical elements in include in the project.

2 Physical Security

2.1 General Requirements

.1 Reference standards include:

.1 Crime Prevention Through Environmental Design (CPTED).

.2 International Association of Campus Law Enforcement Administrators (IACLEA) Accreditation Canadian Standards Manual (ACSM).

.3 International Association for Healthcare Security and Safety (IAHSS): Healthcare Security Industry Guidelines, 10th Edition.

.4 International Association for Healthcare Security and Safety (IAHSS): Security Design Guidelines for Healthcare Facilities 3rd Edition.

.5 ASIS Protection of Assets Manual (POA).

.6 ASIS Physical Assets Protection Standard (ASIS PAP-2021).

.7 ASIS Information Asset Protection Guideline (ASIS IAP-2021).

.8 ASIS Enterprise Security Risk Management Guideline (ASIS ESRM-2019).

.9 ASIS Physical Security Principles (ASIS PSP-2015)

.10 ASIS and the American Association of Museums: Suggested Practices For Museum Security, 2008.

.11 Illuminating Engineering Society (IES) of North America, (2010). The Lighting Handbook, 10th Edition.

.12 Government of Ontario Public Service (OPS) Physical Security Operating Policy Government of Ontario's Physical Security Operating Policy and Threat Risk Assessment (TRA) Workbook.

.13 RCMP Physical Security Guides (PSG).

.14 Government of Ontario IT Standard No. 25.18 - Physical Security Requirements for Data Centres (GO-ITS 25.18)

.15 Workplace Safety and Insurance Act Regulation 1101 on First Aid Kits.

.16 Ontario Bill 141, the Defibrillator Registration and Public Access Act, 2020.

2.2 Landscape Design

.1 For additional landscape requirements, refer to Section 2.7.

.2 Landscape design should support the protection of the building, the detection of suspicious persons, and the response to security incidents. It should employ the principles of Crime Prevention Through Environmental Design (CPTED).

.3 In general, select shrubbery besides entrances, edges of parking lots and along walkways to plants with a maximum height to 3 ft. (0.9 m) from the level of the path to provide a clear line of sight and deny cover to a would-be attacker. Require trees beside entrances and along walkways be trimmed to a minimum height of 7 ft. (2.1 m) to provide a clear view for the human eye and camera lens. Review foliage so it does not block exterior signage or lighting.

.4 Avoid planting small and medium trees within five metres of a building, and large trees within ten metres of a building.

2.3 Security Zone Concept Design

.1 Segregate public areas from sensitive areas such as shipping / receiving, animal surgery, and equipment storage areas using user security zones and barriers.

.2 Establish a strategic security zoning plan to define security zones and barriers that segregate public, faculty, staff only, and higher security areas. Provide a control point (human or managed technology to prevent movement from one zone to another). Horizontal and vertical circulation routes should facilitate operational functions in accordance with security needs and life-safety requirements. Implement the security zoning plan when designing new spaces or buildings. Redefine the security zoning plan for renovations.

2.4 Protection for Critical and Other Assets

.1 Do not locate Data Centres next to publicly accessible corridors.

.2 Locate senior administration in buildings with security zones in place and where adjacent occupants do not require late night or 24/7 access. Student-centered activities and the senior administration offices should be in separate buildings given the security and access needs of each. If separation is not possible, a more rigorous segregation of the spaces is required.

.3 Provide upgraded security protection such as secure fencing for heavy vehicles, if stored off the main campus. Vehicle parking should be in well-lit, high-traffic areas or in secure garages,

2.5 E-Access and Door Hardware

.1 Buildings that require afterhours access require upgraded security protection. Review the E-Access schedule for the building so that it's secured earlier. Students, faculty and support staff will still be able to access the buildings using their access card.

2.6 Video Surveillance Network

.1 A video surveillance system in general is comprised of three major components. The cameras, the recorder and network infrastructure that links them. When deploying a video surveillance system, the network should be dedicated to the components of the system. The network should have no access to other non related systems and no access to the internet.

.2 Consult with Campus Security for optimal layout, components and connection to the system.

2.7 Emergency Telephone Network

.1 The location of individual units should follow the "line of sight," principle meaning you can spot the next unit's location from the current unit's location. This frequently translates to about 100 metres, depending on the nature of surroundings such as buildings, trees or hills that may impede sight and sound.

2.8 Automated External Defibrillator (AED)

.1 Provide signage to signal the location of the AED device within the building. The AED device should be centrally located within the highest risk and most concentrated population area and near trained rescuers. Place the AED device well within three minutes of anywhere within the facility so that it takes 90 seconds to retrieve the device and 90 seconds to return to the victim's location.

2.9 Bicycle Racks

.1 Refer to Section 2.8 Road works & Parking.

3 CPTED Design Requirements

3.1 General

.1 Crime Prevention Through Environmental Design (CPTED) is based on the theory that the proper design and effective use of the built environment can lead to a reduction in the incidence and fear of crime. CPTED promotes high quality and visually pleasing solutions as first responses that aim to enhance the legitimate use of space. The physical design of outdoor and indoor spaces combined with the integration of security systems are important components of an overall University protection plan and a positive student, faculty, staff and visitor experience.

.2 CPTED principles and strategies are best employed during a project's design phase to identify and incorporate design features, which reduce opportunities for criminal activity to occur. The effectiveness of CPTED is based on the fact that criminals make rational choices about their targets. In general:

.1 The greater the risk of being seen, challenged, or caught; the less likely they are to commit a crime;

.2 The greater the effort required, the less likely they are to commit a crime; and

.3 The lesser the actual or perceived rewards, the less likely they are to commit a crime.

3.2 CPTED Concepts

.1 Natural Surveillance

.1 Design with the use open style designs that maximize visibility, good illumination of building entrances, walking paths and parking areas, the avoidance of landscaping visual obstructions to improve sight lines, and promoting activities to put more people (observers) near a potential crime area. The term "natural" refers to deriving surveillance results as a by-product of normal and routine use of the environment.

.2 Natural Access Control

.1 Use doors, fences, shrubs, signage and other physical elements to control and direct movement while keeping unauthorised persons out of a particular place if they do not have a legitimate reason for being there. The term “natural” refers to deriving access control results as a by-product of normal and routine use of the environment.

.3 Territorial Reinforcement and Maintenance

.1 Provide a maintenance strategy that the owners and regular users will take a greater interest in the events occurring in their environment. It is supported by the maintenance of all features the property to demonstrates that ownership is present and ongoing.

.4 Definition of Space

.1 Minimize unassigned space occurs when a site is built with spaces that have no assigned purpose and no one to exercise control over them.

.5 Security Zones

.1 Refer to the following table for Security Zone Types and the best practices at the end of this section.

.2 Employ UofG security zones as a supporting strategy that subdivides a building into different and progressively more restrictive zones of circulation.

.6 Boundaries, Walkways, and Open Spaces:

.1 Plan vegetation, walkways and open spaces with clear sight lines along the pathway, and adjoining spaces for both the public and security personnel.

.2 Define perimeters with barriers, fencing, landscaping, signage, markings, colour schemes, curb painting, etc.

.7 Lighting:

.1 Plan lighting for even dispersion between light poles to avoid bright light and darkened areas.

.2 Provide lighting on standby power or illumination.

.3 Integrate lighting with video surveillance for adequate coverage and visibility.

.4 Refer to Electrical Section 5.4.

.8 Signage:

.1 Design signage to be clearly visible, easy to read and simple to understand with consistent messaging.

.2 Refer to Signage Section 3.5.

.9 Parking:

.1 Ensure parking layouts are fully observed by adjoining use.

.2 Plan paths to parking with visibility from the buildings they served, even light, with video surveillance if needed.

.10 Building Perimeter:

.1 Secure all potential building openings or access points (such as doors, windows, skylights, ducts, grates, etc.) to prevent tampering.

.2 Avoid architectural niches or recesses large enough to conceal a person.

.3 Design vegetation and exterior pipes along walls to prevent unauthorized access to the upper floors or roof. Existing pipes should be sealed off to prevent climbing.

.4 Illuminate all access points.

.5 Fit entry and exit doors with heavy-duty commercial locks.

.11 Hallways, Elevators, Stairwells:

.1 Plan lighting for even dispersion to avoid bright light and darkened areas.

.2 Plan stairwells and elevator lobbies with maximum viewing from the exterior or at a building entrance.

.3 Plan elevators with centre access doors.

.4 Eliminate blind corners with convex mirrors.

.5 Nosing’s shall be installed on top of carpet and fastened with mechanical fasteners. Adhesives may be used in conjunction but not as sole means of attachment.

.12 Classrooms, Labs, Offices:

.1 Reduce isolated classrooms, labs and offices.

.2 Locate classrooms near frequently used circulation for observation. Provide multiple exits.

.13 Equipment and other items:

.1 Apply effective security zones.

.2 Secure rooms with equipment or machines with E-Access and secure the equipment or machines to the floor where possible.

.14 CUP Security:

.1 Secure, and protect all access points with intrusion alarm systems and video surveillance.

.2 Secure all outward facing openings (windows, etc.) with heavy-duty commercial locks.

.3 Protect all windows under 10feet from the ground and exceeding 96 square inches with screens or vandal-proof.

.15 Residences:

.1 Apply effective Security Zones.

.16 Data Centres:

.1 Apply effective Security Zones.

.2 Manage and monitor all perimeter doors with an access control log device capable of producing and audit log.

.3 Provide video analytics with cameras at all exterior doors, within the reception zone, and a CCTV system with 24/7 monitoring and recording.

.4 Reinforce the walls, ceilings and floors against unauthorized access.

.5 Provide an intrusion detection system.

.17 Maintenance, Environmental, and Utility spaces:

.1 Provide tamper-resistant locking devices.

.2 Control access with E-Access or high security lock on a restricted keyway.

.3 Separate electrical from telecommunications spaces.

.18 Materials Management:

.1 Use security zones to segregate the areas accessible to delivery persons, employees and other users.

.2 Secure all storage spaces.

.19 Animal Facilities (Vivarium)

.1 Apply effective Security Zones.

.2 Monitor 24/7 with intrusion alarms, and door held open alarms. Provide video surveillance where applicable.

3.3 Video Surveillance System (VSS)

.1 VSS Networks should be dedicated to the components of the system.

.2 Confirm with Security Team if existing cameras have completed their support period and if they require replacement.

.3 Locate cameras according to Security Team and minimize visual conflicts. Locations to consider monitoring include:

.1 Traffic on major campus streets, intersections, and walkways.

.2 Building main entrance doors and lobbies.

.3 Other entrance portals such as a turnstile.

.4 At building exterior of all other access points.

.5 Exit stairwells and all other emergency exit doors at grade level.

.6 Shipping and receiving areas.

.7 Service vehicle entrance and compound.

.8 Large surface parking areas.

.9 Public emergency telephone locations.

.10 Locations protected by intrusion alarms, exit door controls, security tabs, panic / hold-up alarms, and lockdown buttons.

.11 ATM stations and other areas where funds are exchanged such as a business office, campus store, and other cashier locations.

.12 All entry points from public circulation areas into circulation zones of areas identified as higher risk or sensitivity (animal labs, Human Resources, executive offices, etc.)

.13 Special storage areas.

.14 Depending on the building, the elevator and stairwell lobbies on every floor.

.15 External areas where the VSS can be used as a patrol technique.

.16 Areas prone to on-going criminal activity.

3.4 Key Management System

.1 Utilize UofG Keyways as noted by the Security Team. Provide construction cylinders and final cylinders at the end of the project.

3.5 Emergency Phone Network

.1 Provide Emergency Phones per UofG standards.

.2 Integrate with VSS system.

.3 When locating, ensure they are within line of sight from one Phone to the next.

3.6 Automated External Defibrillator (AED) locations.

.1 Locate centrally within the highest risk and most concentrated population areas. Locate near trained rescuers.

.2 Make accessible for all.

.3 Provide signage per Signage Standard 3.5, including wayfinding.

.4 Place within 3 minutes of anywhere within the facility: 90 seconds to retrieve device, 90 seconds to return to victim.

.5 Place in alarmed cabinet that signals to Campus Security Office that the door has been opened.

4 IT, Communication, Infrastructure & Backup.

4.1 General Requirements

.1 Reference standards include:

.1 ANSI/TIA942: Telecommunications Infrastructure Standard for Data Centres

.2 ANSI/TIA568: Commercial Building Telecommunications Cabling Standards.

.3 ANSI/TIA-569-E: Telecommunications Pathways and Spaces.

.2 These standards address UPS requirements, data center infrastructure and protection, and for the backbone of cabling systems, and should be reflected in any design moving forward.

.3 Ensure that all utility entry points, such as power and data lines, are sealed and protected against water ingress, thereby minimizing vulnerabilities.

.4 Provide lockable maintenance holes, pull boxes, and splice boxes. Any maintenance holes located on building property or under the owner's control should be secured and monitored by the security system, either with a camera, remote alarm, or both.

.5 Restrict and monitor access to pull boxes for data center cabling (whether for entrance cabling or inter-data center cabling) located in public or shared tenant spaces by the data center security system via a camera, remote alarm, or both.

.6 Secure, lock and monitor splice boxes for data center cabling located in public or shared tenant spaces by the data center security system through a camera, remote alarm, or both. Comply with Section 6.3.1 of ANSI/TIA-568, by using redundant fiber optic cabling installed using physically separate pathways, avoiding shared cable entry points, to create uncompromised pathways in the event of environmental hazards or physical damage.

.7 Implement a structured cable management system to maintain operational efficiency and security and meet TIA942 by organizing cabling practices, including proper labeling and management, to facilitate effective maintenance and troubleshooting. Employ cable trays, labeling systems, and management tools.

.8 Organize fiber and balanced twisted-pair cabling within cable trays and shared pathways separately to enhance administration and operational efficiency. Keep apart cords and jumpers from other cabling for clarity. Where practical, provide physical barriers between fiber and balanced twisted-pair cables, otherwise position fiber cables above balanced twisted-pair cables.

4.2 Restrict Utility Tunnel Access

.1 Lock access to utility tunnels used for telecommunications entrance rooms/spaces or other data center cabling. If tunnels serve multiple tenants or cannot be locked, enclose data center telecommunications cabling within solid metallic conduit or other secure pathways.

4.3 Protect Against Water Ingress

.1 If there are chilled water pipes and drain pipes within the data centers and telecom rooms, provide a floor drain with back flow preventer within the room if risk of water ingress exists as per TIA569E. This ensures proper drainage and prevents water from backing up into the space, protecting critical infrastructure and equipment. Compliance with TIA-569-E guidelines helps mitigate potential water-related damages, ensuring the reliability and safety of the environment.

4.4 Digital Signage – Emergency Communications

.1 The University of Guelph utilizes a network of approximately 150 digital signage displays that are integrated with the UofG Alert system. These digital signs are strategically placed across campus to enhance emergency communications and provide a visual component to mass notifications.

.2 Consult with the Campus Safety Office (CSO) and Computing and Communications Services (CCS) and the Project Manager, CPD&D, to confirm if digital screens are required to be integrated with the UofG Alert system. Digital signage infrastructure is maintained by the Campus IT department.

.3 The digital signage system is synchronized through cloud-based technology, ensuring consistency and reliability of the messages across all screens.

.4 Support digital signs through emergency power lines, which are backed up by electrical generators, guaranteeing continued operation during power outages.

.5 Digital signage should be placed in Common Areas and other high-traffic areas.

.6 Consultants should provide digital fire and evacuation routes to be displayed on the screens in case of an emergency.

5 Version Control Summary

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Security Zone Type	Definition	Best Practices	Mandatory Requirements
Public Zone	Any public entrance to a physical facility and the immediate environment around it is considered a public zone.	University parking lots; Grounds surrounding a building; Public corridors or concourses; Retail and food service areas; Elevator lobbies; and Any areas of unimpeded public access during posted business hours.	
Reception Zone	A reception zone is an area where public and student access intersects with University staff to obtain a service, perform an activity, or obtain access. Every facility should have a reception zone accessible directly from the public zone that must be traversed to obtain service, be granted further access, or obtain an escort to proceed to another zone.	A reception desk; service desk or kiosk; Visitor receiving and waiting areas; A secured door with an intercom; and A vestibule with an access controlled door.	
Restricted Student Zone	A restricted student zone is a periodically or informally monitored area where access is limited to authorized students, support staff and approved/ escorted visitors only.	Residences; Laboratories; Computer rooms; and Academic buildings after closing hours.	Must have a recognizable perimeter; Must not permit public access, and employ barriers for this purpose; and Must employ some degree of activity monitoring.
Operations Zone	An operations zone is a periodically or informally monitored area within the facility where access is limited to authorized personnel and approved/ escorted visitors only	Offices; Laboratories; Storage closets; Workshops; Utility spaces; and Materials management spaces.	Must have a recognizable perimeter; Must not permit public access, and employ barriers for this purpose; Must only be accessible via a reception zone; and Must employ some degree of activity monitoring.
Security Zone	A security zone is an area within the facility that is monitored continuously and is accessible to authorized personnel and approved/escorted visitors only. The secure raised floor portion of a data centre is appropriate for inclusion within a security zone. Other areas of a facility (e.g., sensitive communications or wiring closets) may also be defined as security zones.	Server rooms; Vaults or secure storage spaces for high value assets; The Central Utilities Plant and associated spaces; and The Campus Safety Office dispatching centre.	Must have a recognizable perimeter; Must employ robust, reliable high-effectiveness physical barriers to access; Must be constructed such that all barriers and doors remain continuously closed and locked when not in use; Must employ activity monitoring with immediate response; Access must be controlled and recorded at all times; and Must be located within an operations zone.
High Security Zone	A high security zone is an area within the facility that is monitored continuously, and is accessible only to a specific list of screened and authorized personnel, or approved/escorted visitors accompanied by screened and authorized personnel. A dedicated, sensitive processing environment that must be physically separated from raised floor operations is appropriate for inclusion within a high security zone. Some high security zones may require dual-custody access. High security zones usually exist in government facilities only.		

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Common Site Servicing

Version	25-01
Effective Date	September 1, 2025
Approved By	Ena Jhajj, Manager, Mechanical Design
Signature	

Version	25-01
Effective Date	September 1, 2025
Approved By	Steve Nyman, Director, Maintenance and Energy Services
Signature	

1 Introduction

1.1 Site Servicing - General

.1 This section should be read in conjunction with the following sections:

.1 Section 2.4 – Security Design Brief

.2 Section 2.6 – Metering

.3 Section 4.0– Mechanical.

.4 Section 7.0– Electrical.

.2 The requirements outlined in the following clauses are applicable to all new construction; Application Specific requirements are outlined under clauses later in this section. Elements within this section are considered Mandatory, refer to Section 1.

.3 This section includes the following items:

.1 Site Servicing Installation Methods

.2 Tunnel Requirements.

.3 Construction processes for trades and General Contractors.

1.2 Central Utility Plant

.1 Refer to the Sustainability & Energy Design Brief in Section 2.2 for the future power distribution and Net Zero Carbon readiness of the buildings on campus.

1.3 Site Service Installation Methods:

.1 Tunnels are the preferred method for high-value utilities.

.2 If tunnels cannot be used:

.1 Trenching may be discussed for utilities such as chilled water. Provide insulation and tracer wires.

.2 Direct-buried installation is the least preferred as it requires higher maintenance, is hard to trace leaks, and has significant maintenance costs.

1.4 Tunnels

.1 New tunnels and upgrades are to include space for newer system implementation.

.2 New tunnels and renovations to existing tunnels should provide doors that remain locked to prevent unauthorized access.

.3 Tunnel services include essential utilities:

.1 Chilled water

.2 Heat

.3 Mechanical systems

.4 Prohibited services within the tunnels include:

.1 Domestic water

.2 Raw water

.5 Design considerations for tunnels include the following requirements:

.1 Maximize tunnel space and provide enough to accommodate future expansions on campus and within buildings.

.2 Separate services and label. Provide flow direction. Map valves at each chamber.

.3 Avoid services switching tunnel sides unnecessarily.

.4 Provide 1 metre clear access to each service within the tunnel.

.5 Provide Pipe and cable tray supports for all services. Avoid hanging supports and provide floor-mounted or robust ladder-mounted supports.

.6 Provide steam traps.

.7 Provide flat floors in tunnel.

.8 Precast concrete tunnels are preferred.

.9 Waterproof tunnels from the exterior. Tunnel concrete mixes must resist rebar corrosion and water intrusion into the tunnel, and prevent leaks from degrading the interior surfaces.

.10 Provide drains and sump pump systems at regular intervals to avoid flooding. Provide sensors to monitor flood risk.

.11 Provide meters as described in the metering sections.

.12 Avoid inefficient service routing.

.13 Provide minimum clearance height per OBC or greater for all service workers within tunnels.

.14 Include access ladders and safety railings to accommodate all users.

.15 Do not mix water sources: do not locate city supplied water within the tunnel.

.16 Consider removable top design for repair and replacement.

.17 Provide tracer wires for buried utilities.

.18 Provide poly materials for water lines.

.19 Incorporate looping systems and locate valves for redundancy and maintenance.

.20 Review and confirm redundancy requirements within the existing lines, and eliminate obsolete services during new installations or renovations.

.6 Other requirements:

.1 Design tunnels to accommodate vehicular use above. Review with site plans, master plan, and transportation department.

.2 Review and provide opportunities for heat recovery in designs, in coordination with new plant and Net Zero Carbon readiness.

.3 Verify design of existing tunnels, and removable tops to avoid damage during replacements.

.4 Gather documentation and map out all services during design phase such as:

.1 Steam trench repair drawings.

.2 Stormwater management plans.

.5 Provide a minimum 1 metre cover tunnels before surfaces are applied. Deviations must be reviewed by the Project Manager.

.6 Review requirements with the Landscaping Advisory Committee to avoid conflicts.

.7 Review locations for all site servicing for new projects:

.1 Discuss routing watermains, sewage lines, and utility hookup locations.

.2 All utilities to be metered per Section 4.4.

1.5 Construction Requirements:

.1 Consultants are required to review construction requirements with the Project Managerand include them in the Project Manual for any project. This includes emergency procedures.

.2 General Contractors are to review construction expectations with the Project Manager prior to start of construction on campus.

.3 The following conditions apply for construction:

.1 All trades must sign in and out of any tunnel work.

.2 All trades must enter and exit out of the same location.

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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Common Campus Metering

Version	25-01
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Approved By	Natalie Hope, Manager, Energy Engineering
Signature	

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Approved By	Steve Nyman, Director, Maintenance and Energy Services
Signature	

1 Introduction

1.1 General

.1 Reference “requirements for connecting WAGES Mechanical Meters to the EMS for system connection.

.2 All meters must be compatible with Schneider ION PME System.

.3 Provide upstream and downstream minimum distances or as specified by supplier.

.4 To make good on all surroundings after completion of installation of meter. Provide insulation to include meter body, surrounding flanges and unions.

.5 Endress and Hauser RSG45 shall be used for the interface between all meters and ION PME system.

1.2 Metering Requirements

.1 The University of Guelph requires metering of all building services. This will enable us to monitor and track the campus energy usage and provide a clear understanding of each service demand.

.2 All service connections require meters that includes but are not limited to all:

.1 Connections to a new or existing service;

.2 Services include domestic services;

.3 Where applicable, temporary service connections;

.4 Connections that include an underground irrigation system.

.5 Meter shall provide a local readout display with an electronic 4-20mA signal for network connection.

.6 All hazardous area, CSA, and CRN where applicable, approvals must be met for all meters supplied.

.7 Supplied meter shall be compatible with services for all supplied.

.8 Meter shall be sized to meet present flow rates, provided by design engineer.

1.3 Metering Installation Requirements

.1 All meter location must be accessible and located in a position that allows ease of maintenance and removal without interfering with the meter accuracy or installation practices.

.2 Meter shall be installed with proper orientation, up and down stream distances and proper grounding as per manufacturer.

.3 Where required, install “Y” strainers immediately upstream of the meter using a flanged connection strainers shall be of the same size as the meter. Steam meter installations are the exception.

.4 Provide isolation valves upstream and downstream of the meter to allow removal of meter and strainer cases. Install one valve on bypasses. Provide a lock wing on the operating nut of bypass valves 50mm and smaller.

.5 For single source meter 3” in diameter and larger provide a by-pass. By-pass line should be sized for approximately 2/3 the line size.

.6 Meters, valves, and bypasses should be supported with appropriate adjustable pipe stands. Bricks, concrete or wood blocking are not acceptable means of support.

.7 Meter installations must be checked for leakage or contaminants at completion of the installation, the proper operation of the meter should be established.

.8 A by-pass is not required for dedicated irrigation meters.

.9 For meters 2 1/2” diameter and larger provide a mechanical flange adapter on the downstream side of the meter to provide flexibility for meter and strainer case removal.

.10 All flange connections must be supplied with an asbestos-free gasket material top meet temperature and pressure for service.

.11 All documentation and related work shall be provided for the flow rate specified, commissioning, calibration, verification, performance specification and warranty related to the metering device.

1.4 Reference Documents

.1 Ontario Building Code

.2 Canadian Electrical Code

.3 Public Health Agency of Canada - Laboratory Biosafety Guidelines

.4 LEED Guidelines

.5 Mechanical HVAC Systems Standard DSM-01*

.6 Mechanical Plumbing Systems Standard DSM-02*

.7 Electrical Power Systems Standard DSE-01*

.8 Architectural Space Planning & Finishes Standard DSA-01*

2 Philosophy

3 Campus Architecture

3.1 Metering System - Legacy

.1 This section is reserved to describe the existing campus architectures. E.g a diagram showing how the existing systems work.

3.2 Metering System – New

.1 The section should define how we want future metering systems to interconnect.

.2 Architecture

.1 Ontario Building Code – SB-10. “Rough-in” Metering per building required. UoG will actually meter for each installation.

.2 Electrical Energy Monitoring (per ASHRAE)

.1 Total Electrical Energy

.2 Lighting – Indoor

.3 Lighting - Outdoor

.4 Receptacles

.5 HVAC

- Not per equipment, rather overall per system
- Specify equipment which can monitor it's energy to BAS (not revenue)

.3 Renewables

4 Metering Systems

4.1 Chilled Water Metering Standards

.1 HVAC General - New Construction Projects

.1 Incoming chilled water supply/return lines to be metered in accordance with the University's metering standards. Include for measuring for supply and return temperatures as well. Meter to be integrated into the Building Automation System and the Schneider ION Utility Metering and Management System.

.2 Incoming chilled water supply/return lines shall be complete with flow and pressure station to control flow and isolate building chilled water system from pressure fluctuations in the campus mains.

.2 Chilled Water Meter

.1 Chilled water meter electrode shall be constructed of stainless steel.

.2 Units provided with a local digital display with tonnes and digital 4-20mA output to tie into the University of Guelph Schneider ION PME System.

.3 Provide inline electronic magnetic meter, complete with proper grounding, temperature sensors, metering flow computer with display, and warranty.

.4 To use polyurethane sensor liner. (this is relating to the flow sensor/magnetic flow meter)

.5 The temperature sensors must be supplied on both supply and return lines, supplying a 4-20mA output signal. Temperature sensors must be properly orientated and verified for accuracy. Output of temperature and meter must be combined to display units required. (temperature sensors must be matched pair)

.6 The meter body shall include grounding and empty pipe electrodes of the same material as the measuring electrodes.

.7 The magnetic flowmeter shall be microprocessor based with integral electronics.

.8 LCD display shall enable the operator to monitor flow rate in clear text messages.

.9 The meter shall have field replaceable sensors and coils.

.10 The magnetic flowmeter shall provide an accuracy of +/- 0.5% of flow rate over the range of expected flow rates.

.11 It should be possible to check the functionality and verify deviation of the flow meter without needing to dismantle the device by using an external device. This Verification of transmitter electronics should be traceable to NIST or equivalent standards. (only coil resistance and meter "0" point can be verified, this does not account for issues like crustation and calcification within the body of the meter)

.12 Size meter to meet all present flow rates, provided by design engineer.

.1 Approved manufactures:

.2 Endress & Hauser

.3 Emerson Rosemount

.4 Krohne

.13 Design to include requirement for onsite commissioning of BTU meter by meter manufacturer or designated technician and submission of commissioning report.

.14 Design to include requirement for submitting shop test calibration certificate during procurement.

.15 BTU/Thermal Energy meters are to include an energy computer directly connected to the paired flow and temperature sensors. All Energy calculations are to be done at the energy computer and not at the BAS.

4.2 Steam & Condensate Metering Standards

.1 Steam System

.1 Steam supplied from the Central Utility Plant (CUP) shall be the primary source of heat to the Building. Heating within the Building including its Air Systems shall be based on the use of Hydronic Distribution Systems

.2 Steam Supply Pressure from the CUP to Building:

.1 Design 150 PSI / Operating 125 PSI (1034 kPa / 862 kPa)

.2 Incoming steam to be extended from the campus mains, include isolation valve.

.3 Incoming steam supply to be metered in accordance with the University's Metering Standard. Meter to be integrated into the Schneider ION Utility Metering and Management System.Design Steam Distribution Pressure within the Building – Design for 10PSI (68.9 kPa).

.4 1/3, 2/3 arrangement for all Steam Pressure Regulating Valves. 1/3 set to 13PSI, 2/3 set to 11PSI. Ensure valves are tagged noting final pressures.

.3 Pressure Regulating Valves shall be Pilot-Operated

.4 Consideration shall be given for wireless monitoring of steam traps with prior approval by the Manager, Mechanical Design, DEC, before the completion of Schematic Design.

.5 Steam meter body shall be constructed of stainless steel.

.6 Steam meters units shall be provided with a local digital (display) gauge with metric kilograms per hour (kg/hr) display with full compensation for temperature and pressure complete with digital 4-20mA output to tie into the University of Guelph Schneider ION system.

.7 Supplier to indicate permanent pressure losses to quantify effect on the installation.

.8 Provide inline meter, complete with proper grounding, display, and warranty.

.9 Meter must be HARTHART / ION compatible.

.10 The sensor to count the vortices shall be capable of withstanding temperatures ranging from -40°F to 500°F.

.11 The sensor shall be constructed of 316 L SS.

.12 Where specified, calibration data shall be supplied which verifies the meter accuracy to be ±1.0 percent of actual flow rate for gases and ±0.75% of flow rate for liquids.

.13 LCD Digital display shall enable the operator to monitor flow rate in clear text messages.

.14 It should be possible to check the functionality and verify deviation of the flow meter without needing to dismantle the device by using an external device. This Verification of transmitter electronics should be traceable to NIST or equivalent standards.

.15 Meters must have valid CRN/Canadian Registration Number for Ontario to satisfy TSSA requirement

.16 Size meter to meet all present flow rates, provided by design engineer.

.17 Approved manufactures:

.1 Endress & Hauser

.2 Emerson Rosemount

.3 Spirax SarcoKrohne

.18 Design to include requirement for onsite commissioning of water meter by meter manufacturer or designated technician and submission of commissioning report.

.19 Design to include requirement for submitting shop test calibration certificate during procurement.

.20 The steam meter shall have a stream flow computer either integral to the flow sensor or remotely mounted. The steam flow computer will collect relevant steam flow, temperature and pressure readings and provide totalized steam mass flow, based on required data. The steam flow computer will be equipped with suitable signal output to provide totalized steam consumption, volume flow rate, steam temperatures and pressure which are capable of integration into the University of Guelph building automation system (ION).

.21 The following steam data is to be trended and archived:

.1 m^3/hour of steam consumed

.2 Totalized Lb or kg of steam consumed

.3 Temperature in °C

.4 Pressure of steam in kPa or psi

.2 Condensate System

.1 Condensate Water Meter electrode shall be constructed of stainless steel construction.

.2 Units provided with a local digital display with meters cubed (M3) and digital 4-20mA output to tie into the University of Guelph Schneider ION System.

.3 Provide inline electronic magnetic meter, complete with proper grounding, display and warranty. Quantify alternate flow meter to meet accuracy, specification and range of flow rate specified.

.4 Quantify accuracy specification through the range of flow rate specified for approval.

.5 To use polyurethane sensor liner. (polyurethane maxes out at 90°C, if they insist on magnetic flow meters liners have to be ETFE or Teflon to be able to handle water close to boiling point

.6 The meter body shall include grounding and empty pipe electrodes of the same material as the measuring electrodes.

.7 Meter must be HART / ION System compatible. HART is an industrial communication protocol, Schneider PME accepts Modbus RTU or Modbus TCP/IP for third party device inputs. None of the listed manufacturers below offer ION protocol as it is proprietary to Schneider)

.8 The magnetic flowmeter shall be microprocessor based with integral electronics.

.9 LCD display shall enable the operator to monitor flow rate in clear text messages.

.10 The meter shall have field replaceable sensors and coils.

.11 The magnetic flowmeter shall provide an accuracy of +/- 0.5% of flow rate.It should be possible to check the functionality and verify deviation of the flow meter without needing to dismantle the device by using an external device. This Verification of transmitter electronics should be traceable to NIST or equivalent standards.

.12 Size meter to meet all present flow rates, provided by design engineer.

.13 Approved manufacturers:Mechanical

- Endress & Hauser
- Emerson Rosemount
- GWF

.1 Krohne

- Endress & Hauser
- Emerson Rosemount
- GWF
- Krohne

.14 Design to include requirement for onsite commissioning of water meter by meter manufacturer or designated technician and submission of commissioning report.

.15 Design to include requirement for submitting shop test calibration certificate during procurement.

4.3 Plumbing System Metering Standards

.1 Domestic Water Meter

.1 Domestic Water Meter electrode shall be constructed of stainless steel construction.

.2 Units provided with a local digital display with meters cubed (M3) and digital 420mA output to tie into the University of Guelph Schneider ION System.

.3 Provide inline electronic magnetic meter, complete with proper grounding, display and warranty. Quantify alternate flow meter to meet accuracy, specification and range of flow rate specified. (2.5" and larger)

.4 Quantify accuracy specification through the range of flow rate specified for approval.

.5 To use polyurethane sensor liner.

.6 The meter body shall include grounding and empty pipe electrodes of the same material as the measuring electrodes.

.7 Meter must be HARTHART / ION System compatible.

.1 The magnetic flowmeter shall be microprocessor based with integral electronics.

.2 LCD display shall enable the operator to monitor flow rate in clear text messages.

.3 The meter shall have field replaceable sensors and coils.

.4 The magnetic flowmeter shall provide an accuracy of +/- 0.5% of flow rate.

.8 It should be possible to check the functionality and verify deviation of the flow meter without needing to dismantle the device by using an external device. This verification of transmitter electronics should be traceable to NIST or equivalent standards.

.9 Size meter to meet all present flow rates, provided by design engineer.

.10 Approved manufacturers:

.1 Endress & Hauser

.2 Emerson Rosemount

.3 Krohne

.11 Meter to be NSF 61 approved.

.12 Design to include requirement for onsite commissioning of water meter by meter manufacturer or designated technician and submission of commissioning report.

.13 Design to include requirement for submitting shop test calibration certificate during procurement.

.2 Raw Water Meter

.1 Raw water meter electrode shall be constructed of stainless steel construction.

.2 Units provided with a local digital display with meters cubed (M3) and digital 4-20mA output to tie into the University of Guelph Schneider ION System.

.3 Provide inline electronic magnetic meter, complete with proper grounding, display and warranty. Quantify alternate flow meter to meet accuracy, specification and range of flow rate specified.

.4 Quantify accuracy specification through the range of flow rate specified for approval.

.5 To use polyurethane sensor liner.

.6 The meter body shall include grounding and empty pipe electrodes of the same material as the measuring electrodes.

.7 Meter must be HART / ION System compatible.

.8 The magnetic flowmeter shall be microprocessor based with integral electronics.

.9 LCD display shall enable the operator to monitor flow rate in clear text messages.

.10 The meter shall have field replaceable sensors and coils.

.11 The magnetic flowmeter shall provide an accuracy of +/- 0.5% of flow rate.

.12 It should be possible to check the functionality and verify deviation of the flow meter without needing to dismantle the device by using an external device. This Verification of transmitter electronics should be traceable to NIST or equivalent standards.

.13 Size meter to meet all present flow rates, provided by design engineer.

.14 Approved manufactures:

.1 Endress & Hauser

.2 Emerson Rosemount

.3 Spirax Sarco

.15 Meter to be NSF 61 approved.

.16 Design to include requirement for onsite commissioning of water meter by meter manufacturer or designated technician and submission of commissioning report.

.17 Design to include requirement for submitting shop test calibration certificate during procurement.

.3 De-ionized (DI) Water Meter

.1 Deionized water meter body shall be constructed of non-conductive material.

.2 Units provided with a local digital display with meters cubed (M3) and digital two (2) wire 4-20mA output to tie into the University of Guelph Schneider's ION System.

.3 Provide inline electronic meter to meet required turn-down, complete with proper grounding, display, and warranty.

.4 Meter must be HART / ION compatible.

.5 The meter body shall be bi-directional and non-intrusive

.6 LCD display shall enable the operator to monitor flow rate in clear text messages.

.7 The meter shall provide an accuracy of +/- 1% of flow rate.

.8 It should be possible to check the functionality and verify deviation of the flow meter without needing to dismantle the device by using an external device. This Verification of transmitter electronics should be traceable to NIST or equivalent standards.

.9 Size meter to meet all present flow rates, provided by design engineer.

.10 Approved manufactures:

.1 Endress & Hauser

.2 Emerson Rosemount

.3 Spirax Sarco

.11 Design to include requirement for onsite commissioning of water meter by meter manufacturer or designated technician and submission of commissioning report.

.12 Design to include requirement for submitting shop test calibration certificate during procurement.

4.4 Compressed Air Flow Metering Standards

.1 A compressed air meter shall be provided on the building incoming compressed air service.

.2 Meter shall have a BACNet output for interface with the University's Building Automation System or the Schneider ION System. (BACnet is suitable for Building Automation system however for ION we need Modbus RTU/Modbus TCP/IP)

.3 The compressed air service will only require metering if the expected service is larger than a 1" line size and/or has more than 50CFM requirements.

.4 Compressed air meter body shall be constructed of stainless steel.

.5 Units provided with a local digital display with standard cubic feet per minute (CFM) with full compensation for temperature and pressure complete with digital 4-20mA output to tie into the University of Guelph Schneider's ION System.

.6 Provide inline meter, complete with proper grounding, display, and warranty.

.7 Meter must be HART compatible and shall be compatible with the Schneider's ION System.

.8 Do not reduce the line size. This will minimize the permanent pressure loss.

.9 The sensor shall be constructed of 316 L SS.

.10 Where specified, calibration data shall be supplied which verifies the meter accuracy to be ±1.0 percent of actual flow rate for gases and ±0.75% of flow rate for liquids.

.11 LCD display shall enable the operator to monitor flow rate in clear text messages.

.12 It should be possible to check the functionality and verify deviation of the flow meter without needing to dismantle the device by using an external device. This Verification of transmitter electronics should be traceable to NIST or equivalent standards.

.13 Size meter to meet all present flow rates, provided by design engineer.

.14 Approved manufactures:

.1 Endress & Hauser

.2 Emerson Rosemount

.3 Krohne

.15 Design to include requirement for onsite commissioning of water meter by meter manufacturer or designated technician and submission of commissioning report.

.16 Design to include requirement for submitting shop test calibration certificate during procurement.

4.5 Electrical Metering Standards

.1 Electrical Design Metering

.1 The U of G metering system is based on the Schneider Electric Power Logic system remotely monitored using the Schneider PME software.

.2 Verify the Schneider meter model to be used with DEC Manager, Electrical Design as offerings and applications change.

.3 Separate sub-metering is to be installed on all circuits connected to main switchboards.

.4 Electrical metering to be provided for:

.1 Total energy per building

.2 HVAC

.3 Interior lighting

.4 Exterior lighting

.5 Receptacle circuits

.5 All meters to be connected into the Central Metering System through on-board communication cards via the local Ethernet and be fully programmed complete with updated graphics by qualified Schneider technicians.

.6 Metering software and firmware to be updated to current level at time of install.

.7 Metering to be connected to emergency power through a UPS.

.8 Emergency powered loads to be metered on the load side of ATS and MTS switches.

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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Common Landscaping

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Approved By	Mary Jane Ash, Manager Grounds
Signature	

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Approved By	Jill Vigers, Manager, Architectural Design
Signature	

1 Introduction

1.1 Landscaping General

.1 The requirements outlined in the following clauses are applicable to all new construction; Application Specific requirements are outlined in later parts of this section. Elements within this section are considered Mandatory, refer to Section 1.

.2 When planning or modifying landscape elements throughout campus, Crime Prevention Through Environmental Design (CPTED) principles apply. For more information on the design requirements for these security and safety principles, refer to the Security Design Brief Section 2.4.

.3 Other relevant sections to reference:

.1 Furniture: Architectural Design Standards

1.2 General Design Criteria

.1 UofG's Tree Protection Policy 1.2.56: Obtain the policy from the PR Project Manager to incorporate within the design and construction tender documents. Consider the policy as mandatory.

.2 UofG's Construction Near Trees Policy 3.4.11: obtain the policy from the PR Project Manager to incorporate within the construction tender documents. Consider the policy as mandatory.

.3 Landscaping and Planting shall be in general accordance with the University's Landscaping Standard.

.1 Proposed approaches to Landscaping shall be submitted to the Landscape Advisory Committee (LAC) for review and approval at the Schematic Design Stage.

.2 Conceptual Landscaping Plans shall be submitted to the LAC for review as a part of the Design Development process. Landscape consultant may need to present detailed design to LAC including specific plant materials.

.4 General Landscape Design Criteria are as follows:

.1 Retain as many trees on site as feasible and incorporate University's tree protection guidelines when trees are in construction zone.

.2 Any trees removed will be replaced by UofG policy 1.2.56 that states; two trees (6.5 cm replacement) for every tree removed under 15 cm in diameter, each tree removed between 15 and 50 cm in diameter will cost five replacement trees (6.5 cm in diameter) and trees removed over 50 cm in diameter will cost the project a minimum of $2,500 per tree. If one of the University's most valued specimens over 50 cm in diameter is removed, the value will be assessed by an external arborist and the estimated value charged to project.

.3 Grade topsoil to drain surface water away from buildings and walkways.

.4 Design with consideration to maintenance requirements.

.5 Keep plant growth 3 feet away from walls to prevent damage and allow maintenance staff access to buildings. This allows the plants to grow and provide access to the building while preventing building damage for a minimum of three feet. Consider the mature size of the plant to meet this requirement. Provide enough distance between trees and other features to accommodate cost effective mowing equipment.

.6 Avoid sharp angles, tight spaces and slopes greater than 3:1 that would make lawn maintenance difficult and unsafe.

.7 Use Indigenous plant species to the extent feasible and practical. Invasive species that are known to spread uncontrollably should be excluded from use. Where species of ornamental plants that do not spread in our climate are proposed (i.e. Japanese Barberries, Japanese Lilac tress, etc.) these plants must be proposed in Schematic Design to the PR Project Manager and approved by the LAC. Use of permanently installed sprinkler systems are not permitted within Planting Beds. Deviations from this requirement need approval from Manager, grounds.

.8 Provide path access to maintenance and landscaping vehicles throughout campus, including watering trucks.

.9 Provide clear access to building hose bibs.

.10 Locate freestanding planters in high-traffic areas. Indicate on drawings if Contractors are to temporarily relocate plants during construction.

.5 Plants for maintenance and replanting are to be coordinated with the Grounds departmentProvide shared maintenance sheds as directed by the landscaping department to store landscaping equipment.

.6 Where construction occurs near trees, the follow the protocols outlined in the Construction Near Trees policy 3.4.11:

.1 Construction Coordinators and PR Project Managers will asses if work will jeopardize the health of any established vegetation, tree, or landscape features & enforce protection requirements.

.2 Parking or driving of vehicles under and/or near trees and established vegetation is prohibited.

.3 Do not store materials under or against trees or vegetation.

.4 Ensure fencing is erected to protect trees and vegetation during construction.

.7 Tree and Established Vegetation Protection is to follow the policy 1.2.56.

.1 Refer to the policy for the definitions of Established Vegetation, Emergency Work, and Tree Protection Zone.

.2 No tree should be injured, destroyed or removed without written authorization from PR, the Grounds Manager, or designate, or the written approval of the UofG Landscape Advisory Committee. If approved, a "tree Removal Notice" shall be posted 2 weeks prior to removal.

.3 2 week prior to schedule or emergency structural or utility repairs being performed within a tree protection zone, the applicable discipline manager will contact the PR, Grounds Manger, or designate. The Grounds Manager or designate will implement a protection plan along with a recovery plan. Consider boring instead of trenching.

.4 Prior to tender, the detailed engineering drawings must be reviewed and approved by the UofG Landscape Advisory Committee.

.5 Tree removal must be approved prior to tender.

.6 Any vegetation not accounted for prior to tender must be approved by PR, the Grounds Manager, or designate and the UofG Landscape Advisory Committee.

.7 Plan work to protect trees and established vegetation.

.8 Tree Protection Zones (TPZ) include the following:

.1 Trees: From the tree truck to 1m beyond the drip line.

.2 Vegetation: 1 meter beyond the edge of vegetation.

.3 Enclose completely in a four foot high snow fence with posts on 8 foot centres at a minimum.

.4 Fencing will protect from soils, materials and other run off into the TPZ.

.5 Affix TPZ signage to the fence per the policy.

.6 Review root damage with Grounds crew for course of action. Grounds Crew will prune as required.

.7 Protect the Roots to 1.5 x the distance of the drip line with a barrier fence. Apply soil or wood chips to protect the roots.

1.3 Pathways and Sidewalks:

.1 Provide natural drainage of all stormwater and snow melt away from buildings, ramps, and stairs and towards planting or storm water drains. Eliminate spaces where snow melt may refreeze and create additional slippage.

.2 Where possible, avoid interlocking pavers, cobble stone or other similar materials that get easily dislodged with frost and provide accessibility and tripping issues. Provide surfaces that have a wet slip coefficient of 0.42 as measured by the ANSI A326.3 Wet DCOF. Paving stones are to be used strategically on the main pedestrian spine of campus only. Broom finished concrete is preferred. (i.e Winegard Walk, Alumni Walk) Where a pathway is currently constructed with interlocking pavers, or similar, they must be maintained with the same materials.

.3 Provide visibility per CPTED requirements and the Security Design Brief.

.4 During construction, provide physical barriers that prevent people from stepping over or accessing the path of travel.

.5 Pathway sub-base to allow for vehicular traffic.

.6 Snow melt systems shall be installed under concrete walkways in strategic areas, high-traffic zones or areas with a lot of ramping. This will help to reduce salt usage and tracking salt into buildings which deteriorates finishes and materials faster.

.7 Generous flairs at corner conditions when pathways intersect, start or stop are required. Intersections that have no flaring lead to ruts, tracked mud and generally unsightly situations.

.8 Pathways, including ramps to be minimum 1.8 M wide to accommodate two passing people.

.9 Ramp design:

.1 Review ramps with the Accessibility Design Brief requirements in Section 2.2.

.2 Ramp materials should be concrete with anti-corrosion additives to protect the rebar.

.3 Broom finished concrete.

.4 Ramp slopes to target a max 5% slope.

1.4 Appurtenances

.1 Exterior railings should be constructed from hot dipped galvanized steel, except as noted below:

.1 Match what is on existing buildings to avoid different materials and types on one building.

.2 Plain Galvanized Steel Railings are permitted in “back of house” areas such as Service Alleys, Loading Docks, etc.

.3 Stainless Steel, Aluminum Alloy or Powder Coated Galvanized Railings are permitted at and in the vicinity of the Main Entrance or where required to compliment the Landscaping Plan.

.1 Galvanized railings to be powder coated must be etched (sandblasted or acid) and primed with a Sherwin Williams ‘Pro-Grill’ primer or approved equivalent. Weathered galvanizing may consider use of a phosphoric acid to etch.

.4 All fasteners shall be stainless steel, coated to work with galvanized steel railings where required.Mounted to the substrate utilizing a 4-hole Plate mount with 2 diagonally placed fasteners.

.5 Provide disruptors on handrails every 48 inches.

.6 Use Rust-resistant steel (i.e. galvanized) for any steel tread plates mounted within concrete walking paths, such as stairs, to prevent rust from staining any concrete.

.2 Bollards

.1 Bollards, where provided shall be of the “Fixed Type” except as noted below:

.1 Removable bollards shall be provided at Public Entrances where there is a perceived need that the entrance may have to serve a dual function of means of access for materials and equipment.

.2 Removable bollards may be provided in Loading Areas with restricted access.

.3 Removable bollards should be installed to allow removal without the need to unbolt the mounting plate anchored to the foundation.

.4 Bollards are to have appropriate base, asphalted in bollards are not permitted.

.2 Bollards should be spaced to allow easy passage for the Utility Carts used by Campus Operation and Maintenance Staff

.3 Constructed from Hot Dipped Galvanized Steel, except as noted below:

.1 Epoxy Coated Galvanized Steel Bollards are permitted in "back of house" areas such as Service Alleys, Loading Docks, etc.

.2 Stainless Steel, Aluminum Alloy or Powder Coated Galvanized Bollards are permitted at and in the vicinity of the Main Entrance or where required to compliment the Landscaping Plan.

.3 Galvanized bollards to be powder coated must be etched (sandblasted or acid) and primed with a Sherwin Williams 'Pro-Grill' primer or approved equivalent. Weathered galvanizing may consider use of a phosphoric acid to etch.

.4 All fasteners shall be stainless steel.

.5 All bollards in loading areas or areas subject to regular vehicular traffic shall be clearly marked or otherwise identified as a visual aid. Marking shall be coordinated with the landscape design.

.6 Standard of Acceptance: 'Sureguard' (Bollard Guard Products Corporation) or Equivalent.

1.5 Site Furniture

.1 Site Furniture shall be in general accordance with the University's Landscaping Standard.

.2 Standard Benches across campus will be custom designed Accoya wood and steel bench procured through Architectural

.3 Locations for benches must be approved in advance by the approval of the Manager, Architectural Design before completion of the Schematic Design.

.4 Acceptable alternate with prior approval of the Manager, Architectural Design before completion of the Schematic Design:

.1 Eva bench (wood and steel) - http://www.victorstanley.com/product/eva/

1.6 Bicycle Parking

.1 Refer to Section 2.8 for bicycle parking standards.

1.7 Signage

.1 Signage shall be in general accordance with the University's Signage Standard Section 5.

1.8 Site Lighting

.1 Site Lighting shall be designed to complement the Landscaping Plan.

.1 Arrange Light Fixtures to minimize Light Pollution

.2 Light Fixtures shall be in general accordance with the Electrical Lighting Standard Section 7.2 and security design brief in Section 2.4.

1.9 Snow Removal & Vehicle requirements.

.1 Provide clearances for garbage trucks and snowplows.

.2 Provide space on ramp landings for snow removal equipment to make turns, and to fully clear snow.

.1 Review landscape path materials with the landscape team as snow clearing machine blades vary depending on the surfaces and need to be changed out.

.2 Confirm snow removal equipment sizes with Landscaping Department and design spaces to 125% of equipment sizes.

.3 Provide a snow dumping area beside the landing of stairs and ramps. Locate snow dumping areas max 500 ft from each other.

2 Version Control Summary

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0	09/01/2025	Whole section	Design and Construction Standards Modernization
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Common

Roads, Walkways & Parking

Version	25-01
Effective Date	September 1, 2025
Approved By	Shane Danis, Associate Director, Capital Development & Project Delivery
Signature	

Version	25-01
Effective Date	September 1, 2025
Approved By	Shannon Talbot, Manager, Campus Parking Services
Signature	

1 Introduction

1.1 Campus Parking Services and Parking – General Items

.1 The requirements outlined in the following clauses are applicable to all new construction; Application Specific requirements are outlined under clauses later in this section. For whether the elements within this section are considered Mandatory, refer to Section 1.

1.2 Reference Items

.1 All items in this section are to follow the requirements of:

.1 Ontario Provincial Standards for Roads and Public Works (OPS)

.2 Accessibility for Ontarians with Disabilities Act (AODA)

.3 The Ontario Building Code.

.4 UofG's Parking Policy and Regulations: https://www.parking.uoguelph.ca/important-rules/parking-policy-and-regulations/traffic-parking-administrative-system.

.2 Refer to other sections for the following information:

.1 Accessibility Design Brief Section 2.3.

.2 Security Design Brief Section 2.4. Lighting Section 5. Electrical Services Section 5. Loading and Garbage Section 7.

1.3 Road Works and Pavement

.1 All road works and pavement areas are to comply with OPS requirements.

.2 All pathways and roadworks are to have pavement and underlayment that supports traffic for all types of vehicles, including:

.1 First Responders (fire, ambulance, police).

.2 Public transit.

.3 Garbage Collection.

.4 Materials delivery.

.5 Hospitality vehicles.

.6 Maintenance vehicles.

.7 All other vehicles.

.3 All pathways should have underlayment below paths that comply with OPS requirements for first responders and campus maintenance and utility vehicles.

1.4 Parking Considerations

.1 For new buildings and major additions, coordinate all fire access routes with the fire department.

.2 Parking space allocation is one parking space for every 7+ community members.

.3 Parking lots should have a minimum of 5-6 parking spaces per building nearby, unless buildings are for public use and education.

.4 Parking requirements should be coordinated by Consultants, working with the PR Project Manager, and the Campus Parking Services department.

.5 Locate accessible parking as close to the nearest building and accessible pathway as possible. Confirm through the PR Project Manager how accessible parking should be allocated as this changes with use.

.6 Campus Parking Services operates parking services as a financially self-reliant ancillary operation, offering community members reasonable access to visitors and permit parking facilities. Campus Parking Services is required to provide UofG with a reasonable contribution in the form of rent for the long-term use of UofG property on which parking facilities are situated Locate at least one pay station adjacent to the accessible parking. Other stations should be centrally located within the parking lot.

.7 Locate EV chargers on the perimeter of the lot. Where possible, co-locate electric vehicle charging stations so that they can be used by both the accessible parking stall and the ones next to them.

.8 Provide dual direction circulation in all parking areas. Where this is not possible, review in consultation with the PR Project Manager and the Campus Parking Services department.

.9 Provide illumination, surveillance cameras, and clear open safe spaces per Security Section 2.4.

.10 Maintain green space among campus development. Design landscaping around the parking area to provide visibility from the neighbouring buildings to the parking, so it doesn't obstruct any sightlines to emergency phones or buildings or phones.

.11 Design parking to achieve minimum 20% area for snow loading zones. Locate snow loading zones as far from accessible parking as possible.

.12 Slope pavement and parking areas to drain storm water and snow runoff away from the centre of the road.

.13 UofG prioritizes parking privileges per their Parking Policy, however students and employees are encouraged to use public transportation.

1.5 Bicycle Storage and Parking

.1 The University of Guelph has several locations for bicycle shelters, racks, and repair stations.

.1 The locations can be found here: https://www.parking.uoguelph.ca/going-green/bicyclese-bikese-scooters-campus

.2 Provide bicycle, electric bikes, and scooter parking is day use only, and not intended for bicycle storage.

.3 The preferred bicycle rack types are the Triangle Loop Rack, such as Greenspoke Bike Parking Solutions in hot dip galvanized finish.

1.6 Bus Shelters

.1 Design bus shelters on campus to meet City of Guelph requirements.

1.7 Signage

.1 Provide parking signage per Signage Section 3.5.

.2 Standard exterior signs should be reviewed with Campus Parking Services, and have exterior grade materials that protect from deterioration and are easily cleanable.

.3 Traffic and parking signs are to be highly reflective, and visible at night.

2 Version Control Summary

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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Common Elevators

Version	25-01	**Version**	25-01
Effective Date	September 1, 2025	**Effective Date**	September 1, 2025
Approved By	Steve Nyman, Director, Maintenance and Energy Services	**Approved By**	Shane Davis, Associate Director, Capital Development & Project Delivery
Signature		**Signature**	

1 General

1.1 Elevator General

.1 The requirements outlined in the following clauses are applicable to all new construction, and major additions. Application Specific requirements are outlined under clauses later this section. Elements within this section are considered Mandatory, refer to Section 3.

.2 When planning or modifying elevators throughout campus, accessibility and security requirements apply. For more information on the design requirements for these security and safety principles, refer to the Security Design Brief Section 4.4 and the Accessibility Design Brief Section 2.3Other relevant requirements:

.1 The Ontario Building Code

.2 The Technical Standards & Safety Authority (TSSA)

.3 Ontario Regulation 209/01: Elevating Devices.

.4 ASME A176.1/CSA B44 – Safety Code for Elevators and Escalators

.5 Elevating Devices Act, Revised Statutes of Ontario, Regulation 316.

.6 CSA B651 – Accessible Design for the Built Environment.

.7 Occupational Health and Safety Act

1.2 General Design Criteria

.1 New elevators for new construction or additions shall meet or exceed the requirements of the Ontario Building Code (OBC), the Technical Standards and Safety Authority (TSSA) and the ASME 17.1/CSA B44 Handbook..

.2 Elevators are to be upgraded for whole building / multi-floor renovations, but do not require updates for smaller renovations.

.3 For accessibility guidance above and beyond the OBC, refer to the Accessibility Design Brief in Section 2.3.

.4 Elevator naming is to match the University of Guelph naming conventions. Existing elevators throughout campus have a different number assigned and must be labelled accordingly, in drawings, submittals and elevator information within the cab.

.5 For new elevators coordinate with the Chief Engineer, CUP.

1.3 Proprietary Equipment

.1 Provision of proprietary equipment, limited or restricted access software and diagnostic tools, or equipment designed with automatic “time out” or “shut down” features will not be accepted.

.2 Provide University of Guelph with all diagnostic tools, equipment, software and manuals to allow others to undertake equipment maintenance other than original installer.

.3 Under no circumstances shall prototype components or equipment be provided.

.4 Arrange that the equipment can be maintained and adjusted by any competent elevator company without the use of proprietary tools, information or equipment or, if such tools, information or equipment are required, provide them (these shall become the property of the owner).

.5 Do not incorporate any running time, cycle counters or trip counters that would cause the equipment to shut down or alter its operation in any ways.

1.4 Cab Interior

.1 Ensure approval of finishes from the Manager, Architectural Design.

.2 Buttons with LED illumination for automatic operation to replace all existing buttons including, door open button, door close button and phone button. Buttons shall be Dupar, US91 Optic C3 with BB button having the following features:

.1 Surround finish shall be mirror chrome.

.2 BB button shall be mirrored steel outer with stainless steel middle.

.3 Bi-illumination features in white/red. Partially light button and Braille in white, and turn halo around button in red when pressed while Braille turns to full white intensity.

.4 Buttons shall be as a minimum 19 mm in size.

.5 All buttons shall be both visual and emit an audible tone when activated.

.6 Number the floor push buttons to correspond with the floors served.

.7 Include corresponding Braille tactile to the left of each button in black anodized aluminum. Tactile to be recessed and studded on the car station. Braille shall be a minimum of 16 mm high and raised a minimum of .75 mm.

.3 Ensure the alarm button sounds the alarm bell on the car top.

.4 Provide new key switches to include a stop switch, an independent service switch, light switch, inspection switch, emergency light test switch, and a fan switch all contained in a locking service cabinet.

.1 Locking service cabinet shall also include for a 115 volt GFI outlet.

.5 Provide a digital dot matrix car position indicator with characters at least 50mm high in size; colour of indicator display to be red.

.6 Include for fully volume adjustable passing chimes in the car.

.7 Provide a rechargeable battery powered emergency light that is activated immediately upon power failure.

.8 For renovations, provide for each car, an automatic voice annunciator. The audible signal shall be 10 dBA minimum above ambient, but shall not exceed 80 dBA maximum, measured at the annunciator. Ensure the signal is an automatic verbal announcement that announces the floor at which the car has stopped and direction of travel. Ensure the audible signal also has a frequency of 1500 Hz maximum and sounds as the car passes or stops at a floor served by the elevator. Voice annunciator speaker grille shall be located on

the car station or in the front return. Provide adjustable volume and on/off switch in locking service cabinet for future Owner's use.

.1 For new elevators, video annunciators are required in addition to the requirements above.

.9 New car cab interiors shall include, new wall panels, new base frieze and reveals, new flooring, new front returns, new ceiling, re-skinned canopy, new handrail, new bumper rail, and re-skinned transom.

.1 Each side and rear wall is to consist of new Plastic Laminate wall finish in public areas, but checked Rimex Stainless Steel 12LG finish in all other locations.

.2 Front return, car door, door jambs, transom to be skinned in Rimex Stainless Steel 12LG finish.

.3 Side and rear wall panels below the handrail are to be finishes in Rimex Stainless Steel 12LG finish, while the panels above the handrail to be plastic laminate.

.4 Car canopy to be re-skinned in #4 brushed stainless steel.

.5 The reveals surrounding the wall panels and kick-plates are to be stainless steel finish

.10 Supply and install on all non-access walls, 38 mm diameter stainless steel handrails with ends returned to wall and securely fastened and spaced 40 mm between the handrail and the wall. Install handrail at a height of 950 mm as measured from top of handrail to floor as per Accessibility for Ontarians Disability Act (AODA) requirements.

.11 Supply and install on back wall only, stainless steel bumper rail, ¼" x 3" flat bar, at a height of 229 mm as measured from the top of the rail to the finished floor.

.12 Any finish is to be of Architectural Grade with all fastening systems invisible from view from within the elevator cab.

.13 Provide four (4) canopy recessed pot lights minimum with stainless steel trims and LED lights. Equally space and locate lights towards the corners of the cab canopies.

.14 High-damage areas to have vandal-resistant surfaces.

.15 Flooring: Non-Wax / Maintenance Free Sheet Flooring, no seams, Centura Gerflor or equivalent. Aluminum check plates preferable for freight and research equipment.

.1 Provide high-visibility and slip-resistant flooring for frequent use.

.2 Avoid use of walk-off mats inside or near the elevator.

.16 Protective Pads & Hooks: Provide one set of custom fitted protective pads for all elevators including pads to fit over the front return and transom areas with a cut out for the car station and locking service cabinet. Cut out should allow for the car position indicator to be visible. Pads shall meet with all B44 Code requirements. Ensure that the protective pad material is well stuffed, has a diamond pattern stitching and is treated with a fire retardant. Supply and install aluminum hooks inside all elevator cabs from which to fasten the pads to the walls.

.17 Car Stations: For all elevators, main panel shall be located on the right-hand side when standing in the car facing the doors. The stainless steel operating panel is to be a brushed #4 finish.

1.5 Hall Stations / Hall Indication / Hall Doors

.1 Elevator doors to be centre-opening.

.2 Supply and install new surface mounted stations at all landings in #4 brushed finished stainless steel with extended faceplates such that the centre line of the hall call button or buttons is between 895 mm and 945 mm as measured to the finished floor. If necessary and convenient to the building, install new stations in overtime at no additional cost to the University. Hall buttons shall be from same series and colour as those selected for the car. Retain and reuse where currently provided, stainless steel covers plates behind all existing hall stations. If new covers are required because of this work, provide same.

.3 Provide new surface mounted hall lanterns and stainless steel faceplates above all entrances of all elevators. All hall lanterns shall be LED illuminated with Green for UP and Red for DOWN. Engrave at one end of this stainless steel plate, University of Guelph's elevator designation, 50 mm high character, and black in-filled.

.4 Supply and install new metal hall door Braille tactile plates on both sides of each door frame with the centre line at 1525 mm to the Braille tactile. Do not reuse existing plates and ensure all glue residual from these existing plates are removed from the frame. Plates shall have stainless steel background with black characters. Ensure Ground floor or main egress is provided with a star symbol. Plates shall meet all Ontarians Disability Act (AODA) Guidelines and as a minimum have characters 50 mm high and at least .75 mm thick.

.5 Update elevator signage and numbering to align with campus conventions.

.6 Provide for each car at the ground floor above the entrance, new surface mounted lobby 2 character dot matrix position indicators with characters 50 mm high. Faceplate shall be #4 stainless steel. When car is on independent service, display "IS" on the indicator. Engrave on left hand side of faceplate and 75 mm high, elevator number (E#) and filled in black.

.7 Hall doors and entrance frames to be re-skinned at all typical levels in Rimex Stainless Steel 12LG finish.

.8 Supply and install for all cars, new aluminum cab sills.

1.6 Accessibility

.1 Integrate Card readers and access controls into the car operating panel (COP) with secure & protected installations.

1.7 Painting – Machine Room

.1 Paint machine room floor in 2 coats of grey enamel using low odor paint. If requested by University due to possible paint odor concerns, carry out this work in overtime at no cost to the University.

1.8 Elevator Maintenance

.1 Elevator maintenance of elevators shall commence upon Substantial Completion and shall be carried out in accordance with University of Guelph's Maintenance Agreement document, which is to be provided with the Bid and Contract Documents, for a period of twelve (12) months. Include all labour, materials, equipment, and services that are necessary to fulfill the requirements of preventive elevator maintenance in accordance with the requirements of ASME A17.12022/CSA B4410 Safety Code for Elevators inclusive of Article 8.6.1.2, CSA B44.210, and the University of Guelph's maintenance requirements as provided in Section 14100, Maintenance Agreement.

.2 Make good any defect not resulting from vandalism or misuse, for a period of one year from the Date of Substantial Performance, or at any time during the maintenance contract. Warranty shall cover for both the labour and material associated with the replacement of such part(s).

1.9 Controllers

.1 CSA microprocessor based non-proprietary controls meeting all the latest ASME A17.12022/CSA B4410 Safety Code for Elevators, TSSA and all University of Guelph and Specification requirements.

.2 Identify on the Bid Form the make and model of the elevator controller.

.3 The elevators shall also offer Independent Service Operation, Automatic, Phase I and Phase II Firefighter Emergency Operation, and security card provisions including floor tracking and full internet redundancy.

1.10 Drive System – SCR DC Regenerative

.1 Supply and install new Regenerative solid-state digital motor drive systems to control speed of the elevator by applying variable power to the motor. Drives shall be either:

.1 DSD 412 as manufactured by Magnetek

.2 System 12 as manufactured by Motion Control Engineering

1.11 Door Operator

.1 Supply and install on all elevators, new GAL MOVFR closed-loop door operators capable of providing smooth and consistent door operation on each of the car doors.

1.12 Door Protection Device

.1 Provide new electronic infrared detectors on all cars.

.2 Ensure the protection device initiates door reversal at any point of travel, when any object is in the path of the closing door without engaging the object.

.3 Ensure the operation of the protection device includes limited door reversal operation or "nudging" and is set-up to operate as per the requirements of the ASME A17.12022/CSA B4410 Code.

1.13 Security

.1 Align Elevator upgrades with BAS controls.

.2 Collaborate between elevator, IT, and security consultant teams to ensure compliance and functionality.

.3 A minimum of two co-axial RG6/U 75 ohm co-axial cables and 8 pairs of shielded wires per elevator are to be supplied within the travel cables or as a separate travelling cable for CCTV camera provisions or security card requirements connecting to Campus Security.

.4 Provide security cameras with clear views of the cab, floor, and external station in all elevators, including retrofit projects.

.1 Hydraulic elevators with existing phones are exempt from upgrades.

.5 Provide video intercoms with text-to-speech options.

1.14 Emergency

.1 (Placeholder for general guidance on mustering.)

1.15 Heating, Ventilating, and Air Conditioning

.1 Ventilation and temperature control of elevator equipment room to maintain ambient temperatures between 10 to 30 degrees Celsius. Thermostatic control device on the machine room wall should be electronic.

.2 Preference for cooling the mechanical rooms is to use chilled water fan-coils with a fan coil located in either the machine room itself, or located in an adjacent space with supply and return ductwork to the elevator room.

.3 Remove and dispose of all existing car fans and provide new 2 speed fan for all cars and wired to 3 position switch in car locking service cabinet. Isolate fan from car canopy to ensure noise level of fan shall meet 58 dBA.

.4 Provide new stainless steel fan grille in the car canopy.

1.16 Machine Room Guarding

.1 Supply and install for all elevating devices, machine room guarding in accordance with Ministry of Labour standards and requirements and to all applicable published guidelines or standards on this topic.

.2 Provide sump pumps and drains in elevator pits.

2 Version Control Summary

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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural

Version	Effective Date	Approved By	Signature
25-01	September 1, 2025	Jill Vigers, Manager, Architectural Design	

3

Architectural

.1 General Requirements
.2 Building Envelope
.3 Space Planning & Interior Design
.4 Painting
.5 Signage
.6 Vivarium
.7 Laboratory
.8 Classrooms
.9 Custodial
.10 Door Hardware

1 How to Read this Section

.1 This section should be read in conjunction with the other sections in this Standard.

.2 This section outlines both the architectural design and space planning for the Campus and individual buildings and programs, but also provides information and details for specific areas within the University Campus that have more specific requirements than the broad. This includes finishes, and additional information for assemblies, furniture, maintenance, etc.

.3 The start of this section focuses first on the space planning principles for the Campus. These become more detailed in specific sections, for example, the general finishes will apply, except as noted in the lab or classroom sections, where they will deviate to suit their use. This section should be used in its entirety, and where conflicts may arise, clarity should be sought from the PR Project Manager.

2 Common Design Elements and Standards

.1 The standard applies Campus accessibility and sustainability principles outlined in the briefs to the whole campus. As such, sample room types have been included in the appendix and referenced in layouts, sections, and elevations where helpful. Section 7.2 Room Data Sheets have also been developed to reflect these layouts, which would occur in ideal conditions. The Consultant is to review how well these layouts work in existing renovations, and work with the Design team and consultants to create the right solution for the space.

.2 Section 1.6 Compliance Criteria outlines the compliance requirements for all building and project types on campus. The Consultant is responsible for following the compliance paths outlined there.

.3 Section 2 outlines the Design Briefs and other common standards for the campus that affect multiple divisions of work. The work in this section should reflect the goals and objectives outlined in Section 2.

.4 This section is not intended to be prescriptive, except with respect to maintenance and general design. It is intended to promote innovative design for the campus, while reflecting the campus objectives of accessibility and sustainability, as outlined.

3 Consultant Responsibilities

.1 This Architectural Standard has been developed to establish the University's minimum expectations and requirements for Renovations and new Construction on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of site layout & landscaping, building facades, space planning, materials and finishes, building performance, accessibility and sustainability.

.3 The Designer remains responsible for ensuring proposed design solutions are in full compliance with applicable Codes & Standards in force at the time of the design.

.4 Conflicts between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Architectural Design together with proposed measures for addressing the conflict before completing the Schematic Design.

.5 Refer to Section 1 for additional reference documents that must be followed.

4 Introduction

4.1 General

.1 This section provides guidance on most spaces within the campus. For alternatives, follow the procedures outlined in Sections 1 and 2.

5 Design Standards - General

5.1 Overarching Principles

.1 The requirements outlined in the following clauses are applicable to all new construction; Application Specific requirements are outlined under clauses later in this section. For whether the elements within this section are considered Mandatory, refer to Section 1.

.2 Overarching Design Principles

.1 Building Design shall support the intended Functional Program.

.2 Building Design shall present an individual identity to the structure while fulfilling the following objectives:

.1 Draw inspiration from the original buildings on campus.

.2 Make evident the activities occurring within the building while supporting the wider structural patterns of the campus.

.3 Embody principles of Crime Prevention through Environmental Design (CPTED)

.4 All new construction shall be constructed to be Accessible by following the AODA, OBC Part 3, Section 3.8 at minimum to the extent mandated, and better practice standards CSA Standard B651 – Accessible Design for the Built Environment and OCADU FADS and where possible to the ideal extent where practical and/or feasible. Refer to Section 2.3 for the Accessibility Design Brief.

.3 Buildings of Historic Significance: Where scope of work involves a building of historic significance, refer to guidelines in Section 2.2.

.4 General Material Selection:

.1 Select Materials that meet or exceed the Sustainability requirements of Section 2.2.

.2 Materials should be manufactured in Canada are preferred, followed by those readily available in Canada. Identify any materials not readily available in Canada for approval by the Manager, Architectural Design, prior to completing Schematic Design, along with any materials with potential tariffs.

.3 Provide Level 3 Environmental Product Declarations (EPDs) for all materials selected, and review for Life Cycle Carbon Assessment. Compare that to the requirements of Section 2.2 at the end of each project stage. And product changes must meet or exceed the requirements as the project progresses.

.5 Furniture must be part of the planning process and presented for the approval of the Manager, Architectural Design, before completion of the Schematic Design.

.6 The University will not accept any asbestos materials or products that contain asbestos.

.7 Group the placement of the following building accessories in and around one principal building entrance:

.1 Fire alarm system panel

.2 Fire department connection, i.e., standpipe or sprinkler connection point

.3 Placement of exterior hydrants

5.2 Building Siting and Footprint

.1 Locate new buildings in general accordance with the University's Campus Master Plan.

.2 Align overall footprint and gross floor area (GFA) in general accordance with the University's Campus Master Plan, validated through functional planning and programming at the onset of a project, per the precincts described.

.3 Consultants shall obtain Site Plan Approval if the project site borders one or more main city streets (Gordon Street, College Ave., Stone Road are prime examples) or for any major work within 50 m of main roads.

5.3 Radon

.1 Consultants are to integrate University Standard Specification section 02 56 20 Radon Mitigation into their contract documents for all new building and building additions, as required by Code.

.2 LEX Scientific is the University's preferred radon consultant for all projects. For any new project, including an addition or a new build, the Design Team will be expected to include LEX Scientific as a part of the Design Team.

5.4 Building Exterior & Massing

.1 While buildings have been typically four storeys in height to maintain the low to mid-rise character of the campus, refer to updates to the Campus Master Plan for where deviations might occur, i.e. student residences.

.2 The following minimum architectural design features and elements shall be incorporated into every building, at least on one elevation:

.1 Obvious Defined Entries:

.1 With clear connection to campus circulation patterns.

.2 Scaled proportional to the human scale.

.2 Masonry Elements: Stone, Brick and Terra Cotta, singly or in combination. Other materials may be used along with these.

6 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural

Building Envelope

1 Design Standards – Building Envelope

1.1 Building Envelope – Exterior Assemblies

.1 General:

.1 Meet Campus sustainability targets, including performance-based energy efficiency design standards (CAGBC ZCB) metrics for the R-Values for envelope components and operational and embodied carbon balance. Specify low maintenance materials with longevity as priority with a guaranteed minimum lifespan of 30 years.

.2 Minimize different types of materials used on a facade.

.3 Consultants must provide the Manager, Architectural Design, CPD&D, with Environmental Product Declarations (EPD) that include CO_2 calculations for all materials and systems prior to design, and require the same submittals from all Contractors.

.4 Optimize envelope design for the new construction through thermal modelling based on the climate zone (5) and site specific conditions, through R-Value metrics for walls, airtightness and lack of thermal bridges to achieve maximum thermal comfort and guide the selection of mechanical equipment.

.5 Maximize envelope insulation and airtightness (i.e. Net Zero Carbon) to reduce electrical and mechanical equipment demand for new construction and building additions.

.6 Maximize R-Values for walls:

.1 New projects and additions should target values of R-40 (U = 0.15).

.2 Renovations should target deep energy retrofits, with values of R-35. Refer to strategies in Section 4.2 for buildings with historic significance.

.7 Composed of Concrete, Stone, Brick, Panelized Wall Systems, Metal Panel Systems with a gauge strong enough to avoid oil canning, Curtain Wall Assemblies and Glazing Assemblies, singly or in combination.

.1 Panelized systems may include ACM or similar non-combustible systems with metal finishes. Z-girt supports may be used, with a preference to fibreglass and thermally broken supports to eliminate thermal bridging.

.8 Use extra durable and vandal resistant finishes at grade.

.9 Use of Exterior Insulation Finishing Systems (EIFS), stucco, and uncoated concrete masonry systems is not permitted anywhere. Exceptions are subject to approval from the Manager, Architectural Design, and are to be designed as a rainscreen solution per CAN/ULC-S716 standards. They shall be identified before completion of the Schematic Design Phase

.10 Projects with existing EIFS cladding that requires repair shall consider the extent of the damage and if deemed substantial enough by PR Project Manager, provide a design option for complete cladding replacement.

.11 Use Concrete or Stone for all envelope elements to a minimum height of 1.5m above the water tables or 1.5m above grade whichever is greater.

.12 Consultants are to require Contractors perform wall-mock-ups by the subtrades to understand how the membranes and tapes overlap at junctions and openings.

.13 Consultants are to require Contractors conduct an airtightness test to improve performance and durability.

.14 Provide acceptable air infiltration metrics and require that blower door tests be completed during construction to ensure the metrics are not exceeded. It is the contractor's responsibility to ensure the envelope is assembled in a way that promotes air tightness. Consultants and commissioning agents need to verify the assemblies are constructed correctly through site reviews.

.15 Consultants shall evaluate a minimum of four distinct building envelope options for each new build, addition, and major renovation. Each option must be assessed and compared in terms of operational carbon, energy performance, embodied carbon, and thermal comfort, with findings summarized in a clear comparative analysis.

1.2 Rain Screen Systems

.1 Incorporate to the extent feasible and practical, a Rain-Screen System as outlined in the whitepaper co-authored by the Ontario Association of Architects and CMHC.

.1 Incorporate air barriers into building envelope to meet the characteristics of an air barrier system as discussed and design to meet airtightness testing and air blower tests to minimize leakage.

.2 Detail air barrier with particular attention to continuity and constructability at:

.1 window and door frames

.2 mechanical and electrical penetrations

.3 wall/roof connections

.4 changes in plane

.5 joints between like and dissimilar materials

.3 Provide large scale details to show how air barrier continuity will be achieved and how differential movements and construction sequences will be accommodated. Insulation must be secured mechanically and in direct contact with the air barrier system.

.2 Minimize thermal bridging, and design to prevent condensation on interior surfaces due to thermal bridging. Use structural neoprene thermal breaks for minor projecting steel elements and use insulated double Z-bars or thermal clips to support cladding and metal roofing.

1.3 Brick and Stone

.1 All Brick & Stone color to match adjacent building / context.

.2 Brick, stone and mortar selections and color to be reviewed and approved by Manager, Architectural Design, before finalizing the Schematic Design.

.3 Use of site mixed mortar colours is not permitted.

.4 Provide mandatory full size mock-ups of wall systems prior to construction, as a part of the construction process for approval of workmanship and materials. Mock-up to be inspected and tested.

1.4 Building Envelope – Windows, Curtainwall and Glazing

.1 Recommend glazed openings be limited to a maximum of 25% of a building's facade. Work with principles of building envelope design to maximize airtightness and insulation, or per the Authorities Having Jurisdiction if on a major roadway.

.2 To meet University Net Zero Carbon requirements, new construction and addition openings should have thermally broken triple glazed openings with:

.1 U-Value: less than or equal to .085 (R-6.7).

.2 Solar Heat Gain Coefficient (SHGC): Ug-g*1.5<0 depending on orientation.

.3 Submit test data for review by the Manager, Architectural Design as a part of the Schematic Design Phase.

.3 Incorporate energy conservation into fenestration design; examples include short canopies on South and West exposures and low emissivity.

.4 Energy conservation is crucial in fenestration design, and this includes using features like short canopies on south and west exposures and low emissivity coatings to optimize solar gain and minimize heat loss.

.5 Horizontal skylights are not encouraged except in areas where natural light is required and can only be provided by a skylight; however, clerestory windows are acceptable.

.6 Safety glazing materials shall be used in locations prone to accidental damage such as entrance & exit doors and adjacent to unprotected fixed glass panels.

.7 Minimize glazing at grade level.

.8 Custom tinted colours of glazing should be avoided. If to be considered then provide specifications for inventory and approval from the Manager, Architectural Design. Review colours, films, tinting, etc. with sustainability and visibility requirements for the project.

.9 Match replacement windows and glazing elements to existing. Select windows or glazing assemblies with a High 'I Factor' in the case of older buildings where high resistance to condensation is required (typically due to inadequate air circulation). For renovations: match the look (glass, shade, fritting, coatings, etc.) of the existing building

.10 Design with factory finished aluminum frames with Thermal Break Construction. Documented Test Results demonstrating R-Values of the assembly shall be submitted for review by the Manager, Architectural Design, CPD&D as a part of the Schematic Design Phase.

.11 Consultants to provide to Manager, Architectural Design, with Level 3 Environmental Product Declarations (EPD) that include CO2 calculations for all materials and systems prior to design, and require the same submittals from all Contractors.

.12 Provide safety glazing systems as required by the application.

.13 All operable hardware, hinges, handles, pulls, etc. shall be heavy duty.

.14 Sealants shall be permanently elastic, non-shrinking, and non-migrating.

.15 Multi-lite windows are not permitted except with prior approval by the Manager, Architectural Design, as a part of the Schematic Design Phase.

.16 Use of operable windows is not recommended except in the case of student residences. Where desired, the use of operable windows shall be identified at the Schematic Design Phase and presented for the approval of the Manager, Architectural Design.

.17 Frames: mechanically fastened into structure.

.18 When replacing or installing new exterior glass / glazing it must be treated in accordance with City of Guelph Guidelines. Submit design intent for review to the Manager, Architectural Design as a part of the Schematic Design Phase.

.1 For glazing to be bird friendly, use a 125 x 125 mm frit spacing with grey dots, on the majority of glazing, except at major roads, where it should be 100 x 100 mm frit. It is difficult to source speciality patterns even 10 years down the road. No speciality patterns or deviations shall be accepted, without approval from Architectural Manager.

.2 City of Guelph Guideline can be found at: https://guelph.ca/wp-content/uploads/Attachment-1Bird-friendlyDesignGuideline.pdf

2 Building Envelope – Roof Assemblies

2.1 General

.1 UofG has a stand-alone roofing project every year as a part of our capital planning life cycle replacements in which have independent roofing specialists. These replacements occur annually or bi-annually. UofG requires a tight envelope to maintain their assets, and the contents inside, as they are long term owner-operators. This starts at the most exposed area, the roof.

.2 Often, major renovations include a new roof as a part of the project scope. Both types of projects should follow this section.

.3 Roofing guidance is listed below. Consultants are expected to align roofing systems with the Sustainability and Energy direction outlined in Section 2.2.

.4 This section includes activities performed by the trades and vendors. Consultants are to include these requirements in their Bid documents, and review all submittals, including warranties, for the correct information.

.5 Design for weathertight and highly insulated roof to minimize mechanical and electrical systems.

3 Minimum Design Standards – Roofing Systems

3.1 Sustainability and Energy Targets

.1 To meet campus sustainability targets, incorporate performance-based energy efficiency design standards by optimizing roof insulation R-values and achieving a carbon balance.

.2 To be specified for maximum thermal comfort, low maintenance, and longevity as priorities with a guaranteed minimum lifespan of 30 years.

.3 The roof insulation design for new construction should be developed based on the outputs of the energy model (recommended R-60 to R-100) to maximize thermal comfort. Ensure airtightness measures are integrated to reduce electrical and mechanical demand.

.4 Consultants to provide to Manager, Energy Engineering, with Environmental Product Declarations (EPD) that include Level 3 CO2 calculations for all materials and systems prior to design and require the same submittals from all Contractors.

.5 Submit the intent to use green roofs for review by the Director, CPD&D during the Schematic Design Phase. It is recommended to submit a revised Energy Model and Lifecycle Assessment to demonstrate environmental and economic values. Where Green Roofs are proposed and accepted, the following elements shall be incorporated into the design:

.1 Measures for Leak Detection.

.2 Measures for Irrigation.

.3 Measures for access and safety

.4 Measures for monitoring and verification

.6 Consultants are to confirm if Enbridge incentive programs apply. To determine Enbridge incentive opportunities, the following info is required:

.1 The R-value differential between the existing roof and the new installation.

.2 An estimated cost differential per square foot between the old and new roofing systems.

.3 The effective roof area that is covered by the improved R-value.

3.2 General Low Slope Roof System Requirements

.1 Three ply cold applied built-up roofing system to be used. Hot kettle or torch applied systems are not permitted.

.1 All membrane materials are to be supplied by Tremco Canada, meeting manufacturer's respective material compatibility requirements to achieve required System Warranty

.2 Adhesive for Roof Insulation Boards and Overlay Boards: Two component solvent free, elastomeric urethane adhesive. Asbestos free, low odor and does not contain any bitumen or VOC's

.3 Roofing Contractor must be pre-approved and certified by Membrane Manufacturer for specified materials and installation type

.4 Contractor's installers must be certified and carded for installation of specified materials.

.2 Maintain a minimum 2% slope to roof drains. For repairs and new roofs, Consultants are to include a mandatory water test to indicate no ponding or leaks are occurring.

.3 Installed built-up roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Built-up roofing and base flashings shall remain watertight.

.4 Design: Where roof has a limited number of drains, design to minimize drains by adding tapered insulation unless required.

.5 R- and U- Values: as noted above.

.6 Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by built-up roofing manufacturer based on testing and field experience.

.7 Provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following minimum load-strain properties at membrane failure when tested according to ASTM D 2523:

.1 Tensile strength at failure, at -18 deg. C (0 deg. F): 78.8 kN/m (450 lb./in) machine direction, minimum; 3.0 percent elongation, maximum.

.2 Tensile strength at failure, at -18 deg. C. (0 deg. F. 70.1 kN/m (400 lb. /in) cross-machine direction, minimum; 2.7 percent elongation, maximum.

.8 Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with the requirements and recommendations of the most current addition of the NRCA Roofing and Waterproofing Manual.

.9 Roof Replacement Workmanship Warranty:

.1 Contractor to supply Owner with a two (2) year Contractor's Warranty for Workmanship on a form acceptable and pre-approved by Consultant on Contractor's letterhead, signed, authorized and executed.

.2 In event any work related to roofing, flashing, or metal is found to be within Contractor's warranty term, defective or otherwise not in accordance with Contract Documents, Contractor to repair that defect at no cost to Owner. Applicator's warranty obligation to run directly to Owner with a copy sent to Manufacturer.

.10 Contractor to supply Owner with Manufacturer's Labour, Material and Workmanship System Warranty for a period of twenty (20) years on roof replacement areas from date of Substantial Completion.

.11 Manufacturer to provide inspections and maintenance of the roofing system in years 2, 5, 10 and 15 of the warranty period. The following duties, at a minimum, shall be carried out at no extra cost to the Owner as required, by a qualified contractor retained by the Manufacturer:

.1 Sealing of flashing seams.

.2 Filling of pitch pockets.

.3 Repairs to blisters and ridges.

.4 Caulking at metal details as required.

.5 Written inspection report.

.6 Removal of vegetation and debris from the roof and premises.

.7 Cleaning of drain screens.

.12 Provide documentation that the manufacturer has personnel to carry out above noted warranty requirements and has a history of providing these services for a minimum of 5 years.

.13 The Manufacturer (Tremco) shall update the University's Online Roof Management Program (MyOLI) with all new information upon satisfactory completion of the roofing project at no charge to the University.

.14 Any project where personnel will require roof access, Manufacturer shall conduct an Infra-Red analysis of the warranted roof prior to any work starting and upon completion of the work to ensure no damage and to ensure the roof warranty is protected.

3.3 Low Slope Roof System Products

.1 Roofing Membrane Plies:

.1 Basis of design product: Tremco, Burmastic Composite Ply: Non-perforated, asphalt-coated, polyester/fiberglass/polyester reinforced sheet dusted with fine mineral surfacing on both sides which meets the requirements of ASTM D 4601, Type II, suitable for application method specified:

.2 Base Flashing Sheet Materials

.1 Flashing Sheet: Basis of design product: Tremco, TRA Elastomeric Sheeting: Elastomeric, polyester-reinforced sheet with EPDM and SBR elastomers:

.3 Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.

.4 Bitumen Materials

.1 General: Adhesive and sealant materials recommended by roofing manufacturer for intended use and compatible with built-up roofing.

.2 Liquid-type materials: Low VOC products are required.

.3 Adhesives and sealants that are on the interior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

.4 Insulation Adhesive: Tremco, Fas-n-Free Adhesive: Solvent-free, cold fluid-applied, bituminous-urethane adhesive formulated to adhere roof insulation to substrate:

.5 Cold-Applied Adhesive: Basis of design product: Tremco, Burmastic Adhesive: One-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with specified roofing membranes and flashings, with the following physical properties:

.6 Cold-Applied Adhesive: Basis of design product: Tremco, Tremlar/TP-60 Vertical Grade: One-part, cold-applied bitumen modified polyurethane waterproofing adhesive specially formulated for adhering TRA membrane sheet, with the following physical properties:

- Tensile Strength: ASTM D 412: 2060 map 1.7MPa (250 psi).
- Low Temperature Elongation at -20 deg. C (29 deg. F): ASTM D 412: 500 percent.
- Elongation: ASTM D 412: 700 percent.

.5 Vapour Retarder:

- Air and Vapour Barrier: 1 mm thick, SBS modified, self-adhesive air and vapour control membrane with slip resistant cross laminated polyethylene surface film; to ASTM D 1970-09.

.1 Insulation:

- General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.
- R Value: At a minimum, R value to match existing condition R Value for roof replacement projects. For new construction, R values are to maximize envelope performance to reduce equipment heat loads and detailed for Net Zero principles, maximizing airtightness. Refer to the Sustainability and Energy Section 2.2.
- Polyisocyanurate Board Insulation: CAN/ULC-S704 ASTM C 1289, Type II, Class 1, Grade 2, HCFC-free, with felt or glass-fiber mat facer on both major surfaces.

.2 Insulation Accessories:

- General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.

.3 Flashings:

- Control or Expansion Joint Flashing: Sheet butyl, metal counter flashings and wood materials, as detailed.

.4 Roof Surfacing:

- Pea gravel free of fines, long splinters, dust or foreign matter, nominal (3/8”) 10mm diameter.

.5 Cants:

- Fibre Cant and Tapered Edge Strips: Asphalt impregnated wood fibreboard, preformed to 45 degree angle, tapered edge strips, and as additionally detailed.

.6 Accessories:

- General: Accessory materials recommended by roofing manufacturer for intended use and compatible with built-up roofing.
- Sheathing Joint Tape: Sheathing manufacturer’s recommended self-adhering joint tape.
- Caulking: Dymonic by Tremco Canada Ltd.

4 Version Control Summary

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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural

Space Planning & Interior Design

1 Design Standards - Interior

1.1 Building Interior – General Requirements

.1 All new buildings should be designed to encompass the overarching objectives listed below:

.1 Accessibility: Support independent student access and use of the entire building and campus. Refer to Section 2.3 for the Accessibility Design Standards Brief.

.2 Functionality: Support the efficient execution of tasks assigned to each functional unit.

.3 Collaboration:

.1 Facilitate an efficient and effective collaboration amongst units through the spatial relationships of facilities.

.2 Provide common areas to encourage both formal and informal interaction.

.3 Provide a high degree of internal visibility to enhance awareness of activities within the building.

.4 Safety and Security:

.1 Refer to campus security design brief.

.2 The security and safety of building occupants, the continuity of essential operations, and the protection of assets.

.3 Implement the security zoning plan when designing new spaces or buildings. Develop a plan to correct deficiencies with legacy spaces.

.4 Minimize access of people to areas that require higher security, e.g. mechanical rooms, IT rooms, data centres, labs, by providing ante rooms or private corridors to those spaces.

.5 Durability: Designed to withstand 24 hour uses; materials and components must be selected with a mind to durability, ease of maintenance, reliability and longevity.

.6 Flexibility: The building must be capable of accommodating on-going changes within the overarching framework of the original functional program.

.7 Acoustics: consider noise sensitive spaces locations within overall plan and avoid high noise program adjacencies.

.8 Maintenance and Serviceability: Avoid adjacencies that are problematic, e.g. mechanical rooms or washrooms directly over server rooms.

.2 Internal Circulation:

.1 Interior pedestrian routes should be linked and intuitive, with occasional views to allow orientation.

.3 Interior Finishes:

.1 In renovations finishes should use and/or be in keeping with established building standards. Where none exist then the design of major renovations should look to establish appropriate standards.

.2 Consultants to provide to Manager, Architectural Design, CPD&D, with Environmental Product Declarations (EPD) that include CO_2 calculations for all finishes prior to design and require the same submittals from all Contractors.

.4 On any new construction / renovation, include occupancy signs for areas intended for more than 60 people.

.1 General structure:

.1 Meet OBC Code requirements for fire separations and ratings.

.2 Provide Concrete or CMU walls between mechanical service rooms and the rest of the building.

.3 Encapsulated timber frame construction can be considered depending on the building use. Confirm with Architectural Design Manager, CPD&D prior to completing Schematic Design phase for its use.

.2 Floor Structure:

.1 Underfloor systems: Preferred construction is poured in place concrete. Where fire rating versus depth of slab, vibration and/or sound transmission considerations, or timelines and/or budget prohibits this type of construction then hollow core pre-stressed slab or composite steel deck systems may be considered but are to be approved as part of schematic design by Manager, Architectural Design.

- Hollow core pre-stressed slab will only be considered if 'wet' areas are minimal and can be mitigated by waterproofing and drainage measures. No services shall be run within the slab. Integral cove bases are to be incorporated as well as waterproofing in all rooms where program includes plumbing.

1.2 Building Interior – Space Planning Criteria

.1 Allocation Guidelines:

.1 Allocation Guidelines shall be in general accordance with the University's Office Space Allocation Guidelines.

.2 The tabulation below outlines the minimum sizing criteria for different uses and occupancies. All other spaces shall be sized to support functional requirements.

.1 Circulation Corridors: The larger of 1.8m (width) minimum area / key dimension or OBC minimum.

.2 Universal or Accessible Single Washroom: In accordance with OBC. Refer to sample layout for best accessibility practices in Section 2.3.

.3 On-Floor Electrical, I.T. / CCS, and Service Closets: Minimum 5 m2 each, size to be validated by the electrical designer.

.2 Mechanical Rooms:

.1 A designated and dedicated Mechanical Room shall be provided in every new building to accommodate the incoming water service. Do not combine with electrical or IT rooms.

.2 Designated and dedicated Mechanical Room(s) shall be provided to accommodate HVAC Plant Equipment and Process Equipment.

.1 Provide at least one double door for entry into each Mechanical Room.

.2 Provide Elevator Access for each Mechanical Room located above or below the Ground Floor Level.

.3 Incorporate measures to facilitate movement of materials into and out of Mechanical Room(s).

.3 Refer to the Mechanical section for addition plant and room requirements in Section 2.5.

.3 Electrical Rooms

.1 A designated and dedicated Electrical Room shall be provided in every new building to accommodate the incoming electrical service. Do not combine with mechanical or IT rooms.

.2 Designated and dedicated Electrical Room(s) shall be provided to accommodate Electrical Switchgear and Switchboards.

.1 Provide at least one double door for entry into each Electrical Room.

.2 Provide Elevator Access for each Electrical Room located above or below the Ground Floor Level.

.3 Incorporate measures to facilitate movement of materials into and out of Electrical Room(s).

.3 Refer to Electrical section for additional plan and room requirements in Section 5.Maintenance Storage Room

.4 Provide a designated room in new buildings, substantial additions or renovations where none currently exist, of approximately 8'x8' for storage of critical replacement materials for the building.

.5 For a sample layout, refer to Section 7.

.4 Offices

.1 Office or Workstation Requirements for Faculty, Staff and Graduate Students; The allocation of office space will be based upon functional need and the following guidelines:

Office Space Category	Administrative Function	Academic Function	Functional Allocation	Standard	
				SM	SFT
A	President	President	1 Dedicated Private Office	40.00	431.00
B	Vice-Presidents	Dean	1 Dedicated Private Office	26.00	280.00
C	Associate/Assistant Vice Presidents	Associate Dean	1 Dedicated Private Office	19.00	205.00
D	Directors & Associate Directors	Department Chair/Director	1 Dedicated Private Office	15.00	161.00
E	Unit Managers	Full-Time Faculty/Contractual Faculty/Program Counselors	1 Dedicated Office or Workstation in Shared Space	12.00	129.00
F	Project Managers/ Coordinators/Supervisors	N/A	1 Workstation in Shared Space	10.00	108.00
G	Administrative Assistants	Administrative Assistants/ Secretaries	1 Workstation in Shared Space	8.00	86.00
H	Administrative/ Technical Staff	Technicians/Technologists	1 Workstation in Shared Space	7.00	75.00
J	Clerical/Operational Staff	Clerical Staff	1 Workstation in Shared Space	6.00	65.00
K	N/A	Emeriti/Retired Research Faculty/Postdoctoral Fellow	Shared Office (2:1) within E size office	6.00	65.00
L	N/A	Sessional Lecturers / Retired Teaching Faculty/	Shared Office (3:1) within E size office	4.00	43.00
M	N/A	Graduate Students	Shared Office (4:1) within E size office	3.00	32.00

.2 Submit Office Furniture Layouts for the approval of the Manager, Architectural Design, CPD&D before completion of the Design Development phase.

.3 Furniture layout shall be thought out as a part of the final overall layout of the space. Also refer to the requirements of Clause 2.19.

.4 Coordinate blocking in walls and placement of electrical/data/communication outlets and placement of wall switches and thermostats with the furniture layouts.

.5 Use of Service Poles is not permitted without the prior approval Manager, Architectural Design, CPD&D; requests for approval shall be tabled before completion of the Design Development phase.

.6 Provide at a minimum one (1) data outlets and three (3) duplex electrical outlets in each office and at each workstation.

.7 In the case of private offices, maintain at least 6" clear between the door frame and nearest wall to allow space for coat hooks behind door. Provide wall door stops.

.8 If an Office space is designed with glazing on the Corridor / Public side, the section of glazing below the desk height shall be frosted or treated as a spandrel to mask desk clutter, if any.

.5 Laboratories & Vivarium (Layouts):

.1 Laboratories shall be designed in accordance with the University's Laboratory Standard.

.1 The Laboratory Architectural requirements can be found in Section 3.7.

.2 The Laboratory Mechanical requirements can be found in Section 4.5.

.3 The Laboratory Electrical requirements can be found in Section 5.5.

.2 Laboratories for animals shall be designed in accordance with the University's Vivarium Standard.

.1 The Vivarium Architectural requirements can be found in Section 3.6.

.2 The Vivarium Mechanical requirements can be found in Section 4.4.

.3 The Vivarium Electrical requirements can be found in Section 5.4.

.3 Locate laboratories other than teaching laboratories:

.1 In areas away from general traffic flow, and

.2 Away from spaces readily accessible by the general public.

.4 Laboratory layouts shall be developed around the use of modularized benches and mechanical & electrical servicing to maximize, within reason, flexibility and adaptability for future changes in use.

.5 Functional Planning and Programming shall endeavor to capture all equipment, chemicals and reagents that are likely to be used within the lab.

.6 Universal Washrooms

.1 At least one (1) Universal Washroom shall be provided per floor in all new construction and major renovations to meet code requirements and Accessibility Design Brief. Refer to Section 2.3.

.7 Custodial Rooms

.1 Custodial Rooms shall be designed in accordance with the University's Custodial Standard. Provide one(1) per floor in all new construction and major renovations to meet code requirements and Guelph's custodial standard. Refer to Section 3.9.

1.3 Building Interior – Walls and Wall Finishes

.1 Interior partitions and walls may be constructed of Concrete Block or Impact resistant Gypsum Board on Steel Studs. Provide rated gypsum board as required by code. Exceptions include:

.1 Concrete Block shall be used for walls of building or campus Mechanical & Electrical Rooms.

.2 Concrete Block shall be used for walls in areas with a potential for physical abuse.

.3 Concrete Block shall be coated with durable epoxy paint in areas subject to moisture.

.4 Washroom and Showers:

.1 Walls may be constructed of Epoxy Coated Concrete Block or multifunctional tile substrate and building panel such as KERDI-BOARD by Schluter System L.P. or equivalent.

.2 Washroom and Shower Walls shall be finished with "Glaze" or Ceramic Tile, inexpensive readily available lines that are not discontinued. Basis of design: Olympia's Ontario Series.

.3 Grout shall be non-sanded epoxy based and of a color that does not show dirt and salt and affords a high level of cleanability.

.2 Provide Acoustic Batt Insulation over the entire height of walls identified as acoustic separations. Ensure acoustic properties of insulation are adequate to provide the identified STC rating for the assembly.

.3 Glue and mechanically fasten Gypsum Board installed on Concrete Block.

.4 Wall Protection and Corner Guards:

.1 Provide wall protection on all circulation areas as well as anticipated high traffic areas that could likely be exposed to abuse.

.2 Use FRP Wall Protection Panels is permitted in Mechanical & Electrical Rooms, Service Rooms, Closets and other "Back of House" areas, or other public areas where additional abuse may occur.

.3 Provide wall protection in Student Residences with ½" plywood behind impact resistant gypsum wall board.

.4 Review the requirement to incorporate wall protection measures in Classrooms and other areas where walls could be subject to physical damage with the Manager, Architectural Design CPD&D, before completing the Schematic Design.

.5 Provide stainless steel corner guards at all exposed outside corners within circulation areas as well as all other areas where there is a high likelihood of impacts to corners.

.6 Provide stainless steel corner guards at all exposed outside corners within corridors leading to Mechanical and Electrical Room(s)

.5 Handrails:

.1 Interior handrails: stainless steel, to code requirements.

.2 Exterior handrails: galvanized, to code requirements.

.6 Special Requirements – Student Housing:

.1 Main Halls - Concrete block preferred, impact resistant drywall backed with ½" plywood may be considered.

.2 Vestibules / Exit Stairs / Kitchenettes - Concrete block. Kitchen corners to be open.

.3 Corridors - Concrete block preferred, impact resistant drywall backed with ½" plywood may be considered.

.4 Dorm Rooms / Lounges - Concrete block preferred, impact resistant drywall may be considered.

.7 Demountable Walls

.1 Consideration for demountable walls such as 'Trendway' or approved alternate as a solution where frequent change or quick construction is necessary. Sometimes difficult to achieve appropriate STC ratings with this wall type. Acoustic issue must be carefully considered, designed, and communicated to end user.

1.4 Building Interior – Floors and Floor Finishes

.1 Overarching Design Criteria:

.1 Reduce the overall number of distinct products and finishes to a minimum to minimize long-term maintenance costs.

.2 Reduce joints or seams in flooring to a minimum and locate as much as possible off high traffic zones.

.3 Propose the approach to selection and use of finishes to the Manager, Architectural Design CPD&D for approval as a part of the Design Development process.

.4 Carpet recommended manufacturers are Tarkett, Milliken and Interface.

.2 High Traffic Entries and Circulation Areas:

.1 Ceramic Tiles with Stainless Steel Sunken Floor Grates and Pan (less drains) for full extent of the entry where possible.

.2 Ceramic Tiles are to have a DCOR over 0.42 with due consideration given to manufacturer's recommended maintenance practices, durability, cleanability and resistance to salt and dirt.

.3 Size of Tiles shall be as large as possible; preferred minimum size is 300mm x 600 mm (12"x24")

.4 Use of Vinyl Composite Tile is not permitted.

.5 Walk-Off Carpet Tile (similar or equivalent to Abrasive Action by Tarkett); the final extent shall be identified in consultation with the Manager, Architectural Design, CPD&D before completing the Schematic Design.

.6 Resilient Flooring low VOC, non-wax, antibacterial recycled content minimum of 10%, heat welded seams and integral cove base may be considered with prior approval (at the Schematic Design Stage) from the Manager, Architectural Design.

.7 Draining floor grids or pedimats are not to be used.

.8 Install min floor drain per set of doors at an entrance vestibule with floors sloping to drain. (refer to mech for more details, need an elbow etc) Concrete floors are to be coated with latticrete or similar to protect any concrete from salt decay and deterioration.

.3 Stairs and Stairwells

.1 Provide photo-luminescent nosing in Exit Stairwells and Stairs in Classrooms with auditorium style seating.

.2 Exit Stairwells: Use of ceramic tile with Photo-luminescent Steel Pan Nosing Construction is acceptable.

.3 Special Requirements – Student Housing:

.1 Rubber treads and risers in stairwells

- One piece construction
- Circle dimple design for treads
- No grooves; only smooth

.4 Research Classrooms, Laboratories, Storage and General Offices:

.1 Resilient Flooring low VOC, non-wax, antibacterial recycled content minimum of 10%, heat welded seams and integral cove base where required, or

.2 Carpet Tile / Rolled Goods with 'powerbond' backing and 90% solution dyed / soil resistant material where appropriate for the application.

.1 Products requiring the use of an under pad are not permitted.

.5 Lecture Theatres, Seminar Rooms and Academic Offices:

.1 Carpet Tile (preferred) or Rolled Goods with powerbond backing and 90% solution dyed / soil resistant material where appropriate for the application.

.1 Products requiring the use of an underpad are not permitted.

.2 Chemically Bonded Carpet with prior approval (at the Schematic Design Stage) from the Manager, Architectural Design, CPD&D.

.1 Cut Pile Carpet, Printing Dyed Fiber and Olefin and Polyster Fibers are not acceptable.

.6 Animal Facilities

.1 Monolithic Epoxy Finish

.2 100 mm Cove Base

.7 Mechanical and Electrical Rooms, and Housekeeping Rooms & Closets

.1 Monolithic Epoxy Finish or sealed concrete

.2 100 mm Cove Base

.3 Positively sloped towards a Floor Drain

.8 Thresholds and Bases

.1 Base should be highly durable. Use Johnsonite Tightlock base when using carpet or sheet floor or ceramic tile when ceramic tile is the flooring of choice.

.2 Use of wooden baseboards is not permitted.

.3 Thresholds should be aluminum or other metal to match surroundings.

.4 Use of Fibreglass/Rubber/Plastic/Composite thresholds is an option. Confirm with the PR Project Manager.

.9 Special Requirements - Student Residences

.1 Carpet - Corridors (Secondary), Dorm Rooms, & Lounges:

.1 Carpet (rolled goods only) complete with powerbond, or equivalent backing, closed loop nylon, 90% solution dyed, 3.0 - 5.0 mm maximum pile height, and soil resistant.

.2 Colour/pattern must not show dirt and salt easily.

.3 100% of the carpeted area must be glued directly to the substrate, no underlayment allowed.

.4 Welded seams centered under doors.

.5 Layout carpet to minimize the amount of seams not in traffic routes. Traffic routes to use seams required to maximize strength and durability of carpet.

.2 Flooring - Entrances / Lobby / Info Desk Areas / Service Entrances / Exit Stairs:

.1 Porcelain / Ceramic tiles (colour pattern that does not show dirt and salt easily and has a high level of cleanability).

.2 Grout (non-sanded epoxy based) colour: colour that does not show dirt and salt easily and has a high level of cleanability.

.3 Walk off matting (Tarkett Abrasive Action, or equivalent) in traffic area to be installed for all year long use in line with tiles from main entrances to secondary corridors and elevators.

.3 Corridors (Main):

.1 Porcelain / Ceramic tiles (colour pattern that does not show dirt and salt easily and has a high level of cleanability).

.2 Grout (non-sanded epoxy based) colour: colour that does not show dirt and salt easily and has a high level of cleanability.

.4 Kitchenettes:

.1 Porcelain / Ceramic tiles (colour pattern that does not show dirt and salt easily and has a high level of cleanability).

.2 Grout (non-sanded epoxy based) colour: colour that does not show dirt and salt easily and has a high level of cleanability.

Or

.3 Maintenance free non-wax sheet flooring (Gerflor, Noraplan or equivalent) or commercial grade LVT.

.4 Anti-bacterial, Antistatic and fungicidal.

.5 100% of the area must be glued directly to the substrate, no underlayment allowed.

1.5 Building Interior – Washrooms

.1 General Requirements

.1 Standard washroom accessories shall be designed in accordance with the University's Custodial Standard. Refer to Section 2.9.

.2 Toilet partitions: Solid phenolic core partition, through bolted, stainless steel fasteners, floor to ceiling mounted, and laminated with high pressure laminated plastic sheets. No solid colours for laminate, must be flecked.

.1 Toilet partitions to be affixed at three points of contact: floor bolting, divider panel connection & overhead bracing.

.2 Only specify standard colour selections.

.3 Gender neutral washrooms must have full height partitions

.3 All washrooms to be complete with central floor drain.

1.6 Building Interior – Washroom and Shower Floors, Walls & Ceilings

.1 Floors

.1 Ceramic tiles, colour pattern that does not show dirt and soap scum easily and has a high level of cleanability, speckled tile preferred.

.2 Non-Sanded Epoxy Based Grout, colour that does not show dirt and soap scum easily, neutral colours preferred.

.3 Provide substrates complete with 'Hydro-Ban' or 'Kerdi', or equivalent, waterproofing system. System to be installed on entire floor area.

.4 Must slope to drain with a minimum 1% slope.

.5 Make joints between tile uniform and approximately 3 mm wide (or dimensioned to match tile joints as manufactured) plumb, straight, true, even and flush with adjacent tile.

.6 Do not caulk at the intersection of tiled walls, floors, and ceilings. Provide grout-filled seams.

.7 Tile floors preferred but non-wax / maintenance free sheet flooring acceptable in some cases with prior approval (at the Schematic Design Stage) from the Manager, Architectural Design, CPD&D.

.8 Proud or sharp edges on tile unacceptable.

.2 Special Requirements – Floors - Student Residences

.1 Door thresholds to be marble or travertine and be ½" above finished floor.

.2 Tile mandatory in all residences.

.3 Walls

.1 Ceramic tiles, solid colour, accents acceptable.

.2 Light coloured Non-Sanded Epoxy Based Grout.

.3 Substrate must be level, plumb, true and square. Use Kerdi-Board, or equivalent, system to accomplish this in locations where existing substrate is not level, plum, true and square.

.4 Kerdi Board, or equivalent, is to be the finished substrate surface. All patching and leveling to be done behind Kerdi Board. Fill any large voids with layers of Kerdi and parging, behind the final sheet of Kerdi.

.5 All corners complete with aluminum 'Schluter', or equivalent, trim, sized appropriately to the tile thickness. Using tile for corners may be acceptable with prior approval (at the Schematic Design Stage) from the Manager, Architectural Design, CPD&D. If approved, include a significant quantity of extra stock of these tiles.

.6 Full tile to be used at all locations if possible. If cut tiles are required they are only to be used on inside corners at the most conspicuous locations.

.7 Make joints between tile uniform and approximately 3 mm wide (or dimensioned to match tile joints as manufactured) plumb, straight, true, even and flush with adjacent tile.

.8 Tile walls preferred but epoxy painted moisture resistant drywall acceptable in some cases with prior approval (at the Schematic Design Stage) from the Manager, Architectural Design, CPD&D.

.1 At a minimum, half height wall tile to support an easier cleaning process is preferred.

.9 Proud or sharp edges on tile unacceptable.

.4 Ceilings

.1 In wet areas Ceramic tiles, solid colour, Light coloured Non-Sanded Epoxy Based Grout.

.2 Drywall ceilings are acceptable, painted with epoxy paint

.5 Washroom Vanities

.1 Solid Surface Countertops: DuPont "Corian", Formica or Wilsonart, (or equivalent) non-porous filled polymer through body colour, Solid grade, 13 mm minimum thickness. No solid colours, must use flecked.

.2 38mm high applied front edge nosing; 6mm radius top and bottom edge profile.

.3 152mm high applied matching backsplash and end splash at adjacent walls c/w 6mm radius top edge profile.

.4 19 mm waterproof Fir ply substrate fully adhered to solid surface countertops.

.5 All solid surface countertops to be fabricated as one piece, without surface seams. Provide integral or undermount sinks.

.6 When floating, mount on steel support system. If in wet area, steel must be stainless steel.

1.7 Building Interior – Ceiling Systems

.1 General Requirements

.1 Gypsum Wall Board or Lay-in Acoustic Tile:

.1 Acoustic Tile installed within a 600 mm x 1200 mm grid. Use of 600 mm x 600 mm tile shall be limited to "feature spaces" and shall be identified and presented for approval by the Manager, Architectural Design before completion of the Design Development phase.

- Use of Acoustic Tile is not permitted in Washrooms.

.2 Grid suspension systems supported off the building structure

- Edge molding, 28 gauge, cold-rolled steel angles, galvanized and prefinished on exposed surfaces in baked-enamel, white.
- Framing: 28 gauge, cold-rolled steel tees, galvanized and prefinished on exposed surfaces in baked-enamel, white.

.2 Ceiling Systems shall be arranged to provide ready access to services above.

.3 Use of Clipped Ceiling Tiles (as a means of fire separation) is not permitted.

.4 Suspended Ceiling to be plumb and square with adjoining work, main tees as long as practical to minimize joints.

.5 Oversize tiles are not permitted.

.6 Acceptable solutions include:

.1 Armstrong; 763D; Georgian. Size: 24" x 48" (2' x 4')

.2 Armstrong; 769AN; Cortega Square Lay-In. Size: 24" x 48" (2' x 4')

.3 Armstrong; 755B; Fine Fissured (NRC-rated). Size: 24" x 48" (2' x 4')

.4 Armstrong; 1729AN; Fine Fissured Square Lay-In. Size: 24" x 48" (2' x 4')

.5 Armstrong; 1773A; Dune, Fine Texture. Size: 24" x 48" (2' x 4")

.7 Alternates must be presented for approval to the PR Project Manager and Manager, Architectural Design before completing the Design Development phase.

.2 Special Requirements – Ceiling Systems - Student Residences

.1 Main Halls / Vestibules / Exit Stairs / Corridors / Lounges / Kitchenettes - Painted concrete, impact resistant drywall or Lay-In washable/cleanable tile within a 600mm x 1200MM grid. Grid size may be changed based on space and design requirements if approved by the Manager, Architectural Design CPD&D, at the Schematic Design Stage.

.2 Dorm Rooms - Impact resistant drywall.

.3 Provide recessed heads for all sprinklers in dorms. Refer to Section 4.1.

.4 Provide blackout drapery in residential spaces, and / or a 3% fabric shade to reduce glare within spaces with windows.

1.8 Building Interior – Partitions

.1 General

.1 Block walls shall be the partition type for areas requiring durability and/or sound transfer.

.2 Gypsum Board Assemblies typically 16mm thick for partition applications / 13mm acceptable for fascia's, soffits and suspended ceilings.

.3 Design assemblies to provide sound control ratings as appropriate: offices requiring acoustical privacy extend wall to underside of slab minimum STC52, Washrooms extend wall to underside of slab and STC 47 to 52 depending on adjacencies. Classrooms extend to underside of slab minimum STC 52.

.4 In the case of renovations, the following shall be considered.

.1 The extent of firestopping is to cover entire project area, i.e. any penetrations in rated walls in project areas are to be firestopped not just new penetrations required by the scope of the project.

.2 Special Requirements – Partitions - Student Residences

.1 Main Halls - Concrete block preferred, impact resistant drywall backed with ½" plywood may be considered.

.2 Vestibules / Exit Stairs / Kitchenettes - Concrete block.

.3 Corridors - Concrete block preferred, impact resistant drywall backed with ½" plywood may be considered.

.4 Dorm Rooms / Lounges - Concrete block preferred, impact resistant drywall may be considered.

1.9 Building Interior – Painting

.1 General

.1 As outlined in the University's Painting Standard. Refer to Section 3.4.

1.10 Building Interior – Doors, Frames and Hardware

.1 General

.1 In the case of renovations, all doors, frames and hardware shall match the existing building standards.

.2 All Doors are to be industry standard door width sizes, according to code. Height is 7'-0" standard. Where wider doors are required due to equipment using a second leaf is preferable over an oversized door. Doors taller in height must be approved by the Manager, Architectural Design, CPD&D before completion of the Schematic Design, and must have an anchor in frame every 2'-0".

.3 Avoid use of glass in bottom ½ of door for buildings where vandalism could be more prevalent.

.2 Exterior Doors and Frames

.1 Main and Secondary entrance doors shall be heavy duty (at least 16 Gauge) commercial doors with reinforcements for all hardware: closers, locks, exit devices, butt hinges and power operators.

.2 Exterior aluminum frames shall be reinforced for hardware: butt hinges, continuous hinges and strikes.

.3 Bronze is standard and Bright or Deep Colors are not permitted without prior approval from the Manager, Architectural Design, CPD&D.

.4 Wood Doors (painted or stained) are not permitted except in instances where required to preserve historical character.

.5 Double door sized openings shall use a keyed removable center mullion.

.3 Interior Doors and Frames

.1 All doors shall be Solid Core type. Use of Hollow Core or Alternate Types shall be submitted for the approval of the Manager, Architectural Design, CPD&D before completion of the Schematic Design.

.1 Where permitted, Hollow Core Doors shall be Commercial Grade, with core and hardwood stile specifications to be suitable for application.

.2 Quality of doors and frames to be sufficient to provide security to rooms, with consideration given to fire rating, acoustical or special requirements.

.3 Do not design doors which void guarantee because of oversized cut outs or insufficiently sized stiles and rails.

.4 Add vision panels or side panel windows in doors for offices, seminar rooms, etc. for security and visibility.

.2 Finishes should be Flush wood with catalyzed lacquer, Plastic Laminate, factory finish paint.

.3 Welded and ground frames 16 gauge minimum, knockdown frames to be avoided, no wood frames or trim materials to be used. Provide minimum three anchors for standard door height frame.

.4 Transom and side panels provide similar quality and appearance to doors.

.5 The use of operable partitions is to be considered only where budget allows a heavy duty commercial wall with warranty that is easy to operate. Only to be used where necessary and a performance specification shall be submitted for review during the design development phase.

.6 In cases where doors are subject to high abuse, extra attention is to be paid to door construction and profile.

.7 All steel doors to be stiffened at edges.

.4 Hardware

.1 All Hardware shall be as per the University's Hardware Standard.

.2 Supply, installation, and keying by contractor

.5 Fire Shutters

.1 All fire shutters will terminate at a low wall or counter, any fire shutter that must terminate at the floor must be brought to the attention of manager architectural.

.6 Special Requirements – Doors - Student Residences

.1 Solid core laminated, all edges to be sealed, piano hinges recommended.

1.11 Signage

.1 General

.1 All interior and exterior signage must conform to the University of Guelph Signage Standards. If in existing building interior signage must match existing standard in that building or replace a logical area to avoid piecemeal signage systems. Refer to Section 3.5.

.2 Any film or graphics on exterior windows must be approved by manager CPD&D.

.3 City of Guelph Sign By-Law compliance is required for those projects requiring Site Plan Approval with signage within 50 metres of the property line.

.1 Link to City of Guelph By-law: https://guelph.ca/wp-content/uploads/Sign-Bylaw.pdf

.2 University of Guelph Standard signage is exempt.

.2 Life Safety Plans

.1 Consultants are to provide Life Safety Plans as part of the closeout process.

.2 Life Safety Plans are an item the University of Guelph has introduced as part of the signage plan to meet the regulations under the Ontario Fire Code and authorities having jurisdiction. Our policy at University of Guelph is to post a plan as described below at all major entry points to building and at all levels where vertical circulation enter a floor. There may be exceptions to posting locations but all are to follow the general rule of being a quick and easily found guide to building features.

.3 Simplified Plans:

.1 Remove Elevators and Stairs details, add icons

.2 Corridors and circulation are shaded yellow

.3 Icons are added and inventoried to ensure accuracy

.4 Locations/Quantities for plans need to be determined then correct orientations generated. Signage service provider can put 'you are here' dot on plans and typically prefer .jpg or .pdf type files. This inventory complete with orientations should be updated on Life Safety Plan tracking spreadsheet.

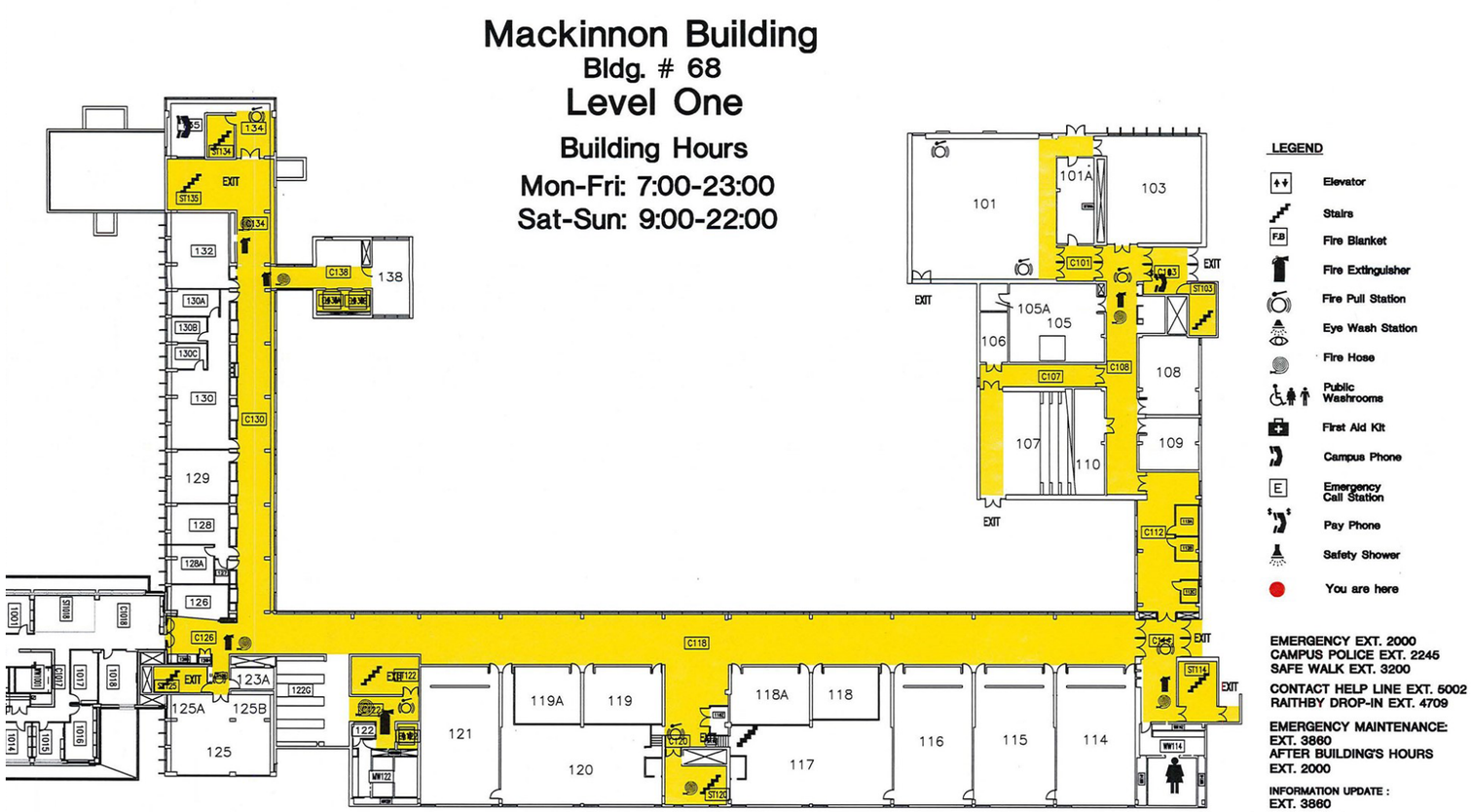
.5 Holders for these signs should follow building standards and generally would be Vista for lobby signs then Vista or a simple acrylic sleeve for subsequent locations and floors as best suited to project. In aggressive environments (Student Residences) or high quantity situation printed vinyl decals on metal panel is viable option.

.6 Size - Typically these plans will be 11" x 17" or 18" x 24" as the project requires.

.7 Layout – Emergency contacts should be lower right hand corner with a box around, building information at bottom of drawing, legends at right or bottom depending on what works with plan size and building layout.

.8 Contacts may be added but should be vetted with client contact to ensure accuracy. Should include at minimum: Emergency ext., campus police ext., safe walk ext., Possible Others: Emergency Maintenance, Building Contacts.

.4 Example Life Safety Plan:



1.12 Millwork

.1 General

.1 Design and fabricate all architectural millwork to AWMAC Millwork Standards premium grade. Avoid built-in millwork where a furniture solution would provide more long-term flexibility.

.2 Use 110º hinges where door opens adjacent to wall; 170 º hinges where there is no adjacent wall.

.3 Provide edge banding to all edges exposed, matching colour in 3mm PVC.

.4 Drawer Slide: heavy duty ball bearing telescopic slides.

.5 Adjustable standards and clips to be metal.

.6 Acceptable substrates are plywood, MDF and OSB to be specified dependent on application. All exposed surfaces should be finished in plastic laminate interiors of millwork are permitted to be melamine.

.7 In high humidity or wet areas marine grade plywood substrate preferred.

.2 Laboratories

.1 Laboratories shall be designed in accordance with the University's Laboratory Standard.

.2 Laboratories for animals shall be designed in accordance with the University's Vivarium Standard.

.3 Bench-tops – Dry Labs & Biology Labs: Chemical resistant P-Lam with plywood substrate.

.4 Bench-tops – Wet Labs & Chemistry Labs: Solid phenolic or epoxy top. Use of Chemical resistant P-Lam with plywood substrate is permitted only with the prior approval of the Manager, Architectural Design. Provide solid substrate for machinery as required.

.5 Bench-tops shall be designed with marine edges and drip stops to aid containment of spills.

.6 Bench depth standardized at 30" unless otherwise required for the application. All non-standard sizes shall be brought to the attention of the Manager, Architectural Design CPD&D before completion of the Design Development phase.

.7 Base Cabinets

.1 Configured with a 50/50 split between Doors and Drawer Units.

.2 Door hardware to permit 180º opening and not be self-closing.

.3 Drawers shall be one piece construction, full extension, ball bearing slides and stops to keep the drawer from being pulled out of its carcass.

.3 Adjustable Wall-mounted Shelving

.1 Size and construct shelves of a gauge or thickness selected to suit the intended application.

.1 Support all shelving on 24" centers.

.2 Supports shall incorporate a double pilaster arrangement.

.2 Shelving over bench-top equipment shall be designed to support the weight of equipment that it could be expected to support.

1.13 Furniture & Specialties

.1 General

.1 Furniture must be part of the planning process and presented for the approval of the Manager, Architectural Design, CPD&D before completion of the Schematic Design.

.2 Furniture and furnishings must be functionally efficient, compatible, and economical to replace/ add to with good life cycle value. Public spaces, especially those outside of classrooms, are to have furnishings that allow use but are difficult to vandalize or move from their location.

.3 In the case of renovations, new furniture shall blend in with and meet the standards benchmarked by the existing furniture.

.4 Demountable walls should be considered as an alternative in spaces where flexibility is a primary concern but maintenance issues need to be evaluated and client made aware of maintenance costs.

.5 On all new construction projects and renovations larger than 5000 sq. ft., a furniture consultant shall be engaged to facilitate the furniture selection, design & layouts. Conceptual furniture layouts shall be presented for review to the Manager, Architectural Design no later than at the 50% Design Review stage.

.6 Furniture layouts shall be coordinated with the Mechanical & Electrical installations.

.7 Refer to classroom Section 3.8 for specific furniture requirements.

.2 Window Coverings

.1 A Roller-shade is the preferred product for window coverings, Hunter Douglas or equivalent quality. Heavy Duty Clutch Operated Control System, engineered heavy duty chain drive pully operating system with adjustment-free continuous T304 stainless steel ball chain with 110 lbs. breaking strength, standard loop length as long as shade. Chain tensioner to be compliant with WCMA safety standard, components will be maintenance free from adjustments or lubrication, heavily reinforced aluminum roller tube and extruded aluminum weight in a sealed pocket hem bar for tracking adjustments and uniform look. Typically 3% or 5% openness with blackout capability where required by the functional use in neutral colours. Consideration to uniformity of appearance from exterior of building should be given.

.2 Special Requirements – Student Housing

.1 Curtains will be considered and sometimes mandatory, review on a project by project basis. If curtains selected, must be easily removable, washable and pre-shrunk lined cotton

.3 Whiteboards & Bulletin Boards

.1 Whiteboards must be P3 ceramic steel porcelain enamel, or 28-gauge steel boded to a minimum of ½" thick. MDF core with an aluminum back – bonding material shall be waterproof. Alternate: Glass writing boards may be used.

.2 Bulletin boards shall be Forbo or approved alternate (fire rating) and that bulletin board may not exceed 25% of wall area that is resides on.

2 Installation & Workmanship Standards

2.1 General

.1 The requirements outlined in the following clauses are applicable to all Architectural elements.

.2 All joints between tile to be uniform and approximately 3 mm wide (or dimensioned to match tile joints as manufactured) plumb, straight, true, even and flush with adjacent tile.

.3 ACT to be affixed to wall at edges of space

.4 Window shades are to be installed with proper anchor and appropriate length of anchor. Anchors are never to be snipped off.

.5 Brick and Stone & Ceramic Tile shall have sample panels constructed as a part of the construction process for approval of workmanship and materials.

.6 Provide mock-ups for all exterior wall assemblies.

2.2 Carpet Seaming / Laydown Practices

.1 Seaming diagrams shall be provided prior to commencing installation.

.2 Minimize seams in high traffic areas.

.3 Where possible, position seams under doors.

2.3 Roller Shade Installation

.1 Anchor to support minimum every 2' of shade but at least 3 points in accordance with manufacturers standards and specifications with heavy duty bracket, 1/8" thick hardened steel. Adequate clearance shall be provided to permit unencumbered operation of shade and hardware.

2.4 Wall-Mounted Systems

.1 Blocking shall be provided in walls to support wall-mounted furniture & systems.

2.5 Extra Inventory

.1 After review with applicable stakeholders and user groups, present an inventory list for extra stock (product and quantity) to the Project Manager and Construction Manager for consideration prior to release of tender documents. For each item presented, provide strong reasoning on the need for said item to be stocked. This list shall be prepared giving consideration to the following:

.1 Likelihood that the inventory material will be required in the short term (1 - 9 years) and long term (10 - 20 years).

.2 Amount and application and any applicable warranties of the product

.3 Availability and procurement lead

.4 Cost

.2 No paint, adhesives, caulking, grouts, or similar type products are to be stocked. Mechanical and Electrical items shall be itemized to evaluate whether the University already stocks said components.

.3 For all items that are accepted as Stock Inventory, such as flooring, the user groups must provide an area within the project building to store the items. Physical Resources is not responsible for extra inventory.

3 Material Handling

3.1 Loading Areas:

.1 Loading Areas:

.1 Accommodate vehicles up to 30’ truck trailer length. Accommodate standard garbage trucks as needed per section 2.8.

.2 Accommodate commercial delivery vans up to 264” length, with a height of 110.2” and 97.4” width.

.3 Provide turning circles, gates or bollards as required by Transportation Services.

.4 Arrange loading areas for clear visibility and provide security and surveillance of the area.

.5 Clear access, turning circles, and ways to back up the area for the vehicles serving the loading area.

.6 Route pedestrians away from loading areas.

.2 Loading docks themselves should include the following:

.1 Dock Leveller.

.2 Dock Bumpers.

.3 Overhead door (coiling or other), with electrical controls.

3.2 Doors:

.1 Refer to Section 3.3 for door sizes, and materials.

.2 Refer to Section 3.10 for door hardware requirements.

.3 Size doors for equipment and other item delivery according to the activity programmed.

.4 Provide double doors with removable astragals for delivery of items, whether for servicing or to accommodate the Hospitality department.

.5 For existing buildings with existing non-conforming doors, review with the Project Manager, CPD&D

4 Inventory Control

4.1 Stockroom items:

.1 The University has stock items that they keep on hand for maintenance, repair, and replacement parts. These items include the following:

.1 Smaller plants and trees.

.2 Doors and hardware.

.3 Faucets, sinks and toilets.

.4 Various floor finishes for replacement.

.5 Ceiling tiles.

.6 Paint.

.2 For small to medium renovations, match existing materials within the existing building, and confirm with the Project Manager CPD&D if

.3 For new buildings and additions, consider the tree inventory plan outlining the layout of large trees on campus

5 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural Painting

1 General Requirements

1.1 General

.1 Painting guidance is listed below. Consultants are expected to align painting specifications with the Sustainability direction outlined in Section 2.2.

.2 This section includes activities performed by the trades and vendors. Consultants are to include these requirements in their Contract and Tender documents, and review all submittals, including warranties, for the correct information.

.3 Supply CO2 emission information via EPDs for all products listed.

1.2 Design

.1 If work is occurring in an existing building contact CPD&D for existing painting colour standards for building.

.2 Accent colours:

.1 Limit the number of accent colours used in the overall design.

.2 Avoid deep saturated accent colours in high traffic areas to minimize maintenance. Alternatively, specify a more resilient paint product, such as scuff master for easier cleanability.

.3 Minimize accent colours in offices.

.3 Consultants should pay attention to colour theory to avoid specifying colours that would escalate or otherwise cause harm.

1.3 Painting General

.1 The Painting Contractor will produce a 'Properly painted surface.' A properly painted surface is defined as uniform in appearance, color, texture, hiding and sheen. It is also free of foreign material, lumps, skins, runs, sags, holidays, misses, or insufficient coverage. It is also a surface free of loose, chipped, broken or bubbled paint, as well as drips, pin holes, spatters, spills or overspray whether or not caused by the Painting Contractor's workforce.

.2 Specify the appropriate Surface Preparation requirement for project. Level 4, Supreme, is recommended.

.1 Level 1 - Basic:
This surface preparation level requires basic cleanliness of surfaces to ensure the adhesion of new finishes to the surfaces to which they are applied with less concern for the adhesion of existing paint coats and quality of appearance of the finished surfaces. Preparation shall include the removal of surface dust, dirt, obvious loose paint and other surface contaminants by washing, light power washing or pressure washing, hand cleaning, including the use of a duster brush or broom, and mildew treatment. This level of preparation should ensure that subsequently applied coats of paint will adhere to existing paint coats.

.2 Level 2 - Standard:
This surface preparation level requires basic cleanliness of surface to ensure the adhesion of new finishes to the surfaces to which they are applied as well as the examination of existing coatings to assess their adhesion. With this level of surface preparation, good adhesion and longevity of finish is of primary concern and appearance is of secondary concern. This level of surface preparation includes that described in Level 1 plus other procedures necessary to create a sound surface for repainting including solvent cleaning, basic patching/filling, caulking, light sanding/abrading, and "feather edge" sanding.

.3 Level 3 - Superior:
The level 3, superior, surface preparation level incorporates the requirements of Levels 1 and 2 with added emphasis on the quality of appearance of finish painted surfaces. This level of surface preparation includes filling, patching, taping cracks in drywall, and properly dealing with "nail pops," approximate matches to existing textures, and thorough sanding to minimize existing runs, sags, brush/roller marks, and the surface profile of cracked and peeling areas, and other existing surface defects. Under this level of preparation the general surface profile is retained but defects causing abrupt surface profile differences exceeding 1/16 inch or 62.5 mils will be corrected.

.4 Level 4: Supreme:
The Level 4, supreme, surface preparation level incorporates the requirements of Levels 1, 2 and 3 with even more emphasis on the quality of appearance of finish painted surfaces. Under this level of surface preparation, all necessary preparation techniques will be employed to improve the quality of appearance except Restoration/ Resurfacing. Thorough filling and sanding will be accomplished to eliminate defects causing abrupt surface profile differences exceeding 1/32 inch or 31 mils.

.5 Level 5 - Restoration/Resurfacing:
This degree of surface preparation is required when existing conditions indicate that the surfaces are severely deteriorated or there is substrate damage. Existing coatings may be completely or nearly completely removed. Abrasion, chemical removers or applied heat may be employed in order to remove a failed coating and/or to expose a failing substrate. Substrates may have to be completely replaced, repaired or resurfaced.

1.4 Definitions

.1 CRACKS: For the purpose of this standard: A break in the substrate and/ or surface which can result in a subsequent break in the paint film.

.2 HOLIDAYS: Application defects whereby small areas are left uncoated.

.3 NORMAL VIEWING POSITION: For the purpose of inspection a normal viewing position shall be at eye level at a minimum of thirty-nine (39) inches or one (1) meter from the wall. Inspection lighting can be used as defined in this standard.

.4 OVERSPRAY: The paint that did not hit the intended surface during a spray application. This can appear as small raised specks around the area sprayed and can give a halo effect on smooth surfaces. [MPI] Spray particles that are not wet enough to fuse when they reach the surface being sprayed. As a result, overspray may contaminate property beyond the surface being sprayed.

.5 PIN HOLE: A minute hole in a paint film that resembles a pore or pin prick, often due to improper solvent release during drying or the trapping of air or gas in the film during setting.

.6 RUNS: Narrow downward movement of a paint film resulting in an irregular surface.

.7 SAGS: A coating irregularity similar to runs but often broader in scope.

.8 DEVIATION: Completed work that is not in accordance with the specification requirements.

.9 AGGRESSIVE ENVIRONMENT (CONDITION): Examples include but are not limited to: frequent chemical exposures (splash, spillage, fumes), immersion service, secondary containment service, high heat service, marine service and geographic regions with wide temperature ranges, prolonged exposure to ultraviolet rays and high humidity.

.10 AS REQUIRED: A term requiring no action on the part of the Painting and Decorating Contractor unless directed through references in the plans and specifications.

.11 DEFECTIVE: Subnormal with respect to written specifications.

.12 DEVIATION: Completed work that is not in accordance with the specification requirements.

.13 HIDING (Hiding Power): The degree or ability of an opaque coating, applied in a uniform film, to cover, mask or obscure the substrate to which it is applied, or the colors underneath. Hiding power is provided by the paint's pigment.

.14 NONCOMPLIANT: Deficiency in characteristic, documentation or procedure that renders quality of an item unacceptable or indeterminate.

.15 PROPERLY PAINTED SURFACE: A surface uniform in appearance, color, texture, hiding and sheen. It is also free of foreign material, lumps, skins, runs, sags, holidays, misses, or insufficient coverage. It is also a surface free of drips, spatters, spills or overspray caused by the Painting and Decorating Contractor's workforce.

2 Submittals

2.1 General

.1 Provide pain drawdowns prior to any painting.

.2 Consultants, in coordination with the contractor(s), are required to submit records of the final products used. This information to be submitted to the Manager, Architectural Services, separate from the close out documentation. List products in relation to finish system which at a minimum will include the following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour number and name.

.4 Sheen.

.5 Point of Purchase.

.6 Floor Plan(s) showing placement of all colours.

.7 EPDs that clearly indicate all CO_2 emissions.

3 Quality Assurance

3.1 General

.1 Avoid painting raw interior or interior wall or column concrete. Provide an alternate substrate using other methods such as vinyl stickers or fasted panels instead.

.2 If sprayed, all walls and ceilings must be back-rolled on final coat.

.3 Apply paint using brushes and rollers of high-quality grade and as appropriate for the task.

.4 Existing glossy painted surfaces shall be properly prepared by cleaning and de-glossing.

.5 Patch Painting will not be acceptable, total affected area shall be painted. Terminate painting only at corners or joints.

.6 The paint contractor is responsible for protection of all adjacent surfaces. The contractor shall at all times protect those surfaces with approved materials.

.7 Enamel and varnish undercoats are to be sanded smooth prior to the re-coating. Tops and bottoms of wood and metal doors are to be finished in the same manner as door facing.

.8 New plaster and other masonry surfaces shall not be primed until it has been determined these substrates have dried sufficiently to safely accept paint. Unacceptable moisture content should be reported by appropriate authority.

.9 No exterior painting shall be undertaken if air or surface temperature is below 100 C or immediately following rain or until frost, dew or condensation has evaporated.

.10 Paints, stains, and coatings shall be specifically manufactured for the intended use.

.11 The final coats to exhibit uniformity of colour and uniformity of sheen across the full surface area.

.12 Ensure compatible paint products are being used on all surfaces.

.13 All walls and ceilings, new or existing shall receive at least two finish coats of the specified paint.

.14 Cleaning - Specifications will convey the obvious, especially when it comes to cleaning before painting.

.15 The paint contractor is responsible for a complete and thorough clean-up of the areas and items painted. Over paint, splatter and spills will be completely removed prior to inspection of the work.

.16 Caulking:

.1 The application of painter's caulk assumed within the scope of work:

.1 Joints between wood or wood composite materials, trim, baseboard, molding, and casements. These joints include and are limited to wood to wood or wood composite substrates, and wood to gypsum drywall, plaster or similar wall surfaces. These joints shall only be between field painted surfaces.

.2 The application of painter's caulk not within the scope of work:

.1 Surface defects, cracks, joints, voids or holes greater than 1/8 inch (3.18mm) wide, deep or across in wood, masonry, gypsum drywall, plaster or any other substrate.

3.2 Mock-ups

.1 Consultants to request Benchmark Sample(s) are established utilizing full scale, on-site surface areas, prepared using the complete specified or approved paint, coating and/or decorative system. Include surface preparation, and the application of the primer, intermediate, finish coat and touch-up materials.

.2 Consultants to define the recommended Benchmark Sample area(s) in the bid documents. Clearly define the specific number, placement and size of samples in the bid documents.

.3 Contractors to leave exposed a sampling of the approved substrate, before and after any specified surface preparation for the system.In order to determine whether a surface has been "properly painted" it shall be examined without magnification at a distance of thirty-nine (39) inches or one (1) meter, under finished lighting conditions and from a normal viewing position.

4 Surface Preparation

4.1 General

.1 Clean substrate surfaces free from dust, grease, soiling, or extraneous matter, which are detrimental to finish.

.2 Patch, repair, and smoothen minor substrate defects and deficiencies, e.g. machine, tool and sandpaper marks, shallow gouges, pin holes, marks, and nibs.

.3 Clean, sweep, and vacuum floors and surfaces to be painted, debris and dust free prior to painting.

.4 Remove all rust, scale, loose paint and other deleterious matters from existing surfaces which require re-painting. Thoroughly clean and prepare such surfaces to accept positive and permanent bond of new paint finish. If such preparation exposes bare surface, provide touch up primer.

.5 Where finish hardware has been installed, remove, store, and re-install finish hardware to accommodate painting. Do not clean hardware with solvent that will remove permanent lacquer finishes.

.6 Clean existing cementitious surfaces by pressure washing, indicate on drawings, with a TSP solution and pressure range of 1500 - 4000 PSI at 6 - 12". Rinse areas with clean water and allow to thoroughly dry. Provide for collection and disposal of water.

5 Products

5.1 General

.1 For some areas, Architectural Services has a list of standard colours by building. Ensure these lists are consulted prior to producing finish schedule. The colours on the list do not exclude the use of other colors as may be appropriate for a specific project, with prior approval of the Manager, Architectural Services, CPD&D.

.2 Paint materials for paint systems shall be products of a single manufacturer.

.3 The following manufacturers shall be used unless otherwise approved by the Manager, Architectural Services:

.1 Sherwin Williams

.2 ICI

.3 Benjamin Moore

.4 Any proposed substitution must be available in the Guelph and surrounding area and approved by the Manager, Architectural Services, CPD&D.

.4 No extra paint to be kept on site or turned over to owner upon project completion.

5.2 Finish

.1 Surfaces previously painted in Alkyd based product shall be painted over with similar based product or appropriate primer.

.2 Sheen - The following is a list of recommended sheens, any changes must be approved by the Manager, Architectural Services.

.1 Eggshell – walls

.2 Semi-gloss – all trims, doors and high traffic surfaces.

.3 Student Residences – All areas to be painted in semi-gloss.

.4 Ceilings - Low sheen or flat

.3 Interior Paint

.1 100% Acrylic painting to be generally used.

.2 Epoxy and alkyd painting to be approved by Manager, Architectural Services under special circumstances.

.3 Minimum one (1) coat water base primer/sealer, two (2) finish coats on all surfaces.

.4 Doors, metal frames, railings:

.1 Preparation - To wash with TPS (Trisodium Phosphate) all the surfaces and sand. Surfaces preparation to be done adequately to obtain best performance.

.2 Primer - 1 coat, Sherwin Williams, Acrylic, Preprite, Bonding Primer, Interior/exterior, Adhesion Promoting Primer, B51W50 or ICI Paints, Acrylic, ICI X-Pert 250 Gripper, or equivalent system.

.3 Finish - 2 coats minimum, 100% acrylic, semi-gloss finish.

.5 Other paint materials such as linseed oil, shellac, turpentine, etc. shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.

6 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural Signage

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1 General

1.1 General

.1 All interior and exterior signage must conform to the UofG Signage Standards. If in existing building interior signage must match existing standard in that building or replace a logical area to avoid piecemeal signage systems.

.2 Any film or graphics on exterior windows must be approved by manager architectural.

.3 City of Guelph Sign By-Law compliance is required for those projects requiring Site Plan Approval with signage within 50 metres of the property line.

.4 Link to City of Guelph By-law: https://guelph.ca/wp-content/uploads/Sign-Bylaw.pdf

2 UofG Branding

.1 It is important to the campus experience to have consistent signage that fits within the UofG Brand Guide.

.2 For the most current UofG Brand Guide: http://www.uoguelph.ca/brand-guide/

.3 Please follow this link to determine best practices for:

.4 Logo

.5 Colours

.6 Fonts/type styles

.7 Brand voice

.8 Messaging

.9 Imagery

.10 Accessibility

.11 Other resources

2.2 Text Visibility Chart

Maximum Readable Distance	Readable Distance for Max. Effect	Letter Height
100'	30'	3"
150'	40'	4"
200'	60'	6"
350'	80'	8"
400'	90'	9"
450'	100'	10"

*Text sizes are to be used as guidelines only. Size should be looked at in context with function in mind when text height is determined.

3 Signage Design, Principles & Standards

.1 All signage requests to come to Physical Resources and be initiated through a work order, see Physical Resources website for details www.pr.uoguelph.ca

3.1 Exterior:

.1 Major Entries: UofG identifier stainless steel signs

.2 Secondary Entries or Features: to be built into feature walls as engraved back painted stone.

.3 Major Spaces: courtyards and gardens may have stainless steel dimensional Lettering, pin mounted in space as appropriate. See Exterior signs.

.4 Window Treatments:

.5 Etched/Frosted look - may be used for certain areas, department identification and logos.

.6 Must be reviewed with Physical Resources for permissible applications

.7 Full colour graphics, perforated vu thru, wraps and logos - are not permitted.

.8 To maintain quality and consistency, all signs need to adhere to the guidelines and drawings contained in this document. If the proposed sign is to deviate from the signage depicted herein, the design needs to be developed through Physical Resources, Design, Engineering and Construction, Architectural Services (PR Project Manager, DEC, Arch. Service). In consultation with Communications and Public Affairs.

3.2 Interior:

.1 Standardizing interior signs in important to maintain consistency and establish a familiar sign that is easily recognized by the UofG Community to easily identify interior room numbers, departments, washrooms, donor naming, etc. New or additional signage in existing buildings will follow standards as listed in this document. Convex sign system should replace all old sign systems wherever possible.

.2 All new buildings will employ the current convex system, and the proposed interior signage package is to be reviewed by PR Project Manager.

.3 All main entries will have a full colour life safety map and directory as appropriate. Where upgrades occur in existing buildings with older signage systems, typically with 10 or more signs in a general area, the replacement would be the convex system detailed in this document. Life safety maps to be updated with any major renovations or additions. Main internal directional signage will be done in the convex system.

3.3 Digital, electronic or illuminated signage:

.1 All digital signage must be developed with Kevin Jinde kjinde@uoguelph.ca

3.4 Naming Policy

.1 All Naming must adhere to the UofG Board of Governors Naming of Facilities Policy approved, Dec. 2nd, 1999, ie. the Board of Governors shall govern the naming of University of Guelph facilities to their set criteria.

.2 All buildings should be clearly named at their main entrances, preferably at the edge of the walkway. Where large buildings have more than one important entrance (or where faculties share buildings but use different entrances) these should also be signed, but less prominent. Building numbers should not be posted as a part of signage. Building naming has to be approved by PRPC in accordance with the policy. 'New' should not be used in the name of a Building and 'Building' is typically not used. Naming department or unit is to be avoided as this changes too frequently. Any change affects printed maps, sign maps, lists and information with City of Guelph.

3.5 Life Safety Plans

.1 Refer to Section 3.3.

4 Signage Package

.1 What follows is the UofG signage package which will soon be updated with the UofG Brand Guide updates.

5 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
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Interior Way Finding

Primary Sign System - Aluminum Convex and Auxiliary Signs



SIGN 1



SIGN 4



SIGN 4A



SIGN 6, 6A



SIGN 8



SIGN 9



SIGN 7



SIGN 10



SIGN 2a



SIGN 2b



SIGN 3



SIGN 3A



SIGN 5

Secondary Sign System - Acrylic

used for matching existing systems where necessary















Primary Sign System - Aluminum Convex and Auxiliary Signs



SIGN 1



SIGN 4



SIGN 4A



SIGN 6, 6A



SIGN 8



SIGN 9



SIGN 2a



SIGN 2b



SIGN 3



SIGN 3A



SIGN 5

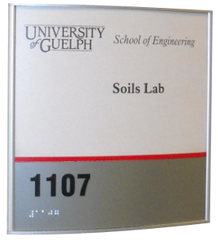


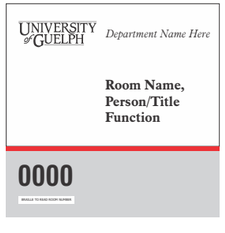
SIGN 7



SIGN 10

Office/Room - Sign 1





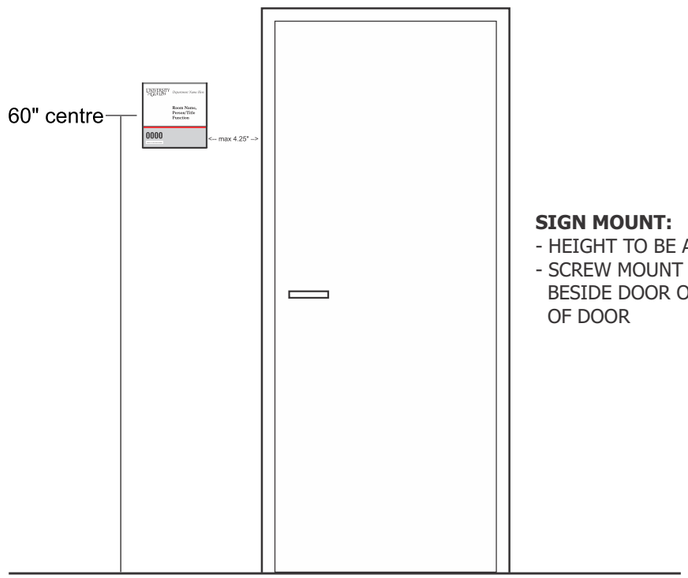
aluminum end caps - top/bottom

top portion:
printed paper insert 8.5" w x 5.625" h
logo top left as shown
font: Aldine 401BT as shown
clear non glare plexi cover 8.5" w x 5.68" h

red gravograph separator strip 8.5" w x 3/16" h
(note: strip alternate color black for library only)

bottom portion:
8.5" w x 2.62" h
black tactile room number - Helvetica narrow bold
Clear Braille room number, below tactile
on 29900 silvery/gray Gravograph

NOTE:
replacement separator strips, top or bottom inserts
can be ordered separately as required



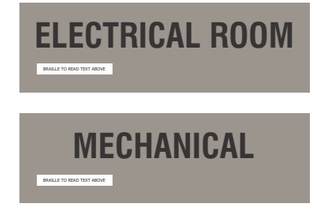
SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- SCREW MOUNT TO WALL SURFACE BESIDE DOOR ON HANDLE SIDE OF DOOR

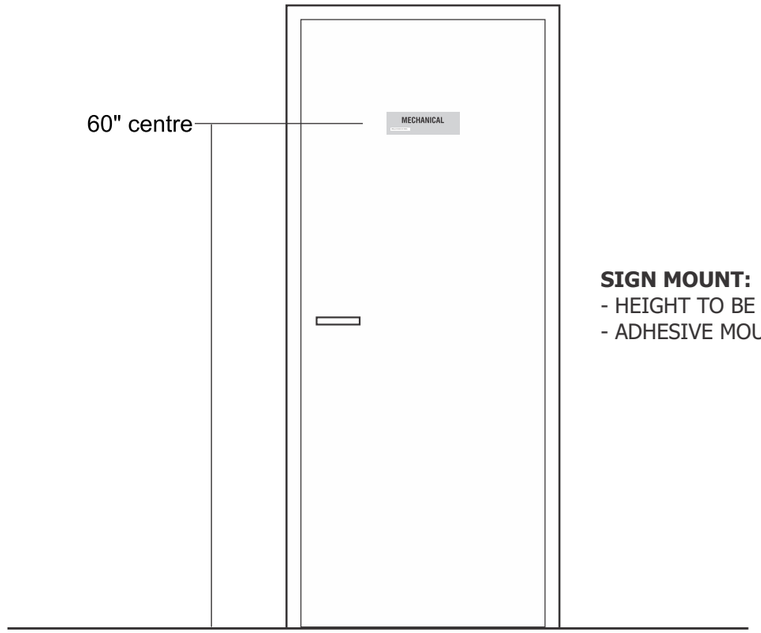
Auxiliary Rooms - Sign 2a

TO BE USED WHEN FULL CONVEX SIGN FORMAT IS NOT REQUIRED

FOR SERVICE ROOMS IE:
ELECTRICAL
HOUSEKEEPING
MECHANICAL
COMMUNICATIONS

BLACK TACTILE
CLEAR BRAILLE
ON 29900 SILVER GRAY GRAVOGRAPH
WITH DS TAPE ON BACK TO MOUNT TO DOORS





SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- ADHESIVE MOUNT TO DOORS

Auxiliary Rooms - Sign 2b

TO BE ORDERED WITH SIGN PACKAGES TO NOTIFY THE MAXIMUM OCCUPANCY OF ANY ROOM USED FOR 60 OF MORE PERSONS.

EACH ROOM TO HAVE (1) TO BE PLACED ON WALL NEAR EACH ENTRY/EXIT TO THE ROOM.

8" H X 10" W
SINGLE SIDED DIGITAL PRINT WITH LAMINATE
ON 1/8" WHITE PVC
MOUNT WITH DOUBLE SIDED TAPE & SILICONE

EXAMPLE:

MAXIMUM
OCCUPANCY
39
Bldg. 068 / Rm. 317

Meeting Rooms - Sign 3



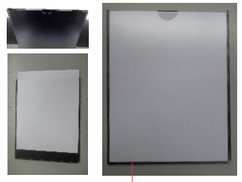
aluminum end caps - top/bottom

top portion:
black tactile "meeting room" - Helvetica condensed bold
blind slider "occupied/vacant" - Helvetica normal caps
on white gravograph
8.5" w x 5.68" h

red gravograph separator strip 8.5" w x 3/16" h
(note: strip alternate color black for library only)

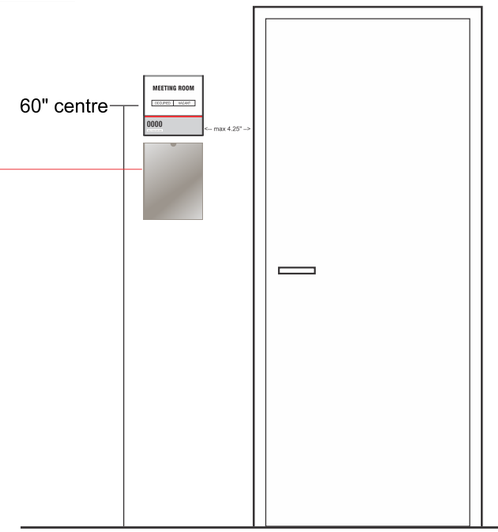
bottom portion:
8.5" w x 2.62" h
black tactile room number - Helvetica narrow bold
Clear Braille room number, below tactile
on 29900 silvery/gray Gravograph

NOTE: replacement separator strips, top or bottom inserts can be ordered separately as required



OPTIONAL MEETING SCHEDULE SHEET HOLDER SIGN 3A

clear plexi face to fit 8.5" x 11" sheet - thumb notch at top
adhered with 1/16" spacers on sides & bottom to 1/4" thick BLACK or GRAY PVC
for adhesive mount to wall below meeting room sign



Washroom Signs - Sign 4



BRAILLE TO READ:
WASHROOM

BRAILLE TO READ:
MEN'S WASHROOM

BRAILLE TO READ:
WOMEN'S WASHROOM

aluminum end caps - top/bottom

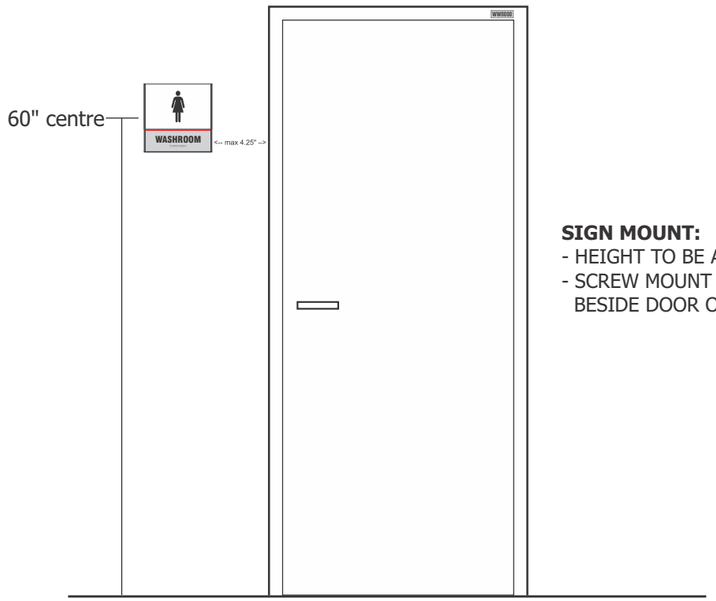
top portion:
black tactile icons
on white
8.5" w x 5.68" h

red gravograph separator strip 8.5" w x 3/16" h
(note: strip alternate color black for library only)

bottom portion:
8.5" w x 2.62" h
black tactile room number - Helvetica narrow bold
Clear Braille room number, below tactile
on 29900 silvery/gray Gravograph

ROOM # TAG - to read
"MW","WW", "WR" + room number
required with all washroom signs as room number
does not go on the braille/tactile area

NOTE:
replacement separator strips, top or bottom inserts
can be ordered separately as required



SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- SCREW MOUNT TO WALL SURFACE
  BESIDE DOOR ON HANDLE SIDE OF DOOR

Accessible Washrooms - Sign 4a



BRAILLE TO READ:
BARRIER FREE WASHROOM

BRAILLE TO READ:
MENS ACCESSIBLE WASHROOM

BRAILLE TO READ:
WOMENS ACCESSIBLE WASHROOM

aluminum end caps - top/bottom

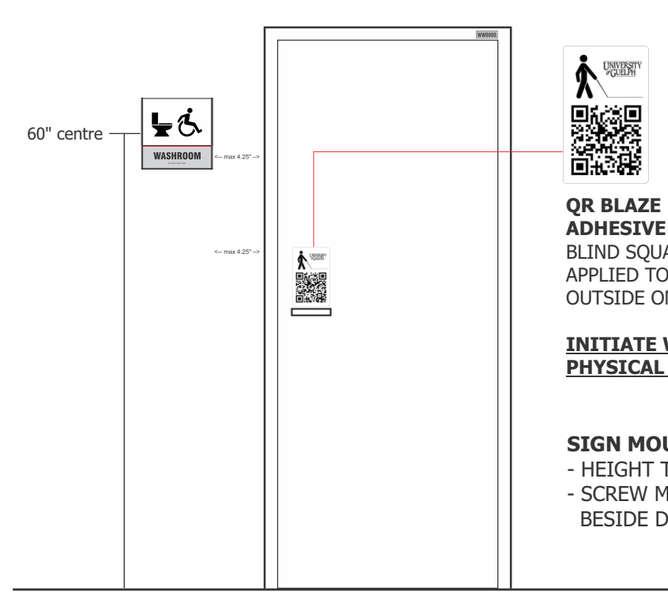
top portion:
black tactile icons
on white
8.5" w x 5.68" h

red gravograph separator strip 8.5" w x 3/16" h
(note: strip alternate color black for library only)

bottom portion:
8.5" w x 2.62" h
black tactile room number - Helvetica narrow bold
Clear Braille room number, below tactile
on 29900 silvery/gray Gravograph

ROOM # TAG - to read "WR + room number"
required with all washroom signs as room number
does not go on the braille/tactile area

NOTE:
replacement separator strips, top or bottom inserts
can be ordered separately as required



QR BLAZE
ADHESIVE BACK DECAL
BLIND SQUARE IDENTIFIER MUST BE
APPLIED TO EACH UNIVERSAL WASHROOM
OUTSIDE ON DOOR ABOVE HANDLE

INITIATE WORK ORDER WITH
PHYSICAL RESOURCES TO IMPLEMENT

SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- SCREW MOUNT TO WALL SURFACE
  BESIDE DOOR ON HANDLE SIDE OF DOOR

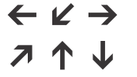
Stairwells - Sign 5



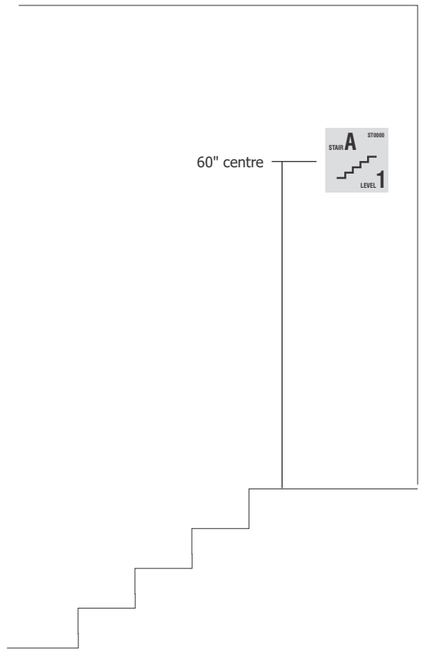


STAIR SIGNS
FRAME: 12" x 12"
SINGLE SIDED WALL SIGN
STANDARD ALUMINUM CONVEX
ALUMINUM END CAPS TOP/BOTTOM

INSERT: BLACK TACTILE GRAPHICS
ON 29900 SILVER/GRAY GRAVOGRAPH



USE STANDARD
STYLE ARROWS

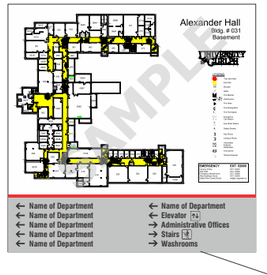


SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- SCREW MOUNT TO WALL SURFACE
- INSTALL ON WALL, CENTRE OF STAIRWELL END WALL WHERE POSSIBLE AT TOP OF STAIRS INDICATING DIRECTION DOWN

TO BE POSTED:
(1) OUTSIDE OF STAIR DOOR
(1) INSIDE STAIRWELL ON STAIR LANDING

Directory with Life Safety Plans - Sign 6



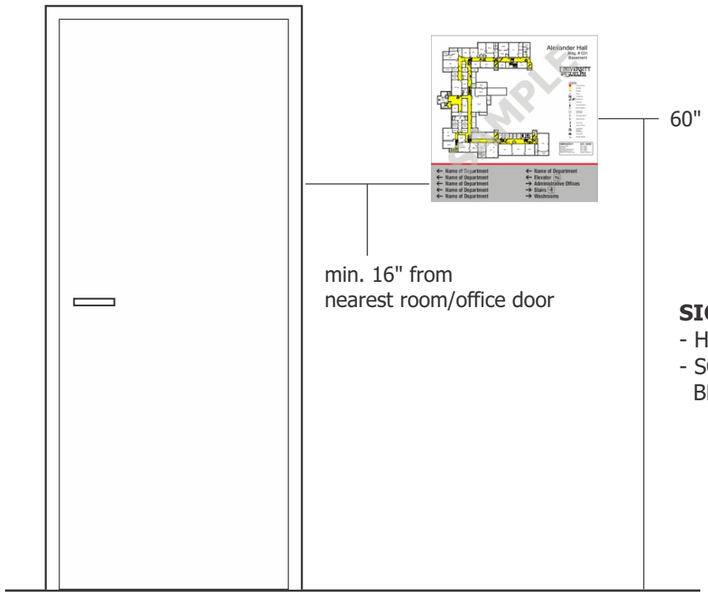


23.625" X 24"
SINGLE SIDED WALL SIGN
STANDARD ALUMINUM CONVEX SIGN FRAME
with ALUMINUM CAPS top/bottom
ALL GRAPHICS SINGLE PRINTED INSERT
with FULL NON GLARE PLEXI OVERLAY
BACKGROUND OF BOTTOM SECTION
TO MATCH 29900 SILVER/GRAY GRAVOGRAPH



USE STANDARD STYLE ARROWS

Directory with Life Safety Plan should be installed in a location viewable upon entry to a building at main entries. See Life Safety Plan standards for details on this insert.



SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- SCREW MOUNT TO WALL SURFACE BESIDE DOOR ON HANDLE SIDE OF DOOR

Life Safety Plan Guidelines

'Life Safety Plans' are part of the University of Guelph Standard Signage.

Their purpose is to enhance basic building information for occupants and are not required under the Ontario Fire Code or authorities having jurisdiction, but may be expected for occupancy.

These signs are to be posted in the main lobby on grade level in a combination sign with the directory. On each floor above and below this, the plan only will be posted in a similar location.

Secondary signs for large buildings will be posted at 50% of main vertical circulation points distributed to cover building, see example life safety plan graphic on the following page. Plans are to be printed 'heads up' (in the orientation of placement) and should be located strategically to minimize the number of orientations required.

The goal is to create a consistent expectation and appearance to Life Safety Plans that communicate to Users in any building on campus the same information. On all major renovations and new builds, Life Safety Plans must be upgraded as a part of the signage package.

Life Safety Plans Requirements:
1. Simplified Plan
a. Locations, orientations and quantities for plans need to be determined with number of orientations being kept as minimal as possible. Choose appropriate template and size:
   - USE FOR SMALLER BUILDING 11" H X 17" W
   - USE FOR LARGER BLDG 18" H X 23.62" W
   - FOR DIRECTORY/LIFE SAFETY PLAN COMBINATION SIGN - 24" H X 23.625"
   The size of the Life Safety Plan should be determined by the building complexity and clarity of details.
   For new signs the final sizing and locations must be approved by Manager Architectural, P.R., DEC.
b. If the building is complex or connected to another building than the Life Safety Plan should show this relationship in an overall Key Plan with the hatched side indicating the applicable area.
c. Remove Elevator, Stairs and Washroom details, add symbols to replace.
d. All main corridors used by the public are shaded yellow
e. The Signage provider can place the 'you are here' dot on plans during printing or install.
f. For the Key Plan outline the building using PLINE on LS_Symbols with a Global Width of .00262628, infill the outline with Hatch style Dots, Scale .00873
g. All walls to be put on layer AWLEXT. Hatch walls with AWLHAT, SOLID.
h. Contact Project Lead or Manager Architectural Design, Engineering and Construction in Physical Resources for layout, design graphic template

2. Safety and General Information
a. Add U of G identifier, Building Number and Level see example life safety plan graphic on following page.
b. Inventory Life Safety features and add standard symbols to legend. The legend for standard symbols should be kept to the right or bottom of the building plan as space best allows. Symbols on plan should be similar in size to the legend. Only safety features in main corridors need to be inventoried and added.
c. Emergency contacts to be added to lower right hand corner of plan. This should only include: Emergency exit., Campus Police ext., Safe Walk ext., After Hours Maintenance, safety plan updates contact email: wo@pr.uoguelph.ca
This information should have border around it and be below or to the side of the safety symbol legend.

3. Printed Signs and Holders
a. Convex signs per our standard are the preferred holder for printed inserts, see 1a. above for typical sizes. Printed inserts can simply be replaced where holders are in good shape, location and standard sizing.
c. Where quantity or environmental conditions warrant, printed vinyl graphics with matte clear UV laminate on 3mm ACP (Alupanel) panels are acceptable, eg. residences.

for Physical Resources: reference template file: K:\SAFETY PLANS_TEMPLATE.
Plot style available at Drawings/ Safety Plans/Templates/ Plot Styles

On all major renovations and new builds, Project Lead must ensure that the Life Safety Plans are upgraded as a part of the signage package. The consultant engaged on the project is typically the best choice to have this simplified plan and inventory for placement of icons.

Consultants to submit PDF version and CAD version to the University and filed in the building folder under Drawings/ Safety Plans/###(building number), 075N001_LS 2015

Update locations and orientations on Life Safety Plan tracking spreadsheet, located at G/DEC/Architectural/Signage

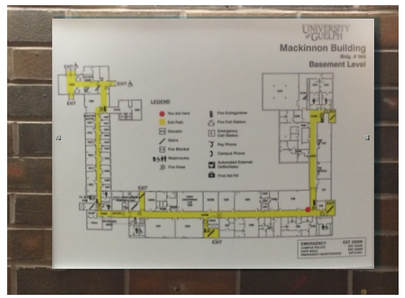
Life Safety Plan Signs - Sign 6A

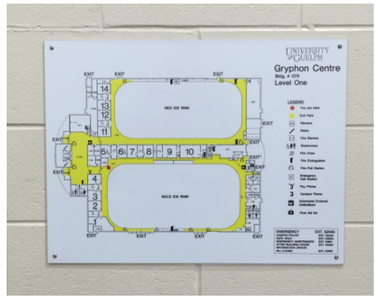




Choose appropriate template and size:
- USE FOR SMALLER BUILDING 11" H X 17" W
- USE FOR LARGER BLDG 18" H X 23.62" W
- FOR DIRECTORY/LIFE SAFETY PLAN COMBINATION SIGN - 24" H X 23.625" W
The size of the Life Safety Plan should be determined by the building complexity and clarity of details.
For new signs the final sizing and locations must be approved by Manager Architectural, P.R., DEC.

SINGLE SIDED WALL SIGN
STANDARD ALUMINUM CONVEX SIGN FRAME
with ALUMINUM CAPS top/bottom
INSERT - PRINTED ON HEAVY POSTER STOCK with FULL NON GLARE PLEXI OVERLAY



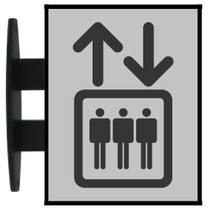


WHERE QUANTITY OR ENVIRONMENTAL CONDITIONS WARRANT,
PRINTED VINYL GRAPHICS WITH MATTE CLEAR UV LAMINATE
ON 3MM ACP (ALUPANEL) PANELS ARE ACCEPTABLE, IE: RESIDENCES
SINGLE SIDED WALL SIGN
HOLE" IN EACH CORNER FOR SCREW MOUNT WITH WALL PLUG

NOTE: YOU ARE HERE TO BE CLEARLY NOTED ON ALL LIFE SAFETY PLAN GRAPHICS

Elevators - Sign 7





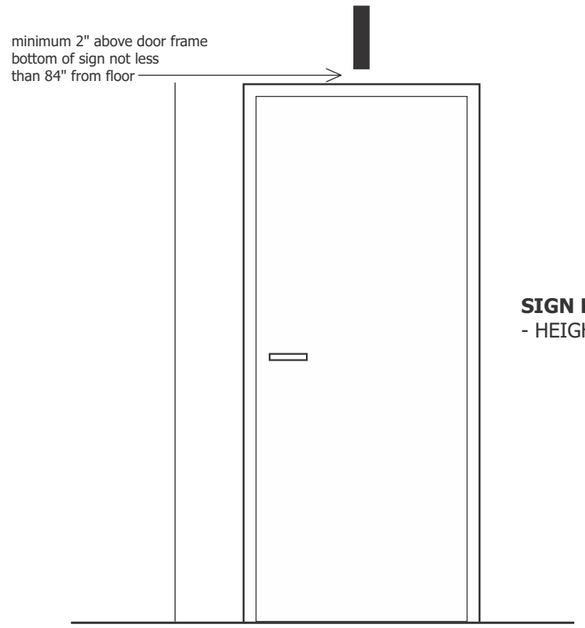
ELEVATOR SIGNS - DOUBLE SIDED
8.75" h x 6" w
(2) SINGLE SIDED CONVEX SIGNS
MOUNTED BACK TO BACK ON BLACK METAL CORRIDOR BRACKET
BLACK VINYL GRAPHICS
ON 29900 SILVER/GRAY GRAVOGRAPH

Double Sided Corridor - Sign 8



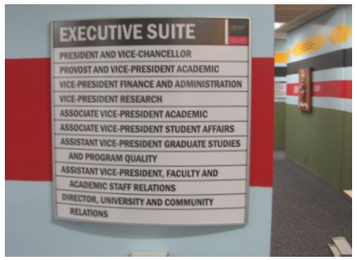


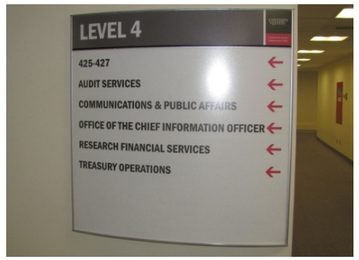
DEPARTMENT or
CORRIDOR DIRECTIONAL SIGNS
- DOUBLE SIDED
6" h x 18" w
(2) SINGLE SIDED CONVEX SIGNS
MOUNTED BACK TO BACK
ON BLACK METAL CORRIDOR BRACKET
BLACK VINYL GRAPHICS
ON 29900 SILVER/GRAY GRAVOGRAPH



SIGN MOUNT:
- HEIGHT TO BE AS SHOWN

Directional Wall - Sign 9





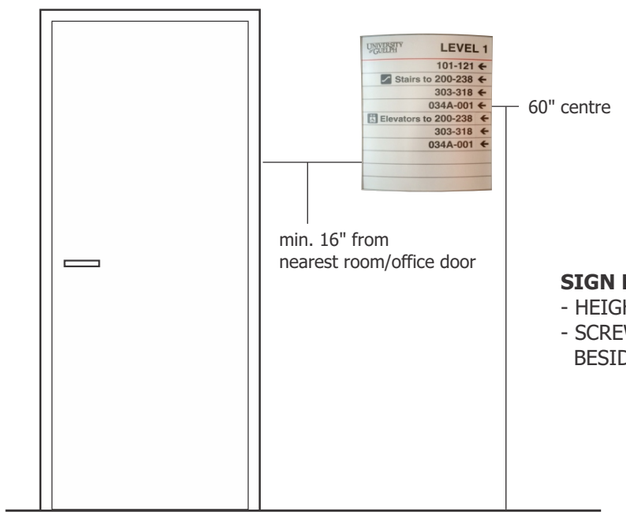


STANDARD SIZES:
12" w x 18" h
16" w x 24" h
24" w x 24" h



USE STANDARD STYLE ARROWS

SINGLE SIDED WALL SIGN
STANDARD ALUMINUM CONVEX SIGN FRAME
with ALUMINUM CAPS top/bottom
INSERT - PRINTED ON HEAVY POSTER STOCK with FULL NON GLARE PLEXI OVERLAY



SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- SCREW MOUNT TO WALL SURFACE
  BESIDE DOOR ON HANDLE SIDE OF DOOR

Room Numbering Tags - Sign 10





ROOM NUMBERING 1” X 3”
BLACK ENGRAVED LETTERS/NUMBERS
ON BRUSHED SILVER PLASTIC/LAMACOID
BEVELLED EDGES
FULL ADHESIVE BACK

ALWAYS ADHERED TO TOP RIGHT CORNER OF DOOR FRAME

USED FOR WASHROOM ROOM NUMBERS, AND UNNAMED ROOMS

Acrylic Signs

Change system to Convex wherever possible



Acrylic Washroom Signs

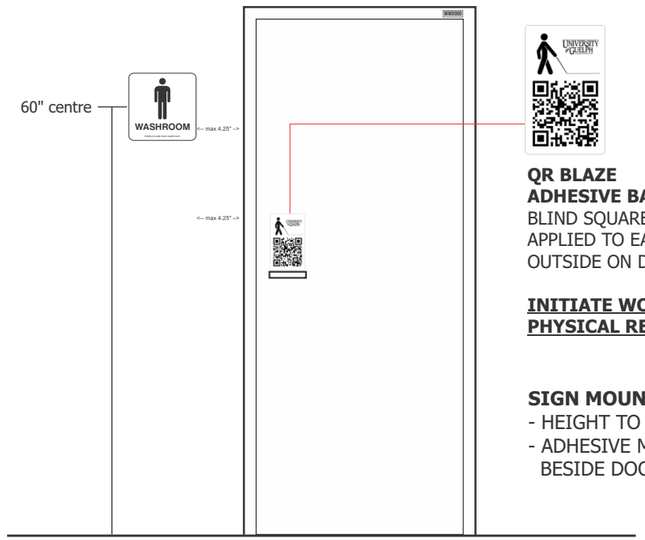
CHANGE SYSTEM TO CONVEX WHEREVER POSSIBLE



WASHROOM SIGNS

8" x 8" single sided wall sign
black tactile icon
black tactile lettering, clear braille
clear non glare 1/8" plexi
with white opaque block out back up
full adhesive back

ROOM # TAG - to read
"MW","WW", "WR" + room number
required with all washroom signs as room number
does not go on the braille/tactile area



QR BLAZE
ADHESIVE BACK DECAL
BLIND SQUARE IDENTIFIER MUST BE
APPLIED TO EACH UNIVERSAL WASHROOM
OUTSIDE ON DOOR ABOVE HANDLE

INITIATE WORK ORDER WITH
PHYSICAL RESOURCES TO IMPLEMENT

SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- ADHESIVE MOUNT TO WALL SURFACE
  BESIDE DOOR ON HANDLE SIDE OF DOOR

Acrylic Room/office Insert Signs

CHANGE SYSTEM TO CONVEX WHEREVER POSSIBLE



ROOM SIGNS
single sided wall sign

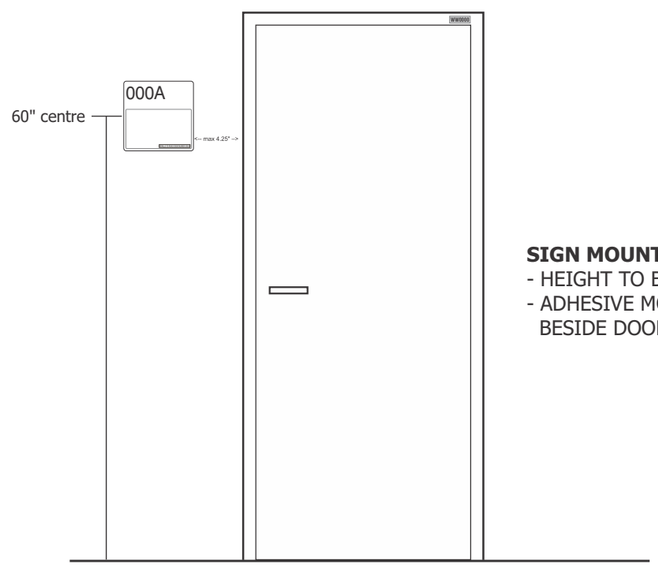
8" x 8"
1/4" radius corners

black tactile room number
on clear non glare 1/8" plexi
white opaque block out border
applied to back
to form sheet holder

clear braille bottom right corner

full adhesive back

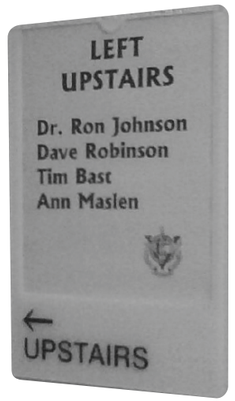
back layer 8"x8" white plexi



SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- ADHESIVE MOUNT TO WALL SURFACE
  BESIDE DOOR ON HANDLE SIDE OF DOOR

Acrylic Room/office Insert Signs

CHANGE SYSTEM TO CONVEX WHEREVER POSSIBLE





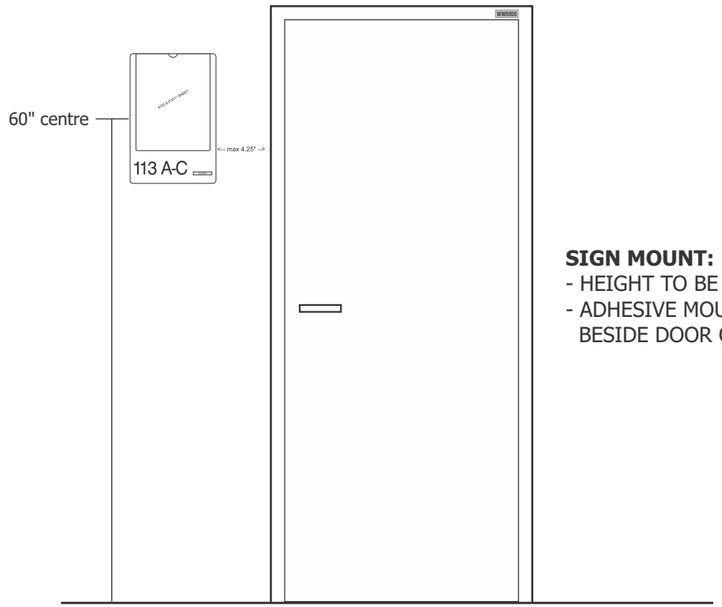
9.625" w x 14.5" h
holds 8.5"x11" paper
1/8" acrylic

1/4" radius corners

front black tactile
room number bottom left
clear braille bottom right

back white vinyl to show through
printed insert

bottom layer white 1/8" plexi



SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- ADHESIVE MOUNT TO WALL SURFACE BESIDE DOOR ON HANDLE SIDE OF DOOR

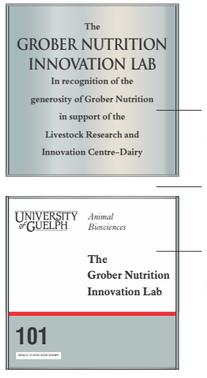
UNIVERSITY OF GUELPH

Specialty Signs

Donor Signage

LEVEL 1 DONOR SIGNAGE - this signage must always be coordinated with Aumni Affairs

up to $ 49,999.00 donations



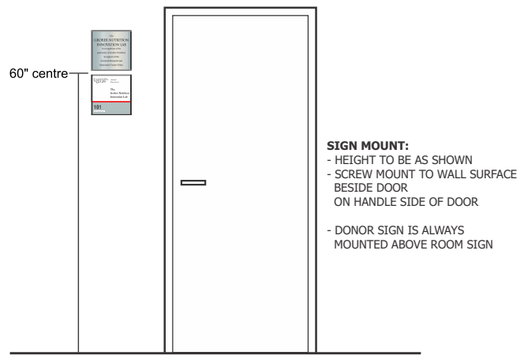
TOP SIGN FOR DONOR INFO:

8.5" h x 8.5" w
SINGLE SIDED WALL SIGN
CONVEX SYSTEM FORMAT
ALUMINUM CAPS
BLACK PRINT ON
BRUSHED SILVER LAMACOID INSERT

1" SPACE BETWEEN SIGNS

BOTTOM ROOM/OFFICE SIGN:

8.5" h x 8.5" w
SINGLE SIDED WALL SIGN
CONVEX SYSTEM FORMAT
ALUMINUM CAPS
TOP: 5.6875" x 8.5"
PRINTED INSERTS WITH NON GLARE OVERLAY
SEPARATOR STRIP: .189" RED
BOTTOM: 2.625" x 8.5"
BLACK TACTILE ROOM NUMBER
BRAILLE ON SILVER 29900 GRAVOGRAPH



SIGN MOUNT:
- HEIGHT TO BE AS SHOWN
- SCREW MOUNT TO WALL SURFACE BESIDE DOOR ON HANDLE SIDE OF DOOR

- DONOR SIGN IS ALWAYS MOUNTED ABOVE ROOM SIGN

LEVEL 2 DONOR SIGNAGE - this signage must always be coordinated with Aumni Affairs

above $ 50,000.00 donations.

BACKER:
WALL SIGN SIZE VARIES
DEPENDING ON CONTENT OF COPY
3/8" THICK CLEAR ACRYLIC
POLISHED EDGES
WITH FULL SUBSURFACE COVERAGE
FROSTED ETCHMARK VINYL
(4) 1" ALUMINUM STAND OFF MOUNTS
LETTERING:
4" HIGH TEXT
1/4" THICK BRUSHED SOLID ALUMINUM
TAPPED FOR BLIND STUD MOUNT TO BACKER
SECURED AT BACK WITH NUTS





Warning & Instructional:

PRINTED ALUPANEL, LAMACOID or PVC SIGNS
to be used for larger signs too extensive to engrave
or for use in harsh interior conditions (ie pool, spa)

DIGITAL PRINT with MATTE FINISH UV LAMINATE
ON 3mm ALUPANEL, 1/8" LAMACOID or .040 STYRENE

Note: Confirm content, use and colors with Physical Resources.
red is not used in all areas of the campus













Regulation Signs

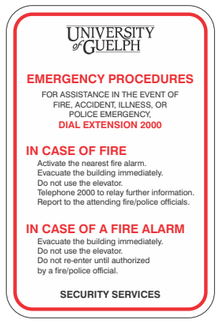




DIGITAL PRINT
WITH UV LAMINATE
12 GAUGE ALUMINUM SIGNS
ROUNDED CORNERS

OR

ADHESIVE BACK DECALS
FOR INTERIOR DOORS,
GLASS, ETC
9" x 12"
12" x 18"



6" w x 9" h
SINGLE SIDED
DIGITAL PRINT
WITH MATTE UV LAMINATE
3mm ALUPANEL or 1/8" PVC
ROUNDED CORNERS

OR

ADHESIVE BACK DECALS
FOR INTERIOR DOORS,
GLASS, ETC
9" x 12"
12" x 18"



ALL ROOMS WITH 60 or MORE OCCUPANTS
MUST HAVE AN OCCUPANCY SIGN
POSTED NEAR THE EXIT/ENTRANCE DOOR

DIGITAL PRINT WITH LAMINATE
OR ENGRAVED TEXT
SINGLE SIDED
BLACK ON WHITE
1/8" PVC

8" X 10"



DIGITAL PRINT
WITH UV LAMINATE
12 GAUGE ALUMINUM SIGNS
ROUNDED CORNERS

OR

ADHESIVE BACK DECALS
FOR INTERIOR DOORS,
GLASS, ETC
9" x 12"
12" x 18"



BLACK ENGRAVED TEXT/ICON
ON BRUSHED SILVER LAMACOID
ADHESIVE BACK
EXTERIOR USE

6" X 6"



WHITE ENGRAVED TEXT
ON RED LAMACOID
ADHESIVE BACK
EXTERIOR USE

3" x 16"
5" x 24"

Exterior Signs

Directional Signs
Traffic and pedestrian circulation routes in the long-range development plan consist of:
Primary traffic; Ring Roads and McGilvray St.
Primary Pedestrian; A main north south walkway – WineGard Walk, Two main East/West Walkways – Reynolds Walk, Stadium Walk
Signage should reinforce the built environment cues on all of these routes. Directional pedestrian or vehicular signage as appropriate should be focused on the main routes. Campus maps should be placed at important orientation points along the key routes, always orientated to conventional north.

Location Principles
- Generally one sign will be provided on the turn-off or side road to minimize number of signs.
- Signs must not be located off University property, ie. right-of-ways of municipal roadways.
- Signs must be set back from the road edge suffiiently to allow a driver coming out of the side road a clear view of intersecting street. This type of sign will follow naming guideline above.
- Locations of signs must take into account landscaping, snow plowing and any lighting if applicable.

SIGN A	•	Main Campus Entrances
SIGN B	•	Secondary Campus Entrances
SIGN C	•	Signs for Major Spaces
SIGN D	•	Additional Identifier on Buildings
SIGN E	•	Building I.D. Signage
SIGN E.1	•	Secondary Building I.D. Signage
SIGN F	•	Gateway Maps
SIGN G	•	Post & Blade Street Directional Signs
SIGN H	•	Parking Lot Identifiers
SIGN I	•	Street Signs
SIGN J	•	Map Totem
SIGN K	•	Finger Posts

Exterior Sign A

All signage builds on standards and rules contained in the University of Guelph Brant Guide - https://news.uoguelph.ca/brand-guide/ Any deviations from standard signage standard will be reviewed by Manager Arch. P.R. and Communications and Public Affairs.

Specifically for exterior permanent building, space, and directional signage the following standards will be implemented.

Main Campus Entrances:

At major intersections and entrances to the campus signage and building materials will be consistent with that of the first wall at Gordon and College Avenue. Details of heights and form will change based on need and location but materials and wall design will be uniform at all entrances. The University of Guelph Identifier in stainless steel (https://news.uoguelph.ca/brand-guide/logos/ - Secondary Logo) will be used at all major entries.

316 Stainless Steel, 3/8" thick, Mount: Flush/#10-24 SS,
Blind stud mount with stainless steel threaded pins and construction adhesive.



Exterior Sign B

All signage builds on standards and rules contained in the University of Guelph Brant Guide - https://news.uoguelph.ca/brand-guide/ Any deviations from standard signage standard will be reviewed by Manager Arch. P.R. and Communications and Public Affairs.

Specifically for exterior permanent building, space, and directional signage the following standards will be implemented.

Secondary Campus Entrances:

Using the same materials and wall detail the secondary entrances will not have the Identifier and will typically be smaller in scale. Signage on these walls will be built into the wall as engraved black painted stone – typically signifying street or nearby feature.

lettering engraved in concrete, infill paint - black, font - helvetica light
All capital letters 5.5" high x appropriate width sized to fit feature wall, wording and location.







Exterior Sign C

All signage builds on standards and rules contained in the University of Guelph Brand Guide - https://news.uoguelph.ca/brand-guide/ Any deviations from standard signage standard will be reviewed by Manager Arch. P.R. and Communications and Public Affairs.

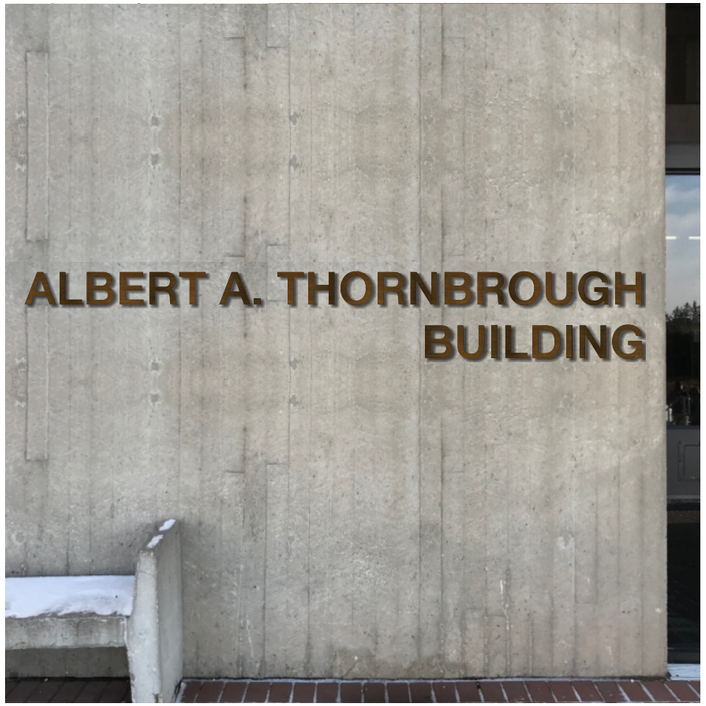
Specifically for exterior permanent building, space, and directional signage the following standards will be implemented.

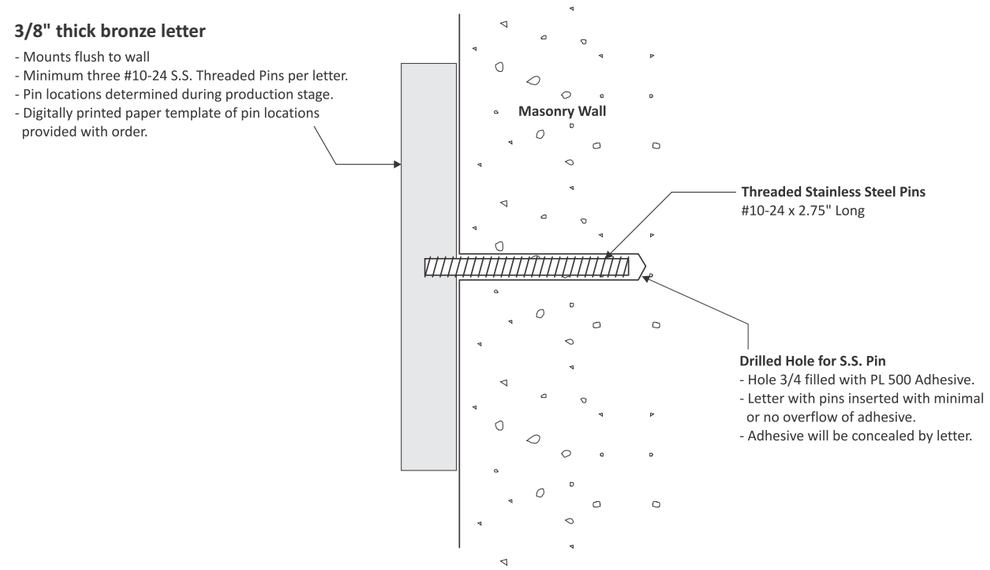
Major Spaces:

Campus spaces and walks will be signed on existing or new walls - as available.
These will be in Helvetica Neue font and be stainless steel for campus wide continuity.
Size will be determined as appropriate for each application.

Additional Identification - Exterior Sign D Dimensional Letters - consult Physical Resources

FONT TO BE USED: HELVETICA NEUE





MATERIAL: STAINLESS STEEL or BRONZE, HORIZONTAL BRUSHED FINISH
THICKNESS: 3/8"
MOUNT FLUSH: #10-24 S.S. THREADED PINS/ADHESIVE

LETTER HEIGHT & MOUNTING PLACEMENT: BASED ON AVAILABLE SPACE, LOCATION, SIZE, ETC.

Exterior Sign E

PRIMARY BUILDING ID SIGNAGE - PLINTH MOUNT and WALL MOUNT

PLAQUE Sign to be anodized Bronze, Br. 40 with engraved copy infilled White.

Font to be Helvetica Light with 5" capital letter height and in Upper and Lower case.

To have concealed mounting hardware, see pages that follow.

PLINTH MOUNT



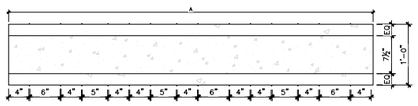
WALL MOUNT



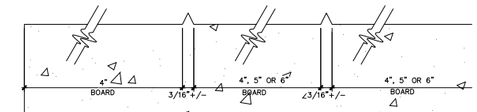


Exterior Sign E cont'd

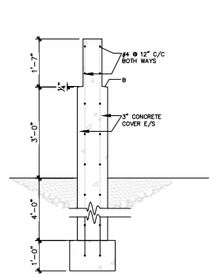
PLINTH MOUNT

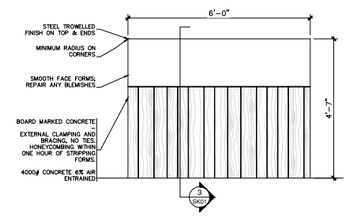


1 SK01 PLAN – CONCRETE PLINTH, 'NAMED SIGNS' 1"=1'-0"



2 SK01 PLAN DETAIL 1'-0" =1'-0"

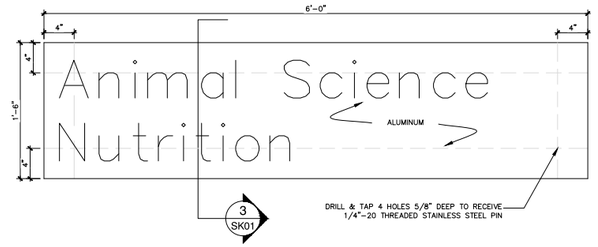




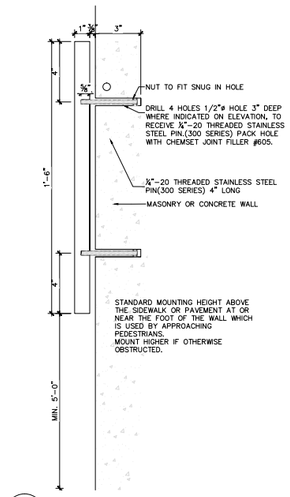
4 SK01 ELEVATION – PLINTH

SIGNS CAN BE 4' or 6' WIDE PLINTH AND/OR WALL MOUNT DEPENDING ON CONTEXT AND LENGTH OF NAME

WALL MOUNT



1 SK01 ELEVATION – WALL MOUNTED ALUMINUM SIGNS



1 SK01 SECTION – WALL MOUNTED SIGNS

Secondary Exterior Sign E.1

USED FOR LESS PERMANENT AND SECONDARY BUILDING ID SIGNAGE OR INFORMATION.

NOT TO BE USED A PRIMARY SIGNAGE OR DONOR RECOGNITION.

12" - 18" HIGH X 36" WIDE
SINGLE SIDED
6 MM THICK ALUPANEL
WHITE 2MIL LETTERING
SC +900-101-O WHITE
VINYL LETTERING
WRAPPED VINYL FACES/EDGES
PMS 412 UC 900-198-T

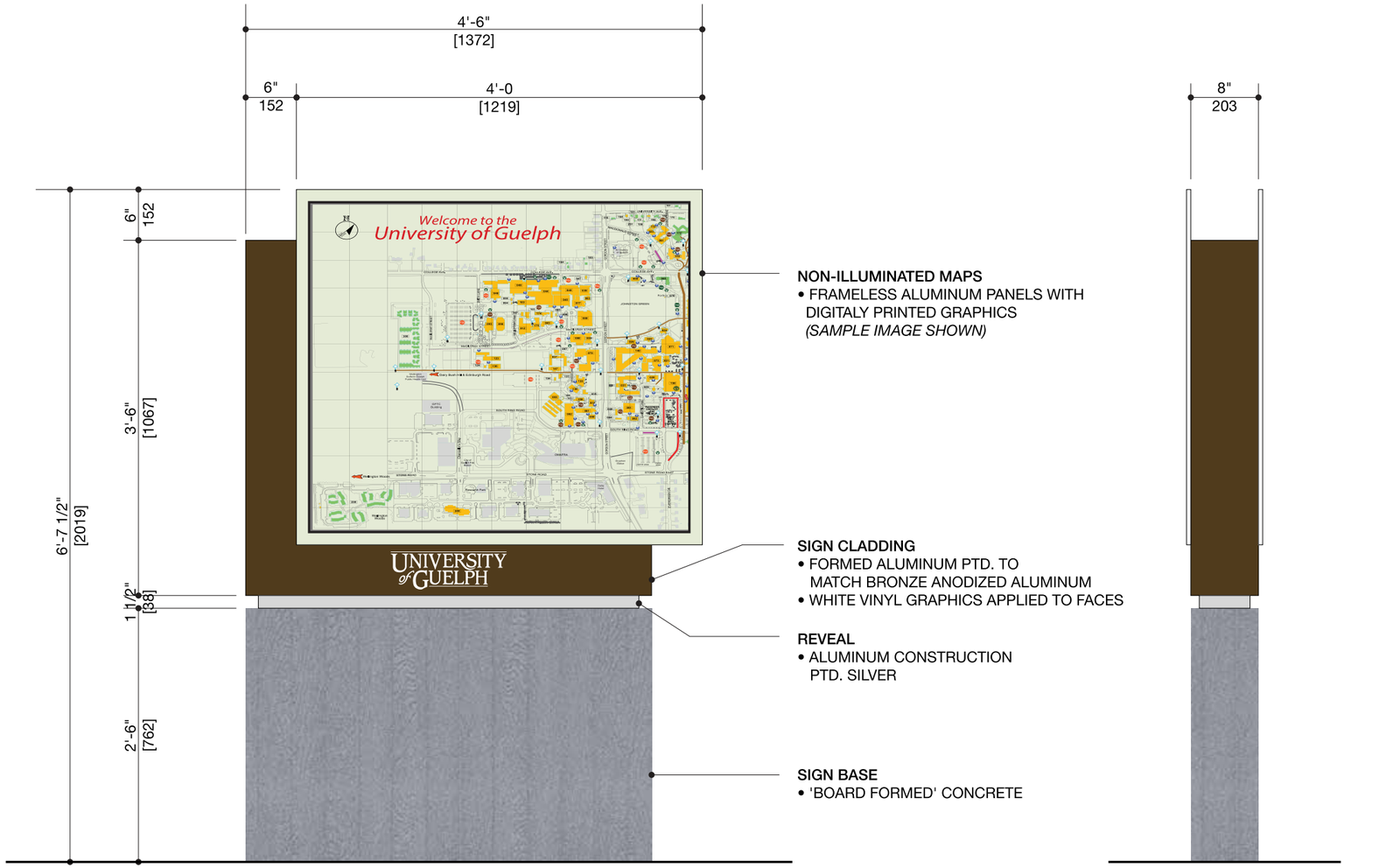








Gateway Map - Sign F



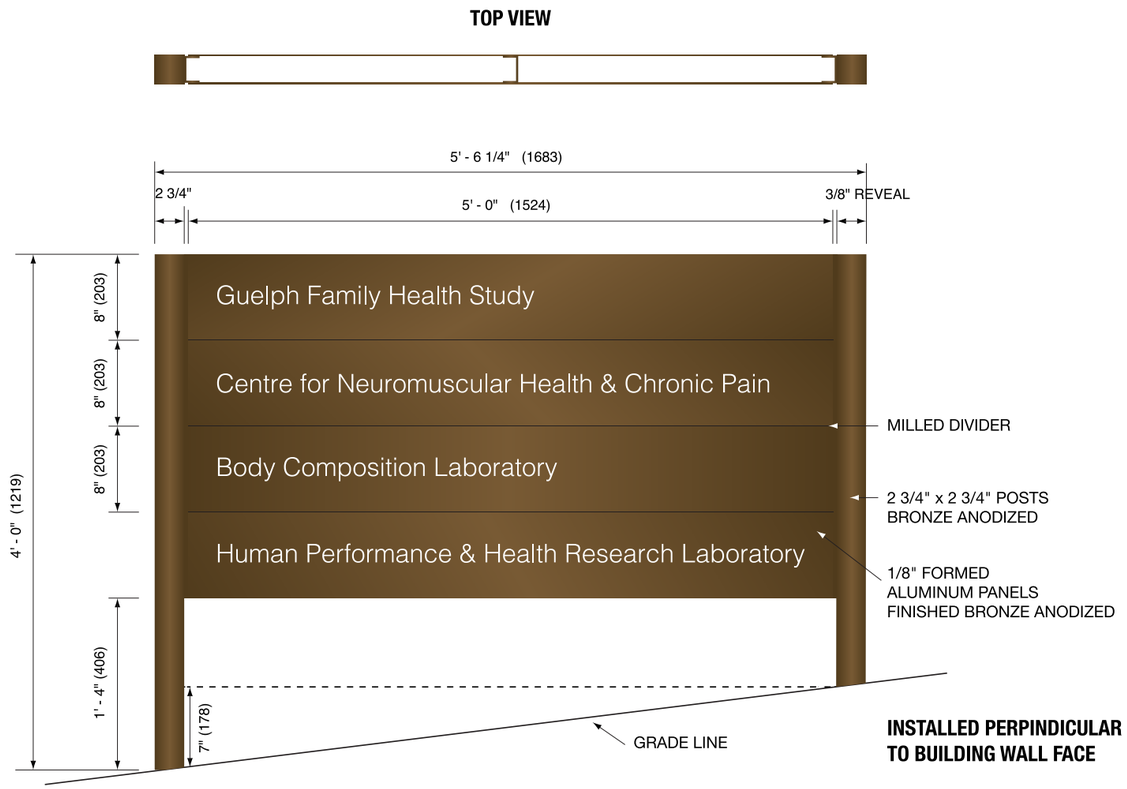
Face Elevation - Gateway Map

Right Side Elevation

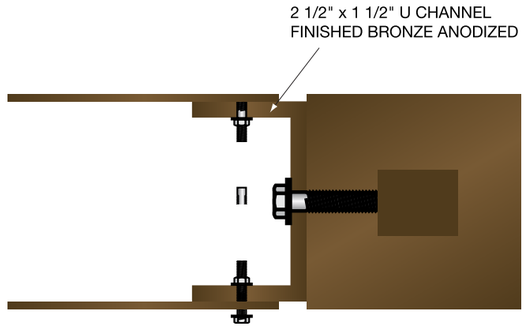
Sign to be located in a safe area for a car to pull over and consult.
Used only at main campus entry points or visitor parking areas.

Post & Blade Street Directional Signs G
- consult Physical Resources

Used to provide directions to frequently used non changing departments or features on campus.



INSTALLED PERPINDICULAR TO BUILDING WALL FACE



SUPPLY & INSTALL

ONE (1) D/S NON-ILLUMINATED GROUND SIGN

- 1/8" FORMED ALUMINUM PANELS
- CUT WHITE VINYL TEXT APPLIED TO FOUR PANELS
- POST AND BLADES TO BE BRONZE ANODIZED
- POST CAPS PAINTED MATTHEWS ACRYLIC POLYURETHANE TO MATCH BRONZE ANODIZED

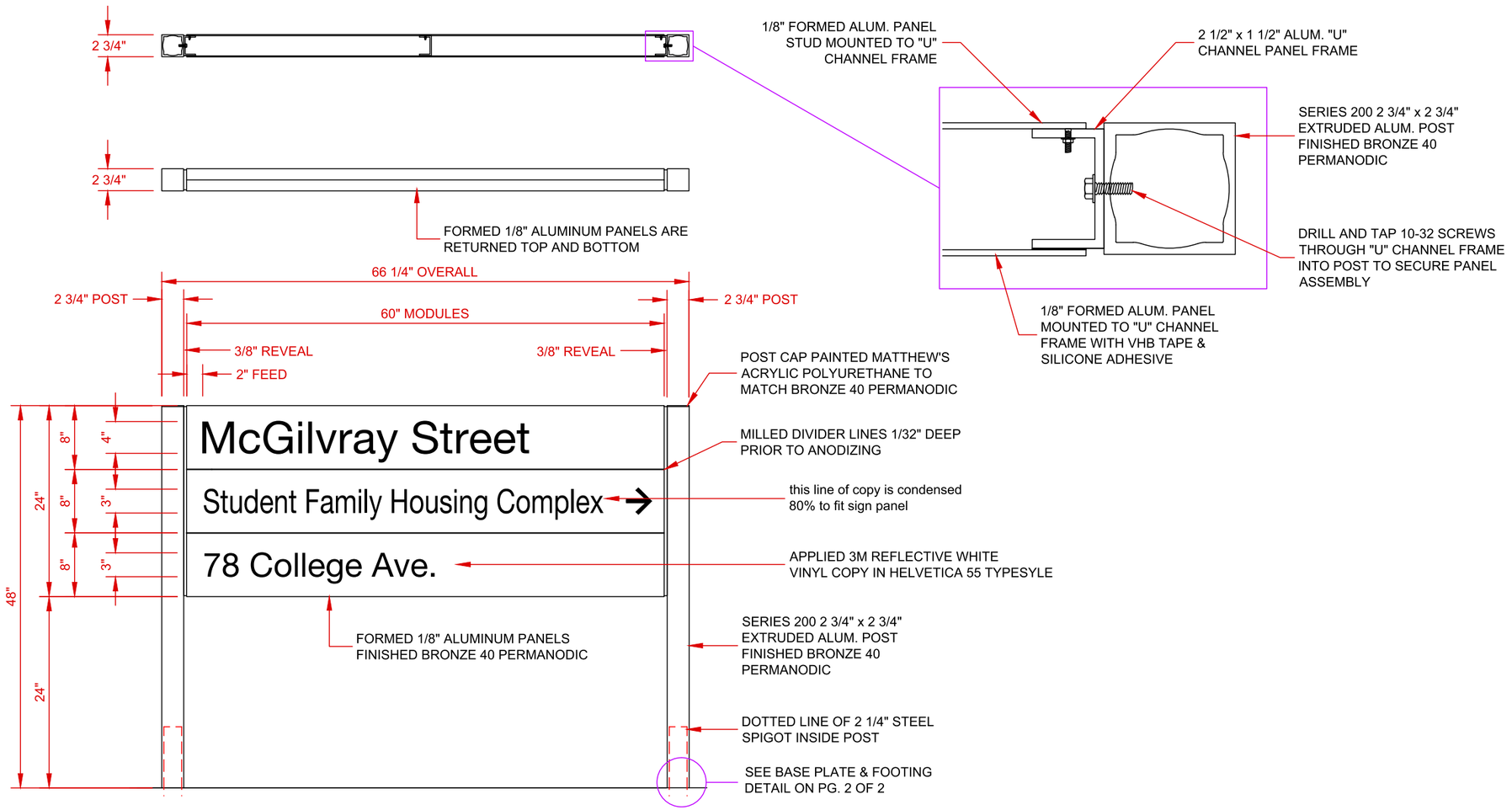


Vehicular Directional Signs

To provide guidance to drivers of motor vehicles while driver is seated and vehicle is in motion. These signs should be used as a guidance to parking lots, campus information, main sections of campus, directions to buildings frequently visited by non-university people, e.g. War memorial Hall and Small Animal Clinic O.V.C. Directions to truck docks and service entrances of buildings accessible from dead end streets or car parking lots. Directional signs will have a series of panels of standard sizes, see applicable drawing, to simplify production and allow for grouping to avoid clutter.

Post & Blade Street Directional Signs G cont'd

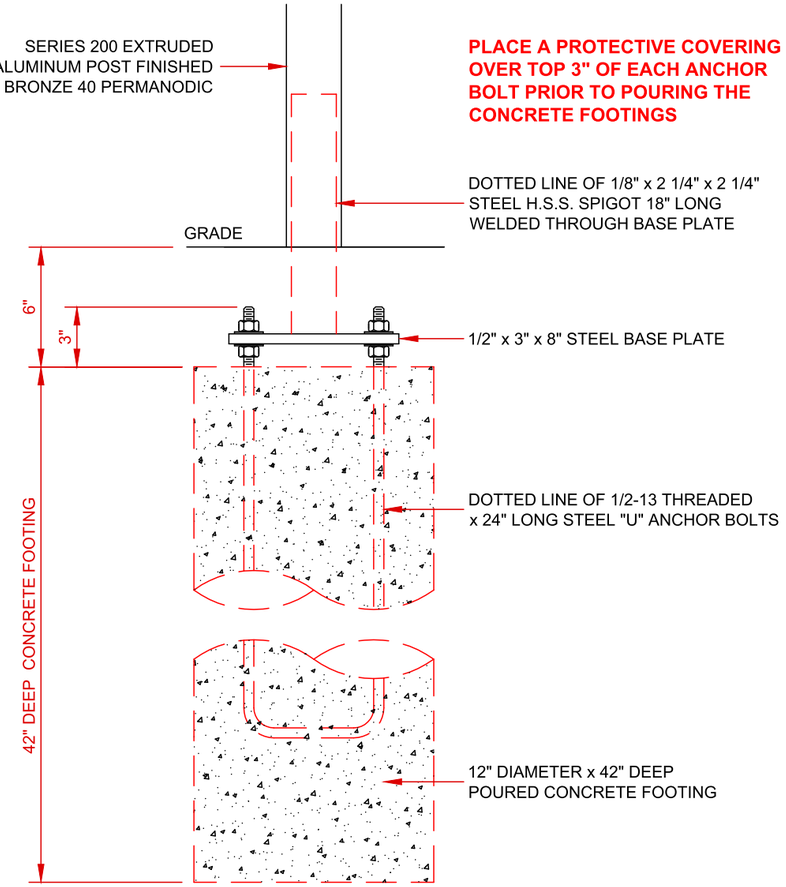
- consult Physical Resources

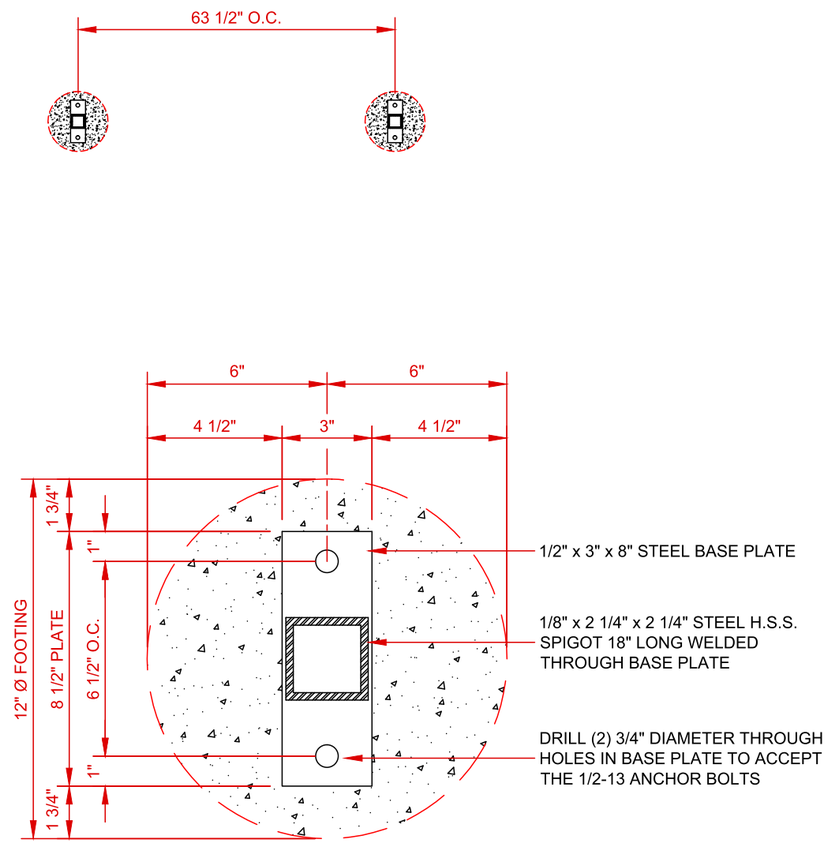


Used to provide directions to frequently used non changing departments or features on campus.

Post & Blade Street Directional Signs G cont'd

- consult Physical Resources

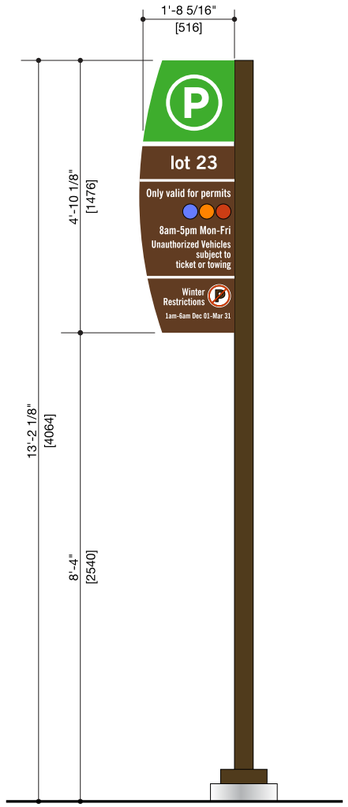




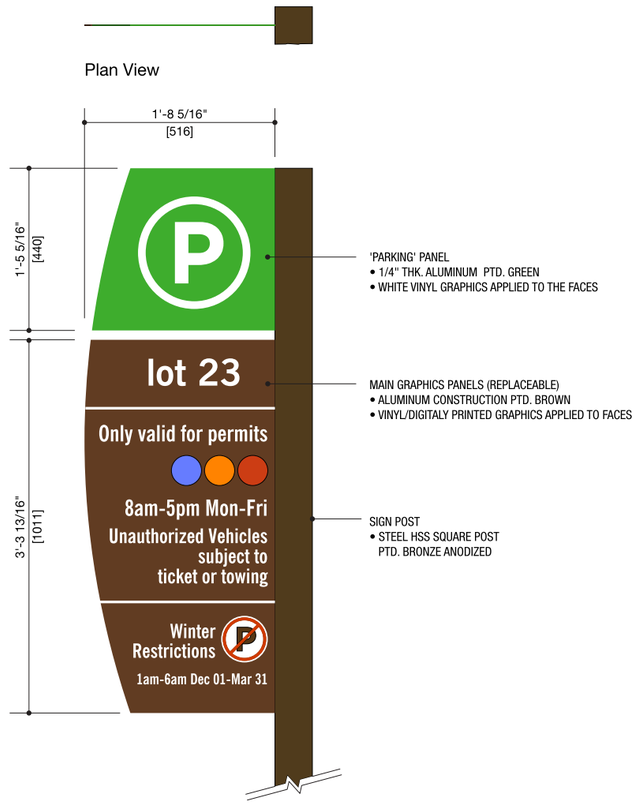
Used to provide directions to frequently used non changing departments or features on campus.

Parking Lot Identifiers H - consult Physical Resources

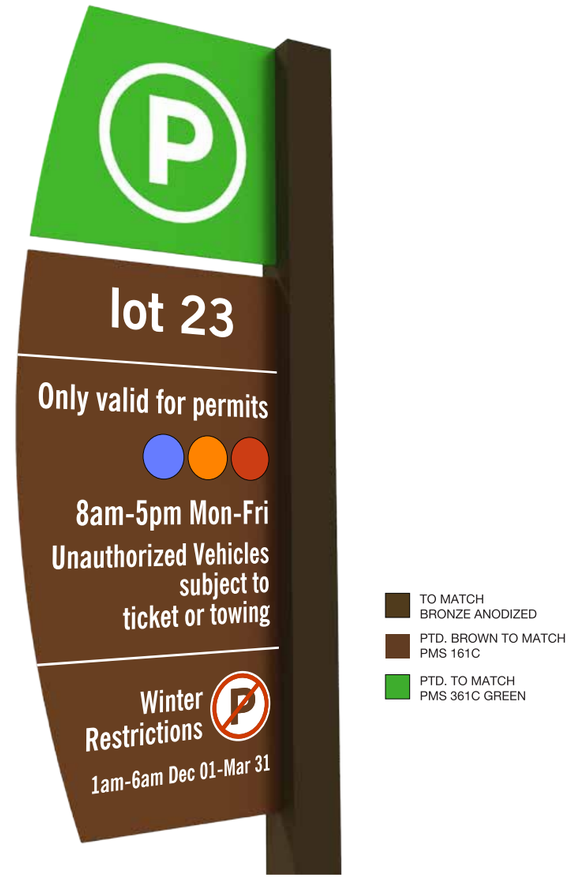
Used to identify parking lots and features/information of lots.



Typ. Elevation - Parking Lot Identifiers



Typ. Graphics Layout - Right Side



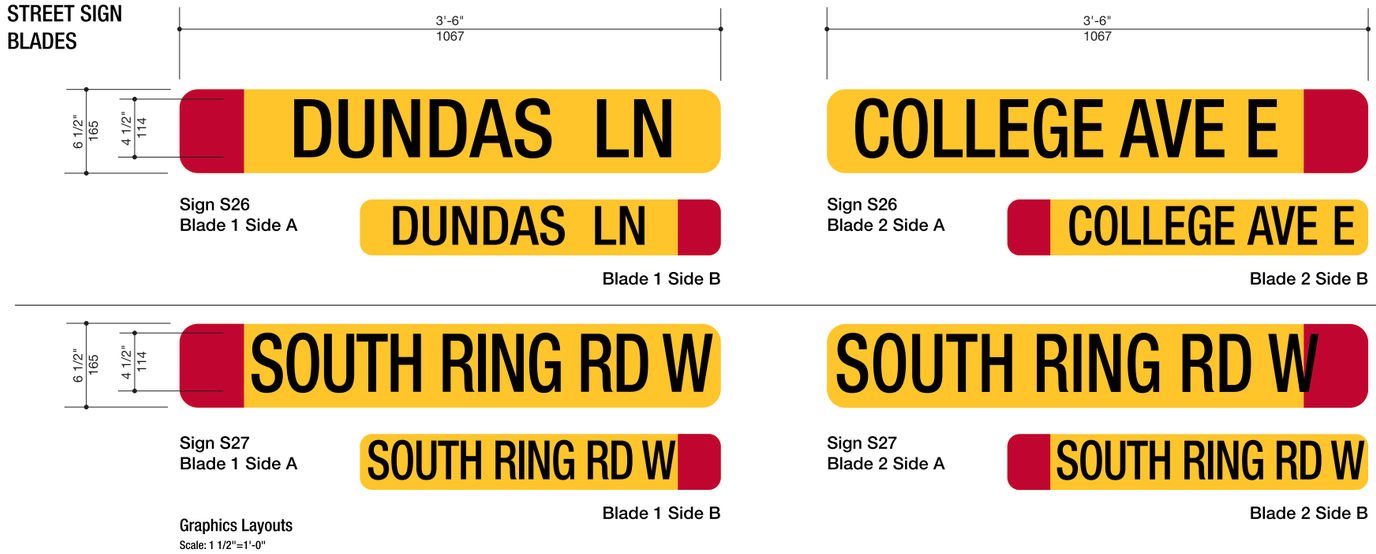
Typ. Perspective

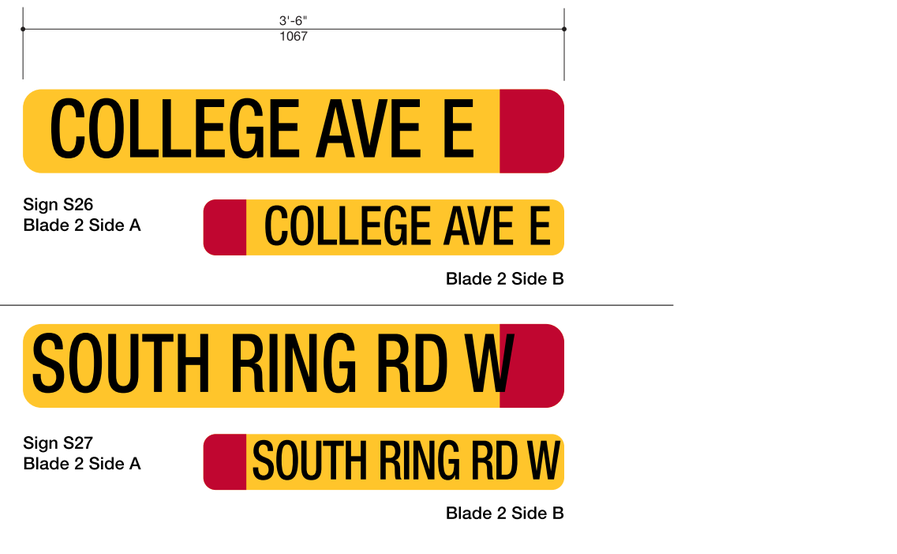
Parking Lot Identification Signs

To identify each lot and the colours of permits permitted in that lot. All designated parking lots are identified with a number between P1 and P70 as per the campus master plan and ministered by Parking Services. All signs are two sided.

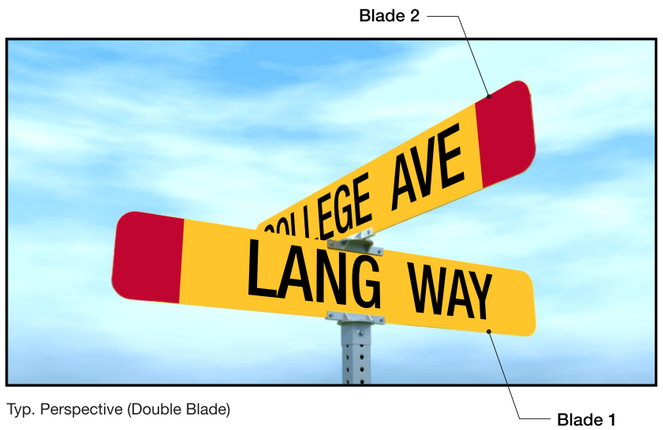
Street Signs I - Consult Physical Resources

STREET SIGN BLADES

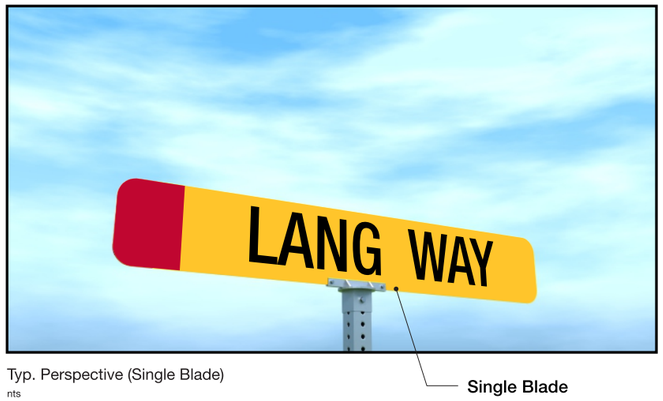




Graphics Layouts
Scale: 1 1/2"=1'-0"



Typ. Perspective (Double Blade)



Typ. Perspective (Single Blade)
nts

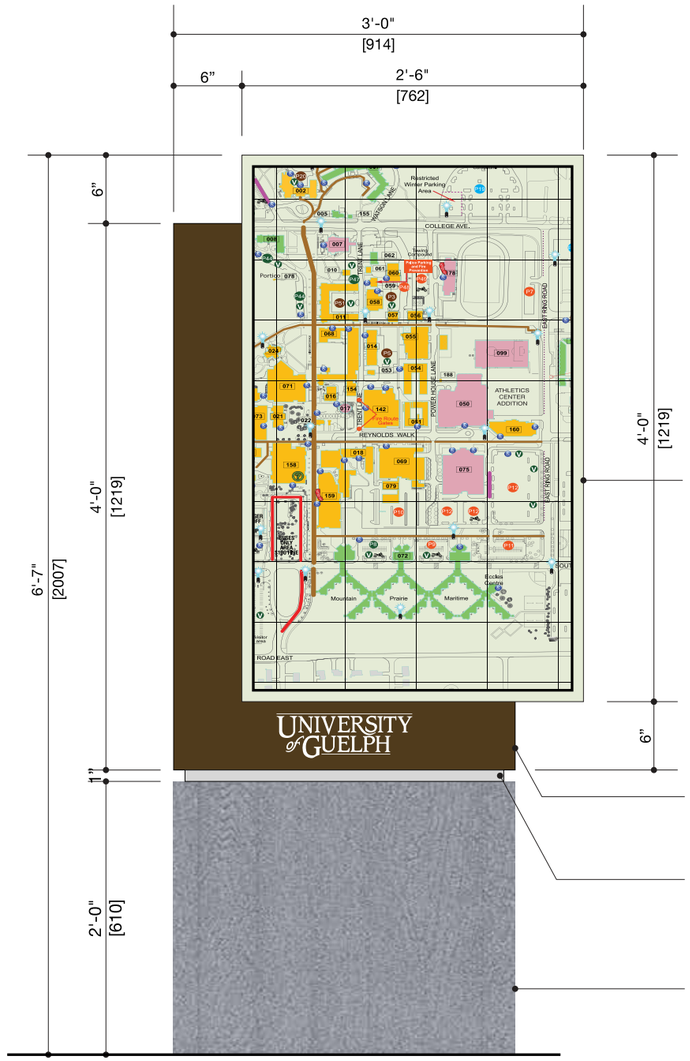
PTD. TO MATCH PMS 123C YELLOW

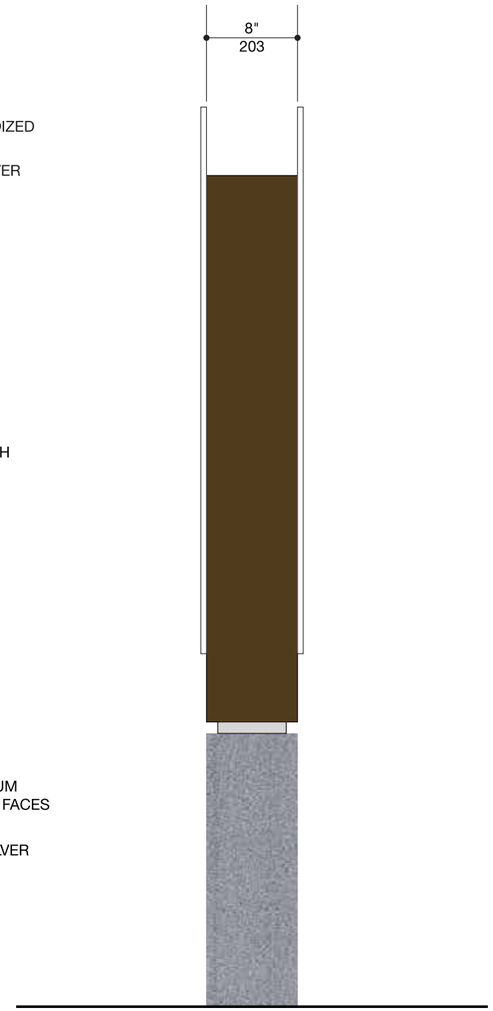
RED REFLECTIVE VINYL

BLACK REFLECTIVE VINYL

Used to identify all internal streets within the campus.

Totem Map J - Consult Physical Resources





TO MATCH
BRONZE ANODIZED

METALLIC SILVER

NON-ILLUMINATED MAPS
- FRAMELESS ALUMINUM PANELS WITH DIGITALY PRINTED GRAPHICS
(SAMPLE IMAGE SHOWN)

SIGN CLADDING
- FORMED ALUMINUM PTD. TO MATCH BRONZE ANODIZED ALUMINUM
- WHITE VINYL GRAPHICS APPLIED TO FACES

REVEAL
- ALUMINUM CONSTRUCTION PTD. SILVER

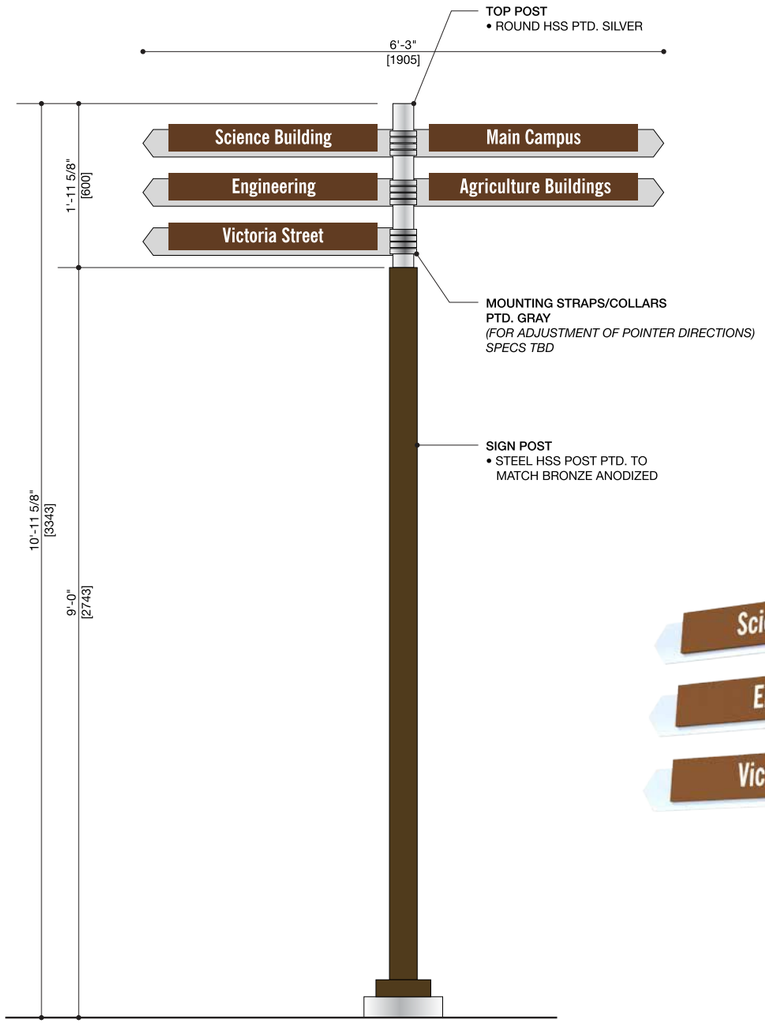
SIGN BASE
- 'BOARD FORMED' CONCRETE

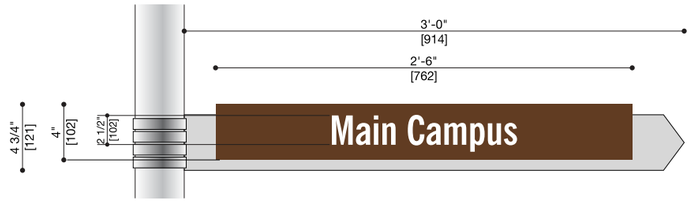
Face Elevation - Totem Map

Right Side Elevation

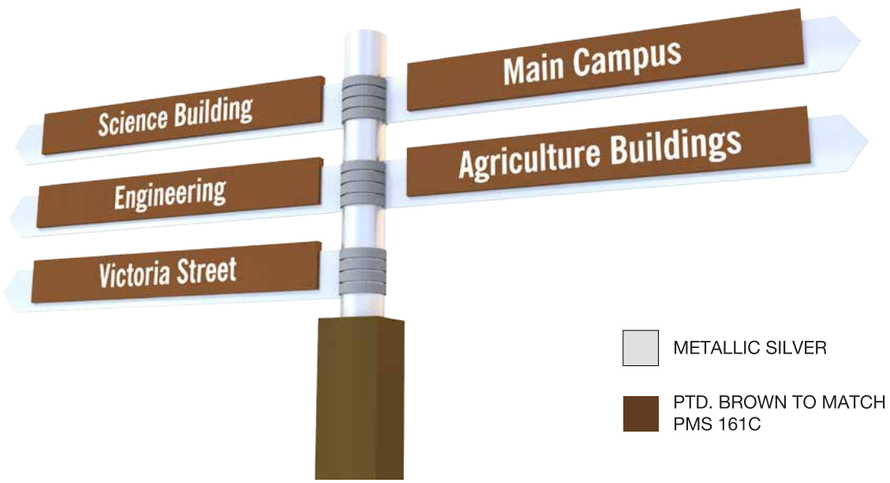
Sign to be located in a safe area to be easily viewed by pedestrians.
Ideally located in hard surface flat grade for accessibility.

Finger Posts K - Consult Physical Resources





D/S ALUMINUM BLADES / ARROWS
- ALUMINUM ARROWS PTD. SILVER
- ALUMINUM BLADES PTD. BROWN TO MATCH PMS 161C WITH WHITE VINYL GRAPHICS APPLIED TO FACES



Sign to be located in a safe area to be easily viewed by pedestrians.
Used mainly for pedestrians to indicate main campus features and directions.

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural

Vivarium

1 Vivarium

1.1 Architectural Introduction

.1 This Vivarium Design Standard has been developed to establish UofG's minimum expectations and requirements for New Renovations and New Construction on Campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of qualitative and quantitative measures, life safety, materiality, finishes, accessibility, sustainability, systems configuration and performance criteria, installation and operating flexibility and efficiency, maintenance practices and protocols and inventory management.

.3 Refer to Mechanical-specific requirements in Section 4.4.

.4 Refer to Electrical-specific requirements in Section 5.4.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new installation(s) within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing building elements, including architectural, structural, mechanical and electrical elements.

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the respective disciplinary Manager (Architectural, Mechanical, Electrical Design) from UofG PR before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The System Designer (having Responsible Control) remains responsible for ensuring any proposed design solution are in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the respective disciplinary Manager (Architectural, Mechanical, Electrical Design) from UofG PR, together with proposed measures for addressing the conflict before the completion of Schematic Design.

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 Design innovation is encouraged. All proposed design innovations shall be tabled for consideration by the respective Discipline Manager (Architectural, Mechanical, Electrical Design) from PR, before the completion of Schematic Design.

1.5 Reference Documents

.1 Comply with the latest editions of the following standards, references and guidelines from the following organizations in addition to the Referenced Documents from other sections noted in the Design and Construction Standards introductions, including:

.1 Canadian Standards Association (CSA)

.2 Ontario Animals for Research Act (ARA)

.3 Canadian Council on Animal Care (CCAC)

.4 Health Canada and the Public Health Agency of Canada (PHAC) – Lab Standards, Canadian Biosafety Standard – CBS and Design Guidelines (latest edition)

.5 Canadian Food Inspection Agency (CFIA)

.6 Underwriters Laboratories of Canada (ULC/UL)

.7 Scientific Equipment and Furniture Association (SEFA)

.8 Clinical and Laboratory Standards Institute (CLSI)

.9 International Organization for Standardization (ISO)

.10 Canadian Nuclear Safety Commission (CNSC)

.11 ASHRAE

.12 National Fire Protection Association (NFPA)

.13 Ministry of Labour (MOL)

.14 United States Pharmacopeia (USP)

.15 National Association of Pharmacy Regulatory Authorities (NAPRA)

.16 Whole Building Design Group (WBDG) – National Institute of Building Sciences

1.6 Additional Reference Standards

.1 The following additional reference standards and guidelines are represented in various forms in the "Reference Documents" sections of the current Standards– this may need to be consolidated and included as an appendix rather than in its current variances in each section.

.2 Architectural Additional:

.1 Ontario Building Code (OBC)

.2 Accessibility for Ontarians with Disabilities Act (AODA)

.3 University's Campus Master Plan

.4 University Design Standards

.5 LEED

.3 Mechanical Additional (HVAC):

.1 SMACNA

.2 University's Metering Standards

.3 University's Identifications Standards

.4 Campus Steam and Condensate System Piping Schematics

.5 Campus Chilled Water Systems Piping Schematic

.4 Mechanical Additional (Plumbing):

.1 ASPE Standards

.2 Campus Domestic Water System Schematics

.3 Campus Storm & Sanitary Piping Schematic

.4 City of Guelph Cross Connection Bylaw (Backflow Bylaw)

.5 Mechanical Additional (BAS):

.1 Canadian Electrical Code

.2 ASHRAE/ANSI 135 BACnet

.3 ASHRAE/Guideline 13 Direct Digital Control

.4 ANSI/TIA/EIA862 BAS

.5 Federal Communications Commission (FCC)

.6 Mechanical Additional (Fire Protection Systems):

.1 Insurers Advisory Organization (IAO) Risk Management Services (RMS)

.7 Electrical Additional (Power):

.1 Canadian Electrical Code

.2 Campus Power Distribution System Single Line Diagrams

.8 Electrical Lighting Systems:

.1 IESNA Lighting Handbook

2 Design Standards

2.1 General

.1 Applicability: The requirements outlined in the following clauses are applicable to all projects outlined in Clause 1.2 - Compliance Criteria specifically for Vivarium, and as outlined in the UofG Design and Construction Standards; Application specific requirements are outlined under clauses 2.2 – 2.22.

.2 Unless otherwise noted, the following standards and guidelines will apply when planning for all new laboratories, major renovations and minor renovations (where feasible) review with PR Project Manager if exemptions are proposed. It should be noted that these standards and guidelines are not intended to replace professional judgement. It is recommended that they be used to supplement and enhance the approach and methodology of the designer(s).

.3 These Standards are intended as a guidance document to facilitate a consistent campus wide approach and to provide stewardship for the design of vivarium.

.4 Room Data Sheets will be created and will be submitted as part of the detailed design process.

.5 For the purposes of clarifying the application of this section of the Design and Construction Standards, vivarium is defined as controlled environment spaces being used for animal housing and animal care (including aquatics), medical and surgical procedures, storage, decontamination, washing, measurement and experimentation. These activities may involve the use of hazardous materials or may include a hazardous process. Applicability of this definition is at the discretion of UofG and should be reviewed and agreed to prior to the implementation of the SD phase.

.6 Prior to project commencing, the designer must consult with UofG Discipline Manager from PR as well as the UofG Animal Care Services in terms of the University's Environmental Health and Safety (EHS) risk assessment report on the vivarium (if applicable) as it relates to hazardous materials and hazardous process that apply to the subject vivarium.

.7 This document should be read in conjunction with the balance of the related Design & Construction Standards as posted by UofG.

.8 If alternates or deviations from the Standards are proposed by the Designer(s), these variances are to be presented to the PR Project Manager for discussion and approval – the completion of a Compliance Checklist will be required.

.9 Accessibility: Vivarium are to be designed to be accessible to the extent possible, and to be compliant with AODA guidelines and UofG's Accessibility Design Brief. It is understood that the process and SOP within a vivarium environment does not always facilitate a fully accessible environment. Variations will be considered on a case by case basis. It is required that that a percentage of workstations be provisioned to be barrier free. The percentage to be determined on a case by case basis for each project.

.10 Containment: Laboratories are to be designed to be fully compliant with CL2 -Ag for small animal facilities containment as per Public Health Agency of Canada – Canadian Biosafety Standards.

.11 Sustainability: Vivarium spaces are among the most energy consumptive spaces on the campus. These Design Standards are intended to acknowledge the unique characteristics of vivarium and therefore aim to promote the rightsizing of lab systems to avoid unnecessary energy use associated with overdesign of the systems. Refer to Section 2.2 for sustainability direction.

.12 Variances and Alternate Compliance: approval form & sign off to be completed prior to completion of the Schematic Design Report.

.13 Vivarium Classification: EHS Hazard and Risk Assessment – Designer to solicit this as soon as is feasible and prior to completing the Schematic Design report.

.14 Sustainability Design and Energy Conservation Targets to be established as part of the Schematic Design Report.

.15 Consult with UofG Energy Efficiency Policy – re: new buildings and substantial renovations.

.16 Energy Use Intensity (EUI) as a minimum standard defined as a percentage better than calculated using ASHRAE 90.1-2013.

.17 Net Zero Carbon Ready: All new buildings are to target Net Zero Carbon ready. Where possible, renovations should also target these requirements.

.18 Other sustainable targets: The PR Project Manager is to outline any audits and mechanical and requirements to minimize energy and carbon within the project. Review in conjunction with the Sustainability Brief in Section 2.2.

.19 Consider Demand Control Ventilation, Air Quality Monitoring and other metering for every laboratory where applicable. Refer to Metering Section 2.6.

.20 Designer required to provide review and substantiation on energy demands, control, consumption – provide ROI calculations as part of the Schematic Design report.

.21 Energy Modelling: in concert with the University, define baseline criteria required for implementation.

.22 Pre-design process: Designer required to demonstrate and solicit approval on overall approach to sustainability – strategies such as low flow/low volume devices, energy recovery strategies, EUI calculations etc.

2.2 Vivarium Metrics

.1 Plan vivarium on a repeatable planning module basis. The typical single planning module should be designed with the process and accommodation in mind. If the room is a procedure room or lab process room, the width of the planning module is recommended to be between 3.2 m and 3.6 m wide and should never be less than 3.2 m wide. In a lab process room, the module length should be between 2- and 3-times module width and should not be less than 2 x the module width or more than 3 x the module width. This will provide a minimum lab aspect ratio configuration of 2:1 and a maximum of 3:1. Additional module width may be required on a case-by-case basis depending on equipment clearances. In procedure rooms, the width and length should be configured for the process and equipment. Planning modules and configurations animal holding rooms will depend on the animal species and the rack/caging, ventilated vs. non ventilated cages for the species in question. Configurations should be explored on a case-by-case basis.

.2 Vivarium can be configured on a repeating module basis by aligning the single modules side by side to create double, triple, quadruple modules in sequence. Application of a consistent and regular module will result in an efficiently planned suite.

.3 Aisles widths within vivarium should comply with the requirements of CCAC, however should be minimally 1.53 m providing a clearance of least 1.53 m between benches and between bench and procedure tables and other equipment. Additional clearances will be required to accommodate large equipment, turning radii and in front of other equipment in compliance with CSA and other standards.

.4 Single aisle configurations (single loaded aisle) should be avoided where every possible. If they must be provided, they should be at least 1.1 m wide.

.5 Aisle lengths should be no longer than between 5 m – 6 m before a cross-aisle is introduced. Long dead-end aisles should be avoided.

.6 Vivarium clear height requirements will vary greatly from lab to lab and will depend on the functionality of the lab as well as the animal rooms and ancillary rooms Ideally, vivarium should be planned to provide a clear unobstructed height of not less than 3.05 m.

2.3 Vivarium Location and Zoning

.1 Vivarium should be designed as per CCAC Guidelines and as a controlled barrier suite and shall be separated from adjacent public spaces by a barrier and lockable access and egress doors with security features that provision-controlled access and prevent unauthorized access by the public.

.2 The circulation within vivarium suite should be regular, clear and logical. Aisles and circulation patterns should be planned to provide the most direct route and access to exit from the rooms within the suite and vivarium in general.

.3 Vivarium should be zoned with clear definition and delineation between the major components within the lab (containment and non containment zones, clean and dirty zones with separate corridors if possible, surgical suites, necropsy suite, animal holding, cage rooms, procedure rooms, cage wash and decontamination rooms, gowning, food and bedding storage rooms, dispensing rooms, isolation rooms, process and working/bench areas, equipment parking areas, transient spaces/circulation, clean up areas/sinks, safety zones/stations etc.).

.4 Provide full separation/barrier between clean and dirty side of the cage wash area and the autoclave area.

.5 Vivarium casework to be arranged to facilitate line of sight and visual connection to egress locations within labs

.6 Path of travel to an egress point of the vivarium should not pass through a high hazard zone

.7 Vivarium services and utilities should be arranged along the common planning module that aligns with the casework or other FFE. Location of services should be arranged such that reconfigurations will minimize the need to relocate major services

.8 Service connection points to be located such that future modifications and configurations of casework and equipment will have minimal impact on the delivery of the services to the work bench and equipment

.9 Offices/write-up/administrative functions are generally discouraged within the vivarium – the preference is to locate non-lab spaces outside of the vivarium suite where possible.

.10 As a rule of thumb, vivarium should be separate from adjacent spaces by a demising fire separation with a minimal FRR of 1 hour. Enhanced FRR may be required in certain circumstances

.11 Vivarium fitments, furniture and equipment should be located to avoid becoming an encumbrance to circulation and air flow within the suite

.12 Locate all areas of high hazard away from access/egress points to the suite

.13 Mobile equipment, carts, mobile racks etc. should not be permitted to reduce the effective aisle width to less than 1.2 m.

.14 Where required to be co-located in vivarium, provide parking spaces for mobile equipment, carts and racks in proximity to access/egress point of lab

.15 Vivarium fitments should be positioned to allow for a robust cleaning and decontamination program including the temporary relocation of mobile casework to facilitate cleaning of spills and decontamination, and to provide access to mechanical and electrical systems

.16 Fitment construction to be robust, hospital grade construction and finish with impervious surfaces. Casework should include fit-up with similar grade hardware

.17 Surfaces, casework, benchtops and furniture to be cleanable, non-absorbent and resistant to scratches, stains, moisture, chemicals, heat, impact, repeated cycles of decontamination and washing.

.18 Capture all equipment, chemicals and reagents that are likely to be used within the lab during Functional Planning and Programming.

.19 Incorporate designated spaces within the vivarium for the storage of:

.1 Waste Containers – Recyclables and Garbage

.2 Laboratory Waste Containers

.3 Gas Cylinders

.4 Mobile equipment used within the Lab

.5 Lab carts, flat-bed carts, etc. use to move equipment and materials within the lab or between the lab and the rest of the building.

.6 A closet for Street Clothes, Aprons, etc.

.7 Flammable Storage Cabinet

.8 A Designated Locked Storage for Toxic Substances and Controlled Drugs

2.4 Process and Flow

.1 Vivarium should be planned for an efficient and safe flow of animals, people, materials, food, equipment, waste and recycling etc.

.2 Prior to completing the Schematic Design phase, provide the discipline manager of DEC with flow diagrams depicting the process and path of travel of the various materials and personnel as noted above and in consideration for requisite biosafety and biosecurity

2.5 Safety Stations

.1 Designate an area near the primary egress point of the laboratory for a Safety Station – provide at least one Safety Station per laboratory – frequency, configuration, travel distance to the safety station to be reviewed on a case by case basis. Typically, the safety station will be located within 8-10 seconds of travel from any point in the vivarium

.2 The Safety Station must be highly visible and signed with the requisite signage designating the location as having an eye wash and deluge shower – design and location of the station should be consistent from room to room in the vivarium

.3 The Safety Station must include, among other things: emergency (deluge) shower, hands free eye wash station (in combination or as individual), first aid kit and a fire extinguisher of appropriate type and size to the hazard class within the lab. Include a floor drain with a self priming trap at each Safety Station. Limit the floor drain to this one location. Locate the floor drain remote from hazardous substances and fume hoods/Bio Safety Cabinets

.4 In addition, and on a case by case basis, the Safety Station will also include a spill kit, and a modesty curtain. Provide a location for the convenient and safe storage of the modesty curtain. If the eye wash and safety shower are individual units, then they must be capable of being operated by the same individual at the same time

.5 Provide a location for personal protective equipment (PPE) near the Safety Station

.6 The Safety Station should accommodate barrier free access and operation

.7 The Safety Station to be defined by a contrasting boarder outlined on the floor for easy recognition of the location for an occupant in distress

.8 In all cases, provide a hands-free hand wash sink near the entrance to the vivarium. Coordinate location with safety station configuration

.9 In vivarium designated as Bio-containment Facilities, the requisite hand wash sink may be used in combination with the eye wash upon review and approval of the Discipline Manager of the University. The safety station will be based on the sample template provided with this standard

.10 Avoid electrical appliances, outlets and switches within proximity of the Safety Station – coordinate to ensure that water cannot be splashed over electrical fixtures

.11 Temperature and Volume of water/duration – Refer to mechanical subsection

.12 Provide a display board in a material and finish appropriate for the lab type being considered. Display board to be white board or similar surface and to be cleanable and non-absorbent

.13 Safety stations in a vivarium suite will be entertained in special cases and for certain procedures, but will be required to be isolated and in a contained area separate from animal holding

2.6 Fume Hoods

.1 Coordinate with Mechanical Vivarium Section 4.4.

.2 If Fume hoods are located in a vivarium suite, they shall be located within the vivarium to avoid high traffic areas and so that their location does not impact the egress from the lab (i.e. not near the egress point of the vivarium). Fume hoods are ideally located in the “back of the room” and where they are least at risk of compromising safe access and egress from the lab and least likely to be disturbed by the flow of personnel, equipment etc.

.3 Avoid fume hood locations near single means of access/egress from the vivarium

.4 Provide recommended clearances in front of and adjacent fume hood in compliance with the standards governing fume hood location and operation (i.e. CSA standards). In no instances should the clearance in front of a fume hood to another fitment be less than 1.53 m

.5 Fume hoods should not be located in corners – provide the minimal clearances recommended by CSA to adjacent fitments and perpendicular objects that project ahead of the face of the fume hood

.6 Avoid locating fume hood directly apposed to another fume hood, biosafety cabinet, laminar air flow device or seated workstations (any activities that will affect the performance of the fume hood or the safety of the user)

.7 Locate fume hoods so they do not interfere with air circulation or do not contribute to air flow short circuiting

.8 Provide adequate clearance below fume hood to facilitate cleaning underneath fume hood – or otherwise fume hood should be sealed to floor with integral cove base to prevent water and contaminants from getting trapped below fume hood

.9 Fume hood specifications:

.1 Fume hood manufacturers shall be members in good standing with Scientific Equipment and Furniture Association (SEFA)

.2 Comply with the latest current edition of CSA Z316, for Fume Hoods and Associated Exhaust Systems

.3 Fume hoods are to be tested for containment at the factory in accordance with ASHRAE 110 standards and PWGSC document MD15128 (latest edition)

.4 Face velocities to be determined in concert with DEC and EH&S – and will be considered on a case by case basis

.5 Fume hoods to be pre-plumbed and pre-wired to a central connection point

.6 The fume hood liner and baffles shall be constructed of either 16-gauge Type 316 stainless steel with welded seamless construction or Fibre Reinforced Plastic (FRP) and with sealed joints – review on a case by case basis for application of surfaces

.7 Interior corners shall have a radius of at least 20 mm and smooth surfaces and transitions to facilitate ease of cleaning and decontamination

.8 Work surface shall be either solid epoxy or phenolic and be at least 25 mm thick with a 12 mm high anti-spill edge on all sides

.9 Sash perimeter openings shall be constructed to minimize eddies and promote smooth entry of air into the hood

.10 Provide 50 mm grommet openings with escutcheon plate and closure in each side panel of fume hood to accommodate services into the hood

.11 Sash and side panel, rear panel glazing and light lens to be constructed of laminated or tempered safety glass.

.12 Sash to be repositioned with minimal force through the full travel path of the sash - the sash should remain stationary when force is removed

.13 Fume hoods shall be equipped with both audible and visual low airflow alarm that will sound if the face velocity should drop below a prescribed set point. The audible alarm shall have the ability to be temporarily silenced but the visual alarm must continue to function until face velocity is re-established

.14 Cup sinks will be constructed of the same material as the work surface - fully integrated with the work surface with a raised edge (minimum 6 mm) to prevent spills from entering drain cup sink

.15 Lighting, plumbing and other gas services are to be remotely operated and to be accessible for servicing outside of the inner lining

.16 Service controls and electrical fitments are to be mounted outside of the cabinet on the front fascia

.17 All receptacles on fume hoods shall be GFI T-slot 120V/20 A

.18 Fume hoods shall operate at a sound level not to exceed 65 dBA at the face of the hood under normal operating conditions

.19 Lighting fixture to be LED and to be mounted externally of the inner liner, all serviceable electrical parts are to be accessible from outside of the structure

.20 All electrical fixtures will be factory installed and pre-wired to a junction box on the top of the fume hood. All components shall bear the CSA and UL/ULC label

.21 Fume hoods shall be supplied with a sash limiting device (sash stop) installed to limit the sash travel to the maximum operational opening of 460mm as measured from the work surface. Sash stops shall be designed to allow the operator to override them and will automatically reset when the sash is lowered back to below 460 mm. Confirm these opening dimensions with DEC as part of the Schematic Design process. The fume hood must be equipped with an alarm to indicate that the sash is above the maximum operational opening

.22 In the case where barrier free construction is required, provide fume hoods with adjustable work surfaces and knee spaces below the work surface

.23 Any variances to the fume hood specifications shall be approved by Discipline Manager at DEC and/or EHS

2.7 Biological Safety Cabinets

.1 Locate BSC's away from high volume path of travel, doorways, supply and return ventilation etc. such as those caused by doorways or general ventilation devices. Locate remote from disruptive air currents that will affect the performance of the BSC. BSC "Type" and "Class" to be reviewed with DEC on a case by case basis

.2 Locate BSC's so they are not directly across from, or adjacent to, seated workstations, other biosafety cabinets or fume hood

.3 Provide a minimum 40 cm clearance between the exhaust outlet on top of the BSC and any overhead obstructions. Provide 30 cm clearance on either side of the BSC.

.4 Biosafety Cabinet Specifications:

.1 must comply with the Canadian Biosafety Standards and Guidelines (latest edition) and be certified in accordance with NSF/ANSI 49 for Biosafety Cabinetry and with manufacturer's specifications

.2 Room exhaust and supply diffusers must be located a minimum distance from BSC measured horizontally from the front face of BSC. Consult with the BSC manufacturer

.3 Provide a minimum clearance between the exhaust outlet on top of the BSC and any overhead obstructions as defined by the BSC cabinet manufacturer. Provide 30 cm must be provided on each side of the BSC

2.8 Specialized Storage

.1 Gas cylinders to be stored to not be a hazard and an incumbrance to circulation within lab. Gas cylinders should be properly restrained with gas bottle harnesses and to be stored in alcoves if possible

.2 Gas cylinders should not be located near access/egress points, paths of travel to exits and in exit corridors

.3 Large floor standing equipment should be located in designated equipment zones so as to not disrupt the activities of the lab

2.9 Hazardous Material Storage/Flammable Storage

.1 Flammable storage cabinets/solvents and acids/corrosives are typically located under or in proximity to a fume hood since that is typically where the hazardous substances are being used. Quantity and type of hazardous and flammable storage will be considered on a case by case basis. As a default, each fume hood should be provided with one hazardous storage cabinet and one acid cabinet below the FH.

.2 Flammable storage cabinets shall not be located within proximity of access/egress to the lab or in a location that would constitute a hazard to egress from the lab

.3 Flammable storage cabinets must conform to standards governing their construction and use including ULC and CSA standards

.4 Flammable storage cabinets are typically not required to be vented for fire protection purposes - venting may compromise the performance of the cabinet. Venting will be considered on a case by case basis only. The default condition will be a non-vented flammable storage cabinet. The cabinet should be supplied with factory furnished vent ports, fitted with flame arrestors, and removable seals. These ports will be leveraged should venting be required for the purposes of protecting workers to exposure of harmful vapours.

.5 If a flammable cabinet is vented, then the exhaust duct, riser and fan must be constructed of materials that will provide the same protection as the cabinet and seals offer to the contents

.6 Corrosion resistant cabinets are required for the storage of acids. These cabinets are to be vented using corrosion resistant material to prevent deterioration due to corrosion or rusting. Venting may be done into adjacent fume hoods as per the manufacturer's specification

.7 In the case of acid cabinets, if the cabinet is vented, the duct should be connected to the port provided in the cabinet. Ducts should be connected to the main fume hood exhaust duct downstream of the fume hood collar and control valve (if applicable)

.8 It is recommended that EH&S be consulted in any case where venting of flammable storage cabinets is requested

.9 In the case where bases are to also be accommodated, they should be stored in appropriate storage cabinets designed for bases and located remote from the acid cabinets

2.10 Laboratory Casework

.1 Vivarium casework to be designed to be of modular configuration and where practical and where possible, to be mobile. Vivarium casework to be fixed in place at select locations if a mobile solution is not practical or feasible. Material of construction to be appropriate for the application and considered on a case by case basis and reviewed with the University prior to beginning design. Provide a list of pros and cons for the University to consider. Minimal standards for material and construction to be compliant with CCAC and bio-containment level CL2.

.2 Casework should be designed to be robust, flexible, interchangeable and adjustable to the fullest extent possible. Casework on casters or wheels should be considered to maximize flexibility and adjustability and to minimize cost on reconfiguration. Provide load ratings for wall mounted shelving for review and approval by the University. Thickness of shelving, length of shelving and c/c of pilaster supports to be commensurate with the application. C/C of pilaster shelving to be no more than 900 mm o/c unless otherwise noted or approved

.3 All casework to be either "stand off" allowing cleaning behind or sealed to prevent dust and contamination build up

.4 Provide barrier free stations in each lab as a minimal (5%) of total work stations unless otherwise defined by the University

.5 Bench top and shelving to be stainless steel – typical. Other materials such as solid epoxy will be considered on a case by case basis. Plastic Laminate counter tops will not be acceptable

.6 Bench tops will be acoustically attenuated with sound deadening material compliant with applicable standards and guidelines

.7 Casework bench height and upper cabinet configurations to be adjustable where possible to facilitate ease of reconfiguration

.8 Provide a 15 cm s/s backsplash at all interfaces of fixed casework with walls/equipment

.9 Upper shelving to have adjustable edge restraints - all sides

.10 Sinks (wash up and hand wash) to have lips to prevent spillage.

.11 Hand wash sinks to be hands-free and hard wired.

.12 Bench tops to be designed with marine edges and drip stops where possible and where required for functionality

.13 Bench depth should be standardized on 760 mm deep units. Deeper or shallower bench tops will be considered in select locations and on a case by case basis

.14 Base cabinets (pedestals) will take on the following configurations unless otherwise designated in the room data sheets:

.1 50/50 split of storage and knee spaces

.2 50/50 split of drawers and doors

.3 Hospital grade hinges to facilitate 180-degree operation

.4 Mobile tables to facilitate a range of height between sitting height and standing height

.5 Drawers to be one-piece construction, full extension, ball bearing glides and stops

2.11 Access, Egress, Doors & Door Swings

.1 Access/Egress doors to/from suite should be used singularly or in tandem to provide adequate clearance widths for the population of the rooms as well as the equipment that will need to pass through the doors. When used in combination, consider a fixed leaf door panel in combination with an active leaf. The fixed leaf door will be secured by way of flush bolts top and bottom – and will be used on occasion when larger pieces of equipment need to be moved

.2 Consider a removable transom panel above door in anticipation of the delivery of large, oversized items

.3 Provide clearance on either side of the door for moving of equipment, carts, turning radii etc.

.4 Wherever possible, and in the cases where occupant load requires it, provide two exits from the suite

.5 Where possible, it is recommended that the doors to rooms within the suite include glazed panels to facilitate visual contact for security and in the event of emergencies or occupants in distress. In instances where light control is required, glazed panels will not be permitted. Specialized tinted red glazing in door panels will be permitted on a case by case basis for specialized animal holding rooms depending on species. Alternate forms of window treatment will be reviewed on a case by case basis

.6 Doors should always swing outward from the suite (swing in the path of travel)

.7 Hardware should provide ease of operational and be self closing and latch able/lockable

2.12 Ratings and Separations

.1 Separate vivarium from non-lab spaces by way of a fire rated enclosure with a fire resistance rating (FRR) as per building code and fire code provisions. Depending on hazard classification, the fire resistance rating of the enclosure will be at minimal a 1 hr FRR.

.2 Depending on hazardous classification, separate vivarium from adjacent spaces by rated assemblies to create compartmentalization of the suite under the provision of the NFC and/or CCAC

2.13 Views and Natural Light

.1 Provide access to external views and natural light wherever possible. If windows are provided in the vivarium, they should be non-operable

.2 Wherever possible and to the extent feasible, provide visual transparency between rooms in the vivarium suite and adjacent public spaces/corridors for safety and security and occupant/animal wellbeing

.3 Where possible and to the extent feasible, provide visual connection from rooms to public spaces and from room to room

2.14 Materials and Finishes

.1 Wall, ceiling, doors/frames and floor finishes shall be finished with smooth, non-absorbent and washable materials. Finishes should be selected to be robust, abuse resistant and cleanable

.2 Protect exposed corners and walls with corner guards and bumper rails of an appropriate material wherever possible, and on a case by case basis

.3 Floor finish will typically be a resilient seamless sheet flooring or troweled on built up coating (epoxy or otherwise) Selection of floor finish shall be commensurate with requirements for cleanliness, containment, robustness, cleanability etc.

.4 Resilient seamless floor should have welded joints and integral 15 cm coved base with top bead sealed to wall – typical at all walls and permanent furniture, curbs etc.

.5 Seamless flooring should be smooth, impervious, washable and chemically resistant. Minimize seams wherever possible to facilitate a smooth surface for carts etc.

.6 All penetrations through floors to be sealed and watertight

.7 Casework and other fixtures and furniture should be robust, contiguous with minimal seams to avoid harboring contaminants and to facilitate cleaning. Epoxy coatings on walls and ceilings in vivarium are common but can be problematic if expansion joints are provided. Epoxy on concrete or masonry is stable but often demising walls in vivarium are steel stud and drywall which have movement and humidity issues.

2.15 Lab Gases and Emergency Disconnects

.1 Provide an emergency gas shut off and an electrical disconnect (kill) switch near the egress point from the suite. Refer also to mechanical and electrical sections for further guidance

.2 The emergency shut off and kill switches should also be located in proximity to the Safety Station

.3 All rooms requiring natural gas should be provided with an emergency shut-off solenoid valve and mushroom type push button near the egress point and the lab Safety Station. The push button shall be keyed type for resetting purposes. The natural gas shut off valve shall be set to fail in closed position in the case of a power outrage. Valve should remain closed after power has been re-established. Only plant operations should have the key to reset solenoid valves.

.4 All casework mounted natural gas turrets to be push/turn type – typical

2.16 Centralized Vacuum Systems

.1 Refer to mechanical

2.17 Centralized Air Systems

.1 Refer to mechanical

2.18 Waste, Recycling

.1 Provide dedicated waste collection area within suite. Provide space in suite for a variety of waste including trash, hazardous waste, broken glass, bedding, sharps etc.).

.2 Integrate the waste station into the design of the suite and in the design of the casework if possible

.3 Provide a dedicated recycling area within the suite – integrate into the design of the casework if possible

.4 Integrate the waste collection and/or the recycling collection infrastructure into a centralized collection protocol if this is available and exists within the building

.5 Consideration to be given for automated technologies such as vacuum system or auger system to transport bedding from dumping station to external dumpsters

2.19 Lab Water and Animal Water

.1 Refer also to mechanical. Consideration will be given to a centralized automated watering system for animal holding rooms on a case by case basis depending on the species, volumes, cage type etc. Decision on automated watering system will be based on what species will be housed

2.20 Lab Mock-Ups

.1 Where-ever possible, specifications should call for the requirement of a mock-up of the various types of casework units as part of the submittals to facilitate a review for conformance and to familiarize the trades with the details, construction and coordination of systems and installation.

2.21 Sanitary Stations, Wash-up and Gowning, PPE

.1 In the case of a room or suite provide a

.2 hands-free hand wash sink adjacent to and near the access/egress to the suite (in compliance with requirements of the agencies governing these lab types – e.g. CCAC, Public Health Agency of Canada)

.3 Locate hooks (where required) near to and adjacent to the hand wash sink as well as the access/egress point to the lab. Avoid hooks that project into the room – use narrow profile wherever possible. Provide sufficient hooks to accommodate both clean and used lab coats

.4 Locate Personal Protective Equipment (PPE) near to and adjacent to had wash and sanitary station

2.22 Vivarium Amenities

.1 Audio-Visual and connectivity (projection, screens, smart boards, data capture, distance learning) are to be fully coordinated with the work of other standards

3 Installation And Workmanship Standards

3.1 General

.1 The requirements outlined in the following clauses are applicable to all general and architectural systems; application specific requirements are outlined under clauses 3.2

3.2 Extra Inventory

.1 A recommended inventory list for additional extra stock shall be presented to the Discipline Manager DEC for consideration prior to Issuance for Bid. The amount of required stockage will be reviewed on a case by case basis by the design team. Extra stock will typically include major components specific to this project type such as sheet flooring, ceiling tile, specialized wall coatings etc. This list shall be proposed in consideration for the following:

.1 Likelihood that the inventory material will be required in the short term and mid-term (1-5 years)

.2 Amount and application, applicable warranties etc.

.3 If the product is readily available and the procurement lead time

.4 Cost of the product

4 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural Laboratory

1 Introduction

1.3 General

.1 This Laboratory Design Standard has been developed to establish the University's minimum expectations and requirements for New Renovations and New Construction on Campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of qualitative and quantitative measures, life safety, materiality, finishes, accessibility, sustainability, systems configuration and performance criteria, installation and operating flexibility and efficiency, maintenance practices and protocols and inventory management.

.3 For Mechanical-specific requirements, refer to Section 4.5.

.4 For Electrical-specific requirements, refer to Section 5.5.

1.4 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new installation(s) within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing building elements, including architectural, structural, mechanical and electrical elements.

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the respective disciplinary Manager (Architectural, Mechanical, Electrical Design) from University of Guelph – Campus Planning, Design and Development (CPDD) before the completion of Schematic Design.

1.5 Responsibility of the Designer

.1 The System Designer (having Responsible Control) remains responsible for ensuring any proposed design solution are in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the respective disciplinary Manager (Architectural, Mechanical, Electrical Design) from CPDD, together with proposed measures for addressing the conflict before the completion of Schematic Design.

1.6 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 Design Innovation is encouraged. All proposed Design Innovations shall be tabled for consideration by the respective Discipline Manager (Architectural, Mechanical, Electrical Design) from CPDD, before the completion of Schematic Design.

1.7 Reference Documents

.1 Comply with the latest editions of the following standards, references and guidelines from the following organizations in addition to the Referenced Documents from other sections noted in the Design Standards Introductions, including:

.1 Canadian Standards Association (CSA)

.2 Ontario Animals for Research Act (ARA)

.3 Canadian Council on Animal Care (CCAC)

.4 Health Canada and the Public Health Agency of Canada (PHAC) – Lab Standards, Canadian Biosafety Standard, Handbook and Guidelines (latest edition)

.5 Canadian Food Inspection Agency (CFIA)

.6 Underwriters Laboratories of Canada (ULC/UL)

.7 Scientific Equipment and Furniture Association (SEFA)

.8 Clinical and Laboratory Standards Institute (CLSI)

.9 International Organization for Standardization (ISO)

.10 Canadian Nuclear Safety Commission (CNSC)

.11 ASHRAE

.12 National Fire Protection Association (NFPA)

.13 Ministry of Labour Immigration Trades and Skills Development (MLITSD)

.14 United States Pharmacopeia (USP)

.15 National Association of Pharmacy Regulatory Authorities (NAPRA)

.2 Whole Building Design Group (WBDG) – National Institute of Building Sciences

.1 Ontario Fire Code (OFC)

1.8 Additional Reference Standards

.1 The following additional reference standards and guidelines are represented in various forms in the "Reference Documents" sections of the current Standards and Guidelines. Refer to other sections for additional Reference Documents.

.2 Architectural Additional:

.1 Ontario Building Code (OBC)

.2 Accessibility for Ontarians with Disabilities Act (AODA)

.3 University's Campus Master Plan

.4 University Design Standards

.5 CaGBC's Zero Carbon Building Standards (ZCB)

.3 Mechanical Additional (HVAC):

.1 SMACNA

.2 University's Metering Standards

.3 University's Identifications Standards

.4 Campus Steam and Condensate System Piping Schematics

.5 Campus Chilled Water Systems Piping Schematic

.6 ASHRAE Laboratory Design Guide.

.4 Mechanical Additional (Plumbing):

.1 ASPE Standards

.2 Campus Domestic Water System Schematics

.3 Campus Storm & Sanitary Piping Schematic

.4 City of Guelph Cross Connection Bylaw (Backflow Bylaw)

.5 Mechanical Additional (BAS):

.1 Canadian Electrical Code

.2 ASHRAE/ANSI 135 BACnet

.3 ASHRAE/Guideline 13 Direct Digital Control

.4 ANSI/TIA/EIA862 BAS

.5 Federal Communications Commission (FCC)

.6 Mechanical Additional (Fire Protection Systems):

.1 Insurers Advisory Organization (IAO) Risk Management Services (RMS)

.7 Electrical Additional (Power):

.1 Canadian Electrical Code

.2 Campus Power Distribution System Single Line Diagrams

.8 Electrical Lighting Systems:

.1 IESNA Lighting Handbook

2 Introduction

2.1 General

.1 Applicability: The requirements outlined in the following clauses are applicable to all projects outlined in Clause 1.2 - Compliance Criteria specifically for Laboratories, and as outlined in the University Design Standards; Application specific requirements are outlined under clauses 2.2 – 2.22.

.2 Unless otherwise noted, the following standards and guidelines will apply when planning for all new laboratories, major renovations and minor renovations (where feasible) Review with CPDD if exemptions are proposed. It should be noted that these standards and guidelines are not intended to replace professional judgement. It is recommended that they be used to supplement and enhance the approach and methodology of the designer(s).

.3 These Design Standards are intended as a guidance document to facilitate a consistent campus wide approach and to provide stewardship for the design of laboratories.

.4 Room Data Sheets will be created and will be submitted as part of the Detailed Design Process.

.5 For the purposes of clarifying the application of this section of the Design Standards, laboratories are defined as controlled environment spaces being used for teaching, research, measurement and experimentation. These activities may involve the use of hazardous materials or may include a hazardous process. Applicability of this definition is at the discretion of the University and should be reviewed and agreed to prior to the implementation of the SD phase.

.6 Prior to project commencing, the designer must consult with the University Discipline Manager from CPDD and specific laboratory users the intended use of the space and specific operating procedures as it relates to hazardous materials and hazardous process that apply to the subject labs. This must be considered as part of the overall laboratory design to ensure safe operation of the space and users.

.7 This document should be read in conjunction with the balance of the related Master List of Design Standards as posted by the University of Guelph.

.8 If alternates or deviations from the Design Standards are proposed by the Designer(s), these variances are to be presented to the University Discipline Manager from CPDD for discussion and approval – The completion of a Compliance Checklist will be required.

.9 Accessibility: Laboratories are to be designed to be fully accessible and compliant with AODA guidelines and the University of Guelph's accessibility standards. It is required that that a percentage of lab workstations and Fume Hoods be provisioned to be barrier free. The percentage to be determined on a case by case basis for each project. Typically, at least one fume hood per floor will be barrier free to avoid transporting hazardous substances in the elevator(s).

.10 Containment: Laboratories are to be designed to be fully compliant with CL2 containment as per Public Health Agency of Canada – Canadian Biosafety Standards.

.11 Sustainability: Laboratory spaces are among the most energy consumptive spaces on the campus. These Design Standards are intended to acknowledge the unique characteristics of laboratories and therefore aim to promote the right-sizing of lab systems to avoid unnecessary energy use associated with overdesign of the systems. . Refer to Section 2.2 for sustainability direction.

.12 Variances and Alternate Compliance: approval form & sign off to be completed prior to completion of the Schematic Design Report.

.13 Laboratory Classification – EHS Hazard and Risk Assessment – Designer to solicit this as soon as is feasible and prior to completing the Schematic Design report.

.14 Sustainability Design and Energy Conservation Targets to be established as part of the Schematic Design Report.

.1 Consult with U of G Energy Efficiency Policy – re: new buildings and renovations.

.2 Energy Use Intensity (EUI) as a minimum standard defined as a percentage better than calculated using ASHRAE 90.1-2013.

.3 During the design process, demonstrate options that could achieve higher performance compared to ASHRAE 90.1-2013 with a payback calculation in years.

.4 Minimal LEED aspirations – U of G currently subscribes to the ZCB system – but with no formal requirement for registration of the project.

.5 Other sustainable targets – requirement to describe other sustainable metrics. Sustainability Brief in Section 2.2.

.6 Demand Control Ventilation, Air Quality Monitoring to be considered for every laboratory where applicable. Refer to Metering Section 2.6.

.7 Designer Required to provide review and substantiation on energy demands, control, consumption – provide ROI calculations as part of the Schematic Design report.

.8 Energy Modelling – in concert with the University, define baseline criteria required for implementation.

.9 Pre-design process – Designer required to demonstrate and solicit approval on overall approach to sustainability – strategies such as low flow/low volume devices, energy recovery strategies, EUI calculations etc.

2.2 Laboratory Metrics

.1 Laboratories are typically planned on a repeatable planning module basis. The typical single planning module should be between 3.2 m and 3.6 m wide and should never be less than 3.2 m wide. Module length should be between 2- and 3-times module width and should not be less than 2 x the module width or more than 3 x the module width. This will provide a minimum lab aspect ratio configuration of 2:1 and a maximum of 3:1. Additional module width may be required on a case-by-case basis depending on equipment clearances.

.2 Laboratories can be configured on a repeating lab module basis by aligning the single lab modules side by side to create double, triple, quadruple labs in sequence.

.3 Aisles widths within labs should be minimally 1.53 m providing a clearance of at least 1.53 m between benches and between bench and equipment. Additional clearance will be required to accommodate large equipment, turning radii and in front of fume hoods and other equipment in compliance with CSA and other standards.

.4 Single aisle configurations (single loaded aisle) should be avoided where every possible. If they must be provided, they should be at least 1.1 m wide.

.5 Aisle lengths should be no longer than between 5 m – 6 m before a cross-aisle is introduced. Long dead-end aisles should be avoided.

.6 Laboratory clear height requirements will vary greatly from lab to lab and will depend on the functionality of the lab. Ideally, labs should be planned to provide a clear unobstructed height of not less than 3.05 m.

.7 Capture all equipment, chemicals and reagents that are likely to be used within the lab during Functional Planning and Programming.

.8 Incorporate designated spaces within the lab for the storage of:

.1 Waste Containers – Recyclables and Garbage

.2 Laboratory Waste Containers

.3 Gas Cylinders

.4 Mobile equipment used within the Lab

.5 Lab carts, flat-bed carts, etc. use to move equipment and materials within the lab or between the lab and the rest of the building.

.6 A closet for Street Clothes, Aprons, etc.

.7 Flammable Storage Cabinet

.8 A Designated Locked Storage for Toxic Substances and Controlled Drugs

2.3 Lab Location and Zoning

.1 Locate laboratories other than teaching laboratories:

.1 In areas away from general traffic flow, and

.2 Away from spaces readily accessible by the general public.

.2 Laboratories should be separated from adjacent public spaces by a lockable door.

.3 The circulation within labs should be regular, clear and logical. Aisles and circulation patterns should be planned to provide the most direct route and access to exit from the lab.

.4 Labs should be zoned with clear definition and delineation between the major components within the lab (fume hood area, working/bench areas, equipment parking areas, transient spaces/circulation, clean up areas/sinks, safety zones/stations etc.).

.5 Lab casework to be arranged to facilitate line of sight and visual connection to egress locations within labs.

.6 Path of travel to an egress point of the lab should not pass through a high hazard zone in lab.

.7 Lab services and utilities should be arranged along the common lab planning module that aligns with the lab casework. Location of services should be arranged such that lab reconfigurations will minimize the need to relocate major services.

.8 Lab service connection points to be located such that future modifications and configurations of lab casework and equipment will have minimal impact on the delivery of the services to the work bench and equipment.

.9 Avoid locating offices/write-up/administrative functions within labs – the preference is to locate non-lab spaces outside of the lab suite. If necessary to co-locate in the lab, these spaces should be located near the access/egress to the lab and away from the high hazard, contaminated spaces within the lab.

.10 As a rule of thumb, separate laboratories from adjacent non-lab spaces by a demising fire separation with a minimal FRR of 1 hour. Enhanced FRR may be required where specified by OBC or other authorities having jurisdiction. Where a code consultant has been engaged, review the proposed minimum FRR in accordance with the specific use of the laboratory and handling of flammable and combustible materials.

.11 Laboratory fitments, furniture and equipment should be located to avoid becoming an encumbrance to circulation and air flow within the lab.

.12 Locate all areas of high hazard (e.g. fume hoods) away from access/egress points to the lab.

.13 Mobile equipment, carts, mobile racks etc. should not be permitted to reduce the effective aisle width to less than 1.2 m.

.14 Where required to be co-located in lab, provide parking spaces within labs for mobile equipment, carts and racks in proximity to access/egress point of lab.

.15 Lab casework should be positioned to allow for a robust cleaning and decontamination program including the temporary relocation of mobile casework to facilitate cleaning of spills and to provide access to mechanical and electrical systems (e.g. wall fin units).

.16 Casework construction to be robust, lab grade construction and finish with impervious surfaces. Casework should include fit-up with lab grade hardware.

.17 Surfaces, casework, benchtops and furniture to be cleanable, non-absorbent and resistant to scratches, stains, moisture, chemicals, heat, impact, repeated cycles of decontamination and washing.

2.4 Process and Flow

.1 Labs should be planned for an efficient and safe flow of people, materials, equipment, waste and recycling etc.

.2 Prior to completing the Schematic Design phase, provide the discipline manager of CPDD with flow diagrams depicting the process and path of travel of the various materials and personnel as noted above.

2.5 Safety Stations

.1 Designate an area near the primary egress point of the laboratory for a Safety Station – provide at least one Safety Station per laboratory – frequency, configuration, travel distance to the safety station to be reviewed on a case-by-case basis. The safety station will be located within a10 second path of travel from any point in the lab.

.2 The Safety Station must be highly visible and signed with the requisite signage designating the location as having an eyewash and deluge shower – design and location of the station should be consistent from lab to lab and located near the exit of lab where possible. All eyewash and showers will be plumbed from a potable domestic cold water source.

.3 The Safety Station must include, among other things: emergency (deluge) shower, handsfree eyewash station (in combination or as individual), first aid kit and a fire extinguisher of appropriate type and size to the hazard class within the lab. Include a floor drain with a self-priming trap at each Safety Station. Locate the floor drain remote from hazardous substances and fume hoods/Bio Safety Cabinets.

.4 In addition, and on a case-by-case basis, the Safety Station will also include a separate spill kit, and a modesty curtain. If the eyewash and safety shower are individual units, then they must be capable of being operated by the same individual at the same time.

.5 The Safety Station should accommodate barrier-free access and operation.

.6 The Safety Station to be defined by a contrasting boarder outlined on the floor for easy recognition of the location for an occupant in distress.

.7 In labs designated as Bio-containment Labs, the requisite hand wash sink may not be used in combination with the eyewash as this may lead to contamination of the eyewash.

.8 Avoid electrical appliances, outlets and switches within proximity of the Safety Station – coordinate to ensure that water cannot be splashed over electrical fixtures. A minimum of 3 feet horizontally and 8 feet vertically is required.

.9 Temperature and Volume of water/duration – Refer to mechanical subsection.

.10 Provide a display board in a material and finish appropriate for the lab type being considered. Display board to be white board or similar surface and to be cleanable and non-absorbent.

2.6 Fume Hoods

.1 For Mechanical Systems, refer to Section 4.5.

.2 Fume hoods shall be located within the laboratory to avoid high traffic areas and so that their location does not impact the egress from the lab (i.e. not near the egress point of the lab). Fume hoods are ideally located in the “back of the room” where they are least at risk of compromising safe access and egress from the lab and least likely to be disturbed by the flow of personnel, equipment etc.

.3 Avoid fume hood locations near single means of access/egress from a lab.

.4 Provide recommended clearances in front of and adjacent to the fume hood in compliance with the standards governing fume hood location and operation (i.e. CSA standards). In no circumstances should the clearance in front of a fume hood to another fitment be less than 1.53 m.

.5 Fume hoods should not be located in corners – provide the minimal clearances recommended by CSA to adjacent fitments and perpendicular objects that project ahead of the face of the fume hood.

.6 Avoid locating fume hood directly opposed to another fume hood, biosafety cabinet, laminar air flow device or seated workstations (any activities that will affect the performance of the fume hood or the safety of the user).

.7 Locate fume hoods so they do not interfere with air circulation or do not contribute to air flow short circuiting.

.8 Provide adequate clearance below the fume hood to facilitate cleaning underneath fume hood – or otherwise the fume hood should be sealed to floor with an integral cove base to prevent water and contaminants from getting trapped below the fume hood.

.9 Fume hood specifications:

.10 Fume hood manufacturers shall be members in good standing with Scientific Equipment and Furniture Association (SEFA):

.1 Comply with the latest current edition of CSA Z316, for Fume Hoods and Associated Exhaust Systems.

.2 Fume hoods are to be tested for containment at the factory in accordance with ASHRAE 110 standards and PWGSC document MD15128 (latest edition).

.3 Fume hoods to be pre-plumbed and pre-wired to a central connection point.

.4 The fume hood liner and baffles shall be constructed of either 16-gauge Type 316 stainless steel with welded seamless construction or Fibre Reinforced Plastic (FRP) and with sealed joints – review on a case-by-case basis for application of surfaces.

.5 Interior corners shall have a radius of at least 20 mm and smooth surfaces and transitions to facilitate ease of cleaning and decontamination.

.6 Work surface shall be either solid epoxy or phenolic and be at least 25 mm thick with a 12 mm high anti-spill edge on all sides.

.7 Sash perimeter openings shall be constructed to minimize eddies and promote smooth entry of air into the hood.

.8 Provide 50 mm grommet openings with escutcheon plate and closure in each side panel of fume hood to accommodate services into the hood.

.9 Sash and side panel, rear panel glazing and light lens to be constructed of laminated or tempered safety glass.

.10 Sash to be repositioned with minimal force through the full travel path of the sash - the sash should remain stationary when force is removed.

.11 Fume hoods shall be equipped with both audible and visual low airflow alarm that will sound if the face velocity should drop below a prescribed set point. The audible alarm shall have the ability to be temporarily silenced but the visual alarm must continue to function until face velocity is re-established.

.12 Cup sinks will be constructed of the same material as the work surface - fully integrated with the work surface with a raised edge (minimum 6 mm) to prevent spills from entering drain cup sink.

.13 Lighting, plumbing and other gas services are to be remotely operated and to be accessible for servicing outside of the inner lining.

.14 Service controls and electrical fitments are to be mounted outside of the cabinet on the front fascia.

.15 All receptacles on fume hoods shall be GFI T-slot 120V/20 A.

.16 Fume hoods shall operate at a sound level not to exceed 65 dBA at the face of the hood under normal operating conditions.

.17 Variable flow type fume hoods to be considered and discussed with Mechanical, Energy and Electrical Design Managers, especially for new Fume Hoods.

.18 Lighting fixture to be LED and to be mounted externally of the inner liner, all serviceable electrical parts are to be accessible from outside of the structure.

.19 All electrical fixtures will be factory installed and pre-wired to a junction box on the top of the fume hood. All components shall bear the CSA and UL/ULC label.

.20 Fume hoods shall be supplied with a sash limiting device (sash stop) installed to limit the sash travel to the maximum operational opening of 460mm as measured from the work surface. Sash stops shall be designed to allow the operator to override them and will automatically reset when the sash is lowered back to below 460 mm. Confirm these opening dimensions with CPDD as part of the Schematic Design process. The fume hood must be equipped with an alarm to indicate that the sash is above the maximum operational opening.

.21 In the case where barrier free construction is required, provide fume hoods with adjustable work surfaces and knee spaces below the work surface.

.22 Any variances to the fume hood specifications shall be approved by Discipline Manager at CPDD and/or EHS.

2.7 Biological Safety Cabinets

.1 Locate BSC's away from high volume path of travel, doorways, supply and return ventilation etc. such as those caused by doorways or general ventilation devices. Locate remote from disruptive air currents that will affect the performance of the BSC. BSC "Type" and "Class" to be reviewed with CPDD on a case-by-case basis.

.2 Locate BSC's so they are not directly across from, or adjacent to, seated workstations, other biosafety cabinets or fume hood.

.3 Provide a minimum 40 cm clearance between the exhaust outlet on top of the BSC and any overhead obstructions. Provide 30 cm clearance on either side of the BSC. In some cases, the BSC may be fully recirculating where permitted and where requested by the users.

.4 Biosafety Cabinet Specifications:

.1 Must comply with the Canadian Biosafety Standards and Guidelines (latest edition) and be certified in accordance with NSF/ANSI 49 for Biosafety Cabinetry and with manufacturer's specifications.

.2 Room exhaust and supply diffusers must be located a minimum distance from BSC measured horizontally from the front face of BSC. Consult with the BSC manufacturer.

.3 Provide a minimum clearance between the exhaust outlet on top of the BSC and any overhead obstructions as defined by the BSC cabinet manufacturer. Provide 30 cm must be provided on each side of the BSC.

2.8 Specialized Storage

.1 Gas cylinders to be stored outside of the lab. Where point of use cylinders are located inside of the lab, they are to be configured so as to not be a hazard and an incumbrance to circulation within lab. Gas cylinders should be properly restrained with gas bottle harnesses and to be stored in alcoves if possible.

.1 The maximum allowable volume of the cylinders in use are to be reviewed in accordance with NFPA and OFC.

.2 Gas cylinders should not be located near access/egress points in labs, paths of travel to exits and in exit corridors.

.3 Freezers/Fridges and other large floor standing should be located in designated equipment zones so as to not disrupt the activities of the lab.

2.9 Hazardous Material Storage/Flammable Storage

.1 Flammable storage cabinets/solvents and acids/corrosives are typically located under or in proximity to a fume hood since that is typically where the hazardous substances are being used. Quantity and type of hazardous and flammable storage will be considered on a case-by-case basis. As a default, each fume hood should be provided with one hazardous storage cabinet and one acid cabinet below the FH.

.2 Flammable storage cabinets shall not be located within proximity of access/egress to the lab or in a location that would constitute a hazard to egress from the lab.

.3 Flammable storage cabinets must conform to standards governing their construction and use including ULC and CSA standards.

.4 Flammable storage cabinets are typically not required to be vented for fire protection purposes - venting may compromise the performance of the cabinet. Venting will be considered on a case-by-case basis only. The default condition will be a non-vented flammable storage cabinet. The cabinet should be supplied with factory-furnished vent ports, fitted with flame arrestors, and removable seals. These ports will be leveraged should venting be required for the purposes of protecting workers from exposure to harmful vapours.

.5 If a flammable cabinet is vented, then the exhaust duct, riser and fan must be constructed of materials that will provide the same protection as the cabinet and seals offer to the contents.

.6 Corrosion-resistant cabinets are required for the storage of acids. These cabinets are to be vented using corrosion resistant material to prevent deterioration due to corrosion or rusting. Venting may be done into adjacent fume hoods as per the manufacturer's specification.

.7 In the case of acid cabinets, if the cabinet is vented, the duct should be connected to the port provided in the cabinet. Ducts should be connected to the main fume hood exhaust duct downstream of the fume hood collar and control valve (if applicable).

.8 Flammable storage cabinets shall not be vented.

.9 In the case where bases are to also be accommodated, they should be stored in appropriate storage cabinets designed for bases and located remote from the acid cabinets.

2.10 Laboratory Casework

.1 Laboratory casework to be designed to be of modular configuration and where practical and where possible, to be mobile. Lab casework to be fixed in place at select locations if a mobile solution is not practical or feasible. Material of construction to be appropriate for the application and considered on a case-by-case basis and reviewed with the University prior to beginning design. Provide a list of pros and cons for the University to consider. Minimal standards for material and construction to be compliant.

.2 Lab casework should be designed to be robust, flexible, interchangeable and adjustable to the fullest extent possible. Casework on casters or wheels should be considered to maximize flexibility and adjustability and to minimize cost on reconfiguration. Provide load ratings for wall mounted shelving for review and approval by the University. Thickness of shelving, length of shelving and c/c of pilaster supports to be commensurate with the application. C/C of pilaster shelving to be no more than 900 mm o/c unless otherwise noted or approved.

.3 All casework to be either "standoff" allowing cleaning behind or sealed to prevent dust and contamination build up.

.4 Provide barrier-free stations in each lab as a minimal (5%) of total workstations unless otherwise defined by the University.

.5 Lab bench top is to be either solid epoxy or solid phenolic – minimal thickness of 25 mm. Plastic Laminate counter tops will not be acceptable.

.6 Lab casework bench height and upper cabinet configurations to be adjustable where possible to facilitate ease of reconfiguration.

.7 Provide 15 cm backsplash at all interfaces of fixed lab casework with walls/equipment.

.8 Upper shelving to have adjustable edge restraints - all sides.

.9 Laboratory sinks (wash up and hand wash) to have lips to prevent spillage. Wash-up sinks to have peg boards mounted above the sink.

.10 Hand wash sinks to be hands-free and hard wired.

.11 Bench tops to be designed with marine edges and drip stops where possible and where required for functionality.

.12 Bench depth should be standardized on 760 mm deep units. Deeper or shallower bench tops will be considered in select locations and on a case-by-case basis.

.13 Base cabinets (pedestals) will take on the following configurations unless otherwise designated in the room data sheets:

.14 50/50 split of storage and knee spaces

.15 50/50 split of drawers and doors

.16 Lab grade hinges to facilitate 180-degree operation

.17 Mobile tables to facilitate a range of height between sitting height and standing height

.18 Drawers to be one-piece construction, full extension, ball bearing glides and stops

2.11 Access, Egress, Doors & Door Swings

.1 Access/Egress doors to/from labs should be used singularly or in tandem to provide adequate clearance widths for the population of the rooms as well as the equipment that will need to pass through the doors. When used in combination, consider a fixed leaf door panel in combination with an active leaf. The fixed leaf door will be secured by way of flush bolts top and bottom – and will be used on occasion when larger pieces of equipment need to be moved.

.2 Consider a removable transom panel above door in anticipation of the delivery of large, oversized items.

.3 Provide clearance on either side of the door for moving of equipment, carts, turning radii etc.

.4 Wherever possible, and in the cases where occupant load requires it, provide two exits from each laboratory.

.5 Where possible, it is recommended that the doors to laboratories include glazed panels to facilitate visual contact for security and in the event of emergencies or occupants in distress.

.6 Doors should always swing outward from the lab (swing in the path of travel).

.7 Hardware should provide ease of operation and be self-closing and latch able/lockable.

2.12 Ratings and Separations

.1 Laboratories are typically separated from non-lab spaces by way of a fire rated enclosure with a fire resistance rating (FRR) as per building code and fire code provisions. Depending on hazard classification, the fire resistance rating of the enclosure will be at a minimum of 1 hr FRR.

.2 Depending on hazardous classification, labs may also be separated from adjacent labs by rated assemblies to create compartmentalization of the lab suite under the provision of the NFC.

.3 Laboratory sealing which includes the continuous sealing of laboratory walls for reliable pressurization, all joints, penetrations, doors, ceilings, floors, and windows using laboratory-grade airtight materials, with slab-to-slab partitions, gasketed doors, hard-lid ceilings, and continuous flooring is to be proposed by the Consultant on a project-by-project basis. Performance should be validated by a room pressurization test.

2.13 Views and Natural Light

.1 Provide access to external views and natural light wherever possible. If windows are provided in the laboratory, they should be non-operable.

.2 Wherever possible and to the extent feasible, provide visual transparency between labs and adjacent public spaces/ corridors for safety and security and occupant wellbeing.

.3 Where possible and to the extent feasible, provide visual connection from labs to public spaces and from lab to lab.

2.14 Materials and Finishes

.1 Wall, ceiling, doors/frames and floor finishes shall be finished with smooth, non-absorbent and washable materials. Finishes should be selected to be robust, abuse resistant and cleanable.

.2 Protect exposed corners and walls with corner guards and bumper rails of an appropriate material wherever possible, and on a case-by-case basis.

.3 Floor finish will typically be either a resilient seamless sheet flooring product or a polished concrete with a strippable sealer to facilitate decontamination as required. Selection of floor finish shall be commensurate with requirements for containment, robustness, etc.

.4 Resilient seamless floor should have welded joints and integral 15 cm coved base with top bead sealed to wall – typical at all walls and permanent furniture, curbs etc.

.5 Seamless flooring should be smooth, impervious, washable and chemically resistant. Minimize seams wherever possible to facilitate a smooth surface for carts etc.

.6 All penetrations through floors to be sealed and watertight.

.7 Lab casework and other fixtures and furniture should be robust, contiguous with minimal seams to avoid harbouring contaminants and to facilitate cleaning.

2.15 Lab Gases and Emergency Disconnects

.1 Provide an emergency gas shut-off and an electrical disconnect (kill) switch near the egress point from the lab. Refer also to mechanical and electrical sections for further guidance.

.2 The emergency shut off and kill switches should also be located in proximity to the Safety Station.

.3 All labs requiring natural gas should be provided with an emergency shut-off solenoid valve and mushroom-type push button in close proximity to the lab egress point and the lab Safety Station. The push button shall be keyed type for resetting purposes. The natural gas shut off valve shall be set to fail in closed position in the case of a power outage. The valve should remain closed after power has been re-established. Only plant operations should have the key to reset solenoid valves.

.4 All casework mounted laboratory natural gas turrets to be push/turn type, typical.

2.16 Centralized Vacuum Systems

.1 Refer to mechanical.

2.17 Centralized Air Systems

.1 Refer to mechanical.

2.18 Waste, Recycling

.1 Provide dedicated waste collection area within lab. Provide space in lab for a variety of waste including trash, hazardous waste, broken glass, sharps etc.).

.2 Integrate the waste station into the design of the lab and in the design of the casework if possible.

.3 Provide a dedicated recycling area within the lab – integrate into the design of the lab and the casework if possible.

.4 Integrate the waste collection and/or the recycling collection infrastructure into a centralized collection protocol if this is available and exists within the building.

2.19 Lab Water

.1 Refer to mechanical.

2.20 Lab Mock-Ups

.1 Where-ever possible, specifications should call for the requirement of a mock-up of the various types of casework units as part of the submittals to facilitate a review for conformance and to familiarize the trades with the details, construction and coordination of systems and installation.

2.21 Sanitary Stations, Wash-up and Gowning, PPE

.1 In the case of labs designated as containment labs, provide a hands-free hand wash sink adjacent to and near the access/egress to the lab (in compliance with requirements of the agencies governing these lab types – e.g. Public Health Agency of Canada) – at a minimum, default provision for compliance for Sanitary Stations will be to Containment Level CL 2.

.2 Locate hooks (where required) near to and adjacent to the hand wash sink as well as the access/egress point to the lab. Avoid hooks that project into the room – use narrow profile wherever possible. Provide sufficient hooks to accommodate both clean and used lab coats.

.3 Locate Personal Protective Equipment (PPE) near to and adjacent to hand wash and sanitary station.

2.22 Lab Amenities

.1 Audio-Visual and connectivity (projection, screens, smart boards, data capture, distance learning) are to be fully coordinated with the work of other standards.

3 Installation And Workmanship Standards

3.1 General

.1 The requirements outlined in the following clauses are applicable to all general and architectural systems; application specific requirements are outlined below.

3.2 Extra Inventory

.1 A recommended inventory list for additional extra stock shall be presented to the Discipline Manager CPDD for consideration prior to Issuance for Bid. The amount of required stockage will be reviewed on a case-by-case basis by the design team. Extra stock will typically include major components specific to this project type such as sheet flooring, ceiling tiles, specialized wall coatings etc. This list shall be proposed in consideration for the following:

.2 Likelihood that the inventory material will be required in the short term and mid-term (1-5 years).

.3 Amount and application, applicable warranties etc.

.4 If the product is readily available and the procurement lead time.

.5 Cost of the product.

4 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural

Classrooms

1 Introduction

1.1 General

.1 This list of standards is to be used for reference purposes in the planning and design stages of new classroom construction and renovation of existing spaces. It highlights the key areas important to the design process and general considerations such as acoustics, lighting, heating, ventilation and air conditioning (HVAC), electrical, room layout and audio-visual equipment (A/V). To be read in conjunction with University of Guelph, General Design Standard Section 3.

.2 As learning is predicated on levels of student engagement, classroom design development should be based on the following 4 principles which are pertinent to the physical environment from the benchmarks for Effective Educational Practice National Survey of Student Engagement (NSSE);

.1 Active and Collaborative (Group) learning: Classrooms must allow for interaction with content and collaboration with other students. Furniture/Layout and A/V systems should be as flexible as possible within parameters for seating count objectives balanced against space requirements. Physical Elements to be considered could include work surfaces, whiteboards/blackboards, AV, furniture, classroom layout.

.2 Student – Faculty interaction: Barriers in the physical space should be reduced as much as possible to facilitate exchanges between students and faculty. Physical Elements to be considered could include podium, AV/ furniture and classroom layout.

.3 Enriching Educational experiences: Classrooms should facilitate teaching in multiple modes, sharing of multiple information sources in a comfortable, accessible, well-kept and well-appointed learning environment. Physical Elements to be considered could include podiums, A/V, furniture, classroom layout, HVAC, window treatments, classroom finishes.

.4 Supportive Campus environment: Though not the subject of these standards, crush spaces and other informal learning spaces, such as washroom locations and sizes, especially those adjacent to classrooms, should complement formal classrooms. Whenever possible they should offer an extension of classrooms and facilitate breakout groups.

.3 Projects can be scored using the EDUCAUSE Learning Space Rating System (LSRS (v.3), and classrooms should be designed to support:

.1 Environmental Quality.

.2 Appropriate layouts and finishes.

.3 Technology and Tools

.4 Inclusion.

1.2 Classroom Types

.1 For the classroom types, descriptions, General Sizes, and Space options, refer to section 2.9.

2 Design standards

2.1 Layout and Design Principles

.1 General design and layouts for classrooms should include the following principles:

.1 New classrooms should avoid structural impediments in larger classrooms.

.2 Group smaller classrooms together with minimal structural impediments to enable redesign

.3 Accommodate larger classrooms sizes by joining them together. Or design larger classrooms to be divisible in the future.

.4 Design classrooms for Universal and Accessible design. Meet OBC requirements, with multiple locations for accessible seating. Maximize reconfigurability within the spaces, without using dividers. Where reconfigurability is a priority, provide adequate storage for chairs and tables not in use during class. In fixed furniture room ensure seating is included for inclusivity, incorporate larger seats (what industry calls bariatric seats) in conjunction with barrier free seating.

.5 All classrooms should have sectional data reviewed for sightlines and screen size as well as offset of first row from screen for appropriate viewing distance.

.6 Provide daylight into classrooms where possible. Ensure window coverings are designed where necessary to darken room as needed. Glazing should not be behind the lectern and AV or block students from seeing the blackboard.

.7 Provide power to students in fixed seating that is safety certified, CSA or other compliant. Design the space to remove tripping over student power cords.

.8 Design the rooms to ensure there is enough crush space outside classrooms to accommodate the number of students entering and leaving.

.2 For Lecture Halls and Auditoria, provide an acoustic consultant to review noise criteria. Consider room shape and eliminating square box shape.

.3 Coordinate all rough-ins for audio-visual, IT and blinds, shades and lighting controls.

.4 Reference the Learning Envrionments Design Standard for AV Technology.

.5 Review process for documents and design include the stakeholders and review items identified in the following table:

Stakeholder	Required Items	Review Timeframe
Campus Classroom Committee	• For overall teaching pedagogy and need on campus	SD phase and 50% CD
Computing and Communication Services (CCS) (IT Team)	• Design review for costing • Design review for size and room type • Furniture Requirements	SD phase and 50% CD
School of Continuing Studies	• Design review for size and room type • Furniture Review • Instructor usage & training	SD phase and 50% CD
PR Campus Planning	• Design review for Accessibility, alignment with Camps Master Plan and other space/planning initiatives	End of SD phase
Classroom Technical Support (CTS) (AV Team)	• SD phase for budget • Coordination with team for equipment placement, conduits, etc.	SD phase and 50% CD
PR Physical Security Infrastructure Team	• SD phase for budget • Coordination with team for security & e-access	SD phase and 50% CD

2.2 Space Requirements

.1 General Size and Structure:

.1 Refer to OBC for minimum square footage and accessibility requirements as well as teaching and learning needs.

.2 Plan should maximize capacity and interaction capabilities.

.3 Meet UofG Accessibility Standards.

.4 Length to width ration: ideally max 1.5:1.

.5 Structure:

.1 If it includes tiers, should consider future flexibility and where possible two rows per tier to allow peer collaboration.

.2 When designing rooms, multiple smaller rooms should be designed to minimize structure so that rooms could be combined into 1 larger meeting room later, minimizing impacts for change.

.6 Configure rooms to allow view of all presented material to all seats, i.e. projection screen(s), whiteboards and / or blackboards. Sightlines for students must be within <90 horizontally and <15 vertically. Rooms for over 80 seats would ideally be Fan-shaped for better viewing and acoustics.

.2 Fixed Seating:

.1 Avoid fixed seating at the front of the room on the wall with entry points into the room.

.2 Provide access aisles to create easy access to all seats and consider instructor's ability to circulate if desired.

.3 Moveable seats and/or tables:

.1 During the SD phase, discuss the need for determining a teaching location if a 'front' of the room will be designated.

.2 If the classroom has a front designated 1/3 of the front of the room for the instructor's station with remaining 2/3 student seats. The first row of seating should be no closer to the screen than twice the screen height but in no case less than 4m.

.3 Sightlines must be within <90° horizontally or <15° vertically.

.4 Design for flexibility for future technology.

.5 If renovating existing departmental or centrally booked classroom the numbers of seats can not be decreased without approval from Classroom Committee.

.6 Room Height:

.1 Minimum 4' AFF to bottom of screen + screen height (= to maximum viewing distance/5 or 6) +1'-0".

.2 Use a 5 or 6 factor to determine viewing activity from ANSI definitions.

.3 Minimum ceiling height shall be 10' AFF for all classrooms. Larger classrooms require proportionally higher ceilings as per diagrams in Section 7.

.7 Classroom Entry:

.1 Entrances to classrooms should be well lit and signed.

.2 In addition to OBC requirements, provide at least 2 entries / exits per Classroom, with one at the front and one at the rear.

.3 Doors

.1 Include vision window or sidelight for visibility.

.2 Provide doors into lecture halls (classrooms 100+ students) with an alcove and double doors as required.

.3 Auto doors openers & e-access is required on all main entrances to classrooms.

.4 Consider sound transfer from crush space should be considered for larger rooms.

.8 Crush Space: Consider space outside of larger instructional spaces to allow for traffic flow to and from classes, for waiting, informal learning or possible break-out activities. Provide durable, secure furniture for waiting.

2.3 Finishes & Signage

.1 Signage: Room signage to conform to University of Guelph signage standard, Section 3.5.

.2 Main signs to be included at front of room must include maximum occupancy and normal seating layout (for moveable furniture classrooms only), and emergency telephone number and evacuation route.

.3 Writable Surfaces: Blackboards and Whiteboards should be minimum 4' AFF.

.1 Blackboards: shall be equipped with full-length, rounded end marker/chalk tray with open ends and no sharp edges or corners. Shall be black in colour with 50-year warranty against 'polishing'.

.2 Whiteboards: only in smaller classrooms where necessary to reduce chalk dust, i.e. where electronic equipment is present. Finish: low-gloss white or off-white finish and a minimum 50-year warranty. Material: P3 ceramic steel; porcelain enamel or 28 gauge steel bonded to minimum ½" thick. MDF core with an aluminum back. Bonding material shall be waterproof.

.4 Finishes: All finishes shall be highly durable.

.1 Tack strips: Incorporate to avoid tape damage to walls in applicable classrooms.

.2 Corner guards: Add to exposed corners to increase durability (min 6' tall stainless steel)

.3 Laminates: Architectural block or Fiber Reinforced Laminate for high traffic classroom areas.

.4 Wall surface:

.1 directly behind seats shall have durable cleanable surface that is not drywall.

.2 Standard paint colours;

- field color: Benjamin Moore, Fog Mist, OC-31
- Any accent colours should be used strategically and be in keeping with building standards. Ceilings – should be light in colour minimum reflectance value of 80. White paint preferred for drywall ceilings.

.5 Powerbond is preferred flooring materials for large classrooms that are tiered, in stain hiding pattern/ colour. Carpet tile can be used in smaller classrooms where stained tiles can be replaced.

.1 Basis of Design: Power Bond hybrid carpet by Tarkett

.2 Alternate products must have waterproof backer to avoid fluid leaks directly to subsurface below.

.6 Ceilings: All ceilings to be standard random fissure acoustic tile, in standard, 24"x24", 24"x48" tiles, with 15/16" T-bar, tegular finish, to meet STC ratings, or metric equivalent size.

.7 Avoid movable partitions. Seek approval from Manager Architectural, DEC prior to using. If used STC rating, facility of operation, maintenance requirements are to be considered.

2.4 Acoustics

.1 For large learning spaces, use an acoustic consultant.

.2 Locate classrooms away from indoor noise generating equipment and activities such as washrooms, mechanical rooms.

.3 For large classrooms consider sound transfer from students waiting outside.

.4 Parallel solid walls and floor/ceiling are more likely to cause acoustic problems. Use strategies to slope or tier floors, vary ceiling profile or angle large expanses of parallel walls.

.5 Ambient noise level in classrooms shall not exceed a NC-45 or 35dB. Impact noise levels in classrooms shall be less than 5dB above the ambient level. Reverberation time (RT) shall be .4 - .6 seconds using the RT-60 method.

.6 Provide voice amplification/sound reinforcement as required in OBC. Provision for wireless microphone capability must be included in all permanent sound reinforcement systems.

.1 Provide FM system (72MHz or 216Mhz) where amplified voice lift is in place. Frequency coordination is done by Classroom Technical Support for all frequencies used on campus where licenses are required (emergency services).

.7 Floors and walls to have minimum 50 STC rating.

.8 Reverberation time - .8 to 1.0 second.

.9 Standard sized Acoustic tiles are to be used for tiled ceilings.

.10 Restrict exterior noise intrusion with best practices for construction, including, but not limited to the following:

.1 Decouple or eliminate back to back studs.

.2 Seal joints with acoustic sealant.

.3 Provide acoustic duct liners.

.4 Alternating glass thicknesses where laminated glazing is in use.

.5 Larger ducts to prevent sound of air moving through them at higher volumes.

.11 Consideration to be given to A/V technology and HVAC as sources of unwanted sound (air conditioning better than NC 30).

.12 One performance objective of an acceptable room design is to provide a quiet work environment hospitable to conversational speaking volume (approx. 60 dBa). Contributing noise sources such as mechanical systems, forced air turbulence, ballast noise, elevator machinery, plumbing surge and traffic can combine to elevate the (ambient) noise floor above acceptable levels for classroom activities.

.13 The Architect should design all general presentation facilities not to exceed NC-35 curve.

.14 The Architect should identify early in the design process any scheduled space for which these specifications may be costly to achieve.

.15 Care should be taken when designing HVAC system and lighting system components to ensure that system noise is not transmitted into the room.

.16 Acoustic testing as a condition of project sign-off should demonstrate success of design.

2.5 HVAC

.1 For general design, refer to Mechanical section 4.

.2 HVAC related background noise ideally should be balanced from all parts of the sound spectrum with no predominant frequency bands of noise, no audible tones such as hum or whine, no fluctuations in level such as throbbing or pulsing.

.3 Control HVAC system within classroom at the lectern.

.4 No return air plenum ceilings.

2.6 Lighting / Window Coverings

.1 For general electrical design, refer to Electrical section 5.

.2 Provide programmable variable light (Lutron type) control within the room and in specific zones, incorporated into the AV controls at the lectern;

.1 At Blackboard 70 fc ensure fixtures don't block sight lines

.2 At desks 50 – 70 fc at instructor's desk plus task lighting to increase illumination to 50-70 fc

.3 At screen 0 fc

.4 In larger classrooms run lights parallel to the front wall, (not perpendicular) for greater control. Consider zoning and dimmable control of lighting regardless of size of room, creation of darker levels for projection while allowing some lighting over desks is common requirement. Typical light fixture is direct/indirect LED.

.5 Refer to zoning diagrams with Classroom typical layouts in section 7.

.3 Window coverings: mesh roller shades with dual cassette where blackout requirement is necessary. Provide 2% to 3% mesh roller shades where it is not. Provide electronic blind controls at lectern.

.4 Incorporate all controls into the AV controls at the lectern.

.5 Provide essential lighting as per current OBC and IES practices.

.6 Provide photo luminescent contrast strips for stair nosing within tiered classrooms.

.7 Classrooms will require variable light control within the room and in specific zones (i.e. fixtures with Labeled primary light controls to be located at the instructor's station, A/V cabinet and projection booth (as appropriate).

.1 Light control at the door is needed to facilitate safe passage to the instructor's station.

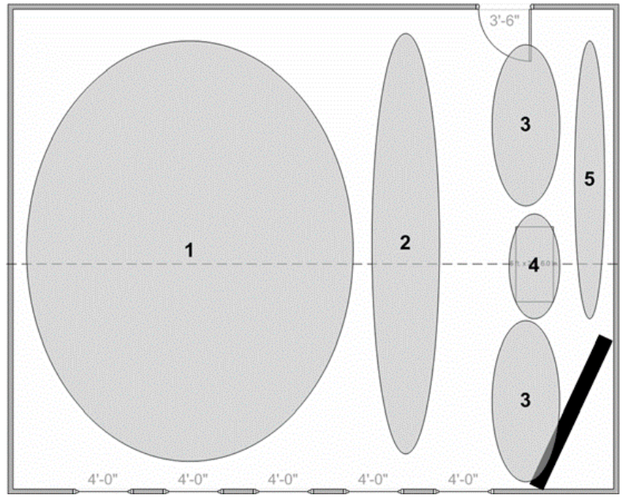
.2 Indirect Lighting. Care should be taken when placing pendant lighting fixtures to ensure that a) ambient light at the screen remains within spec; b) fixture does not invade light path of projected image (see Figure 10).

.3 The objective of a functional lighting plan is to provide sufficient illumination for instructors and students to read, write and interact without dozing off while keeping ambient light off the projection screen to create a high-contrast, readable image. During projection, the lighting plan should achieve the following performance criteria:

.8 Lighting, Zones & Controls:

.9 Classroom lighting should include natural day light, multi-modal lighting and controllability optimized for energy performance. Motion sensors allow for flexibility. Ensure the sensor timer is set to avoid lights shutting off during low-motion activities such as test taking.

.1 Room lighting should be zoned to facilitate different lighting scenarios: Refer to Figure 4. Classroom lighting zones.



.1 Zone 1 – Main Classroom Area. This zone services students and allows them to read and take notes in class.

.2 Zone 2 – Projection Area. During presentation mode, all lighting in front of the projection screen and the projector location should be turned off.

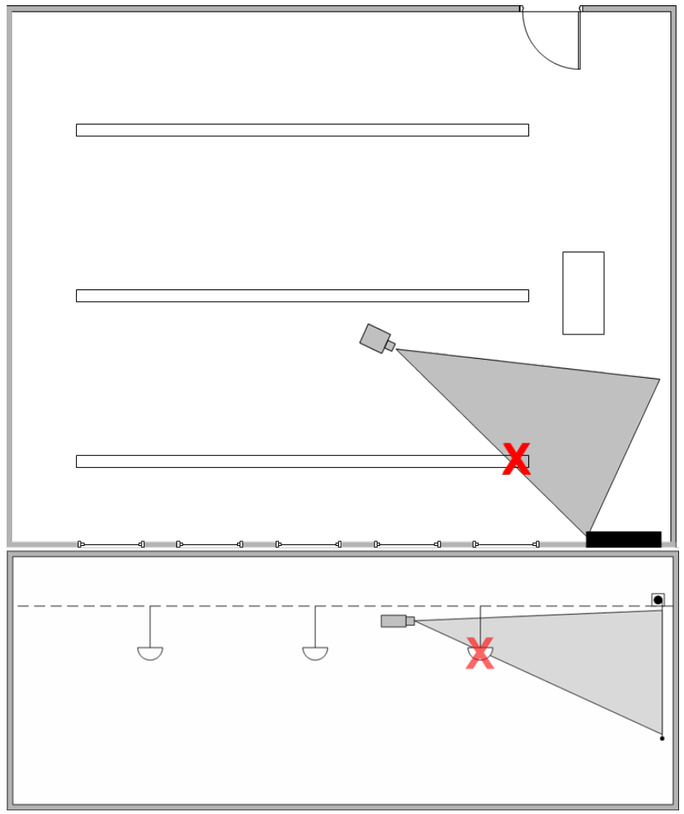
.3 Zone 3 – Some rooms may require a separate lighting zone for the teacher/presenter to illuminate the podium area.

.4 Zone 4 – lectern lighting.

.5 Zone 5 – Whiteboard / Blackboard lighting.

.6 Lighting controls shall be located on an adjacent wall at the entrance doors and on the AV control interface panel.

.2 Lighting and digital project should be coordinated to avoid conflicts and shadows: Refer to Figure 5. Pendant Luminaries obstruct image path.



.10 Lighting Zones

.1 Lighting zones tie together a bank of luminaries on a single (dimmer) circuit (typically) to illuminate a specific region or address a specific task. The following diagrams illustrate a typical five-zone lighting plan.

.1 Zone 1. Main audience/common area.

- Back seating should have uniform ambient lighting for the back rows of seats with sufficient illumination to support reading, notetaking, and visibility of seat occupants by the instructor and by other room occupants.

.2 Zone 2. Front-of -room buffer zone.

- Marker boards should have uniform lighting with sufficient illumination for legibility of writing from all seats. Switch these lamps separately from the rest of the room. These may require division into left and right zones.

.3 Zone 3. Apron/instruction area.

- Front of the room should have uniform ambient lighting for the front of room instructor area with sufficient illumination to support visibility of instructor, other front of room participants, and anticipated demonstrations, without directing light onto the screen surface.

.4 Zone 4. Podium special.

- Teaching station area should have uniform lighting with sufficient illumination for legibility of writing on document camera or reading notes for instructional purposes.

.5 Zone 5. Board warmer.

- Marker boards should have uniform lighting with sufficient illumination for legibility of writing from all seats. Switch these lamps separately from the rest of the room. These may require division into left and right zones.

.2 Refer to lighting diagrams in Section 7.

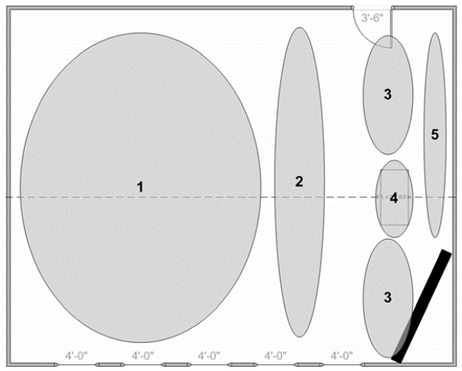


Figure 6. Typical lighting zones in a Multimedia Classroom

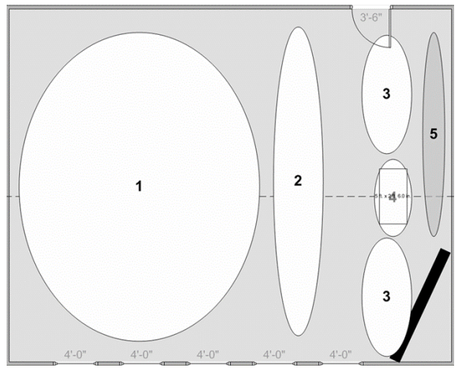


Figure 7. Lighting for Lecture Mode

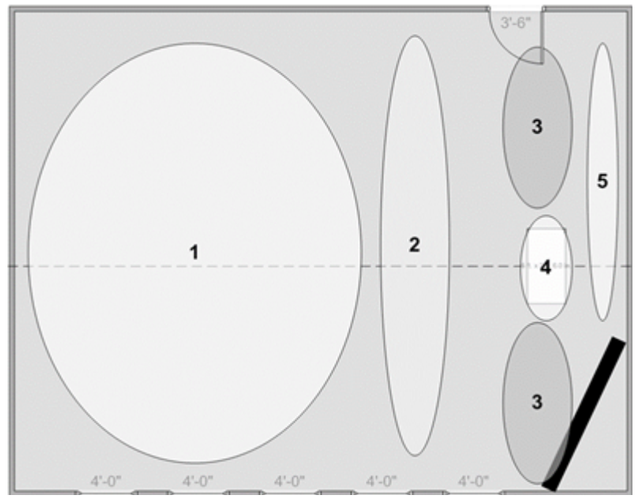


Figure 8. Presentation Mode

Note in Figure 8 that Zone-3 accommodates a second screen if needed.

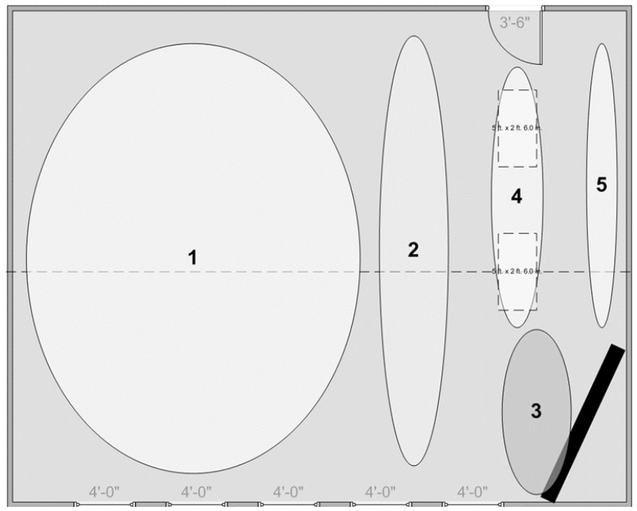


Figure 9. Lighting Zones for a Moveable Podium

Note that in Figure 8 that an additional 1-2 ft of board-to-podium clearance helps to isolate the screen from Zone-4 light spillage.

2.7 Furniture / Lecterns

.1 Fixed Furniture: Select vendors with a 10-year annual on site inspection and repair warranty when selecting furniture. Basis of design for fixed furniture is Sedia Systems or equivalent manufacturer / product. Suppliers to provide annual inspection and repair for a 10 year period.

.2 Rooms with 60+ students:

.1 Provide fixed furniture with swivel chairs. Basis of design is Sedia M60 Swing Away system swivel chairs and tables. Provide bariatric seating for 2-3% of the classroom.

.2 Tables and chairs are preferred over tablet arms for more generous laydown space and to facilitate testing

.3 Auditorium style seat width: 22”-24”.

.4 Provide electrical in fixed tables for recharging, 1 duplex per pair of seats. Locate outlets to avoid tampering or liquid spills as much as possible, with vertical orientation on seat support rail preferred. Refer to electrical requirements in section 5.

.5 Provide modesty panels in fixed tables situations modesty panels as appropriate. Front rows typical

.6 Avoid pedestal seats and go with bench systems where possible

.7 Fixed lecterns to be used with fixed seating layouts, to be height-adjustable, roughed in for AV, lighting, and window controls.

.3 Moveable Tables: should be sturdy and typical size is ideally 20” x 72” (can go down to 18” x 60” min.) if needed, durable high-pressure laminate with FLAT T-mold PVC edge banding, T-leg standard post.

.4 Rooms with chairs and tablets:

.1 Confirm requirement with Manager Architectural, DEC and CCS for use.

.2 10% of seating count is to have left-handed tablets in conformance with current AODA guidelines.

.3 Provide large or oversized (212 sq. inches minimum) tablets.

.4 All working surfaces will be non-glare and smooth.

.5 Lecterns: Moveable, if seating is moveable and fixed in larger classrooms with fixed seating. Provide 3’-0” minimum in front of the lectern to the first row of seats and 3’-6” minimum from lectern to teaching wall.

.6 Furniture standards:

.1 Furniture basis of design is provided. Alternate suppliers will be considered. Review with Manager Architectural, DEC and CCS for use.

.2 Accessible tables: hand crank height adjustable, on castors, w/o impediment at front of table – i.e. support rail that would impede a straight leg seated person. If fixed seating would be supplied by Sedia Systems, if moveable it would be ROI Ergonomic table.

.3 Moveable Tables: Laminate Grey Mesh, Edgeband, drilled for T-bases, Saturn base, T-base c/w levelling glides, black or approved alternate. Consider quick release ganging mechanism.

.4 Moveable Chair Standard: Task Chair – standard ROI Ergonomic chair Active Learning Tablet Chair: Teknion, Variable HyBred Moveable Lectern: Teknion, Instructor Workstation or approved alternate

.5 Fixed Auditorium Seating: Sedia Systems

.1 Product must be backed by 10-year annual seating on-site inspection and repair to be considered.

.2 Provide extra tablet arms and seat pans for overstock, typically 2% of seat count.

.6 Fixed Adjustable Height Lecterns: are to be standard specification as per Open Learning and Educational Support (OLES). Incorporate technology into the lectern per Guelph AV Standards.

.7 Teaching Station

.1 Specifications and information for the standard University of Guelph Teaching stations are available. They are standard products built for the University based on specifications from the Classroom Technical Support department and are based heavily on the Classroom Standards.

.2 The University of Guelph Full Teaching Station (classrooms capacity 50+) is essentially a fixed podium 62”W x 30”D x 30-42”H (height adjustable) located 5’+ feet from the front wall, (see Figure 2) usually to one side of the projection screen. The Station itself does not obstruct the screen or writing surfaces such as blackboard or whiteboard.

.3 The Teaching station may contain the control processor, control touchscreen for user interaction, breakout cables for portable devices USB-C, HDMI and wired Ethernet, flexible podium microphone, tabletop monument with 2 power outlets, with cable grommets. The teaching station is configured with a standard 3-Rack-unit mounting system to facilitate installation of equipment.

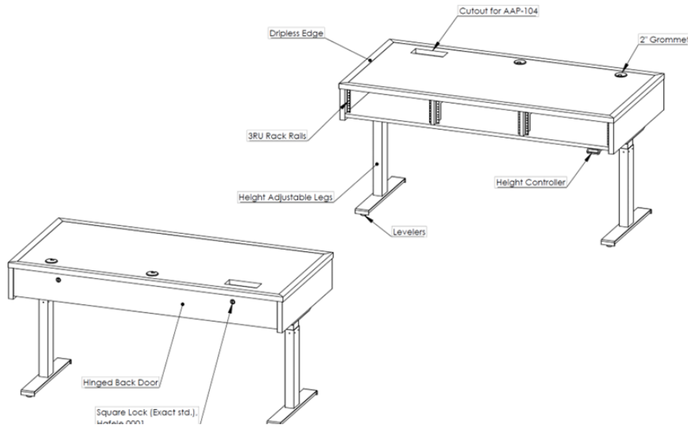


Figure 2. Teaching Station – 3 RU typical

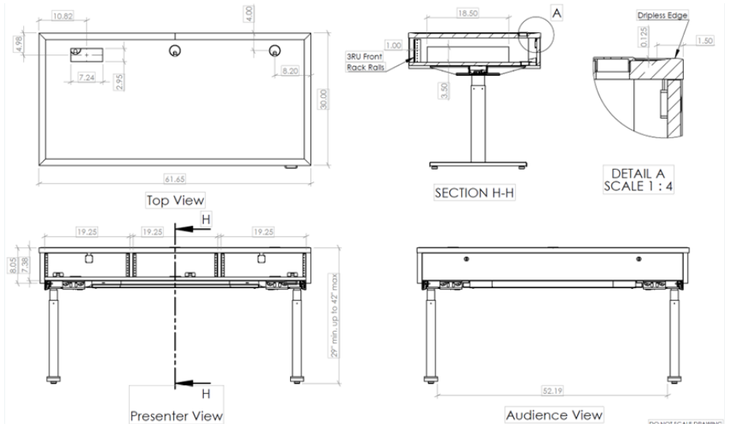


Figure 3. Teaching Station – 3 RU typical CAD workup

.4 With regards to Teaching Station installation and equipment rack installation, all wiring must be neat and tidy inside the podium, cabinet or behind wall mounted displays. The following guidelines should be adhered to:

- All cabling must be meticulously labeled using printed labels. Hand printed labels will not be accepted.
- Cabling bundling must be done using removable Velcro ties and never plastic zip-ties.
- When possible, especially for the Teaching Station, cable management laneways are required.
- Audio-visual suppliers must provide any surge protection bars required to power all A/V equipment and protect it from power spikes/ surges.
- Any network switches that must be installed in the equipment must be supplied and administered by University of Guelph and conform to standards.
- Other networking equipment must not be used without explicit approval from CTS department.
- All technical drawings shall be provided including cable and equipment labeling as per installation.

.5 Refer to drawings in Section 7.

2.8 Technology

.1 School of Continuing Studies must be involved or review all proposed technology packages for centrally booked classrooms. Technology should be reviewed at SD phase, to budget for future equipment and items, then during 50% of CD phase to coordinate with current AV/IT standards.

.2 Equipment:

.1 Provide a minimum of one clock per room visible to both students and faculty hardwired. There must always be a clock visible to the lecturer. Any lecturer who plans his/her lectures, adjusts and adapts them to immediate conditions, or who makes editorial choices as (s)he progresses must have a clock to allow him/her to make his adjustments as (s)he goes.

.2 Clocks mounted at the side of the room near the front are satisfactory. They can be seen by both instructor and class. They should have a large face in a large room. Provide one telephone at the front of the room in the event of an emergency or A/V malfunction.

.3 Ensure electrical infrastructure is present and can accommodate technology levels.

.3 Refer to AV guidelines here. [Insert link].

.4 Coordinate with classroom booking system signage.

2.9 Room Type Technology Matrix

Classroom Type	General size	Space Amenities
Classroom /Seminar room (small)	10-40 non-fixed seats, flexibility	1 Screen for displaying information (projector with screen or LCD monitor) HDMI connection Document camera Teaching Station (connections & controls) 6' Chalk or Whiteboard Mono Sound System LED Video Walls/Digital Displays for presentation, wired computer connection Whiteboard as approved by DEC
Classroom/ Seminar Room (medium)	40-60 loose seats, may have flexibility in teaching station	2 Screens for displaying information (projector with screen or LCD monitor) HDMI connection Document camera Teaching Station (connections & controls) 8' Chalkboard Portable Computer Connection Wireless Microphone Mono Sound System Data Projector LED Video Walls/Digital Displays for presentation, wired computer connection Whiteboard as approved by DEC
Classroom (typical)	61-80 loose seats, may have flexibility in teaching station	2 Screens for displaying information (projector with screen or LCD monitor) HDMI connection Document camera Teaching Station (connections & controls) Sound System Wireless Microphone Hearing Assistance 8' Chalkboard Portable Computer Connection Data Projector LED Video Walls/Digital Displays for presentation, wired computer connection
Classroom (large)	80-150	2 Screens for displaying information (projector with screen or LCD monitor) HDMI connection Document camera Teaching Station (connections & controls) Sound System Wireless Microphone Hearing Assistance
Lecture Hall or Theatre	150+ seats – fixed tiers as needed for sightlines, fixed furniture with tables, fixed height adjustable Teaching Station	2 Screens for displaying information (projector with screen) HDMI connection Document camera Teaching Station (connections & controls) Sound System Wireless Microphone Hearing Assistance 16' Chalkboard Portable Computer Connection Data Projector (2) LED Video Walls/Digital Displays for presentation, wired computer connection
Auditorium (tiered/ sloped Classroom)	60+ capacity with sloped or fixed tiers, preference to tables or theatre-style seating, used for public events with tablet or tables for writing surfaces	2 Screens for displaying information (projector with screen) HDMI connection Document camera Teaching Station (connections & controls) Sound System Wireless Microphone Hearing Assistance 16' Chalkboard Portable Computer Connection Data Projector (2) LED Video Walls/Digital Displays for presentation, wired computer connection
Active Learning Classroom (<150 seats)	Active learning space with flexible technology and furniture to facilitate pedagogy and group work – tiered or non-tiered	Multiple Screens for displaying information (LCD Monitors) HDMI connection or wireless connection via devices Document camera Teaching Station (connections & controls) Sound System 16' Chalkboard Portable Computer Connection Wireless Microphone Mono Sound System Data Projector (2) LED Video Walls/Digital Displays for presentation, wired computer connection
Laboratory	Rooms specific to program, typically fixed but may have loose furniture, computer or wet laboratory space	Refer to lab section for additional information.

3 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural Custodial

Version	25-01
Effective Date	September 1, 2025
Approved By	Mike Posteraro, Senior Manager, Environmental Operations & Sustainability
Signature	

1 Introduction

1.1 General

.1 This Custodial Space Planning and Requirements Design Standard has been developed to establish the University's minimum expectations and requirements for Renovations and new Construction on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of Space Planning, Materials and Finishes, Building Performance, and Accessibility, but place emphasis on function and servicing operations

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new installation within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing building architectural elements.

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the Director, Environmental Services and the appropriate Custodial Area Manager before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The Designer remains responsible for ensuring any proposed design solutions are in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the PR Project Manager, and the appropriate Custodial Area Manager together with proposed measures for addressing the conflict before completing the Schematic Design.

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an innovative approach to design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovation shall be tabled for consideration to the Director, Environmental Services and the appropriate Custodial Area Manager before the completion of Schematic Design.

1.5 Reference Documents

.1 Ontario Building Code

.2 Accessibility for Ontarians with Disabilities Act (AODA)

.3 University's Campus Master Plan

.4 University's Landscaping Standard

.5 University's Hardware Standard

.6 University's Signage Standard

.7 University's Classroom Standard

.8 University's Laboratory Standard

.9 University's Vivarium Standard

.10 HVAC Systems Design Standard DSM-01

.11 Plumbing Systems Design Standard DSM-02

.12 Electrical Lighting Standard DSE-02

.13 University's Painting Standard

.14 University's Physical Security Standard

.15 University's Elevator Standard

.16 University's Roofing Standard

.17 University's Office Space Allocation Guidelines

.18 Handbook of the Canadian Roofing Contractors Association

.19 Accessible design for the built environment B651-04

2 Design Standards

2.1 Overarching Design Principles

.1 When designing custodial closets, UofG generally requires a +/- 1% footprint of the entire building area allocated in new builds and major renovations.

.2 Custodial Rooms

.1 Custodial Services are inherent to the operations of buildings and proper service areas must be considered with all other areas during the schematic design stage of each building with input from the Custodial Services management team. Specific custodial room needs depend on the size, use and materials used in each building, however, the following can be used as a guideline.

.2 Any specific need within the Custodial Standard should not be installed without a site review to confirm specific locations from the Custodial Services management team. Anticipate monthly site visits throughout the project.

.3 Consult with Custodial Services regarding the building requirements to ensure the Custodial Rooms are appropriately sized as these standards change on a project-by-project basis dependent on building requirements.

.4 Refer to the appendix for a layout example in Section 7.

.3 Main Custodial Room

.1 At least one (1) Large Custodial Room shall be provided in every building.

.2 Locate the room close to the Service Entrance and a direct path of travel to the Service Elevator

.3 Minimum size: 200 ft2, but may increase with the scale of the project. Consult with Custodial to confirm.

.4 Double Doors for entry and exit, minimum door opening - 72", opening outward unless prevented by code.

.5 Door requirements may be smaller or larger depending on the equipment being stored and serviced. Consult with Custodial Services regarding the building requirements to ensure the Custodial Rooms doors are appropriately sized.

.6 Ensure door swings out into the common area to ensure the room space can be maximized.

.7 Provide Electronic Access reader

.8 Wall Hooks shall be provided to hang 10'-0" and 12'-0" ladders

.9 Provide a designated Charging Station to charge battery powered equipment; provide four (4) 20A Duplex GFI receptacles on dedicated circuits in this room.

.10 Provide Wash basin with both hot and cold-water fixture with backflow preventers.

.4 Floor Specific Custodial Room

.1 At least one (1) Small Custodial Room shall be provided on every floor or for every 15,000 ft2-18,000 ft2 of floor area.

.2 Minimum size: 60 ft2

.3 Minimum door opening: 42"

.4 Ensure door swings out into the common area to ensure the room space can be maximized.

.5 Provide one (1) 20A Duplex GFI receptacle on a dedicated circuit in each room for charging battery powered equipment

.5 Requirements common to Custodial Room(s) – provide the following:

.1 A 30"x30" Slop Sink c/w an 8" curb or lip and washable and durable FRP wall panel surround.

.2 Permanent Signage over the Slop Sink in a visible location stating: "WARNING: It is dangerous and unlawful to dispose of flammable, toxic, corrosive, oily, or other hazardous waste down drains. FOR DISPOSAL CONTACT ENVIRONMENTAL HEALTH AND SAFETY, PHONE 53282"

.3 Floor Drain, in addition to slop sink drain, with a positive slope to drain

.4 A minimum of four (4) Mop Holders over the Slop Sink

.5 McMaster-Carr – Part # 11-25-0125 or equivalent.

.6 A minimum of four (4) 6" hooks for storage of rotary brushes and pads

.7 Lockset keyed to HKP in existing buildings and EA in new construction as well as Electronic Access capabilities.

.8 To be painted with a minimum high gloss latex paint, epoxy paint preferred in high use rooms and closets.

.9 Light fixtures shall have shatterproof cover or shield.

.10 Shelving: Stainless steel adjustable, or wood, minimum of 3 with a depth of 15" – 18" and 40", to bottom of first shelf, above floor level. Shelving to be non-adjustable, with a minimum 14" between shelves.

.11 Two (2) coat hooks to be provided.

.12 Provide 24" x 24" fire retardant bulletin board on the back of the room entrance door.

.13 Provide a 36" long towel bar above slop sink.

.1 Review final location of all elements with Custodial Services on site before installation.

.14 Provide a washer and dryer in housekeeping rooms within UofG residence buildings.

.6 Any combination or all the following could be used in custodial rooms. Custodial Services will determine on a project-by-project basis what equipment will be required, which will help in determining final size of custodial rooms.

Object	Height	Length	Width
Ladder(s)	X	6' to 12'	X
Auto scrubber - Large Ride-On	50"	60"	331.4"
Auto scrubber - Small walk behind	43"	48"	30"
Sweeper - Large	47"	60"	32"
Sweeper - Small	22"	36.5"	25.5"
Small Scrubber	44"	35"	17"
Stripper - Large	40"	X	45"
Stripper - Small Edge	44"	19"	18"
Swing Scrubber	48"	X	X
Garbage Carts - Large	42"	62"	32"
Garvage Carts - Small	37"	43"	31"
Upright Vacuum	49"	12"	5"
Backpack Vacuum	22"	18"	12"
Custodial Cart	38"	46"	22"
Wet Pick Up	38"	29"	15.5"
Carpet Cleaner - Large	26"	33"	25"
Carpet Cleaner - Small Spotter	36"	21"	21"
Mop Bucket, 1-4	29"	17"	15"
Re-lamping Cart	42"	32"	27"

Object	Height	Length	Width
Floor Fan	19"	19"	17"
Dehumidifier	34"	17"	19"
Dust Mops, Wet Mops, Brooms - Standard	X	54"	X
Extension Poles	6-8'	X	X
Robots	X	X	X

.1 Flooring:

.1 Monolithic Epoxy Finish or sealed concrete

.2 100 mm Cove Base for cleanability.Positively sloped towards a Floor Drain

2.2 Washroom Accessories

.1 Consult with Custodial regarding standard accessories (paper towel dispenser, toilet paper dispenser, sanitary disposal, garbage containers, and soap & hand sanitizer units) as these standards can change on a project-by-project basis dependent on building requirements and what's already within the building.

.2 Double roll toilet tissue dispenser: One per stall. Exact location to be confirmed by the Custodial Services team before installation.

.3 Sanitary napkin disposal

.1 Sanitary boxes: in low traffic to moderate use buildings, plastic or stainless steel

.2 Sani-pod units to be used in high traffic buildings

.4 Hand soap dispenser

.1 One dispenser per sink.

.2 Do not install soap dispensers above electrical receptacles or on mirrors.

.5 Hose bib: in every washroom, mounted under sink with ball valve shut off and standard quick connect, always keyed type for security and vandalism purposes.

.6 Mirrors: must be accessible (reachable) for cleaning.

.7 Garbage - No recessed garbage containers allowed, only wall mounted stainless steel or loose containers acceptable, to be determined on a project-by-project basis.

.8 Sharps container (Disposal Box for Needles, Syringes & Sharp Objects): shall be installed in all new washrooms.

.9 Hand sanitizer dispensers to be provided outside all public washroom entrances.

.10 High efficiency air hand dryers only, no paper towel, is preferred. Exception: When the building has no hand dryers. Existing hand dryers that do not meet current mechanical standards are to be replaced with new.

.1 Quantity:

.1 Large washrooms – 2,

.2 Small washrooms – 1.

.2 Wall area below air hand dryers to be protected with a durable, cleanable FRP material.

.3 See the Mechanical Standards for additional requirements around air dryers.

.11 Some dispensers come with 2 keys. Both keys must be left with each individual dispenser. Custodial Services will collect keys during project turnover from each individual dispenser.

.12 Installation of the garbage bins and sharps containers need to be separate from each other to limit collection in the incorrect container.

.13 Shower Curtain Rods: Installation height based on size of shower curtain used by Custodia. UofG to provide sample to determine exact measurements. Install curtain 1" above finished shower base elevation. Basis of Design: ASI 1224 Shower Curtain Rod, 1" diameter, stainless stee rod complete with concealed fasteners.

.14 Washroom Accessories – Residences

.1 Any combination or all the following may be used in student residence washrooms only. Custodial Services will determine on a project-by-project basis what equipment will be required.

.1 Soap dispensers, air hand dryers, and sanitary disposal units to be provided in residences only, no paper towel dispensers permitted.

.2 Do not install any dispensers on the mirrors.

.2 Fixed Mirrors: silvered 6mm with "pencil edge" polished edge finish and mechanically mounted with concealed fastenings.

.1 In addition to concealed mechanical wall fasteners adhere mirror to prepared wall substrate with silicone-based adhesive as approved by mirror manufacturer to be fully compatible with silvering coating as manufactured to prevent de-lamination.

.3 Coat hooks, 3 per shower area: Satin finish stainless steel, 25 x 160 mm with 75mm projection. Acceptable material: Bobrick #B-233, or equivalent.

Washroom Accessory	Supplied By	Installed By
Double Roll Toilet Tissue Dispenser	UofG	Contractor
Sanitary Napkin Disposal	UofG	Contractor
Hand Soap Dispenser	UofG	Contractor
Horse Bib	Contractor	Contractor
Garbage	Contractor	Contractor
Mirrors	Contractor	Contractor
Sharps Container	Contractor	Contractor
Hand Sanitizers	UofG	Contractor
Hand Dryers	Contractor	Contractor
Paper Towel Dispensers	Contractor	Contractor

2.3 Central Waste

.1 Consult with Custodial Services regarding central waste requirements during the schematic design and construction stages of the project as these standards change on a project-by-project basis dependent on building requirements.

.2 Include within the design, for recessed or thoughtfully placed areas for central waste in lobbies and other high-traffic zones where it does not impede egress but is visible.

.3 Bins supplied and placed by the University

.4 Typical bin sizes:

.1 Please contact Custodial Manager to confirm requirements.

.5 Floor to ceiling wall area required for waste locations complete with bulletin board for waste information and instructions.

2.4 Garbage Disposal:

.1 Design garbage areas, including vehicular access to them, to include the following items:

.1 Standard Garbage Trucks: 294” long, 102” wide, 150” tall.

.2 Garbage enclosure with easy access from the building.

.3 Standard waste / recycling bins of 4, 6, or 8 yard sizes. Confirm with Transportation Services.

.4 Standard organics bins.

.5 Review program specific waste requirements with the Project Manager, CPD&D.

.6 Provide trash compaction in new facilities.

2.5 Cleaning Post Construction

.1 Post construction cleaning is outside of regular custodial duties/scope and will be charged back to the project. All required work will be charged by individual job and not by the Current charge out rates.

3 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Architectural

Door Hardware

Version	25-01
Effective Date	September 1, 2025
Approved By	Steve Nyman, Director, Maintenance & Energy Services
Signature	

1 General

1.1 Compliance Criteria

.1 These standards generally describe the common hardware and its minimum standard to be used at the University of Guelph. These standards do not describe all situations.

.2 Projects may be defined by project type and scope. For project types, refer to Section 1. Additionally, the Matrices in Section 1.7 indicate at which stages the door hardware consultant and security consultants should review drawings, submittals, and specifications with the main Consultant team and the PR Project Manager.

.3 This section applies together with the Security Design Brief, where the security zones and guidance are provided, and with the access control Section 2.4.

.4 The Architect shall meet with the Door Hardware Consultant and a representative of the PR Lock Shop during the design development stage to review the needs for locks and hardware, and ensure the proper functions are applied correctly.

.5 A determination must be made regarding the need for additional security to the project; any enhanced security proposal will be designed to meet the University of Guelph standards.

.6 Functionality takes priority over aesthetics. The PR Lock Shop requires consistent hardware to manage repairs once the project has been completed. The hardware listed below is mandatory, unless there is a specific function for which deviation is required, which is to be approved prior to completion of 75% Construction Documents by the:

.1 PR Project Manager,

.2 Architectural Design Manager

.3 the PR Lock Shop Manager,

.4 the Manager of the Physical Security Infrastructure, Electronic Access Group.

.7 A general rule for requiring a door hardware consultant on a project is if there is the following:

.1 at least 1 external door, or

.2 at least 1 internal door with e-access, or

.3 more than 5 internal doors (with no e-access or locking mechanisms)

.8 Projects involving even one door replacement/repair/ revision must include the PR Lock Shop for the approval in the selection of all door hardware. Responsibility for installation to be determined at the time of review during the 75% construction drawing review.

1.2 Minimum Design Standards

.1 UofG's hardware consultants is listed in Section 1.7.

.2 Doors and door hardware should be designed and built with longevity in mind, addressing consistent heavy use by students and staff. The minimum design for doors and door hardware should last for a 10 year use cycle.

.3 In addition to the materials described below, the following procedures apply:

.1 Where a project has more than $20,000 in architectural (door) hardware, the prime consultant shall specify all door hardware as part of the work. The prime consultant shall use the University of Guelph's Door Hardware Consultant to prepare the specification.

.2 Where a project has less than $20,000 in architectural door hardware, the hardware may be covered with in a cash allowance in the construction contract. The construction contract shall include requirements for preparation of a hardware schedule by the University of Guelph's Door Hardware Consultant, who may be an employee of the hardware supplier.

.3 For projects with hardware needs for 10 doors or less, door hardware may be procured from the University Lock Shop via a requisition issued by the PR Construction Coordinator or Project Manager/Designate with a minimum of 12 weeks' notice. The PR Lock Shop will provide and cut all door lock cylinders for installation.

.1 The above should be reviewed with the PR Lock Shop on a project by project basis as the complexity of some smaller projects may revise the expected requirements.

.4 In existing buildings, the PR Construction Coordinator or Project Manager shall consult with the PR Lock Shop to determine if use of Medeco cylinders is appropriate, or if it is appropriate to use lock cylinders that match the existing building conditions.

.1 Corbin / Russwin remains the standard cylinder selection.

.2 For Student Housing Services, only Corbin to be used.

.5 When specifying Medeco, the PR Lock Shop will coordinate the keying Layout and the numbers of keys required. On larger orders, the contractor will receive the cylinders 'pre-pinned' (with construction key). Upon turn over, the construction keys are disabled while the user keys are activated.

.1 It is the responsibility of the contractor to ensure the cylinders are turned over in a timely matter to ensure the PR Lock Shop has time to change the cylinders before building turnover.

.6 There are no requirements that hardware be purchased from any particular supplier, only that the products specified in the hardware standard are supplied and meet the criteria noted in article 1.5.

.7 All requests for single or multiple electronic door access systems and/or information systems must be directed to the Manager of the Physical Security Infrastructure, Electronic Access Group, who will then forward the request to the PR Project Manager for system design approval and implementation. "Stand Alone Units" shall be a 'Genetec System' and of the card or fob design.

.8 Keypad units may be used with prior approval of the PR Lock Shop. Keypads are not to be connected to the Genetec System.

.1 Standard: Kaba E-Plex

1.3 References

.1 ANSI A 156.4, Door Controls-Closers

.2 ANSI A 156.15, Life Safety Closer Holder Release Devices

.3 ANSI A 156.18, Materials and Finishes

.4 ASTM B 117, Method of Finish Corrosion Testing

.5 NFPA No. 80, National Fire Protection Association

1.4 Submittals

.1 Submit manufacturers' product data indicating compliance with reference standards, transportation, storage, handling and installation requirements.

.2 Submit shop drawings and complete door hardware lists to the PR Lock Shop via the PR Project Manager and Kahua submittal process for review indicating:

.1 Door locations, sizes, hardware manufacturer's catalogue numbers, finish symbols, abbreviations and quantities required

.2 Locations and mounting heights of each type of hardware

.3 Supply templates and required information to door and frame manufacturer to enable accurate sizes, locations of cutouts, and reinforcement for hardware.

.4 Keying Schedule: Submit to PR Lock Shop via the PR Project Manager and Kahua submittal process the finishing door hardware schedule for keying for review. Locks and cylinders are not to be ordered until finalized keying schedule has been approved and the keying schedule returned to the hardware supplier.

.5 Closeout submittals:

.1 Submit the following for each Product for incorporation into Operation and Maintenance Manuals:

.1 Hard copy of installation instructions and same information in a searchable PDF format on CD

.2 Templates

.3 Finishing hardware schedule

.4 Maintenance data

.5 Operating instructions and safety precautions

.6 Parts list with name and address of supplier

.7 Lubrication schedule and type of lubricant recommended

.8 Keys, tools and special devices

.9 Inspection procedures related to preventive maintenance

1.5 Quality Assurance

.1 Manufacturers: Companies specializing in manufacturing door hardware and registered with BHMA.

.2 Door Hardware Suppliers:

.1 Companies specializing in supplying commercial door hardware for no less than two years, staffed to complete their related work and be acceptable to manufacturer.

.2 Companies must be available for site visits when requested by the University.

.3 Employ the University of Guelph's Door Hardware Consultant to be available for consultation about hardware at reasonable times during course of work.

.4 Door hardware suppliers require an access control service technician on staff with same day service capabilities.

.3 Certifications:

.1 Employ an Architectural Hardware Consultant that is a member in good standing with the Door and Hardware Institute, whose name shall be stated in tender proposal, to inspect completed installation and certify that hardware has been supplied and installed in accordance with manufacturer's printed instructions and as specified.

.2 The hardware supplier shall be a certified install and commissioning company for Kaba-ilco stand-alone locking systems.

.4 Special Conditions:

.1 Automatic Door Operators and Activators shall be supplied and installed by authorized personnel who are familiar with the product. Installation shall include all wiring connections including connections for any additional electrified material by others and associated with the operation of the operators.

.2 All wire, junction boxes, conduit and the like shall be furbished and installed by the Division 16 Contractor. The hardware supplier shall furnish complete riser and wiring diagrams to the Division 16 Contractor, which shall include all necessary supplies required for conductors. Installation of and connections to access control systems specified elsewhere are not included in this section.

.3 Door hardware suppliers will supply, install, commission, and train the owner for all the material and locks related to the Kaba-ilco stand-alone locks.

1.6 Warranty

.1 Contractors to submit a warranty in accordance with General Conditions against failure to meet design criteria and requirements, except that warranty period is extended as follows:

.1 All manual door closers shall carry a manufactures ten (10) year warranty.

.2 Closers with electrical components shall have a two (2) year manufacturer's warranty.

.3 Coverage: Complete replacement including affected adjacent Work.

1.7 Responsibility Matrix

.1 The matrix below lists the responsibilities of anyone on the project that will design, install or maintain door hardware.

Hardware and Security Item	PR Project Manager	PR Physical Security Infrastructure, E-Access Group	PR Lock Shop	Architectural Consultant	Door Hardware Consultant & Security Consultant	General Contractor	Trade	Subconsultant: Electrical & IT
Specification Review	Y	Y	Y	Y	Y	Y	Y	Y
Coordination of Stakeholders & Consultant Reviews	Y			Y				
Submittal Reviews	Y	Y	Y	Y	Y	Y	Y	Y
Installation						Y	Y	
Final Review & Sign-Off	Y	Y	Y	Y	Y	Y	Y	

2 Products

2.1 Alternatives

.1 Materials and equipment specifically described are to be named in the specification for establishing a standard of materials and workmanship to which this supplier shall adhere. The pre-selected suppliers wishing to submit specified alternatives for material or equipment must include the following:

.1 Manufacturer and supplier name.

.2 Statement assuming full responsibility that any equipment must not exceed the space requirements allocated on the drawings. This supplier is responsible for any additional installation costs resulting from the acceptance of a substitute piece of equipment or product.

.3 Subject to the approval of the PR Lock Shop.

2.2 General

.1 Ensure that hardware selected will function correctly and meets contract requirements and Ontario Building Code and authorities having jurisdiction.

.2 Hardware for fire rated and labeled door and frame assemblies shall be ULC listed or as accepted by authorities having jurisdiction.

.3 Fire-rated assemblies:

.1 Door Hardware: Selected and installed in accordance with applicable codes and regulations. NFPA - 80 and to approval of Ontario Fire Marshall.

.2 Fire rated doors: ULC labeled hardware. Submit written certification of conformance to ULC requirements for each type of door hardware prior to delivery.

.3 Locksets and latch sets on fire rated doors: 19mm throw minimum.

.4 Fire-rated doors and frames are to be fitted with the testing agency's listing label. Fire labels for hollow metal doors should be placed on the hinge edge of the door rail, and fire labels for hollow metal frames should be placed on the hinge jamb. Fire labels for solid core wood doors should be placed on either the hinge edge of the door or on the door's top edge.

2.3 Manufacturers & Products

.1 This standard does not describe all situations; the designer must use judgment to supplement the standard as required, for review and approval by the PR Lock Shop.

.2 Continuous Hinges

.1 Continuous hinges are to be used on all doors over 36" wide, on high frequency doors, and doors requiring protection from movable equipment or carts:

.1 Standard - Pemko FM Full Mortise series

.2 Retrofit of new doors in existing frames or situations which may require plumb or vertical adjustments:

.1 Standard - Pemko FM Full Mortise series

.3 All new door and frame installations:

.1 Standard - Pemko FM Full Mortise series

.4 10 year Warranty on all Continuous Hinges

.5 When using any continuous hinge featuring the plumb or vertical 'adjusta-screw' it is necessary to order the hollow metal door with hinge side reinforcement. This must be added in at the time of manufacture with a minimum thickness of 10GA.

.6 Approved alternate: Select SL/HD/LL

.3 Hinges (non-continuous)

.1 Standard: Stanley

.1 FBB191 NRP 630

.2 FBB168 626

.3 FBB179- 26D, 114 X 102 - All doors opening into an occupied space, i.e., offices, classrooms, storage, maintenance rooms, washrooms.

.4 FBB179 NRP 26D, 114 X 102 - All doors opening from an occupied space into a common area or door adjoining two occupied spaces.

.2 Approved alternate: Hager models

.4 Locksets

.1 Use only barrier-free compliant lever handle mortise locks.

.2 Use of cylindrical or orbit handle locks to match existing locks is not acceptable.

.3 Standard: Corbin/Russwin

.1 ML2000 Series - NSA 630 - Typical installation

.2 CL3300 Series - NZD 626 - May be used in a retrofit where the existing doors are prepared for this application or in a suite of offices or rooms, i.e., Residence bedrooms where the main door to the suite is fitted with an ML2000 series

.4 Approved alternate: None

.5 Cylinders

.1 Standard: Corbin/Russwin

.1 Various keyways to match existing keying system.

.2 To be Grand Master keyed to University standards, i.e., HO5 and N9

.3 Medeco High security patent protected institutional keyway Grand Master keyed to University standards. See note 1.2.4. & 1.2.5.

.2 Approved alternate: Medeco – See note 1.2.4. & 1.2.5.

.6 Exit devices

.1 Standard: Sargent 8500 Series, Narrow Style

.1 ETL trim mandatory on exterior door applications. To be reviewed with the PR Lock Shop to determine when interior applications do not require the ETL trim.

.2 Vertical rod devices only to be used on the interior and not at all exposed to the weather.

.3 Removable mullions to be key removable type.

.4 Use Sargent 980L for steel doors.

.5 8800 series - 630 Finish; typical NFR installation with dogging feature and ETL outside trim design

.6 For exit only, delete dogging feature and outside trim

.7 8600 series - 630 Finish; to be used in areas with cart traffic, i.e., hallways in food areas, loading docks, etc.

.8 8900 series to be used in conjunction with RCI-F4114 electric strike for Fire Rated installations

.9 When functional exterior trim is required use ETL design.

.10 Use prefix12 on all series for fire rated applications.

.2 Approved alternate: Von Duprin in retrofit situations only.

.7 Door closers

.1 Standard: LCN

.1 4041, finish and arm type as required by site conditions

.2 1461FC closers will be used in low traffic interior areas

.2 Approved alternate: N/A

.8 Bolts

.1 Surface bolts are to be used when possible

.2 Specified product: Glynn Johnson

.1 1631- US2G, Lower bolt

.2 1632- US2G, Upper bolt

.3 1631- L-US2G, Locking bolt

.3 All surface mounted applications to be fastened with thru-bolts

.4 Approved alternate: Ives

.9 Flush Bolts

.1 Standard: Glynn Johnson

.1 UL-FB6-26-D

.2 Approved alternate: Ives

.10 Electric Strikes

.1 Standard: Rutherford

.1 0161 08 24V DC Fail locked, to be used with rim exit device NFR

.2 2124 08D 24V DC RH/LH Fail locked to be used with Corbin/Russwin mortise lockset NFR

.3 2114 08D 24V DC to be used with cylindrical locksets NFR

.4 F 4114 to be used in conjunction with Sargent 12-8900 series exit device for Fire Rated installation

.5 Paired fire door where a typical installation may jeopardize the integrity of the mullion must use an exit device with an electric retractable latch feature.

.2 The power supplies for these products are:

.1 Rutherford- PS 24V 1.5A

.2 Rutherford- PS 24 V 3A

.3 Selection dictated by the number of strikes and the total run.

.3 Approved alternate: HES 9000 series

.11 Door Stops

.1 Floor stops and overhead stops as required by site conditions

.2 Standard: Canadian Builders Hardware

.1 CBH120 Wall stop, typical installation

.2 CBH100-CBH120, as site conditions dictate

.3 Wall stops are to be used whenever possible

.4 Approved alternate: Hagar

.12 Door Sweeps

.1 Standard: K N Krowder

.1 W-24 S-Nylon brush - All exterior and interior doors with an aluminum threshold

.2 CT50 Automatic - All level threshold doors requiring a door sweep.

.2 Approved alternate: Hagar

.13 Weather-stripping

.1 Standard: K N Krowder

.1 Type: as situation dictates

.2 Approved alternate: Hagar

.14 Thresholds

.1 Standard: K N Krowder

.1 CT series, Handicap with frost barrier at all exterior doors, Aluminum Finish

.2 CT series, Handicap, fire rated for all other doors requiring a threshold, Aluminum Finish.

.2 Approved alternate: Hagar

.15 Power Door Operators

.1 Besam SW200 electro-hydraulic opener for exterior and heavy use applications.

.2 Ditec HA8 operators preferred choice for low use and interior applications.

.16 Power Door Pushbuttons:

.1 3’ long pushbuttons.

.2 Provide use indicator for washrooms.

.3 Push-to-Lock: description.

.4 Tie Pushbuttons into RFID access as needed.

.17 Removable Mullions

.1 Standard: Sargent

.1 EL980 to be used on paired openings in conjunction with electric strikes on exterior and non-fire rated doors only.

.2 12-L980 on all fire rated paired openings not exceeding 8’-0” x 8’-0”

.3 Locking mullions to be keyed alike

.2 Approved alternate: None

.18 Pull Handles

.1 Standard: Canadian Builders Hardware - CBH design as site conditions dictate.

.1 Avoid the use offset pulls whenever possible.

.2 Approved alternate: Hagar

.19 Concealed Rods

.1 Standard: Sargent

.2 Acceptable for use if ordered with doors and when panics and mullions are required.

.3 If used mullions and electrified panics must be used.

2.4 Manufactured Units

.1 Door Pulls:

.1 Where door pulls are scheduled on one side of a door with a push plate on the other side, pull is to be installed with flat head thru bolts and the push plate mounted in such a manner to cover the heads of the bolts. Push plates drilled and exposed bolt heads will not be accepted.

.2 Kick Plates and Push Plates:

.1 Mop Plates and Push Plates shall be finished in material as specified, 1.27 mm and shall be free of rough or sharp corners or edges.

.2 Refer to architectural Section 3.3 for more on kickplates.

.3 Thresholds:

.1 Supply complete with countersunk holes, screws, and anchors as required. Length of thresholds equal to door width. Confirm threshold sizes before ordering.

.4 Door Closers:

.1 Provide with back checking feature and of proper size to operate door efficiently. Where non-size closers are provided, installer to adjust closer for size as per manufacturers chart.

2.5 Keying

.1 Where keying into an existing system, match existing, keying to University standards

.2 All Medeco system lock sets and cylinders are subject to the following:

.1 Master keyed under one existing recorded Medeco Biaxial master keyed (MK) system.

.2 Keyed alike (KA) or keyed different (KD) as noted on the schedule.

.3 Cylinders will be construction keyed or the hardware supplier will provide temporary cylinders keyed alike and at the Hardware Suppliers expense; exchange the temporary cylinders with the proper Corbin or Medeco cylinders, depending on project.

.4 Keyed alike groups: as determined by the Consultant and/or University.

.5 Supply to Consultant and University four master keys.

3 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Mechanical

Version	Effective Date	Approved By	Signature
25-01	September 1, 2025	Ena Jhajj, Manager, Mechanical Design	

4

Mechanical

.1 Fire Protection Standards
.2 Plumbing Systems
.3 HVAC Systems
.4 Vivarium
.5 Laboratory
.6 Building Automation Systems

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Mechanical

Fire Protection Standards

1 Introduction

1.1 General

.1 The design, construction and operation of the building and related mechanical systems shall comply with the latest requirements of the following legislations, codes, standards and authorities.

.2 This Fire Protection Systems Design Standard has been developed to establish the University's minimum expectations and requirements for new Fire Protection Systems (Sprinklers and Fire Standpipe) installed on campus.

.3 The University's minimum expectations and requirements for new Plumbing Systems installed on campus are covered under Section 6.3

.4 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new Fire Protection installation within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing Fire Protection infrastructure.

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Mechanical Design, CPDD before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The System Designer remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Mechanical Design, CPDD, together with proposed measures for addressing the conflict.

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovation shall be tabled for consideration by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design.

1.5 Reference Documents

.1 Ontario Building Code

.2 Ontario Fire Code

.3 Mechanical Plumbing Systems Standard Section 6.3

.4 Electrical Power Systems Standard Section 7.2

.5 Electrical Fire Alarm Systems Standard Section 6.4

.6 Campus Domestic Water System Schematic

.7 City of Guelph Cross Connection Bylaw (Backflow Bylaw)

.8 NFPA Standards

.9 University's Identification Standard*

.10 Underwriters Laboratories Canada (ULC)

2 Design Standards

2.1 General

.1 The requirements outlined in the following clauses are applicable to all Fire Protection Systems; Application Specific requirements are outlined under clauses 2.2 – 2.9

.2 Space Hazard Classification for Protection:

.1 Space Hazard classification for the purposes of establishing the minimum level of fire protection shall be as defined under NFPA 13 as defined under NFPA 13 that is most current in the Ontario Building Code.

.3 Fire Protection Systems shall encompass the following:

.1 Standpipe & Hose Systems

.2 Sprinkler System – Dry Systems, Wet Systems, Pre-Action Systems, and Deluge Systems.

.3 Gaseous Fire Suppression Systems: Vortex Suppression, Clean Agent Systems

.4 Kitchen Hood Suppression Systems

2.2 Incoming Fire Water Service

.1 Incoming water service shall be extended from the University's Premise Protected Campus Water Distribution Main.

.1 Incoming water service shall be common with the water service extended to serve the building plumbing systems.

.2 Branch off the fire water service line upstream of any water meter and/or cross-connection protection device.

.3 Provide a Double Check Detector Assembly (DCDA) in the fire water service main.

2.3 General Requirements – Fire Protection System

.1 Renovation Projects – Minor Renovations

.1 Modify existing Fire Protection Systems, as applicable, to suit new Work. Maintain the design criteria as per NFPA 13, that is most current in the Ontario Building Code.

.2 Renovation Projects – Major Renovations

.1 Modify existing Fire Protection Systems, as applicable, to suit new Work. Maintain the design criteria as per NFPA 13, that is most current in the Ontario Building Code.

.2 Where an existing building does not have a functioning Sprinkler System, develop a conceptual design solution with an accompanying Class C Cost Estimate to provide the area of work and the building a new Sprinkler System following the criteria outlined under Clause 2.3.3. Also, in collaboration with the Architect develop a Cost-Benefit Analysis addressing a new sprinkler installation versus other Compensating Construction to comply with Codes. This Conceptual Design Solution and Cost-Benefit Analysis shall be tabled as a part of the Schematic Design submission.

.3 New Construction Projects

.1 All new buildings shall be fully sprinklered

.1 Arrange sprinkler zones in accordance with NFPA 13, that is most current in the Ontario Building Code.

.2 Where practical and feasible without increasing the number of sprinkler zones, arrange sprinkler zones to overlap with architectural fire separations forming a part of an all-encompassing Fire Compartment for the purposes of establishing an Area of Refuge.

.3 Where sprinklers are being used in lieu of detectors, coordinate sprinkler zoning with the Fire Alarm System design.

.4 All new buildings that have sprinkler systems are required to have a full fire alarm system per 2024 OBC.

.2 If a sprinkler system is not required by Code then option to omit sprinkler system, together with an accompanying cost-benefit analysis, shall be presented for the approval of the Manager, Mechanical Design, CPDD before completion of the Schematic Design.

.4 All new buildings shall be provided with a fire standpipe system if required by the Ontario Building Code.

.5 Existing monitored and listed alarm check valves on fire protection services may remain. DCVA type BFPs are required on unprotected fire lines but may have chains with locks on the valve handles. RP type BFP's are required on any chemical containing fire protection lines (anti-freeze sprinkler heads, etc.).

2.4 Fire Pump

.1 Drafted / Awaiting EditsA Fire Pump Assembly (Fire Pump + Jockey Pump) shall be provided, as necessary, to support the facility Standpipe and Sprinkler Water Demand; Jockey Pump Start/Stop shall be automated.

.2 The need for a fire pump assembly shall be identified at the Schematic Design stage and supported with a Hydrant Flow Test and Preliminary Hydraulic Calculations.

.3 Drafted / Awaiting Edits Consideration shall be given to increasing the size of the sprinkler and standpipe system piping to satisfy the system hydraulic demand before opting to use a fire pump.

.4 Where provided, a fire pump installation shall comply with NFPA 20 that is most current in the Ontario Building Code.

.1 Fire Pump Assembly must be on the Essential Power system.

.2 Coordinate Essential Power supplies to the Fire Pump Assembly with the electrical designer and the Electrical Power Systems Standard DSE-01.

.3 Coordinate Fire Alarm interface to the Fire Pump Assembly with the electrical designer and the Electrical Fire Alarm Systems Standard DSE-03.

.4 Provide a ULC/FM listed Bypass Flow Meter or test header assembly across the Fire Pump.

2.5 Sprinkler Systems

.1 Sprinkler Systems shall be hydraulically designed to NFPA 13.

.2 Sprinkler Systems shall be the "Wet-Pipe Type"; exceptions include:

.1 Dry-Pipe System shall be considered for Loading Docks, Unheated or Partially Heated Soffits and other areas that could be exposed to freezing conditions.

.2 A Single-Interlock or Double-Interlock Pre-action System shall be considered for a Transformer Room, Main Electrical & Switchgear Room. Critical Equipment Rooms, Computer Rooms and LAN Rooms.

.3 A Deluge System shall be considered for stage proscenium.

.1 Selection of a Pre-action System as the sprinkler system of choice shall be presented for the approval of the Manager, Mechanical Design, CPDD before the completion of Schematic Design.

.2 Where provided, a Pre-action System shall be configured around the use of a Packaged Pre-action System Cabinet such as the TotalPac Pre-action System or equivalent.

.3 Sprinkler Piping

.1 Wet-Pipe Systems

.1 Piping shall be minimum Schedule 10 Black Steel with flanged, screwed or grooved connection; use of a lower pipe schedule is not permitted without the prior approval of the Manager, Mechanical Design, CPDD.

.2 Use of Pressfit piping is not permitted.

.4 Dry-Pipe Systems

.1 Piping shall be minimum Schedule 10 Black Steel with flanged, screwed or grooved connection; use of a lower pipe schedule is not permitted without the prior approval of the Manager, Mechanical Design, CPDD.

.2 Piping shall be galvanized if located outside and exposed to the elements.

.3 Use of Pressfit piping is not permitted.

.4 Only dry sprinkler systems shall be used in areas where potential freezing will occur

.5 Pre-action Systems

.1 Piping shall be minimum Schedule 10 Galvanized Steel with flanged, screwed or grooved connection; use of a lower pipe schedule is not permitted without the prior approval of the Manager, Mechanical Design, CPDD.

.2 Use of Pressfit piping is not permitted.

.1 Use of "Prefabricated Flexible Piping" is not permitted.

.6 Sprinkler Heads

.1 Sprinkler heads for Wet-Pipe Systems and Pre-action Systems in areas with a finished ceiling shall be white Semi-Recessed type. Exceptions include:

.1 Use of Concealed type sprinkler heads may be considered only in Board Rooms, Large Meeting Rooms and other similar areas where "Form & Aesthetics" are deemed as important as "Function". However, use of Concealed type sprinkler heads is not permitted without the prior approval of the Manager, Mechanical Design, CPDD.

.2 Sprinkler heads for Wet-Pipe Systems, Dry-pipe and Pre-action Systems in areas without a finished ceiling shall be brass Upright type.

.3 Sprinkler Heads in Mechanical Rooms, Gymnasiums, or other similar areas where mechanical damage is a possibility, shall be provided with "cages".

.4 Sprinkler heads in Generator Rooms and other areas with expected high ambient temperature shall be selected as High Temperature Heads suitable for the intended location.

.5 All cold rooms and walk-in freezers shall be equipped with sprinkler heads rated for the room design (refer to NFPA 13 Installation of Sprinkler Systems Standard)

.6 Consultant to make the University of Guelph aware of all inspections prior to closing of finished ceilings.

.7 Valves

.1 Refer clause 2.8

2.6 Standpipe System

.1 Standpipe systems shall be hydraulically designed to NFPA 14.

.2 Standpipe Cabinets

.1 Cabinets shall be Recessed type in all "Finished" areas

.2 Cabinets shall be Semirecessed or Surface mounted type in all other areas.

.3 Cabinets shall be sized to accommodate one 2.25 kg (5 lb.) ABC fire extinguisher.

.4 Door shall be Flush, with a full glass face, hinged, positive latch device as required.

.3 Cabinet finish shall be suitable for the application and location; all internal components shall be polished and chrome plated.

.1 Hose lengths shall be 30m (100 ft.)

.4 Standpipe Piping

.1 Piping shall be minimum Schedule 10 Black Steel with flanged, screwed or grooved connection; use of a lower pipe schedule is not permitted without the prior approval of the Manager, Mechanical Design, CPDD.

.2 Use of Pressfit piping is not permitted.

.3 Use of Pressure Reducing Devices shall be avoided to the extent possible. Where provided, a dedicated and appropriately sized drain riser shall be provided adjacent to the Pressure Reducing Device to facilitate annual testing.

.4 Valves

.1 Refer clause 2.8

2.7 Gaseous Fire Suppression System

.1 Selection of a Gas Fire Suppression System as the sprinkler system of choice for a specific area shall be presented for the approval of the Manager, Mechanical Design, CPDD before the completion of Schematic Design.

.2 Where provided, a Gas Fire Suppression System shall be configured around the use of a Novec 1230 as the suppression agent of choice.

.3 Valves

.1 Refer clause 2.8

2.8 Fire Protection System Valves

.1 All valves shall be supervised

.1 Supervisory devices shall be hard-wired; use of plugin cord type supervisory devices is not permitted.

.2 If supervisory valves are located in ceilings, they must be labeled as per NFPA 13.

.2 Shut off valves shall

.1 be located in restricted use corridors or service rooms and not within occupied spaces.

.2 be accessible by personnel standing on the floor without ladders or other aids.

2.9 Fire Extinguishers

.1 A Fire Extinguisher shall be provided in every Fire Hose Cabinet, Mechanical Room, Electrical Room.

.1 In addition, provide a fire extinguisher in all other areas as called for in the Room Data Sheets or identified though the Functional Planning and Programming.

.2 Standard of Acceptance: Amerex

3 Product & Installation Standards

3.1 General

.1 The requirements outlined in the following clauses are applicable to all Fire Protection Systems; Application Specific requirements are outlined under clauses 3.2 and 3.3.

3.2 Equipment

.1 Fire Pumps

.1 Fire Pumps shall be installed on a 6” (150 mm) housekeeping pad.

.2 Fire pumps must have at least a 36” clearance around the front of it as per NFPA 20.

.3 Fire Pumps shall be installed with upstream and downstream supervised isolation valves.

.4 Fire Pumps shall be installed in a dedicated Service Room or a Mechanical Room in accordance with NFPA 20. This room may be shared with the Incoming Water Meter Room as called for under the Plumbing Systems Standard in Section 6.3.

.2 Incoming Fire Water Service Cross-Connection Protection Device

.1 Cross-Connection Protection Device on the incoming fire water service shall be installed between upstream & downstream isolation valves. These isolation valves may be shared with the Fire Pump in accordance with NFPA 20.

.2 Cross-Connection Protection Device shall be installed in the same Service Room or Mechanical Room as the Fire Pump.

3.3 Identification and Labeling

.1 Products

.1 PVC or vinyl, pressure sensitive adhesive tape for text and flow direction arrows.

.2 Appearance: BLOCK CAPITAL LETTERS with ‘White’ text on Red background.

.3 Text Size:

.1 Up to 2-1/2” NPS: 1” high lettering

.2 3” NPS and Up: 2” high lettering

.4 Terminology: Text to red “SPRINKLER” or “AUTO-SPRINKLER” or “STANDPIPE” to suit the application.

.5 Flow Direction Arrow Size:

.1 Up to 2-1/2” NPS: long by ¾” wide

.2 3” NPS and Up: 6” long by 2” wide

.2 Execution

.1 All pipe identification shall be complete with flow direction arrow labels.

.2 Sprinkler Systems

.1 Piping to which sprinkler heads are directly connected to within the same space do not require identification labels.

.2 Mains or branch piping passing through spaces where sprinkler heads are not directly attached shall be labeled.

.3 For exposed piping label spacing shall not exceed 42’-0” intervals.

.4 Piping within accessible concealed spaces (eg. Ceiling spaces or pipe chase) spacing shall not exceed 21’-0”,

.3 Standpipe Systems

.1 Piping attached to a fire hose cabinet or fire hose rack within the same space does not require identification labels.

.2 Mains or branch piping passing through spaces where fire hose cabinets or fire hose racks are not directly attached shall be labeled.

.3 For exposed piping label spacing shall not exceed 42’-0” intervals.

.4 Piping within accessible concealed spaces (eg. Ceiling spaces or pipe chase) spacing shall not exceed 21’-0”,

4 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Mechanical

Plumbing Systems

1 Introduction

1.1 General

.1 This Plumbing Systems Design Standard has been developed to establish the University's minimum expectations and requirements for new Plumbing Systems installed on campus.

.2 The University's minimum expectations and requirements for new Fire Protection Systems installed on campus are covered under Section 6.2..

.3 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

.4 This document is to be used in conjunction with the Section 6.4 HVAC Systems standards.

.5 Acceptable materials shall comply with Ontario Building Code (OBC) for their intended installation areas. It is the responsibility of the Architect to review specific application areas and select appropriate materials from the standard, ensuring they algin with OBC requirements.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new Plumbing installations within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing Plumbing infrastructure.

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Mechanical Design, CPDD before the completion of Schematic Design.

.5 Design must include onsite investigation for all designs. All university provided drawings and sketches are for reference only and must be verified on site for accuracy.

1.3 Responsibility of the Designer

.1 The Design Engineer of Record remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Mechanical Design, CPDD, together with proposed measures for addressing the conflict before the completion of schematic design.

.3 The Design Engineer of Record is responsible for all investigation and to ensuring designs account for all affected systems including concealed conditions. With prior approval of the University, destructive testing may be required to confirm conditions.

.4 The Design Engineer of Record is responsible for coordinating specific user and equipment requirements from all stakeholders including but not limited to University staff, management, and users of the affected space(s).

.5 All designs must include measures to ensure maintenance is considered, especially with respect to safe access.

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovation shall be tabled for consideration by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design.

.3 All designs must allow for future demand by 10%.

1.5 Reference Documents

.1 Ontario Building Code

.2 ASHRAE Standards

.3 ASPE Standards

.4 Zero Carbon Buildings, ZCB

.5 Mechanical HVAC Systems Standard Section 6.4*

.6 Building Automation Standards Section 6.5*

.7 Mechanical Fire Protection Systems Standard Section 6.2*

.8 Site Servicing Standard Section 4.5*

.9 Campus Site Service Schematics

.10 City of Guelph Cross Connection Bylaw (Backflow Bylaw)

*A copy of these standards is available on the University of Guelph Physical Resources web page

2 Design Standards for Services

2.1 Domestic Water

.1 General

.1 The requirements outlined in the following clauses are applicable to all Plumbing Systems.

.2 Water pressure is supplied by City onto campus at approximately 60PSI and supplied from the Central Utility Plant at approximately 80PSI.

.3 Potable water system design temperature:

.1 cold water: 13.3 ºC (56 ºF)

.2 hot water: 60 ºC (140 ºF)

- Distribute at 49°C (120°F) with mixing station as per OBC.

.4 Balancing

.1 To be pressure independent type. Recirculation systems to have fully stainless steel type TA series 76X for domestic water only.

.5 Domestic Water Filtration Equipment

.1 When a heat exchanger is utilized to generate steam for humidification in air handling units, the incoming city water supply to the heat exchanger shall be treated with at least a water softener. Reverse osmosis systems are also permitted if the process necessitates high purity steam.

.2 Humidification is preferred to be supplied by central plant steam where possible.

.2 Typical building water systems:

.1 Include Wirsbo for inaccessible locations.

Table 1: Pipe and pipe fittings for portable water

Service	Size (mm)	Pipe Material	Fittings	Joints
Domestic hot and cold (above ground)	All sizes	Copper tube type L conforming to ASTM B88	Wrought copper	Soldered or brazed joint
Domestic cold water (buried)	50 (2) and smaller	Copper tube type K conforming to ASTM B88	Wrought copper Worbro for specific areas	Soldered or brazed
Domestic cold water (buried)	65 (2 ½) and larger	Ductile iron conforming to ANSI/AWWA C151/A21.51, PVC conforming to CSA B137.3, Polyethylene (PE) conforming to standard CSA B137.1	PVC PE	Rubber gasket Restrained joints Butt heat fusion
Domestic hot and cold (shafts and other locations with limited access)	All sizes	Copper tube type L conforming to ASTM B88	Wrought copper	Soldered or brazed

Table 2: Pipe and pipe fittings for storm and sanitary sewage

Service	Size (mm)	Pipe Material	Fittings	Joints
Storm (vertical risers)	All sizes	PVC conforming to standard CSA B181.2	PVC	Mechanical joint
Storm (buried)	80 (3) and smaller	PVC conforming to standard CSA B181.2	PVC	Solvent welded
Storm (buried)	100 (4) and larger	PVC conforming to standard CSA B181.2 white colour	PVC	Gasketed joint
Sanitary (above ground)	65 (2 ½) and smaller	PVC System XFR DWV	Wrought copper PVC	Soldered joint PVC Solvent
Sanitary (above ground)	80 (3) and larger	PVC conforming to standard CSA B181.2	PVC	Mechanical joint
Sanitary (buried)	80 (3) and smaller	PVC conforming to standard CSA B181.2	PVC	Mechanical joint Solvent welded
Sanitary (buried)	100 (4) and larger	PVC conforming to standard CSA B182.2	PVC	Mechanical joint Gasketed joint
Bottom of storm and sanitary risers where they connect to horizontal mains, as well as all horizontal and vertical sanitary and storm joints at elevations below grade, including those in parking garages	All sizes	PVC conforming to standard CSA B181.2	PVC	Mechanically braced and combined with a heavy duty mechanical joint
Vent	All sizes	DWV Copper conforming to ASTM B306 Cast Iron conforming to standard CSA-B70	Wrought copper Cast Iron	Soldered joint, mechanical joint
Notes	Sanitary drainage piping and fittings shall be rated to withstand the temperature of the discharge fluid. Ensure that appropriate piping is used for high temperature sewage from autoclaves, cage washes and similar appliances.			

System Configuration	Size mm (in), Fittings & Joints	Definition	Typical Applications
Potable Water Systems			
Potable Water System (cold and/or hot)	All sizes, wrought copper. Soldered or brazed joint	Water Distribution System delivering cold and/or hot water suitable for human consumption. Above ground. Material: Copper tube type L conforming to ASTM B88	Washrooms, Hand Washing Sinks, Pantry Supplies, Drinking Fountains, Sterilizers, Coffee Machines, Soda/Pop Machines, etc.
Tempered Potable Water System		Water Distribution System delivering tempered potable water suitable for human consumption.	Eyewash Stations, Emergency Showers, Hand washing Sinks, etc.
Protected Potable Water System (cold and/or hot), Animal Drinking Water System (cold)		A Process Water Distribution System derived from the Potable Water Distribution System but separated from the same through the use of Cross-Connection (Backflow) Protection Devices. Water delivered through this system is only suitable for Food Contact or Animal Consumption within the protected zone.	Food Preparation, Inspection & Testing Laboratories, Animal Facilities (for Animal Drinking) and Areas required by the Canadian Food Inspection Agency to be serviced with water supplies suitable for human consumption.
Non-potable Water Systems			
Non-Potable Water System (cold and/or hot)		A Process Water Distribution System derived from the Potable Water Distribution System (cold and/or hot) but separated from the same through the use of Cross-Connection (Backflow) Protection Devices. Water delivered through this system is not suitable for human consumption.	Lab Sinks & Lab Supplies, Fume Hood Supplies, Process Equipment Supplies, Hose Bibbs, Janitor/Slop Sinks, Laundry Supplies,
Raw Water System		Water Distribution System delivering untreated well water not suitable for human consumption	Aqua Lab, CUP, Greenhouse, Fish Tanks
Rain (Cistern) System – Definition – Grey Water, Irrigation, Other Water Systems			
Fire Protection Water		A Process Water Distribution System derived from the Potable Water Distribution System but separated from the same through the use of Cross-Connection (Backflow) Protection Devices. Water delivered through this system is strictly for fire suppression and is not suitable for human consumption.	Fire suppression sprinkler and stand-pipe systems and Dry and Wet systems. See fire protection standards for reference

.3 Incoming Water

.1 Incoming water service shall be extended from the University's Premise Protected Campus Water Distribution Main.

.2 All University supplied water is partially softened at the Central Plant. Equipment where scaling is a concern requires additional softening.

.3 Laboratory facilities shall have backflow prevention provided to conform to CSA Standard B64.10

.4 Below Ground

.1 All below ground buried domestic water piping systems shall be constructed out of Schedule 80 PVC.

.2 To avoid the use of tunnel system for running pipe. Exceptions are subject to the approval by the Manager, Mechanical Design, CPDD.

.3 To include gate isolation valves with one piece plastic valve box, copper tracer wirer, 12" x 12" cement pad, and copper tag number (number by University) at valve cap. Locate where line feeds into building, by-pass or where main branches.

.4 All waterlines within tunnels or trenches to be insulated using rigid fiberglass insulation with a thermal performance not to exceed 0.033 W/m2·°C @ 24°C. Include PVC jacket in exposed finished areas. Include wrapping all valves, strainers and fittings.

.5 Direct buried/trenched pipe to be insulated with waterproof-ridged cellular glass insulation. Direct buried must have prior approval by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design. Make all efforts to avoid direct buried piping.

.6 Pipe must include caution tape at least 1' above the pipe and grounding/tracer wire where required.

.5 Above Ground

.1 All above ground domestic water piping systems shall be constructed out of Type L Copper Soldered, Schedule 80 PCV, or Schedule 10 S.S. Wirsbo compression is acceptable for inaccessible dedicated equipment lines 3/4" and below (include strapping).

.1 Galvanized pipe is prohibited.

.2 Insulate all hot and cold piping with rigid fiberglass insulation with a thermal performance not to exceed 0.033 W/m2·°C @ 24°C. Include PVC jacket in exposed finished areas. Include wrapping all valves, strainers and fittings.

.2 All Valves shall be in accordance with Section 3 Valves.

.3 Isolation valves shall be provided on all Branch Piping and at individual fixtures and equipment connections. Branch piping feeding 3 or more items, or above 50 feet, shall include isolation valves for branch piping.

.4 Joints & Fittings:

.1 All copper joints and fittings shall use soldered connections, except at connection to valves, specialties or equipment where threaded or flanged connections shall be used. Any other types of joints and fittings are subject to an approval by the Manager, Mechanical Design, CPDD; table requests for approval prior to completion of the Schematic Design phase.

.2 Grooved piping is not acceptable where buried or within wall.

.5 Dielectric unions are not acceptable.

.6 Backflow

.1 General

.1 Premise Protection against Cross-Connection shall be provided in accordance with the City of Guelph Backflow Bylaw for the Building Hazard Classification. Exceptions include:

.2 Buildings classified as "Light" or "Moderate" Hazard do not require Premise Protection on the incoming water service as the University's Campus Water Distribution Main is already Premise Protected from the City Water Service. However, in such instances the incoming water service piping shall be arranged with a flanged spool piece to allow a Reduced Pressure Backflow device c/w an upstream & downstream isolation valve to be installed at any time. Zone or source isolation is still required where a specific hazards exists.

.3 All install and/or removed backflow must include all related City of Guelph to meets the related bylaw.

.4 A Funnel Floor Drain shall be provided in the immediate vicinity of any Backflow Device, whether installed or provisioned for.

.5 City of Guelph requires a cross-connection survey to be performed and submitted with all building upgrades – form is available on the City's website. Work to be included in tender documents and performed by the contractor.

.6 Water closets, urinals and mop sinks may be on non-potable water systems where approved by the University. Where mop sinks are on potable water and a soap injector system is provided, a separate cold water connection protected by a RP or air gap type BFP is to be provided (zoned where possible). Cabinated

.7 New ice machines may have a suitable air gap protection built-in. For machines without built-in air gap protection, machines will require DCVA type backflow prevention. (Zoned where multiple sources exist).

.8 Maximum mounting height of BFP's to be 1500mm – If exceptions are necessary, revisions must be reviewed on site with City of Guelph prior to installation.

.9 Lead Free Backflows will be supplied which meets this standard. Alternates must be approved by University.

.10 Vacuum breaker type air barriers are acceptable on mop sinks, laundry sinks and residential type washing machines (non-chemical injecting). Detergent injecting type machines require RP type BFPs. Janitors chemical injections must have air gap.

.2 Building Classification

.1 This classification is intended to group buildings based on the Activities envisaged within the buildings now and in the future. In each instance the University's own Building (Hazard) Classification is equal to or higher than the Hazard Classification assigned by the City of Guelph Backflow bylaw.

.2 Building Hazard Classified as "Light", "Moderate" or "Severe"; classification identified by the Manager, Mechanical Design, CPDD, before the commencement of Schematic Design.

.3 Backflow Installation

.1 Cross-Connection Protection Device on the incoming water service shall be installed between upstream & downstream isolation valves. These isolation valves may be shared with the water meter installation. Connections shall be completed using unions for piping NPS 3 or smaller and flanges for piping NPS 4 and larger.

.2 Discharge from the Cross-Connection Protection Device shall be directed to a floor drain located directly underneath or in the immediate vicinity of the device; drain piping shall be arranged with a fixed air gap.

.3 Use two parallel backflow devices for each location unless otherwise approved by Mechanical Manager, CPDD.

.4 Cross-Connection Protection Device shall be installed in the same Service Room or Mechanical Room as the Water Meter.

.5 Comply with the City of Guelph's Backflow By-law requirements.

.7 Water Distribution Systems

.1 Renovation Projects

.1 Modify existing Plumbing Systems to suit new Work. Maintain the design criteria followed for the existing installation.

.2 Provisions to protect against cross-connection: Create a new Non-Potable Water System (Loop) to limit the number of new testable devices required to protect against cross-connection.

- To limit the amount of testable devices it is the preference of the University to provide a zoned non-potable water loop to protect against cross-connection. Where this is not practical or economical, provide source protecting with cost-benefit analysis after confirmation with the University Mechanical Design Manager, CPDD, at the design stage.

.2 New Construction Projects

.1 Potable Water Booster Pumping System

- A Potable Water Booster Pumping System shall be provided, as necessary, to support the Facility Potable Water Demand (Flow and Terminal Pressure)
- Sizing supported by Connected Load and Demand Load Calculations.
- Potable Water Booster Pumping System shall be configured as follows:
- A Variable Speed Duplex Pumping System with each pump sized accordingly and requires 100% redundancy.
- Confirm if available water pressure is sufficient at building site prior to designing booster pump system.
- Booster pumps to be designed such that the pumps are disabled once pressure setpoint has been met for a given time period to reduce pump power during unoccupied periods."

.2 Shall include isolation valves on inlet and outlet.

.3 Potable Water Systems

.1 A Potable Cold Water System shall be provided to support the building's potable cold water demand.

- Potable cold water for the Protected Potable Water System (where provided) shall be extended from the Potable Water System; cross-connection protection devices shall be provided on the potable water supply piping to protect the Potable Water System.

.2 A Potable Hot Water System shall be provided to support the building's potable hot water demand.

- Potable hot water for the Protected Potable Water System (where provided) shall be extended from the Potable Water System; cross-connection protection devices shall be provided on the potable hot water supply piping and recirculation piping to protect the Potable Water System.

.3 The Potable Hot Water System shall be configured as follows:

- Use Plant Steam supplied from the CUP as the primary source of input heat.
- Alternate measures (such as gas-fired heaters, point-of-use electric heaters, etc.) for hot water production for small demands may be considered and shall be presented for review by the Manager, Mechanical Design, CPDD at the Schematic Design Stage.

.4 A recirculation loop of the hot water system is preferred by the University. All other designs shall be approved by the University Mechanical Design Manager, CPDD, at the design stage.

.5 The Potable Water Distribution Systems shall be sub-divided into a Protected Potable Water System as needed.

.6 Sizing supported by Connected Load and Demand Load Calculations.

.4 Non-potable Water Systems

.1 A Non-potable Water System shall be provided to support the building's non-potable water demand, and limit the number of testable backflow devices installed.

.2 A separate Non-potable Hot Water System may be required depending on the application and calculated demand.

.3 Sizing supported by Connected Load and Demand Load Calculations.

.4 Non-potable Hot Water System shall have dedicated hot water heaters (independent of potable hot water heaters) configured as follows:

- Use Plant Steam supplied from the CUP as the primary source of input heat.
- Alternate measures (such as gas-fired heaters, point-of-use electric heaters, etc.) for hot water production shall be presented for review and approval by the Manager, Mechanical Design, CPDD at the Schematic Design Stage
- A recirculation loop of the hot water system is preferred by the University. All other designs shall be approved by the University Mechanical Design Manager, CPDD, at the design stage.

2.2 Storm Drainage Systems

.1 General

.1 All Roof Drains shall be of the "controlled flow" type.

.2 To the extent feasible, storm drainage systems shall be designed for gravity flow.

.3 All non-pressurized pipe constructed from PVC. Cast iron is not acceptable.

.4 Sump Pump Systems

.1 Where required to handle storm water inflow from a weeper system or storm drains that cannot flow to the storm sewer under gravity, a duplex self-priming sump pump system with automatic alternation shall be provided.

.2 Storm water from weeping tile shall be collected via a sand interceptor pit.

.3 Each pump shall be capable of supporting 100% of the calculated storm water inflow.

.4 Sump levels shall be monitored with an additional High Level alarmed with the Building Automation System.

.5 All clean–outs to be accessible with access hatch without the use of a ladder.

.1 Power supply to the sump pumps shall be extended from the facility's Essential Power System.

.6 Rain Water Leaders shall not be routed along any exterior wall or in an area that has the potential to freeze.

.7 All buried storm lines to be minimum 1 Meter (3') and below frost level unless approved by the Manager, Mechanical Design, CPDD.

.8 Buried pipe must include caution tape at least 300mm (1') above the pipe, grounding/tracer wire where required.

.9 Insulate all drainage piping for a minimum of 1 Meter (3') from all exterior locations or any other locations where condensation can occur.

.2 Service Tunnel

.1 Floor drains and sump pits within a Service Tunnel should be directed to a Sanitary Drain. Comply with the requirements of Sanitary Drainage Systems listed under Clause 2.8 and 9.4.

.3 Material

.1 All below ground buried storm drain piping systems shall be constructed out of PVC Schedule 40.

.2 All above ground storm drain piping systems 65mm (2-1/2") or larger shall be Schedule 40 PVC DWV. 50mm (2") and smaller shall be hard temper DWV copper or PVC. The use of fire rated PVC is acceptable (XFR). Use rigid fiberglass insulation with PVC jacket where required with a thermal performance not to exceed 0.033 W/m2·°C @ 24°C.

.3 All pumped storm drain piping systems shall be constructed out of rigid type "L" copper pipe or Schedule 80 PVC.

.4 All drain piping serving Chemistry Labs and Wet Labs shall be shall be constructed out of acid resistant PVDF for the greater of the first 50'-0" or until the effluent is neutralized and deemed safe for use of more conventional drain piping materials.

.5 Cast iron is not acceptable.

2.3 Sanitary Drainage Systems

.1 General

.1 Floor drains shall be provided at a minimum in the following locations:

.1 A combination funnel floor drain at each equipment or group of equipment to serve as a point to drain condensate from equipment or a point of drain to serve piping systems.

.2 Piping to be directed into funnel floor drain to avoid splashing

.3 Floor drains in each mechanical room and service room for housekeeping.

.4 A floor drain at each eyewash and emergency shower

.5 Location of drain shall prevent pipe running into drain to avoid tripping hazard

.2 Sanitary drainage systems shall be designed for gravity flow.

.3 All non-pressurized pipe constructed from PVC or copper. Cast iron is not acceptable.

.4 All buried sanitary lines to be minimum 1 meter (3') unless approved by the Manager, Mechanical Design, CPDD.

.5 Buried pipe must include caution tape at least 300mm (1') above the pipe, grounding/tracer wire where required.

.6 Insulate all drainage piping for a minimum of 1 meter (3') from all exterior locations or any other locations where condensation can occur.

.2 Automatic Trap Priming

.1 System in the form of an Electronic Trap Seal Primer connected to the non-potable water system and shall include a timer, a solenoid valve and a vacuum breaker shall be provided for each floor drain or a group of floor drains; exceptions include:

.2 For renovations including 6 or less floor drains where food processing is not being completed, the preference of using an insertion type Trap-Guard Primer can be used. A Mechanical Pressure Drop Type Primer may be used with the prior approval by the Manager, Mechanical Design, CPDD at the Schematic Design Stage.

.3 Intent to use such alternate measures shall be identified and presented for approval prior to completion of the Design Develop.

.4 Where tying into a potable water source the electronic trap seal primer shall be equipped with an air gap.

.5 Wirsbo compression piping is preferred for piping of trap primer.

.6 Trap seal primer lines:

.1 Buried application: Plastic Poly or Type K copper soft tubing conforming to ASTM B88.

.2 Exposed application: Type K copper soft tubing conforming to ASTM B88.

.3 Sump Pump Systems

.1 Where required to handle sanitary drains that cannot flow to the sanitary sewer under gravity, a duplex self-priming sump pump system with automatic alternation shall be provided.

.2 Each pump shall be capable of supporting 100% of the calculated sanitary water inflow.

.3 Sump levels shall be monitored with High and High High Levels alarmed at the Building Automation System.

.4 Power supply to the sump pumps shall be extended from the facility's Essential Power System.

.5 Sump pit covers shall be gasketed to ensure an air-tight seal. Vent piping shall be extended to the outside.

.6 Provide check valve and isolation valve on discharge where tied into common line.

.4 Sanitary Sewage Pump

.1 Shall be self-priming, base mounted, direct drive type for motor sizes 1 horsepower (HP) and above.

.2 Submersible type is acceptable for fractional horsepower motors.

.3 Shall be serviceable at grade level and not within the sump.

.4 Shall be connected to emergency power.

.5 Submersible must include winch for removal and maintenance.

.5 Elevator Pits

.1 Elevator pits shall be drained to the sanitary drainage system.

.2 Include water alarm system tied into BAS system.

.3 Include a backwater valve.

.6 Cleanouts

.1 Where code allows, washroom cleanouts shall be installed in the room to allow for cleaning within the washroom and not the ceiling below.

.2 Must at least be accessible by use of access door. Where possible, locate in main areas to assist in accessing and maintenance.

.7 Service Tunnel Drainage

.1 Weeper drains associated with a Service Tunnel should be directed to a storm drain. Comply with the requirements of Storm Drainage Systems listed under Clause 2.8 and 9.4.

.8 Material

.1 All below ground buried sanitary drain piping systems shall be constructed out of PVC Schedule 40.

.2 All above ground sanitary drain piping systems 65mm (2-1/2") or larger shall be Schedule 40 PVC DWV. 50mm (2") and smaller shall be hard temper DWV copper or Schedule 40 PVC. The use of fire rated PVC is acceptable (XFR). Use rigid fiberglass insulation with PVC jacket where required with a thermal performance not to exceed 0.033 W/m2·°C @ 24°C.

.3 All pumped sanitary drain piping systems shall be constructed out of rigid type "L" copper pipe or Schedule 80 PVC.

.4 All drain piping serving Chemistry Labs and Wet Labs shall be constructed out of acid resistant PVDF for the greater of the first 50'-0" or until the effluent is neutralized and deemed safe for use of more conventional drain piping materials.

.5 Cast iron is not acceptable.

2.4 Rain Water Harvesting

.1 General

.1 In all new construction, supply water piping to Water Closets and Urinals shall be ran independent of all other supply water piping systems. This will allow ease of switching over to the Grey Water System.

.2 Shall be considered where a cost-benefit analysis demonstrates the viability of such a system. Viability shall be demonstrated to the Manager, Mechanical Design, CPDD prior to completion of Schematic Design.

.3 Rain Water Systems are to be designed to allow city domestic cold water to directly supply the fixtures during periods when rain water is not available.

.1 Code-required backflow prevention is to be provided on the connection between the domestic water supply and the rainwater system. Refer to OBC requirements and the latest requirements of the City of Guelph's Backflow Prevention Bylaw.

.2 If possible, avoid the use of domestic to directly fill the rain water cistern/tank.

.4 Rainwater systems shall utilize pre-filters (Vortex style) to remove large debris prior to the rainwater entering the cistern/storage tank.

.5 Cistern/storage tank design to include calming inlet and floating suction filters to ensure cleanest water is drawn from the tank at all times.

.6 Final filtration system requirements are to be reviewed with the Manager, Mechanical Design, CPDD at the Schematic Design Stage.

.7 System design is to include a properly sized pump and draw-down tank matched to the requirements.

.8 System to be configured to automatically switch to city domestic cold water supply during rainwater system pump failure.

.9 Pump failure alarm is to be provided to the BAS.

.10 All buried rain water harvesting lines to be minimum 1 meter (3') unless approved by the Manager, Mechanical Design, CPDD.

.11 Buried pipe must include caution tape at least 300mm (1') above the pipe, grounding/tracer wire where required.

.12 Insulate all drainage piping for a minimum of 1 meter (3') from all exterior locations or any other locations where condensation can occur.

.2 Material

.1 All below ground buried piping systems shall be constructed out of PVC Schedule 40.

.2 All above ground piping systems 65mm (2-1/2") or larger shall be Schedule 40 PVC DWV. 50mm (2") and smaller shall be hard temper DWV copper or PVC. The use of fire rated PVC is acceptable (XFR). Use rigid fiberglass insulation with PVC jacket where required with a thermal performance not to exceed 0.033 W/m2·°C @ 24°C.

.3 All pumped piping systems shall be constructed out of rigid type "L" copper pipe or Schedule 80 PVC.

.4 No rain water supply to be piped using Copper. Drainage to be PVC.

2.5 Deionized (DI) Water System

.1 The Campus DI Water Distribution Main shall be the preferred source of DI Water. All multiple point use systems shall include a recirculation loop. Exceptions where a new standalone DI Water System may be considered with prior approval from the Manager, Mechanical Design, CPDD include:

.2 An application with a very low DI Water demand where it is more economical to provide a dedicated "Centralized" or a "Point-of-Use" DI Water System, or

.3 A facility located remote from the DI Water Distribution Main, making it impractical and economically unfeasible to extend piping from the Campus DI Water Distribution Main, or

.4 The Campus DI Water Plant located in the CUP and/or the sizing of the Campus DI Water Distribution Main does not support the calculated facility DI Water demand

.5 Where a "Centralized" or a "Point-of-Use" DI Water System is envisaged, the same shall be provided to support the facility DI Water needs.

.1 A Centralized DI Water System shall be arranged with a continuously recirculating loop.

.2 System shall be sized & configured with due consideration to peak and average demands and level of redundancy and availability identified in the functional program.

.3 DI Water System shall not be used for humidification.

.4 Approval by the Manager, Mechanical Design, CPDD at the Schematic Design Stage is required for DI Water to be used in specialty systems.

.5 Provide adequate saddles for DI Water System to prevent pipe sagging.

- Refer to manufacturer specific requirements for required supports.

.6 All fixtures shall also be designed to suit DI water.

.1 Processed water piping

.1 Pipe and pipe fittings shall be in accordance with the following schedules:

Table 3: Pipe and pipe fittings for process water

Service	Pipe Material	Fittings	Joints
Distilled water	Polypropylene PVDF Schedule 80	Polypropylene PVDF Schedule 80	Socket fusion Welded
Deionized water	Polypropylene PVDF Schedule 80	Polypropylene PVDF Schedule 80	Socket fusion Welded
Reverse-Osmosis Water	Polypropylene Schedule 80 PVDF Schedule 80	Polypropylene PVDF Schedule 80	Socket fusion Welded

.2 Process water equipment

.1 Provide booster pump(s) on inlet to Reverse Osmosis packaged filtration unit(s) to ensure sufficient pressure to pass through a dirty unit.

.2 Provide duplex treatment system if continuous flow is essential.

.3 All systems shall be supplied with city water makeup meter as well as RO output meter, this section shall be read in conjunction with building automation systems design standard.

.3 Material

.1 All DI Water piping shall beChlorinated polyvinyl Chloride (CPVC), or Poly fluoride (PVDF) plastic.

2.6 Lab Vacuum System

.1 Refer to Design & Construction Standards -Mechanical Laboratory and or Vivarium

2.7 Compressed Air System

.1 General:

.1 All compressed air piping systems requiring registration with the Technical Standards and Safety Authority (TSSA) shall be constructed and registered under the University's current P-Number by extending the scope of the existing registration.

.2 A Compressed Air System shall be provided to support the facility compressed air needs.

.3 System shall be sized and configured with due consideration to peak and average demands and level of redundancy and availability identified in the functional program.

.4 A minimum sized ¾" compressed air outlet shall be provided in the vicinity of each air handling unit cooling coil to facilitate winterization of the coil.

.5 Communicate the compressed air requirements to the University before the completion of the Schematic Design Phase and verify that the Central Compressed Air Plant located in the CUP and the sizing of the Campus Compressed Air Distribution Main (see clause 2.7.3.2 below) is adequate to support the identified compressed air needs.

.6 A compressed air meter shall be provided on the building incoming compressed air service.

.7 Meter shall have a BACNet output for interface with the University's Building Automation System or the Schneider PME System.

.8 Refer University's Metering Standards for additional details.

.1 An application where it is more economical to provide a "Point-of-Use" compressor, or

.2 A Facility located remote from the Campus Compressed Air Distribution Main, making it impractical and economically unfeasible to extend piping from the Campus Compressed Air Distribution Main, or

.3 The Central Compressed Air Plant located in the CUP and/or the sizing of the Campus Compressed Air Distribution Main does not support the calculated facility compressed air demand.

.9 Any new standalone Compressed Air System shall incorporate the following:

.1 Sized & configured with due consideration to peak and average demands and level of redundancy and availability identified in the functional program plus a 20% future spare capacity.

.2 Compressor must include auto-start and be wired to essential power.

.3 Compressors shall be air-cooled or utilize closed loop cooling via the campus chilled water system.

.4 Compressed air distribution system shall incorporate point-of-use filtration and oil-separation devices where the application demands a very high-quality air supply.

.5 Compressed air supplied by the Campus Compressed Air Distribution Main or any new standalone Compressed Air System shall not be used to support "Bubblers" and/or "Cleaning/Housekeeping" equipment.

.2 Material Compressed Air System:

.1 All Compressed Air System piping shall be Copper Type K brazed or threaded steel, no soldering.

.2 High Pressure Stainless Steel Flexible Tubing may be used for the final connection; length less than 36".

.3 Specification to include requirements for pressure testing at 1.5x maximum operating pressure to investigate for leaks.

.4 Include isolation valves at each branch serving 3 or more sources, or exceeding 50 feet, and at location of equipment.

.5 Include filter, regulator, and lubricator at each location of equipment. Exceptions are subject to the approval by the Manager, Mechanical Design, CPDD during the schematic design stage.

2.8 Specialty Gases

.1 General

.1 A Storage and Distribution System for Specialty Gases shall be provided if required by the functional program

.1 Specialty Gases could include amongst others: Oxygen, Carbon Dioxide, Nitrogen and Helium.

.2 All material used to install the system shall to match chemical resistance of the gas supplied

.3 Installed per TSSA Standards.

.2 Consideration shall be given to the use of Bulk Storage & Distribution Systems where anticipated gas consumption rates could require a frequent swap-out or replacement of cylinder(s) or cylinder banks.

.1 Flammable, non-flammable and toxic gas must be stored separately.

.2 Where bulk storage tanks are provided, the same shall be installed outdoors, on a 150mm (6") concrete pad and within a lockable fenced enclosure.

.3 Where a Multi-Tank Manifold System serves as the source of a specialty gas, the same shall be installed in a dedicated room or a closet, readily accessible from a circulation corridor; exceptions include:

- Instances where a specialty gas is required in one single room (space) and it is more practical to locate the gas cylinder(s) within the space served.
- .'Dewar' is a suitable option if approved by the Manager, Mechanical Design, CPDD at the Schematic Design Stage.

.2 Material

.1 Oxygen, carbon dioxide, nitrogen and helium gas piping

.1 Medical grade copper. Brazed. To confirm compatibility.

.2 High Pressure Stainless Steel Flexible Tubing may be used for the final connection; length less than 36".

.3 Include requirement for pressure testing at 1.5x maximum operating pressure.

.2 Liquid nitrogen and helium piping

.1 Vacuum Jacketed stainless steel welded.

.2 Include requirement for pressure testing at 1.5x maximum operating pressure.

2.9 Unused Infrastructure

.1 All unused plumbing, piping and equipment shall be fully removed with purpose made end connection.

3 Design Standard for Spaces

3.1 General

.1 This section is to be used in conjunction with the "Vivarium" standards.

.2 All design spaces must meet all related code requirements.

3.2 Laboratories (Wet Labs, Chemical Labs & General Labs)

.1 Refer to Design & Construction Standards -Mechanical Laboratory and or Vivarium

Table 4: Pipe and pipe fittings for laboratory

Service	Size mm (in)	Pipe Material	Fittings	Joints
Compressed air – shop	All sizes	Stainless Schedule 10 Coppper	Stainless Steel	Screwed
Compressed air – lab control air	40 (1 ½) and smaller	Copper Tyle L SS-304	Wrought copper SS-304	Soldered, welded
Compressed air lab control air	50 (2) and larger	Copper Type L SS-304	Wrought copper SS-304	Brazed
Vacuum Line	All sizes	Copper Tyle L	Wrought copper	Soldered or brazed, Screwed

.1 Gas Piping for laboratory

.1 Refer to Design & Construction Standards -Mechanical Laboratory and or Vivarium

Table 5: Gas piping for laboratory

Service	Size mm (in)	Pipe Material	Fittings	Joints
Natural gas	50mm (2) and smaller	Schedule 40 steel conforming to ASTM A53/ A53M or ASTM A106	Malleable iron	Threaded, Pressed (Viega or approved equivalent)
Natural gas	65 mm (2 ½) and larger			

.2 Laboratory chemical-waste and vent piping

.1 Pipe and pipe fittings shall be in accordance with the following schedules:

Service	Pipe Material	Fittings	Joints
Laboratory waste – above ground	Glass, polypropylene, plenum rated PVDF or as necessary for the service	Glass, polypropylene, plenum rated PVDF or as necessary for the service	Compression coupling Mechanical joint Electrofusion
Laboratory waste – buried	Polypropylene	Polypropylene	Electrofusion

3.3 Animal Facilities

.1 Refer to Design & Construction Standards -Mechanical Laboratory and or Vivarium

3.4 Mechanical Rooms

.1 One (1) hand-washing sink connected to the Potable Water System shall be provided in each Mechanical Room.

.2 One (1) deep bowl stainless steel chemical service sink, with a vacuum breaker where potential risk exists, connected to the Non-Potable Water System shall be provided in each Mechanical Room housing Heating & Cooling System or Closed Loop System Recirculation Pumps.

.3 At least one (1) hose connection, with a vacuum breaker where potential risk exists, connected to the Non-Potable Water System shall be provided in each Mechanical Room.

3.5 Service Rooms

.1 One (1) stainless steel slop sink connected to the Non-Potable Water System shall be provided in each Service Room.

3.6 Housekeeping Rooms & Closets

.1 One (1) stainless steel or fiberglass slop sink connected to the Non-Potable Water System shall be provided in each Housekeeping Closet.

.2 One (1) soap dispenser, complete with air gap, compliant with the University's Standard shall be provided within each Housekeeping Closet.

.3 No fittings, fixtures, or valves requiring maintenance shall be located above Housekeeping Room or Closets.

4 Plumbing Fixtures

4.1 Installation Standards

.1 The requirements outlined in the following clauses are applicable to all Plumbing Systems.

.2 Piping Risers shall be routed through accessible pipe chases or accessible service shafts. In the case of the latter at least one light c/w manual light switch and one duplex receptacle shall be provided within the service shaft at each level.

.3 Access to pipe chases to be minimum 12"x12" for hand access, 18"x18" for arm access and 24"x24" for upper body.

.4 All Equipment and System Components shall be arranged and located to allow proper access for service and maintenance.

.5 Mechanical systems shall be installed to maximize the building's usable space while maintaining optimal service clearances for maintenance and repair.

.6 New systems shall not block access to existing systems.

.7 Unobstructed space must be maintained for removal of all equipment including, but not limited to, valves, coils, motors, fans, and pumps.

.8 All equipment and materials shall be installed in a neat and orderly fashion, whenever possible, run level, straight and true, parallel, and perpendicular to walls and floors. Refer to applicable ASHRAE and Plumbing code guidelines for best practice guidelines.

.9 In finished areas, mechanical systems will be concealed. Exceptions are subject to the approval by the Manager, Mechanical Design, CPDD during the schematic design stage.

.10 All equipment connections shall include unions, strainers and isolation valve as a minimum.

.11 CRN / CSA numbers required for all equipment.

.12 Automatic Air Vents c/w manual isolation valves shall be provided at all high points in water systems.

.13 Drain Valves (ball) with a garden hose connection c/w screwed cap shall be provided at all low points in water systems.

4.2 Plumbing Fixtures and Trim

.1 Plumbing fixtures shall be water conserving type. Maximum baseline requirements:

.1 Water closets: 4.8 lpf

.2 Urinals: 3.8 lpf

.3 Showerheads: 5.7 lpm

.4 Faucets: 3.8 lpf

.2 All plumbing fixtures to be commercial grade.

.3 All plumbing trim shall be sourced from a single manufacturer (per washroom group). Identify the preferred manufacturer in consultation with the Manager, Mechanical Design, CPDD before completion of the Design Development phase.

.4 A hose bibb connection shall be provided below the lavatory counter in all washrooms.

.5 Trim shall include ceramic disk cartridges, vandal resistance options in public areas and meet ADA requirements.

.6 All exposed valves, fittings, escutcheons, trim, etc. at each fixture shall be polished chrome plated brass. Exceptions are subject to the approval by the Manager, Mechanical Design, CPDD.

.7 All electronic faucet mixing stations shall be installed as high as possible under the countertop while maintaining access.

.8 All electronic fixtures shall be hardwired.

.9 Lavatory basins wastes shall have grids and extra heavy quality traps. Chain and plug or pop-up plug shall not be used for basins.

.10 All outdoor hose bibs shall be frost-proof self-draining type to provide freeze protection.

.11 Labs with a deluge shower shall have a floor drain. (Refer to Design & Construction Standards – Mechanical Laboratory and or Vivarium)

.12 Water closets

.1 All water closets shall be of the wall mounted type, elongated with automatic flush valves.

.2 Seats for water closets shall be anti-microbial, with no lid.

.3 To include individual isolation valves with metal handle at fixture.

.4 Water closets must be able to operate adequately within the entire specified range when flushing flow rates require adjustment at flush valves.

.5 Grouped toilets (3 or more) shall have 100mm (4 in) cleanout located in the same room as the fixtures.

.13 Washroom Faucets

.1 Hands-free type on a case by case basis, review with mechanical manager.

.2 Deckk mount

.3 Hardwired with adjustable sensor range. Battery type shall be AA or C only.

.4 Thermostatic mixing valve with adjustable temperature range and anti-scald feature shall be provided with each faucet.

.5 Low flow water conservation type.

.14 Laboratory faucets (Refer to Design & Construction Standards – Mechanical Laboratory and or Vivarium)

.1 Manual with lever style handle(s). Refer to Design & Construction Standards – Mechanical Laboratory and or Vivarium

.2 Deckmount

.3 Complete with vacuum breaker and serrated nozzle.

.4 ADA Compliant with ceramic cartridge.

.15 Flush Valves serving water closets and urinals

.1 Hands-free and exposed

.2 Flush valves must be hard wired. .

.3 Low flow water conservation type.

.16 Urinals

.1 All urinals shall be of the wall mounted type with automatic flush valves.

.2 Waterless urinals shall not be installed.

.3 All drainage piping must be PVC.

.4 To include individual isolation valves with metal handle at fixture.

.5 Urinals shall have cleanouts located above flood level of fixture if possible.

4.3 Valves

.1 General

.1 Conform to requirements of ANSI, ASTM, ASME, and applicable MSS standards.

.2 Isolation valves shall be provided on all Branch Piping and at individual fixtures and equipment connections.

.3 Wafer checks a minimum installation point of 8 to 10 pipe diameters downstream of pumps is recommended.

.4 Silent checks are not recommended for use with reciprocating pumps.

.5 Manufacturer

.1 Provide valves of same manufacturer throughout, where possible.

.2 Provide valves with manufacturer's name and pressure rating clearly marked on body (per MSS-SP-25).

.3 Product shall carry valid CRN (Canadian Registration Number) issued by respective Provinces.

.4 University of Guelph will only accept original manufactured products.

.5 For equipment that is supplied as a package with valves built in, preference is that these valves meet the following valve standards.

.2 General Design Specifications

.1 Valve Materials

.1 Bronze: to ASTM B62 (406F / 208C) or B61 (550F / 288C) as applicable

.2 Brass: to ASTM B283 C3770

.3 Cast Iron: to ASTM A126, Class B (353F / 178C) at 125 PSIG.

.4 Forge Steel: to ASTM A105N (800F / 427C)

.5 Cast Steel: to ASTM A216WCB (800F / 427C)

.2 Valve Markings

.1 All pressure ratings, manufacturers trademark and size to conform as per MSS SP-25.

.3 End Connections

.1 Threaded ends to: ASME B1.20.1

.2 Solder ends to: ASME B16.18

.3 Flanged ends to: ASME B16.1 (Class 125)

.4 Face to Face dimensions to: ASME B16.10

.5 Fanged ends to: ASME B16.5

.6 Butt Weld Ends to: ASME 16.25

.7 Socket Weld Ends to: ASME B.16.11

.4 Testing and Design

.1 MSS-SP-80 - Bronze, Gate & Check Valves.

.2 MSS-SP-110 - Ball Valves.

.3 MSS –SP-70, 85, 71 - Cast Iron Gate, Globe & Check Valve.

.4 MSS-SP-72 - American Valve

.5 MSS-SP-67 – Kitz, MAS, Butterfly Valves.

.6 API 602 – Forge Steel Valves (Design)

.7 API 598 – Cast Steel Valves, Forge Steel Valves (Testing)

.8 API 600 – Cast Steel Valves (Design)

.3 Hot and Cold Domestic Potable Water Service up to 200PSIG - (Certified NSF 372 – Lead Free – Valves)

.1 Ball valves (Isolation) – Up to 50MM (2”)

.1 Class 150, 600 psi (4140 kPa) CWP, ASTM C46750 forged Lead Free brass/bronze, two piece body, stainless steel ball and stem, full port, virgin PTFE seats, Double O Ring design, blow-out proof stem, locking lever handle with memory balancing stops, stem extensions for insulated piping.

- Kitz 869AMLL (Soldered) (Stem Ext Kitz 69SE), Nibco S-585-70-66-LF-LL (EL)
- Kitz 868AMLL (Threaded) (Stem Ext Kitz 68SE), Nibco T-585-70-66-LF-LL (EL)

.2 Hose Bibbs/Drain Hose Connections c/w Cap and Chain

.1 Class 150, 600 psi (4140 kPa) CWP, ASTM C46750 forged Lead Free brass/bronze, two piece body, stainless steel ball and stem, full port, virgin PTFE seats, Double O Ring design, blow-out proof stem, locking lever handle. Lead free brass Cap & Chain fitting to be purchased and installed in the valve.

- Kitz 869AMLL (Soldered), Nibco S-585-70-66-LF-LL
- Kitz 868AMLL (Threaded), Nibco T-585-70-66-LF-LL

.3 Check Valves (Backflow Prevention) – Up to 50MM (2”)

.1 860 KPA (125 psig), 200 WOG Rating, bronze body to ASTM C89530 (Lead Free Bronze), Y Pattern, swing, PTFE Seat.

- Kitz 823T (Soldered), Nibco S-413-Y-LF (PTFE Disc)
- Kitz 822T (Threaded), Nibco T-413-Y-LF (PTFE Disc)

.4 Strainers – Up to 50MM (2”)

.1 860kpa (125PSIG) / 200wog Rating, Lead free Bronze Body, Screwed Cap, Y-Pattern, 316 S.S. 20 mesh Screen

- Mueller Steam Specialty LF 358S (Soldered)
- Mueller Steam Specialty LF351 (Threaded)

OR

.2 Class 600, 1480 PSI, Stainless Steel ASTM A351 CF8M Body, Screwed Cover, 316 S.S Screen with 1/16 Perforation.

- Mueller Steam Specialty 581-SS (Threaded)

.5 Recirculation Low Lead Balancing Valves – Up to 20MM (3/4”)

.1 ASTM A351 CF8M Body Stainless steel construction. Valves to be order for required flow rate. All to be installed including ball isolation valve on upstream and downstream of flow valve

.2 Victaulic TS Series 76

.6 Ball Valves (Isolation) – 65MM (2 ½”) & Over

.7 2 1/2” TO 10” Class 125, 200 WOG, LEAD FREE Flanged Full Port Ball Valves, Cast Iron ASTM A126, epoxy coated, 316 S.S.Stem, PTFE Fused Ball, RPTFE seats, EPDM O-Ring packing, Tapped & plugged boss, Class B Body, for venting or draining downstream side, lever operated or gear operated.

.1 American Valve 4000 Ball Valves (Isolation) – 65MM (2 ½”) & Over

- Class 150 Stainless Steel A351 CF8M Body, SS Ball & Stem, PTFE packing, Hypatite (PFA/PTFE) seats, locking lever operated (Use gear operated for 6”, 8” & 10”)
  - Kitz 150UTDZM-N (Full Port), Nibco F-515-S6-F-66-FS
  - Kitz 150UTAZM-N (Reduced Port), Nibco F-510-S6-F-66-FS

.8 Butterfly Valves (Isolation and Balancing) – 65MM (2 ½”) and Over

.1 1380 KPA / 200WOG Rating. Butterfly valves shall be lugged type, Ductile iron body, with 2” extended neck to allow for insulation, Aluminum/Bronze disc with EPDM molded or bonded seat, stainless steel stem with top and bottom bushings of dissimilar material. Valve shall have bubble tight shut-off to 200PSI when downstream flange is removed (Full dead-end service). Valves 150MM (6”) and smaller shall have locking lever operator, valves 200MM (8”) and larger shall have locking Manual Gear operator. NSF 372 Certified.

- Kitz 6122 EL and Kitz 6122 EG, Nibco LD-2000-3 (Lever) and Nibco LD-2000-5 (Gear)

.9 Check Valves (Backflow Prevention) - 65mm (2 ½ “) & Over

.1 Class 150, Stainless Steel A351 CF8M Body, Bolted Cover, Trim #12, Graphite Gasket, Flanged.

- Kitz 150 UOAMB-GRF-12, Powell 1561-FM2G-GXX (Flanged)

.10 Wafer Checks – 65MM (2 ½”) & Over

.1 Class 150, 316 Stainless Steel Body A351 CF8M, 316 SS A351 CF8M Disk, Viton Seat.

- Single Flapper: Moygro W15A-66V, Uni-Chek 15A233000
- At a minimum, installation point of 8 to 10 pipe diameters downstream of pumps is recommended.

.11 Double Door Check Valve – 65MM (2 ½") & Over

.1 Class 150, 316 Stainless Steel Body A351 CF8M, 316 SS A351 CF8M Disk, Buna Seat.

- Mueller Steam Specialty 72HHH3H, Duo-Chek G15CVM-14

.12 Silent Check – 65MM (2 ½) & Over

.1 Class 150, 316 Stainless Steel Body A351 CF8M, 316 SS A351 CF8M disk & Seat, Spring Loaded Center Guided Disc.

- Mueller Steam Specialty 101MHT
- Mueller Steam Specialty 105MHT (Globe Style)

.13 Strainers – 65MM (2 ½) & Over

.1 Class 150, Stainless Steel Body, Bolted Cover, Y-Pattern, 316 S.S. Screen with 1/32 Perforation, Flanged.

- Mueller Steam Specialty 781-SS

.4 Heating and Cooling Valves up to 150PSIG (Closed Loop Treated Water)

.1 Gate Valves (Isolation) – Up to 50mm (2")

.1 860KPA (125psig) / 200 WOG Rating, Bronze Body to ASTM – B62 Solid Wedge Disc, Bronze Trim, Rising Stem.

- Kitz 44, Nibco S-111 (Soldered)
- Kitz 24, Nibco T-111 (Threaded)

.2 Globe Valves (Throttling) – Up to 50MM (2") – Lock Shields Available

.1 860KPA (125psig) / 200WOG Rating, Bronze Body to ASTM B62, Rising Stem, Composition Disc (Teflon)

- Kitz 10, Nibco S-235-Y (Soldered)
- Kitz 03, Nibco T-235-Y (Threaded)

.3 Check Valves (Backflow Prevention) – Up to 50MM (2")

.1 860KPA (125psig) / 200 WOG Rating, Bronze Body to ASTM B62, Bronze Trim, and Y Pattern.

- Y – Pattern Swing
- Kitz 23, Nibco S-413-B (Soldered)
- Kitz 22, Nibco T-413-B (Threaded)

.4 Spring Loaded Checks

- Kitz 26, Nibco S-480 (Soldered)
- Kitz 36, Nibco T-480(Threaded)

.5 Ball Valves (Isolation) – Up to 50MM (2")

.1 Class 150, 600 psi (4140 kPa) CWP, Brass Body ASTM 283 C37700, two piece body, stainless steel ball and stem, full port, virgin PTFE seats, Double O Ring design, blow-out proof stem, locking lever handle with memory balancing stops, stem extensions for insulated piping.

- Kitz 69AMLL (Stem Ext Kitz 69SE), Nibco S-585-70-66 (Bronze body)(EL) (Soldered)
- Kitz 68AMLL (Stem Ext Kitz 68SE), Nibco T-585-70-66 (Bronze body)(EL) (Threaded)

.6 Hose Bibbs/Drain Hose Connections c/w Cap and Chain

.1 Class 150, 600 psi (4140 kPa) CWP, Brass Body ASTM 283 C37700, two piece body, stainless steel ball and stem, full port, virgin PTFE seats, Double O Ring design, blow-out proof stem, locking lever handle. Brass Cap & Chain fitting to be purchased and installed in the valve.

- Kitz 69AMLL, Nibco S-585-70-66 (Bronze body) (Soldered)
- Kitz 68AMLL, Nibco T-585-70-66 (Bronze body) (Threaded)

.7 Strainers – Up to 50MM (2")

.1 860KPA (125psig) / 200 WOG Rating, Bronze Body to ASTM B62, Screwed Cap, Y-Pattern, 316 S.S Screen with 20 mesh Perforation.

- Mueller Steam Specialty 352 ½, Kitz 16 (Soldered)
- Mueller Steam Specialty 351M, Kitz 15 (Threaded)

OR

.2 Class 250 / 400 WOG Rating, Cast Iron Body, Screwed Cap, Y Pattern, 316 S.S Screen with 20 mesh Perforation.

.3 Mueller Steam Specialty 11M (Threaded)

.8 Gate Valves (Isolation) – 65MM (2 ½") & Over

.1 860KPA (125psig) /200WOG Rating, Cast Iron Body to ASTM A126 Class B, Bronze Trim, OS &Y, Flanged.

- Rising Stem Kitz 72, Nibco F-617-0

.9 Globes (Throttling) – 65MM (2 ½") & Over

.1 860KPA (125psig) / 200WOG Rating, Cast Iron Body to ASTM A126 Class B, Bronze Trim, OS & Y, Flanged.

- Kitz 76, Nibco F-718-B

.10 Checks (Backflow Prevention) – 65MM (2 ½") & Over

.1 860KPA (125psig) /200WOG Rating, Cast Iron Body to ASTM A126 Class B, Bronze Trim, Bolted Bonnet, Flanged.

- Kitz 78, Nibco F-918-B

.11 Wafer Checks – 65MM (2 ½") & Over

.1 Class 150, 316 Stainless Steel Body A351 CF8M, 316 SS A351 CF8M Disk, Viton Seat.

- Single Flapper: Moygro W15A-66V, Uni-Chek 15A233000

.12 Double Door Check Valve – 65MM (2 ½") & Over

.1 Class 150, 316 Stainless Steel Body A351 CF8M, 316 SS A351 CF8M Disk, Buna Seat.

- Mueller Steam Specialty 72HHH3H, Duo-Chek G15CVM-14

.13 Silent Check – 65MM (2 ½) & Over

.1 Class 150, 316 Stainless Steel Body A351 CF8M, 316 SS A351 CF8M disk & Seat, Spring Loaded Center Guided Disc.

- Mueller Steam Specialty 101MHT (Wafer),
- Mueller Steam Specialty 105MHT (Globe Style)

.14 Butterfly Valves (Isolation) – 65MM (2 ½") & Over

.1 1380 KPA / 200WOG Rating. Butterfly valves shall be lugged type, Ductile iron body, with 2" extended neck to allow for insulation, Aluminum/Bronze disc with EPDM molded or bonded seat, stainless steel stem with top and bottom bushings of dissimilar material. Valve shall have bubble tight shut-off to 200PSI when downstream flange is removed (Full dead-end service). Valves 150MM (6") and smaller shall have locking lever operator, valves 200MM (8") and larger shall have locking Manual Gear operator.

.2 Kitz 6122 EL and Kitz 6122 EG, Nibco LD-2000-3 (Lever) and LD-2000-5 (Gear)

.15 Ball Valves in Lieu of Gate Valves, & Retrofits

.1 Requires prior approval by the Manager, Mechanical Design, CPDD at the Schematic Design Stage when selecting Ball Valves in lieu of Gate Valves. 2 ½" to 10" Flanged, Ball valves 2 ½" to 10", Can be used in lieu of gate valves, with Cast Iron ASTM A126 CLASS B Body, epoxy coated to NSF 61. Rated for Class 125, 200 WOG, 316 S.S. stem, Teflon Fused Ball, RPTFE seats, seals, and packing. Full port up to 6", locking lever operated, or gear operated.

- American Valve #4000

.16 Strainers – 65MM (2 ½) & Over

.1 860KPA (125 psig) / 200 WOG Rating, Cast Iron Body to ASTM A126 Class B, Bolted Cover, Y-Pattern, 316 S.S. Screen with 1/32 Perforation, Flanged.

- Mueller Steam Specialty 758, Kitz 80

.5 Steam and Condensate Service up to 50PSI / 307F / 153C

.1 Gate Valve, (Isolation) – Up to 50mm (2")

.1 Class 800, Forge Steel A105N Body, OS & Y, Bolted Bonnet, ½ Stellite (Trim #8), Graphite Packing.

- Bonney Forge HL–11–T (Threaded), Bonney Forge HL–11-SW (Socket Weld)
- Beric 501-T-(X)-8-A-08 (Threaded), Beric 501-T-(X)-8-A-08 (Socket Weld)
- Powell GA08TA58GB (Threaded), Powell GA08SA58GB (Socket Weld)

.2 Globe Valves, (Throttling) – Up to 50mm (2")

.1 Class 800, Forge Steel A105N Body, OS &Y, Bolted Bonnet, ½ Stellite (Trim #8), Graphite Packing.

- Bonney Forge HL–31–T (Threaded), Bonney Forge HL–31-SW (Socket Weld)
- Beric 502-T-(X)-8-A-08 (Threaded), Beric 502-S-(X)-8-A-08 (Socket Weld)
- Powell GL08TA58GB (Threaded), Powell GL08SA58GB (Socket Weld)

.3 Check Valves, (Backflow Protection) – Up To 50mm (2")

.1 Class 800, Forge Steel A105N Body, Bolted Bonnet, ½ Stellite (Trim#8), and Graphite Gasket, Spring Loaded Piston Check for Vertical or horizontal use.

- Bonney Forge HL–41–T (Threaded), Bonney Forge HL–41–SW (Socket Weld)
- Beric 503-T-(X)-8-A-08 (Threaded), Beric 503-S-(X)-8-A-08 (Socket Weld)
- Powell PC08TA58GB (Threaded), Powell PC08SA58GB (Socket Weld)

.4 Strainers – Up to 50MM (2")

.1 860KPA (125psig) / 200WOG Rating, Bronze body, 316 S.S Screen with 20 mesh Perforation.

- Mueller Steam Specialty 11M (Cast Iron Class 250/ # 400WOG) (Threaded)

.5 Gate Valves (Isolation) – 65mm (2 ½") & Over

.1 Class 125 / 200WOG Rating, Cast Iron Body to ASTM A126 Class B, Bronze Trim, OS&Y, Flanged. Rising Stem ONLY.

- Kitz 72, Nibco F-617-0

.6 Globes (Throttling) – 65mm (2 ½") & Over

.1 Class 125 / 200WOG Rating, Cast Iron Body to ASTM A126 Class B, Bronze Trim, Rising Stem, OS&Y, Flanged.

- Kitz 76, Nibco F-718-B

.7 Checks (Backflow Prevention) – 65mm (2 ½") & Over

.1 860KPA (125psig) /200WOG Rating, Cast Iron Body to ASTM A126 Class B, Bronze Trim, Bolted Cover, Flanged.

- Kitz 78, Nibco F-918-B

.8 Strainers – 65mm (2 ½") & Over

.1 860KPA (125 psig) / 200 WOG Rating, Cast Iron Body to ASTM A126 Class B, Bolted Cover, Y-Pattern, 316 S.S. Screen with 1/32 Perforation, Flanged.

.2 Mueller Steam Specialty 758, Kitz 80

.6 Steam and Condensate Service up to 150PSI / 366F / 186C

.1 Gate Valve, (Isolation) – Up to 50mm (2")

.1 Class 800, Forge Steel A105N Body, OS & Y, Bolted Bonnet, ½ Stellite (Trim #8), Graphite Packing.

- Bonney Forge HL–11–T (Threaded), Bonney Forge HL–11-SW (Socket Weld)
- Beric 501-T-(X)-8-A-08 (Threaded), Beric 501-T-(X)-8-A-08 (Socket Weld)
- Powell GA08TA58GB (Threaded), Powell GA08SA58GB (Socket Weld)

.2 Globe Valves, (Throttling) – Up to 50mm (2”)

.1 Class 800, Forge Steel A105N Body, OS &Y, Bolted Bonnet, ½ Stellite (Trim #8), Graphite Packing.

- Bonney Forge HL–31–T (Threaded), Bonney Forge HL–31-SW (Socket Weld)
- Beric 502-T-(X)-8-A-08 (Threaded), Beric 502-S-(X)-8-A-08 (Socket Weld)
- Powell GL08TA58GB (Threaded), Powell GL08SA58GB (Socket Weld)

.3 Check Valves, (Backflow Protection) – Up To 50mm (2”)

.1 Class 800, Forge Steel A105N Body, Bolted Bonnet, ½ Stellite (Trim#8), and Graphite Gasket, Spring Loaded Piston Check for Vertical or horizontal use.

- Bonney Forge HL–41–T (Threaded), Bonney Forge HL–41–SW (Socket Weld)
- Beric 503-T-(X)-8-A-08 (Threaded), Beric 503-S-(X)-8-A-08 (Socket Weld)
- Powell PC08TA58GB (Threaded), Powell PC08SA58GB (Socket Weld)

.4 Strainers – Up To 50mm (2”)

.1 Class 600, 1480 PSI, Cast Steel ASTM A216WCB Body, Screwed Cover, 316 S.S Screen with 20 mesh Perforation.

- Mueller Steam Specialty 581 (Thread Ends), Mueller Steam Specialty 582 (Socket Weld)

.5 Gate Valves (Isolation) – 65mm (2 ½”) &Over

.1 Class 150, Carbon Steel A216 WCB Body, Bolted Bonnet, OS&Y, ½ Stellite (Trim#8), Graphite Packing.

- Kitz 150SCLS (Flanged)
- Beric 101-RF-AA08-H (Flanged)
- Powell 1503-FC8G-GXX (Flanged)

.6 Globe Valves (Throttling) – 65mm (2 ½”) &Over

.1 Class 150, Carbon Steel A216 WCB Body, Bolted Bonnet, OS&Y, ½ Stellite (Trim #8), Graphite Packing.

- Kitz 150 SCJS (Flanged)
- Beric 201-RF-EAO8-H (Flanged)
- Powell 1531-FC8G-GXX (Flanged)

.7 Check Valves (Backflow Prevention) – 65mm (2 ½ “) & Over

.1 Class 150, Carbon Steel A216 WCB Body, Bolted Cover, ½ Stellite (Trim#8), Graphite Gasket.

- Kitz 150 SCOS (Flanged)
- Beric 301-RF-EAO8-X (Flanged)
- Powell 1561-FC8G-GXX (Flanged)

.8 Wafer Checks – 65mm (2 ½ “) & Over

.1 Class 150, Carbon Steel body ASTM A216WCB, 316 S.S (ASTM A351 CF8M), Disc & Trim.

- Moygro W15A – C66 (Single Flapper)

.9 Double Door Check Valves – 65mm (2 ½ “) & Over

.1 Class 150, Carbon Steel body ASTM A216 WCB, 316 S.S Disk, Inconel 600 Spring, 316L Overlay seat.

- Mueller Steam Specialty 72-DHHVX, Powell 1570YMOXXXX

.10 Strainers – 65mm (2 ½”) & Over

.1 Class 150, Carbon Steel ASTM A216WCB Body, Bolted Cover, and Y-Pattern, 316 S.S. Screen with 1/32 Perforation, Flanged.

- Mueller Steam Specialty 781 CS

.7 Compressed Air

.1 Ball valves (Isolation) – Up to 50MM (2”)

.1 Class 150, 600 psi (4140 kPa) CWP, Brass Body ASTM 283 C37700, two piece body, stainless steel ball and stem, full port, virgin PTFE seats, Double O Ring design, blow-out proof stem, locking lever handle with memory balancing stops, stem extensions for insulated piping.

.2 Kitz 68AMLL, Nibco T-585-70-66(Bronze body) (Threaded)

.2 Ball valves (Isolation) – 65MM (2 ½”) & Over

.1 Flanged Ball Valves 2 ½” to 10”, with Cast Iron Body, Epoxy Coated to NSF 61. Class 125 / 200 WOG, Teflon Fused Ball, RPTFE Seats, Seals and Packing. Full Port up to 6”, Lever Handle, Flanged.

.2 American Valve #4000

OR

.3 Class 150, Carbon Steel A216WCB Body, S.S. Ball and Stem, RPTFE Packing and Gaskets, Lever Handle, Flanged.

- Kitz 150SCTDZM-N, Nibco F515-CS-R-66-FS (Full Port)
- Kitz 150SCTDM-N (Reduced Port), Nibco F-510-CS-R-66-FS (Reduced Port)

.3 Check Valves – Up to 50MM (2”)

.1 1034KPA (150PSIG) / 300WOG, Bronze Body to ASTM B62, Spring Loaded

- Kitz 36, Nibco T-480 (Threaded)

OR

.4 860KPA (125PSIG) / 200WOG, Bronze Body to ASTM B62, PTFE seat, Y Pattern Swing type.

.1 Kitz 22T (Threaded), Nibco T413Y

.8 CGA Ball Valves – Lab Gases Refer to Design & Construction Standards – Mechanical Laboratory and or Vivarium

.1 Up to 50mm (2")

.1 Class 150, 600 psi (4140 kPa) CWP, Brass Body ASTM 283 C37700, two piece body, stainless steel ball and stem, full port, virgin PTFE seats, Double O Ring design, blow-out proof stem, locking lever handle with memory balancing stops, stem extensions for insulated piping.

.2 Kitz 68AMLL (Threaded)

.2 65mm (2 ½") & Over

.1 Class 150, Carbon Steel A216WCB Body, S.S. Ball and Stem, RPTFE Packing and Gaskets, Locking Lever and or Gear. Flanged.

- Kitz 150SCTDZM-N (Full Port), Kitz 150SCTAZM-N (Reduced Port)

4.4 Domestic Water Heat Systems – Requirements

.1 General

.1 Provide two (2) semi-Instantaneous Type Steam to Hot Water Heaters, each sized to satisfy 100%of the Peak Demand.

.2 Heat pumps shall be considered for small applications, need approval from mechanical and energy design managers.

.3 Instantaneous type water heaters are not permitted.

.4 A complete Water Heater Skid package, rated to heat of water from 40°F to 140°F (40°F to 120°F is also possible on a case by case basis for downstream requirements) , and control the domestic fixture outlet temperature to within +/- 4°F of the selected temperature when supplied with low pressure 15PSIG saturated steam before the control valve.

.5 Due to overhead clearance restrictions, each heater shall be capable of being disassembled in place, for maintenance and inspection purposes, without having to remove the shell from the domestic water piping. The heater's support shall provide ample clearance for tube bundle removal. A full diameter threaded tube sheet shall be provided to allow for inspection and maintenance while the shell remains under pressure.

.6 Each package shall consist of the following components, completely factory assembled ready for connection to services:

.1 Water heater with vertical support

.2 Visible metal plate stamped with CRN (Canadian Registration Number), model number and serial number.

.3 Bronze ASME rated pressure and temperature relief valve set at 150 psig and 210°F.

.4 Bronze circulator pump pre-wired with pilot lighted ON/OFF switch operating at 60/1/115V. The purpose of this pump is to prevent scale build-up in the unit shell. Recirc. System to be S.S. or bronze elbow.

.5 Double solenoid temperature limit system.

.6 Insulation in accordance with the current ASHRAE standards. Flexible foam insulation laminated to a durable, reinforced PVC jacket.

.7 Mechanical actuated steam control valve. 150# cast steel body with stainless steel trim. Mounted with an air-to-pen pneumatic actuator and Siemens PS2 Sipart SMART electro-pneumatic valve positioner to accept 4-20 mA signal. Size determined by manufacturer based on the heating requirements.

.8 Main control panel to be removed from skid as all sensors to be controlled from BAS.

.9 RTD temperature sensor.

.10 Domestic water thermometer direct mounted with separable S.S. thermowell

.11 Steam pressure gauge with shut-off cock.

.12 Float & thermostatic steam trap assembly c/w cast iron Y strainer and steam rated isolation ball valve. Size determined by manufacturer based on the heating requirements.

.13 Bronze vacuum breaker.

.2 Materials of Construction

.1 Shell – 90/10 Copper Nickel or304L, ASME certified for 155 psig working pressure

.2 Tubes – 90/10 Copper-Nickel, double Wall

.3 Tubesheet – Solid Copper Allow

.4 Baffles – Teflon

.5 Shell Connections – Solid Copper Alloy

.6 Solenoid valves to be S.S. construction

.7 Integrated Recirc. System to be S.S.

.8 All thermostat well to be S.S.

.3 Warranty

.1 The heater manufacturer shall warranty all components and workmanship for one year from date of start-up. The following components are to carry an extended, unconditional, non-prorated warranty, which shall be included as part of the submittal:

.1 Tube Bundle – The entire tube bundle assembly, from the steam inlet to the condensate outlet, shall be guaranteed for 10 years against failure from thermal shock, mechanical failure or erosion.

.2 Pressure Vessel – 20 year warranty against leakage.

.3 Anticipator Temperature Control – 20 year warranty against any failure.

4.5 Grease Interceptors

.1 General

.1 To be stainless steel or fiber reinforced plastic construction.

.2 To include vent and isolation valves on inlet and outlet.

.3 Must be accessible for cleaning at floor level.

4.6 Eyewash

.1 General

.1 To be plastic or stainless bowl and single dispenser.

.2 Use combo unit shower / eye wash stations when a space requires both.

.3 Shower – Push lever or pull rod. Include lamacoid on wall reading "SAFETY STATION")

4.7 Flash Tanks

.1 General

.1 Subject to the approval by the Manager, Mechanical Design, CPDD, higher pressure flash tanks to be connected to low pressure steam line to capture flashed steam whenever feasible.

4.8 Condensate Receiver

.1 General

.1 Install in accessible location.

.2 Tank to be constructed with factory coated metal for corrosion resistance

.3 Must include additional BAS high level alarm sensor connection.

.4 To include duel parallel pumps.

4.9 Drinking Fountains

.1 General

.1 Shall be barrier free, and

.2 Of the "Refrigerated Type", and

.3 Equipped with Bottle-Filler c/w totalizers.

.4 Non-filtered combo bottle filling drinking fountain style.

.5 Ensure unit is accessible for ease of maintenance. Use of access panels acceptable.

.6 Equipped with tamperproof fasteners and stainless steel surfaces.

.7 Water supply shall incorporate a separate isolation valve to enable filter replacement.

.8 Elkay Model University Standard. Confirm on a project-by-project basis that the standard remains up to date.

4.10 Safety Relief Valves

.1 General

.1 Install where easily accessible without removal of other equipment or components.

4.11 Preferred Vendors

Equipment/System	Proposed Vendor
Sinks & Lavatories	Novanni
	American Standard
	Kindred
	Kohler
	Franke
Flush Valves & Faucets	Delta Commercial
	Sloan
	Moen
Eyewash & Emergency Showers	HAWS
Backflow Preventers	Conbraco
	Zurn
Vacuum Breakers - Hose Connection	A.W. Cash Valve
	Watts
	Zurn
Vacuum Breakers - Lab Faucets	Conbraco
	Zurn
	Watts
Temperature Mixing Valves	Armstrong
	Bradley Navigator
Domestic Water System Valves	Nibco
	Kitz
Floor Drains	Zurn
	Jay R Smith
	Watts
	OS&B
	Mifab
Trap Seal Primers	Zurn
	Mifab
Incoming Water Meter	Endress + Hauser
	Emerson Rosemount
	Spirax Sarco
Pipe Hangers	Myatt
	Taylor
	Johns Manville

Equipment/System	Proposed Vendor
Miscellaneous / Special Systems	
Insulation	Johns Manville
	Knauf Fiberglass
	Owens Corning
	Apex
Preferred Insulating Contractors	Fibercon
	True North
	Apex
Preferred Balancing Contractors	Air Audit
	Dynamic
	Airwaso

5 Labelling

5.1 General

.1 Identification and labeling shall follow the University Standard.

.2 Equipment numbers are to be provided by the University's PM Scheduler.

.3 Equipment numbering strategy shall be presented for review / approval by the Manager, Mechanical Design, CPDD and Manager, Maintenance & Energy Services prior to completion of Design Development.

.4 After completion of insulation and / or painting, all piping shall be identified to show the service and direction of flow as described below.

.5 Additional requirements may apply to pipe identification within the Central Utility Plant (building 55), Generator Building (building 56), and service tunnels.

.6 Lamacoid nameplates identifying non-potable water sources are required at each source unless the entire room is served by non-potable water in which case labels on both sides of the doors to the room is acceptable.

5.2 Applicable Codes and Standards

.1 CSA Standard B53 – Identification of Piping Systems

.2 CSA B149.1, Natural Gas and Propane Installation Code.

.3 Liquid Fuels Handling Code by Technical Standards and Safety Authority (TSSA)

.4 ANSI/ASME A13.1-2007 – Scheme Standards for the Identification of Piping Systems

.5 NFPA 99/CGA C-9 Standards for Medical Gas and Vacuum Systems.

.6 CAN/CSA Z305.1.92 – Standards for non-flammable medical gas piping systems and CGSB standard 1-GP-12 for colour coding

.7 Fire protection: Sprinklers in accordance with NFPA 13. Standpipes in accordance with NFPA 14

.8 CAN/CGSB-24.3-12 - Standard for Pipe Identification.

.9 R.R.O. 1990, Reg. 860 - Workplace Hazardous Materials Information System (WHMIS), under the Occupational Health and Safety Act.

.10 CSA C22.2 No. 130. Standards for heating cables and piping.

5.3 Label Placement

.1 The entire piping system is to be identified, including piping located in ceiling spaces, interstitial spaces, or within pipe chases.

.2 Pipe identification is required:

.1 At every point of entry or exit to a space, on both sides of where the pipe penetrates a wall, floor, service column or enclosure, change in direction;

.2 At every access door

.3 Within 3 ft. (1 m) of pipe termination points

.1 Within 3 ft. (1 m) of valve assemblies or individual valves

.2 Within 3 ft. (1 m) of branching off (or connecting to) a distribution header

.3 At least every 20 ft. (6 m) along pipe lengths.

.4 Pipe identification shall be visible from point of normal approach.

.5 Pipe identification shall be applied to clean, dry surfaces only and installed according to manufacturer's instructions.

5.4 Label Configuration

.1 Pipe identification shall consist of a label identifying the piping system contents, along with directional arrows indicating the flow direction and University of Guelph's standard system designations.

.2 Flow direction arrows shall be located at a minimum of one end of the pipe identification label.

.3 Pipe or duct label shall be properly orientated so wording of the pipe clear and free of interferences.

.4 Electrically traced piping shall have additional identification label indicating "Electric Traced" on the outside of the thermal insulation.

.5 Nylon cable ties shall be used to secure pipe identification labels at both ends

.6 Piping installed indoors shall be identified using labels/ markers meeting either Option B, C, E or F requirements defined in Section 6 below. Option A to be used with the approval of the mechanical manager prior to the design or installation of any work.

.7 Piping installed outdoors (above grade) shall be identified using labels meeting Option B, C, D, E or F requirements defined in Section 6 below.

.8 Piping installed underground shall be identified with marking tape as outlined in Option C for locating buried services in addition to eliminating potential hazards of excavating in unmarked areas. For best detectability and protection during excavation, tape should be fully buried and installed as close to the surface as possible, no less than 3 feet above the service.

5.5 Label Size

.1 Pipe identification and flow direction markers shall be appropriately sized to match the outer diameter of the finished pipe installation.

.2 Label length and minimum text height shall be determined based on outside diameter of the finished pipe installation as follows:

Outside Pipe Diameter Including Covering	Minimum Length* of Label Field Colour	Minimum Text Height
3/4” – 1-1/4”	8”	1/2”
1-1/2” – 2”	8”	3/4”
2-1/2” – 6”	12”	1-1/4”
8” – 10”	24”	2-1/2”
Over 10”	32”	3-1/2”

5.6 Materials

.1 Option A – adhesive type

.1 Only to be used with the approval of the mechanical manager prior to the design or installation of any work. Not preferred.

.2 Non-customized pressure sensitive adhesive label and banding tape:

.1 minimum 6 mm thick vinyl or polyester with pressure sensitive acrylic adhesive backing; silk-screened with vinyl ink.

.2 label printed with applicable abbreviation from Section 7 below.

.3 label and text color as defined in Section 7 below.

.4 banding tape with directional flow arrows placed at a minimum one end of the pipe. Label and wrapped 360° around outside diameter. or include arrows directly on the label

.5 banding tape colors to match label color scheme.

.6 standard of acceptance:

- Brady
- Seton
- SMS Smillie McAdams Summerlin

.2 Option B – semi-rigid plastic vinyl. (Preferred type of labelling by University.)

.1 semi-rigid plastic vinyl label with ultraviolet ink surface printing, printed with applicable abbreviation from Section 7 below;

.2 label printed with applicable abbreviation from Section 7 below;

.3 label and text color as defined in Section 7 below;

.4 piping up to 6” OD: coiled vinyl wrapped to snap around pipe and provide 360° visibility;

.5 piping larger than 6” OD: flat vinyl tied down with 36” long nylon cable ties

.6 standard of acceptance:

.1 Brady

.2 Dura Label

.3 Seton

.4 SMS Smillie McAdams Summerlin

.3 Option C – Ductwork Stencil

.1 To be used on ductwork supply and return trunk mains.

.2 No less than one stencil per room or at least every 20’

.3 To be added to each main upon entering room.

.4 No less than 6” or greater than 1’ sized black lettering

.4 Option D – Underground Marking Tape

.1 Non-detectable 4mm thick low density polyethylene.

.2 Detectable has 35 gauge aluminum core encased by a protective plastic jacket.

.3 Organic pigmented lead free black ink.

.4 Install one (1) meter above underground pipe or service

.5 Option E – Medical Gas & Specialty Pipe Markers

.1 6mm thick (+/- 0.05mm soft vinyl

.2 Pressure sensitive acrylic adhesive

.3 Silk screened ¾” high lettering

.6 Option F –Valve Tags

.1 Exterior Valve Tag

.1 Material

- 0.025” thick yellow brass
- Round: 1 1/2” diameter
- Hole for chain installation

.2 Lettering

- 3/8” high
- Black filled
- Can include identifier on top line

.2 Interior Valve Tag

.1 Material

- square, 1/16” thick lamacoid plastic hole for chain installation

.2 Lettering

- 3/8” engraved lettering
- Two (2) contrasting letters, yellow with black lettering
- 3/8” engraved lettering

.7 Ceiling Dot Labeling

.1 Applies to all ceiling panels. Place on ceiling support grid closest to equipment.

- Red Dot - Fire Damper
- Blue Dot - Heating & Cooling (coil, valves, etc)
- Yellow Dot - VAV
- Green Dot - Potable & Non-Potable Water

.1 Lamacoids

.1 Label all fixtures within lab spaces and mechanical rooms.

.2 Potable to use "Potable Water" 4" x 6" Green lamacoid with 1" white lettering

- Non-potable to use "Non-potable. Do not Drink." 4" x 6" Red lamacoid with 1" white lettering.

5.7 Label Legend

.1 Avoid using custom made labeling. Labelling must meet the legend below or receive approval of the Manager, Mechanical Design, CPDD for any deviations.

Label Abbreviation	System, Pipe Contents	Label Colors (Text - Background)
	Piping	
ACETYLENE	Acetylene	Black - Yellow
ACID	Acid	Black - Yellow
BIOHAZARD VENT	Biohazard Vent	Black - Yellow
BIOHAZARD WASTE	Biohazard Waste	Black - Yellow
BLOW-OFF	Blow-Off	Black - Yellow
BOILER BLOWDOWN	Boiler Blowdown	Black - Yellow
BOILER FEED WATER	Boiler Feed Water	Black - Yellow
CHEMICAL FEED	Chemical Feed	Black - Yellow
CHILLED WTR. RET.	Chilled Water return	White - Green
CHILLED WTR. SUP.	Chilled Water Supply	White - Green
COMPRESSED AIR (XXX PSI)*	Compressed Air	Black - Yellow
COMPRESSOR VENT	Compressor Vent	White - Green
CONDENSATE	Condensate	Black – Yellow
COOLING TOWER RET.	Cooling Tower Return	White – Green
COOLING TOWER SUP.	Cooling Tower Supply	White – Green
DEIONIZED WATER	Deionized Water	White – Green
DISTILLED WATER	Distilled Water	White – Green
DIESEL FUEL RETURN	Diesel Fuel Return	Black - Yellow
DIESEL FUEL SUPPLY	Diesel Fuel Supply	Black - Yellow
DISTRICT HTG. RET.	District Heating Return	Black - Yellow
DISTRICT HTG. SUP.	District Heating Supply	Black - Yellow
DUAL TEMP. RET.	Dual Temperature Return	Black - Yellow
DUAL TEMP. SUP.	Dual Temperature Supply	Black - Yellow
EXHAUST / EXH.	Exhaust Air	Black - Yellow

Label Abbreviation	System, Pipe Contents	Label Colors (Text - Background)
	Piping	
FIRE PROT. WATER	Fire Protection Water	White - Red
FIRE STANDPIPE	Fire Standpipe	White - Red
FIRE	Fire Suppression Water	White - Red
FIRE (DRY)	Fire Suppression (Dry Pipe)	White - Red
FIRE (insert gas/ chemical type)*	Fire Suppression (Gas or Chemical)	White - Red
FUEL OIL RETURN / F.O.R.	Fuel Oil Return	Black - Yellow
FUEL OIL SUPPLY / F.O.S.	Fuel Oil Supply	Black - Yellow
FUEL OIL VENT / F.O.V.	Fuel Oil Vent	Black - Yellow
GAS VENT	Gas Vent	Black - Yellow
GLYCOL HTG. RET. / GLY.H.R.	Glycol Heating Return	Black - Yellow
GLYCOL HTG. SUP. / GLY.H.S.	Glycol Heating Supply	Black - Yellow
GLYCOL MAKE-UP / GLY.FILL.	Glycol Make-up (confirm)	Black - Yellow
HEAT RECLAIM RET.	Heat Reclaim Return	Black - Yellow
HEAT RECLAIM SUP.	Heat Reclaim Supply	Black - Yellow
HEATING WTR. RET.	Heating Water Return	Black - Yellow
HEATING WTR. SUP.	Heating Water Supply	Black - Yellow
HIGH PRESS. COND.	High Pressure Condensate	Black - Yellow
HIGH PRESS. STEAM	High Pressure Steam (≥125psi)	Black - Yellow
LOW PRESS. COND.	Low Pressure Condensate	Black - Yellow
LOW PRESS. STEAM	Low Pressure Steam (≤15psi)	Black - Yellow
LAB VACUUM	Lab Vacuum	White - Green
MED. PRESS. COND.	Medium Pressure Condensate	Black - Yellow

Label Abbreviation	System, Pipe Contents	Label Colors (Text - Background)
	Piping	
MED. PRESS. STEAM	Medium Pressure Steam (>15psi,<125psi)	Black - Yellow
MAKE-UP WATER	Make-up Water	Black - Yellow
NATURAL GAS	Natural Gas (all piping painted yellow)	Black - Yellow
PUMPED CONDENSATE / P.COND.	Pumped Condensate	Black - Yellow
REFRIG. LIQUID / R.L.	Refrigerant Liquid	Black - Yellow
REFRIG. SUCTION / R.S.	Refrigerant Suction	Black - Yellow
REHEAT WATER RETURN	Reheat Water Return	Black - Yellow
REHEAT WATER SUPPLY	Reheat Water Supply	Black - Yellow
SPRINKLER WATER / SPR.W.	Sprinkler Water	White - Red
VACUUM	Vacuum	White - Blue
VENT	Vent (non-plumbing)	Black - Yellow
	Plumbing	
CAPTURED RAIN WATER	Captured Rain Water	White - Green
DOM. H.W. RECIRC./ D.H.W.R.	Domestic Hot Water Recirculation	White - Green
DOM. H.W. SUPPLY / D.H.W.S.	Domestic Hot Water Supply	White - Green
DOM. COLD WATER / D.C.W.	Domestic Cold Water	White - Green
DOM. HOT WATER / D.H.W.	Domestic Hot Water	White - Green
DRAIN	Drain	White - Green
GREY WATER	Grey Water	White - Green
NON POT ANIMAL CW	Non Potable Animal Water	White - Green
NON POTABLE COLD WTR.	Non Potable Cold Water	White - Green
NON POT H.W. RECIR.	Non Potable Hot Water Recirculation	White - Green
NON POT HOT WTR.	Non Potable Hot Water	White - Green
POTABLE WATER	Potable Water	White - Green
POT CW	Potable Cold Water	White - Green
POT HW	Potable Hot Water	White - Green
POT HWR	Potable Hot Water Recirculation	White - Green
PROTECTED POT CW	Protected Potable Cold Water	White - Green
PROTECTED POT HW	Protected Potable Hot Water	White - Green
PROTECTED POT HWR	Protected Potable Hot Water Recirculation	White - Green
R W L	Rain Water Leader	White - Green
RAW WATER	Raw Water	White - Green
SANITARY DRAIN / SAN.	Sanitary Drain	White - Green
STORM DRAIN / STM.	Storm Water Drain	White - Green
TEMPERED WATER	Potable Tempered Dom. Water - Safety Eqpt	White - Green
VACUUM	Vacuum	White – Green
VENT	Sanitary Vent	Black - Yellow
	Medical Gas	
ARGON	Argon	Black - White
CARBON DIOXIDE	Carbon Dioxide	Black - Yellow
HELIUM	Helium	White - Brown
MEDICAL AIR	Medical Air	White - Black
MED VAC	Medical Vacuum	Black - Yellow
NITROGEN	Nitrogen	White - Black
NITRUOUS OXIDE	Nitrous Oxide	White - Blue
OXYGEN	Oxygen	White - Green

*Include operating pressure
**Include chemical type

6 Pressure Piping Tssa Registration

6.1 General

.1 All pressure piping systems shall conform to the requirements, regulations, and standards of the City of Guelph, Ontario Building Code, Technical Standards & Safety Authority (TSSA), and any other local authority having jurisdiction.

.2 Pressure piping systems are subject to inspection by the TSSA.

.3 Fittings are to have Canadian Registration Numbers (CRN).

.4 Contractors working on pressure piping systems are responsible for registering the piping system with the TSSA, and obtaining TSSA approval of the final installation.

.5 Contractors performing registered pressure piping work are required to be licensed by TSSA.

.6 All manufacturers and installers of pressure piping parts and systems must hold a valid Certificate of Authorization for piping from TSSA.

.7 Welding/brazing procedures and welders/brazers are to be approved by the TSSA, Boilers and Pressure Vessels Safety Program.

6.2 Campus CRN Number

.1 The University has obtained a CRN# for pressure piping systems on campus: CRN#: P38014

.2 This CRN# currently covers high pressure steam and compressed air systems built to the design criteria provided below. This scope will increase as piping systems with different design criteria are registered with the TSSA as amendments to the campus CRN#.

.3 The campus CRN# covers the piping system only and does not include registration of boilers, pressure vessels, and fittings required under the TSSA Act 2000, Boilers and Pressure Vessels Regulations.

.4 The design criteria (materials of construction, test pressures, etc.) for the currently approved piping systems are provided in the following sections.

.5 .Whenever possible, piping systems shall be constructed to the same design criteria approved as part of the campus CRN#.

.6 New work which adheres to the approved design criteria is subject to inspection by the TSSA.

.7 New work which differs from the approved design criteria must be submitted, in advance, to the TSSA for approval. Specifications are required to be approved by Physical Resources (CPDD, Mechanical) prior to submission to the TSSA.

.8 Contractors submitting piping designs to the TSSA for approval should request they be approved as an amendment to the campus CRN# identified above.

.9 Following TSSA approval of a pressure piping system, the Contractor shall submit to Physical Resources (CPDD, Mechanical) a copy of such approval along with any related supporting documentation. These documents shall be submitted in both hardcopy and electronic (searchable pdf) format.

.10 Physical Resources (CPDD, Mechanical) shall update this document as necessary following approval of a pressure piping system by the TSSA under the campus CRN#.

6.3 High Pressure Steam Piping Systems

.1 The following materials and methods have been approved as part of the CRN number referenced in section 6.2 above.

High Pressure Steam		
Design Pressure		200 psi @ 388°F
Operating Pressure		150 psi @ 366°F
Safety Relief Valve		165 psi
Hydrostatic Test Pressure (option 1) (1.5 x Design Pressure)		300 psi
Pneumatic Test Pressure (option 2) (1.2 x Design Pressure)		240 psi
Design Stan-dard		ASME 831.1
Pipe Spec	**NPS up to 2"**	**NPS greater or equal to 2-½ "**
Material	ASTM A106 SCH80, Seam-less	ASTM A53 Grade B SCH40, ERW
Pipe Jointing		
Threaded	Class #300 to ANSI 816.3	-
Socket Weld	ANSI B16.11 (300#)	-
Butt Weld	ANSI 816.9	ANSI 816.9
Flanged	-	Class 300 to ANSI B16.5
Components	All components for HPS system are rated for 300# All components for HPS system to have CRN numbers	

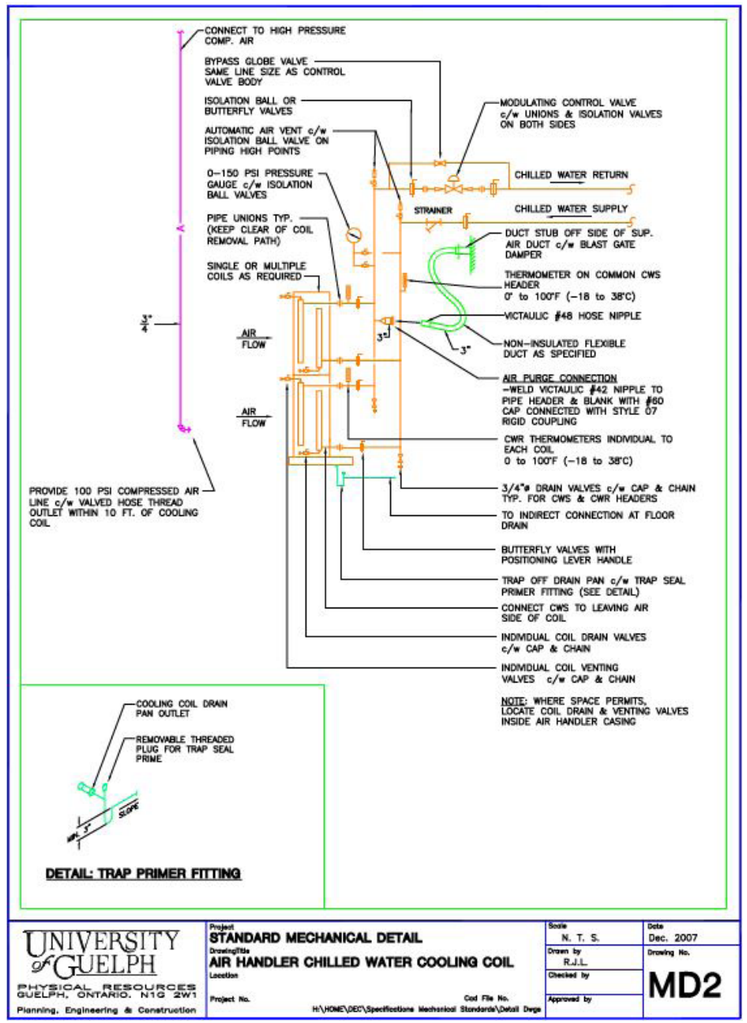
6.4 Compressed Air Piping Systems (Steel/Copper)

.1 The following materials and methods have been approved as part of the CRN number referenced in section 6.2 above.

Compressed Air		
Design Pressure		150 psi @ 70°F
Operating Pressure		100 psi @ 70°F
Safety Relief Valve		125 psi
Hydrostatic Test Pressure (1.5 x Design Pressure)		225 psi
Pneumatic Test Pressure (preferred) (1.2 x Design Pressure)		180 psi
Design Standard		ASME 1331.1
Pipe Spec	**NPS up to 2"**	**NPS greater or equal to 2-½ "**
Steel Pipe	ASTM A106 Grade B SCH40,Material Seamless-Welded	ASTM A53 Grade B SCH40, ERW
Copper	ASTM B88M Type L,K Drawn	ASTM A53 Grade B SCH40, ERW
Pipe Jointing		
Threaded	Class #150 to ANSI B16.3	-
Socket Weld	ANSI 1316.11	ANSI 1316.11
Butt Weld	ANSI 816.9	ANSI B16.9
Copper fittings	ASTM B16.26, cast bronze	
Joints	Brazed	
Components	All components for HPS system are rated for 300# All components for HPS system to have CRN numbers	

7 Details

7.1 Air Handler Chilled Water Cooling Coil (Required for each coil)



8 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Mechanical

HVAC Systems

1 Introduction

1.1 General

.1 This HVAC Systems Design Standard has been developed to establish the University's minimum expectations and requirements for new HVAC Systems installed on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

.3 This document is to be used in conjunction with the "DSM Plumbing Systems" standards.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new HVAC installation within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing HVAC infrastructure

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Mechanical Design, CPDD before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The Design Engineer of Record remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Mechanical Design, CPDD, together with proposed measures for addressing the conflict before the completion of schematic design

.3 The Design Engineer of Record is responsible for ensuring designs account for all affected systems including concealed conditions. With prior approval of the University, destructive testing may be required to confirm conditions.

.4 The Design Engineer of Record is responsible for coordinating specific user requirements from all stakeholders including but not limited to University staff, management, and users of the affected space(s).

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovation shall be tabled for consideration by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design.

1.5 Reference Documents

.1 Ontario Building Code

.2 Ontario Ministry of the Environment (Air Quality & Noise Guidelines)

.3 OHSA Standards

.4 CSA Standards

.5 Zero Carbon Buildings, ZCB

.6 ASHRAE Standards

.7 SMACNA Standards

.8 Public Health Agency of Canada - Laboratory Biosafety Guidelines

.9 Canadian Council for Animal Care

.10 LEED Certification – Measurement & Verification

.11 Mechanical Plumbing Systems Standard DSM-02*

.12 Building Automation Systems Standard DSM-03*

.13 Electrical Power Systems Standard DSE-01*

.14 Architectural Space Planning & Finishes Standard DSA-01*

.15 Campus Site Service Schematics

.16 University's Identification Standard*

.17 Campus Steam and Condensate System Piping Schematic

.18 Campus Chilled Water System Piping Schematic

*A copy of these standards is available on University of Guelph Physical Resources web page.

2 Design Standards for Services

2.1 General

.1 Registered Pressure Piping System

.1 All pressure piping systems requiring registration with the Technical Standards and Safety Authority (TSSA) shall be constructed and registered under the University's current P-Number by extending the scope of the existing registration.

.2 Identification

.1 All Equipment and Piping Systems shall be identified in accordance with the University's Identification Standards and numbering convention. Equipment numbers are to be provided by the University's PM Scheduler.

.3 Outdoor Design Conditions

Parameter	Winter	Summer
Dry Bulb	- 21 ^{0}C	29 ^{0}C
Wet Bulb		23 ^{0}C

.4 Indoor Design Conditions

.1 The Indoor Design Conditions tabulated below apply to all air-conditioned spaces within a facility.

Parameter	Winter	Summer
Dry Bulb	22 ^{0}C ± 1 ^{0}C	24 ^{0}C ± 1 ^{0}C
Relative Humidity	20-30%	50% - 60%

.2 Indoor Design Conditions for spaces that are "naturally ventilated" and/or "only heated" shall be determined to suit the application. In such instances the chosen Indoor Design Conditions shall be tabled for consideration by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design.

.1 Ensure that a minimum deadband of 2°C is provided between the heating and cooling setpoints.

.3 Considerations shall be given to the provision of pressurized vestibules at the entry from conditioned to unconditioned, naturally ventilated or heated only spaces to guard against infiltration into the conditioned spaces.

.5 Unused Infrastructure

.1 All unused ductwork, piping and equipment shall be fully removed with purpose made end connection.

.2 Equipment rendered obsolete due to the project shall be removed. Services rendered obsolete shall be cut back to the source unless otherwise approved by owner.

.6 Exposed moving parts, such as belt drives, fan blades, and similar components that could cause injury through accidental contact, shall be properly guarded.

.7 Equipment access shall be in accordance with OHSA.

.8 Serviceable equipment and components shall not exceed 3m (10ft) above the finished floor.

.9 Provide pedestrian waterproof traffic topping system over entire mechanical room floor including over housekeeping pads under air handling units, for the new construction.

2.2 Ventilation Systems

.1 Air Systems serving Office Areas, Classrooms, Corridors or other General Occupancies shall be separate from those serving Lab Spaces. Exceptions include:

.1 Offices directly attached to or located within a larger Lab Space.

.2 Air Systems serving Office Areas, Classrooms, Corridors or other General Occupancies shall be designed as Variable Air Volume Systems,

.2 Space Noise Criteria shall be based on the current ASHRAE Handbook – HVAC Applications. Refer to the design guidelines provided for HVAC-related background sound in rooms.

.1 Engineered Silencers shall be provided within the main supply, return and exhaust air ductwork and/or at terminal units to achieve the specified NC Limits

.2 Use of internally lined ductwork is not permitted except in the case of Transfer Air Ducts less than 2 meters in length and VAV supplier manufactured attenuator. All lining to be constructed with fully sealed edges.

.3 All Supply and Exhaust fans sized beyond 1HP shall be controlled using Variable Frequency Drives.

.4 100% Outdoor Air systems shall be complete with Heat Recovery system.

.5 Considerations shall be given for the provisioning of Heat Recovery Systems on all ventilation and exhaust systems. A Cost-Benefit Analysis shall be presented for review by the Manager, Mechanical Design, Manager, Energy Engineering,CPDD, as a part of the Schematic Design. Demand control ventilation systems shall also be considered, the type depending on the space.

.6 Wrap all supply ductwork using exterior fiberglass insulation where required. All seams to be fully sealed. Include white PVC jacket, or zero permeability, all-weather, multi-layered, reinforced laminate coated with an aggressive cold weather acrylic adhesive in exposed finished areas. Include wrapping all valves, strainers and fittings.

2.3 Steam System

.1 General

.1 Steam supplied from the Central Utility Plant (CUP) shall be the primary source of heat to the Building. Heating within the Building including its Air Systems shall be based on the use of Hydronic Distribution Systems

.1 Steam Supply Pressure from the CUP to Building:

- Design 150 PSI / Operating 125 PSI (1034 kPa / 862 kPa)
- Incoming steam to be extended from the campus mains, include isolation valve.
- Incoming steam supply to be metered in accordance with the University's Metering Standard. Meter to be integrated into the Schneider ION Utility Metering and Management System.

.2 Design Steam Distribution Pressure within the Building – Design for 10PSI (68.9 kPa).

.3 1/3, 2/3 arrangement for all Steam Pressure Regulating Valves. 1/3 set to 13PSI, 2/3 set to 11PSI. Ensure valves are tagged noting final pressures.

.4 Pressure Regulating Valves shall be Pilot-Operated

.5 Consideration shall be given for wireless monitoring of steam traps with prior approval by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design.

.2 Existing Building

.1 Modify existing Heating Systems to suit new Work. Maintain the design criteria followed for the existing installation.

.3 Material

.1 All steam piping systems shall be constructed out of schedule 40 steel for steam and schedule 80 for condensate. Insulate all piping using fiberglass with a thermal performance not to exceed 0.033 W/m2·°C @ 24°C. Include PVC jacket in exposed finished areas. Include wrapping all valves, strainers and fittings.

.2 To include for expansion joints.

.3 Welded or flanged construction for 2.5" and above.

.4 Threaded construction for < 2.5".

.5 Direct buried/trenched pipe to be insulated with waterproof-ridged cellular glass insulation and to include identification marker 1 meter above pipe. Direct buried must have prior approval by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design. Make all efforts to avoid direct buried piping.

.6 For buried within a chamber or tunnel, shall include fiberglass insulation, new side or top mounted hangers, and be of welded construction.

.7 New chamber constructed to be fully waterproof.

2.4 Condensate System

.1 General

.1 Condensate shall be returned to the CUP via condensate return line.

.2 Preference to be given to capturing flash from flash tank into low pressure steam supply.

.3 Condensate tank shall be vented to atmosphere. Back pressure for condensate pumps to be 207kPa (30PSI) (50PSI for buildings west of Gordon Street) required lift. Condensate tank shall have an electric duplex pump arrangement fed from the building's Essential Power System. Additional condensate tank's high-level alarm shall be monitored by the BAS.

.2 Material

.1 All condensate piping systems shall be constructed out of schedule 40 steel for steam and schedule 80 for condensate. Insulate all piping using fiberglass insulation with a thermal performance not to exceed 0.033 W/m2·°C @ 24°C. Include PVC jacket in exposed finished areas. Include wrapping all valves, strainers and fittings. Refer to ASHRAE 90.1 for insulation thickness of different types of piping, ductwork, etc. (Typ.)

.2 To include for expansion joints.

.3 Welded or flanged construction for 2.5" and above.

.4 Threaded construction for < 2.5".

.5 Direct buried/trenched pipe to be insulated with waterproof-ridged non-collapsing cellular glass insulation and to include identification marker 1 meter above pipe. Direct buried/trenched pipe must have prior approval by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design. Make all efforts to avoid direct buried piping.

.6 For buried within a chamber or tunnel, shall include fiberglass insulation, new side or top mounted hangers, and be of welded construction.

.7 New chamber constructed to be fully waterproof.

.8 Provide galvanized schedule 40 pipe sleeves for all piping penetrations through concrete and masonry.

.9 Safety relief devices:

.1 Shall not be combined with non-safety vents,

.2 Shall not terminate at a minimum of 3 m (10ft) above finished roof,

.3 Shall terminate a minimum 3 m (10 ft) distance away from air intakes and building openings,

.4 Shall be vented individually, with connected vent piping designed to convey the fluid without pockets to the outside atmosphere, and then directing it away from ventilation equipment and vents from other systems.

2.5 Hydronic Heating

.1 General

.1 Separate and dedicated Heating Distribution Systems to service:

.1 100% Outdoor Air Systems (Air Handling Units) or areas susceptible to freezing

.2 Perimeter Heating Systems and Heating Coils within Recirculation Type Air Handling Systems.

.3 Terminal Reheat Systems.

.2 Heating Systems serving 100% Outdoor Air Systems to utilize 40% Propylene Glycol.

.3 Duplex Steam to Hot Water/Glycol Heat Exchangers shall be sized and arranged such that each Heat Exchanger is capable of supporting at least 75% of the peak heating demand. Flooded Heat Exchangers are preferred if the application allows.

.1 In some cases Heat Exchanger must be capable of supporting 100% of peak heating demand. Specific building needs shall be verified with the Manager, Mechanical Design, CPDD, before the completion of Schematic Design.

.2 Considerations shall be given to combining the Heat Exchangers serving Perimeter Heating Systems and Terminal Reheat Systems, with the stipulated system operating temperatures realized through the use of Pumps and Mixing Valves in the distribution piping. A Cost-Benefit Analysis comparing separate heat exchangers versus combined heat exchangers shall be presented for review by the Manager, Mechanical Design, CPDD, as a part of the Schematic Design.

.4 Design Temperature and Temperature Differential

.1 100 % Outdoor Air Systems: 82.2 ºC (180 ˚ F)/ Delta T: 11.1 ºC (20˚F)

.2 Perimeter Heating and Heating Coils within Recirculation Type Air Handling Systems: 82.2 ºC (180 ˚ F)/ Delta T: 11.1 ºC (20˚F)

.3 Terminal Reheat Systems: 60 ºC (140 ºF) Supply / Delta T: 5.6 ºC (10 ºF).

.4 Consideration is to be provided to utilized systems with a higher design delta T fordecreased pumping power. Gain approval from the Manager, Mechanical Design, CPDD, during the schematic design phase.

.5 Automatic Air Vents c/w manual isolation valves shall be provided at all high points in the system.

.6 Drain Valves (ball) with a garden hose connection c/w screwed cap shall be provided at all low points in the system.

.7 Considerations shall be given for the provisioning of Heat Recovery Systems on all ventilation and exhaust systems. A Cost-Benefit Analysis shall be presented for review by the Manager, Mechanical Design, CPDD, as a part of the Schematic Design.

.2 Distribution Pumps

.1 shall be duplex, arranged in parallel

.2 Each pump shall be sized for 100% of the circulation rate

.3 Pumps and related control system shall be fed from the building's dedicated Essential Power System

.4 Variable frequency drives shall be utilized with two-way control valves in lieu of three-way control valves.

.5 Shaft grounding is to be provided on all pump motors.

.6 All heating and cooling pumps sized beyond 1HP shall be controlled using Variable Frequency Drives.

.3 Valves

.1 Manual valves shall be provided at a minimum at the following locations:

.1 At individual equipment for isolation.

.2 On every branch pipe serving more than three (3) individual pieces of equipment or having a length in excess of 20m.

.3 Upstream of all control and balancing valves and downstream if longer than 50' to equipment. Include isolation on all bypass.

.4 Valve construction shall be in accordance with the University's Plumbing Standard DSM-02.

.4 Materials

.1 Black Steel

.2 Copper – Type L

.3 Insulate all piping using fiberglass insulation with a thermal performance not to exceed 0.033 W/m2·°C @ 24°C. Include PVC jacket in exposed finished areas. Include wrapping all valves, strainers and fittings.

.5 Jointing Systems

.1 Threaded Connections

.2 Welded Connections

.3 Flanged Connections

.4 Soldered Connections

.5 Grooved Joint System (Victaulic): On accessible locations only (unburied) including accessible ceilings. On mains only within tunnels. Grooved piping is not acceptable where buried or within wall. Note: grooved joint system to be used only if approved by the Manager, Mechanical Design.

.6 Use of Pressfit Joints is not permitted.

.7 Dielectric unions are not acceptable.

.6 Cleaning and Flushing

.1 All heating and cooling piping systems shall be cleaned and flushed according to procedures provided by the University's approved water treatment supplier prior to operation, and before being connected to the University's distribution systems.

.2 Cleaning of strainers must be completed before and after the cleaning and flushing process.

.3 Chemical treatment system shall be provided for the heating water system including pipe line filters. Glycol mixing station required for glycol systems complete with pot feeder and filter.

2.6 Cooling Systems

.1 General

.1 Modify existing Cooling Systems to suit new Work. Maintain the design criteria followed for the existing installation.

.2 Installation of window-shaker style air conditioners is not permitted without prior consent of Manager, Mechanical Design, CPDD.

.3 Provide dedicated point-of-use cooling only as detailed elsewhere in this Standard

.4 Use of DX Cooling Systems including Split Ductless and VFR Units is permitted only in buildings without a chilled water supply from the Central Utility Plant or where it deemed uneconomical to extend chilled water piping to provide point-of-use cooling. In each of these instances comply with the following:

.1 A choice to use DX Cooling, Split Ductless, or VFR Units is to be tabled for consideration and approval by the Manager, Mechanical Design before completion of the Schematic Design Phase, and

.2 The capacity permitted for DX Cooling Systems, Split Ductless, or VFR Units is no more than 5 Tons.

.3 Low ambient kit to be included for DX units being used throughout the winter months

.4 Domestic water is prohibited to be used as back-up

.5 Automatic Air Vents c/w manual isolation valves shall be provided at all high points in the system.

.6 Drain Valves (ball) with a garden hose connection c/w screwed cap shall be provided at all low points in the system.

.7 All new refrigerating, cooling and air conditioning equipment shall not contain any CFC or HCFC-based refrigerants or mixtures of such refrigerants. Chiller refrigerants shall not exceed the global warming potential limits prescribed by Environment and Climate Change Canada. Refrigerants scheduled for phaseout are prohibited.

.8 Major chillers shall operate with refrigerants 513A, 515B or 1233zd.

.2 Chilled Water Distribution

.1 Design Chilled Water Distribution Pressure within the Building:

.1 Design / Operating: 150 / 115 PSI (utilize system pressure)

.2 Return Water Pressure Differential: 30 PSI

.2 Design Temperature and Temperature Differential

.1 Supply Water Temperature: 5.5 – 7.2 ^{0}C

.2 Return Water Temperature Differential: 10 ^{0}C

.3 Chilled water distribution system within a building is to be a closed system whereby all chilled water is returned to the main campus distribution system. Sending chilled water to drain is not permitted.

.3 Valves

.1 Manual valves shall be provided at a minimum at the following locations:

.1 At individual equipment for isolation.

.2 On every branch pipe serving more than three (3) individual pieces of equipment or having a length in excess of 20m.

.3 Upstream of all control and balancing valves and downstream if longer than 50' to equipment. Include isolation on all bypass.

.2 Valve construction shall be in accordance with the University's Plumbing Standard DSM-02.

.4 New Construction Projects

.1 Chilled Water supplied from the Central Utility Plant (CUP) shall be the primary source of cooling to the Building.

.1 Chilled Water Supply Pressure from the CUP to Building:

- Design / Operating: 150 / 115 PSI
- Return Pressure Differential: 30 PSI

.2 Incoming chilled water supply/return lines to be metered in accordance with the University's metering standards. Meter to be integrated into the Building Automation System and the Schneider ION Utility Metering and Management System.

.3 Incoming chilled water supply/return lines shall be complete with flow and pressure station to control flow and isolate building chilled water system from pressure fluctuations in the campus mains.

.5 Materials

.1 Black Steel

.2 Copper – Type L

.3 Insulate all above ground or tunnel piping using elastomeric insulation with a thermal performance not to exceed 0.040 W/m2·°C @ 24°C. Include PVC jacket in exposed finished areas. Include wrapping all valves, strainers and fittings.

.4 Direct buried/trenched pipe to be insulated with waterproof-ridged cellular glass insulation and to include identification marker 1 meter above pipe. Direct buried/ trenched pipe must have prior approval by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design. Make all efforts to avoid direct buried piping.

.6 Jointing Systems

.1 Threaded Connections

.2 Welded Connections

.3 Flanged Connections

.4 Soldered Connections

.5 Grooved/Brazed Joint System (Victaulic): On accessible locations only (unburied) including accessible ceilings. On mains only within tunnels. Grooved piping is not acceptable where buried or within wall.

.6 Use of Pressfit Joints is not permitted.

.7 Dielectric unions are not acceptable.

.7 Cleaning and Flushing

.1 All heating and cooling piping systems shall be cleaned and flushed according to procedures provided by the University's approved water treatment supplier prior to operation, and before being connected to the University's distribution systems.

.2 Cleaning of strainers must be completed before and after the cleaning and flushing process.

.3 Chemical treatment system shall be provided for the heating water system including pipe line filters. Glycol mixing station required for glycol systems complete with pot feeder and filter.

2.7 Air Distribution Systems

.1 General

.1 Designed in accordance with SMACNA Standards to withstand the intended system operating pressure and application.

.2 Balancing Dampers

.1 Shall be provided on every main, sub-main, branch-main and branch ducts (definitions as per ASHRAE systems hand book) and at locations required to perform testing, adjusting & balancing.

.3 Relief Dampers

.1 Shall be provided on every return/exhaust system sized at 4500 L/S or higher and located within or in close proximity to the return/exhaust fan inlet ductwork.

.4 Filtration

.1 Oil impregnated filters shall not be used.

.2 Unless specified elsewhere in this Standard, or required by the application, filters are not required on exhaust systems except upstream of heat recovery/enthalpy wheels.

.3 Standard filter sizes: 12” x 24” and 24” x 24”

.5 Flexible Ductwork

.1 To allow easy location of diffusers flexible ductwork may be used to make the final connection from the sheet metal ductwork.

.2 Maximum length of flexible ductwork shall be 2.0m (78”)

.3 Flexible ductwork shall not pass through floors of firewalls

.4 Flexible ductwork shall be a single section of duct (no joints)

.5 Flexible ductwork shall be connected to sheet metal duct and diffusers using duct sealer, minimum of 3 screws (evenly spaced), and metal draw bands.

.6 Flexible ductwork must be insulated.

.6 Ductwork

.1 Interior lining of ductwork is not permitted without prior approval by the Manager, Mechanical Design, CPDD. This excluded attenuator and transfer ducts, which require lining to be completely sealed.

.2 Access shall be provided to each air terminal unit, including VAV and CAV boxes, as appropriate to enable maintenance and removal of the reheat coil and inlet screen. The equipment shall be positioned in a way that does not require the use of scissor lifts, articulated boom lifts, or similar equipment for access when possible.

.3 VAV boxes minimum airflow settings shall comply with ASHRAE recommended values and required matching reheat coils shall comply with latest OBC/ASHRAE requirements.

.7 HVAC Air Cleaning

.1 HVAC systems shall be designed to meet or exceed the minimum requirements of ASHRAE Standard 241 for the control of infectious aerosols and to ensure compliance with applicable minimum indoor air quality standards, including ASHRAE 62.1.

.2 Air cleaning devices (e.g., filters, air cleaners, UVGI) shall be selected and sized to achieve the equivalent clean air delivery rate (eCADR) targets specified for the building’s risk category and occupancy classification.

.3 Systems shall maintain appropriate air change rates, filtration efficiency, and airflow distribution to support healthy indoor environments under both normal and infectious risk conditions

.8 Materials

.1 Galvanized Steel, G90

.2 Stainless Steel, SS 316

.3 Aluminum

.4 Wrap all supply ductwork using fiberglass insulation where required. All seams to be fully sealed. Include PVC jacket in exposed finished areas.

.5 Include white PVC jacket, or zero permeability, all-weather, multi-layered, reinforced laminate coated with an aggressive cold weather acrylic adhesive in exposed finished areas. Include wrapping all valves, strainers and fittings.

2.8 Humidification System

.1 General

.1 When feasible, Humidification Systems shall be designed around the use of direct steam injection systems utilizing Plant Steam.

.2 The use of DI water for humidification is prohibited

.3 The use of inlet steam temperature sensor and flow sensors shall be utilized to avoid the risk of condensing within the duct.

.2 Renovation Projects

.1 Maintain the design criteria followed for the existing installation.

3 Design Standard for Spaces

3.1 General

.1 The use of VAV is preferred for the design Alternative designs providing increased energy performance will be considered. Gain acceptance from the Manager, Mechanical Design, CPDD during schematic design

.2 This section is to be used in conjunction with the “Vivarium” standards.

.3 All design spaces must meet all related code requirements.

3.2 Office Areas

.1 A maximum of three (3) offices, with similar loading, may be served by a single Zone Thermostat.

.2 Research Offices intended to be used for experimentation using temperature sensitive or heat generating equipment to be zoned independent of other offices.

3.3 Classrooms

.1 Each Classroom shall be served by a dedicated Zone Thermostat

.1 Where the size of a Classroom is greater than 140 m2, provide multiple thermostat zones to limit the size of a single zone to under 140 m2.

.2 Multiple VAV's shall be used where air flow required is greater than a single VAV.

.3 Where specified by the Functional Program, arrange the Air Distribution Systems to allow a single large classroom to be sub-divided into smaller rooms.

.4 All Air Systems, Supply & Exhaust, shall be sized to allow an average of 6-8 ACH in all classrooms.

3.4 Laboratories – Chemical/Wet/Bio/Chemistry

.1 Refer to the Laboratory Section,

3.5 Animal Facilities

.1 Refer to the Laboratory Section

3.6 Electrical Rooms

.1 Air Distribution and Cooling Systems for Main Electrical Rooms to be independent of similar systems serving other Spaces; equipment not to be installed in the Electrical Room. Exceptions include:

.1 Cooling for Electrical Distribution Closets on a floor can be extended from the HVAC Systems serving the floor.

.2 Cooling Solutions for Main Electrical Rooms shall be designed around the use of Mechanical Ventilation using Outdoor and Recirculation Air. Exceptions include:

.1 Interior Electrical Rooms without ready access to an exterior wall.

.3 Indoor Environmental Conditions:

.1 Mechanically Ventilated Electrical Rooms: Maximum 35 ^{0}C

.2 Mechanically Cooled Electrical Rooms: Maximum 30 ^{0}C, Non-Condensing

.1 Requirement for Electrical Room Cooling to be reviewed on a project by project basis and will require approval the Manager, Mechanical Design before completion of the Schematic Design Phase.

3.7 Mechanical Rooms

.1 Air Distribution and Cooling Systems for Main Mechanical Rooms to be independent of similar systems serving other Spaces. Exceptions include:

.1 Cooling required for Mechanical Closets on a floor can be extended from the HVAC Systems serving the floor.

.2 Cooling Solutions for Main Mechanical Rooms shall be designed around the use of Mechanical Ventilation using Outdoor and/or Recirculation Air. Exceptions include:

.1 Interior Mechanical Rooms without ready access to an exterior wall.

.3 Indoor Environmental Conditions:

.1 Mechanically Ventilated Mechanical Rooms: Maximum 35 ^{0}C

.2 Mechanically Cooled Mechanical Rooms: Maximum 30 ^{0}C, Non-Condensing

.4 Requirement for Mechanical Room Cooling to be reviewed on a project by project basis and will require approval the Manager, Mechanical Design before completion of the Schematic Design Phase.

3.8 IT / Communication Rooms

.1 Air Distribution and Cooling Systems for IT/COMM Rooms to be independent of similar systems serving other Spaces. Exceptions include:

.1 Cooling for IT/COMM Distribution Closets on a floor and not housing heat generating equipment can be extended from the HVAC Systems serving the floor.

.1 An independent system is vital to ensure that IT rooms maintain 18-24 degrees C at all times.

.2 Cooling Solutions for IT/COMM Rooms:

.1 Shall be designed around the use of Mechanical Cooling Solutions utilizing Chilled Water supplied from the Central Utility Plant

.2 Cooling Coils shall be sized to provide Cooling with an incoming cooling water temperature of 15 ^{0}C (59 ^{0}F)

.3 Redundancy in Cooling for Rooms larger than 46 m2.

.4 Use of domestic water for back-up cooling is to be avoided where possible. Should domestic water for back-up cooling (to maintain continuity of cooling in the event of a loss of chilled water supply) be required, a request is to be tabled for consideration and approval by the Manager, Mechanical Design before completion of the Schematic Design Phase.

.1 back-up cooling switchover shall be completely automatic, including return to use of chilled water

.2 non-potable water shall be used

.3 parameters to be monitored to trigger switchover may include:

.4 chilled water flow, temperature, pressure

.5 status (open/close) of all valves forming part of the automatic switchover scheme is to be monitored by the BAS

.6 alarming (both local and on BAS) is required

.7 proposed sequence of operation and P&ID sketch to be submitted with Request for consideration

.5 Indoor Environmental Conditions: 18 - 24 ^{0}C, Non-Condensing

3.9 Equipment / Elevator Machine Rooms

.1 Air Distribution and Cooling Systems for Equipment / Elevator Machine Rooms to be independent of similar systems serving other Spaces.

.2 Cooling solutions shall be designed around the use of Mechanical Cooling Solutions utilizing Chilled Water supplied from the Central Utility Plant and shall be ducted where applicable to provide access to cooling equipment from outside of the elevator machine room.

.3 To be tied to BAS for monitoring for water sensor and high temperature sensor. Alarm locally if building does not have BAS infrastructure already in place.

.4 Indoor Environmental Conditions: 28 ^{0}C, Non-Condensing

3.10 Freezer Rooms and Coolers

.1 For coolers only, Ventilation Air shall be extended from the HVAC Systems serving the floor on which the Room is located.

.2 Space Cooling shall be provided using dedicated point-of-use cooling equipment as noted below:

.1 Shall be sized and arranged to provide 100% redundancy; sizing criteria shall be identified on drawings.

.1 Not required for all freezers, review with the Manager, Mechanical Design before completion of the Schematic Design Phase to determine when requirements exist.

.2 Shall be designed around the use of Mechanical Cooling Solutions utilizing Chilled Water supplied from the Central Utility Plant

.3 Cooling Coils shall be sized to provide Cooling with an incoming cooling water temperature of 15 ^{0}C (59 ^{0}F)

.4 Use of domestic water for back-up cooling is to be avoided where possible. Should domestic water for back-up cooling (to maintain continuity of cooling in the event of a loss of chilled water supply) be required, a request is to be tabled for consideration and approval by the Manager, Mechanical Design before completion of the Schematic Design Phase.

.1 Upon approval:

- Back-up cooling switchover shall be completely automatic, including return to use of chilled water
- Non-potable water shall be used
- Parameters to be monitored to trigger switchover may include chilled water flow, temperature, and pressure
- Status (open/close) of all valves forming part of the automatic switchover scheme is to be monitored by the BAS
- Alarming (both local and on BAS) is required
- Proposed sequence of operation and P&ID sketch to be submitted with request for consideration
- Indoor Environmental Conditions: 24 ^{0}C, Non-Condensing
- Power supplies to the cooling equipment may need to be extended from the building's dedicated Essential Power System. To be reviewed on a case by case basis and will require approval by the Manager, Mechanical Design before completion of the Schematic Design Phase.

3.11 Lab Freezers and Coolers

.1 Refer to the Laboratory Section

3.12 Vestibules

.1 Need BAS to better control varying conditions

.2 Prefer fan coil to convectors

.3 Take pressurization into account.

.4 BAS to provide control of heat in the vestibule space. Ensure that a critical alarm is sent to the BAS for low temperature in the vestibule to reduce risk of freezing.

.5 Provide force flow heaters for space conditioning. Ensure that heating calculations take into account the anticipated usage of the entrance.

4 Product Standards

4.1 General

.1 The requirements outlined in the following clauses are applicable to all HVAC Systems.

.2 Mechanical Rooms

.1 Designated and dedicated Mechanical Room(s) shall be provided to accommodate HVAC Plant Equipment and Process Equipment.

.1 Provide at least one double door for entry into each Mechanical Room.

.2 Provide Elevator Access for each Mechanical Room located above or below the Ground Floor Level.

.3 Incorporate measures to facilitate movement of materials into and out of Mechanical Room(s).

.3 When required (Labs / Hospital Environments), drawing shall be developed showing the Building Pressurization Regime as well as the Pressure Control Regime for functional areas and units within the building.

.4 All Equipment, including Isolation and Safety Valves, and System Components shall be arranged and located to allow proper access for service and maintenance.

.5 Mechanical systems shall be installed to maximize the building's usable space while maintaining optimal service clearances for maintenance and repair.

.6 All equipment and materials shall be installed in a neat and orderly fashion.

.7 In finished areas mechanical systems will be concealed. Exceptions are subject to the approval by the Manager, Mechanical Design, CPDD.

.8 Equipment Starters shall not be installed above finished ceilings.

.9 Access

.1 Provide access to all items which may require adjustment, regular scheduled maintenance or inspections, and/or interaction, including and not limited to coils, dampers, valves and fixtures.

.2 The access construction shall include all minimum ratings which apply.

.3 The size of access shall be minimum 12" x 12" for access of only hand, minimum 18" x 18" for access within arm reach and minimum 24" x 24" for all other access. Larger sizes to be used when required.

.4 Pressurized access shall be constructed for pressure rating and to maintain pressure. To be sealed to prevent whistling.

.5 All in-duct coils must include access from both sides.

.6 Unobstructed space must be maintained for removal of all equipment including, but not limited to, valves, coils, motors, fans, and pumps. Include clear direction for removal of coils.

.7 All equipment and materials shall be installed in a neat and orderly fashion, whenever possible, run level, straight and true, parallel, and perpendicular to walls and floors. Refer to applicable ASHRAE and Plumbing code guidelines for best practice.

.8 Ensure all equipment that needs servicing/maintenance can be reached in a safe manner. Include for service platform and ladder if required.

4.2 Custom Units (Indoor)

.1 General

.1 New construction shall include an indoor space for all air handling equipment.

.2 Existing outdoor units may be replaced with outdoor units.

.3 Where required, add safety grating in service areas around and within air handling units.

.4 HVAC systems to be sized with 10% - 15% extra capacity for potential modifications to the spaces

.2 General Unit Construction

.1 Unit casing shall consist at a minimum of 2-inch thick panels with 4.0 lb/ft.3 density insulation sandwiched between 16-gauge galvanized steel exterior liner and a 22-gauge galvanized steel interior liner. Galvanized steel washdown liners with convenience floor drains in wetted sections (cooling, humidification, outdoor air intake plenum). Unit exterior shall be finish painted.

.2 0.12-inch thick aluminum checker plate floors in all sections except where drain pans are required.

.3 Structural steel base rails preferred.

.4 Access doors shall include test ports, windows and Ventlok type access door handles operable from both sides of the door. Access doors shall open against positive pressure. LED marine lights shall be installed in all access sections opposite the access door side of the unit.

.5 Double sloped (IAQ) Stainless steel drain pans shall be provided in cooling coil sections.

.6 Design housekeeping pad and unit mounting sufficient for trap depth requirements.

.3 Cabinet Performance

.1 Leakage shall not exceed 1.0% of the unit air flow at 1.5 times the rated total static pressure.

.2 Factory/Field Leak testing is mandatory for all air handling units at the factory and in the field complete with documentation.

.4 Fans

.1 Fans shall bear the AMCA sticker indicating that they have been tested for both air and sound performance. Non-overloading type fans shall be provided.

.2 Fan wheel classification shall be selected such that they can operate at a minimum of 15% above the RPM of the fan at the duty point.

.3 Motor's shall be sized no less than 15% above the fan operating BHP when all belts and drives have been accounted for. For motors that are required to operate below the nominal motor speed to meet the design conditions, the available motor HP must exceed the system BHP by no less than 15% at the design conditions.

.4 Motor's for use in variable speed applications shall be factory wired to unit mounted ABB VFDs with manual bypass. Motor shaft grounding rings shall be provided on all motors that are controlled by variable frequency drives.

.5 Bearings shall be selected for an L10 life of 200,000 hours at design operating conditions.

.6 All welded structural steel vibration isolation bases shall be provided to support fan and motor assemblies on 2" deflection spring isolators.

.7 Fan static pressure efficiency shall meet the requirements of ASHRAE 90.1.

.8 Fan vibration testing and balancing:

.1 Manufacturers to ensure that fans are balanced according to ANSI/AMCA 204-05.

.5 Heat Transfer Coils

.1 Coils shall be performance tested and certified in accordance with AHRI Standard 410.

.2 Copper Tube (min .030" thick tubes), Aluminum Fin.

.3 Galvanized steel casing on heating coils.

.4 Stainless steel casing on cooling coils.

.5 Heresite coating applied to all coils in corrosive airstream such as lab exhaust (Run around loop, pool chlorine areas, etc).

.6 Size coils for less than 500 FPM.

.7 Individual coil support rack shall allow for removal of individual coils stacked without having to remove all the coils.

.8 Stainless steel cooling coil racks with intermediate drain pans.

.9 Ensure condensate drain traps are properly sized (for all heat transfer coil/cooling coil sections).

.6 Humidifiers

.1 To be connected and supplied by central plant steam.

.2 To provide proper entrainment length or mist eliminator to prevent condensation within the AHU.

.7 Filters

.1 Pre-Filters (MERV 8); 95% Pleated Final Filters (MERV 14).

.2 Dwyer Magnehelic (or Digihelic) filter gauges shall be provided for each filter rack.

.3 Filter racks shall be designed to accommodate filters of no more than two different filter sizes while achieving face velocities no greater than 500 FPM (24 x 24 preferred, 12 x 24 half sizes as required).

.8 Intake Sections

.1 Dampers shall be TAMCO 9000 for outdoor air inlets and exhaust air outlets.

.2 Dampers shall be TAMCO 1000 for return air inlets or dampers internal to the air handling unit.

.9 Electrical

.1 Single point power with non-fused disconnect switch for all large electrical devices (fan motors, energy recovery wheels, gas furnaces, etc.).

.2 Separate power feed requirement for lighting/gfi outlet electrical circuit.

.3 An empty run of ¾" conduit throughout the entire unit with junction boxes in each access section for field control wiring.

.4 Provide internal waterproof lighting in all accessible air handling unit compartments.

.5 Provide hinged access doors to the equipment compartments, with latching hold-open devices and door handles on both sides of the door with respect to coil removal space.

.6 Ensure there is sufficient clearance for the removal of coils from the air handling units. Coil removal space shall be identified on the drawings.

.7 Provide lifting facilities such as eye bolts, I-beams and A-frames for coils heavier than 90.7 kg (200 lbs).

.8 Variable frequency drives shall be used for fans.

.9 Fan drives: V-belt shall be industrial grade. Multi-sheave belts shall be "power bands."

.10 Cooling coils shall have stainless steel frame.

.11 Provide moisture eliminator made of stainless steel.

4.3 Custom Units (Outdoor)

.1 General

.1 Standards noted above (Custom Units Indoor) not referenced below are applicable to outdoor units.

.2 Unit shall be designed to be supported by a roof curb.

.3 Roof panels shall be broken outward to provide a lapped joint watertight seal. Roofs shall be sloped a minimum of 5/8" away from the access side.

.4 Screws and other similar fastening devices shall not penetrate the roof deck k or the top of standing seems.

.5 Units shall have 4" thick walls with 4" thick 4.0 lb. density insulation.

.6 With prior approval by the Manager, Mechanical Design, CPDD, a unit exterior may be cladded with architectural louvered panels (shipped loose for field installation). The architectural cladding shall be securely mounted on the unit exterior and shall not require any external support mechanism. Louvers shall be manufactured from galvanized steel, and factory painted to match color as selected by the owner / architect. Provide hinged, operable sections for access to concealed service entry doors where required.

.2 Service Corridor

.1 Supply and install a 60" service corridor the entire length of the supply side of the unit. The corridor shall be a minimum of 87" tall if it houses electrical panel boards accessed from inside the corridor. Casing construction is the same as the rest of the air handler. Factory mount, wire, and pipe the fan motor VFDs and/or starters, DX cooling circuit, hot gas reheat circuit, humidifier, gas burner, water/glycol coils, controls, compressed air, and enthalpy wheel VFD.

.2 Provide an electric/hydronic heater and thermostat sized to offset heat loss of corridor. Provide a propeller exhaust fan and thermostat sized to ventilate the corridor at a rate of 1 CFM/Sq. Ft with motorized intake damper and louver and motorized exhaust damper and louver.

.3 With prior approval by the Manager, Mechanical Design, CPDD, the corridor floor may consist of removable welded bar grates spanning the entire width and length. Material shall be equal in quality to Fisher Ludlow style 1-3/16" 19-W-4 welded grates. Provide grates in sections no greater than 60 inches x 48 inches throughout the entire corridor, allowing full access to the roof curb space below for service and inspection of all recessed pipe fittings and gauges.

.3 Louvers

.1 Louver blades shall be fixed on a 45° angle. Blades shall be 4" wide, made of extruded aluminum construction. Bird screen shall be galvanized mesh with 0.5" x 0.5" openings and shall be fixed to the rear with cadmium plated screws. Finish shall be natural mill finish.

.4 Hoods

.1 Fresh air intake hoods shall be provided complete with 1/2" x 1/2" bird screen and finished to match the unit. A rain gutter shall be provided on all edges of the hood. Outside air hoods shall be sized for maximum inlet velocity of 600 FPM.

.5 Electrical

.1 External disconnects shall be provided in a NEMA 4 enclosure for superior water protection. Disconnects must be interlocked with the electrical panels for added personnel safety.

.6 Finish

.1 Outdoor unit shall be finish coated with polyurethane paint. Paint for outdoor units shall be tested to ATSM B117 for 5000hr salt spray endurance.

4.4 Semi-Custom Units (Indoor)

.1 General

.1 Unit casing shall consist at a minimum of 2-inch thick, R13 foam injected panels with 24-gauge interior and exterior liners. Unit exterior shall be finish painted.

.2 0.044-inch thick aluminum checker plate floors in all walk-in access sections except where drain pans are required.

.3 Formed metal or structural base rails shall be provided.

.4 Access doors shall include windows and quarter-turn access door handles. Access doors that do not open against positive pressure shall include a secondary latch to relieve pressure before the access door can swing fully open. LED marine lights shall be installed in all walk-in access sections.

.5 Double sloped (IAQ) Stainless steel drain pans shall be provided in cooling coil sections.

.6 Design housekeeping pad and unit mounting sufficient for trap depth requirements.

.7 Factory or field testing is required for all AHU. If assembly of the unit is required after shipping, a field test is required, complete with documentation.

.8 All semi-custom indoor units shall undergo factory casing pressure testing. Certified test results shall be provided as part of the submittal package.

.2 Cabinet Performance

.1 The casing leakage rate shall not exceed 0.50 cfm per square foot of casing surface area at design static pressure up to a maximum of +5" w.c. in positive pressure sections and -6" w.c. in negative pressure sections.

.2 Fan vibration testing and balancing (need to discuss details of performance).

.3 Air handling unit performance shall be certified under AHRI testing Standard 430. Alternately, Fans must bear the AMCA seal for air and sound performance.

.3 Fans

.1 Non-overloading type fans shall be provided. Fan wheel classification shall be selected such that they can operate at a minimum of 15% above the RPM of the fan at the duty point.

.2 Motor's shall be sized no less than 15% above the fan operating BHP when all belts and drives have been accounted for. For motors that are required to operate below the nominal motor speed to meet the design conditions, the available motor HP must exceed the system BHP by no less than 15% at the design conditions.

.3 Motor's for use in variable speed applications shall be factory wired to unit mounted ABB VFDs with manual bypass. Motor shaft grounding rings shall be provided on all motors that are controlled by variable frequency drives.

.4 Bearings shall be selected for an L50 life of 200,000 hours at design operating conditions.

.5 Formed steel vibration isolation bases shall be provided to support fan and motor assemblies on 2" deflection spring isolators.

.4 Heat Transfer Coils

.1 Copper Tube (min .030" thick tubes), Aluminum Fin.

.2 Galvanized steel casing on heating coils.

.3 Stainless steel casing on cooling coils.

.4 Moisture eliminators downstream of cooling coils (selected for greater than 500 FPM face velocity).

.5 Humidifiers

.1 To be connected and supplied by central plant steam.

.2 To provide proper entrainment length or mist eliminator to prevent condensation within the AHU.

.6 Filters

.1 Dwyer Magnehelic filter gauges shall be provided for each filter rack.

.2 Filter racks shall be designed to accommodate filters of no more than two different filter sizes while achieving face velocities no greater than 500 FPM. (24 x 24 preferred, 12 x 24 half sizes as required).

.7 Intake Sections

.1 Dampers shall be TAMCO 9000 for outdoor air inlets and exhaust air outlets.

.2 Dampers shall be TAMCO 1000 for return air inlets or dampers internal to the air handling unit.

.8 Electrical

.1 All electrical devices (motors, lights) shall require an individual field power connection.

4.5 Semi-Custom Units (Outdoor)

.1 General

.1 Standards noted above (Custom Units Indoor) not referenced below are applicable to outdoor units.

.2 Outdoor units shall have a solid metal roof cap, intake hoods, exhaust hoods and piping vestibules. Piping vestibules shall be shipped loose for field installation by others.

.3 The unit shall be equipped with a unitized base and shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weather tight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

.4 Units shall 4" thick walls with 4" thick 4.0 lb. density insulation.

.5 All semi-custom indoor units shall undergo factory casing pressure testing. Certified test results shall be provided as part of the submittal package.

.2 Hoods

.1 Fresh air intake hoods shall be provided complete with 1/2" x 1/2" bird screen and finished to match the unit. A rain gutter shall be provided on all edges of the hood. Outside air hoods shall be sized for maximum inlet velocity of 400 FPM.

Equipment/System	Proposed Vendor
HVAC Systems	
Custom Air Handling Units	Mafna Haakon Engineered Air
Semi-Custom Air Handling Units	Mafna Daikin Engineered Air
VAV	EH Price Nailor Krueger Metalaire Titus
ERV	Loren Cook Daikin
Fans	New York Blower Barry Blower EH Price Penn Barry Greenheck Aeroflo Loren Cook Twin City
Contaminated Exhaust System	Plastic Air Strobic Cook
AHU Coils	Aerofin Trane Daikin Ventrol
AHU Filters	American Air Filter Camfil Farr Dafco
AHU Humidifiers	Dri-Steem Condair (Nortech) Armstrong
Fan Coils	Daikin IEC Trane
Convectors/Unit Heater/Wall Fin/ Forced Flow Heater	Sigma Engineered Air Zehnder Rittling

Equipment/System	Proposed Vendor
HVAC Systems	
Sump Pumps	Hydromatic Barnes Bell & Gossett Taco Myers Grunfos
Centrifugal Pumps	S.A. Armstrong Bell & Gossett Paco Taco Peerless Grunfos
Steam to Hot Water / Steam to Gycol Heat Exchangers	Preston Phipps Armstrong Spirax Sarco
Semi-Instantaneous Steam Hot Water Heaters	Armstrong Patterson-Kelly Spirax Sarco
Steam Traps	Armstrong Spirax Sarco
Steam Vacuum Breaker	Armstrong Hoffman Colton
Safety Relief Valves	Watts Conbraco
Triple Duty Valves	S.A. Armstrong Bell & Gossett Emerson
Air Separators	Taco Bell & Gossett Amtrol S.A. Armstrong
Automatic Air Vents (Viton Seat for Glycol)	Maid-o-Mist Taco Amtrol Spirax Sarco Grinnell Bell & Gossett

Equipment/System	Proposed Vendor
HVAC Systems	
Expansion Tanks	Amtrol Taco Bell & Gossett
Hydronic System - Gauges (Temperature, Pressure and Differential Pressure)	Weiss Winters Wika
Air System Meters and Gauges (Temperature, Differential Pressure and Static Pressure)	wyer Setra
Dampers	Ruskin EH Price Alumivent Tamco
Louvres	Ventex EH Price Tamco Nailor
Air Distribution - Grilles & Diffusers	EH Price Nailor Metalaire Kreuger Titus
Fume Arm	Plymovent Niderman
VRF	Daikin LG
Air Distribution - Pressure Independent Air Valves	Siemens Phoenix
Manual Balancing Valves	T.A. Armstrong
Pressure Independent Balancing Valves	T.A. Siemens

Equipment/System	Proposed Vendor
Miscellaneous / Special Systems	
Clean Steam Generators	Dri-Steem Preston Phipps
Variable Frequency Drives	ABB Danfoss
Vibration	Flexonics Metraflex Vibro-Sonic
Silencers	Vibro-Acoustics IAC Kinetics-Vibron
Preferred Insulating Contractors	Fibercon Apex True North
Insulation	Knauf Johns Manville Owens Corning
Preferred Balancing Contractors	Air Audit Dynamic Airwaso

.3 Electrical

.1 External disconnects shall be provided in a NEMA 3R enclosure for superior water protection.

4.6 Convectors

.1 General

.1 To have standard sloped top

.2 Controlled by pressure independent valves (PIC).

4.7 Heat Exchangers

.1 General

.1 For all steam-to-water heat exchanger, provide fully welded stainless steel flooded exchangers utilizing condensate control. Plate-to-plate is not acceptable when using steam.

.2 For steam-to-water exchanger, it is the preferred option to only include automatic control valves on the condensate side for heating control. Where automatic control valves are located on the water side, steam supply automatic control valves must also be included.

.3 Provide steam trap on steam supply for each heat exchanger.

.4 Provide blended temperature sensor to control the lead exchanger.

.5 When using plate-to-plate exchangers, provide for future plate expandability for extra 25% capacity.

.6 Avoid using horizontal shell and tube heat exchangers unless approved by the Manager, Mechanical Design, CPDD.

4.8 Floor Mounted Equipment

.1 General

.1 Installed on a minimum 100mm concrete housekeeping pads.

.2 Provided with vibration isolation as per ASHRAE between the equipment and the housekeeping pad.

.2 Suspended Equipment

.1 Provided with mounting base frame or suspension brackets as recommended by the equipment manufacturer.

.2 Anchored to structure using Spring Isolation Hangers.

4.9 Preferred Vendors

.1 When reasonable and cost effective, it is preferred that skid package parts are complete with only proposed vendors noted below.

5 Chemical Cleaning Procedure – Heating & Cooling Piping

5.1 Preferred Supplier

.1 VeoliaWater Technologies & Solutions

5.2 Closed Loop Systems

.1 Drain system of all stagnant water after hydrostatic testing is completed and you are assured that there are no system leaks. Ensure the system to be cleaned is completely isolated from the Main or Original System if this is a retrofit or an addition to an existing system. A temporary recirculation system will be required for system flow during the procedures listed below and must be of suitable size to ensure a continuous flow of 5 ft. per second. If this is not feasible then the draining and cleaning and retreatment of the entire system may be necessary.

.2 Construction strainers shall be used to catch finer particulates during flushing. It is still necessary to ensure strainers are cleaned before turnover.

.3 Refill the system with clean city water. If you are unsure as to the system volume we recommend that you meter the amount of water required to completely fill the system. This information is useful for calculating cleaner and corrosion inhibitor dosage requirements.

.4 Recirculate system for at least 30 minutes with city water and verify that you do not have any leaks. If the water is unusually dirty drain and refill. Retain a 500 ml sample for our analysis. If this is a retrofit to an existing system, the use of the main recirculation pumps may not be possible without contaminating the existing system. Ensure the original system is completely isolated from the portion of the system being added and do not use the existing system for flushing or final treating.

.5 Once you are sure that you have no leaks and you know the system volume add Ferroquest FQ7103 cleaner at a minimum dosage of 2 % with water. I.e. add 2 gallons for every 100 gallons of system volume. A dosage of 2 gallons per 100 gallons system volume is usually sufficient for the cleaning of new systems. Systems containing process contamination or oils and greases or require optimum passivation should be cleaned with a 4 % to 5 % solution and may require more than one cleaning. Ensure a system flow rate of 5 ft. per second.

.6 Hard city water may be used for cleaning and primary flushing purposes. Softened water or water of reduced hardness to less than 100 ppm (University of Guelph's Domestic Water System) is required for final flushing purposes prior to corrosion inhibitor addition. Glycol systems require 100% softened water during final flushing and glycol solution preparation.

.7 Ensure that the system temperature does not exceed 50 degrees Celsius (122 F) as the ability of the cleaner to remove oil and grease will be greatly reduced and may warrant additional cleanings.

.8 Continually recirculate the system cleaner solution for a minimum of 72 hours (3 days) through the entire system to be cleaned. This time can be shortened to 48 hours if the water temperature can be maintained between 40 and 48 degrees Celsius and the cleaner FQ7103 strength is raised to 4 to 6%. Verify that the cleaner solution is moving through all areas to be cleaned.

.9 Taking a clear bottle and sampling from different sample points and system levels (if there is more than one floor) is recommended. The samples containing cleaner will have a sweet odor and will become and remain foamy upon agitation. Retain 500 ml samples of the cleaner solution from each area for our analysis as soon as the cleaner is mixed through all areas of the system.

.10 After the recirculation period in step 5 is completed, the system is ready for flushing. Allow for at least one to two days for flushing depending on the number of floors and system complexity. Smaller less complex systems may be flushed for the removal of all cleaner solution in one day or less.

.11 If you do not have sufficient time to completely flush out the cleaner after the recirculation period is completed, it is best to leave the cleaner in the system (over a weekend for example). Ferroquest cleaners also contain corrosion inhibitors. Leaving any system drained or full of untreated City Water will promote system rusting and fouling and may result in a system requiring a second cleaning.

.12 City water may be used for the initial flushing. It is recommended that softened or partially softened water to less than 100-ppm total hardness be used for final flushing purposes. This ensures that the final treated water left in the system is of low scaling or deposit forming tendency.

.13 Glycol systems require zero hardness in the final flush water and for glycol mixing purposes. Zero hardness waters are also best in any system in which the water is to be heated.

.14 The Ferroquest FQ7103 cleaner solution is safe to put to sanitary sewer or a pre-authorized waste stream. The MSDS information is available upon request.

.15 Usually a system dump from the low points followed by refilling, recirculation and dumping will get rid of the bulk of the cleaner solution. The inspection and cleaning of all strainers is recommended after the initial cleaner dump.

.16 A simultaneous flush and fill with system recirculation is best during the final stages of the flushing to ensure that all the air is removed and all the cleaner is out. This is best accomplished by draining from the low points and adding water at the make-up point while ensuring the required system pressure, so as not to cause recirculation pump cavitation, is maintained.

.17 During final flushing verify as to when the Ferroquest FQ7103 cleaner is out by taking samples of the recirculating flush water, from all areas, particularly those areas of reduced flow. We recommend that the final flush water be of low total hardness (<100 ppm). Softened or partially softened water is best, especially in heating or glycol systems.

.18 Your Suez representative must be informed as to when the system cleaning and flushing is to commence and be provided with the 500-ml samples of cleaner solution and of the final flush water from areas representing points close, mid-way and furthest from the recirculation pumps and at different system levels or floors, if applicable, to determine cleaner distribution and to prove it was completely removed from all areas of the system. All samples should be dated and labeled as to the system, date taken and location in that system they were taken from.

.19 If the samples are coloured or foamy upon agitation, further flushing of those areas will be required. Once all areas are clear and non-foamy, you are ready to install your bypass filter cartridges (if applicable) and add the corrosion inhibitor.

.20 As soon as the cleaner is completely flushed from the entire system, stop all system water losses and confirm that there are no leaks. It is time to add the corrosion inhibitor. If you wait even for a few hours you will begin to rust the piping and may have to re-clean the system.

.21 Add Corrshield MD 4102, 4101, 4158 or 4159 as specified for your job at a dosage of one half to one gallon per 100 Imperial gallons (454 L) of system volume or 2.3 to 4.5 Liters per 454 Liters of system volume. Continuously recirculate the system to assist in passivating the system piping and the removal of any residual suspended solids. Corrshield OR4407 is used in systems containing aluminum. The Corrshield OR4407 dosage is 2 liters per 100 gallons of system capacity.

.22 Inhibitor AZ 8104 is used to boost copper inhibitor residuals in all closed loop systems.

.23 Inhibitor AZ8104 is fed once the system is fully treated with Corrshield products and fully mixed and distributed. Inhibitor AZ8104 is fed at a dosage of 100 ml per 100 IG (454L) of system volume.

.24 Install all filter cartridges. Start with the larger micron size filters first. This is indicated on the filter cartridge box. The first few filter changes may be required every few hours to remove any suspended solids not removed by the final flushing. Eventually filter changes will be less frequent as filter inspections reveal clean filters. Then switch to the smaller micron filters and repeat the inspection and filter change process.

.25 Should the final treated system contain high bacterial counts the addition of Spectrus NX1100 biocide may be required. The typical dosage for closed water systems is 1 Liter of NX1100 per 4,540 Liters of system volume.

.26 Contact your GE Water representative to test those samples collected and to final commission any newly installed systems.

5.3 Glycol Systems

.1 The piping is cleaned the same as in steps 1 to 8 above. Ensure 100% softened water is used for final cleaner removal procedures and when making all glycol solutions.

.2 In the case of propylene glycol systems to be filled with Corrshield OR4405 (specialty inhibited propylene glycol) or ethylene glycol systems to be filled with Corrshield OR4404 (specialty inhibited ethylene glycol) add Corrshield NT4206 at a dosage of 40 L per 1,000 IG (4540 L) system volume and continuously circulate with softened water with system filtration in place. This solution can stay in the system prior to draining and glycol antifreeze addition to maintain corrosion control and allow for system passivation and filtration to remove any debris not removed during the previous flushing and cleaning stages.

.3 Once you are ready to add the Corrshield OR4405 or Corrshield OR4405 antifreeze solution it is strongly recommended that you drain all water from the entire system including any expansion tanks, heat exchangers, coils, etc. Simply draining some areas such as coils will not remove all the water. In these cases blowing them out with compressed air until dry is best. Repeat inspections to ensure all the residual water has been removed is critical to achieving the desired glycol strength.

.4 Measure the length or capacity of the glycol mixing tank that will be used to make up batches of glycol. Example: If a 50 % solution of inhibited propylene glycol is specified, add CorrshieldOR4405 to fill the tank to the 60% full level. Then add soft water to the 100 % full level. Mix this solution and pump it into the system. Repeat this procedure until the system is completely full.

.5 If a 40% glycol to water solution is required add the appropriate glycol product to the tanks 50 % full level and add soft water to the 100 % full level and turn the mixer on for 5 minutes.

.6 Please contact us if you are unclear what to do or have any special system requirements not covered in this general procedure.

.7 Mark Keddie – Cell Phone - 519 239 5147

.8 E-mail: Mark.Keddie@suez.com

6 Labelling

6.1 General

.1 After completion of insulation and/or painting, all piping shall be identified to show the service and direction of flow as described below.

.2 Additional requirements may apply to pipe identification within the Central Utility Plant (building 55), Generator Building (building 56), and service tunnels.

.3 Applicable Codes and Standards:

.1 CSA Standard B53 – Identification of Piping Systems

.2 CSA B149.1, Natural Gas and Propane Installation Code.

.3 Liquid Fuels Handling Code by Technical Standards and Safety Authority (TSSA)

.4 ANSI/ASME A13.1-2007 – Scheme Standards for the Identification of Piping Systems

.5 NFPA 99/CGA C-9 Standards for Medical Gas and Vacuum Systems.

.6 CAN/CSA Z305.1.92 – Standards for non-flammable medical gas piping systems and CGSB standard 1-GP-12 for colour coding.

.7 Fire protection: Sprinklers in accordance with NFPA 13. Standpipes in accordance with NFPA 14.

.8 CAN/CGSB-24.3-12 - Standard for Pipe Identification.

.9 R.R.O. 1990, Reg. 860 - Workplace Hazardous Materials Information System (WHMIS), under the Occupational Health and Safety Act.

.10 CSA C22.2 No. 130. Standards for heating cables and piping.

6.2 Label Placement

.1 The entire piping system is to be identified, including piping located in ceiling spaces, interstitial spaces, or within pipe chases.

.2 Pipe identification is required:

.1 At every point of entry or exit to a space, on both sides of where the pipe penetrates a wall, floor, service column or enclosure, change in direction;

.2 At every access door

.3 Within 3 ft. (1 m) of pipe termination points

.4 Within 3 ft. (1 m) of valve assemblies or individual valves

.5 Within 3 ft. (1 m) of branching off (or connecting to) a distribution header

.6 At least every 20 ft. (6 m) along pipe lengths.

.3 Pipe identification shall be visible from point of normal approach.

.4 Pipe identification shall be applied to clean, dry surfaces only and installed according to manufacturer's instructions.

6.3 Label Configuration

.1 Pipe identification shall consist of a label identifying the piping system contents, along with directional arrows indicating the flow direction and University of Guelph's standard system designations.

.2 Flow direction arrows shall be located at a minimum of one end of the pipe identification label.

.3 Pipe or duct label shall be properly orientated so wording of the pipe clear and free of interferences.

.4 Electrically traced piping shall have additional identification label indicating "Electric Traced" on the outside of the thermal insulation.

.5 Nylon cable ties shall be used to secure pipe identification labels at both ends, installed with the available methods outlined in Section 6.

.6 Piping installed indoors shall be identified using labels/ markers meeting either Option B, C, E or F requirements defined in Section 6 below. Option A to be used with the approval of the mechanical manager prior to the design or installation of any work.

.7 Piping installed outdoors (above grade) shall be identified using labels meeting Option B, C, D, E or F requirements defined in Section 6 below.

.8 Piping installed underground shall be identified with marking tape as outlined in Option C for locating buried services in addition to eliminating potential hazards of excavating in unmarked areas. For best detectability and protection during excavation, tape should be fully buried and installed as close to the surface as possible, no less than 3 feet above the service.

.9 All mechanical equipment and field devices must have a unique identification number. Contact a Facilities and Services representative for information on existing identification numbers to prevent duplication when assigning numbers to new equipment. Equipment and field devices connected to the BAS must be labeled with identification numbers matching those on the BAS graphics. For naming conventions, refer to the BAS design standard.

.10 For equipment and field devices not connected to the BAS, apply the same naming conventions from the BAS design standard.

.11 Each tag shall include the unique identification number, a description of the equipment type (ex. chiller, pump), the type of service (ex. Chilled water, compressed air), the panel number and circuit number of the power source, the controller number, and the controller's power source panel number with circuit number.

.12 Tags shall be resistant to weather and UV light without fading over time. The default material for identification tags is plastic with a white background and black engraved lettering. Attach the tags to the equipment using adhesive, a chain, or an S-clip. If plastic tags are unsuitable due to the equipment's working conditions, such as high surface temperatures, use metal tags with engraved lettering, riveted or chained to the equipment.

6.4 Label Size

.1 Pipe identification and flow direction markers shall be appropriately sized to match the outer diameter of the finished pipe installation.

.2 Label length and minimum text height shall be determined based on outside diameter of the finished pipe installation as follows:

Outside Pipe Diameter Including Covering	Minimum Length* of Label Field Colour	Minimum Text Height
3/4" – 1-1/4"	8"	1/2"
1-1/2" – 2"	8"	3/4"
2-1/2" – 6"	12"	1-1/4"
8" – 10"	24"	2-1/2"
Over 10"	32"	3-1/2"

*Note: not including flow direction arrows

6.5 Materials

.1 Option A – Adhesive Labels

.1 Only to be used with approval of the Manager, Mechanical Design, CPDD prior to the design or installation of any work.

.1 If approved, application area must be cleaned thoroughly before adhesion.

.2 Non-customized pressure sensitive adhesive label and banding tape:

.1 minimum 6 mm thick vinyl or polyester with pressure sensitive acrylic adhesive backing; silk-screened with vinyl ink.

.2 label printed with applicable abbreviation from Section 7 below.

.3 label and text color as defined in Section 7 below.

.4 banding tape with directional flow arrows placed at a minimum one end of the pipe, label and wrapped 360° around outside diameter, or include arrows directly on the label.

.5 banding tape colors to match label color scheme.

.6 standard of acceptance:

- Brady
- Seton
- SMS – Smillie McAdams Summerlin
- Or equivalent with prior approval by the Manager, Mechanical Design, CPDD.

.2 Option B – Semi-rigid Plastic Vinyl

.1 semi-rigid plastic vinyl label with ultraviolet ink surface printing, printed with applicable abbreviation from Section 7 below;

.2 label printed with applicable abbreviation from Section 7 below;

.3 label and text color as defined in Section 7 below;

.4 piping up to 6" OD: coiled vinyl wrapped to snap around pipe and provide 360° visibility;

.5 piping larger than 6" OD: flat vinyl tied down with 36" long nylon cable ties

.6 standard of acceptance:

.1 Brady

.2 Seton

.3 SMS – Smillie McAdams Summerlin

.4 Dura Label

.5 Or equivalent with prior approval by the Manager, Mechanical Design, CPDD.

.3 Option C – Ductwork Stencil

.1 To be used on ductwork supply and return trunk mains.

.2 No less than one stencil per room or at least every 20'

.3 To be added to each main upon entering room.

.4 No less than 6" or greater than 1' sized black lettering

.4 Option D – Underground Marking Tape

.1 Non-detectable 4mm thick low density polyethylene.

.2 Detectable has 35 gauge aluminum core encased by a protective plastic jacket.

.3 Organic pigmented lead free black ink.

.5 Option E – Medical Gas & Specialty Pipe Markers

.1 6mm thick (+/- 0.05mm soft vinyl)

.2 Pressure sensitive acrylic adhesive

.1 Silk screened ¾" high lettering

.6 Option F – Valve Tags

.1 Exterior Valve Tag

.1 Material

- 0.025" thick yellow brass
- Round: 1 1/2" diameter
- Hole for chain installation

.2 Lettering

- 3/8" high
- Black filled
- Can include identifier on top line

.2 Interior Valve Tag

.1 Material

- 1 ½" square, 1/16" thick lamacoid plastic hole for chain installation

.2 Lettering

- 3/8" engraved lettering
- Two (2) contrasting letters, yellow with black lettering
- 3/8" engraved lettering

.7 Ceiling Dot Labeling

.1 Applies to all ceiling panels. Locations based on identification of valves and equipment.

.1 Red Dot - Fire Damper

.2 Blue Dot - Heating & Cooling (coil, valves, etc.)

.3 Yellow Dot – VAV

.4 Green Dot - Potable & Non-Potable Water, DI Water

.8 Lamacoids

.1 Label all fixtures within lab spaces and mechanical rooms.

.2 Potable to use "Potable Water" 4" x 6" Green lamacoid with 1" white lettering

.3 Non-potable to use "Non-potable. Do not Drink." 4" x 6" Red lamacoid with 1" white lettering.

6.6 Label Legend

.1 Avoid using custom made labeling. Labelling must meet the legend below or receive approval of the Manager, Mechanical Design, CPDD for any deviations.

Label Abbreviation	System, Pipe Contents	Label Colors (Text - Background)
	Piping	
ACETYLENE	Acetylene	Black - Yellow
ACID	Acid	Black - Yellow
BIOHAZARD VENT	Biohazard Vent	Black - Yellow
BIOHAZARD WASTE	Biohazard Waste	Black - Yellow
BLOW-OFF	Blow-Off	Black - Yellow
BOILER BLOWDOWN	Boiler Blowdown	Black - Yellow
BOILER FEED WATER	Boiler Feed Water	Black - Yellow
CHEMICAL FEED	Chemical Feed	Black - Yellow
CHILLED WTR. RET.	Chilled Water return	White - Green
CHILLED WTR. SUP.	Chilled Water Supply	White - Green
COMPRESSED AIR (XXX PSI)*	Compressed Air	Black - Yellow
COMPRESSOR VENT	Compressor Vent	White - Green
CONDENSATE	Condensate	Black – Yellow
COOLING TOWER RET.	Cooling Tower Return	White – Green
COOLING TOWER SUP.	Cooling Tower Supply	White – Green
DEIONIZED WATER	Deionized Water	White – Green
DISTILLED WATER	Distilled Water	White – Green
DIESEL FUEL RETURN	Diesel Fuel Return	Black - Yellow
DIESEL FUEL SUPPLY	Diesel Fuel Supply	Black - Yellow
DISTRICT HTG. RET.	District Heating Return	Black - Yellow
DISTRICT HTG. SUP.	District Heating Supply	Black - Yellow
DUAL TEMP. RET.	Dual Temperature Return	Black - Yellow
DUAL TEMP. SUP.	Dual Temperature Supply	Black - Yellow
EXHAUST / EXH.	Exhaust Air	Black - Yellow

Label Abbreviation	System, Pipe Contents	Label Colors (Text - Background)
	Piping	
FIRE PROT. WATER	Fire Protection Water	White - Red
FIRE STANDPIPE	Fire Standpipe	White - Red
FIRE	Fire Suppression Water	White - Red
FIRE (DRY)	Fire Suppression (Dry Pipe)	White - Red
FIRE (insert gas/ chemical type)*	Fire Suppression (Gas or Chemical)	White - Red
FUEL OIL RETURN / F.O.R.	Fuel Oil Return	Black - Yellow
FUEL OIL SUPPLY / F.O.S.	Fuel Oil Supply	Black - Yellow
FUEL OIL VENT / F.O.V.	Fuel Oil Vent	Black - Yellow
GAS VENT	Gas Vent	Black - Yellow
GLYCOL HTG. RET. / GLY.H.R.	Glycol Heating Return	Black - Yellow
GLYCOL HTG. SUP. / GLY.H.S.	Glycol Heating Supply	Black - Yellow
GLYCOL MAKE-UP / GLY.FILL.	Glycol Make-up (confirm)	Black - Yellow
HEAT RECLAIM RET.	Heat Reclaim Return	Black - Yellow
HEAT RECLAIM SUP.	Heat Reclaim Supply	Black - Yellow
HEATING WTR. RET.	Heating Water Return	Black - Yellow
HEATING WTR. SUP.	Heating Water Supply	Black - Yellow
HIGH PRESS. COND.	High Pressure Condensate	Black - Yellow
HIGH PRESS. STEAM	High Pressure Steam (≥125psi)	Black - Yellow
LOW PRESS. COND.	Low Pressure Condensate	Black - Yellow
LOW PRESS. STEAM	Low Pressure Steam (≤15psi)	Black - Yellow
LAB VACUUM	Lab Vacuum	White - Green
MED. PRESS. COND.	Medium Pressure Condensate	Black - Yellow
MED. PRESS. STEAM	Medium Pressure Steam (>15psi,<125psi)	Black - Yellow

Label Abbreviation	System, Pipe Contents	Label Colors (Text - Background)
	Piping	
MAKE-UP WATER	Make-up Water	Black - Yellow
NATURAL GAS	Natural Gas (all piping painted yellow)	Black - Yellow
PUMPED CONDENSATE / P.COND.	Pumped Condensate	Black - Yellow
REFRIG. LIQUID / R.L.	Refrigerant Liquid	Black - Yellow
REFRIG. SUCTION / R.S.	Refrigerant Suction	Black - Yellow
REHEAT WATER RE-TURN	Reheat Water Return	Black - Yellow
REHEAT WATER SUP-PLY	Reheat Water Supply	Black - Yellow
SPRINKLER WATER / SPR.W.	Sprinkler Water	White - Red
VACUUM	Vacuum	White - Blue
VENT	Vent (non-plumbing)	Black - Yellow
	Plumbing	
CAPTURED RAIN WATER	Captured Rain Water	White - Green
DOM. H.W. RECIRC./ D.H.W.R.	Domestic Hot Water Recirculation	White - Green
DOM. H.W. SUPPLY / D.H.W.S.	Domestic Hot Water Supply	White - Green
DOM. COLD WATER / D.C.W.	Domestic Cold Water	White - Green
DOM. HOT WATER / D.H.W.	Domestic Hot Water	White - Green
DRAIN	Drain	White - Green
GREY WATER	Grey Water	White - Green
NON POT ANIMAL CW	Non Potable Animal Water	White - Green
NON POTABLE COLD WTR.	Non Potable Cold Water	White - Green
NON POT H.W. RECIR.	Non Potable Hot Water Recirculation	White - Green

Label Abbreviation	System, Pipe Contents	Label Colors (Text - Background)
NON POT HOT WTR.	Non Potable Hot Water	White - Green
POTABLE WATER	Potable Water	White - Green
POT CW	Potable Cold Water	White - Green
POT HW	Potable Hot Water	White - Green
POT HWR	Potable Hot Water Recirculation	White - Green
PROTECTED POT CW	Protected Potable Cold Water	White - Green
PROTECTED POT HW	Protected Potable Hot Water	White - Green
PROTECTED POT HWR	Protected Potable Hot Water Recirculation	White - Green
R W L	Rain Water Leader	White - Green
RAW WATER	Raw Water	White - Green
SANITARY DRAIN / SAN.	Sanitary Drain	White - Green
STORM DRAIN / STM.	Storm Water Drain	White - Green
TEMPERED WATER	Potable Tempered Dom. Water - Safety Eqpt	White - Green
VACUUM	Vacuum	White – Green
VENT	Sanitary Vent	Black - Yellow
	Medical Gas	
ARGON	Argon	Black - White
CARBON DIOXIDE	Carbon Dioxide	Black - Yellow
HELIUM	Helium	White - Brown
MEDICAL AIR	Medical Air	White - Black
MED VAC	Medical Vacuum	Black - Yellow
NITROGEN	Nitrogen	White - Black
NITRUOUS OXIDE	Nitrous Oxide	White - Blue
OXYGEN	Oxygen	White - Green

*Include operating pressure
**Include chemical type

7 Pressure Piping Tssa Registration

7.1 General

.1 All pressure piping systems shall conform to the requirements, regulations, and standards of the City of Guelph, Ontario Building Code, Technical Standards & Safety Authority (TSSA), and any other local authority having jurisdiction.

.2 Pressure piping systems are subject to inspection by the TSSA.

.3 Fittings are to have Canadian Registration Numbers (CRN).

.4 Contractors working on pressure piping systems are responsible for registering the piping system with the TSSA, and obtaining TSSA approval of the final installation.

.5 Contractors performing registered pressure piping work are required to be licensed by TSSA.

.6 All manufacturers and installers of pressure piping parts and systems must hold a valid Certificate of Authorization for piping from TSSA.

.7 Welding/brazing procedures and welders/brazers are to be approved by the TSSA, Boilers and Pressure Vessels Safety Program.

7.2 Campus CRN Number

.1 The University has obtained a CRN# for pressure piping systems on campus: CRN#: P38014

.2 This CRN# currently covers high pressure steam and compressed air systems built to the design criteria provided below. This scope will increase as piping systems with different design criteria are registered with the TSSA as amendments to the campus CRN#.

.3 The campus CRN# covers the piping system only and does not include registration of boilers, pressure vessels, and fittings required under the TSSA Act 2000, Boilers and Pressure Vessels Regulations.

.4 The design criteria (materials of construction, test pressures, etc.) for the currently approved piping systems are provided in the following sections.

.5 Whenever possible, piping systems shall be constructed to the same design criteria approved as part of the campus CRN#.

.6 New work which adheres to the approved design criteria is subject to inspection by the TSSA.

.7 New work which differs from the approved design criteria must be submitted, in advance, to the TSSA for approval. Specifications are required to be approved by Physical Resources (CPDD, Mechanical) prior to submission to the TSSA.

.8 Contractors submitting piping designs to the TSSA for approval should request they be approved as an amendment to the campus CRN# identified above.

.9 Following TSSA approval of a pressure piping system, the Contractor shall submit to Physical Resources (CPDD, Mechanical) a copy of such approval along with any related supporting documentation. These documents shall be submitted in both hardcopy and electronic (searchable pdf) format.

.10 Physical Resources (CPDD, Mechanical) shall update this document as necessary following approval of a pressure piping system by the TSSA under the campus CRN#.

7.3 High Pressure Steam Piping Systems

.1 The following materials and methods have been approved as part of the CRN number referenced in section 7.2 above.

High Pressure Steam		
Design Pressure		200 psi @ 388°F
Operating Pressure		150 psi @ 366°F
Safety Relief Valve		165 psi
Hydrostatic Test Pressure (option 1) (1.5 x Design Pressure)		300 psi
Pneumatic Test Pressure (option 2) (1.2 x Design Pressure)		240 psi
Design Standard		ASME 831.1
Pipe Spec	**NPS up to 2"**	**NPS greater or equal to 2-½ "**
Material	ASTM A106 SCH80, Seamless	ASTM A53 Grade B SCH40, ERW
Pipe Jointing		
Threaded	Class #300 to ANSI 816.3	-
Socket Weld	ANSI B16.11 (300#)	-
Butt Weld	ANSI 816.9	ANSI 816.9
Flanged	-	Class 300 to ANSI B16.5
Components	All components for HPS system are rated for 300# All components for HPS system to have CRN numbers	

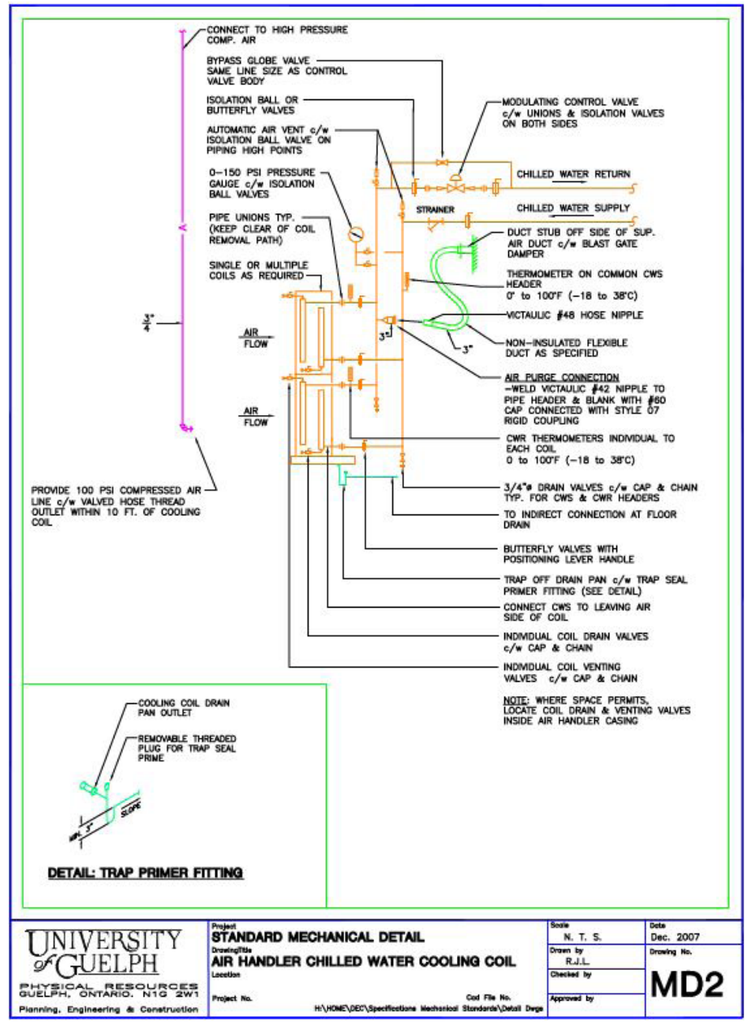
7.4 Compressed Air Piping Systems (Steel/Copper)

.1 The following materials and methods have been approved as part of the CRN number referenced in section 7.2 above.

Compressed Air		
Design Pressure		150 psi @ 70°F
Operating Pressure		100 psi @ 70°F
Safety Relief Valve		125 psi
Hydrostatic Test Pressure (1.5 x Design Pressure)		225 psi
Pneumatic Test Pressure (preferred) (1.2 x Design Pressure)		180 psi
Design Standard		ASME 1331.1
Pipe Spec	**NPS up to 2"**	**NPS greater or equal to 2-½ "**
Steel Pipe	ASTM A106 Grade B SCH40,Material Seamless-Welded	ASTM A53 Grade B SCH40, ERW
Copper	ASTM B88M Type L,K Drawn	ASTM A53 Grade B SCH40, ERW
Pipe Jointing		
Threaded	Class #150 to ANSI B16.3	-
Socket Weld	ANSI 1316.11	ANSI 1316.11
Butt Weld	ANSI 816.9	ANSI B16.9
Copper fittings	ASTM B16.26, cast bronze	
Joints	Brazed	
Components	All components for HPS system are rated for 300# All components for HPS system to have CRN numbers	

8 Details

8.1 Air Handler Chilled Water Cooling Coil (Required for each coil)



9 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Mechanical

Vivarium

1 Mechanical Introduction

1.1 General

.1 This Mechanical Systems Design Standard has been developed to establish the University's minimum expectations and requirements for new Mechanical Systems supporting Vivarium spaces.

.2 A Vivarium can be defined as a facility where animals are housed for scientific observation or research.

.3 The purpose of this standard is to provide guidance and design requirements that support a safe, comfortable and efficient environment that is highly functional for the animals, researchers, faculty, students and facility operators that occupy it.

.4 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

.5 This Design Standard shall be read in conjunction with the specific physical resources design, engineering and construction standards noted in Section 1.6. .

1.2 Compliance Criteria

.1 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing mechanical infrastructure.

.2 Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Mechanical Design, CPDD before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The Design Engineer of Record remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Mechanical Design, CPDD, together with proposed measures for addressing the conflict.

.3 The Design Engineer of Record is responsible for ensuring the design accounts for all affected systems including concealed conditions. With prior approval by the University, destructive testing may be required to confirm conditions.

.4 Where new work will connect to existing building systems, the Design Engineer of Record is responsible for ensuring the tie-in and interaction of the new systems are compatible with existing infrastructure.

.5 The Design Engineer of Record is responsible for coordinating specific user requirements from all stakeholders including, but not limited to, University Staff, Management, and users of the affected space(s).

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovations shall be tabled for consideration by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design.

1.5 Sustainability Requirements

.1 Wherever possible, sustainable strategies shall be incorporated into the laboratory design while maintaining the safety and functionality goals of the project.

1.6 Standards, Codes and References

.1 Ontario Building Code, Latest Edition

.2 Animals for Research Act, R.S.O. 1990, c. A.22

.3 Canadian Council on Animal Care (CCAC) Standards and Guidelines, Current Edition

.4 Canadian Council on Animal Care (CCAC) Heating, Ventilation, and Air Conditioning: Addendum to the CCAC Guidelines on Laboratory Animal Facilities – Characteristics, Design and Development.

.5 Canadian Food Inspection Agency (CFIA) Standards and Guidelines, Current Ediition

.6 Public Health Agency of Canada – Canadian Biosafety Standard (CBS) Second Edition, March 2015

.7 American Conference of Industrial Hygienists (ACGIH), Industrial Ventilation: A Manual of Recommended Practice, Current Edition.

.8 Canadian Nuclear Safety Commission: RD-52: Design Guide for Nuclear Substance Laboratories and Nuclear Medicine Rooms

.9 ANSI Z358.1: Emergency Eyewash and Shower Equipment

.10 ANSI/AIHA Z9.5: American National Standard for Laboratory Ventilation

.11 ANSI/ASHRAE 62.1: Ventilation for Acceptable Indoor Air Quality

.12 ANSI/ASHRAE 55.1: Standard for Thermal Environmental Conditions for Human Occupancy

.13 ANSI/ASHRAE 90.1: Energy Standard for Buildings

.14 ANSI/ASHRAE 110: Method of Testing Performance of Laboratory Fume Hoods

.15 CSA Z316.5-15: Fume Hoods and Associated Exhaust Systems

.16 CSA B64.10: Selection and Installation of Backflow Prevention Systems

.17 NFPA 55: Compressed Gases and Cryogenic Fluids Code

.18 NFPA 91: Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Non-Combustible Particulate Solids

.19 NSF/ANSI 49: Standard for Biosafety Cabinetry: Design, Construction, Performance, and Field Certification

.20 University of Guelph Design Standard DSM-01 HVAC Systems*

.21 University of Guelph Design Standard DSM-02 Plumbing Systems*

.22 University of Guelph Design Standard DSM-03 Building Automation Systems*

.23 University of Guelph Design Standard DSM-04 Fire Protection Systems*

.24 University of Guelph Metering Standard*

.25 University of Guelph Identification Standard*

*A copy of this standard is available on the University of Guelph Physical Resources web page

2 Heating, Ventilation and Air Conditioning Systems (Hvac)

2.1 General

.1 Each room shall be provided with mechanically generated supply air and exhaust air in sufficient quantities to provide a comfortable and safe environment for the animals and occupants of the facility.

.2 Animal facilities shall be supplied with 100% outdoor air; recirculation of exhaust air is not permitted.

.3 Pressure independent, Variable flow systems shall be used for all supply air, general exhaust air and fume hood exhaust air systems.

.4 Differential pressures shall be used to create an air barrier between two areas or zones of the facility. Differential pressures between areas of the animal facility should be established so that air flows from the cleaner areas to the dirtier or potentially contaminated areas.

.5 Relative pressurization of spaces shall be maintained through volumetric airflow offsets managed through the pressure independent, variable air volume system. Control regimes using differential pressure monitoring systems are not acceptable.

.6 Use campus steam for humidification where possible.

.7 Ventilation systems serving Designated Containment Laboratory spaces shall be independent of systems serving other occupancies of the building, such as offices, conference rooms and common elements.

.8 The Design Engineer shall coordinate with the various user group(s) and the University to determine if the animals will be housed in locally ventilated racks or those connected directly to the building ventilation system(s).

2.2 Ventilation Rates

.1 Vivarium Demand Control Ventilation System:

.1 The designer must consider the installation of a Vivarium Demand Control Ventilation System that is capable of modulating ventilation air rates in response to the measured concentration of contaminants in the space. To provide for accuracy of measurement and ensure occupant safety, differential type sensors must be included to monitor air quality, stand-alone wall mounted sensors will not be accepted as part of the system proposal.

.2 The Demand Control Ventilation System shall be considered for the Secondary Enclosure only and shall vary air change rates based on the room environmental conditions, while satisfying heat load demands.

.3 The recommendation to install this type of system shall be based on a risk assessment, return on investment (ROI) and annual operational cost savings analysis. Submit this analysis to the Manager, Mechanical Design, CPDD, for discussion and review as part of the Schematic Design Phase of Work.

.4 The complete system shall be provided in accordance with the Heating, Ventilation, and Air Conditioning: Addendum to the CCAC Guidelines on Laboratory Animal Facilities – Characteristics, Design and Development.

.2 Animal Housing Rooms shall be designed to operate at the default ventilation rates indicated below, unless an approved Vivarium Demand Control Ventilation System is provided in accordance with 2.2.1.

.3 Animal Housing and Research Areas shall be designed to operate at the following default ventilation rates:

.1 The minimum allowable ventilation rates to be as per Canadian Council on Animal Care (CCAC) Standards and Guidelines, Current Edition

.2 15 – 20 Air Changes per Hour (ACH) (Reduced ACH may be permitted at room level with the installation of an approved Vivarium Demand Control Ventilation System and authorization from University of Guelph)

.4 As part of the Schematic Design Phase of work, prepare a floor plan indicating relative pressurization of spaces and direction of airflow and submit to the Manager, Mechanical Design, CPDD, for review.

2.3 Central Air Handling Systems

.1 Air handling systems serving Laboratory Spaces shall be fully custom type, provided in accordance with Design Standard DSM-01, HVAC Systems.

.2 Central Air Handling Equipment, and associated main service distribution, serving Animal Care Facilities shall be sized with sufficient spare capacity to allow for future flexibility and adaptability to change; review with Manager, Mechanical Design, CPDD, as part of the Schematic Design Phase of Work.

.3 Provide Variable Frequency Drives for all Supply and Exhaust Air Fans.

.4 Provide minimum efficiency reporting value (MERV) 14 final filters for animal research laboratories. Local HEPA filters may be required for specialty spaces where research materials or animals are susceptible to contamination. The requirement for local or central HEPA filtration shall be reviewed for each project with the Manager, Mechanical Design, CPDD, as part of the Schematic Design Phase of Work.

.5 Central supply and exhaust air handling systems shall operate continuously 24 hours per day, year-round, and shall be provided with suitable redundancy. 100% redundancy is required on all HVAC components and an essential power source are mandatory requirements.

.6 Energy Recovery:

.1 Must be provided to recover energy from the exhaust air systems to pre-condition make-up outdoor air.

.2 Shall be complete with full by-pass to reduce pressure drop during free cooling (economizer) operation and whenever else the fan power energy penalty of passing air through the recovery device exceeds the energy recovered.

.3 Shall be complete with a minimum sensible recovery efficiency of 65%.

.4 A risk assessment of energy recovery device type shall be complete to ensure cross contamination concerns are addressed while maximizing energy recovery efficiency of the system.

.5 Systems to consider include the following:

.1 Heat Recovery Run-Around Loops

.2 Heat Pipe Systems

.3 Heat Recovery Chillers

.4 Others discussed with the Manager, Mechanical Design, CPDD and approved based on a hazard risk assessment.

2.4 Miscellaneous Exhaust Devices

.1 Local exhaust ventilation (LEV) arms shall be provided where a requirement for local point-of-use exhaust is identified through the Functional Programming and Planning exercise.

.2 Surgical and Necropsy suites using anesthetic gases shall be provided with suitable local exhaust air connection points for the express use of hose connections extracting anesthetic waste gases.

.3 Miscellaneous exhaust air devices and associated ductwork shall be constructed of a material suitable for use with the chemicals encountered.

2.5 Ductwork:

.1 All ductwork shall be smooth rigid type; flexible ductwork is not permitted under any circumstances.

.2 Acoustic lining and other liners are not permitted within the airstream of ventilation system ductwork.

2.6 Supply and Exhaust Air Terminal Units

.1 Terminal elements shall consist of venturi valves with pressure independent flow control for variable speed operation.

.2 Terminal units shall be located such that they are readily accessible for maintenance, including appropriate provisions for duct access and each individual component such as coils.

.3 Terminal units shall include identification in accordance with the University of Guelph Identification Standard, including location tag.

.4 Terminal units shall be complete with a maximum 1s speed of response.

.5 Terminal units shall be provided with their own stand-alone system of controls which shall be capable of communicating with the facility Building Automation System without the need for protocol converters or translators (i.e. native BACnet).

.6 Terminal units shall utilize flow tracking to maintain prescribed airflow offsets and associated space relative pressurization.

.7 Terminal units shall be suitable for both horizontal or vertical mounting.

.8 Galvanized, Aluminum or Stainless-Steel valves shall be deployed for general ventilation systems. The material selected must be suitable for intended use.

.9 Real-time audio-visual monitoring of the Environmental Conditions associated with each Animal Holding area shall be provided. System shall be complete with interface to the Building Management System.

.10 Provide sound attenuation to ensure maintenance of acceptable, and consistent, noise levels in Animal Holding Rooms and Research Areas.

2.7 Supply and Exhaust Air Outlets

.1 Location of supply air outlets shall be carefully coordinated in each space containing a containment device, as to not impact the containment effectiveness. Similarly, outlets shall be carefully located to prevent disturbances to animals or the operation of ventilated racks.

.2 Non-Aspirating type supply air diffusers (non-aspirating) arerequired in spaces housing a containment device.

.3 In animal holding area(s), exhaust air grilles shall be fitted with filters to limit the opportunity of dander, animal hair or other contaminants from entering the ductwork. Minimum efficiency rating and filter material type shall be selected by the design team based on the unique requirements of the associated animal holding room.

3 Plumbing Systems

3.1 Sanitary Drainage

.1 Provide in accordance with University of Guelph Design Standard DSM-02 Plumbing Systems.

.2 Floor drains should be avoided in Animal Holding Rooms when not intended to be used frequently as they present a potential source of contamination. Animal holding rooms containing large animals such as Dogs, Sheep, Pigs, Poultry shall be provided with a floor drain.

.3 Where provided, floor drains shall be complete with automatic trap seal primer and provided with a removable cap and basket sediment interceptor.

.4 Ensure that a means of drainage is provided where there are washdown requirements.

.5 Provide trap seal primer for all drains.

3.2 Water Distribution

.1 Provide in accordance with University of Guelph Design Standard DSM-02 Plumbing Systems.

.2 Water supplies to handwash, emergency eyewash and shower stations shall be extended from the potable water system.

.3 Water supplies to Laboratory sinks, benches, fume hoods and Process Equipment shall be extended from the non-potable water system.

.4 Water supplies to safety emergency fixtures shall be tempered.

.5 Water supply shall be of sufficient pressure to allow for effective operation of fixtures, equipment and cleaning of the large animal holding rooms.

.6 Animal drinking water supplies shall be extended from a designated Protected Potable Water System. Automated watering systems are highly recommended. Approval shall be required from University of Guelph to not implement an automated watering system.

.7 Zone protection in the form of a non-testable device shall be provided for individual labs fed from the non-potable water system.

.1 A Lab faucet vacuum breaker shall be provided on each outlet within a Zone Protected Lab where it is necessary to protect individual outlets from self-induced cross-contamination.

.8 Fixtures and equipment fed from the non-potable water system shall be clearly labeled as fed from a non-potable water supply.

3.3 Fixtures and Trim

.1 Minimum one (1) dedicated handwash sink shall be provided in each animal holding room and/or the associated anteroom with handsfree hardwire sensor activated faucet. Water supplies to this handwash sink shall be extended from the Potable Water System.

.2 All services to be provided with service isolation valves upon entry into each lab space. In general, it is preferred that all service valves be located neatly in an accessible area of the ceiling space above the main entry door.

3.4 Fire Protection Systems

.1 Provide in accordance with applicable NFPA Standards, Local Code(s) and University of Guelph Design Standard DSM-04 Fire Protection Systems.

3.5 Automation and Control Systems

.1 Provide in accordance with University of Guelph Design Standard DSM-03 Building Automation Systems

.2 Each animal holding room shall be provided with a user interface adjacent the entry door that allows temperature and humidity control and feed-back; a local graphical user interface is preferred. All temperature and humidity controls shall be set through the local interface; the central BAS shall be reserved for monitoring and alarm purposes only and shall not be used as a means for adjusting temperature or humidity in animal holding rooms.

.3 The University of Guelph houses a diverse range of lab animals. In order to provide flexibility to the animal holding rooms temperature set-point shall be adjustable between 18°C - 28°C and relative humidity shall be adjustable between 30% RH - 70% RH.

.4 Refer to Typical Animal Holding Room Temperature and Pressure Control Schematic attached to and forming part of this Design Standard.

3.6 Commission and System Acceptance

.1 The Design Engineer of record shall ensure that the basic commissioning requirements indicated below are included in the appropriate section(s) of the contract specification package. These requirements may be modified should a third-party Commissioning Agent be retained by the University;

.1 Ventilation system functional tests, including emergency purge mode of operation, and unoccupied mode set-backs for temperature and airflow, as applicable.

.2 Demonstration of relative pressurization achieved, including record submittal of facility floor plan indicating relative pressurization of spaces and direction of airflow.

.3 Testing, Adjusting and Balancing (TAB) Reports for exhaust air, and supply air systems.

.4 Pre-Occupancy Acoustic Performance Testing for all Animal Holding Rooms and other noise sensitive areas of the program.

.5 Functional performance testing, labelling and identification of each fume hood and other applicable containment devices in accordance with ASHRAE Standard 110 and University of Guelph EHS Standards.

.6 Plumbing fixture functional testing

.7 Cross Contamination device testing and identification in accordance with CSA and University of Guelph EHS Standards.

.8 Emergency shower and eye/face wash system testing and identification in accordance with ANSI and University of Guelph EHS Standards.

.9 Separate user and facility maintenance training modules for laboratory and central equipment / systems.

.2 All pressure vessels and fittings built to a registered design shall be complete with a Canadian Registration Number (CRN) to identify that the design has been accepted and registered for use in the province.

.3 Include CSA certification on all devices

1 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Mechanical

Laboratory

1 Introduction

1.1 General

.1 This Mechanical Systems Design Standard has been developed to establish the University's minimum expectations and requirements for new Mechanical Systems supporting Laboratory spaces.

.2 Laboratories are defined as spaces equipped for scientific research, experimentation or teaching, involving the use and storage of hazardous materials. Laboratory spaces can be divided into the following general types:

.3 Biological Laboratories

.4 Chemical Laboratories

.5 Physical Laboratories

.6 Animal Laboratories (Refer to Section 4.4)

.7 The purpose of this standard is to provide guidance and design requirements that support a safe, comfortable and efficient laboratory environment that is highly functional for the researchers, faculty, students and facility operators that occupy it.

.8 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

.9 This Design Standard shall be read in conjunction with the specific physical resources design, engineering and construction standards noted in Section 1.6 below.

1.2 Compliance Criteria

.1 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing mechanical infrastructure.

.2 Generally, minimum laboratory design requirements will follow that of a CL2 category, and only where specifically requested, requirements of higher design criteria such as CL3 or CL4 will be considered. Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Mechanical Design, CPDD before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The Design Engineer of Record remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Mechanical Design, CPDD, together with proposed measures for addressing the conflict.

.3 The Design Engineer of Record is responsible for ensuring the design accounts for all affected systems including concealed conditions. With prior approval by the University, destructive testing may be required to confirm conditions.

.4 Where new work will connect to existing building systems, the Design Engineer of Record is responsible for ensuring the tie-in and interaction of the new systems are compatible with existing infrastructure.

.5 The Design Engineer of Record is responsible for coordinating specific user requirements from all stakeholders including, but not limited to, University Staff, Management, and users of the affected space(s).

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovations shall be tabled for consideration by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design.

1.5 Sustainability Requirements

.1 Wherever possible, sustainable strategies shall be incorporated into the laboratory design while maintaining the safety and functionality goals of the project.

1.6 Standards, Codes and References

.1 UofG EH&S, Fire Code, & OSHA

.2 Ontario Building Code, Latest Edition

.3 Public Health Agency of Canada – Canadian Biosafety Standard (CBS)

.4 American Conference of Industrial Hygienists (ACGIH), Industrial Ventilation: A Manual of Recommended Practice, Current Edition.

.5 Canadian Nuclear Safety Commission: RD-52: Design Guide for Nuclear Substance Laboratories and Nuclear Medicine Rooms

.6 ANSI Z358.1: Emergency Eyewash and Shower Equipment

.7 ANSI/AIHA Z9.5: American National Standard for Laboratory Ventilation

.8 ANSI/ASHRAE 62.1: Ventilation for Acceptable Indoor Air Quality

.9 ANSI/ASHRAE 55.1: Standard for Thermal Environmental Conditions for Human Occupancy

.10 ANSI/ASHRAE 90.1: Energy Standard for Buildings

.11 ANSI/ASHRAE 110: Method of Testing Performance of Laboratory Fume Hoods

.12 CSA Z316.5-15: Fume Hoods and Associated Exhaust Systems

.13 CSA B64.10: Selection and Installation of Backflow Prevention Systems

.14 NFPA 45: Standard on Fire Protection for Laboratories Using Chemicals

.15 NFPA 55: Compressed Gases and Cryogenic Fluids Code

.16 NFPA 91: Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Non-Combustible Particulate Solids

.17 NSF/ANSI 49: Standard for Biosafety Cabinetry: Design, Construction, Performance, and Field Certification

.18 University of Guelph Design Standard DSM-01 HVAC Systems*

.19 University of Guelph Design Standard DSM-02 Plumbing Systems*

.20 University of Guelph Design Standard DSM-03 Building Automation Systems*

.21 University of Guelph Design Standard DSM-04 Fire Protection Systems*

.22 University of Guelph Metering Standard*

.23 University of Guelph Identification Standard*

.24 *A copy of this standard is available on the University of Guelph Physical Resources web page

2 Heating, Ventilation And Air Conditioning Systems (Hvac)

2.1 General

.1 Each laboratory shall be provided with mechanically generated supply air and exhaust air in sufficient quantities to prevent the build-up of fugitive emissions in the Laboratory.

.2 Each laboratory shall be supplied with 100% outdoor air; recirculation of general exhaust air or fume hood exhaust air is not permitted.

.3 Local containment and exhaust capture systems such as fume hoods, canopies and extraction arms shall be provided to control emissions at the source.

.4 Fume hoods or other local capture systems shall not be the sole means of room exhaust air. General exhaust air shall be provided as required to maintain ventilation rates and pressurization.

.5 Energy recovery options including heat wheels, runaround loops, and heat pipes may be incorporated provided the level of cross contamination of the outdoor air stream has been reviewed with the Manager and users

.6 Pressure independent, Variable air Volume (VAV) systems may be used for all supply air, general exhaust/return air serving non laboratory spaces. Equip supply and exhaust systems directly serving the laboratory and other process related exhaust systems including fume hoods with air valves.

.7 Laboratories shall be maintained under negative pressure in relation to the corridor or other adjacent space deemed less hazardous. Clean rooms and workspaces requiring positive pressure are an exception.

.8 Relative pressurization of spaces shall be maintained through volumetric airflow offsets managed through the pressure independent, variable air volume system. Control regimes using differential pressure monitoring systems are not acceptable.

.9 Ventilation systems serving Laboratory spaces shall be independent of systems serving other occupancies of the building, such as offices, conference rooms and common elements. This to maximize occupant safety and allow for future flexibility and adaptability to change.

.10 Where new ventilation/exhaust air systems serving Laboratory spaces are provided, space acoustical considerations must be reviewed with the Manager and user to ensure sound power levels within the laboratory do not impede on the specific work being performed. Consider the provisions of duct mounted silencers where applicable. The design must consult with the Manager and users to establish the maximum allowable noise power level in the lab.

2.2 Ventilation Rates

.1 Lab Demand Control Ventilation System:

.1 The designer must consider the installation of a Lab Demand Control Ventilation System that is capable of modulating ventilation air rates in response to the measured concentration of contaminants in the occupiable workspace. To provide for accuracy of measurement and ensure occupant safety, differential type sensors must be included to monitor air quality, stand-alone wall mounted sensors will not be accepted as part of the system proposal.

.2 The recommendation to install this type of system shall be based on a risk assessment, return on investment (ROI) and annual operational cost savings analysis. Submit this analysis to the Manager, Mechanical Design, CPDD, for discussion and review as part of the Schematic Design Phase of Work. A subsequent re-entrainment analysis/ model must be competed by an environmental consultant to validate re-entrainment of laboratory exhaust air back into the building can be prevented using a Demand Control Ventilation System.

.2 Laboratories shall be designed to operate at the default ventilation rates indicated below, unless an approved Lab Demand Control Ventilation System is provided in accordance with 2.2.1.

.3 In Teaching Laboratories, where it is known that Lab activities will cease to exist when unoccupied; Laboratory ventilation rates and temperature set-points shall be maintained based on occupied or unoccupied modes of operation. Occupancy sensors shall be provided to automatically adjust the above parameters.

.4 Laboratories shall be designed to operate at the following default ventilation rates:

.1 Occupied Mode: 10 Air Changes per Hour (ACH) (4-6 ACH permitted with the installation of an approved Lab Demand Control Ventilation System). Reduced outdoor air changes may be explored if reviewed and approved by the Manager and users.

.2 Unoccupied Mode (Teaching Laboratories): 6 Air Changes per Hour (ACH) (2 ACH permitted with the installation of an approved Lab Demand Control Ventilation System)

.3 Regardless of the space design air change, or where reductions in air changes are provided either via an unoccupied mode of operation, or through consultation with the Manager, the design must ensure that space

temperature and humidity set point criteria are maintained within the laboratory

.5 As part of the Schematic Design Phase of work, prepare a floor plan indicating relative pressurization of spaces and direction of airflow and submit to the Manager, Mechanical Design, CPDD, for review.

.6 Emergency Purge Mode:

.1 A highly visible push button located near the emergency exit of the lab shall be provided to enable an increased room ventilation rate and full exhaust airflow of the associated fume hood(s) to quickly evacuate contaminants in the space.

.2 Once enabled, the emergency purge mode ventilation rate shall be active for minimum two (2) hours. Activation duration

.3 The requirement for emergency purge mode of operation and activation duration shall be confirmed with the University of Guelph's Environmental Health and Safety (EHS) Department as part of the schematic design phase of work, based on a risk assessment of the hazardous materials or processes to be used in the laboratory space.

2.3 Central Air Handling Systems

.1 Air handling systems serving Laboratory Spaces shall be fully custom type, provided in accordance with Design Standard DSM-01, HVAC Systems. Full redundancy of air handling systems are not required unless specifically requested.

.2 Provide minimum efficiency reporting value (MERV) 8 Pre-filters and MERV 14 final filters for air handling systems serving laboratory spaces. HEPA filters should be provided for specialty spaces where research materials or animals are susceptible to contamination. Where remote filters are installed outside of air hanging/exhaust fan systems, the location of the filter must be accessible to allow for ease of maintenance. Where filters are installed above ceilings, provide unique identification labels on the ceiling to locate filter. Remote filters are to be located in spaces which can be easily accessed and not pose impact to the operation of the space i.e. circulation corridors.

.3 Energy Recovery:

.4 Must be provided to recover energy from the exhaust air systems to pre-condition make-up outdoor air.

.5 Shall be complete with full by-pass to reduce pressure drop during free cooling (economizer) operation and whenever else the fan power energy penalty of passing air through the recovery device exceeds the energy recovered.

.6 Shall be complete with a minimum sensible recovery efficiency of 75%.

.7 A risk assessment of energy recovery device type shall be complete to ensure cross contamination concerns are addressed while maximizing energy recovery efficiency of the system.

.8 Systems to consider include the following:

.9 Heat Recovery Run-Around Loops

.10 Heat Pipe Systems

.11 Heat Recovery Chillers

.12 Others discussed with the Manager, Mechanical Design, CPDD and approved based on a hazard risk assessment.

2.4 Exhaust Air Systems

.1 Laboratory exhaust air systems should be designed for high reliability and ease of maintenance. Consideration shall be provided for multiple exhaust air fans and provisions for sectioning of equipment such that maintenance can be performed on any single fan while sustaining operation of the system.

.2 Where the renovation or new scope of work includes modifications to an existing laboratory exhaust system, or the installation of a new laboratory exhaust air system, and impacts to the environment include discharge of any contaminant into the environment (excluding sewers) a re-entrainment analysis must be completed as required by the Environmental Activity and Sector Registry (EASR)

.3 To the extent possible, components of exhaust systems should allow routine maintenance to be performed without exposing personnel to the exhaust airstream.

.4 Exhaust fans from fume hoods or local exhaust control systems should be positioned as close as possible to the point of final discharge, such that exhaust air ductwork routed through the facility is maintained under negative pressure.

.5 Manifolding of fume hood exhaust air systems and connection to one or more common central fans is preferred. However, shall only be permitted for fume hoods with similar types of use and where no chemical reactions can occur.

.6 Fume hoods designed for the exhaust of perchloric acid or radioactive contaminants must be independently ventilated and specifically designed for the application; such as the integration of a wash-down cycle in the instance of a perchloric acid fume hood.

.7 Central fume hood exhaust air systems shall be designed with N+1 redundancy and fed from the essential power system.

.8 Lab exhaust air systems shall be constructed of materials suitable for the chemicals encountered.

.9 The requirement for spark-proof exhaust air system construction should be reviewed for each application, and shall be considered based on the material or exhaust vapor being handled.

.10 Each lab exhaust air fan shall be complete with an up-blast configuration with either a discharge stack or high-plume exhaust.

.11 Exhaust stacks from fume hoods should provide a minimum discharge velocity of 15.2 m/s (3000FPM). Where this exist velocity can not be achieved a dispersion study shall be complete, indicating that a lower velocity will be acceptable.

.12 A minimum distance of 30m (98FT) shall be maintained between fume hood/ contaminated lab exhaust outlets and building intakes. This requirement additionally applies to adjacent building intakes and openings.

.13 Fire detection and alarm systems shall not be interlocked to automatically disable fume hood or local control exhaust air systems handling hazardous materials or emissions.

2.5 Fume Hoods

.1 Proximity occupancy sensors, automatic sash closures and face velocity monitoring systems shall be considered for each fume hood, based on the results of the Functional Programming and Planning exercise.

.2 Fume hood design and face velocity shall be discussed during the Schematic Phase of Design with EHS and the Manager, Mechanical Design, CPDD. In general:

.3 Existing and legacy fume hoods shall be assumed to operate with a face velocity of 80-120FPM

.4 New fume hoods shall be selected to ensure a safe working environment with a face velocity as low as 60FPM.

.5 New fume hoods shall be tested and certified in accordance with ASHRAE 110 requirements.

.6 High performance fume hoods certified to ensure a safe working environment with a face velocity below 60FPM are to be investigated on a project-by-project basis.

.7 All fume hood exhaust systems are to include low flow alarm sensing devices to locally alert the user of a low flow condition and possible loss of containment

.8 Refer to the University of Guelph EHS Program for additional information and guidance.

2.6 Miscellaneous Exhaust Devices

.1 Local exhaust air drop(s), Articulating Arm Type Exhaust Air Drop(s), Snorkels and Bench Sweeps shall be provided where a requirement for local point-of-use exhaust is identified through the Functional Programming and Planning exercise.

.2 Miscellaneous exhaust air devices shall be constructed of a material suitable for use with the chemicals encountered.

2.7 Ductwork:

.1 All ductwork shall be smooth rigid type; flexible ductwork is not permitted under any circumstances.

.2 All exhaust ductwork from chemical fume sources shall be constructed of welded stainless steel. Types shall be based on chemicals encountered.

.3 Fiber glass reinforced (FRP) ductwork may be considered a suitable alternate to Stainless Steel material, and is to be discussed with the Manager, Mechanical Design, CPDD during the Schematic Design Phase of work.

.4 Ductwork serving fume hoods shall not be fitted with fire or smoke dampers and must be constructed watertight. Where fume hood exhaust air ductwork must pass through a fire rated assembly, provide suitable fire wrap from the rated assembly to the outdoors in accordance with OBC.

.5 Acoustic lining and other liners are not permitted within the airstream of ventilation system ductwork.

2.8 Supply and Exhaust Air Terminal Units

.1 Terminal elements shall consist of venturi valves with pressure independent flow control for variable speed operation.

.2 Terminal units shall be located such that they are readily accessible for maintenance.

.3 Terminal units shall be complete with a maximum 1s speed of response.

.4 Terminal units shall be provided with their own stand-alone system of controls which shall be capable of communicating with the facility Building Automation System without the need for protocol converters or translators (i.e. native BACnet).

.5 Terminal units shall utilize flow tracking to maintain prescribed airflow offsets and associated space relative pressurization.

.6 Terminal units shall be suitable for both horizontal or vertical mounting.

.7 Galvanized, Aluminum or Stainless-Steel valves shall be deployed for general ventilation systems.

.8 Stainless Steel or Heresite Coated valves, suitable for the chemicals encountered, shall be provided for fume hood exhaust air applications.

2.9 Supply and Exhaust Air Outlets

.1 Location of supply air outlets shall be carefully coordinated in each laboratory space containing a fume hood, or other containment device, as to not impact the containment effectiveness.

.2 Laminar flow type supply air diffusers (non-aspirating) are preferred in Laboratory spaces containing a fume hood or other similar containment device.

.3 Preferred location of general exhaust air inlets are at low level at the head of the Laboratory; however, an analysis of types of chemicals and density of gases anticipated shall be complete to determine the final location of general exhaust air grille placement.

3 Plumbing Systems

3.1 General

.1 Lab services and utilities should be arranged along the common lab planning module that aligns with the lab casework. Location of services should be arranged such that lab reconfigurations will minimize the need to relocate major services.

.2 Lab service connection points to be located such that future modifications and configurations of lab casework and equipment will have minimal impact on the delivery of the services to the work bench and equipment.

3.2 Sanitary Drainage

.1 Provide in accordance with University of Guelph Design Standard DSM-02 Plumbing Systems.

.2 All drain piping serving Chemistry Laboratories and Wet Laboratories shall be constructed of acid resistant PVDF

for the greater of the first 50'-0" or until the effluent is adequately diluted and deemed safe for use with conventional piping materials.

.3 All plumbing fixtures located in the laboratory shall be individually vented

3.3 Water Distribution

.1 Provide in accordance with University of Guelph Design Standard DSM-02 Plumbing Systems.

.2 Water supplies to handwash, emergency eyewash and shower stations shall be extended from the potable water system.

.3 Water supplies to Laboratory sinks, benches, fume hoods and Process Equipment shall be extended from the non-potable water system.

.4 Zone protection in the form of a non-testable device shall be provided for individual labs fed from the non-potable water system.

.5 A Lab faucet vacuum breaker shall be provided on each outlet within a Zone Protected Lab where it is necessary to protect individual outlets from self-induced cross-contamination.

.6 Fixtures and equipment fed from the non-potable water system shall be clearly labeled as fed from a non-potable water supply.

.7 Water supply shall be of sufficient pressure to allow for effective operation of fixtures, equipment

3.4 Natural Gas

.1 One (1) strategically located emergency gas master shut off valve shall be provided in a visible location at the exit of the laboratory space, within an enclosure and identified as "Emergency Gas Shut-Off".

3.5 Fixtures and Trim

.1 Minimum one (1) dedicated handwash sink shall be provided in each laboratory with handsfree hardwire sensor activated faucet. Water supplies to this handwash sink shall be extended from the Potable Water System.

.2 Minimum one (1) eye/face wash station and emergency drench shower shall be provided in each laboratory. Water supplies to this eye/face wash station shall be extended from the Potable Water System.

.3 Water delivered to each handwash, eye/face wash and emergency drench shower station shall be tempered. Tempered water associated with eye/face wash and emergency drench shower shall be delivered between 18˚C and 24˚C. Tempering valve shall be designed to fail cold.

.4 Floor drains located in laboratories shall be limited to the emergency shower area only.

.5 All services to be provided with service isolation valves upon entry into each lab space. In general, it is preferred that all service valves be located neatly in an accessible area of the ceiling space above the main entry door.

3.6 De-ionized (DI) Water

.1 Provide in accordance with University of Guelph Design Standard DSM-02 Plumbing Systems.

3.7 Compressed Air System

.1 Provide in accordance with University of Guelph Design Standard DSM-02 Plumbing Systems.

3.8 Vacuum System

.1 Provide in accordance with University of Guelph Design Standard DSM-02 Plumbing Systems.

3.9 Specialty Gases

.1 Provide in accordance with University of Guelph Design Standard DSM-02 Plumbing Systems.

4 Fire Protection Systems

.1 Provide in accordance with applicable NFPA Standards, Local Code(s) and University of Guelph Design Standard DSM-04 Fire Protection Systems.

.2 Fire extinguishers appropriate for the chemicals and equipment in use must be installed near the entrance of each laboratory.

5 Automation And Control Systems

.1 Provide in accordance with University of Guelph Design Standard DSM-03 Building Automation Systems

.2 Refer to Typical Laboratory Temperature and Pressure Control Schematic attached to and forming part of this Design Standard.

6 Commissioning And System Acceptance

.1 The Design Engineer of record shall ensure that the basic commissioning requirements indicated below are included in the appropriate section(s) of the contract specification package. These requirements may be modified should a third-party Commissioning Agent be retained by the University;

.2 Ventilation system functional tests, including emergency purge mode of operation, and unoccupied mode set-backs for temperature and airflow, as applicable.

.3 Demonstration of relative pressurization achieved, including record submittal of facility floor plan indicating relative pressurization of spaces and direction of airflow.

.4 Testing, Adjusting and Balancing (TAB) Reports for exhaust air, and supply air systems.

.5 Functional performance testing, labelling and identification of each fume hood and other applicable containment devices in accordance with ASHRAE Standard 110 and University of Guelph EHS Standards.

.6 Plumbing fixture functional testing

.7 Cross Contamination device testing and identification in accordance with CSA and University of Guelph EHS Standards.

.8 Emergency shower and eye/face wash system testing and identification in accordance with ANSI and University of Guelph EHS Standards.

.9 Separate user and facility maintenance training modules for laboratory and central equipment / systems.

.10 All pressure vessels and fittings built to a registered design shall be complete with a Canadian Registration Number (CRN) to identify that the design has been accepted and registered for use in the province.

7 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Mechanical

Building Automation Systems

Version	25-01
Effective Date	September 1, 2025
Approved By	Steve Nyman, Director, Maintenance & Energy Services
Signature	

1 Introduction

1.1 General

.1 This Building Automation Systems (BAS) Design Standard has been developed to establish the University's minimum expectations and requirements for new BAS installations on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new BAS installation within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing BAS infrastructure.

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Mechanical Design, CPDD before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The System Designer remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Mechanical Design, CPDD, together with proposed measures for addressing the conflict.

.3 Designer is responsible for all as-builts.

.4 All designs must include site walks to verify existing conditions.

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an innovative approach to design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed design innovation shall be tabled for consideration by the Manager, Mechanical Design, CPDD, before the completion of Schematic Design.

1.5 Reference Documents

.1 Ontario Building Code

.2 ASHRAE Guidline 36, High-Performance Sequence of Operation for HVAC Systems

.3 Canadian Electrical Code

.4 ASHRAE Standard ANSI/ASHRAE 135 - BACnet

.5 ASHRAE Guideline 13, Specifying Direct Digital Control Systems.

.6 ANSI/TIA/EIA862 Building Automation Systems Cabling Standard for Commercial Buildings.

.7 Federal Communication Commission (FCC) Rules and Regulations, Part 15, Subpart J for computing devices

.8 Public Health Agency of Canada - Laboratory Biosafety Guidelines

.9 Canadian Council for Animal Care Guidelines

.10 LEED Guidelines

.11 Zero Carbon Building Standard, ZCB

.12 Mechanical Plumbing Systems Standard Section 6.3

.13 Mechanical HVAC Systems Standard Section 6.4

.14 Electrical Power Systems Standard Section 7.2

.15 Architectural Space Planning & Finishes Standard Section 5.2

2 Design Standards

2.1 General

.1 The requirements outlined in the following clauses are applicable to all Building Automation System (BAS) installations. Application Specific requirements are outlined under clauses 2.2 – 2.17

.2 This document is not intended to describe the controls or sensors required for correct operation of the building systems or equipment. The Designer remains responsible for ensuring equipment and systems can be appropriately operated and maintained.

.3 Overarching Design Principles

.1 All new BAS installations shall be designed as an integrated, open protocol, BACnet compliant system to ANSI/ASHRAE Standard 135.

.2 All BAS installations in projects involving significant renovations shall be designed as an integrated, open protocol, BACnet compliant system to ANSI/ASHRAE Standard 135; any proposed deviations shall be presented to the Manager, Mechanical Design, CPDD, for approval during the Schematic Design Phase.

.3 All BAS installations in projects involving minor renovations to areas currently served by Legacy (KMD) systems shall comply with 2.1.3.b above; any proposed deviations, including modifying existing Legacy (KMD) system, shall be presented to the Manager, Mechanical Design, CPDD, for approval during the Schematic Design Phase.

.4 Buildings shall not have multiple Control systems. Wherever possible, the Building Automation System shall directly control the equipment. Vendor provided control systems shall only be permissible with the approval of the Manger, Mechanical Design, CPDD.

.5 Interfacing Standards:

.1 All components must be CSA approved.

.1 Input/output devices to use ASCII (American Standard for Communication and Information Interchange) code and standard EIA (Electronic Industry Association) interfaces.

.2 CSA T530: Building Facilities, Design Guidelines for Telecommunications (same as EIA/TIA 569).

.3 IEEE 802.3 Ethernet 10Base-T LAN

.6 All Components and Equipment shall be designed and selected to provide the requisite level of function and performance when operating in following minimum ambient condition ranges:

.1 Temperature: 0°to 40°C (32° to 104°F) for Indoor Installation / -30°to 40°C (-22° to 104°F) for Outdoor Installation.

.2 Relative Humidity: 10% to 90% non-condensing

.3 Withstand VHF, UHF, FM, AM or background RFI as generated by commercial or private, portable or fixed transmitters that meet regulatory codes

.7 For retrofit work the existing conditions may differ from those stated above. The designer must confirm that all newly specified equipment is rated for the conditions experienced within the retrofitted space.

.8 All equipment, components& devices shall be designed to operate on an electrical power service rated at 120 VAC +/- 10%, 60 Hz nominal.

.1 Components installed within Motor Control Devices to be designed to operate with transient electrical fields occurring within these devices

.9 Licenses and Ownership

.1 Ownership of, and licenses for, all hardware and software originally installed or required for ongoing system operation, maintenance and modification to be registered, without restrictions, in Owner's name.

.2 Licensing to permit an unlimited number of users to access system without additional fees.

.3 As of last month of the warranty period, software is to be upgraded to current version or release at no cost to the Owner.

.10 Accessibility

.1 All equipment must be installed such that access can be easily provided for maintenance.

2.2 BAS Architecture – Individual Buildings

.1 BAS Network Architecture

.1 Dedicated VLAN for BAS:

.2 BAS communication architecture to consist of at least two tiers with each tier using ethernet communications (ISO 8802-3/IEEE 802-3), using high speed local area network communications .

.1 Tier 1: University of Guelph CCS Network;

- High level network providing communication between campus Building Control Unit's (BCU's).
- BCU shall connect to CCS network at a patch panel using ethernet communications (ISO 8802-3/IEEE 802-3), using high speed local area network communications. TCP/IP to be used as communication protocol on first tier network.
- Dedicated VLANs for the BAS shall be coordinate with CCS.

.2 Tier 2: Equipment Controller network;

- Lower level network providing communications between Equipment Control Units (ECU's) and BCU's.
- Ethernet communications (ISO 8802-3/IEEE 802-3), using high speed local area
- Network communications. BACnet/IP to be used as communication protocol on second tier network. Network to be designed in a daisy-chain or ring topology. Designer to discuss with University of Guelph requirements for redundancy/critical nature of equipment served.
- Refer to Appendix A, BUILDING AUTOMATION CONTROLLER, for further information.

.3 System architecture to be modular, permitting stepped expansion of application software, system peripherals, and field hardware

.4 Use of non-networked stand-alone control devices is not permitted.

.5 Designer to ensure contractor coordinates IP address with University of Guelph's IT department Computing & Communications Services (CSS)..

.2 Control System:

.1 High-speed IP network comprising microprocessor based Direct Digital Control (DDC) controllers with a web-based operator interface,

.2 Each system controlled or monitored through the BAS, building floor plan, and control device to be displayed through point-and-click graphics,

.3 Web server with network interface card to gather data from this system and generate web pages that can be accessed through conventional web browser on any PC connected to network,

.4 Operators to access this system through web browser, and browser interface to perform normal operator functions.

.5 OEM Controller integration

.6 BAS to incorporate hardware and software to allow bi-directional data communications between BAS and 3rd party manufacturers' control panels.

2.3 BAS Functional Requirements

.1 Functional requirements shall be defined through the use of Control Sequences & Schematics and Points List used in combination.

.1 Control sequences shall be developed based on overarching criteria defined under Clause 2.10.

.2 Controllers

.1 Designed to operate with local closed loop programming, independent from server, if peer-to-peer communication is interrupted.

.3 Central BAS Web Server

.1 Designed to perform global application programs and data consolidation including:

.2 Communications with controllers,

.3 Host software routines for:

.1 BAS Server operation,

.2 Database creation and data storage,

.3 Web based Graphical User Interface (GUI) with graphics generation and display,

.4 Reporting

2.4 BAS Server – Individual Buildings

.1 A dedicated BAS Server is not required; rather the BAS software shall be installed on a designated Campus Server residing on a Tier I network.

.1 Minimum performance levels for the server shall be estimated before completion of the Design Development Phase and submitted to the Manager, Mechanical Design, CPDD.

.2 Performance levels for the server shall be validated by the chosen BAS vendor and finalized within 60 days of commencement of the Construction Phase

2.5 Main Operator Workstation – Individual Buildings

.1 A dedicated Main Operator Workstation (OWS) is not required.

.2 However, each Mechanical Room / Equipment Room shall have at least one (1) designated connection point to allow access to the BAS Graphics using a portable device.

2.6 Internet Appliances

.1 BAS architecture and software to incorporate thin client design software to allow use of web appliances such as Tablets and web-enabled cellular telephones

2.7 Fibre Optic Cable

.1 Duplex 900 mm tight-buffer construction designed for intra-building environments

.2 UL listed sheath OFNP meeting requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.

.3 Field terminations made using ST type connectors with ceramic ferrules and metal bayonet latching bodies.

2.8 Tier 2 Network – Managed Switches

.1 Selected as Industry standard hardware

.1 Central system to use an Ethernet Local Area Network (LAN) for communication.

.2 Communication between central server and controllers to be IP.

.3 Communication between equipment controllers to be BACnet/IP.

.4 Managed switches required for equipment control network to be provided by controls contractor.

.1 Refer to Appendix B, BUILDING AUTOMATION MANAGED SWITCHES, for further information.

2.9 Routers and Bridges

.1 To be used in legacy installations or as required. Intended function shall be presented to the Manager, Mechanical Design, CPDD, for approval during the Schematic Design Phase.

.2 Selected as Industry standard hardware

.1 Central system to use an Ethernet Local Area Network (LAN) for communication.

.2 Communication between central server and controllers to be IP.

.3 Router to bridge IP and data link (ARCNET, BACnet, MS/TP, LON) to be used between controllers if required.

.4 Router to use FLASH memory and allow firmware updates to be performed from remote work station.

2.10 BAS Software

.1 System software to support alternate operating systems, such as Red Hat Linux, or Sun Solaris.

.2 Software to be completely web based without need for interface/translation devices or need to load software individually on each computer.

.3 System and software to permit remote access, for multiple users, through internet connections.

.4 Graphic files to be created with use of graphics generation package furnished with system.

.5 Software to support concurrent operation of multiple standard and non-standard protocols including but not limited to:

.1 BACnet

.6 Operator Interface designed to operate through standard desk top or lap top personal computers without requiring purchase of special software from BAS manufacturer.

.1 Interface on these personal computers to be standard Web Browser by Microsoft, Chrome or Firefox.

.7 System software to support automatic paging

2.11 Control Sequences - Overarching Criteria

.1 Control sequences shall be developed with consideration to the overarching criteria listed below. Where criteria have not been defined, develop control sequences based on guidelines published in the ASHRAE Handbook and/or following industry best practices.

.2 Control sequence descriptions, and list of control and alarm points, shall be submitted for review/approval by the Manager, Mechanical Design, CPDD and Director, Maintenance & Energy Services prior to the completion of Design Development.

.3 Minimum Requirements

.1 Occupied/Unoccupied mode schedule for terminal unit set-back controls

.2 Occupied/Unoccupied mode schedule and Occupancy sensors to control AHU(s) dedicated to an individual classroom

.3 Standalone local washroom exhaust fan interfaced with the light switch and an Off-Timer

.4 Control Valve sequences shall incorporate a feedback loop to detect leakage past valve when in "Closed Position"

.5 Pressure is to be monitored across all individual filter racks (analog value)

.6 Supply air humidity sensors are to be located downstream of air handlers in the ductwork to promote full mixing and accurate readings.

.7 Leak sensors to be installed in flood-prone areas including mechanical rooms and elevator machine rooms and connected to the BAS.

.8 Space temperature to be monitored by the BAS in mechanical rooms and vestibules and any other areas where a freezing potential exists.

.4 Scheduling

.1 Scheduling is to include the capability of including multiple adjustable modes of operation including: School In, School Out, Run Day (unoccupied, but runs equipment for 30 minutes during the day), and Run Night (unoccupied, but runs equipment for 30 minutes overnight) . Specific operation of systems during these modes is to be defined in the sequence of operations.

.2 Scheduling application must include the ability to override schedules to turn systems on or off for Holidays and special events.

.3 Systems that can be shut down will do so based on the schedule

.4 Sequences and Schematics for Typical Systems

.5

.5 Exhaust Fans

.1 Exhaust fans provided for ventilation will typically operate based on a predefined Occupancy Schedule. Occupancy sensors can be considered for control if applicable

.2 Exhaust fans provided for temperature control must include a temperature setpoint that is adjustable from the BAS graphics.

.3 For special circumstances such as equipment specific exhaust, local control of exhaust fans may be utilized. Consult with the University of Guelph Manager, Mechanical Designat the time of design.

.6 Condensate Pump Systems

.1 BAS to monitor alarms from packaged duplex pumping system.

.7 Global Commands

.1 Chilled Water Clamp.

.2 Ability to clamp all chilled water control valves to a fixed position (excluding critical systems)

.3 This will allow the chilled water valves to be limited to a maximum position for extreme hot days as well as any CUP production limitations

.8 Heating setpoint Offset

.1 Ability to offset the setpoint for all heating systems (excluding critical systems)

.2 This will allow temperature setbacks for Holidays, and will limit steam requirements due to any CUP production limitations

.9 Maximum Outdoor Air Damper Position (all Mixed Air units)

.1 Ability to adjust maximum damper position

.2 This will allow maximum damper position to be limited based on outdoor temperature and humidity

.10 SAT setpoint Offset

.1 Ability to put an offset on all fan units.

.2 This will allow a temperature offset to be introduced for extreme temperature days to allow for reduction of chilled water use as well as steam use

.11 Perimeter Heating Disable

.1 Ability to disable perimeter heating for all buildings.

.2 This will allow buildings, on days with cool mornings and warmer days, to not use perimeter heat in the morning and chilled water later on.

.12 VFD Maximum Clamp

.1 Ability to set the VFD speed for critical global adjustment days (excluding critical areas)

.1 Want to know what was the last speed the unit was running

.2 More thought required for this section – SN

.13 Global Command Page

.1 Global Command Page shall be created on each BAS system to allow operator to monitor status of global command points and have the ability to set the values and override automatically calculated values.

.2 This page will include:

.1 Current Schedule running

.2 Chilled Water Maximum clamp value

.3 Heating setpoint offset value

.4 Damper Maximum Position value

.5 SAT offset value

.6 Perimeter Heating enable status

.7 VFD Maximum clamp value

.8 Chilled water pressures and temperatures in various locations

.3 This page is also to display the status of chilled water cooling systems that have domestic water backup

.14 Emergency Services Only

.1 Ability to disable all systems on campus with the exception of those providing emergency services as defined by the University.

2.12 BAS Graphics

.1 At a minimum BAS graphics shall display the following:

.1 Facility Site Graphic

.2 Individual Graphics for each System

.3 Terminal Unit & Equipment Floor Plan

.4 Room Number and Area designation for each Terminal Unit & piece of Equipment

.2 A Main Page in Tabular Format displaying, as applicable, the following information for each piece of equipment/system

.1 Command Status

.2 State Status

.3 Current Setpoints

.4 Current Speed

.5 Current Temperatures

.6 Alarm Condition, if any, displayed in a different color.

.1 Alarms to be assigned a Priority Ranking and include Descriptor identifying relevant equipment and its location. (eg. E1 BLDG 040 P4 Condensate Pump failed to start <Room 008>)

.7 Area served by Equipment/System with a link to the individual graphic for the said Equipment/System

.3 Graphics shall be developed using a standard library of image files and industry standard symbols.

.4 Graphics shall have the capability to be modified and edited by University of Guelph personnel. This functionality shall allow the University to accomplish the following:

.1 Relocate and customize information provided within the graphics

.2 Create links to external relevant information and reports including Testing and Balancing reports or Operation and Maintenance manuals

.3 Rename equipment and other graphic labels as required.

.4 Provide link to.pdf with sequence of operations and control schematic for each piece of equipment on that equipment's graphic.

2.13 BAS Alarms

.1 The BAS system shall be complete with all alarming required for proper operation of the equipment and systems.

.2 All time delays and alarm thresholds shall be adjustable via the software, not via the BAS graphics.

.3 Alarms shall include any specific alarms required for specialized applications.

.4 Critical alarms requiring email or text notification are to be confirmed during the design and commissioning of the project.

.5 At a minimum the following alarms are to be provided:

.1 Priority 1 alarms (P1):

.1 HVAC system motor fails to start (pumps, fans, etc.). BAS shall include the capability of detecting a broken belt as part of this alarm through a properly calibrated current sensing relay.

.2 Critical fan system supply air temperature deviates from setpoint by 5°C for more than 10 minutes

.3 Perimeter heat pump fails to start and temperature is not at set point

.4 Critical exhaust fan motors fail to start

.5 Critical static pressure deviates from setpoint by an adjustable amount for 10 minutes.

.6 High-high level for all condensate tanks, sump pits, or any other application where a flood will occur if the high-high level is surpassed

.7 Low temperature alarm in vestibules or other freeze-prone areas

.8 Overall building maximum or minimum space temperature exceeds threshold (adjustable).

.9 Alarms from leak sensors where installed.

.2 Priority 2 Alarms (P2):

.1 Non-critical fan system supply air temperature deviates from setpoint by 5°C for more than 10 minutes

.2 Terminal heat pump fails to start and temperature is not at set point.

.3 Non-critical exhaust fan motor fails to start

.3 Maintenance Alarms (Maint):

.1 System not in Auto Mode

.2 Filter pressure drop is out of range (low or high)

.3 Control valves leaking (Temperature difference across all heating or cooling coils greater than 5°C after a 5 minute delay following control valve closing).

.4 Dampers fail to open

.5 Dampers fail to close

.6 Supply air temperatures cycling

.7 Converter temperatures more than 10°C from setpoint for more than 10 minutes

.8 CO_2 sensor readings are out of range

.9 Broken belt alarm (to be setup and configured through the variable frequency drive).

.4 High CO_2 level (when CO_2 sensor(s) are utilized)

.5 Differential pressure across filter bank exceeds 250pa

.6 High supply humidity level in supply air duct

.7 High duct pressure

.8 High duct temperature

.9 Low plenum air temperature after 3 resets of Freezestat. Refer to the sequences attached for the approved freezestat sequence strategy.

.10 Temperature difference across all heating or cooling coils greater than 5°C after a 5 minute delay following control valve closing

.11 Supply air temperatures that deviate more than 5°C from setpoint for more than 10 minutes

.12 Converter temperatures that deviate more than 10°C from setpoint for more than 10 minutes

.13 Outdoor air, mixed air, exhaust air damper positions that do not match the command. Logic must be implemented to exercise dampers fully open and closed every 24 hours. Alarms for leaking or incorrect damper positions must be based on physical monitoring of damper position or temperature calculations.

.14 Leaking steam valves: For all steam-to-water heat exchangers, alarms must be provided if the steam valves are closed and the heat exchanger or supply water temperature sensor detects high temperature in the system (initially set at 50°C)

2.14 Power Supplies and Line Filtering

.1 Power Supplies:

.1 Where Essential Power is available in a building, all Tier I devices shall be fed off an Essential Power source.

.2 Power supplies to all BCU's and all ECU's/Control Elements associated with equipment fed off an Essential Power source shall be extended from an Essential Power source, preferably the same Essential Power source feeding the equipment in question.

.1 An On-Board UPS Power source with a minimum 12 hour backup shall be provided within each BCU & ECU with the prior approval of the Mechanical Design manager. Include written approval in the close out documentation

.2 Capacitor UPS systems shall be preferred over battery technology due to reduced maintenance requirements.

.3 Control transformers shall be UL listed,

.4 Line voltage units shall be CSA listed,

.5 Provided with over-current protection in primary and secondary circuits,

.6 Sized to limit connected loads to 80% of rated capacity.

.7

.2 DC power supplies:

.1 Output to match equipment current and voltage requirements,

.2 Units to be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation to be 1.0% line and load combined, with 100-microsecond response time for 50% load changes,

.3 Units shall have built-in over-voltage and over-current protection and to be able to withstand 150% current overload for at least three seconds without trip-out or failure,

.4 Units shall be capable of operation between 0°C and 50°C (32°F and 120°F). EM/RF to meet FCC Class B and VDE 0871 for Class B and MILSTD 810C for shock and vibration.

.3 Power Line Filtering:

.1 Shall be provided to afford internal or external transient voltage and surge suppression for workstations and control modules,

.2 Surge protection:

.1 Dielectric strength of 1000 V minimum,

.2 Response time of 10 nanoseconds or less,

.3 Transverse mode noise attenuation of 65 dB or greater,

.4 Common mode noise attenuation of 150 dB or greater at 40-100 Hz.

2.15 Automatic Control Valves

.1 Performance:

.1 General:

.1 Straight through water valves shall be single seated type with equal percentage flow characteristics and minimum resolution of 40:1 or greater.

.2 Designed to close at a differential pressure of 280 kPa (40 psi), with an inlet pressure of 1035 kPa (150 psi).

.3 Three-way mixing water valves: linear for each port giving constant total flow.

.4 Modulating steam valves: modified linear flow characteristics.

.5 All valve body must avoid dielectric corrosion.

.2 Steam Valves, Pressure Drop,.

.1 Modulating, 100 kPa (15 psig) or less steam supply pressure: maximum 80% of inlet gauge pressure.

.2 Two position, 100 kPa (15 psig) or less steam supply pressure: maximum 15 kPa (2 psig).

.3 Modulating, greater than 100 kPa (15 psig) steam supply pressure: 42% of the inlet absolute pressure.

.3 Water Valves, Pressure Drop

.1 Two position: maximum 10% of system pump head.

.2 Modulating, two-way: maximum of 36 kPa (12 ft) pressure drop.

.3 Modulating, three-way: maximum of 60 kPa (20 ft) pressure drop.

.4 Proportional valves - Globe:

.1 Body:

.1 Carbon steel, bolted body.

.2 Maximum allowable water pressure: 860 kPa (150 psi)

.3 Maximum working temperature: 216°C (260°F).

.2 Trim:

.1 Stem guided plug,

.2 V-port cage, equal percentage,

.3 T316 stainless steel

.4 Threaded seat ring, T316 stainless steel.

.5 Disc, seals, and other valve components suitable for clean water.

.5 ANSI Class IV leakage.

.6 Refer to Appendix B, PRESSURE INDEPENDENT CONTROL VALVES, for further information

.7 Actuators:

.1 Electric or electronic action

.2 Electronic interface control board, solid state drive, reversible motor, oil immersed gear train

.3 Spring return mechanism to return valve to “normal” position on power failure (i.e. Normally Open (NO), or Normally Closed (NC)),

.4 Manual override for valves over NPS 2½.

.5 Valve positioners:

.1 Microprocessor based digital valve controllers,

.2 HART communications protocol,

.3 Two independent adjustable travel position switches and wiring to BAS for indication of valve position.

.4 To be provided on automatic valves NPS 2½ and larger.

.8 General purpose, drip proof NEMA 2 die-cast housing with corrosion resistant steel cover for indoor applications, watertight NEMA 4 enclosure for outdoor use,

2.16 Automatic Dampers

.1 Multi-leaf Dampers for general service

.1 Shall be parallel blade type for two-position OPEN/CLOSED service

.2 Shall be parallel blade or opposed blade type for modulating service

.2 Performance:

.1 Leakage in closed position: maximum 2% of rated air flow at 500Pa (2 in wg) differential across assembly,

.2 Pressure drop in open position: maximum 50 Pa (0.2 in wg) differential at 5 m/s (1000 fpm).

.3 Frame & Blade Construction :

.1 Insulated or non-insulated depending upon service. Thermal breaks in insulated frame construction.

.2 Extruded aluminum for general applications; formed stainless steel for corrosive environments.

.3 Extruded aluminum, thermally broken,

.4 Seals: extruded vinyl seals, and spring stainless steel side seals,

.5 Maximum blade width: 125 mm (5 in),

.6 Maximum blade length: 1200 mm (4 ft).

.7 Self-lubricated bronze bearings.

.8 Blade linkage with steel tie rods, brass pivots and steel brackets.

.4 Damper Actuator (Operator)

.1 Electric or electronic action

.2 Electronic interface control board, solid state drive, reversible motor, oil immersed gear train

.3 Spring return mechanism to return valve to “normal” position on power failure (i.e. Normally Open (NO), or Normally Closed (NC)),

.4 Manual override.

.5 Damper positioners: microprocessor based digital damper controllers c/w

.6 HART communications protocol two independent adjustable travel limit switches with wiring to BAS for indication of damper position and alarm annunciation in the event position is not positively verified.

.7 General purpose, drip proof NEMA 2 die-cast housing with corrosion resistant steel cover for indoor applications, watertight NEMA 4 enclosure for outdoor use,

.5 Isolation / Control Valves Type for Isolation Service:

.1 Single blade type for modulating and two position, OPEN/CLOSED, service..

.2 Performance:

.1 Leakage in closed position: maximum 0.01% of rated air flow at 7 kPa (28 in wg) differential across assembly,

.2 Linear characteristic with 20:1 turndown,

.3 Sized using Cv numbers in 65% open position for pressure drop of less than 150 Pa (0.6 in wg) differential at 5 m/s (1000 fpm),

.3 Construction:

.1 316L stainless steel construction for Body, Trim, Shaft and all elements exposed to the air stream

.2 Teflon packing glands

.3 Seat: elastomer seat compatible with paraformaldehyde and ethylene gas

.4 Flanged gasketed connections for 7 kPa (28 in wg) service

.4 Damper Actuator (Operator)

.1 Electric or electronic action

.2 Electronic interface control board, solid state drive, reversible motor, oil immersed gear train

.3 Spring return mechanism to return valve to “normal” position on power failure (i.e. Normally Open (NO), or Normally Closed (NC))

- Normal operation: heating normally open, cooling normally closed.

.4 Manual override.

.5 Damper positioners: microprocessor based digital damper controllers c/w

.6 HART communications protocol two independent adjustable travel limit switches with wiring to BAS for indication of damper position.

.7 General purpose, drip proof NEMA 2 die-cast housing with corrosion resistant steel cover for indoor applications, watertight NEMA 4 enclosure for outdoor use,

2.17 Cleanroom and Laboratory (incl. Animal Labs) Pressure Monitor

.1 Space pressure measurement, referenced to adjacent space, designed, tested, and packaged by a single manufacturer.

.1 Standard of Acceptance – packaged by BAS provider. If not Siemens requires prior approval from University Mechanical manager.

.1 Siemens

.1 Monitor unit construction:

.1 Industrial grade metal case mounted on an electrical junction box,

.2 Local digital display control unit;

- Range: -50 to + 50 Pa (-0.19999 to +0.19999 in.wg.)
- Resolution: 5% of reading,
- Display updated every second,
- Spill-proof membrane keypad for programming,
- Local calibration protected by pass-code.

.2 Indicating lights:

.1 Low pressure alarm

.2 Normal

.3 High pressure alarm

.4 Audible Mute

.5 Vivarium standards may differ – ensure vivarium standards are met.

.3 Audible alarm annunciates when pressure in monitored room is in alarm condition.

.1 Adjustable time-delay on alarm initiation for door opening,

.4 Remote alarm annunciation:

.1 High pressure alarm contact - contacts normally open.

.2 Low pressure alarm contact - contacts normally open

.5 Pressure Sensor:

.1 Two velocity sensing elements mounted in-line to each other, with temperature compensating element;

- Pressure measurement accuracy: -50 to + 50 Pa (-0.19999 to +0.19999 in.wg.)
- Temperature compensation range: 12.7 to 35 °C (55 to 95 °F)

.6 Alarm setpoints:

.1 Adjustable to any point over sensing range. Must be set to meet project requirements.

2.18 Building Pressure Control

.1 A dynamic Building Pressure Control System shall be provided to maintain the building pressurized relative to the outside.

.1 Building reference pressure shall be measured on the 2nd Floor

.2 Outdoor pressure reference shall utilize a properly designed outdoor air static pressure pickup port to eliminate the influence of wind pressure.

2.19 Sensors and Instrumentation

.1 All field sensors and instrumentation shall have a measurement range suitable to the application.

.1 All field sensors, instrumentation, and control loops shall meet the minimum performance requirements tabulated below.

Parameter	Variable	Reporting Accuracy	Control Accuracy	Remarks
Temperature	Space Ducted air Liquids	±0.25°C (±0.50°F)	±1.0°C (±2.0°F)	RTD type
	Outside air	±0.5°C (±1.0°F)		
	Differential	±0.15°C (±0.25°F)		
	Dew point	±1.0°C (±2.0°F)		
	Low limit (Freezestat)			3 attempts at Automatic Reset before lockout range:1.7°C to 7.2°C (35°F to 45°F) field adjustable
Humidity	Relative Humidity	± 3%	± 5%	Electronic type Range: 10-100% RH
Pressure	Air	± 1%	± 5Pa (±0.02”w.g)	Electronic type
	Ducts / Space Static / Differential			for compressed air see Liquids requirements
	Liquids	± 1%	± 1.5 psi	
	Absolute / Static / Differential			
Flow	Air	± 1% full scale	± 10% full scale	Multiple-head Pitot Tube Type or Thermal Anemometer Probe Type
	Proving Switch			Differential pressure activated diaphragm type
	Liquids	± 2% full scale		
	Flow Switch			Differential pressure activated paddle type
Gas Detection	CO CO2	± 3% ± 5 ppm		Zone-level CO2 sensors to be installed on wall adjacent to thermostats. System-level CO2 sensors to be installed in return air ductwork.
	Laboratory gases			Project specific requirements
Occupancy Sensors	Occupancy			Can be used for triggering occupancy mode in terminal equipment. Consideration can be provided for hard-wired interface with lighting control system. Occupancy status from lighting control system through network communication shall not be utilized.

3 Installation Standards

3.1 General

.1 The requirements outlined in the following clauses are applicable to all BAS Installation. Application Specific requirements are outlined under clauses 3.2 – 3.13

.2 All campus network drops required to complete the BAS installation shall be provided by the BAS Contractor.

.1 Extend network a connection(s) from the nearest IT/ Communications Closet; coordinate this activity with the Electrical/Communications contractor.

3.2 BAS Panels & Cabinets

.1 Install Building Control Units, Equipment Control Units, and Field Panels in cabinets.

.1 Cabinets shall be mounted on a painted non-combustible backboard which is rigidly mounted to a wall or on a galvanized steel, floor mounted support frame.

.2 Installation on ductwork, equipment, and locations subject to vibration is not acceptable

.3 Cabinets for Terminal Equipment Controllers may be installed on the terminal equipment provided there is no vibration that could affect controller operation or calibration of control device(s).

.2 Cabinets to be sized to accommodate 20% future I/O points.

.3 Cabinet locations are to be coordinated with other trades and the general contractor.

.4 No panels (except Terminal Equipment Controllers) shall be installed in the ceiling space or at an elevation inaccessible for normal & ready access from the finished floor.

3.3 BAS Wiring

.1 Wiring shall be installed in conduit, raceways and enclosures separated from other wiring.

.1 Wiring may be installed without conduit in the interstitial space above finished ceilings provided the following conditions are met:

.1 Wiring has a minimum rating of FT6;

.2 Interstitial ceiling space is within the room where final termination of wire will be made;

.3 Wiring is neatly installed parallel to walls.

.4 Approval in advance by mechanical and electrical manager.

.2 Wiring is supposed and suspended off drop ceiling.

.3 Each run of communication wiring to be continuous length without splices

.4 Wiring within BCU's, ECU's and Field Panels (Cabinets) shall be installed in a plastic tray with a removable cover

.5 Wiring shall be terminated at field-removable, modular terminal strips

.6 Connections within cabinets and panels shall be done using terminals

.7 Wire nuts and Marr connections are not acceptable

.8 Wiring to field sensors shall not be daisy-chained

.9 Should it become necessary to splice field wiring it shall be soldered and a 500mm (20in.) loop length is to be provided

.1 Wire nuts and Marr connections are not acceptable

.2 If soldering is not possible approved B-type crimp connectors are an acceptable alternative

.10 Conduit:

.1 Thin wall (EMT) conduit up to and including 32mm (1¼") size for exposed wiring up to 3 m (10 ft) above floor level

.2 Rigid galvanized steel conduit in locations accessible to public, subject to mechanical injury, or outdoors; and for conduit 40mm (1½") size and larger

.3 Conduit to be parallel with, or at right angles to, building walls

.4 Concealed within finished shafts, ceilings, and walls where possible

.5 Route all conduit to clear beams, plates, footings, and structural members

.6 Watertight compression fittings in exterior locations

.7 Provide watertight seals at penetrations through outside walls

.8 Conduits leaving a building to the outside shall be sealed internally to prevent moist air from being pulled through the conduits, condensing, and then the water freezing inside the conduit

.9 Empty or unused conduit openings and stubs to be plugged or capped with compatible fittings

.10 Plugs or caps on conduit openings are to be maintained during construction

.11 Conduits travelling between separate pressure regime areas shall be sealed internally to prevent migration of air and odors

.12 Conduit to field sensors shall not be daisy chained

.11 Flexible conduit:

.1 Shall be provided for the final conduit run to vibrating or rotating equipment so that vibration and equipment noise is not transmitted to the rigid conduit

.2 Minimum 450mm (18in.) / maximum 900mm (36in.)

.3 shall be provided for the last 450mm (18 in.) of conduit runs to field sensors

.4 A junction box / enclosure shall be provided for terminations

.5 Waterproof flexible conduit to be provided where exposed to weather or in damp or wet locations

.12 Lightning arrester shall be provided according to manufacturer's recommendations between the communication cable and ground wherever cable enters or exits building. Doug Doel to provide feedback on this note.

.13 Fire stopping to be included as required.

3.4 Air Handling Units

.1 At a minimum instrumentation shall be provided at each Air Handling Unit to monitor the following:

.1 Outside Air Temperature (may be common to a building)

.2 Return Air Temperature

.3 Mixed Air Temperature

.4 Filter Pressure Drop across each individual rack of filters

.5 Air Temperature Upstream & Downstream of all Coils

.6 Supply Air Relative Humidity

.7 Supply Air Static Pressure

.8 Supply Air Flow

.9 Supply Fan Speed (where fan is equipped with a Variable Frequency Drive)

.10 Return Air Relative Humidity

.11 Return Fan Speed (where fan is equipped with a Variable Frequency Drive)

.12 Return Air CO_2 sensor (where required)

.13 Supply and Return Fan Status

.14 Control valve command and feedback

.15 Return air pressure (where required)

.2 All damper positions to be provided with end switch.

3.5 Heating & Cooling Coils

.1 A water temperature sensor shall be provided on the inlet and outlet of each coil installed within an air handling unit.

.2 An air temperature sensor shall be provided upstream and downstream of each coil installed within an air handling unit.

3.6 Reheat Coils & VAV Boxes

.1 An air temperature sensor shall be provided downstream of each reheat coil.

.2 Air temperature sensors shall be provided such that the discharge temperature of each VAV can be measured.

3.7 Terminal Units

.1 Terminal units shall be equipped with an Air-flow Monitoring device interfaced with the BAS.

3.8 Heat Exchangers

.1 Temperature sensors shall be provided on the inlet and outlet of each heat exchanger.

.2 Where a dual (or triple) heat exchanger system is used temperature sensors shall be provided on the outlet of each exchanger plus a common sensor for the mixed outlet.

.3 Control valve command and feedback

3.9 Steam

.1 A pressure sensor shall be provided downstream of every PRV station.

.2 A pressure sensor shall be provided on the building's incoming high pressure steam line.

3.10 Compressed Air

.1 A pressure sensor shall be provided on the building's incoming compressed air line (if present).

3.11 Water

.1 A pressure sensor shall be provided on the building's incoming domestic water line.

.2 A pressure sensor shall be provided on the building's incoming deionized water line (if present).

.3 Pressure and temperature sensors shall be provided on the building's incoming chilled water supply and chilled water return lines.

3.12 Identification

.1 Point Object Numbering systems shall include the Building Number as a prefix to all object identifiers. (eg. <99. AC1.SAT> is Building 99 Air Handling Unit 1 Supply Air Temperature).

.2 All Equipment shall be identified in accordance with the University's Identification Standards and numbering convention. Equipment numbers are to be provided by the University's PM Scheduler.

.3 Equipment numbering strategy shall be presented for review/approval by the Manager, Mechanical Design, CPDD and Manager, Maintenance & Energy Services prior to completion of Design Development.

.1 Wiring

.1 All wires shall be tagged at both ends. The tagging shall identify the device a wire is connected to. Use of the point object name is an acceptable means of device identification.

.2 All junction boxes shall be tagged "BAS" with a sequential number suffix.

.4 Control Devices shall be labelled using a Blue Flag Tie-Marker, such as Nelco PT#N-9L (or equivalent). Labels shall be white or yellow with large black text.

.5 All local alarm devices (lights, strobes, horns, etc.) shall be clearly labelled as to their purpose with an appropriately sized lamacoid plastic plate that is securely affixed so as to be visible and legible from the direction of normal approach.

.1 Prior to fabrication, proposed alarm device labels (wording, size, colors) shall be presented for review/approval by the Manager, Mechanical Design, CPDD and Manager, Maintenance & Energy Services.

3.13 Redundant or Obsolete Pneumatic, Electric, Electronic, and DDC Devices

.1 Existing BAS control equipment rendered redundant or obsolete by the installation of a new BAS system or component shall be removed to the greatest extent possible.

.2 Control drawings and graphics shall be updated accordingly.

.3 Removal shall include the clean-up, removal, and proper termination of all existing pneumatic equipment (tubing, piping, panels, actuators, sensors, etc.), existing electronics (wiring, conduit, actuators, sensors) or existing DDC system (controllers, cabinets, sensors, relays, transformers, power supplies, etc.) no longer used by the BAS.

.1 Ductwork or walls affected shall be patched and sealed or covered with a suitable wall plate

.2 Removal may require the re-piping or rewiring of existing BAS control equipment that is to remain

.3 Pneumatic tubing or piping that cannot be removed shall be suitably plugged to prevent air leakage. Crimping or folding of tubing/piping is not acceptable.

.4 Wiring remaining shall be suitably terminated

.4 Removal shall occur immediately after commissioning of the new control system in the building is complete.

4 Appendices

4.1 Appendix A - Building Automation Controller

.1 Programmable System Controllers

.1 Provide all necessary hardware for a complete operating system as required. The Building Controller shall be able to operate as a standalone panel and shall not be dependent upon any higher-level computer or another controller for operation.

.2 Basis of Design Product: Provide Siemens Industry, Inc., Siemens Desigo PXC Primary Automation Controller.

.1 Building Automation Controller shall be BTL Certified.

.3 Building automation controllers shall support the following:

.1 System controllers shall be native-BACnet Secure Connect (BACnet/SC) and shall provide data encryption utilizing secure Websocket protocol with TLS V1.3 (WSS) functioning on TCP/IP.

.2 System controllers shall be native-BACnet/SC or shall provide device authentication of those BACnet/SC devices by utilizing the X.509 International Telecommunication Union standard defining the format of PKI certificates.

.3 System controllers shall utilize two (2) BACnet/SC hubs per BACnet network for logical function. A primary hub is required for communication to occur on the BACnet/SC network. A secondary failover hub shall be required to ensure communication can resume in the case of primary hub failure.

- BACnet/SC hubs shall be embedded devices on the BACnet/SC network.
- BACnet/SC hub-capable controllers shall support routing between different BACnet data link types such as BACnet/SC-to-BACnet/IP-to-BACnet MS/TP routing.
- BACnet/SC controllers with BACnet/SC hub functionality must support a minimum of 100 node connections per hub.

.4 System controllers shall support BACnet/SC node, or BACnet/SC hub+node functionality (natively or with future firmware upgrade) for the system to function.

.5 BACnet/SC must support Certificate Authority (CA) or Certificate Management

- BAS provider must provide software tools for Certificate Authority and Certificate Management.
- The software tool must be made available to interact with the customer's IT department infrastructure by exchanging certificates and CSR (certificate signing request) for certificate management of the BACnet/SC system for the life of the building automation system.
- The BACnet/SC solution must allow for an internal-to-the-organization Certificate Authority (self-signed certificates) utilizing a software tool method capable of generating, singing, and provisioning certificates to the BAS vendor's devices, and revoking certificates completely on its own.
- The BACnet/SC Certificate Management must allow for interaction with a trusted 3rd party Certificate Authority (CA) for customers. The BAS vendor provided software tool for generating certificates and provisioning them to the vendor's devices must be able to generate a CSR (Certificate Signing Request) and be able to export the required common Root Certificate (aka Issuer Certificate) on a file level to be signed by a trusted 3rd party certificate authority of the customer's preference as well as be able to import the signed certificate and provision it to the vendor's devices along with the required unique Operational Certificates (aka Client Certificates).
- Certificate Management must allow for interoperability with 3rd party vendor BACnet/SC certificate management methods and allow for CA migration (CA1 -> CA2).
- The certificates validity period shall be configurable in the vendor's certificate management tool to comply with customer security requirements. This shall be configurable in weeks or years.
- The vendor specific BACnet/SC configuration and management tool from each and every BACnet/SC vendor on the project as well as the corresponding project database containing the Root Certificate must be provided to the customer for ongoing certificate management as well as vendor coordination on the project.

.4 The building automation controller shall support the following:

.1 Modbus integration.

.2 KNX PL-Link as a peripheral bus

.3 Plug & play (KNX PL-Link) periphery devices

.5 The building automation controller shall have the BTL listing and meet the BACnet device profile of a Building Controller (B-BC) and shall support the following BACnet BIBBs:

.1 Data Sharing

- Data Sharing-Read Property-Initiate, Execute (DS-RP-A,B)
- Data Sharing-Read Property Multiple- Initiate, Execute (DS-RPM-A,B)
- Data Sharing-Write Property- Initiate, Execute (DS-WP-A,B)
- Data Sharing-Write Property Multiple- Execute (DS-WPM-B)
- Data Sharing-COV- Initiate, Execute (DS-COV-A,B)
- Data Sharing-COV-Unsolicited- Initiate, Execute (DS-COVU-A,B)

.2 Scheduling

- Scheduling-Internal- Execute (SCHED-I-B)
- Scheduling-External- Execute (SCHED-E-B)

.3 Trending

- Trending-Viewing and Modifying Trends - Initiate (T-VMT-A)
- Trending-Viewing and Modifying Trends Internal-Execute (T-VMT-I-B)
- Trending-Viewing and Modifying Trends-External- Execute (T-VMT-E-B)
- Trending-Automated Trend Retrieval- Execute (T-ATR-B)

.4 Network Management

- Network Management-Connection Establishment-Initiate (NM-CE-A)

.5 Alarming

- Alarm and Event-Notification- Initiate (AE-N-A)
- Alarm and Event-Notification Internal- Execute (AE-N-E-B)
- Alarm and Event-Notification External- Execute (AE-N-E-B)
- Alarm and Event-ACK- Initiate, Execute (AE-ACK-A,B)
- Alarm and Event –Alarm Summary- Execute (AE-ASUM-B)
- Alarm and Event –Enrollment Summary- Execute (AE-ESUM-A,B)
- Alarm and Event –Information- Initiate, Execute (AE-ESUM-A,B)

.6 Device Management

- Device Management-Dynamic Device Binding-Initiate, Execute (DM-DDB-A,B)
- Device Management-Dynamic Object Binding-Initiate, Execute (DM-DOB-A,B)
- Device Management-Device Communication Control- Execute (DM-DCC-B)
- Device Management-Private Transfer- Initiate, Execute (DM-PT-A,B)
- Device Management-Text Message- Initiate, Execute (DM-TM-A,B)
- Device Management-Time Synchronization-Execute (DM-TS-B)
- Device Management-Reinitialize Device- Execute (DM-RD-B)
- Device Management-Backup and Restore- Execute (DM-RD-B)
- Device Management-List Manipulation- Execute (DM-RD-B)
- Device Management-Object Creation and Deletion- Execute (DM-OCD-B)

.7 Building Automation Controller shall support the following Data Link Layers:

- BACnet IP Annex J
- BACnet IP Annex J Foreign Device
- MS/TP Master (Claus 9)

.8 Building Automation Controller shall be able to interact with all of the BACnet objects in the controllers. In addition, the software shall be able to support the following objects as they relate to features in the workstation software:

- Calendar – Creatable, Deletable
- Command – Creatable, Deletable
- Event Enrollment – Creatable, Deletable
- Notification Class – Creatable, Deletable
- Schedule - Creatable, Deletable

.9 Building Automation Controller shall support transmitting and receiving segmented messages.

.10 Building Automation Controller shall have the capability to be the BACnet/IP Broadcast Management Device (BBMD) and support foreign devices.

.11 Building Automation Controller shall have the capability to act as a BACnet router between MS/TP subnetworks and BACnet/IP.

.6 This Building automation controller shall be used for the following types of systems:

.1 Chiller plant systems

.2 Heating plant systems

.3 Cooling Towers

.4 Pumping systems

.5 VAV air handlers

.6 Air handlers over 15,000 cfm

.7 Systems with over 24 input/output points

.8 Rooftop systems

.7 Computing power and memory minimum:

.1 A 32bit, standalone, multitasking, multiuser, real-time 100MHz digital control microprocessor module.

.2 Inputs shall be 16-bit minimum analog-to-digital resolution

.3 Outputs shall be 10-bit minimum digital-to-analog resolution

.4 Memory module (24 Megabyte, minimum) to accommodate all Primary Control Panel software requirements, including but not limited to, its own operating system and databases (see Controllers Software section), including control processes, energy management applications, alarm management applications, historical/trend data for points specified, maintenance support applications, custom processes, operator I/O, dialup communications.

.5 Real time clock and battery

.6 Data collection/ Data Trend module sized for 10,000 data samples.

.7 Flash Memory Firmware: Each Building Level Control Panel shall support firmware upgrades without the need to replace hardware.

.8 Onboard or Modular hardware and connections:

.1 Primary Network communication module, if needed for primary network communications.

.2 Secondary Network communication module, if needed for secondary network communications.

.3 RJ45 port 10/100Mbaud

.4 RS485 ports for subnetworks and point expansion

.5 Man to Machine Interface port (MMI)

.6 USB Port

.7 Wireless Mesh Network Floor Level communication ability

.8 Local Controller Interface. A local user interface to the controller shall be provided. The interface shall be hot swappable and may be mounted on any building controller and automatically read and initiate commands of local database points without further set-up or configuration. The Controller Interface shall be provided for interrogating and editing data, commanding point values at user defined priorities, viewing and acknowledging alarms, and viewing point monitoring reports. An optional system security password shall be available to prevent unauthorized use of the local controller interface and display.

.9 Input and Output Points Hardware

.1 Input/output point modules as required including spare capacity.

.2 Input/output point modules shall have removable terminal blocks.

.3 Monitoring of the status of all handoffauto switches.

.4 Monitoring of all industry standard types of analog and digital inputs and outputs, without the addition of equipment to the primary control panel.

.5 Local status indication for each digital input and output for constant, uptodate verification of all point conditions without the need for an operator I/O device. Each primary control panel shall perform diagnostics on all inputs and outputs and a failure of any input or output shall be indicated both locally and at the operator workstation.

.6 Graduated intensity LEDs or analog indication of value for each analog output.

.7 Optional HOA (hand-off-auto module) with software configurability and LED status indicators.

.10 Code compliance

.1 Approvals and standards: UL916; CE; FCC

.2 Provide UL864-UUKL where called for in the sequences of operations.

.11 Accessories:

.1 Appropriate NEMA rated metal enclosure.

.2 Power supplies as required for all associated modules, sensors, actuators, etc.

.12 The operator shall have the ability to manually override automatic or centrally executed commands at the primary control panels via local, point discrete, onboard hand/off/auto operator override switches. If on board switches are not available, provide separate control panels with HOA switches. Mount panel adjacent to primary control panel. Provide hand/off/auto switch for each digital output, including spares.

.13 Panel setup, point definitions and sequencing diagrams shall be backed up on EEPROM memory.

.14 Power loss. In the event of the loss of power, there shall be an orderly shutdown of all Building Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 30 days.

.15 Building automation control panels shall provide at least two serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals. Primary control panels shall allow temporary use of portable devices without interrupting the normal communications, operation of permanently connected modems, printers or terminals.

.16 Building Automation Controllers shall have the capability to serve as a gateway between Modus subnetworks and BACnet objects. Provide software, drives and programming.

.17 Isolation shall be provided at all primary control panel terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standards 5871980.

.18 Spare Capacity: Provide enough inputs and outputs to handle the equipment shown to be "future" on drawings and 10% more of each point type. Provide all hardware modules, software modules, processors, power supplies, communication controllers, etc. required to ensure adding a point to the spare point location only requires the addition of the appropriate sensor/actuator and field wiring/tubing.

.19 Environment

.1 Controller hardware shall be suitable for the anticipated ambient conditions.

.2 Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 0°C to 49°C (32°F to 120°F).

.3 Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 49°C (32°F to 120°F).

.4 Controller hardware shall be optionally suitable for rooftop environments.

.20 Immunity to power and noise.

.1 Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage.

.2 Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).

.3 Isolation shall be provided at all primary network terminations, as well as all field point terminations to suppress induced voltage transients consistent with:

- RF-Conducted Immunity (RFCI) per ENV 50141 (IEC 1000-4-6) at 3V.
- Electro Static Discharge (ESD) Immunity per EN 61000-4-2 (IEC 1000-4-2) at 8 kV air discharge, 4 kV contact.
- Electrical Fast Transient (EFT) per EN 61000-4-4 (IEC 1000-4-4) at 500V signal, 1 kV power.
- Output Circuit Transients per UL 864 (2,400V, 10A, 1.2 Joule max).

.4 Isolation shall be provided at all Building Controller's AC input terminals to suppress induced voltage transients consistent with:

- IEEE Standard 587 1980
- UL 864 Supply Line Transients
- Voltage Sags, Surge, and Dropout per EN 61000-4-11 (EN 1000-4-11)

.2 Programmable Application Specific Controllers

.1 Each Application Specific Controller shall operate as a standalone controller capable of performing its user selectable control routines independently of any other controller in the system. Each Application Specific Controller shall provide standard applications and programmability to provide both reliability and flexibility. Each application specific controller shall be a microprocessorbased, multitasking, digital control processor.

.2 Basis of design is the programmable Siemens DXR controller

.3 Configurable control applications. Each Application Specific Controller model must have a set of pre-loaded, selectable and field-adjustable control applications appropriate for the secondary HVAC equipment that the controller model is intended to control. Specific applications must be configurable to meet the user's control strategy requirements, allowing for additional system flexibility.

.4 Programmability: Application Specific Controllers shall be programmable. Program language shall be graphical.

.5 Each Application Specific Controller model must have a set of pre-loaded, selectable and field-adjustable control applications for lighting equipment control, independent from or in conjunction with the HVAC control applications, which can be enabled if the appropriate lighting control devices are connected.

.6 Each Application Specific Controller model must have a set of pre-loaded, selectable and field-adjustable control applications for shading equipment control, independent from or in conjunction with the HVAC control applications, which can be enabled if the appropriate shading control devices are connected.

.7 The Application Specific Controller shall include all point inputs and outputs necessary to perform the specified HVAC control sequences. The controller shall accept input and provide output signals that comply with industry standards. Controllers utilizing proprietary control output signals shall not be acceptable. Controllers shall provide outputs utilized either for two-state, modulating floating, or proportional control, allowing for additional system flexibility.

.1 Analog inputs shall be software configurable to accept sensors using 0-10v (such as RH or CO_2 sensors), NTC3k, NTC10k, NTC100k, Ni1000, PT1K 385, and resistance sensors of 1000Ω, 2500 Ω, 10K Ω, and 100k Ω . 24vDC power to drive active sensors shall be an option available from the controller.

.2 Digital input

.3 Analog Outputs shall support 0-10v HVAC control signals.

.4 Digital outputs shall be AC 24V high-side switching triacs, able to switch loads of 250 mA / 6 VA per output.

.5 Every installed Application Specific Controller shall be prepared for the addition of occupancy, CO_2 and humidity sensors

.6 Additional sensors and output modules for occupancy, lighting and shade control within the same space as the HVAC control shall be connected as needed via a sub-network connection on each Application Specific Controller

.7 The Application Specific Controller shall be compatible with a Siemens Room Unit which combines a display with CO_2, temperature and humidity sensing in 1 wall device.

.8 The Application Specific Controller shall be compatible with a Siemens Room Unit which combines a display with temperature sensing and configurable switches for lighting, shade and scene control in 1 wall device.

.8 Application Specific Controller communication

.1 Communication over floor level network shall be BACnet over BACnet IP over Ethernet.

.2 Each controller that uses BACnet IP shall provide at least two Ethernet ports allowing the controllers to be wired in a daisy-chain configuration of up to at least 20 controllers per chain, utilizing standard Ethernet cables of up to 300ft in length between each controller.

.9 The Application Specific Controller shall have the BTL listing and meet the BACnet device profile of an Application Specific Controller (B-ASC) as specified in ANSI/ASHRAE 135-2012. The controller shall support the following BACnet BIBBs:

.1 Data Sharing

- DS-RP-A: Data Sharing – Read Property-A
- DS-RP-B: Data Sharing – Read Property-B
- DS-RPM-A: Data Sharing – Read Property Multiple-A
- DS-RPM-B: Data Sharing – Read Property Multiple-B
- DS-WP-A: Data Sharing – Write Property-A
- DS-WP-B: Data Sharing – Write Property-B
- DS-WPM-A: Data Sharing – Write Property Multiple-A
- DS-WPM-B: Data Sharing – Write Property Multiple-B
- DS-COV-A: Data Sharing – Change of Value -A
- DS-COV-B: Data Sharing – Change of Value -B
- DS-COVP-A: Data Sharing – Change of Value Property -A
- DS-COVP-B: Data Sharing – Change of Value Property –B

.2 Alarm and Event

- AE-N-I-B: Alarm and Event – Notification Internal-B
- AE-ACK-B: Alarm and Event – ACK-B
- AE-ASUM-B: Alarm and Event – Alarm Summary-B
- AE-ESUM-B: Alarm and Event – Enrollment Summary-B
- AE-INFO-B: Alarm and Event – Information-B
- AE-EL-I-B: Alarm and Event – Event Log Internal-B

.3 Trending

- T-VMT-I-B: Trending – Viewing and Modifying Internal-B
- T-ATR-B: Trending – Automated Trend Retrieval-B

.4 Device Management

- DM-DDB-A: Device Management – Dynamic Device Binding-A
- DM-DDB-B: Device Management – Dynamic Device Binding-B
- DM-DOB-B: Device Management – Dynamic Object Binding-B
- DM-DCC-B : Device Management – Device Communication Control-B
- DM-TS-B: Device Management – Time Synchronization-B
- DM-UTC-B: Device Management – UTC Time Synchronization-B
- DM-RD-B: Device Management – Reinitialize Device-B
- DM-BR-B: Device Management – Backup and Restore-B
- DM-R-B: Device Management – Restart-B
- DM-LM-B: Device Management – List Manipulation-B

.5 The Application Specific Controller shall support the following Data Link Layers:

- BACnet MS/TP Master (Clause 9)
- BACnet IP, Foreign Device

.10 The Application Specific Controller shall provide for control of each piece of equipment, including, but not limited to the following:

.1 Variable Air volume (VAV)

.2 Constant Air volume (CAV)

.3 Hot water and electric reheat Coils (RH)

.4 Fan Coil Units (FCU)

.5 Fan Powered Boxes (FPB)

.6 Unit Conditioners

.7 Unit Ventilators

.8 Baseboard radiator

.9 Chilled/heated ceiling panels

.10 DX cooling and chilled water coils

.11 Applications for VAV terminals:

.1 The following VAV terminal box equipment configurations must be supported with pre-loaded, pre-tested applications that can be selected and configured during commissioning:

- VAV w/cool air only
- VAV w/hot or cool air, automatic switchover
- VAV w/ HW reheat
- VAV w/ CHW
- VAV w/ HW reheat and CHW
- VAV w/ Electric reheat
- VAV w/ Series fan and HW reheat
- VAV w/ Series fan and Electric reheat
- VAV w/ Parallel fan and HW reheat
- VAV w/ Parallel fan and Electric reheat

.2 All VAV applications must support the following options (where appropriate):

- Demand Control Ventilation using CO_2 measurement

- Minimum ventilation control and flow set points configurable for each application operating mode
- Separate minimum and maximum flow set points for heating, cooling and ventilation
- Supply temperature cascade control
- Configuration for Constant Volume control
- Chilled/heated ceiling
- 2-pipe HW/CHW coil valve control
- Variable speed fan control (fan-power applications only)
- Multi-speed fan control (fan-power applications only)
- Auxiliary/Base-board/Radiator heating, valve, two position or modulating and electric.
- Analog or 3-point floating control valve/damper actuation, including 6-way heating/cooling valve via standard BACnet Analog Output objects.
- Fault Detection for automatic change to pressure dependent control.
- Built in air balancing support.
- User initiated rapid ventilation to assist in purging the space for a configurable time with a separate flow set point
- Occupancy sensor

.12 Applications for Fan Coil terminals:

.1 The following Fan Coil terminal box equipment configurations must be supported with pre-loaded, pre-tested applications that can be selected and configured during commissioning.

.2 Heating sources

- 2-pipe HW coil
- 2-pipe HW/CHW coil, automatic switchover
- Electric reheat

.3 Cooling sources

- 2-pipe CHW coil
- DX Cooling

.4 All Fan Coil applications must support the following options (where appropriate):

- VAV pressure dependant control of a damper (no flow sensor)
- Heating/cooling control with no fan
- Chilled/heated Ceiling
- Single or multi-speed or variable speed fan control
- Auxiliary/Base-board heating, valve modulating or two position and electric
- Analog or 3-point floating control valve actuation, including 6-way heating/cooling valve via standard BACnet Analog Output objects.
- Occupancy sensor

.13 Applications for Unit Ventilator terminals:

.1 The following Unit Ventilator terminal box equipment configurations must be supported with pre-loaded, pre-tested applications that can be selected and configured during commissioning.

- Heating and/or Cooling with Outdoor air damper control

.2 All Unit Ventilator applications must support the following options (where appropriate):

- DX or CHW cooling
- Electric or HW heating
- 2-pipe HW/CHW coil, automatic switchover
- Discharge temperature control
- Demand Control Ventilation for each application operating mode
- Single or multi-speed or Variable speed fan control
- Auxiliary/Base-board heating,, valve modulating or two position and electric
- Analog control or floating control valve/damper actuation, including 6-way heating/cooling valve via standard BACnet Analog Output objects.
- Cooling via economizer control of outside air damper.
- Occupancy sensor

.14 Applications for Light Control

.1 Each Application Specific Controller shall provide a set of pre-loaded, selectable and field-adjustable control applications for lighting equipment control, independent from or in conjunction with the HVAC control applications, which can be optionally enabled if the appropriate lighting control devices are connected.

.2 The following Lighting control equipment must be supported with pre-loaded, pre-tested applications that can be selected and configured during commissioning:

- ON/OFF Lighting
- Line voltage Dimmed Lighting
- 0-10V Dimmed Lighting

.3 All Lighting control applications must support the following options (where appropriate):

- Manual Switching / Dimming
- Occupancy / Vacancy control
- Automatic Light Level control
- Accept floor or building wide commands from the BMS such as scheduled control

.15 Applications for Motorized Shade Control

.1 Each Application Specific Controller shall provide a set of pre-loaded, selectable and field-adjustable control applications for shading equipment control, independent from or in conjunction with the HVAC control applications, which can be optionally enabled if the appropriate shading control devices are connected.

.2 The following Shade control equipment must be supported with pre-loaded, pre-tested applications that can be selected and configured during commissioning

- Indoor or outdoor motorized shades, with or without tiltable slates, supporting a 2-relay interface for positioning the shades

.3 All Shade control applications must support the following options (where appropriate):

- Manual Shade control
- Occupancy / Vacancy control
- Accept floor or facade level commands from the BMS such as solar glare protection

.16 Provide centralized control functions for secondary HVAC control, Lighting, and Shading

.1 Functions for coordinating control across a grouping of rooms, a floor area, entire floor, façade, mechanical or electrical supply chains, or different combinations thereof shall be provided.

.2 Support commanding of all group members to a common position or state.

.3 Support consolidation of common information from group members for calculation or optimization purposes

.4 Central functions shall reside in an Application Specific Controller dedicated to the central control functions specified herein.

.5 Members of the groups used by the central functions specified herein shall be assigned and be changeable through standard BACnet services.

.17 Central functions for Secondary HVAC

.1 Utilize the HVAC control status and conditions in a large number of Application Specific Controllers in order to support optimization of primary HVAC plants.

.2 Central Supply Air function collects air demand data from rooms (Application Specific Controller flow control loops) to support demand-based run/stop CPDDisions for air handler. Rooms indicate need for primary heating, cooling and ventilation.

.3 Central Supply Air function collects data from rooms (Application Specific Controller flow loops) to minimize duct pressure. Application Specific Controllers provide multiple signals to support duct pressure reset, including damper command, damper saturation signal and air flow deviation signal. All are available for collection by Central Air application.

.4 Central Supply Air function collects data from rooms (Application Specific Controller control loops) to support dynamically optimizing the primary supply air temperature. Data available from the Application Specific Controller includes cooling demand and demand in the room for reheat.

.5 Central Supply Air function collects data from rooms (Application Specific Controller control loops) to support dynamically optimizing the outside air intake. Data available from the Application Specific Controller includes ventilation demand and CO2 levels.

.18 Coordination between Application Specific Controllers. In situations where more than one controller is serving a common space, it must be possible through configuration only (not reprogramming) to subordinate one or more Application Specific Controllers to another Application Specific Controller allowing multiple controllers to coordinate HVAC control in a large space.

.19 Application Operating Modes - All of the following operating modes shall be supported, with configurable operation of each controlled device during each mode.

.1 Comfort, Standby (Pre-comfort), Economy, and Building Protection modes

- Comfort: Space is occupied
- Standby: Space has been or will be unoccupied for a short time
- Economy: Space has been or will be unoccupied for a longer time
- Building Protection: Space has been or will be unoccupied for a more than a day

.2 Configurable set points and limits for each mode.

- The operating mode can be changed by system schedule or command or by conditions in the space such as by presence detection.
- All controlled devices shall respond to changes in operating mode in a configurable way such as set point resets after a configurable time to optimize energy consumption.

.20 Room Units / HMIs shall provide an intuitive user alert to indicate energy-efficient operation or when there is unnecessary energy consumption, and provide occupants with a one-touch release to return to efficient, comfortable control. Energy efficient operation shall be determined by configurable and programmable algorithms provided by the Application Specific Controller and shall include (but not be limited to) the following conditions:

.1 Temperature set point is set outside customer-specified limits

.2 Fan Speed is overridden to a higher speed than is required for automated temperature control

.3 Manual override of brightness control, lights using more energy than needed to light the space

.4 Shades are overridden to position that allows too much solar radiation into the room during cooling modes, wasting HVAC energy

.21 The energy efficiency status for each Application Specific Controller and space shall also be available as BACnet object at the BMS for operating and monitoring.

.22 Scene control. The Application Specific Controller shall provide a set of configurable and field-adjustable presets of HVAC, lighting and shading levels that can be activated by pressing assigned buttons on the Room Unit / HMI.

.23 Application Specific Controller Configuration and Commissioning Tool

.1 Provide industry standard, commercially available laptop to host the Application Specific Controller Configuration and Commissioning Tool. The tool shall plug directly into all controllers as described below:

.2 Functionality of the Configuration and Commissioning Tool connected to any Application Specific Controller shall include:

- Provide connection capability at either the controller, a related room unit, through a BACnet router or through a Siemens Apogee Field Panel controller to access controller information.
  - When connected via a related room unit to a controller, the tool shall be able to access information of the controller the room unit is connected to and all controllers connected to the same MS/TP or IP network.
  - Connection of the Tool to a controller shall not interrupt nor interfere with normal network operation in any way, prevent alarms from being transmitted or preclude centrally-initiated commands and system modification.
  - Tool access to controller shall be password-controlled. Password protection shall be configurable for each operator based on function, points (designating areas of the facility), and edit/view capability.
- Provide device discovery, configuration and setup for addressing and network management of multiple devices from one connection point (location) in parallel.
- Select, view, command, change, and enable/disable features and functionality of the control application.
- Load pre-designed templates of configuration settings and allow copying of templates to other controllers in order to speed the commissioning process.
- Provide status, setup, balancing and control reports to support commissioning and troubleshooting activities.
- Backup and restore of application configurations
- Air flow balancing.
  - For every air flow sensing channel in the Application Specific Controller control application, the Tool shall offer an interface and menu specifically designed to support the Test, Adjust, and Balance functions. Through the balancing menu, the controller enables the following operations:
    - Select the operating point for the test from a list of named operating points, including maximum and minimum cooling, maximum and minimum ventilation and maximum and minimum heating.
    - Accept the balancer's flow measurement as a manually entered value.
    - Automatically calculate and display the revised flow calibration factor.
    - Apply the new calibration factor on command.
  - The Application Specific Controller shall maintain a BACnet object reflecting the TAB state of the controller as: Initial, Balancing, Balanced. The Application Specific Controller records data representing the TAB process, and stores for later retrieval. The controller delivers the data when called for producing reports. Stored data includes:
    - Air balancer's air flow measurement.
    - Controller's air flow measurement after correction.
    - Named test point (max cooling, etc.).
    - Initial calibration factor.
    - Applied selected calibration factor
  - The tool should allow configuring, loading and balancing multiple controllers from one connection point (location) in parallel
  - The Ethernet / IP Application Specific Controller models shall provide web pages for troubleshooting and operation and monitoring which can be accessed via a standard web browser

.24 Each Application Specific Controller shall, at a minimum, be provided with:

.1 Appropriate NEMA rated enclosure

.2 Power supplies as required for all associated modules, sensors, actuators, etc.

.3 Each controller measuring air volume shall include a differential pressure transducer

.4 Approvals and standards: UL916 PAZX; CUL; FCC

.25 Each Application Specific Controller shall continuously perform selfdiagnostics on all hardware and secondary network communications. The Application Specific Controller shall provide both local and remote annunciation of any detected component failures or

repeated failure to establish communication to the system.

.26 Power Supply. The Application Specific controller shall be powered from a 24 VAC source and shall function normally under an operating range of -15% / +20%.

.27 All controller configuration settings and programs shall be stored in nonvolatile memory. The controllers shall be able to return to full normal operation without user intervention after a power failure of unlimited duration.

.28 Environment. The controllers shall function normally under ambient conditions of 23 to 122°F (-5 to 50°C) and 5% to 95% RH (non-condensing). Provide each controller with a suitable cover or enclosure to protect the circuit board assembly.

5 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole Section	Design and Construction Standards Modernization
1			
2			
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Electrical

Version	Effective Date	Approved By	Signature
25-01	September 1, 2025	Doug Doel, Manager, Electrical Design	

5

Electrical

.1 Power Systems
.2 Lighting Systems
.3 Fire Alarm Systems
.4 Vivarium
.5 Laboratory
.6 Access Control Systems

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Electrical Power Systems

1 Introduction

1.1 General

.1 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration, performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

1.2 Compliance Criteria

.1 Refer to [front end section on compliance and deviation tracker]

.2 Deviations from these minimum requirements outlined in these Standards must be logged on the University of Guelphs Project Deviation Tracker.

1.3 Responsibility of the Designer

.1 The Designer remains responsible for ensuring any proposed design solution is in full compliance with applicable codes and standards in force at the time of the design.

.2 Any conflict between applicable Codes and Standards and this Standard shall be identified and presented to the Manager, Electrical Design, DEC, together with proposed measures for addressing the conflict.

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

1.5 Reference Information and Documents

.1 The following documents should be read in conjunction with this standard.

.1 Ontario Building Code (OBC)

.2 Ontario Electrical Safety Code (OESC)

.3 NETA

.1 ATS - Acceptance Testing Specification

.2 MTS - Maintenance Testing Specification

.4 IEEE

.1 1584 Guide for Performing Arc-Flash Hazard Calculations

.2 1584.1 Guide for the Specification of Scope and Deliverable Requirements for an Arc-Flash Hazard Calculation Study in Accordance with IEEE Std 1584

.3 3002 Power System Analysis

.4 3004 Protection & Coordination

1.6 Campus Power Distribution

.1 Refer to [*DS- Future TBD campus wide distribution standard*]

.2 The University of Guelph is supplied primary electrical power at 13.8 kV grounded wye from Alectra Utilities (the LDC). There are a total of 6(six) 13.8kV Incoming Lines supplying the main campus through 3(three) main substation locations.

.1 Reference: drawings:

.1 # 209 Reference – E3,

.2 ...E3A,

.3 ...E3B).

.4 Campus Power Distribution System Single Line Diagram

.3 The power is distributed throughout campus to over 35 substations using cables run in tunnels and ductbank/manhole systems. Most substations are loop fed to provide security of supply.

.4 Substations utilize high voltage switches for the loop feeds and fused switches feeding stepdown transformers. The loops are operated in radial mode with a designated open point.

.5 Multiple buildings are supplied from the LDC

.6 Where primary power is required for a project, early consultation is required with the Manager, Electrical Design, CPD&D to establish service entrance points and other related requirements.

2 Electrical

2.1 26 05 00 Common Work Results for Electrical

.1 All electrical conductors to be copper. This includes wire and cable, bus bars and transformer windings etc.

.2 Electrical rooms shall be used for electrical equipment and not shared with telecom / IT equipment.

.3 The following utilization voltage and phasing configurations are found at the university:

.1 120/208 V, 3 phase, 4 wire

.2 600/347 V, 3 phase, 4 wire

.3 600 V, 3 phase, 3 wire

.4 120/240 V, single phase, (special applications only, e.g. low temperature freezers)

.5 120/208 V, 1 phase, 3 wire (residential suites)

.4 Motors greater than ½ horsepower shall be 600 V, 3 phase, 3 wire.

.5 Panelboards or cables (especially clothed wrapped) older than 25 years old shall be replaced with new.

.1 Subject to DEC approval, via the Deviation Tracker. Perform insulation resistance testing per NETA MTS and demonstrate test results are satisfactory for continued service.

.1 Test results are required at completion of physical installation, i.e. must be completed after possibility of damage to existing cables.

.6 Provide updated drawings and Single Line Drawings when modifying electrical equipment.

.7 Provide updated Power System Study when modifying electrical equipment. and include for arc flash labels.

.8 Do not use Series Rated breakers.

.9 Use twohole compression lugs for feeder cable terminations.

.10 Panelboards should not be located in general public places.

.11 IT Closets to have at least one duplex receptacle fed Normal Power and one duplex receptacle fed Emergency Power both rated to match UPS requirements.

.12 All TVs / Digital Signboards in public locations to be roughed in on emergency (essential) power for the purposes of relaying vital information as part of the Emergency Management Plan.

.13 New substations (e.g. Science Buildings) shall be supplied power at 13.8 kV and be configured as a loop fed.

.14 New substations shall be doubled ended switchgear design c/w dual tie breakers (where feasible) to facilitate safer maintenance.

.15 Substations and main electrical rooms to be equipped with wall mounted selfcontained emergency lighting units plugged into emergency (essential) power receptacles and aimed to illuminate aisles and exits.

.16 Provide updated Fire Alarm Graphics when modifying fire alarms and/or when floor plans are altered.

3 26 05 00 Common Work Results for Electrical

.1 Electrical rooms and substations shall be exclusive to that function.

4 26 05 13 Medium Voltage Cables

.1 Loop and radial cables to be TECK 15kV TRXLPE 133% copper conductor and a minimum 250 kcmil.

.2 Teck Power Cable Teck outer jackets tend to come in the following colours:

.1 5kV - Orange

.2 15kV - Red

.3 28kV - Black

.3 Cable: to CAN/CSA C22.2 No. 131 and C68.10 Shielded Power commercial and industrial applications, 546kV.

.4 Conductor: Copper, size and number as indicated.

.5 Conductor shield: Extruded semi conducting layer over conductor.

.6 Insulation: TR XLPE 90°C. and a 133% insulation level.

.7 Insulation shielding: Extruded semiconductor layer over insulation.

.8 Metallic Shield: Copper Wires: All single conductor TECK cables to have helically wound concentric ground wire over extruded semiconductor layer.

.9 Ground Conductors:

.1 Single conductor cable, same copper wires applied helically over insulation shields can be used as grounding conductor.

.2 Three conductor cables, an uninsulated stranded copper conductor serve as bonding conductor.

.10 Inner jacket: flame retardant PVC inner jacket.

.11 Armor: Interlocked aluminium armour.

.12 Overall PVC jacket rated 40°C. rated at a minimum of FT4 and “Sun Res”.

.1 There is no FT6 cable jacket available so TECK should only be installed in a nonplenum ceilings.

4.2 Testing

.1 Cable shall be tested at the manufacturer’s plant prior to shipping. Tests shall include:

.1 Standard quality control testing to verify cable construction parameters.

.2 Insulation resistance.

.3 Compliance with CSA.

4.3 Installation

.1 Cable size and configuration to accommodate application.

.2 Terminations and splices to be made utilizing

.3 purposemade kits.

.4 Cables to be labelled in substations, in manholes at entry and exit faces and every 10 metres where installed in trays or visible in tunnels and building areas.

.5 Labels shall indicate proper identifier and installation date for example Loop 4 Section A / LB or BKR (loadbreak or breaker) to LB or BKR/ Sept. 2023(installation date). e.g.:

.1 LOOP 8 SECTION A056 LB 8A TO 055 LB 8AJULY 2007

.6 Splices to be wrapped with a purposemade fire proofing tape (such as Scotch® FireRetardant Electric Arc Proofing Tape 77)

.7 Splices to be labelled to indicate type of bonding/grounding used.

.1 THE ARMOUR OF RIGHT CABLE IS UNGROUNDED

.2 THE ARMOUR OF LEFT CABLE IS GROUNDED



Figure 4.1: MV Cable Armour Grounding Diagram

.8 The cable run and splice locations are to be recorded on cable plan drawing and submitted with maintenance documentation.

5 26 05 19 Low Voltage Electrical Power Conductors and Cable

.1 All wire and cable conductors to be copper conductor.

.2 Wire shall be RW90/RWU90 minimum size #12 stranded copper.

.3 AC90 (BX) cables to be used for fixture drops from junction box to fixture and limited to 3 metres and independently supported.

.4 Feeder cables to be terminated with two-hole compression lug fittings.

6 26 05 33.13 Conduit for Electrical Systems

.1 Use EMT complete with setscrew steel connectors.

.2 Install a separate insulated ground wire in all conduits.

7 26 05 43 Underground Ducts and Raceways for Electrical Systems

.1 Power cables installed underground shall be run in concrete encased ductbank manhole systems.

.2 Ductbank to be reinforced using PVC coated rebar.

.3 Use “bell end” where ductbanks enter buildings and manholes.

.4 Manholes to be equipped with a minimum 840 mm in diameter access cover.

.5 Manhole to be provided with environmentally acceptable means of active or passive water removal.

.6 Use nonmetallic cable supports.

8 26 05 53 Identification for Electrical Systems

.1 Electrical equipment connected to “Normal” power to be coloured ANSI 61 grey.

.2 Electrical equipment connected to “Emergency aka Essential” power to be coloured FF4F00 International Orange

.3 When numbering/naming equipment, there are a few things to take into consideration, name should include the building number, type of panel, floor that the panel is located on, indicating which system the panel is on, where the panel is fed from, voltage level(s), ampere rating, number of phases, and number of incoming wires.

.4 Example:

.1 EDP0312, 600V/347V, 2000A, 3P, 4W, Fed from Transformer T1 (750kVA, 13.8kV – 600V/347V)

.1 ‘E’ represents that the panel is on the emergency / essential power system

.2 ‘DP’ indicates the panel is a distribution panel

.3 ‘031’ indicates the panel is in building 031

.4 ‘2’ is indicating that the panel is located on the second floor

.5 ‘600V/347V’ is indicating the voltage level in the panel

.6 ‘2000A’ indicates the ampere rating of the panel

.7 ‘3P’ indicates the number of phases coming into the panel

.8 ‘4W’ represents the number of incoming wires to the panel

.5 Provide a single line drawing showing all electrical distribution equipment complete with connected equipment.

.6 Provide floor plans showing the location of all electrical distribution equipment.

.7 Provide detailed panel schedules.

.8 Provide Arc Flash Warning and Shock Hazard Labels on all electrical equipment.

9 26 05 73 Electrical Power Systems Studies

.1 The Electrical Power System Study (EPSS) shall consist of a Short Circuit Study, Coordination Study, and Arc Flash Hazard Analysis and is to be completed and stamped by a Professional Engineer (the Engineer).

.2 Two models are anticipated as described:

.1 Design Model & Report

.1 Model and report is to be developed by the design team as part of the design process. The output is to demonstrate that the incident energy levels of the specified equipment is within the acceptable range.

.2 Submit model and report with each review submittal.

.2 Construction Model & Report

.1 Design model to be provided “as-is” to Contractor for continued development.

.2 Contractor to submit model files with each report.

.3 Final model to include as-built information. Equipment within model state to reflect the installation status.

.4 The completed EPSS is to be provided to the Electrical Consultant and the University's Electrical Design Manager for review.

.3 The study described is to consider normal power operation, essential power operation, and generator run operation. The study is to be on the entire electrical system, regardless of whether the equipment is new or existing. Scope may be reduced with approval of the Electrical Design Manager at University of Guelph.

.4 The naming of electrical equipment in the study is to match that on Consultant's Single Line Diagram.

.5 The Engineer completing the study shall not make any assumptions about data which can be obtained within reason.

.1 Connections to LDC: A formal request for information must be made by the Electrical Contractor to the LDC as soon as possible. At the time of writing this standard, the LDC is Alectra Utilities Ltd.

.2 Connections within existing Campus. A formal request must be made by Consultant to CPD&D.

.6 The Engineer completing the study is to allow for a minimum of two revisions/adjustments. In this context, revisions/adjustments do not refer to complete redesigns of the electrical distribution system. Rather, it refers to working with the U of G Electrical Design Manager and the Electrical Consultant to ensure that all details are captured in the review process. The completion of the study is expected to be an iterative process, in which the Engineer completing the study, will receive comments back that require clarification or adjustments to the report.

.7 Include all cable sizes and lengths collected by the electrical contractor within the report. The report is to serve as an evolving document that can be referenced in the future. Cable size and length to be included table format and on the main single line model used in the calculation.

.8 Include an explanation for each main section of the report describing the goals of that section.

.9 Provide the complete single line used for study and complete schedule of all main protective relays, fuses and other protective device listing device locations, function number, manufacturer, model number, size, range, settings, etc.

.10 Clearly state the software and version number used to complete the analysis, along with any assumptions.

9.4 26 05 73.13 Short Circuit Study

.1 Perform a short circuit analysis to determine short circuit current levels at all critical points in the distribution system.

.2 Calculate short circuit currents under a 3 Phase RMS Symmetrical Fault and a Single Line to Ground Fault. Summarize the results in a table. Include X/R ratios.

.3 A set of time current curve characteristics (TCCs) of all protective devices (along with damage curves as required) in the system digitally plotted on log/log scale with corresponding short circuit current levels. On each curve, include:

.1 relevant portion of the single line diagram showing the specific section of the system being analyzed

.2 manufacturer of devices protection devices and protection settings

.3 damage points for equipment, such as transformers, motors, and generators.

.4 Include table summarizing all input data, such as length of the cable, size, and conductor material.

.1 Use actual conductor impedances if known, otherwise use typical impedances based on IEEE Standard 1411993.

.2 Use transformer impedances from nameplate of transformer.

.5 Evaluate all equipment and protective devices in relation to the available fault current. Identify circuit protective devices and equipment that is not rated for the calculated available fault current.

9.5 26 05 73.16 Coordination Studies

.1 Generate appropriate settings for all relays and protective devices from the level of the LDC feeder protective devices to the largest downstream device on all the feeder secondary distribution levels.

.2 Ensure circuit protective devices such as overcurrent trips, relays, circuit breakers and fuses are installed to values and settings to provide protection by means of opening the closest device to the fault.

.3 If there are recommendations to change existing breaker settings, include a section with the new time current curves that assume the new settings have been applied.

.4 SeriesRated Overcurrent Protective Device systems are not permitted. Design measures must incorporate a FullyRated Overcurrent Protective Device System.

.1 Where unavoidable, series rating devices shall be presented on the Deviations Tracker for approval, and carefully detailed in the study.

.5 Equipment Evaluation Table to be produced prior to ordering any electrical equipment, including but not limited to Main Switchgear, Generation equipment, High Voltage Switches, Transformers, Distribution Boards, Automatic Transfer Switches, Manual Transfer Switches, Fused Switches, MCCs, and etc.

.1 Table to include at minimum: Pass/Fail status of all electrical equipment, name of equipment (matched to Consultant's Single Line Diagram), manufacturer, calculated short circuit current, withstand rating (short circuit withstand).

.6 Automatic Transfer Switches (ATS) and Manual Double Throw Switches (MTS) are to be evaluated as part of the study and adequate measures must be taken ensure that the withstand rating of the unit is appropriate for the application in which it is to be used.

.7 Identify any electrical equipment such as; nonfused disconnects which do not have the appropriate withstand ratings.

9.6 26 05 73.19 Arc Flash Hazard Analysis

.1 Perform an arc flash risk assessment in accordance with CSA Z462 using the incident energy analysis method.

.2 Measures shall be implemented in the design to limit incident energy exposure up to and including 12 cal/cm2 for all equipment.

.1 PPE selection will be as per CSA Z462:24 Table 2.

.2 Incident energy calculations on the line side of a main breaker must consider contributions from both the line side and load side.

.3 including:

.1 Executive summary.

.2 Narrative describing the scope and results of the study and the methodology used. Description of modes of operation (power system) and details of the scenarios evaluated.

.3 Results of short-circuit analysis listing equipment that is applied above its short-circuit current rating, and recommendations if appropriate.

.4 Results and recommendations of time-current analysis, including time-current curves.

.5 Arc-flash spreadsheet: A tabulated form including a listing of all equipment that had arc-flash hazard values calculated as part of the study. This listing should include the calculated three-phase bolted fault current, arcing fault current, identity of overcurrent protection device with its opening time, working distance, arc-flash protection boundary, and incident energy.

.6 A tabulated form showing the worst case incident energy calculated for each bus and the associated mode of power system operation. Report may include incident energy calculated for each bus for each mode of operation.

.1 NOTE—This may be part of the arc-flash spreadsheet.

.7 Documentation of all study input data, including utility available fault currents; cable sizes, types, and lengths; motor data; breaker types and settings; fuse sizes and types; etc.

.8 Up-to-date single-line diagram(s).

.1 Optionally, further detailed single-line diagrams including small motors, and 208 V/240 V panelboards may be included for use by maintenance personnel.

.9 Documentation of the software manufacturer, exact version of software used, and configuration settings used to do the study.

.10 List of assumptions that were made for cable lengths, CT ratios, transformer impedances, etc.

.11 Additional information may be included where it enhances understanding of the electrical system and arc-flash study.

.12 Advisory statements covering the impact of changes to the power system, including overcurrent protective devices or system operation and potential impact on arc-flash incident energies.

.4 Arc flash report recommendations

.1 Recommendations for arc flash mitigation must be included for locations with an incident energy exposure above 12 cal/cm2.

.2 Recommendations should be made to reduce the arc-flash incident energy where reasonably possible. These recommendations can be categorized into three groups based on complexity and cost. The three groups could include:

.1 Simple: Low cost options such as overcurrent device setting changes or fuse size/type changes.

.2 Moderate: Moderate cost solutions such as additional overcurrent protection.

.3 Detailed: Higher cost options such as installing new distribution equipment or retrofitting circuit breakers with new trip units or specialty relay control schemes to reduce arc-flash hazards. Moderate and detailed recommendations do not need to be complete but only address a probable approach to reduce the incident energy exposure. Detailed design is not able to be approximated at the time of specification and therefore cannot be expected to be complete until additional decisions are resolved by the owner and engineer.

.3 Where inadequate overcurrent device ratings (interrupting ratings) and equipment ratings (short-circuit current ratings) are reported, the study should provide recommendations on achieving proper overcurrent device and equipment ratings.

.5 All settings and recommendations described in the study are to be implemented by the Contractor and reviewed by the Engineer as part of the commissioning process.

.1 The review process may occur by means of the Electrical Contractor submitting pictures to the Engineer. The Engineer is to confirm whether the settings shown in the submitted pictures or report are adequate. The goal of this process is to ensure that the settings have been applied as per the Engineer's report.

.6 Supply and install arc flash shock and warning labels for each piece of equipment.

.1 Labels are to be purpose made as per the latest edition of CSA Z462.

.2 Labels to include hazard level, date of study, name of equipment, approach levels, and voltage.

.3 Do not identify glove class on labels: University of Guelph Safety Policy will dictate this.

.4 Combined arc flash and shock warning labels to be attached to each equipment for substantial completion see [Ref*/ Figure 9.1/*]

.1 Arc Flash label to be approximately 4.5” high and 5.5” wide and to be thermal transfer type label of high adhesion polymer. Labels to be machine printed. A sample label is to be provided to the Manager Electrical Design for approval before printing the final labels.

.2 Arc Flash Energy exceeding 40 cal/cm2 to be on special red “DANGER” label.

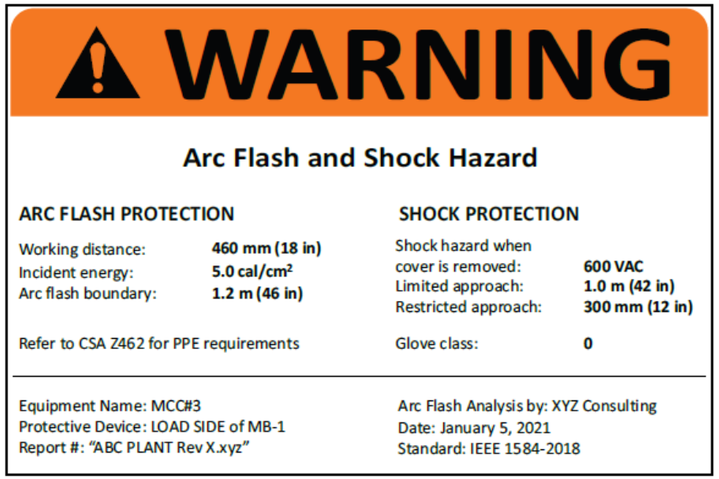


Figure 9: Sample arc flash and shock warning label per CSA Z462-2024 (Figure Q.3)

.7 The Engineer completing the studies and Electrical Contractor to include for 2 training session (minimum of 4 hours each) for University of Guelph Maintenance Staff on the protective device settings and arc flash risk of the equipment in the building.

10 Switchboards And Panelboards

.1 Panelboards shall be “door in door” design complete with hinged covers to facilitate infrared scanning.

.2 Tandem double density (mini) circuit breakers are not acceptable.

.3 Panelboards to have 10% spare breakers and 10% spaces c/w mounting bus hardware to accommodate future loads.

11 Electrical Metering

.1 Electrical metering required. Refer to [4.6 Metering Systems]

12 26 27 26 Wiring Devices

.1 Receptacles and switches to be spec grade.

.2 Emergency (aka essential) power receptacles to be red.

13 26 32 00 Packaged Generator Assemblies

.1 Fuel supply provided shall be capable of running genset for 24 hours at full load.

.2 Provide a loadbank / mobile generator connection point complete with start circuit wiring. Connection point shall be located at ground level in an accessible location and be secure.

14 26 36 23 Automatic Transfer Switches

.1 Automatic transfer switches shall be contactor type.

.2 Transfer switch to be equipped with manual bypass.

15 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole Section	Design and Construction Standards Modernization
1			
2			
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Electrical

Lighting Systems

1 26 50 00Lighting

1.1 General

.1 Lighting designs shall reference the latest revisions of the following documents:

.1 Ontario Building Code (OBC)

.2 IES Recommended Practices (RP series)

.1 IESNA Lighting Handbook

.3 [reference future UofG energy management program]

1.2 26 05 76 Photometric Studies

.1 Interior and exterior lighting plans complete with photometric layouts shall be submitted.

.2 Photometrics to include:

.1 Lighting model parameters

.2 IES recommended lighting levels and uniformity

.3 Simulation results

1.3 26 51 00 Interior Lighting

.1 All lighting to be LED.

.2 All fixtures to be rated 120V.

.3 LED luminaires and drivers must have a minimum 5 year warranty.

.4 CCT: 3500 K unless otherwise stated.

.5 Acceptable Manufacturers for LED fixtures are as follows:

Manufacturers	Area 1	Area 2	Area 3
Cree Lighting			
Signify			
Leviton			
Visioneering			
Sylvania			
Acuity Brands			

2 26 09 43 Network Lighting Controls

.1 Lighting controls systems shall favor maintainability and longevity over complex functionality.

.2 Building-level lighting control systems to be installed to meet code requirements (i.e. according to building type/ occupancy). Where building- level lighting controls are utilized, a computer (with the lighting software installed), used to interface with the lighting control system, must be provided.

.3 All new and existing construction projects to to use daylight harvesting.

.4 Building/floor-level lighting control systems shall be centralized such that lighting relays and dimming modules are centralized in panels within electrical rooms/closets (or other similar non-public spaces). Switched power and/or 0-10VDC dimming signals shall come from these centralized panels to the individual light fixtures. Each centralized panel will power/control light fixtures for multiple areas within a floor, an entire floor or multiple floors depending on the building. Light switches, occupancy sensors, etc. are to be hard-wired to the lighting control system (i.e. not wireless communication nor battery-powered) and are not to use specialized cabling, tools, or knowledge to maintain or replace the devices within the system.

.1 Acceptable manufacturers:

.1 Leviton

.2 Lutron

.3 Wattstopper.

.5 Addressable fixtures, ballasts, and drivers shall not be used.

.6 Where dimming is required, LED fixtures shall be controlled by a 0-10 VDC dimming control system.

.7 Wireless controls shall not be used.

.8 Room lighting will be controlled by wall switches, with dimming and occupancy sensing as appropriate.

.9 Service rooms (I.e. electrical room, mechanical room, elevator machine room, etc.) shall have locally switched lights. (i.e. no occupancy or vacancy sensor or remote-controlled light from lighting control system, etc).

3 26 52 13 Emergency and Exit Lighting

.1 Emergency/exit lighting shall be powered from building emergency power (aka essential power) or battery packs if no building emergency power exists.

.2 Unit equipment for emergency/exit lighting shall be selected for optimum life cost, maintenance being of utmost consideration. Automatic controls shall be provided for charging at both high and low rates. Meters/monitors shall be provided to indicate charge rate and condition. Lamp heads shall be of LED type.

.3 Unit equipment output voltage shall normally be rated 12 VDC.

.4 Battery run times in accordance with OBC including 25% spare capacity.

.5 Exit lights shall be Green Pictogram LED-type, shall be robust for any student-intensive areas (i.e. Student Residences, etc.) and must be solidly mounted to the building structure.

4 26 56 00 Exterior Lighting

.1 Exterior lighting to be LED and Dark Sky approved.

.2 Outdoor CCT: 3000 K and conform to the City of Guelph lighting Guidelines.

.3 Wall mounted fixtures should be first considered before choosing pole-mounted lighting.

.4 Walkway poles to be typically 12 foot, 4 inch square, galvanized, bronze, mounted on 12 inch high ArtFORMS Newavea bases.

.5 Bollard lighting requires approval via the Deviation Tracker.

.6 Use astronomic timers for exterior lighting control.

4.1 Roadway and Parking Lot lighting

.1 Roadway and Parking lot poles to be typically 20 foot, 4 inch square, galvanized, bronze, mounted on 12 inch high ArtFORMS Newavea bases and on 3 foot high ArtFORMS Newavea bases when used in parking lots or other areas to protect poles from vehicular damage.

.2 Acceptable LED fixture manufacturers:

.1 Lithionia, D-Series

.2 Kim Lighting, Entablature

5 27 32 26 Emergency Phones

.1 Code Blue emergency phones are U of G standard for exterior and interior applications.

.2 Exterior yellow pole with metallic blue “EMERGENCY” signage

.3 [UoG has updated phone standards. Will provide photo]

6 Version Control Summary

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0	09/01/2025	Whole Section	Design and Construction Standards Modernization
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Electrical

Fire Alarm Systems

1 28 46 00 Fire Detection and Alarm

1.1 General

.1 This Electrical Fire Alarm Systems Design Standard has been developed to establish the University's minimum expectations and requirements for Fire Alarm Systems installed on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new Fire Alarm System installation within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing Fire Alarm System infrastructure

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Electrical Design, DEC before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The System Designer remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes and Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Electrical Design, DEC, together with proposed measures for addressing the conflict.

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovation shall be tabled for consideration by the Manager, Electrical Design, DEC, before the completion of Schematic Design.

1.5 Reference Documents

.1 Ontario Building Code

.2 Ontario Fire Code

.3 Ontario Electrical Safety Code

.4 CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems

.5 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.

.6 CAN/ULC-S537, Verification of Fire Alarm Systems.

.7 CAN/ULC-S561, Installation and Services for Fire Signal Receiving Centres and Systems

.8 ULC-S533, Egress Door Securing and Releasing Devices

.9 CAN/ULC-S527 Control Units for Fire Alarm Systems

.10 CSA B44 -Elevator standards.

2 Design Standards

2.1 General

.1 The requirements outlined in the following clauses are applicable to all Electrical Fire Alarm Systems; Application Specific requirements are outlined under clauses 2.2 – 2.x.

.2 Fire Alarm Systems shall be designed to

.1 System Survivability and Post Disaster Building Performance

.2 Clear and Concise System Reporting and Monitoring

.3 Cost Effective and Code Compliant System Maintainability

.3 Tie-in to campus safety office

.1 Campus safety office communicates to fire department

2.2 Fire Alarm System Configuration

.1 The fire alarm system shall be an automatic, single-stage, addressable, networked with peer-to-peer emergency voice communication system.

.2 The fire alarm system shall be provided with an integrated emergency voice communication system for broadcasting emergency voice messages, alert and alarm tones simultaneously to separate areas via the fire alarm system speakers.

.3 The fire alarm system shall include but not be limited to the following:

.1 Display and Control Centre (DCC) Annunciator in a secure location

.2 Transponders connected to the DCC in a DCL-C performance and topology.

.3 LCD annunciator in the building main entrance vestibule with a LED Lamp Annunciator for Zone Indication

.4 A Common "Trouble" and "Alarm" LCD annunciator in the Campus Security Office

.1 Copper/ Bell telephone interconnects between buildings

.5 Manual and automatic initiating devices

.6 Addressable monitor modules and addressable relays

.7 Audible and visual signaling devices

.8 End-of-line resistors serving conventional Notification Appliance Circuits such as speakers and visual strobe devices

.4 System transponders shall be modular design type to allow minimum 25% future expansion. Each initiating and notification signaling circuit shall not be loaded at more than 80% of its capacity.

.5 The transponders and DCC Annunciator equipment shall support communication wiring to comply with "DCL-C" performance as identified in Table 1 of CAN/ULC-S524

.6 All surface mounted control and display equipment enclosures shall be provided with rain (sprinkler) guard shields.

.7 System operating architecture must allow any input to be programmed to any or all outputs of the system.

.8 System shall have the transponders located in one hour separated electrical utility rooms and Display and Control Centre Annunciator located at the Central Alarm Control Facility.

.9 The fire alarm system shall be continuously monitored as per the requirements defined in CAN/ULC-S561, Installation and Services for Fire Signal Receiving Centres and Systems.

2.3 28 46 31 Fire-Alarm Initiating Devices

.1 Pull Stations shall be provided at all Exit Doors / Exit Paths and as mandated by the Ontario Building Code.

.2 Pull Stations shall be the dual action type / manual single-stage type with vandal-proof ULC listed manual station cover accessories, pull-type covers and local piezo audible signal to prevent false alarms.

.3 Heat and Smoke Detectors as stipulated elsewhere in this Standard.

.4 Cross Zoned Heat and Smoke Detectors to support a Double Interlocked Cross-Zoned Pre-action Sprinkler System. [Reference to 6.2 Fire Protection Systems].

2.4 28 46 41 Fire Alarm Notification Appliances

.1 Fire alarm audible signal devices shall be provided throughout the facility as required by Code.

.2 Audible devices shall be supplemented by visual signal devices in all public corridors and in areas with high ambient noise level such as but not limited to Mechanical Rooms and Generator Rooms.

2.5 Power Supply to Fire Alarm System

.1 Each fire alarm transponder and DCC to be serviced with two sources of power.

.2 Primary source of power supply shall be derived from the building's essential (emergency) power source.

.3 Power supplies shall automatically transfer to the emergency internal batteries upon failure of the primary 120 Volt AC source.

.4 Temporary AC power interruptions (30 seconds or less) shall not be indicated or treated as a trouble condition. If the AC failure lasts longer than 30 seconds, operate trouble signals and indicate power failure condition showing "System on Battery".

.5 Failure of any over current device on the primary source shall not cause the trouble signals to become inoperative. All wiring to be fail-safe.

.6

2.6 28 46 51 Fire-Alarm Supervised Interface Hardware

.1 HVAC Systems

.1 Ancillary HVAC Air Handling System shutdown shall be controlled by the fire alarm system.

.2 Sprinkler Systems

.1 Sprinkler system, pre-action system and other types of fire suppression system installed within in the facility shall be monitored by the associated transponders and annunciated at the all Annunciators.

2.7 Special Requirements – Classrooms, Service Spaces & Stairwells

.1 Classrooms:

.1 Provide Heat Detectors – Rate of Rise & Fixed (135F) in combination device.

.2 Service Spaces

.1 Provide Heat Detectors – Rate of Rise & Fixed (135F) in combination device.

.3 Stairwells

.1 Provide smoke detectors in each Stairwell.

.4 Electrical Rooms

.1 Provide Heat and Smoke Detectors in each Electrical Room.

.5 IT/COMM Rooms and Raised Floor Areas

.1 Very Early Warning Smoke Detection shall be provided under all Raised Floors.

.2 Provide Heat and Smoke Detectors in all IT/COMM Rooms.

.6 Equipment/Elevator Machine Rooms

.1 Provide a Heat and Smoke Detector at top and bottom of Pit and in front of door on every floor.

.7 Generator Room

.1 Provide a High Temperature Heat Detector in the Generator Room.

.8 Central Utility Plant

.1 Provide Linear Heat Detection Cable within the Central Utility Plant, due to height accessibility constraints.

.9 Atriums and High Bay Areas

.1 Provide Beam Type Detector(s) within Atriums and High Bay Areas

.2 Avoid installation requiring lift equipment.

.10 Residences

.1 Provide Combination Heat/Smoke Detectors in all Dorm Rooms.

.2 Hardwire Power supplies to each detector.

.11 The following areas will be reviewed for special requirements on a per-project basis:

.1 Animal labs

.2 Livestock barns

3 Installation Standards

3.1 General

.1 The requirements outlined in the following clauses are applicable to all Electrical Fire Alarm Systems; Application Specific requirements are outlined under clauses 3.2 – 3.3.

3.2 Initiating Devices

.1 To be compliant with control panel.

3.3 Notification Appliances

.1 To be compliant with control panel.

3.4 Fire Alarm Graphics

.1 Layout - The fire alarm zone passive graphic display shall be completed in the latest version of AutoCad. The graphic display shall indicate all the building floor plans and respective fire alarm and supervisory zones with the description corresponding to the zone indication at the fire alarm control panel and annunciator.

.2 The building floor plans shall be arranged on the drawing with the basement or first floor located in the bottom right corner of the plan, with subsequent second or third floors located above. Additional floor plans shall be stacked to the left with the top floor of the building located at the upper left corner of the drawing.

.3 The fire alarm zones indicated for each floor shall be clearly defined with dashed red line borders to indicate zone separation. The dashed lines shall wrap around the entire zone. The dashed zone line shall be on top of and follow the exterior or interior wall detail and shall not be shown outside of the wall.

.4 All arrowed line leaders on the passive graphic display for a specific alarm zone, a specific supervisory zone or a group of supervisory alarm zones shall be coloured red.

.5 Indicate on the passive display graphic the fire alarm zone number corresponding to the zone number from the annunciator panel and annual test sheets with a Z prefix. (e.g. Z15 : for fire alarm zone number 15).

.6 For fire alarm zone indication in multiple buildings where the fire alarm system may be composed of networked panels, Z will prefix the building number followed by the zone number (e.g. Z039-15 : for building number 039, zone number 15).

.7 For fire alarm zone indication in multiple buildings where the buildings and fire alarm system have been constructed in phases and composed of networked fire alarm panels, Z will prefix the building number followed by the construction phase and the fire alarm zone (e.g. Z140/1-15 : for building number 140, phase 1 and zone number 15).

.8 When a fire alarm system encompasses multiple buildings, a key plan shall be provided on the display graphic to show the various building sections that make up the primary building. The key plan shall be located in the upper left corner of the display graphic.

.9 When a fire alarm display graphic encompasses multiple buildings, a blue demarcation line must be used to show the break point or zone separation point between the buildings. The corresponding building name and number is to be indicated on each side of the demarcation line. The major building number placement shall be in the same blue font which is 1/4” high, as required for the main building address.

.10 On the Legend Block the following shall apply;

.1 the word `LEGEND’ must be in red.

.2 the fire department connection and label is to be in red.

.3 the fire hose cabinet symbol and label is to be cyan.

.4 supervisory functions and description are to be in black text.

.5 fire alarm functions are to be in red text.

.11 Specific individual fire alarm zone labels on the passive graphic display are to be identical to the specific individual zone labels used on the LED annunciator paper strip labels and zone description on the LCD annunciator

.12 On the passive display graphics, the fire alarm input or alarm zone text shall be coloured red, while all supervisory input zone text shall be coloured black.

.13 All supervisory input zones on the passive display graphic shall be predicated by SV (in black text) to differentiate the supervisory zone from a fire alarm input zone. (e.g. SV45: for fire alarm zone number 45).

.14 When labeling sprinkler flow or supervisory devices on both the passive display graphic and the LED annunciator paper strips, the area the device serves shall be indicated on the specific individual zone label, instead of the device location. The location of the device shall be indicated on the display graphic with the zone and area description.

.15 The general font style shall be Helvetica in upper case for all text and apply the following:

.1 3/8” height for building name and 1/4” for municipal address and floor plans all coloured green.

.2 The `You Are Here’ note, to be 1/4” high in red text on one line located in a red rectangular box with yellow background. The `You Are Here’ box to be 3” long x 3/4” high as location permits.

.3 Fire alarm zones and equipment notes shall be 3/16” in height coloured red.

.4 Fire alarm supervisory zones and equipment notes shall be 3/16” in height coloured black.

.5 The main entrance arrow and text shall be Romans forward slant style 1/4” in height coloured cyan.

.16 Graphic display colours:

.1 The outline of each building plan to be black line on white background. All interior and exterior walls shall be white solid hatch pattern.

.2 All egress corridors shall be clearly defined with Red colour #13 solid hatch pattern.

.3 All stairs and elevators shall be indicated using yellow solid hatch pattern.

.4 The fire department connection symbols shall be coloured red with the

.5 location indicated on the floor plans. Include the respective symbol and text description in red on the graphic display Legend.

.6 The fire hose cabinet symbols shall be coloured cyan and labeled `FHC’ with the locations indicated on the floor plans. Include the respective symbol and text description in cyan on the graphic display Legend.

.17 Include the following information on the fire alarm display graphic:

.1 Provide a north arrow on the upper right hand corner of the display graphic.

.2 The `You Are Here’ symbol shall indicate the location of the fire alarm display graphic with the arrow pointing straight up and perpendicular to the location of the fire alarm display graphic as seen by the viewer while standing directly in front of the display graphic. If the `You Are Here’ symbol must be located to clear other notes or symbols, all line leader direction changes are to be at 90 degrees to maintain the orientation of the viewer to the fire alarm display graphic.

.3 Provide a drawing scale graph and drawing graphic file number located in the lower right of the display graphic.

.4 The building name and number shall be located at the top center of the fire alarm display graphic with the building municipal address indicated on the next line below.

.5 Provide indication of the main building entrance and nearest street reference.

.6 Include on the fire alarm display graphic the locations of the fire alarm control panel and annunciators, all fire department connections, fire pumps, fire hose cabinets and associated standpipe and sprinkler valves.

.7 Locate all main gas valves, suppression systems, chemical storage vaults, major mechanical equipment on the fire alarm display graphic.

.8 Provide the location of all duct smoke detectors on the fire alarm display graphic indicating the zone number.

.9 Indicate substation and transformer vault locations on the fire alarm display graphic showing primary and secondary voltages.

.18 Construction

.1 The graphic display shall be:

.1 Composed of 1/4” white PVC (Sintra) backing panel with the graphic plan printed on replaceable mylar film with U.V. stable inks. Include 1/8” clear non-glare lexan cover.

.2 The graphic frame shall be satin silver anodized with security mounting hardware.

.3 The standard passive graphic display sizes are 22” x 32” and 17” x 22”. The final size of the graphic may vary depending on the building size, layout requirements and site conditions.

.19 Location

.1 Install the fire alarm zone passive display graphic:

.2 adjacent to all remote fire alarm annunciator panels, the fire alarm control panel and all networked panels associated with the building fire alarm system.

.3 the framed fire alarm zone passive display graphic to be fixed to the building structure using the security mounting hardware provided. Mount all non-framed fire alarm zone passive display graphics on the building structure or on a fire alarm control panel enclosure using tamper proof screws at each corner and at the mid point on all four sides.

.20 Approval Drawings

.1 Submit three full colour print copies of the fire alarm zone passive graphic display to the consultant for review by the University of Guelph Design, Engineering and Construction Department.

.2 Forward the final approved fire alarm graphic display auto cad drawing(s) in electronic format to the University of Guelph Design, Engineering and Construction Department.

4 Version Control Summary

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0	09/01/2025	Whole Section	Design and Construction Standards Modernization
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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Electrical

Vivarium

1 Electrical Introduction

1.1 General

.1 This Electrical Power Systems Design Standard has been developed to establish the University's minimum expectations and requirements for new Electrical Power Systems installed on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction and within projects involving significant renovations.

.2 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of the existing Electrical installation.

.3 Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Electrical Design, CPDD before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The System Designer remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Electrical Design, CPDD, together with proposed measures for addressing the conflict.

.3 The Design Engineer of Record is responsible for ensuring the design accounts for all affected systems including concealed conditions. With prior approval by the University, destructive testing may be required to confirm conditions.

.4 Where new work will connect to existing building systems, the Design Engineer of Record is responsible for ensuring the tie-in and interaction of the new systems does not impact existing operations.

.5 The Design Engineer of Record is responsible for coordinating specific user requirements from all stakeholders including, but not limited to, University Staff, Management, and users of the affected space(s).

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovations shall be tabled for consideration by the Manager, Electrical Design, CPDD, before the completion of Schematic Design.

1.5 Reference Documents

.1 Ontario Building Code

.2 Canadian Electrical Safety Code

.3 Electrical Power Systems Final DSE-01*

.4 Lighting Systems DSE-02*

.5 Fire Alarm Systems DSE-03*

.6 IT & Communications Standard DSE-04*

.7 Access Control Systems DSE-05*

.8 Mechanical HVAC Standard DSM-01*

.9 Campus Power Distribution System Single Line Diagram

.10 CCAC guidelines, specifically C. Characteristics of a Laboratory Animal Facility, item 8. Electrical p52-53.

*A copy of these standards is available on University of Guelph Physical Resources web page

2 Design Standards

2.1 General

.1 In general, products should be manufactured in North America, but if not, local product representation must be in place, before specifying these products.

.2 All labs to be compliant with CL2 Small Animals Standards requirements as a minimum.

2.2 Conductors and Cables

.1 Refer to Electrical Power Systems Standard DSE-01, for minimum requirements for Conductors and Cables.

.2 Provide independent means of grounding to research/ experiment/procedure room

.3 In addition to the requirements stipulated in the above named standards, provide:

.1 All wiring shall be in conduit.

.2 Provide a ground wire in every conduit.

2.3 Grounding and Bonding

.1 Refer to Electrical Power Systems Standard DSE-01, for minimum requirements for Conductors and Cables.

.2 In addition to the requirements stipulated in the above named standards, provide:

.1 Provide a green insulated ground wire in each conduit.

2.4 Conduits and Outlet Boxes

.1 For all surface mounted conduit, stand conduit off the wall to allow for wiping down of conduit all of the way around. Stand-off conduit using conduit clamps that provide a 6 -10 mm gap.

2.5 Cable Trays

.1 Basket trays are preferred over rigid ladder or cable trays, due to added flexibility and lower weight on supporting structures.

2.6 Wiring Devices

.1 All power outlets to be GFI protected with While-In-Use Water-Proof Covers

.2 Refer to Room Data Sheets for specific wiring device requirements.

.3 Whether new build or renovation, label all receptacles and switches, with wall mounted lamacoid nameplates, colour coded as per item 2.6 of DSE-01.

.4 Receptacles within 1.5 meters of an eyewash or shower must be equipped with a Class A ground fault circuit interrupter.

2.7 Panelboards

.1 All breaker panels shall be door-in-door type.

.2 Locate breaker panels in electrical rooms or closets, not in Vivarium spaces.

2.8 Essential Power

.1 Provide essential power as per the applicable codes and standards.

.2 The provision of essential power must be raised early in the design process. University of Guelph will indicate availability and approve location if a new generator is required.

.3 All Bio Safety Cabinets shall be supported by essential power when used in a Containment Level 2 small animal facility.

.4 Connect all refrigerators and freezers to Essential Power.

2.9 Uninterruptable Power Supplies

.1 For new construction, new centralized 3 phase UPS units shall be provided, in lieu of localized UPS single phase UPS units.

2.10 Lighting

.1 All luminaires to LED type.

.2 Colour temperature to suit the user requirements. White tunable lighting may be appropriate in some labs. Review colour temperature/colour requirements with the user groups and CPDD. Red lighting scenes are required in many animal holding spaces.

.3 CRI shall be +80.

.4 All luminaires shall be gasketed, sealed and waterproof, IP66 as a minimum.

.5 All luminaires must be cleanable to prevent dust accumulation and bacteria growth.

.6 All LED luminaires, with the exception of specialty fixtures such as “Room In Use” signage, shall have a minimum lumens per watt of 100, with 0-10V or DALI drivers as required by the applicable lighting control system.

.7 All luminaires shall be reviewed with the project’s user group, in addition to review by the CPDD.

.8 Provide a photometric study of each room type on each project for University of Guelph’s review.

2.11 Lighting Control

.1 The lighting controls must be accessible by all needing to interact with the animals including researchers, technicians and veterinary staff 24/7.

.2 Lighting control devices must be at the entrance to each animal holding room. Each room must be capable of programmable light cycles specific to the developmental stages of the animals and the research program.

.3 Do not use occupancy sensors or daylight sensors.

.4 Local lighting control devices shall be part of a software enabled, centralized system complete astronomical clock control, dimming capability and where appropriate white tunable control.

.5 Access to revise the programming of the lighting control system shall be restricted via usernames and passwords.

.6 All lighting control systems shall be BACnet compatible.

2.12 Telecommunications

.1 Refer to Room Data Sheets for specific telecom outlet requirements.

.2 All telecom outlets to be complete with In-Use Water-Proof Covers.

2.13 Clocks

.1 Provide Primex 120V wireless clocks in locations called for in the RDS.

.2 Provide a receptacle behind each clock location.

2.14 Access Control and CCTV

.1 Refer to the Design Standard for Access Control Systems.

.2 All refrigerators and freezers shown be monitored for common trouble on the Genetec Access Control system.

3 Installation Standards

3.1 General

.1 Refer to Design Standards DSE-01 to 05.

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Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Electrical Laboratory

1 Introduction

1.1 General

.1 This Electrical Power Systems Design Standard has been developed to establish the University's minimum expectations and requirements for new Electrical Power Systems installed on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction and within projects involving significant renovations.

.2 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of the existing Electrical installation.

.3 Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Electrical Design, CPDD before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The System Designer remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Electrical Design, CPDD, together with proposed measures for addressing the conflict.

.3 The Design Engineer of Record is responsible for ensuring the design accounts for all affected systems including concealed conditions. With prior approval by the University, destructive testing may be required to confirm conditions.

.4 Where new work will connect to existing building systems, the Design Engineer of Record is responsible for ensuring the tie-in and interaction of the new systems does not impact existing operations.

.5 The Design Engineer of Record is responsible for coordinating specific user requirements from all stakeholders including, but not limited to, University Staff, Management, and users of the affected space(s).

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an Innovative Approach to Design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovations shall be tabled for consideration by the Manager, Electrical Design, CPDD, before the completion of Schematic Design.

1.5 Reference Documents

.1 Ontario Building Code

.2 Canadian Electrical Safety Code

.3 Electrical Power Systems Final DSE-01*

.4 Lighting Systems DSE-02*

.5 Fire Alarm Systems DSE-03*

.6 IT & Communications Standard DSE-04*

.7 Access Control Systems DSE-05*

.8 Mechanical HVAC Standard DSM-01*

.9 Campus Power Distribution System Single Line Diagram

*A copy of these standards is available on University of Guelph Physical Resources web page

2 Design Standards

2.1 General

.1 In general, products should be manufactured in North America, but if not, local product representation must be in place, before specifying these products.

.2 Lab benches shall be wired for flexibility. Examples of acceptable configurations:

.3 Basic overhead power and data servicing:

.4 Overhead services via a Unistrut mounted set of twistlock receptacles and data jacks. Twistlock receptacles shall be face down, while the data jacks shall face to the side or

.5 Stainless steel or galvanized cable tray with wiremold on both sides with separated power and data -power on the bottom and data on the top.

.6 The lab bench is pre-wired by the Lab bench supplier.

.1 Recessed ceiling service panel:

.7 This is typically fabricated by the Lab Bench supplier as part of the bench package.

.8 Sets of twistlock receptacles and data jacks are recessed into the underside of a metallic ceiling panel with both twistlock receptacles and data jacks facing down.

.9 The lab bench is pre-wired by the Lab bench supplier.

.1 Ceiling mounted service pedestal:

.10 This is typically fabricated by the Lab Bench supplier as part of the bench package.

.11 Sets of twistlock receptacles and data jacks recessed into the sidewalls of a pedestal.

.12 The lab bench is pre-wired by the Lab bench supplier.

.1 Do not feed lab benches from the floor slab.

.2 All labs to be compliant with CL2 requirements as a minimum.

.3 Provide silicon to seal all crevices around outlet boxes and conduit stand-offs.

2.2 Conductors and Cables

.1 Refer to Electrical Power Systems Standard DSE-01, for minimum requirements.

.2 In addition to the requirements stipulated in the above named standards, provide:

.3 All wiring shall be in conduit.

.4 Provide a ground wire in every conduit.

2.3 Grounding and Bonding

.1 Refer to Electrical Power Systems Standard DSE-01, for minimum requirements.

.2 In addition to the requirements stipulated in the above named standards, provide:

.3 Provide a green insulated ground wire in each conduit.

2.4 Conduits and Outlet Boxes

.1 All surface mounted outlet boxes shall be FS type or equivalent.

.2 For all surface mounted conduit, stand conduit off the wall to allow for wiping down of conduit all of the way around. Stand-off conduit using conduit clamps that provide a 6 -10 mm gap.

.3 All conduit recessed in partitions separating Lab spaces from adjacent non-Lab spaces must be suitable for installation in a 1 Hour fire separation.

.4 Provide a spare power conduit and a spare data conduit to each Lab bench service grouping as described in item 2.12 above.

2.5 Cable Trays

.1 Basket trays are preferred over rigid ladder or cable trays, due to added flexibility and lower weight on supporting structures (except at overhead services above casework).

2.6 Wiring Devices

.1 Refer to Electrical Power Systems Standard DSE-01, item for minimum requirements.

.2 In addition to the requirements stipulated in the above named standards, provide:

.3 All power outlets over/on Lab Benches and in fume hoods to be GFI protected.

.4 In addition to requirements identified in Room Data Sheets, provide a Duplex Outlet every 10'0".

.5 While-in-use covers shall be provided for all wiring devices in wash down areas.

.6 Refer to Room Data Sheets for specific wiring device requirements.

.7 Whether new build or renovation, label all receptacles and switches, with wall mounted lamacoid nameplates, colour coded as per item 2.6 of DSE-01.

.8 Receptacles within 1.5 meters of an eyewash or shower must be equipped with a Class A ground fault circuit interrupter.

.9 Above lab counters, use surface mounted raceways, finished to suit environment.

2.7 Panelboards

.1 Provide a dedicated breaker panel for each Lab. The panel location must be identified early in the design process. The location must be within the lab and 1 metre access in front must be provided.

.2 Breaker panels to have gasketed door-in-door enclosure.

.3 Provide emergency-power-off (EPO) buttons at the main door and any secondary exit/entry door for all loads in teaching labs, except for loads such as incubators, refrigerators and freezers.

.4 Provide digital metering for all high power use labs and specific equipment.

2.8 Essential Power

.1 The provision of essential power must be raised early in the design process. University of Guelph will indicate availability and approve location if a new generator is required.

.2 The University may require some hoods to continue operation during a power outage and should therefore be connected to a back-up power source. Consult with CPDD and EHS prior to design.

.3 Connect all refrigerators and freezers to Essential Power.

2.9 Uninterruptable Power Supplies

.1 For new construction, new centralized 3 phase UPS units shall be provided, in lieu of localized UPS single phase UPS units.

2.10 Lighting

.1 All luminaires to LED type.

.2 Provide lighting levels as per the chart below:

.1 Provide Task Lighting as necessary to support Functional Needs. Higher number includes task lighting.

Space/ Application	Average Illumination Level at Task Height	Average: Minimum	Additional Requirements
Electronic Labs	650 min.-800 lux*	2:1	Original Issue
Food Labs	650 min.-650 lux*	2:1	500 lux average illumination level at floor
Chemistry Labs	550 min.-650 lux*	2:1	
Biology Labs	550 min.-650 lux*	2:1	
Bio-containment Labs	650 min.-700 lux*	2:1	

.2 Colour temperature to be 4000 degrees K. Other colour temperatures may be required for certain labs. White tunable lighting may be appropriate in some labs. Review colour temperature options with the user group and CPDD prior to inclusion in the design.

.3 All luminaires, with the exception of specialty fixtures such as “Darkroom In Use” signage, shall have a minimum lumens per watt of 125, with 0-10V or DALI drivers as required by the applicable lighting control system.

.4 CRI shall be +80.

.5 All luminaires must be cleanable to prevent dust accumulation and bacteria growth.

.6 Open ceilings using direct/indirect luminaires are preferred.

.7 All luminaires shall be reviewed with the project’s user group, in addition to review by the CPDD.

.8 Provide a photometric study of each room type on each project for University of Guelph’s review.

2.11 Lighting Control

.1 Provide centralized lighting control wherever possible. All centralized lighting control equipment shall be BACnet compatible.

.2 Access to settings of the centralized lighting control system shall be via the campus network or on-line and shall be password protected to limited access to programming revisions to Physical resources.

.3 Provide dual technology occupancy sensors in all Labs. Occupancy sensors must be able to be over-ridden via the room light switches or scene controllers.

.4 Provide daylight sensors where appropriate. Control of lighting based on available daylight must be dimming (not on-off), fast acting and over-ridable.

.5 All daylight sensors and occupancy sensors in open ceilings shall be dropped down to the appropriate height on using conduit stems.

.6 Provide dimmers in all Labs to allow for decreasing the lighting levels.

2.12 Telecommunications

.1 Provide a minimum of one data outlet per lab.

.2 Refer to Room Data Sheets for specific telecom outlet requirements.

.3 Provide an emergency [phone at the Safety Station.

2.13 Clocks

.1 Provide Primex 120V wireless clocks in locations called for in the RDS.

.2 Provide a receptacle behind each clock location.

2.14 Access Control and CCTV

.1 Refer to the Design Standard for Access Control Systems.

.2 All refrigerators and freezers shown be monitored for common trouble on the Genetec Access Control system.

.3 Provide CCTV cameras in all CL3 labs.

2.15 Installation Standards

.1 General

.1 Refer to Design Standards DSE-01 to 05.

3 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole Section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Electrical

Access Control Systems

Version	25-01
Effective Date	September 1, 2025
Approved By	Nathan Griff, Manager, Physical Security Infrastructure, Electronic Access Group
Signature	

1 Introduction

1.1 General

.1 This Access Control Systems Design Standard has been developed to establish the University's minimum expectations and requirements for new Access Control Systems installed on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new Access Control System installation within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing Access Control Systems infrastructure

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the Manager, Physical Security Infrastructure, Electronic Access Group

1.3 Responsibility of the Designer

.1 The System Designer remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design.

.2 It is the responsibility of the System Designer to engage the UofG E-Access team prior to the completion of the schematic design stage.

.3 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Manager, Physical Security Infrastructure, Electronic Access Group, together with proposed measures for addressing the conflict before the finalization of the Schematic Design.

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an innovative approach to design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed design innovation shall be tabled for consideration by the Manager, Physical Security Infrastructure, Electronic Access Group, before the completion of Schematic Design.

1.5 Reference Documents

.1 Underwriters Laboratories

.1 UL 294-[1999], Standard for Safety for Access Control System Units.

.2 CAN/ULC-S302-M91 - Standard for Installation and Classification of Burglar Alarm Systems for Financial and Commercial Premises, Safes and Vaults

.3 CAN/ULC-S303, Local Burglar Alarm Units and Systems.

.4 CAN/ULC-S304, Intrusion Detection.

.5 CAN/ULC-S306, Intrusion Detection Units.

.6 CAN/ULC-S304-06, Signal Receiving Centre and Premise Burglar Alarm Control Units.

.7 CAN/ULC-S3-1-M88 Standard for Central and Monitoring Station Burglar Alarm systems.

.8 ORD-C634, Connectors and Switches for Use with Burglar Alarm Systems.UL 1076-[1995], Standard for Safety for Proprietary Burglar Alarm Units and Systems.

.9 ULC-S318, Power Supplies for Burglar Alarm Systems.

.10 CAN/ULC-S524-06 – Installation of Fire Alarm Systems

.11 CAN/ULC-S559-04 – Equipment for Fire Signal Receiving Centers and Systems

.12 CAN/ULC-S561-03 – Installation and Services for Fire Receiving Centers and Systems

1.6 Canadian Standards Association (CSA International)

.1 CSA C22.1-[98], Canadian Electrical Code, Part 1 (18th edition) Safety Standard for Electrical Installations.

.2 Applicable local Building Codes and Fire Codes

.3 Manufacturer's specifications, latest issue.

1.7 Definitions

.1 The PR, or PR Project Coordinator: will be the main contact person at the UofG for all matters relating to the project. They will be the liaison to the Electronic Access Group team.

.2 UofG: means the University of Guelph.

.3 24/7: Twenty four (24) hours, seven (7) days a week, three hundred and sixty five (365) days a year including all holidays.

.4 Authority Having Jurisdiction (AHJ): An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

.5 Backbone Cabling: Cabling and connecting hardware that provides interconnections between telecommunications rooms, equipment rooms, and entrance facilities.

.6 Backbone: A facility (e.g., pathway, cable or conductors) between telecommunications rooms, or floor distribution terminals, the entrance facilities and equipment rooms within or between buildings.

.7 Equipment Room (ER): An environmentally controlled centralized space for telecommunications that houses a main or intermediate cross-connect.

.8 Fire Alarm System: is designed to detect the unwanted presence of fire by monitoring environmental changes associated with combustion.

.9 Horizontal Cable: The cabling between and including the work area telecommunications outlet/connector and the horizontal cross-connect/patch cord in the telecommunications room.

.10 Internet Communications Protocol (IP): is the principal communications protocol used for relaying datagrams (also known as network packets) across an internetwork using the Internet Protocol Suite responsible for routing packets across network boundaries.

.11 Others: specifies UofG divisions and/or UofG designated Contractors

.12 Owner: specifies the UofG designated representative.Power Over Ethernet (POE): Power-over-Ethernet (PoE) or "Active Ethernet" eliminates the need to run 120/220 VAC power to Wireless Access Points and other devices on a wired LAN. Using Power-over-Ethernet system installers need to run only a single Ethernet cable that carries both power and data to each device.

.13 Protective Wiring: Any of the various recognized forms of conductor, such as conductive foil, open-wire lacing, grooved stripping, screens, and connectors and switches, used for protecting windows, doors, transoms, vents, skylights, walls, floors and ceilings.

.14 Protector: A device used to protect facilities from and equipment from abnormally high voltages or currents.

.15 Provide: The term "provide" shall be synonymous to, and complementary with, "supply", "install", "configure", "make operational", and "warranty", in reference to any and all hardware, equipment and materials, unless explicitly stipulated otherwise.

.16 Pull Point: A Pull Point is a space use to transition between floors for backbone and horizontal cabling within a building riser system.

.17 Repair: To furnish and/or restore an equipment module and/or system to its fully functional state without any additional costs to UofG. This applies to all warranty and non-warranty equipment.

.18 Riser Cable: Telephone, data, audio, video, coaxial and other structured cabling system cables extending vertically and/or horizontally between the BDF and each area IDF to support low voltage systems.

.19 Services: specifies all services and deliverables to be provided by a Contractor(s) working with UofG.

.20 Shop Drawings: specifies drawings, diagrams, illustration, schedules, performance charts, brochures and other data, which are to be provided by the Contractor(s) working with UofG.

.21 Solution: specifies a set of goods and services meeting the UofG's requirements, as set out within their Installation Standards.

.22 Structured Cabling System (SCS): the complete collective configuration of a telecommunications cabling and associated hardware at a given location.

.23 Tampering: Attempting to compromise the protection.

.24 Wiring: specifies all final and necessary terminations and connections of cable to the equipment, components and devices; including all necessary connectors and fasteners.

.25 Work: The term "work" includes all labour, materials, equipment and services required and implied as shown and described in the contract documents, supplied and installed or erected, complete at the designated place, in compliance with the laws and regulations of the locality.

1.8 Acronyms

.1	ACS	Access Control System
.2	AFF	Above the Finished Floor
.3	CAT	Category
.4	CCTV	Closed Circuit Television
.5	DCU	Door Control Unit
.6	DGP	Data Gathering Point
.7	DPU	Distributed Processing Unit
.8	EMI	Electromagnetic Interference
.9	ER	Equipment Room
.10	JB	Junction Box
.11	KVM	Keyboard, Video, Mouse console
.12	LAN	Local Area Network
.13	PB	Pull Box
.14	PP	Pull Point
.15	RAM	Random Access Memory
.16	REX	Request to Exit Motion Detector
.17	RXP	Request to Exit Push Button
.18	SCS	Structured Cabling System
.19	SPOC	Single point of Contact
.20	TR	Telecommunications Room
.21	UPS	Uninterruptible Power Supply
.22	UTP	Unshielded Twisted Pair

2 Design Standards

2.1 General

.1 This standard is to be utilized in conjunction with contract specifications and associated drawings issued for project initiation and implementation.

.2 The procurement, detailed design, installation, terminations, programming, integration, testing and demonstrating system functionality shall be formally presented, documented and verified to UofG or its elected representatives prior to implementation.

.3 All required cabling, connectors, hardware, software, hardware and software updates, hardware and software upgrades and licenses to allow for the required functionality under this standard shall be provided.

.4 The products and performance levels specified are those that have been standardized by the UofG and are intended as mandatory performance levels for the system. Alternative architectures and solutions are not acceptable.

.5 Current various site conditions and existing system configurations shall be reviewed and taken into consideration prior to providing proposed ACS design detail.

.6 Labour and material must be provided to comply with manufacturer's requirements and applicable standards and codes for grounding of devices.

.7 Equipment shall be installed as per manufacturer recommendations or as otherwise noted within this standard as well as specification and specification drawings issued at the time of award or project initiation.

.8 Coordination of work with all applicable trade contractors (including and not limited to UofG's IT Computing & Communications Service Group) on site shall be managed by this Contractor's project manager.

.9 The Contractor(s) shall remain responsible for the safe keeping and protection of system equipment while work is in progress and until the system is fully accepted by the UofG after the commissioning process.

.10 Equipment and material provided to UofG shall be CSA/ULC certified. Where there is no existing rating to equipment specified, the Contractor shall obtain special prior written approvals from Electrical Inspection Department.

.11 The ACS including all equipment / hardware, software and documentation shall be warranted by any Contractor(s) working with UofG as well as maintain the ACS in compliance with manufacturer specified preventative maintenance schedule throughout the project implementation period.

.12 The Contractor shall provide detailed system wiring diagrams to UofG standards. It is the responsibility of Contractor to finalize the wiring diagrams to meet any site specific conditions and provide a fully functional system. The Contractor shall submit the finalized drawings for approval to UofG in RAW editable format.

2.2 Operational Systems

.1 Work shall be executed to minimize the impact or the disruption of the existing, operational, systems and facility operations. At any time during the performance of the work, if the existing, operational, systems are affected beyond the expectation approved through the implementation plan or there is an imminent danger to be affected beyond the approved expectation, the Contractor shall stop work and minimize the impact on the operational systems. The Contractor shall immediately inform UofG. At UofG's request, the Contractor shall perform all work to implement a temporary solution to enable the functionality for the operational systems. The Contractor is to proceed with permanent work only after a solution is approved by the Manufacturers Engineer and UofG.

.2 Failure to fully comply with the above paragraph will make the Contractor directly responsible for all damages and all costs required to respond to the incident and to remedy the failure.

2.3 Hazardous Materials

.1 Some UofG sites may contain asbestos and other hazardous materials. Prior to the start of any work, the Contractor shall consult with UofG and obtain relevant documentation from UofG that identifies specific locations and areas containing hazardous materials. The Contractor shall be required to follow UofG's policies along with relevant regulations and standards prior to, and when preforming work where such materials are present.

2.4 Warranty

.1 The Security Contractor shall warranty the completed solution including all equipment, computer software, documentation and latent defects delivered shall perform in accordance with and conform to all applicable standards, requirements, specifications, descriptions, and other requirements included in their proposal and shall be without defects in materials, workmanship and design. The warranty shall commence upon Substantial Performance and Ready-for-Takeover as defined by the UofG.

.2 Expose, and assign to UofG, any manufacturer's warranties including all associated documentation of such warranty. Include for 12 month all-inclusive parts and labour with 12 month warranty as part of the tender price.

.3 As a minimum during the warranty period and at no extra cost to UofG, the Security Contractor shall include a guaranteed response time of two (2) hours for a major system failure and eight (8) hours for a minor system failure on a 24 hour per day, 7 days per week basis. A major system failure shall be defined as the failure of any operator controls as well as any system controller, processor or communication link which renders more than 10% of a specific security subsystem of systems inoperative. A minor system failure shall be defined as the failure of a single security device such as a card reader, egress device, camera, intercom unit, etc.

.4 As part of the submission, provide a complete list of recommended spare parts which should be held in the Country as well as a list of parts available on Company premises for fast system repairs and/or replacements.

.5 Preventive and corrective maintenance performed by a maintenance contractor other than this Contractor after or during the warranty period shall not void warranty on labor, hardware and software provided by this Security Contractor.

2.5 System Description

.1 The current approved access control platform at the University of Guelph is Genetec Security Centre. No substitutions shall be considered. Only contractors certified by the manufacturer shall be permitted to work on the system.

.2 The Access Control System (ACS) consists of field devices including, but not limited to:

.1 Cards and other credentials

.2 Credential Readers

.3 Door Control Units (DCU)

.4 Electrified door hardware such as electric strikes, latches and locks

.5 Electric Power Transfer and concealed hinges/switches

.6 Request to Exit Motion Detectors

.7 Request to Exit Push Buttons

.8 Tamper Alarms

.9

.10 With ancillary connections to:

.11 Intercom Stations for door release

.12 Fire Pull Stations

.13 Hold open devices (Fire alarm release)

.14 Power and automatic door operator units

.15 Control and termination equipment including, but not limited to:

.1 Access Control System Server

.2 Operator Work Stations

.3 Power supplies

.4 Batteries

.5 Uninterruptable power supplies (UPS)

.16 All system devices / doors connect to centrally located Door Control Panels, connectivity from Door Control Panels to the system server front end is based on Ethernet IP based protocols over the UofG network.

2.6 Data Gathering Panels / Door Controller Units

.1 DGPs for access control facilities shall be located and mounted within a secure dedicated room with a minimum size of 48" depth and 72" width. Room size to be adjusted to ensure adequate wall space to mount all enclosures required for project. If a dedicated room cannot be provided a secure enclosed area shared with other physical resources assets may be proposed for approval by UoG Physical Resources Electronic Access group. Location shall be secured by store room function door opening located on the width dimension.

.2 Door controller units to be fully contained within approved enclosures no substitutes. Acceptable enclosures in order of preference as follows:

.1 Lifesafety Mercury Prowire pre-wired power systems to be used for all new construction or where retrofit will establish a new DGP location

.2 Lifesafety MCLASS integrated mercury power systems to be used for all new construction or where retrofit will establish a new DGP location

.3 Lifesafety VCLASS integrated vertx power systems to be used only for expansion of existing DGP locations where Vertx is already present

.4 Nema 1 steel enclosure with Securitron AQS 1216 and Securitron AQS 2410 power supplies (see typical at end of document) to be used only for expansion of existing DGP locations where Vertx is already present. Supply with PTC 16 output boards. Supply Fire Trigger board as needed for fire code compliance.

.3 DGP door controller panels to consist of at least one Genetec Cloud Link and the following acceptable options:

.1 Mercury Security door controllers to be used for all new construction or where retrofit will establish a new DGP location
- models and quantities to meet requirements for use with Genetec Cloud Link integration

.2 HID Vertx door controllers to be used only for expansion of existing DGP locations where Vertx is already present

.3 2N or Axis door controller boards as approved by Physical Resources EA Group

.4 Control units shall be sized on per project basis to appropriately support the total number of devices and areas required.

.5 For new or expansion of existing DGP configurations provide cable troughs, conduit, and essential power circuits. Cable troughs shall be grounded to earth ground.

.6 All Equipment mounted in each DGP configuration shall be mounted on fire rated plywood supplied and installed by this Contractor.

.7 Access Control equipment, cable troughs, conduit, and emergency power circuits, shall be wall mounted.

.8 Prior to start of installation of any equipment this Contractor shall remove all water, dirt and debris of any kind from the room. It shall be the responsibility of the Contractor to always keep communications / equipment rooms clean and free of dust during the installation.

2.7 Power Failure

.1 The system is currently capable of operating even in the event that the system management server is unavailable. Future expansions and additional of the system shall maintain this ability.

.2 Following a power failure and the restoration of main or backup power, the ACS shall revert automatically, within 3.5 minutes, to normal service status without the need for operator intervention. The system shall restart in the same state as existed before the power interruption with no loss of functionality or transaction data.

.3 In the event that communication between the door control panel and access control server is unavailable, the functionality of the door control panel shall be preserved such that door functionality at every door is unaffected.

.4 This will apply for all credential records that were recorded in the access control system database prior to the loss of communication between the panel and access control system server.

2.8 Portal Definitions

.1 Refer to "door typical" drawings included in this standard for required door configuration and functionality.

.2 For specific door types that do not match those provided in this document, the Contractor shall create a new "door typical" drawing and submit to UofG for approval.

2.9 Network Communication

.1 Connectivity from door controller panels to the system front end shall be based on Ethernet IP based protocols over a UofG supplied network. The Contractor shall connect access control equipment to communication rooms containing UofG network switches and connect to associated network patch panels.

.2 The Contractor shall coordinate and facilitate all connections with the Computing & Communications Service. Follow existing procedure for obtaining IT resources..

.3 The Contractor shall ensure all IP addressing schemes used on access control equipment are coordinated and approved by the Computing & Communications Service group. Follow existing procedure for obtaining IT resources ACS Server.

.4 All access control system servers are currently and shall remain in on site secure data center.

2.10 Monitoring & Control Locations

.1 Client software is installed and maintained by the Computing & Communications Service.

.2 Contractor shall not provide monitoring equipment or user accounts to end users unless instructed to by contract documents and as confirmed by Computing & Communications Service.

2.11 Interface with Other Systems

.1 Elevators

.2 Where elevators require card access, the card reader shall be mounted inside the cab behind a plexiglass opening and shall provide for floor by floor control. The elevator on a valid credential read shall unlock all floors pertaining to the cardholders access rights. Once a floor is chosen the elevators shall be directed to the restricted floor. The system shall capture information as to the floor that was chosen by the credential holder (floor tracking).

.3 All work, equipment, and supplies relating to the installation of Card Access, and/or modification of elevators to support card access in building elevators shall be performed by the existing elevator maintenance company. The Contractor shall carry in their bid all cost associated with this work.

.4 The Contractor shall be responsible for coordinating and identifying all installation requirements to the elevator company.

.5 The Contractor shall ensure and maintain the functionality of the elevator fireman's override key switch such that on activation the security system shall relinquish all control over the elevator call buttons and the elevator shall function normally.

.6 The Contractor shall provide to the elevator company all required security equipment such as card readers, controllers, cabinet, power supplies, resistors, varistors, diodes, etc. required for elevator security.

.7 The Contractor shall connect all equipment to the Access Control system and shall restrict and track access of card holders to each elevator floor.

.8 The Contractor shall be responsible to coordinate the installation testing and commissioning of all required elevator security equipment with the elevator company in relation to security system components and devices.

.9 Refer to Elevator Section 2.9 for other requirements.

.10 Network Time Protocol

.1 All Access Control System devices that utilize time and date shall be maintained with NTP time. The NTP master clock shall be provided by UofG.

.11 Parking Garage Entrances, Gates and Loading Dock Overhead Doors

.1 For such new facilities the Contractor shall be responsible for coordination, supply, installation and integration of access control and intercom system components and cabling to all locations where required.

.2 Where required the Contractor shall be responsible for ensuring that roll up doors and gates shall integrate to the access control system to open on a valid credential read or remote operator action.

.3 Contractor shall provide for all entrance and exit gates to have an override option for remote open and close of gates via the access control system software.

.4 Acceptable intercom systems as follows:

.1 2N IP intercoms

.2 Axis IP intercoms

.3 Aiphone analog intercoms

2.12 Power Requirements

.1 120 VAC power on essential power shall be provided for additional security system components at each location required. This includes all modifications to existing systems required to accomplish this task.

.2 The power solution shall comprise of CSA listed power supplies and transformers to distribute low voltage power to system components.

.3 The power solution shall include lockable, hinged covered, terminal cabinets for all power supplies, transformers, and power distribution terminal strips. The Contractor shall provide all conduit and wiring from the 120 VAC facilities to the terminal cabinets.

.4 The power solution shall provide protection against surges, spikes, noise, harmonic distortion and other line problems for all system equipment and their components. In addition to generator support, all power sources shall be equipped with uninterrupted power supply capable of supporting all attached equipment for a period of 20 minutes.

.5 All equipment and system components which are powered by more than 48 volts AC or DC shall be ULC listed for safety. This includes equipment or system components classified as non-power limited.

.6 All system power supplies shall be monitored, by the Access Control System, for line failure on a dedicated monitoring input point. Therefore, when an AC line fails, a unique alarm condition will be caused.

2.13 Labeled Fire Doors and Frames

.1 Any labeled fire door or frame which will require modification to meet the system specifications must be immediately brought to the attention of the UofG.

.2 The Contractor shall be responsible for replacing any labeled fire door or frame that is modified, by the Contractor, without written approval from UofG.

2.14 Field Devices

.1 Electrified Door Hardware

.1 All Contractor provided door hardware shall conform to UofG Standards for Door Hardware Section 3.10, latest revision.

.2 All electrified door hardware provided shall be field convertible between 12 and 24v.

.3 All electrified door hardware shall be configured for 24v operation.

2.15 Mullion Disconnect

.1 Whenever possible a preference for electrified door hardware in lieu of electric strike will be chosen when using a removable mullion.

.2 For door locations with removable mullions a sealed cable to cable connection is required.

.3 Sealed cable to cable connectors be shall MX150 series connectors as manufactured by Molex.

.4 Each connection shall consist of the following part numbers:

.1 1 x Female receptacle, part number 33471-0201

.2 2 x Female receptacle terminals, part number 33001-3003

.3 1 x Male receptacle, part number 33481-0201

.4 2 x Male receptacle terminals, part number 33011-0004

.5 All connections shall be crimped with the approved Molex crimp tool.

2.16 Door Position Switches

.1 In locations with door position switches, they shall be supplied and installed by this contractor.

.2 Door position switches shall be concealed discrete devices unless otherwise noted and shall not be integral to other devices such as strikes, maglocks, etc unless approved by Physical Resources EA group. Where exposed mounting is necessary devices shall be mounted so as to limit easy access to unauthorized personnel.

.3 At high security locations, E.O.L. resistors shall be installed at the door contact.

.4 Acceptable devices are as follows:

.1 Concealed – Sentrol 1078, 1076, 1840 or approved equivalent

.2 Surface – Sentrol 1045T or approved equivalent. (may be used where approved only)

.3 Overhead – Sentrol 2200 Armoured Cable or approved equivalent. (One overhead doors)

.5 Frame mounted magnetic door contacts, hinge mounted plunger type switches, are not acceptable.

2.17 Electromagnetic Locks

.1 Electromagnetic locks shall be designed and provided by Division 8 (Door Hardware Section 3.10) It is the responsibility of the security contractor to coordinate these locations and provide control and power for these devices.

.2 Power connections shall have a metal oxide varistor connected at the lock termination point.

.3 Applicable permits, inspections, and testing shall be the Contractor‘s responsibility at the contractor’s expense, unless stated otherwise in project specific contract specifications.

2.18 Automatic Door Operators

.1 Where automatic door operators are present they are to be interfaced with the access control system as described in common portal functions. Dedicated low voltage power circuits will be provided from the DGP location to the automatic door operators interface board and electrified door devices to provide access control function when operator is de-energized.

.2 Where automatic revolving or sliding doors are to be installed, the door shall be capable of being locked securely when parked. Door contacts shall be provided on all door leafs to monitor door status.

.3 Refer to Accessibility Design Brief for other ADO requirements.

2.19 Door Release Push Buttons (Security Push Buttons to Exit)

.1 For use only on maglock doors, each door release push button shall be 8825-13 F system standard which provides double pole, double throw configuration.

.2 One pole is to request exit from the system, the other shall redundantly release the magnetic lock by power interruption.

.3 The exit pushbuttons shall be totally fail-safe, to release the doors in the event of a failure of the exit control circuitry within the reader interface module.

.4 All exit pushbuttons shall be labeled to meet local codes.

2.20 Magnetic Lock Master Reset Switches

.1 Where required by code provide Locknetics 640 Series magnetic lock reset keyswitch. This switch shall be set-up to “enable” when turned one way and “disable” when turned the other.

.2 In accordance with the Authority having jurisdiction, this switch should be normally located inside the Fire Panel System Room and shall indicate the lock control system status with red and green LED indicators at the switch.

2.21 Card Readers

.1 HID Signo Contactless smart card readers are to be provided no substitutions. Contractor to provide readers pre-configured with Signo smart profile and UofG MOB key; Contractor to order readers using UofG specific HID product codes listed below.

.2 Acceptable HID product codes are as follows:

.1 HID SY-20KNKS-02-0012W3
HID Signo 20 reader with keypad, suitable for frame or mullion mounting OSDP/Wiegand compatible with pigtail.

.2 HID SY-20NKS-02-0012W3
HID Signo 20 reader, suitable for frame or mullion mounting OSDP/Wiegand compatible with pigtail.

.3 HID SY-40KNKS-02-0012W3
HID Signo 40K reader with keypad, suitable for wall or surface mounting OSDP/Wiegand compatible with pigtail.

.4 HID SY-40NKS-02-0012W3
HID Signo 40 reader, suitable for wall or surface mounting OSDP/Wiegand compatible with pigtail.

.3 Readers will be wired based on the following criteria:

.1 For new construction where mercury security panels have been supplied readers will be connected using OSDP interface.

.2 For new or retrofit construction where Vertx security panels have been supplied readers will be connected using Wiegand interface.

2.22 Tamper Alarms

.1 All ACS equipment cabinets including system power supply cabinets, shall be equipped with sensors, which detect and remotely annunciate their opening.

.2 All communication and alarm device cabling at the door and between the DGP and the door shall be supervised to detect and remotely annunciate “open”, “high impedance”, “low impedance”, and “short” conditions. The end of line supervision device shall be installed as close as possible to the security device.

2.23 Conduits, Boxes and Raceways

.1 The Contractor, unless otherwise stated in project specific contract specifications shall be responsible for providing all cable, conduits, boxes, and raceways deemed necessary to provide a quality turn-key installation.

.2 All electronics modules shall be properly housed in steel enclosures or junction boxes as required.

.3 The Contractor shall be responsible for providing these enclosures or boxes where necessary.

.4 The Contractor shall be responsible for ensuring that all back boxes, conduit, and raceways meet equipment and wiring requirements for the system.

.5 The Contractor shall inspect the raceway system during construction and shall notify of any problems found, prior to the finishing of the wall, ceiling, or floor surface.

.6 All junction boxes are to be accessible for future service. All junction boxes shall be secured with tamperproof screws where installed below 8 feet.

.7 Location of all boxes and access panels are to be approved by UofG prior to installation.

.8 No access panels may be located where they will affect the finished appearance of the surrounding area.

2.24 Cabling

.1 Samples of all wire and cable types shall be submitted to U of G for acceptance prior to installation.

.2 All cables must be whole. Splicing of cable is Only permitted in extreme cases where approved by EA PR.

.3 All cabling shall be stranded. Solid core cable is not acceptable.

.4 All cables to be CMG communications cable, FT6 rated

.1 Door contacts require 4C 22AWG

.2 Request to exit devices require 4C 22AWG

.3 Credential readers require 6C 22AWG

.4 Electrified Devices require 4C 18AWG

.5 Acceptable cabling products in order of preference as follows:

.1 Combo cable containing 1x4C 18AWG, 1x8C 22AWG and 1x6C 22AWG. Suitable manufacturer PROVO or approved equivalent.

.2 Individual cables for each device sized as per 2.11.4. Suitable manufacturers BELDEN, PROVO or approved equivalent.

.6 Indoor cabling shall be installed in existing cable tray where and when possible and in EMT conduit when exposed or when required by applicable codes. Outdoor cabling shall be installed in PVC liquid tight conduit.

.7 Where required, cables shall be fire rated to comply with applicable codes.

.8 Conductors shall not be smaller than No. 22 AWG copper wire and of a type rated for burglar alarm system wiring.

.9 Connecting wire between a battery or power supply and a sounding device shall be not smaller than No. 16 AWG.

.10 Cable fill shall not exceed 40% on any new conduit installations.

.11 All cables shall be fastened to the structure at least every ten (10) feet where not in conduit.

.12 Wires shall be protected from abrasion due to sharp corners or projections by at least two layers of electrical insulating tape or the equivalent. Wire that has scrapes, nicks, gouges, or crushed insulation shall not be used and must be removed.

.13 Connecting wires may be attached to plaster or wood by means of acceptable forms of staples, porcelain, or other non-absorptive insulating, or bridle rings or tie wraps.

.14 Connecting wires above suspended ceiling assemblies shall be secured and protected against physical damage.

.15 It is absolutely prohibited to run low voltage power limited wiring in the same wire-ways with, or closely parallel to, high voltage and/or switched power wiring.

.16 For connections and splices all shall be mechanically secured using gel filled crimp connectors designed for use on stranded wire. Twist type connectors shall not be used.

.17 The wire or circuit provisioned shall be no longer than 80% of the maximum allowable length and power consumption for the wire size and application.

.18 Wiring in all cabinets and terminal boxes shall be neatly arranged and bundled with Panduit cable management or equivalent.

.19 Code compliant fireproofing techniques shall be used by the Contractor on all penetrations of fire rated partitions and slabs, where the penetrations are made by or used by the Contractor.

.20 All wires and cables shall be ULC listed for their application and shall conform to manufacturer specifications for installation.

.21 All cable and wiring methods shall meet national, provincial, and local code requirements.

.22 All cable must be properly grounded to meet Codes and provide a trouble free system.

2.25 System Programming

.1 The Contractor is required to provide all system programing including but not limited to:

.2 All system(s) configuration.

.1 All system naming conventions shall follow UofG naming conventions as provided by UofG.

.2 The Contractor is required to conduct and chair pre-installation meetings as required with UofG EA group to identify specific requirements of the system programming.

.3 All programming or editing of the existing program in the system shall be achieved without interrupting card authentication.

.4 Computing & Communications Service shall provide temporary access to the Security Contractor on request to allow for configuration and testing of new equipment.

2.26 Testing and Commissioning

.1 Refer to the University of Guelph Commissioning Standard for additional details.

2.27 System As-Built Documentation

.1 Deliver three (3) hard and soft copies of each manual within two (2) weeks of receiving formal system acceptance.

.2 Final documentation soft copies shall be prepared and submitted in the native (editable) electronic format (.vsd, .dwg, .xls, .doc). All documents produced shall be property of UofG Contractor shall have no rights over the entire documentation package or any parts of the documentation package.

.3 Final As-built Drawings and Turnover Documentation shall consist of the following as a minimum:

1. Equipment List

Shall Included as a Minimum	Description
Devices	All Supplied Equipment with Manufacturers Part Number, Model Number & Serial Number and Quantity per Comm. Room
Components	Removable Components that make up the device (example: slotted cards) Showing Part Number, Model Number & Serial Number
Manufacturers	Manufacturer of the Device and the Components that make up the Device (Include contact name, address, phone, fax, email, website)
Suppliers	Company Supplying the Component or Device (Include contact name, address, phone, fax, email, website)
Distributors	Distributor or Manufacturers Rep. (Include contact name, address, phone, fax, email, website)

2. Final Revision As-Builds & Shop Drawings

Interconnected Diagrams	Very detailed drawing showing connection of one device to another (specifically how it's wired)
Equipment Layouts	Riser diagrams indicating location of equipment along with IP stack, and system addressing information
Electrical Schematics	All associated electrical panel and breaker numbers for all powered equipment
Wiring Diagrams	Detailed drawing depicting exact terminations and component quantities as they have been installed
Point Allocation Table	Very specific showing all termination points for all devices, components. Shows what is connected to each terminal on each device, component
Architectural drawings (Security System Layout drawings)	Floor plans that show all device locations

3. Software

Shall Included as a Minimum	Description
Installed Software List	For each supplied device including operating system. Show current software versions
Equipment Operating System CDs (Installed Version)	For each supplied device in "Equipment List"
Application CDs	For each application noted in "Installed Software List"
Configuration	All Software Configuration Parameters presented in excel spreadsheets (alarming tables, equipment addressing etc...)
Registrations	Software Registration numbers, codes and forms supplied by the manufacturer for each supplied device noted in "Equipment List"

4. Manuals

Manufacturer Equipment Manuals	Published by the Manufacturer
Manufacturer Operation Manuals	Published by the Manufacturer
Manufacturer Service Manuals	Published by the Manufacturer
Manufacturer Maintenance Manuals	Published by the Manufacturer
Equipment Keys	Keys or combinations that unlock any provided equipment or components

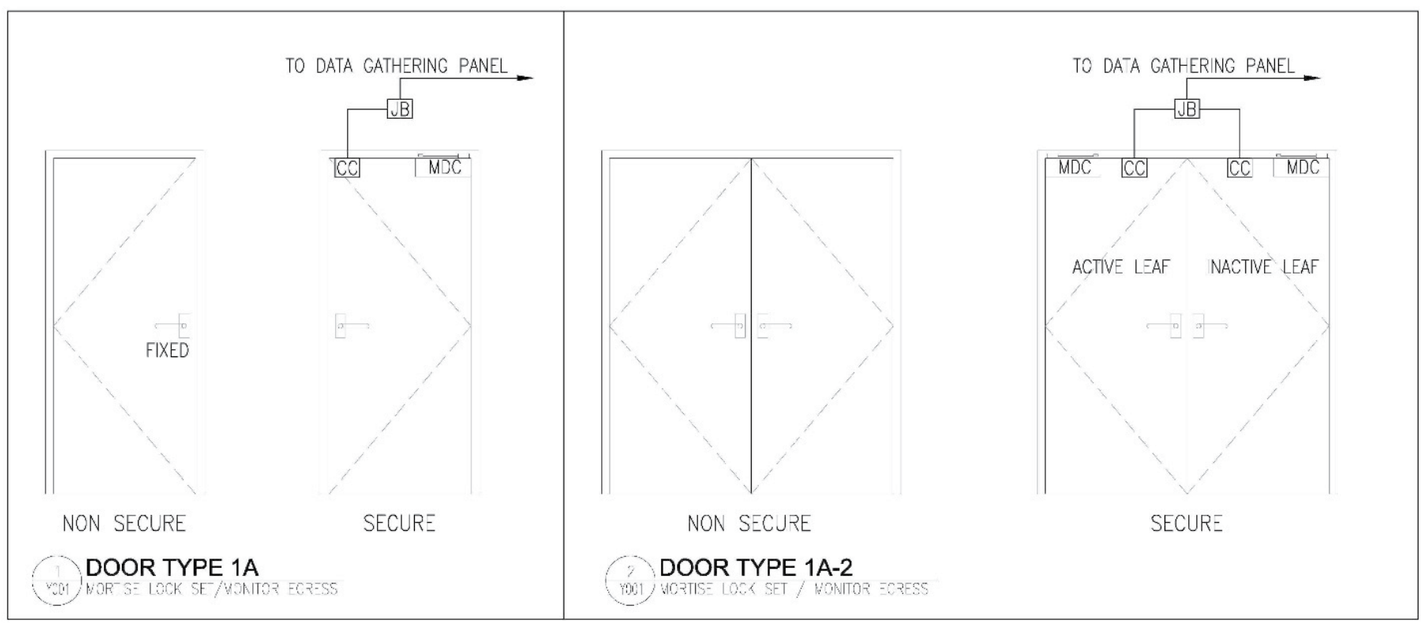
5. Warranties

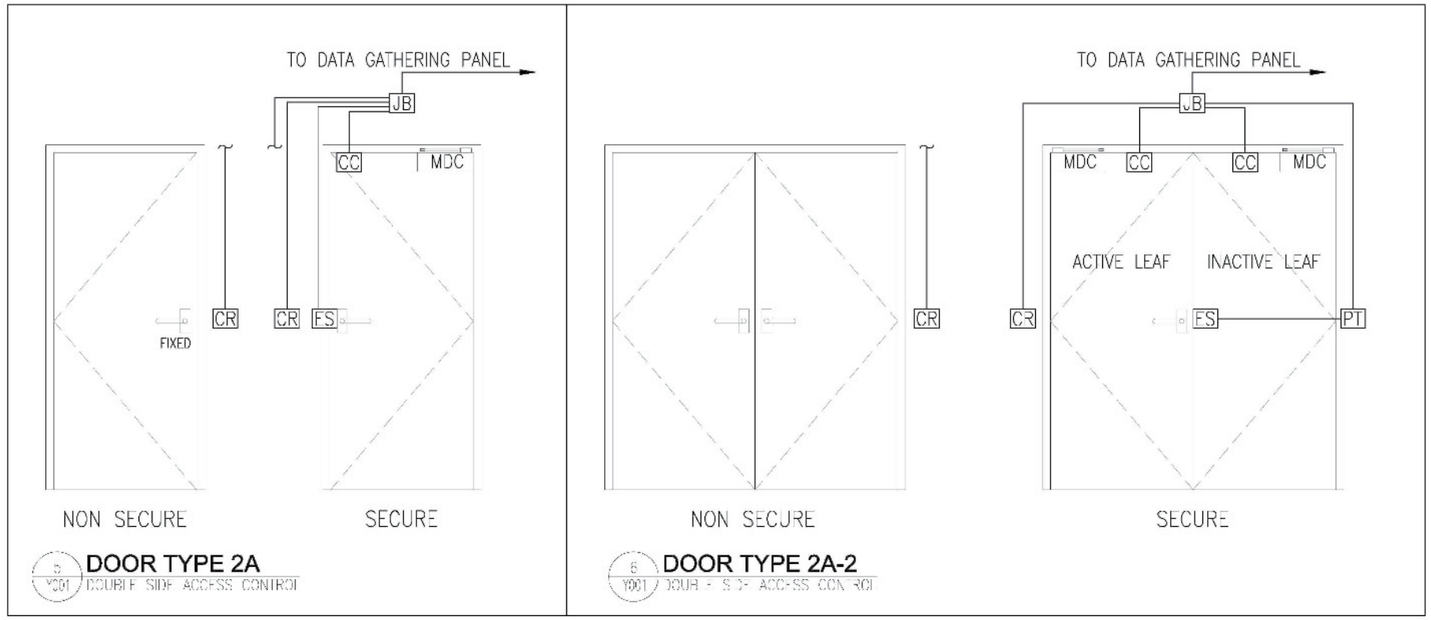
Shall Included as a Minimum	Description
Vendor Installation Warranties	Include start date and end date. Response times
Vendor Equipment Warranties	Include start date and end date
Software Warranties	
Hardware Warranties	
Manufacturing Warranties	

6. Checklist/Commissioning Forms

Shall Included as a Minimum	Description
Inspection Checklist	
Verification Checklist	
Integration Checklist	Camera to door, door to intercom, intercom to camera etc...

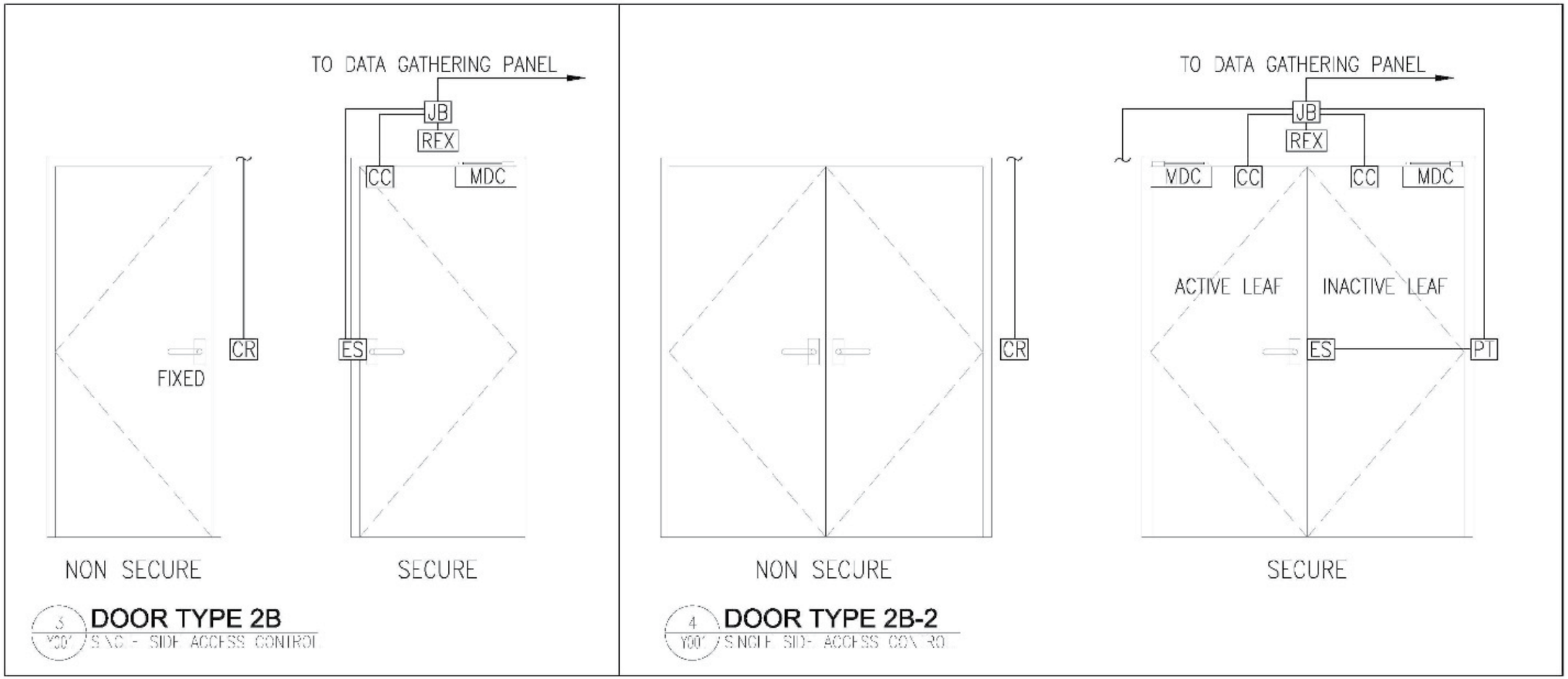
3 Door Typicals

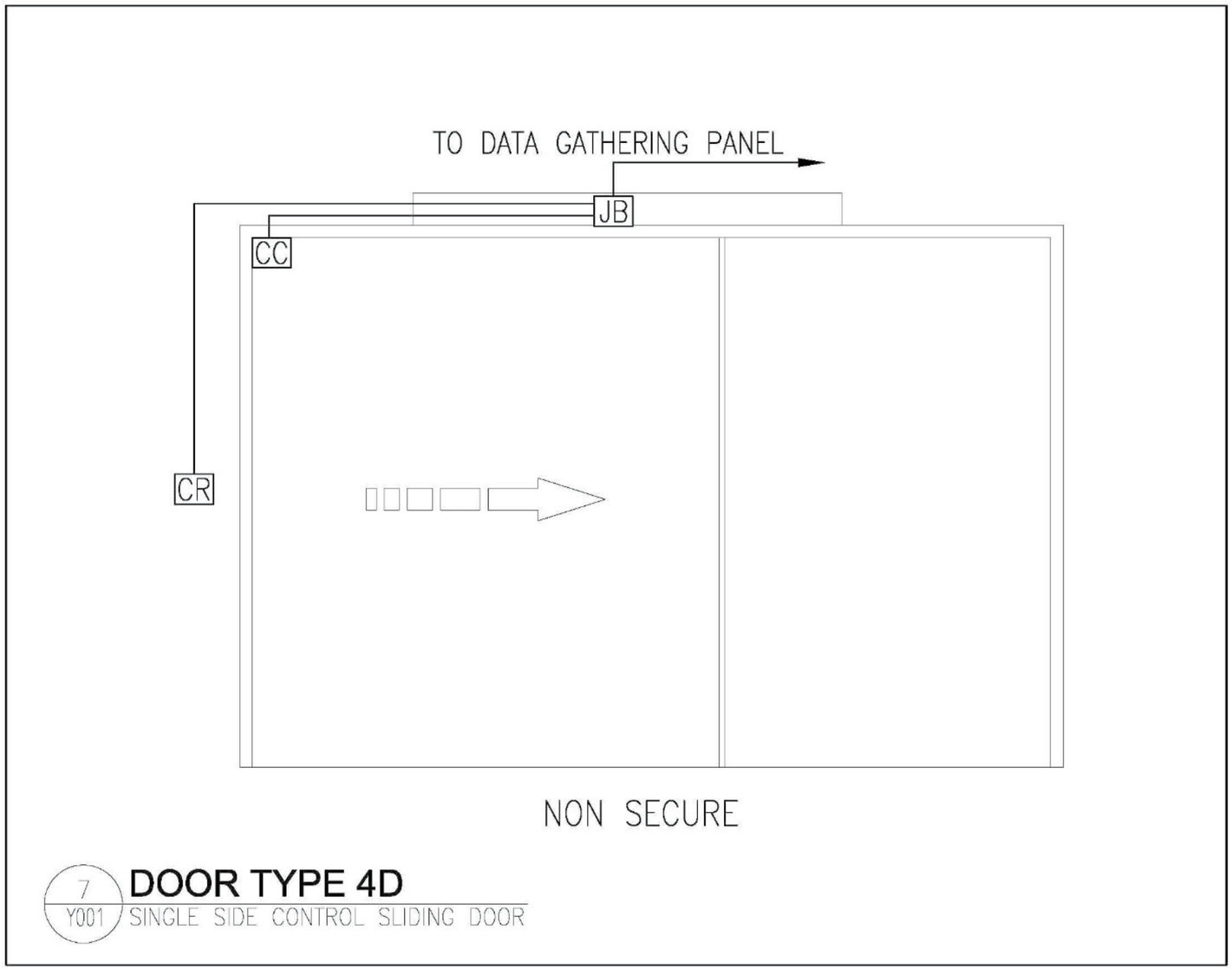




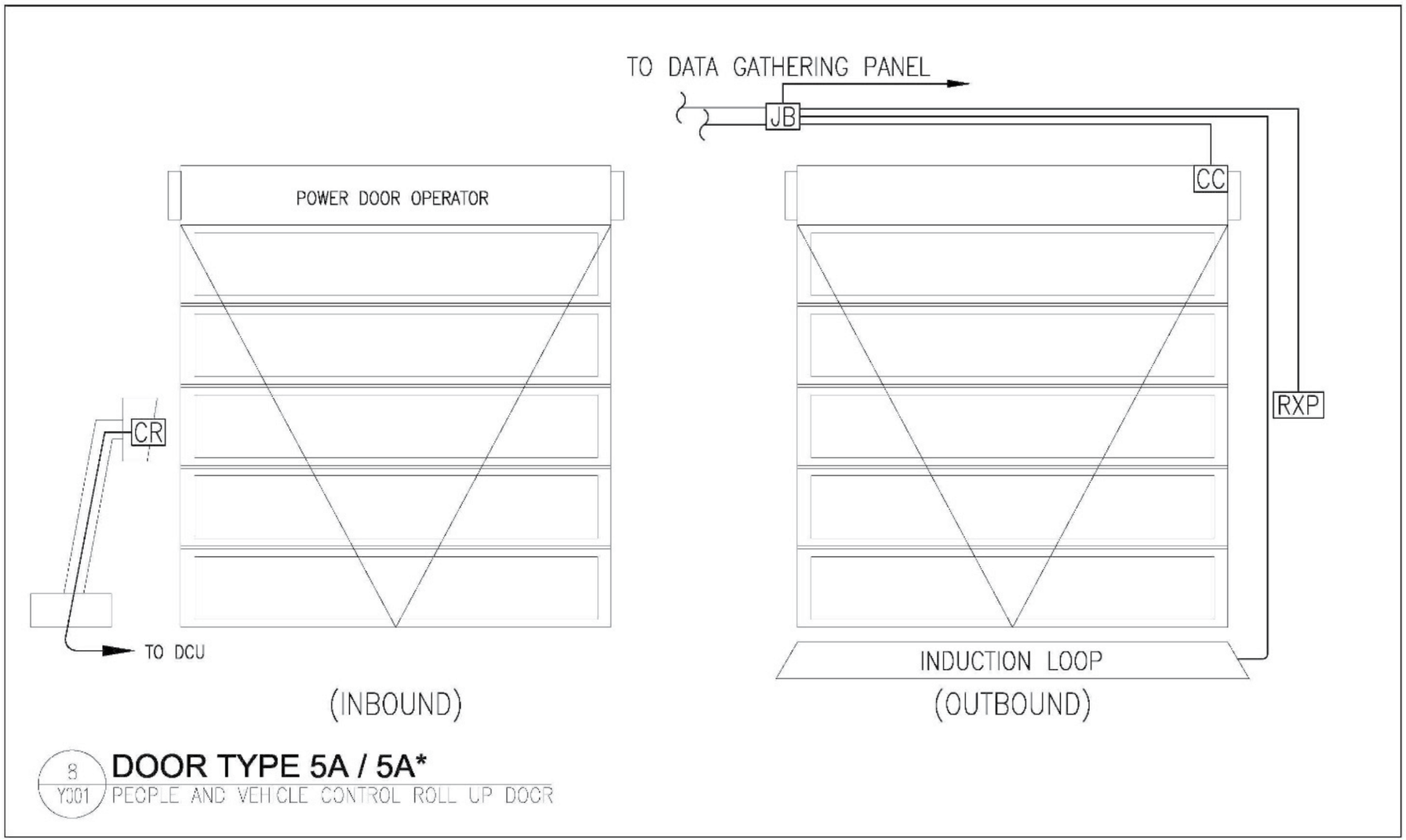
SYMBOL LEGEND

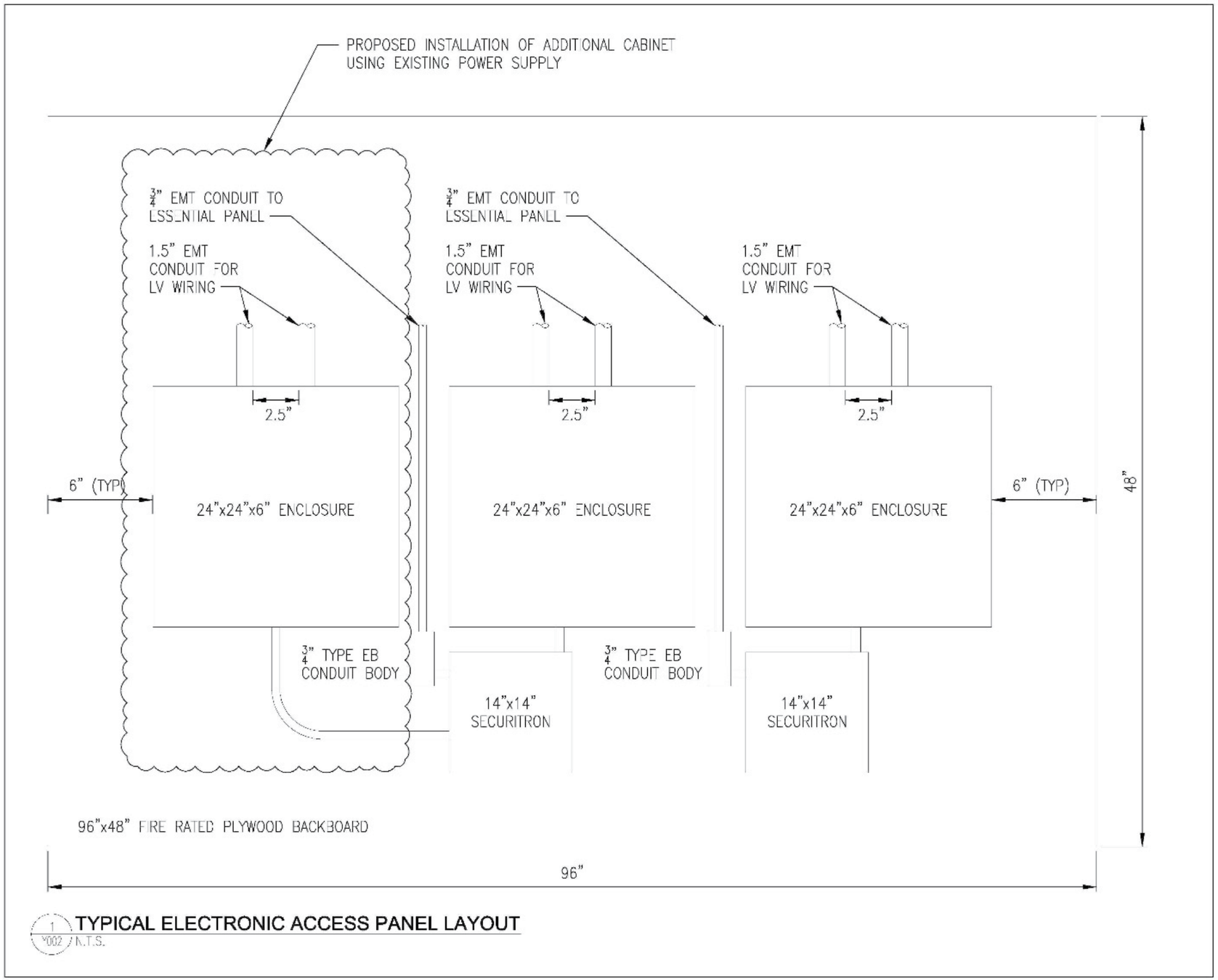
CR	CARD READER
CC	CONCEAL DOOR CONTACT
ES	ELECTRIC STRIKE
PT	POWER TRANSFER
RCX	REQUEST TO EXIT MOTION DETECTOR
JB	JUNCTION BOX
MDC	MANUAL DOOR CLOSER


TO DATA GATHERING PANEL
JB
RFX
CC
MDC
CR
ES
FIXED
NON SECURE
SECURE
5
Y00'
DOOR TYPE 2B
S.V.C. - SIDE ACCESS CONTROL
TO DATA GATHERING PANEL
JB
RFX
VDC
CC
CC
MDC
CR
ACTIVE LEAF
INACTIVE LEAF
ES
PI
NON SECURE
SECURE
4
Y00'
DOOR TYPE 2B-2
SINGLE SIDE ACCESS CONTROL

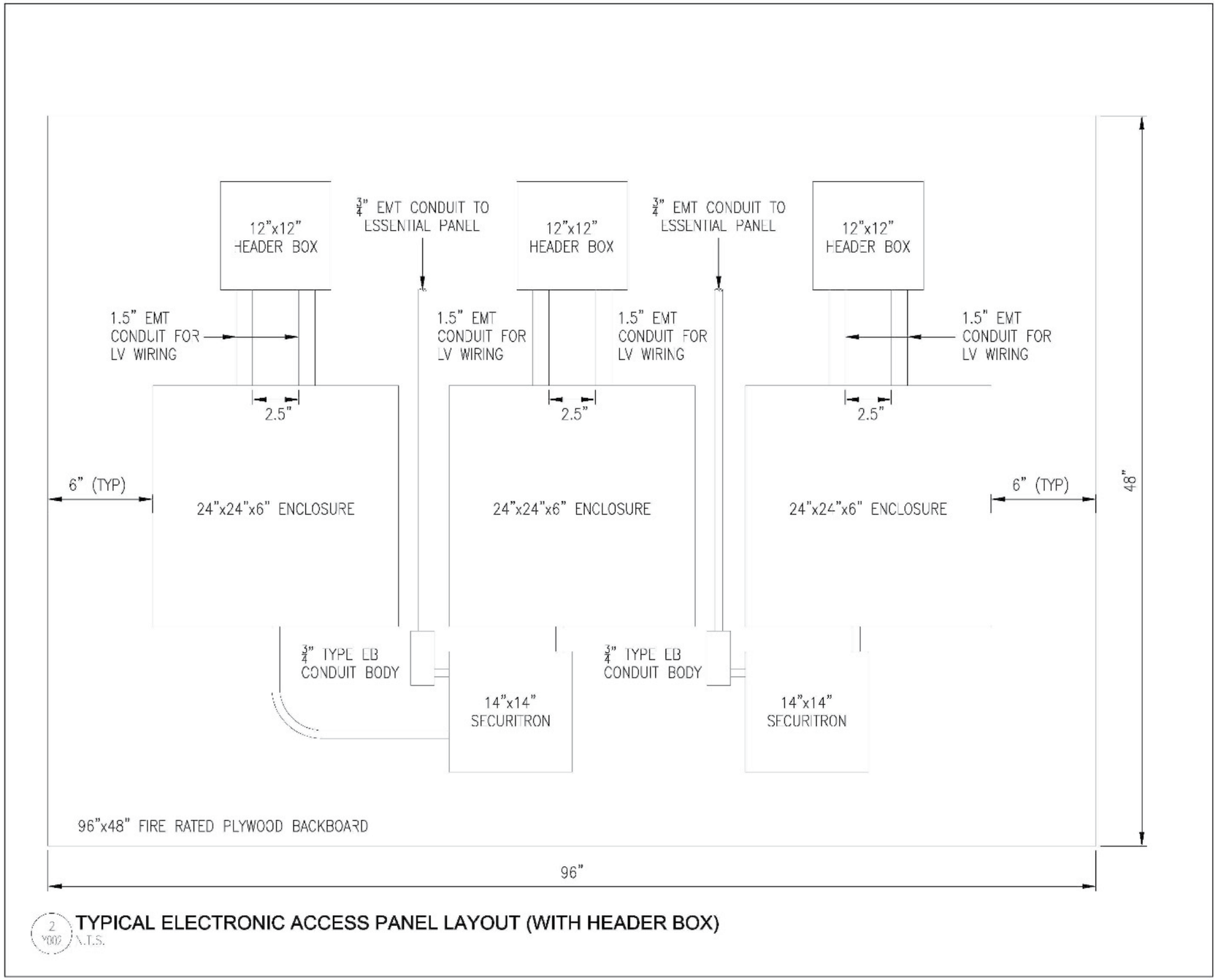


7 Y001 **DOOR TYPE 4D**
SINGLE SIDE CONTROL SLIDING DOOR

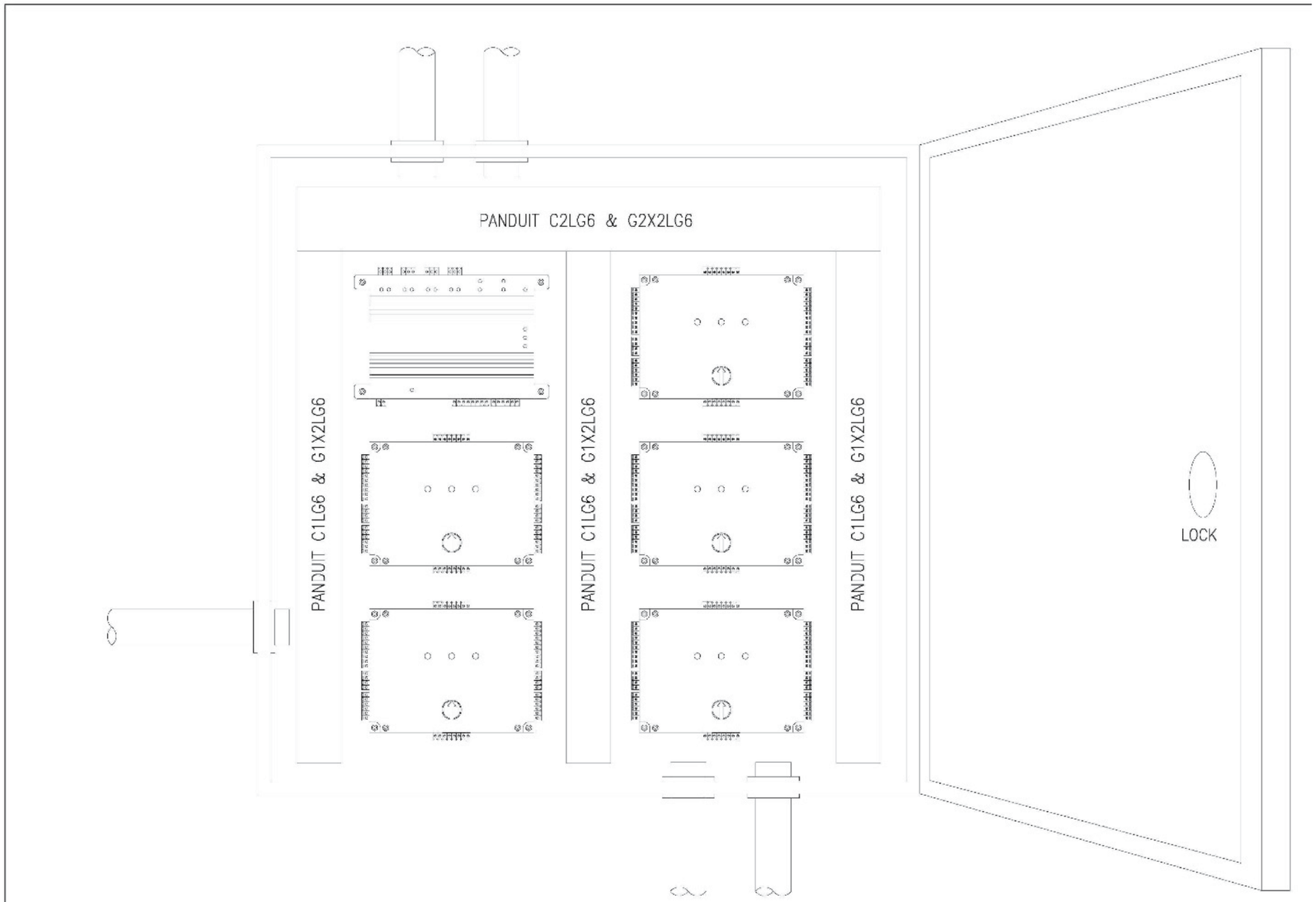

TO DATA GATHERING PANEL
JB
CC
POWER DOOR OPERATOR
CR
RXP
TO DCU
INDUCTION LOOP
(INBOUND)
(OUTBOUND)
8
Y301
DOOR TYPE 5A / 5A*
PEOPLE AND VEHICLE CONTROL ROLL UP DOOR



1 TYPICAL ELECTRONIC ACCESS PANEL LAYOUT
E002 N.T.S.



2 E002 A.T.S. **TYPICAL ELECTRONIC ACCESS PANEL LAYOUT (WITH HEADER BOX)**



3 YC02 HOFFMAN 24 X 24 X 6 NEMA 1 STEEL ENCLOSURE LAYOUT DETAILS
N.T.S.

LAYOUT:

1. PROVIDE 24"x24"x6" NEMA 1 STEEL ENCLOSURE. COLOUR TO BE BAKED ENAMEL GRAY.

CABLING:

1. SECURITY CONTRACTOR TO PROVIDE CABLE AND ELECTRICAL CONTRACTOR TO INSTALL ALL CONDUIT AND PULL CABLES.
2. ALL CABLES TO BE CMG COMMUNICATION CABLE, FT6 RATED.
   - 2.1. DOOR CONTACTS REQUIRED 4C, #22AWG
   - 2.2. REQUEST TO EXIST DEVICES REQUIRE 4C, #22AWG
   - 2.3. CARD READERS REQUIRE 6C, #22AWG
   - 2.4. ELECTRIC STRIKES REQUIRE 4C, #18AWG.
3. PROVIDE PANDUIT AS SHOWN IN DIAGRAM. MODEL NUMBERS ARE INDICATED ON DIAGRAM.

5 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards –
IT & Communications System

Version	Effective Date	Approved By	Signature
25-01	September 1, 2025	Tom Herr, Director, Technology Operations Computing & Communications Services (CCS)	

6

IT & Communications Systems

1 Introduction

1.1 General

.1 This Electrical IT & Communication Systems Design Standard has been developed to establish the University's minimum expectations and requirements for new IT & Communication Systems installed on campus.

.2 This Standard is based on current Codes and Standards, Industry Best Practices and the University's preferred approach to standardizing design from the perspective of system configuration and performance, operating flexibility and efficiency, maintenance practices and protocols and inventory management.

1.2 Compliance Criteria

.1 Full compliance is mandatory on projects involving new construction.

.2 Full compliance is mandatory for new IT & Communication System installation within projects involving significant renovations.

.3 Compliance is recommended to the extent practical and feasible for all projects involving minor renovations and rework of existing IT & Communication Systems infrastructure

.4 Any deviations from the minimum requirements outlined in this Standard must be approved by the Director, Technology Operations, Computing & Communications Services before the completion of Schematic Design.

1.3 Responsibility of the Designer

.1 The System Designer remains responsible for ensuring any proposed design solution is in full compliance with applicable Codes & Standards in force at the time of the design.

.2 Any conflict between applicable Codes & Standards and this Standard shall be identified and presented to the Director, Technology Operations, Computing & Communications Services, together with proposed measures for addressing the conflict before the finalization of the Schematic Design.

1.4 Design Innovation

.1 This Standard is not intended to preclude or constrain an innovative approach to design. It however remains the responsibility of the Designer to demonstrate that any proposed design innovations are in general compliance with the design intent outlined in this Standard.

.2 All proposed Design Innovation shall be tabled for consideration of the Director, Technology Operations, Computing & Communications Services, before the completion of Schematic Design.

1.5 Reference Documents

.1 Ontario Building Code

.2 Canadian Electrical Code

.3 CAN/CSA C22.2 No. 232-M Optical Fibre Cables

.4 CAN/CSA C22.2 No. 214 Communications Cables

.5 TSB-67, Transmission Performance Specifications for FieldTesting of UTP Cabling

.6 TSB-72, Centralized Optical Fibre Cabling Guidelines.

.7 TSB-75, Open Office Cabling.

.8 ANSI/EIA/TIA-455, Test Procedures for Optical Fibres, Cables and Transistors

.9 ANSI/EIA/TIA568A (or CAN/CSA T529M), Commercial Building Telecommunications wiring standard and all the Communications Bulletin Boards (TSBs')

.10 ANSI/EIA/TIA-569 (or CAN/CSA T530-M), Commercial Building standard for Communications pathways and spaces

.11 ANSI/EIA/TIA-598, Colour Coding Of Optical Cables

.12 ANSI/EIA/TIA-604-3, FOCIS 3 Fibre Optic Connector Intermateability Standard

.13 ANSI/EIA/TIA-606 (or CAN/CSA T528-M), Administration standard for Communications infrastructure of commercial buildings

.14 ANSI/EIA/TIA-607 (or CAN/CSA T527), Commercial Building Grounding and Bonding requirements for communications

.15 ANSI/ICEA S-83-596, Fibre Optic Premises Distribution Cable

.16 ANSI/ICEA S-83-640, Fibre Optic Outside Plant Communications Cable

.17 ANSI Z136.2, American Standards For The Safe Operation Of Optical Fibre Communication Systems Utilizing Laser Diode And LED Sources

.18 Building Industry Consulting Service International (BICSI) TDM Manual

.19 Electrical Power Systems Standard DSE-01*

.20 Building Industry Consulting Service International (BICSI) ITSIM Manual

2 Design Standards

2.1 General

.1 The requirements outlined in the following clauses are applicable to all Electrical IT & Communication Systems; Application Specific requirements are outlined under clauses 2.2 – 2.11.

.2 IT & Communication System shall be designed to

.1 Assure System Survivability and Post Disaster Building Performance.

.2 Integrate Security Systems including, as applicable, a Video Surveillance System and an Access Control System.

.3 Assure Cost Effective System Maintainability.

2.2 IT & Communication System – General Requirements

.1 The IT & Communication System shall include

.1 A Building Entry Room

.2 Communications Equipment Room

.3 Backbone Cabling

.4 Horizontal Cabling

.5 Voice / Data Outlets

.2 Equipment not related to the support of the telecommunications space (e.g., piping, ductwork, pneumatic tubing) shall not be installed in, pass through, or enter IT rooms.

2.3 Building Entry Room (BER)

.1 A dedicated BER shall be provided in all new construction and major renovations with the exception that a BER may be consolidated with the Communications Equipment Room with the prior approval of the Director, Technology Operations, Computing & Communications Services; requests for approval shall be tabled for consideration before finalization of the Schematic Design.

.1 BER shall be capable of supporting fibre optic 'backbone' cable, splice enclosures and service loops as well as copper backbone cabling, lightning protectors, terminations and cross-connects.

.2 All of the cables, enclosures and devices shall be mounted on a ¾" fire-rated plywood backboard; the plywood backboard shall be painted once the fire rating labels (stamps) are verified by the Engineer but before any devices or equipment is mounted.

.2 A 7m (25 ft.) fibre service loop shall be provided in the BER to accommodate incoming Fibre Optic Cable.

.3 A minimum of two (2) 6-strand fibre cables (for redundancy) shall be pulled through the BER into each Communication Equipment Room (CER).

.4 Copper backbone cables shall be pulled through the BER into the CER's or terminated and cross-connected to smaller cables in the BER.

2.4 Communications Equipment Room (CER)

.1 At least one (1) dedicated CER shall be provided on every floor; exceptions shall be tabled for consideration by the Director, Technology Operations, Computing & Communications Services, before finalization of the Schematic Design.

.1 CERs must not open directly onto a public corridor. They should open to an anteroom or private suite.

.2 CERs shall be equipped with dust-mitigation features such as door seals and air filtration equipment.

.3 CERs shall be equipped with sufficient HVAC to maintain acceptable temperature and humidity levels for anticipated equipment, plus a 25% margin for growth.

.1 Computing & Communications Services will provide HVAC recommendations once final connectivity requirements of the CER have been confirmed.

.4 CERs shall not service an area of over 335 m2 (3600 ft2).

.5 CERs shall be sized to accommodate immediate requirements and foreseeable growth. The minimum expected margin for growth is 25%.

.6 Communication Equipment is to be terminated to the Horizontal Distribution Cable and interconnected to the Backbone within the CER.

.7 One Workstation and one CER Patch Cord shall be provided for each Horizontal Cable.

.8 Workstation Patch Cords shall be 3.0m (10ft.) in length.

.9 CER Patch Cords shall be 2.2m (7ft) in length.

Patch Cords	
Part Number	**Manufacturer and Description**
UC1AAA2-0ZF007	CommScope® Uniprise, Category 6A Modular Patch Cord 7'
UC1AAA2-0ZF010	CommScope® Uniprise, Category 6A Modular Patch Cord 10'
HC6AB07	Hubbell, NEXTSPEED® Ascent Category 6A 7' Patch Cord
HC6AB10	Hubbell, NEXTSPEED® Ascent Category 6A 10' Patch Cord
Steam Traps	Armstrong Spirax Sarco

.2 The Voice Intra-building backbone cable shall be terminated on BIX 1A connectors (Nordx).

.1 All traditional voice cables shall be labelled using Nordx Designation Strips; identification labels must follow the colour scheme tabulated below.

Voice Cabling Identification Scheme	
Application	**Colour**
Central Office Terminations	Green
Network	Orange
Switching and Data Equipment Terminations	Red, White or Sil-ver
MDF to IDF Cabling Terminations	Purple
IDF to TC Cabling Terminations	Grey
Horizontal Cabling Terminations	Blue
Auxiliary, Maintenance Alarm, and Security	Yellow
Key Telephone Systems	Red

.2 Data termination shall be completed using CAT 6A Patch Cords, length sized to limit the quantity of Patch Panels.

.3 Fibre termination / splice panels shall be utilized for all CER fibre terminations; minimum requirements are as tabulated below.

Fibre Termination / Splice Panel Hardware

Description	Part Number	Quantity
Corning 2U Closet Connector Housing	CCH-02U	1
Corning SM Pigtailed Termination Cartridge	CCH-CP12-A9	2

.4 Copper patch panels shall be used for all copper backbone terminations (using the appropriate number of 25 pair, 24 gauge, Category 3 cables); minimum requirements are as tabulated below.

Patch Panel and Cable Requirements

Description	Part Number	Quantity
CommScope® Uniprise or Hubbell Category 5E (or higher) Patch Panel, 24-Port, RJ45 T568A (4-Pair) Wiring (Active Pins 1 - 8)	UNP500-24 or P5E48U	1 (small CER with ≤ 50 pr. copper backbone)
CommScope® Uniprise or Hubbell Category 5E (or higher) Patch Panel, 48-Port, RJ45 T568A (4-Pair) Wiring (Active Pins 1 - 8)	UNP500-24 or P5E48U	1 (large CER with > 50 pr. copper backbone)

.3 In CER's utilizing multiple racks and vertical cable managers, each rack shall be bolted to its cable manager and each cable manager bolted to the next rack to form a single unified unit (assembly).

.4 All assemblies are to be bolted to the floor after having their placements confirmed by Computing & Communications Services. 2.5

2.5 Communication Racks

.1 Communication Racks shall be "R F Mote" floor mounted, 19" communication Free Standing Relay Racks.

.1 R F Mote racks shall incorporate a vertical cable manager on both sides.

.2 Cable management panels shall be reserved for patch cords, pigtails and jumper wire; minimum requirements are as tabulated below.

Communication Rack Hardware

Manufacturer	Part Number	Description
R.F. Mote	RFM-1944-RB	19", 44u Relay Rack
R.F. Mote	RFM-FMS-12	12" Vertical cable manager

2.6 Communications Cabling & Wiring

.1 Communications cabling & wiring shall satisfy the minimum requirements outlined below:

.1 The Backbone shall be provided by a single mode fibre based communications system.

.2 The basic workstation communications shall be provided utilizing unshielded twisted pair cabling.

.2 Fibre Backbone/Riser Cable

.1 Fibre Backbone/Riser Cable shall be

.2 9/125mm Single Mode Optical Fibre Cables, with a loss of not more than 0.40 dB/km at 1310 nm and 0.35 dB/km at 1550 nm.

.3 Loose tube construction. 6 & 12 strand fibre cable shall be of single tube construction; 24 strand or greater fibre cable shall have 12 fibres per tube

.4 Suitable for indoor/outdoor with FT- 4 rating. 7m loop

.5 Standard of Acceptance: Cable constructed with Corning Glass.

.3 Copper Backbone and Riser Cable

.1 Copper Backbone / Riser Cable shall meet the following minimum requirements

.2 Backbone/Riser shall be constructed using Multipair Copper Cables, PIC (Plastic Insulated Conductor) in 25 pair multiples

.3 Building Backbone feeder cable shall be of a ALPETH construction

.4 Riser cable shall be FT-4 rated

.4 Horizontal Cabling

.1 Maximum lengths of individual cable runs shall be 90m (295ft.); a pull box shall be provided every 27m (90 ft).

.2 The sum of bends between pull-boxes shall not exceed 180 degrees.

.3 Cabling shall be completed utilizing CAT 6A, 4-pr UTP, 24 AWG cables.

.4 Cable shall be sweep tested and characterized to 350 MHZ

.5 The cables shall be CMR (FT4) rated or CMP (FT6) depending on the applications and local fire code.

.6 Use of Splicing or intermediate termination of UTP cable is not permitted.

.7 Cabling shall be installed in conduit; conduit sweep (bend) radius shall be at least 10 times the conduit diameter.

.8 Cable shall meet the following minimum requirements:

Horizontal Category 6A Cable	
Part Number	**Description**
UN884031014/10	CommScope® Uniprise, CS44R BLU C6A 4/23 U/UTP CPK 1KFT (blue riser)
UN874035114/10	CommScope® Uniprise, CS44P BLU C6A 4/23 U/UTP CPK 1KFT (blue plenum)
C6ASRB	Hubbell NEXTSPEED® Ascent Category 6A FT-4 (blue)
C6ASPB	Hubbell NEXTSPEED® Ascent Category 6A FT-6 (blue)

.9 Communications cabling & wiring shall be physically separated from power sources; minimum separation shall be as tabulated below:

Minimum Separations for EMI	
Power Source	**Minimum Separation (Clearance)**
Fluorescent ballasts	150mm (6”)
Conduit and cables used for electrical distribution less than 1kV	300mm (12”)
Conduit and cables used for electrical distribution greater than 1kV	1000mm (36”)
Motor	1200mm (48”)
Transformer	1200mm (48”)

2.7 Communications Outlet

.1 Communications Outlets shall be provided throughout the facility to satisfy the functional needs and intended use of the facility.

.1 At a minimum one Communications Outlet shall be provided in the following areas. Final outlet count shall be as outlined in the Functional Program and/or Room Data Sheets.

.2 Every Workstation

.3 Each Office

.4 Training, Meeting & Board Rooms

.5 Security Rooms

.6 Electrical Rooms

.7 Dorm Room

.8 Equipment Rooms

.9 Mechanical Rooms

.10 Labs and Teaching Spaces

.11 Other areas as defined in the Room Data Sheets

.2 Communication Outlet – Wall faceplates

.1 All outlets shall be 2-port (minimum) face plates.

.2 Minimum requirements shall be as tabulated below

Wall Faceplates and Surface Boxes	
Part Number	**Manufacturer and Description**
M10L-246	SYSTIMAX, Modular faceplate, 1 port, Ivo-ry**
M12L-246	SYSTIMAX, Modular faceplate, 2 port, Ivo-ry**
M14L-246	SYSTIMAX, Modular faceplate, 4 port, Ivo-ry**
M16L-246	SYSTIMAX, Modular faceplate, 6 port, Ivo-ry**
M102SMB-246	SYSTIMAX, Surface mounted box, 2 port, Ivory**
M104SMB-246	SYSTIMAX, Surface mounted box, 4 port, Ivory**

Wall Faceplates and Surface Boxes	
Part Number	**Manufacturer and Description**
M106SMB-246	SYSTIMAX, Surface mounted box, 6 port, Ivory**
M112SMB-246	SYSTIMAX, Surface mounted box, 12 port, Ivory**
IFP11EI	HUBBELL, Modular faceplate, 1 port, Ivo-ry**
IFP12EI	HUBBELL, Modular faceplate, 2 port, Ivory**
IFP14EI	HUBBELL, Modular faceplate, 4 port, Ivory**
IFP16EI	HUBBELL, Modular faceplate, 6 port, Ivory**
ISM2EI	HUBBELL, Surface Housing, 2 port, Ivory**
ISM4EI	HUBBELL, Surface Housing, 4 port, Ivory**
ISM6EI	HUBBELL, Surface Housing, 6 port, Ivory**
ISM12EI	HUBBELL, Surface Housing, 12 port, Ivory**

.3 Modular Outlets – 8-position Data

.1 Minimum requirements shall be as tabulated below

Modular Jacks	
Part Number	**Manufacturer and Description**
UNJ10G	CommScope® Uniprise, Ultra 10® UNJ10G Category 6A Modular Jack (blue)
HXJ6AB	Hubbell, NEXTSPEED® Ascent Category 6A Modular Jack (blue)

.2 White module to be used for traditional voice applications (such as fax lines).

.3 Pin-out Termination Sequence shall be to T568A.

.4 Patch Panels – 8-position Data

.1 Minimum requirements shall be as tabulated below

Patch Panels	
Part Number	**Manufacturer and Description**
UNP-6A-DM-1U-24	CommScope® Uniprise, Category 6A, UTP, 1U, 24 port patch panel
UNP-6A-DM-2U-48	CommScope® Uniprise, Category 6A, UTP, 2U, 48 port patch panel
HP6A24	HUBBELL, NEXTSPEED® Ascent Category 6A 24 port patch panel
HP6A48	HUBBELL, NEXTSPEED® Ascent Category 6A 48 port patch panel

.5 Use of Cat6A modules in existing patch panels is permitted to save space in existing IT rooms.

.6 If adding a module would create a mixed-standard patch panel, or if adding a module to a mixed-standard patch panel, all modules must be clearly marked with their category standard either by the manufacturer or the installer.

2.8 Equipment Cable Assemblies

.1 UTP Patch Cables

.1 Stranded patch cables with characteristics of 100W CAT 6A cables

.2 Rated for performance at 20°C.

.2 Single Mode Fibre Optic Patch Cords

.1 Dual strand, 9/125mm single mode cable, connectors to suit end equipment.

.2 Standard of Acceptance: Cable constructed with Corning Glass.

2.9 Fibre Splice Panels

.1 Fire Splice Panels shall meet the following minimum requirements:

Manufacturer	Part Number	Description
Tyco Electronics	FOSC-400-A4-24-1-NGV	Fibre Optic Splice Closure (buildings with ≤ 2 C.E.R.'S)
Tyco Electronics	F-CB24-	Fibre Optic Splice Closure (buildings with > 2 C.E.R.'S)

2.10 Copper Lightning Protectors

.1 Copper Lightning Protectors shall meet the following minimum requirements

Manufacturer	Part Number	Description
Circa	2100B-25	25 pair lightning protector
Circa	2100B-100	100 pair lightning protector
Circa	4B1S-300	Solid State Module

2.11 Special Requirements

.1 Wet Environments (e.g., Animal Facilities, Laboratories, Kitchens)

.1 All Outlets within wet areas or areas that may be washed down to be equipped with water-tight covers.

.2 In-Floor Ethernet Jacks

.1 All in-floor ethernet jacks shall use a recessed floor box that allows the jacks to be protected from foot traffic, liquids, and foreign objects (dust, debris, etc.) while connected.

.2 Example: CER CF9C4B Concrete Floor Box

3 Installation Standards

3.1 General

.1 The requirements outlined in the following clauses are applicable to all Electrical IT & Communication Systems; Application Specific requirements are outlined under clauses 3.2 – 3.x

.2 Communications wiring shall be installed within a conduit sized at no less than ¾" diameter; a conduit shall be no more than 50% full at time of initial installation.

.3 All Patch Panels shall be sized with 25% spare capacity at the time of the original installation.

.4 CERs shall be commissioned well in advance of network hardware installation.

.5 CERs must be free of construction materials, debris, and drywall dust before network hardware installation.

3.2 Wifi System

.1 Wireless Access Points (WAPs) will be provided by the University.

.2 Wireless survey and design is to be done by Computing and Communications Services or their approved designate.

.3 One Comm Outlet is required per WAP.

.4 Any deviations in wireless design and deployment must be approved by the Director, Technology Operations, Computing & Communications Services.

3.3 Emergency Phones

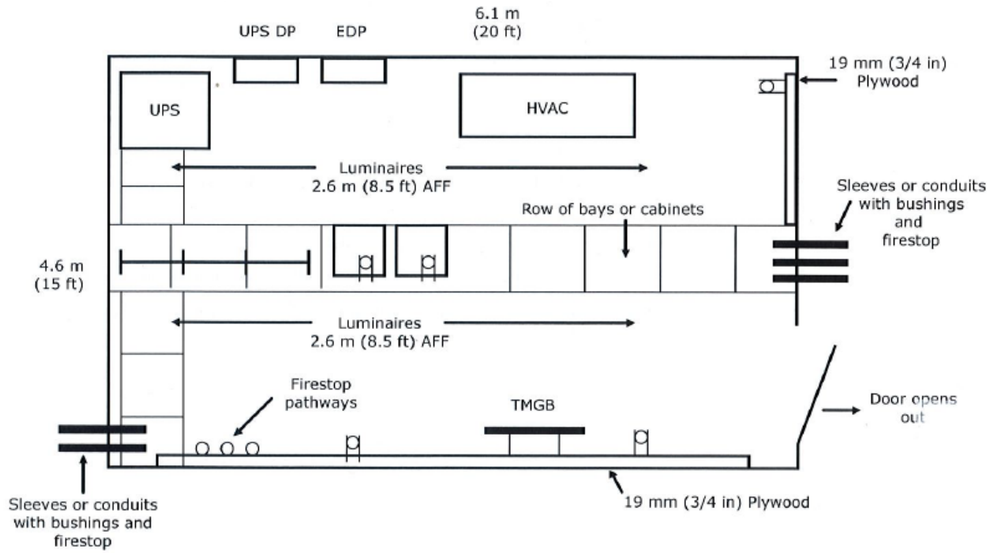
.1 Emergency Phones (Code Blue Phones) shall be provided Indoors and Outdoors.

.2 Emergency Phones are to be wired or connected using a Campus Safety Office-approved method.

3.4 Alarms

.1 High Security Alarms shall be hard-wired and interfaced with the Campus ONYX Works system.

4 Communication Equipment Rooms, General Layouts (common spaces)



AFF = Above finished floor
EDP = Electrical distribution panel
ft = Foot
HVAC = Heating, ventilating, and air conditioning
in = Inch
m = Meter
mm = Millimeter
TMGB = Telecommunications main grounding busbar
UPS = Uninterruptible power supply
UPS DP = Uninterruptible power distribution panel

Image source: BICSI ITSIMM 6e, section 3, page 35

5 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Appendix Items

.1 General Layouts (common spaces)

.2 Room Data Sheets (common spaces)

7

Appendix Items

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Appendix Items

General Layouts (common spaces)

Version	25-01
Effective Date	September 1, 2025
Approved By	Jill Vigers, Manager, Architectural Design
Signature	

1 How to Read this Section

.1 The following pages of sample room layouts are to be read as samples, and not the exact result of any project within the University and reflect standard spaces that existing in multiple buildings and departments within the campus.

.2 They do not eliminate the responsibility of Project Teams to consult with user groups and the University's Internal Stakeholders for the successful planning and implementation of projects.

.3 They are meant to illustrate the basis of design of rooms where the University has consistent problems that require addressing.

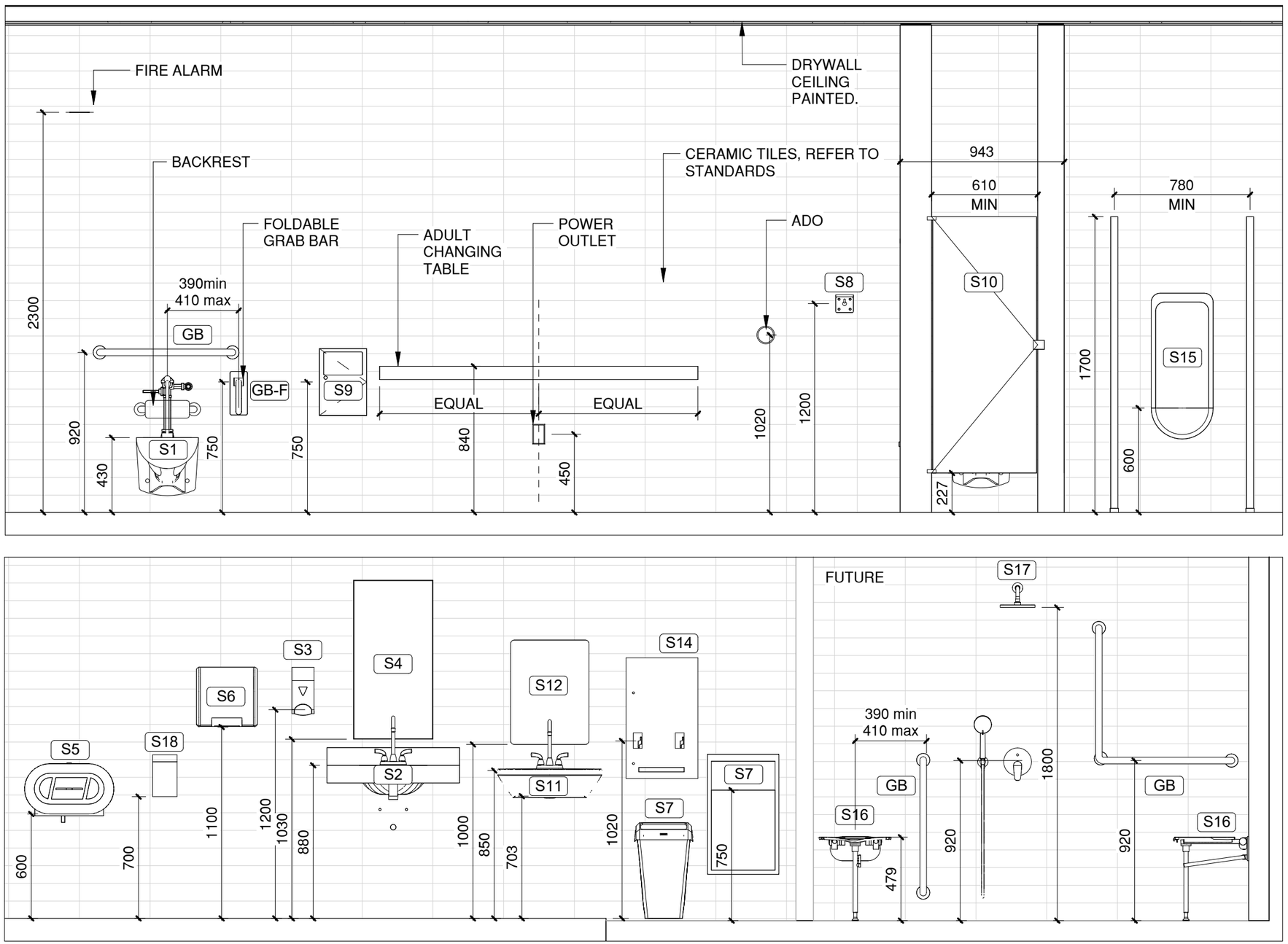
.4 Rooms provided here as examples are meant to conform with the latest codes for education and go above and beyond code requires to enhance accessibility for inclusion and equity. They are also illustrative of key relationships between components and spaces for the suites they illustrate.

.5 Regulations such as CSA and OBC constantly change and improve, as such it is the Consultant's responsibility to ensure compliance with all necessary codes.

.6 If adjustments are required to any of the spaces illustrated in the next pages, Consults are to bring it to the attention of the PR Project Manager.

2 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

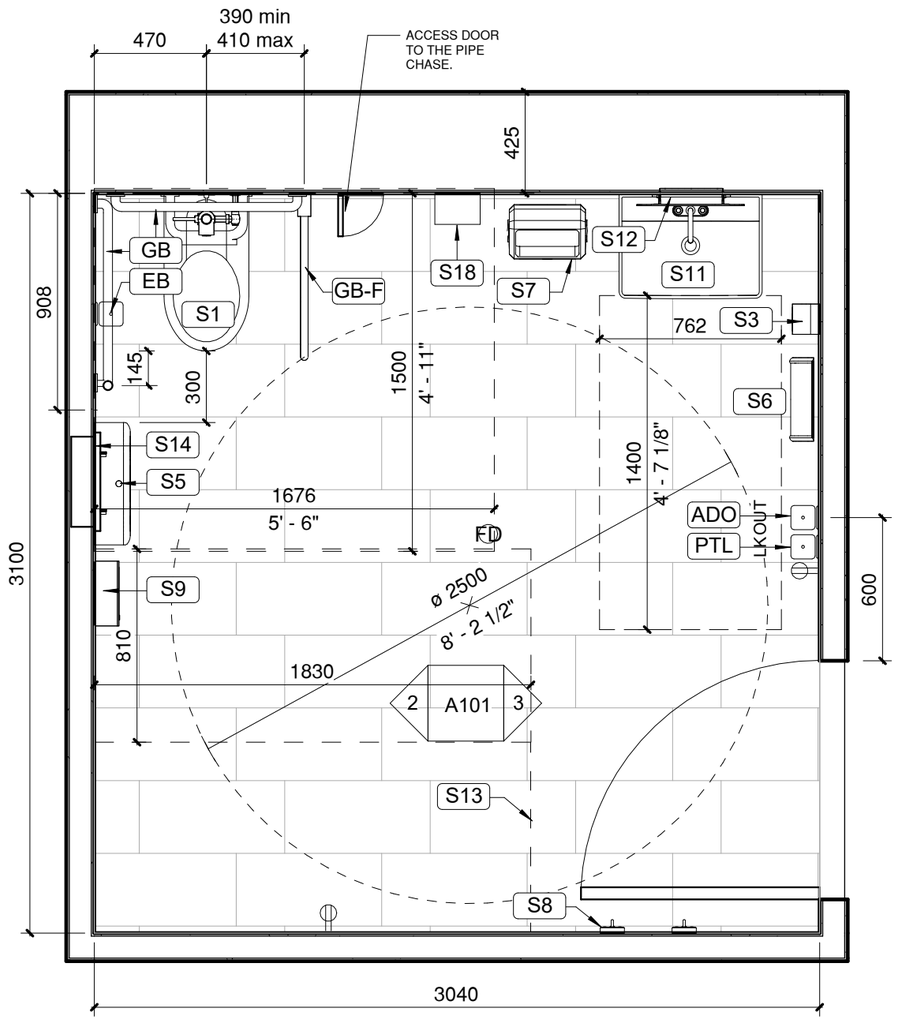


1 Washrooms Mounting Heights

LEGEND

S1 -	WATER CLOSET
S2 -	UNDERMOUNT SINK
S3 -	SOAP DISPENSER
S4 -	MIRROR
S5 -	TOILET PAPER HOLDER
S6 -	HAND DRYER
S7 -	WASTE RECEPTACLE
S8 -	COAT HOOKS
S9 -	SANITARY DISPOSAL
S10 -	TOILET & URINAL PARTITIONS
S11 -	BARRIER FREE UNDERMOUNT SINK
S12 -	TILTED MIRROR
S13 -	ADULT CHANGE TABLE
S14 -	SANITARY NAPKIN DISPENSER
S15 -	URINAL
S16 -	SHOWER SEAT
S17 -	SHOWER HEAD
S18-	SHARPS DISPOSAL CONTAINER
S19-	LOCKERS
S20-	BENCHES
GB -	GRAB BARS
ADO -	AUTO DOOR OPERATOR
EB -	EMERGENCY BUTTON
PTL-	PUSH TO LOCK
ACT -	ADULT CHANGE TABLE
GB-F -	GRAB BAR FOLDING

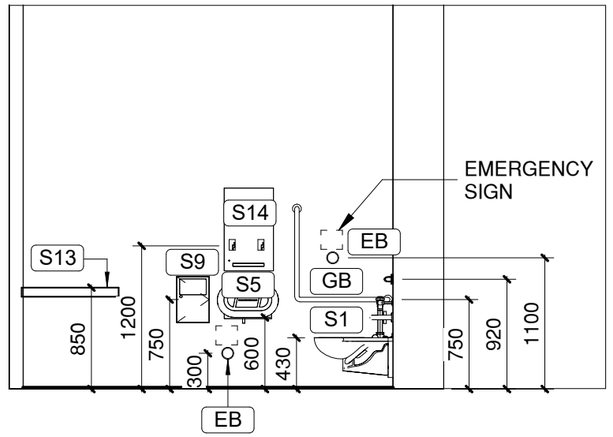
Provide only blocking for adult change table, unless location is deemed one that may need table.



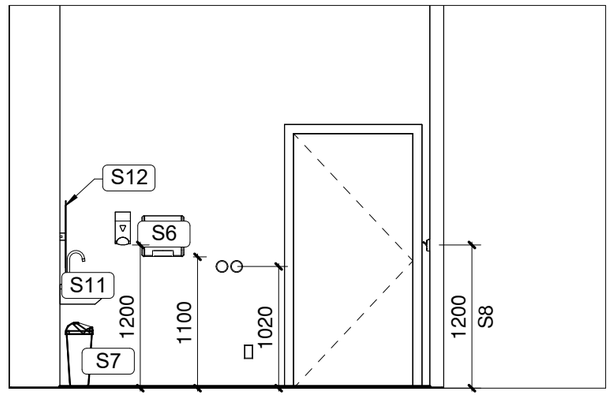
**NOTE: Standard washroom accessories shall be designed in accordance with the University's Custodial Standard.*

1 Gender Neutral Universal Washroom

0 0.25 m 0.5 m 1m



2 Elevation-2

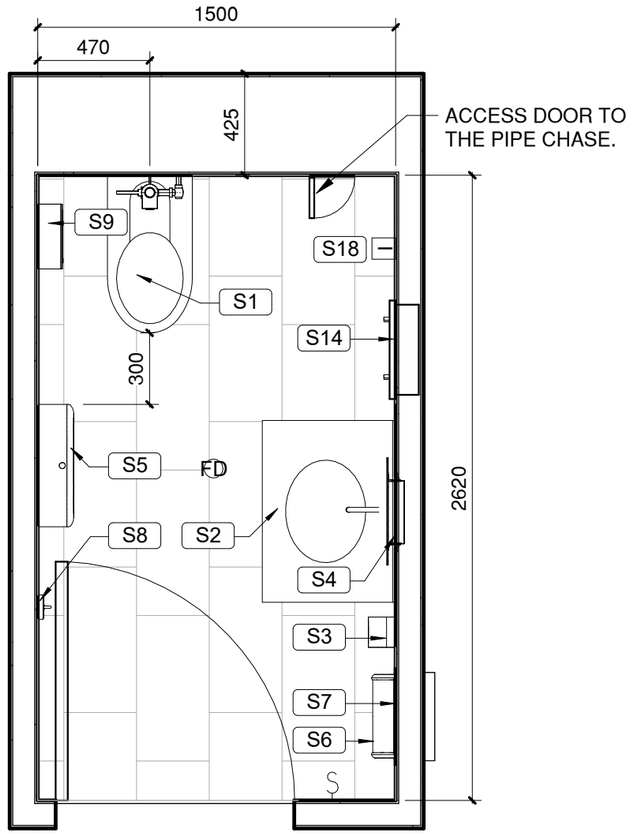


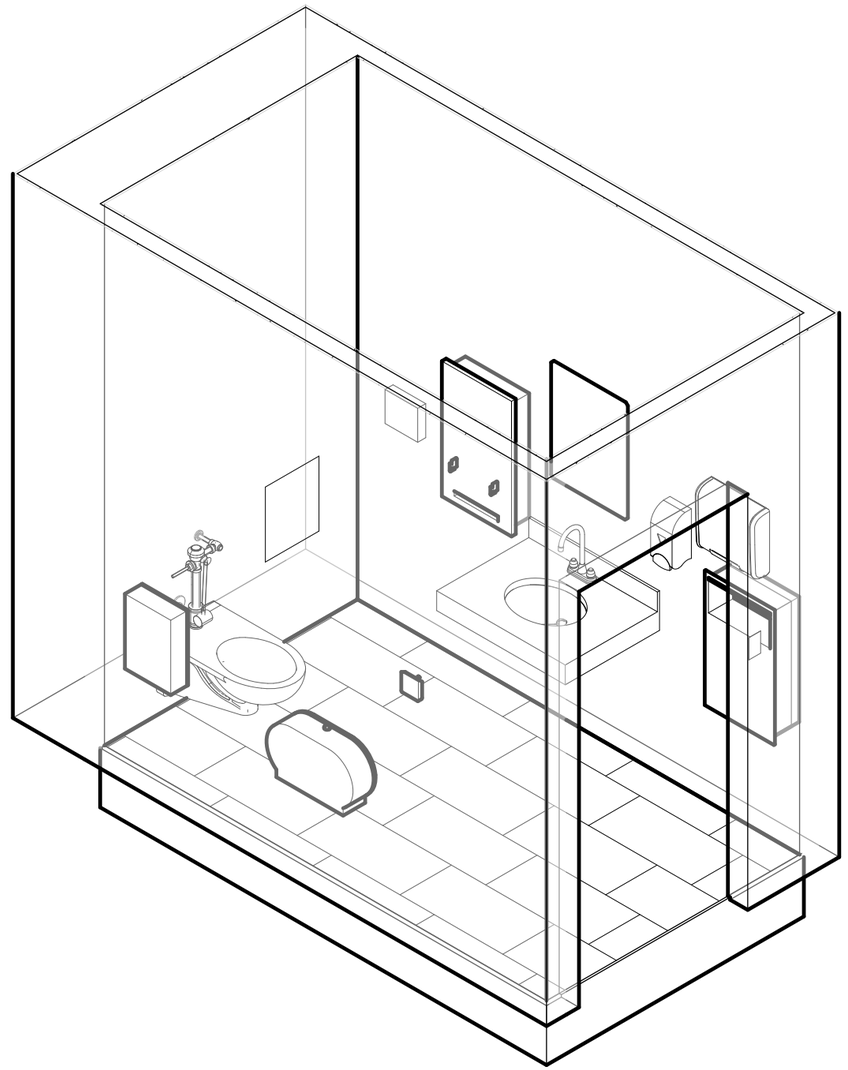
3 Elevation-3

0 0.5 m 1 m 2 m

LEGEND

S1 -	WATER CLOSET
S2 -	UNDERMOUNT SINK
S3 -	SOAP DISPENSER
S4 -	MIRROR
S5 -	TOILET PAPER HOLDER
S6 -	HAND DRYER
S7 -	WASTE RECEPTACLE
S8 -	COAT HOOKS
S9 -	SANITARY DISPOSAL
S10 -	TOILET & URINAL PARTITIONS
S11 -	BARRIER FREE UNDERMOUNT SINK
S12 -	TILTED MIRROR
S13 -	ADULT CHANGE TABLE
S14 -	SANITARY NAPKIN DISPENSER
S15 -	URINAL
S16 -	SHOWER SEAT
S17 -	SHOWER HEAD
S18-	SHARPS DISPOSAL CONTAINER
S19-	LOCKERS
S20-	BENCHES
GB -	GRAB BARS
ADO -	AUTO DOOR OPERATOR
EB -	EMERGENCY BUTTON
PTL-	PUSH TO LOCK
ACT -	ADULT CHANGE TABLE
GB-F -	GRAB BAR FOLDING





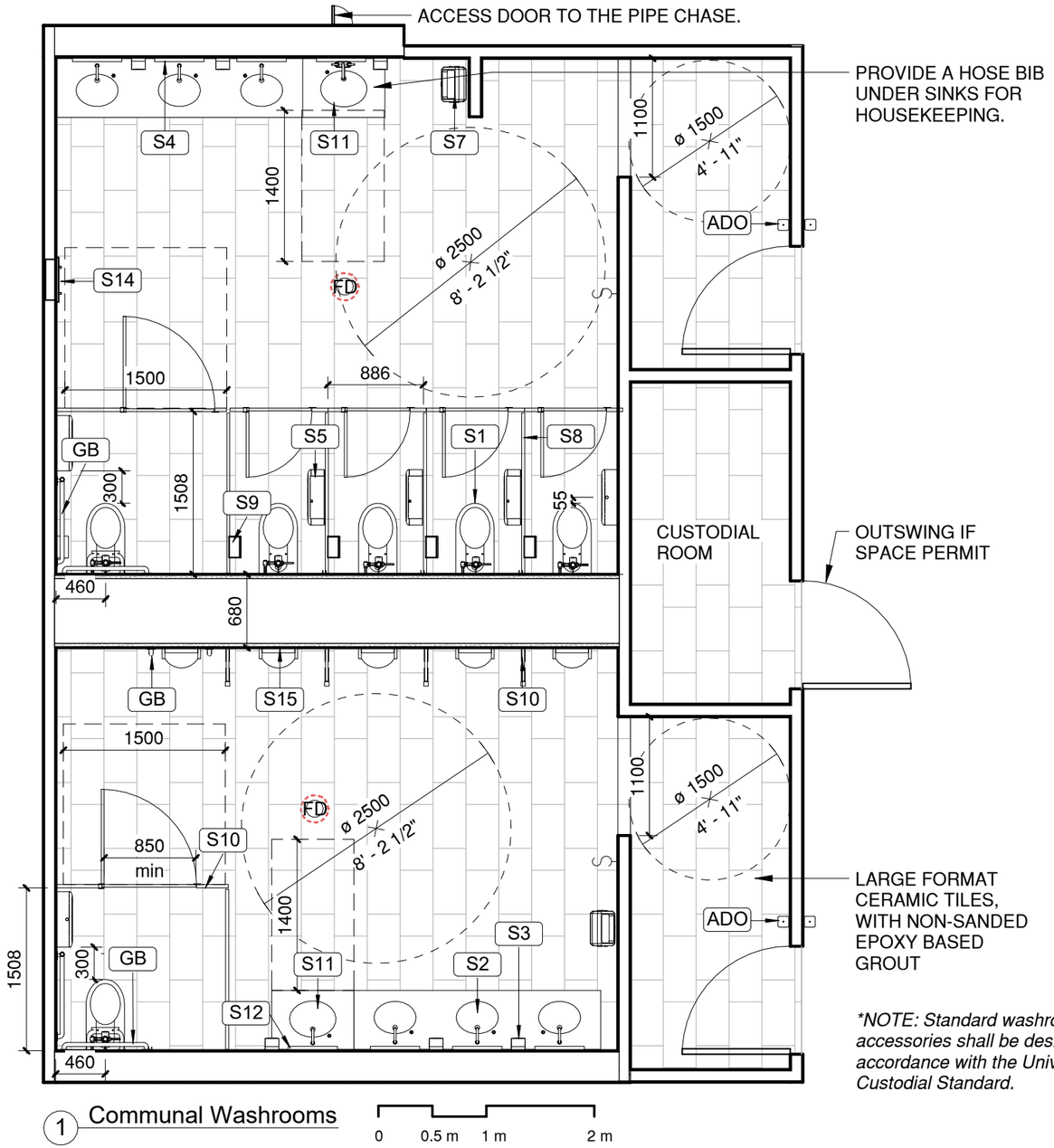
**NOTE: Standard washroom accessories shall be designed in accordance with the University's Custodial Standard.*

1 Gender Neutral Washroom

0 0.25 m 0.5 m 1m

LEGEND

S1 -	WATER CLOSET
S2 -	UNDERMOUNT SINK
S3 -	SOAP DISPENSER
S4 -	MIRROR
S5 -	TOILET PAPER HOLDER
S6 -	HAND DRYER
S7 -	WASTE RECEPTACLE
S8 -	COAT HOOKS
S9 -	SANITARY DISPOSAL
S10 -	TOILET & URINAL PARTITIONS
S11 -	BARRIER FREE UNDERMOUNT SINK
S12 -	TILTED MIRROR
S13 -	ADULT CHANGE TABLE
S14 -	SANITARY NAPKIN DISPENSER
S15 -	URINAL
S16 -	SHOWER SEAT
S17 -	SHOWER HEAD
S18-	SHARPS DISPOSAL CONTAINER
S19-	LOCKERS
S20-	BENCHES
GB -	GRAB BARS
ADO -	AUTO DOOR OPERATOR
EB -	EMERGENCY BUTTON
PTL-	PUSH TO LOCK
ACT -	ADULT CHANGE TABLE
GB-F -	GRAB BAR FOLDING

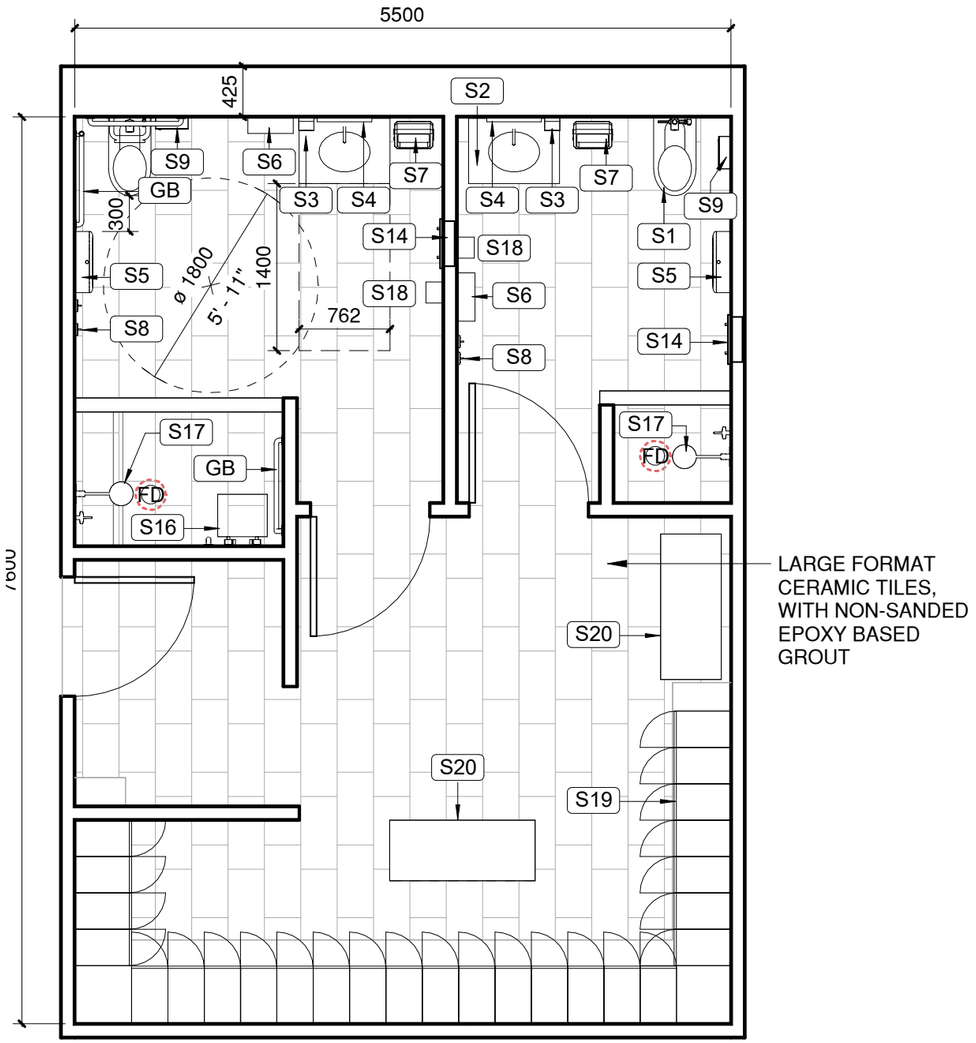


1 Communal Washrooms

**NOTE: Standard washroom accessories shall be designed in accordance with the University's Custodial Standard.*

LEGEND

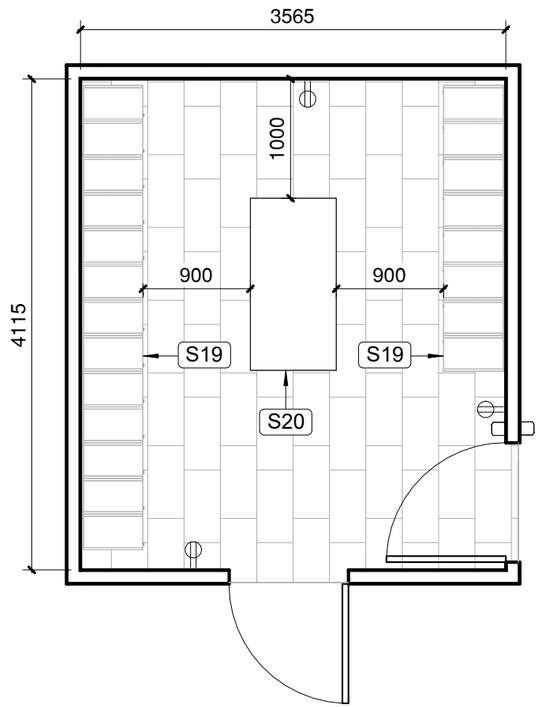
S1 -	WATER CLOSET
S2 -	UNDERMOUNT SINK
S3 -	SOAP DISPENSER
S4 -	MIRROR
S5 -	TOILET PAPER HOLDER
S6 -	HAND DRYER
S7 -	WASTE RECEPTACLE
S8 -	COAT HOOKS
S9 -	SANITARY DISPOSAL
S10 -	TOILET & URINAL PARTITIONS
S11 -	BARRIER FREE UNDERMOUNT SINK
S12 -	TILTED MIRROR
S13 -	ADULT CHANGE TABLE
S14 -	SANITARY NAPKIN DISPENSER
S15 -	URINAL
S16 -	SHOWER SEAT
S17 -	SHOWER HEAD
S18-	SHARPS DISPOSAL CONTAINER
S19-	LOCKERS
S20-	BENCHES
GB -	GRAB BARS
ADO -	AUTO DOOR OPERATOR
EB -	EMERGENCY BUTTON
PTL-	PUSH TO LOCK
ACT -	ADULT CHANGE TABLE
GB-F -	GRAB BAR FOLDING



LARGE FORMAT CERAMIC TILES, WITH NON-SANDED EPOXY BASED GROUT

1 Change Rooms & Showers

0 0.5 m 1 m 2 m

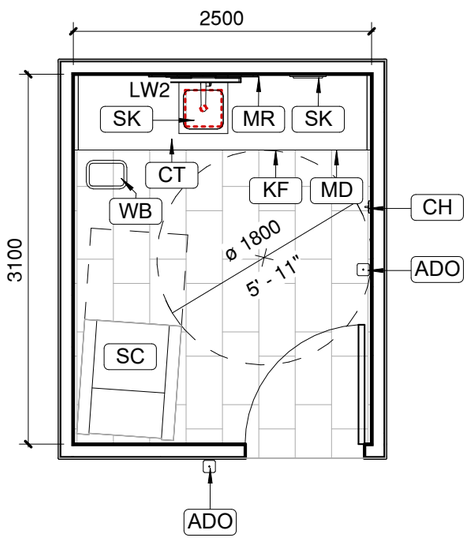


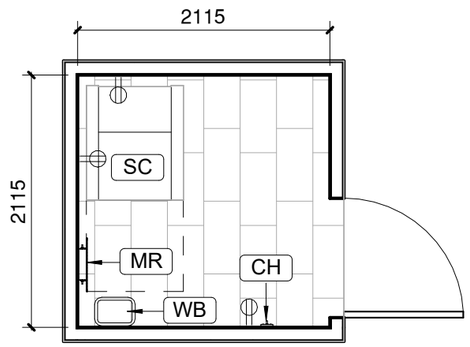
2 Lockers

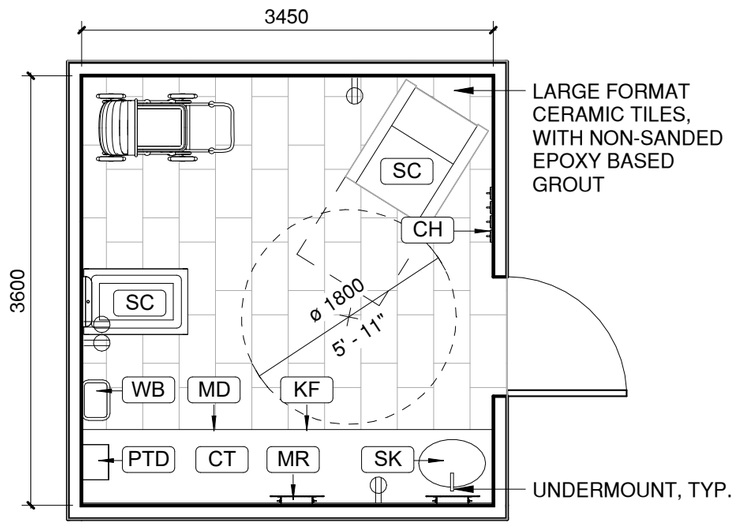
**NOTE: Install doors where feasible and space allows. Avoid shower curtains where possible. Accessible lockers must be provided in all locker spaces.*

LEGEND

S1 -	WATER CLOSET
S2 -	UNDERMOUNT SINK
S3 -	SOAP DISPENSER
S4 -	MIRROR
S5 -	TOILET PAPER HOLDER
S6 -	HAND DRYER
S7 -	WASTE RECEPTACLE
S8 -	COAT HOOKS
S9 -	SANITARY DISPOSAL
S10 -	TOILET & URINAL PARTITIONS
S11 -	BARRIER FREE UNDERMOUNT SINK
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GB -	GRAB BARS
ADO -	AUTO DOOR OPERATOR
EB -	EMERGENCY BUTTON
PTL-	PUSH TO LOCK
ACT -	ADULT CHANGE TABLE
GB-F -	GRAB BAR FOLDING







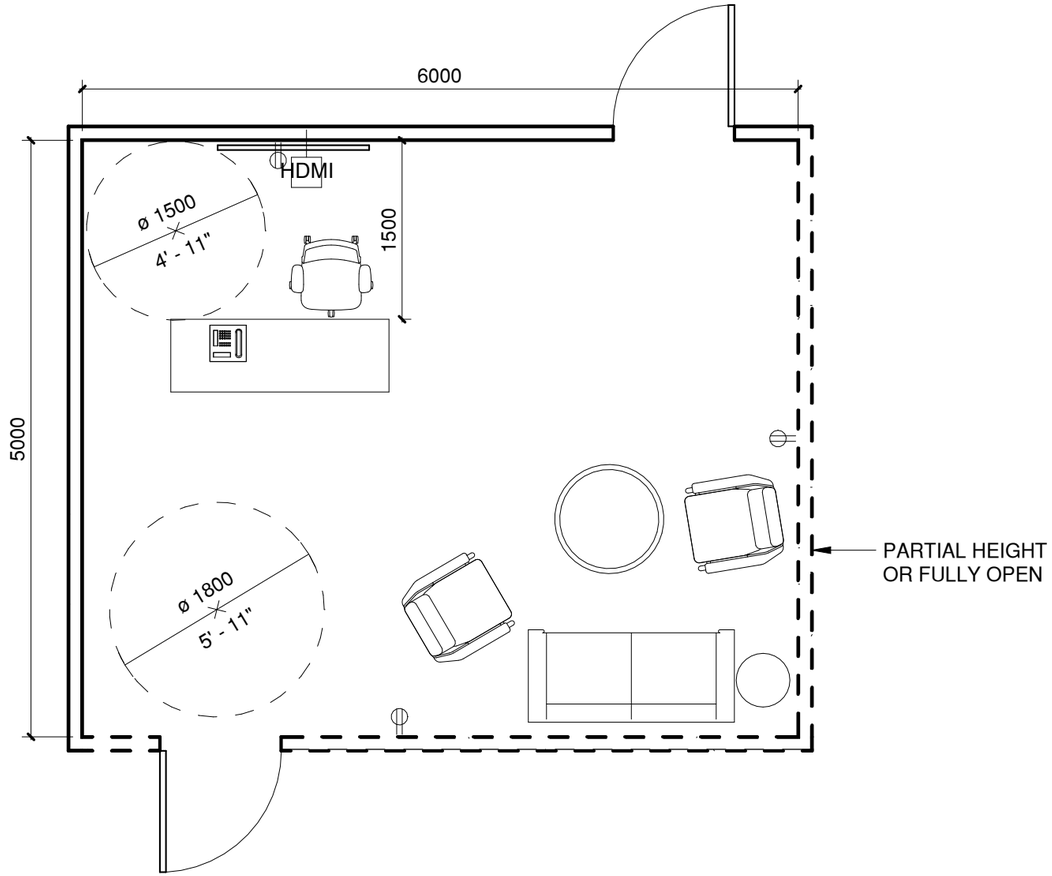
LEGEND

SC -	SLEEPER CHAIR
MR -	MIRROR
SK -	UNDERMOUNT SINK
CT -	COUNTERTOP
CK -	CLOCK
LW2 -	WALL SCONCE
KF -	MINI FRIDGE
MD -	DRAWERS
WB -	WASTE BIN
CH -	COAT HOOK
BCT -	CHANGE TABLE
PTD -	PAPER TOWEL DISPENSER

**NOTE: Standard washroom accessories shall be designed in accordance with the University's Custodial Standard.*

1 Quiet Room (for Prayer / Wellness / Lactation / Meditation)

0 0.5 m 1 m 2 m



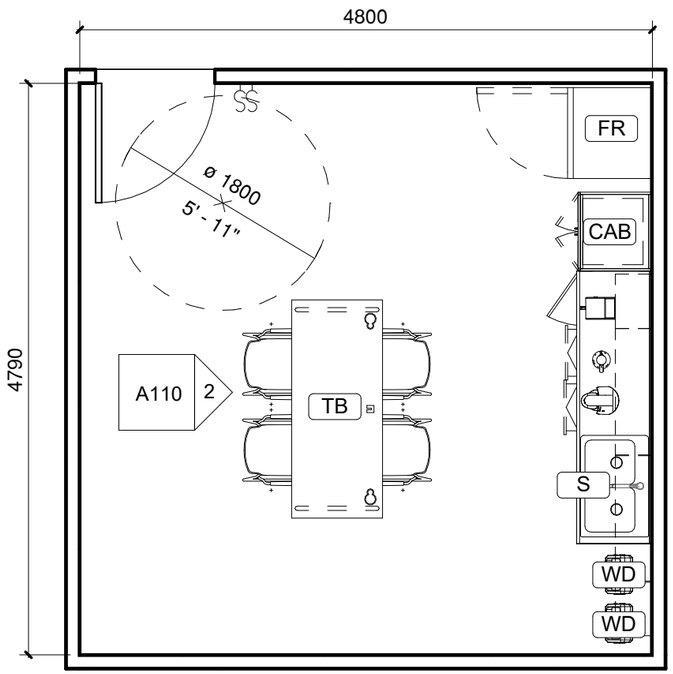
LEGEND

HDMI — HDMI OUTLET

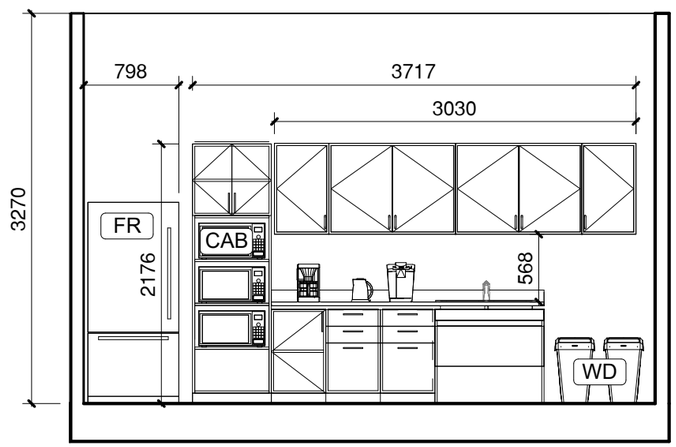
WALL MOUNTED POWER AND DATA

1 Reception/Waiting Area

0 0.5 m 1 m 2 m



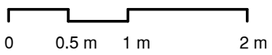
1 Kitchenette

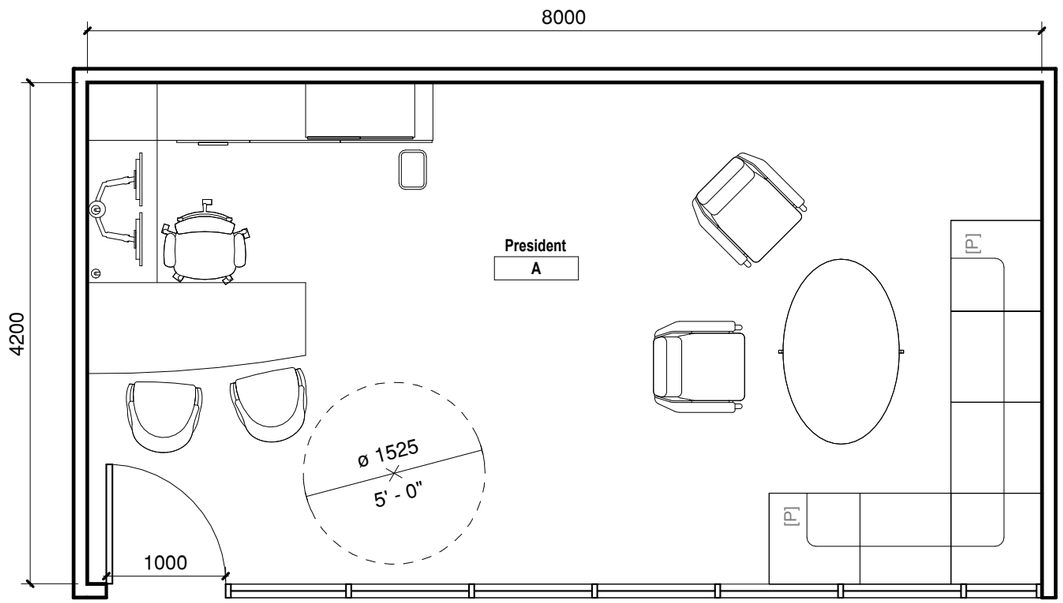


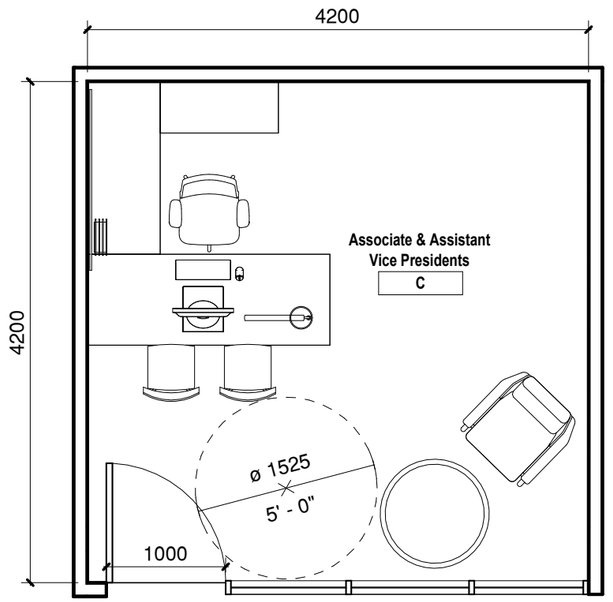
2 Kitchenette Elevation

LEGEND

WD	GARBAGE & RECYCLING BINS
CAB	MICROWAVE CABINET
TB	TABLE
S	SINK
FR	FRIDGE



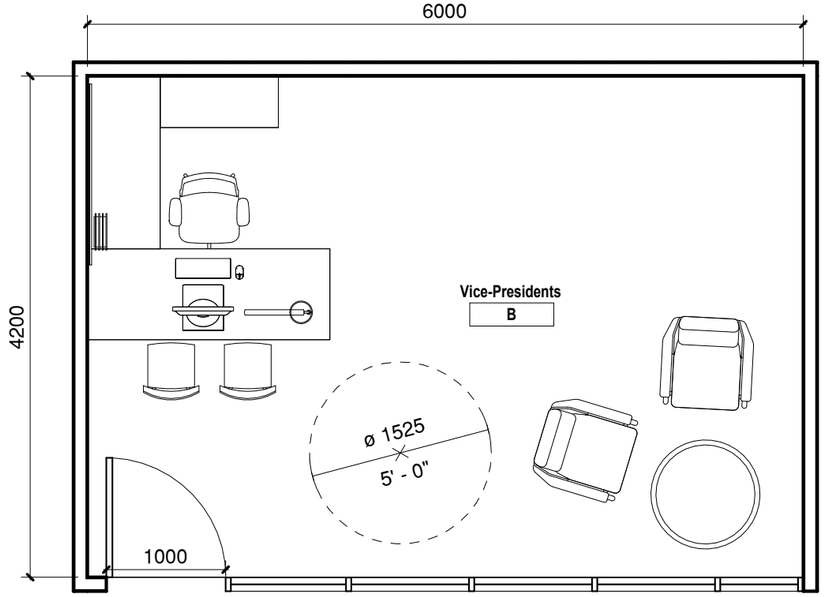


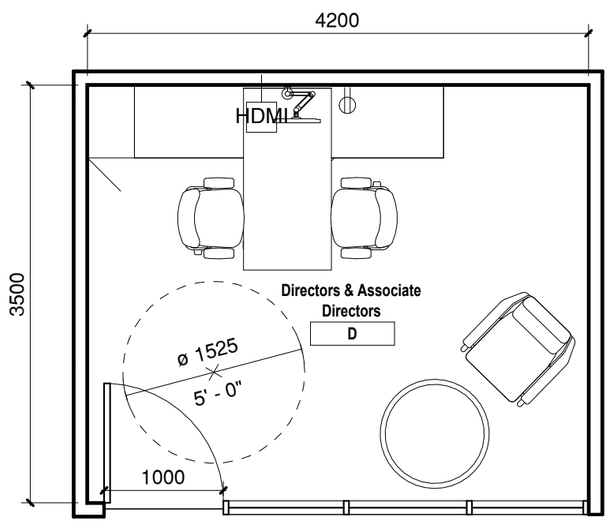


LEGEND

HDMI — HDMI OUTLET

WALL MOUNTED POWER AND DATA

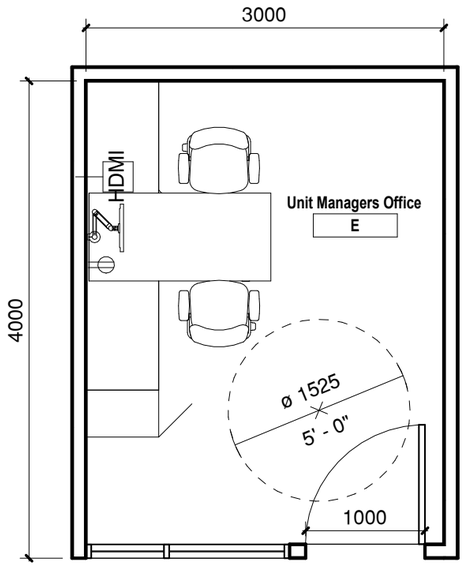


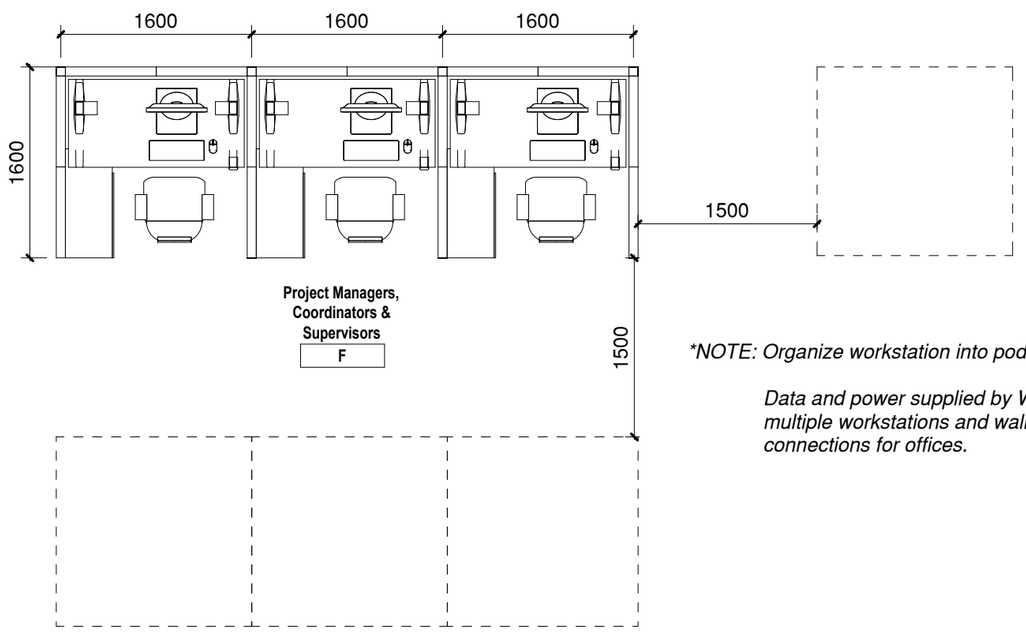


1 Private Office Typ.

0 0.5 m 1 m 2 m

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2025/09/01





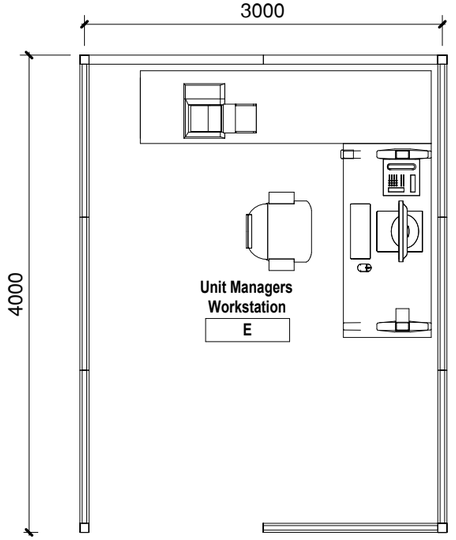
**NOTE: Organize workstation into pods.*

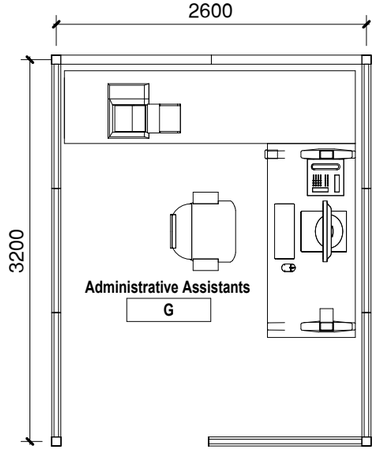
Data and power supplied by WHIP for multiple workstations and wall connections for offices.

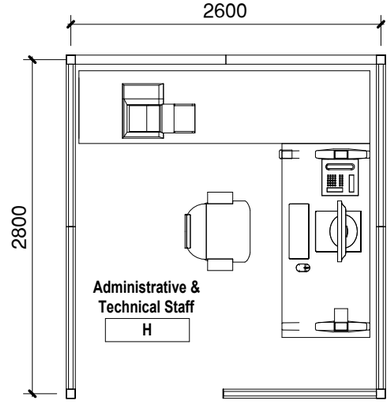
LEGEND

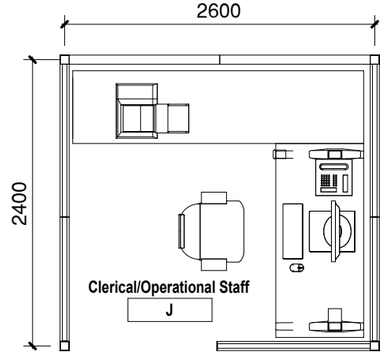
HDMI — HDMI OUTLET

WALL MOUNTED POWER AND DATA





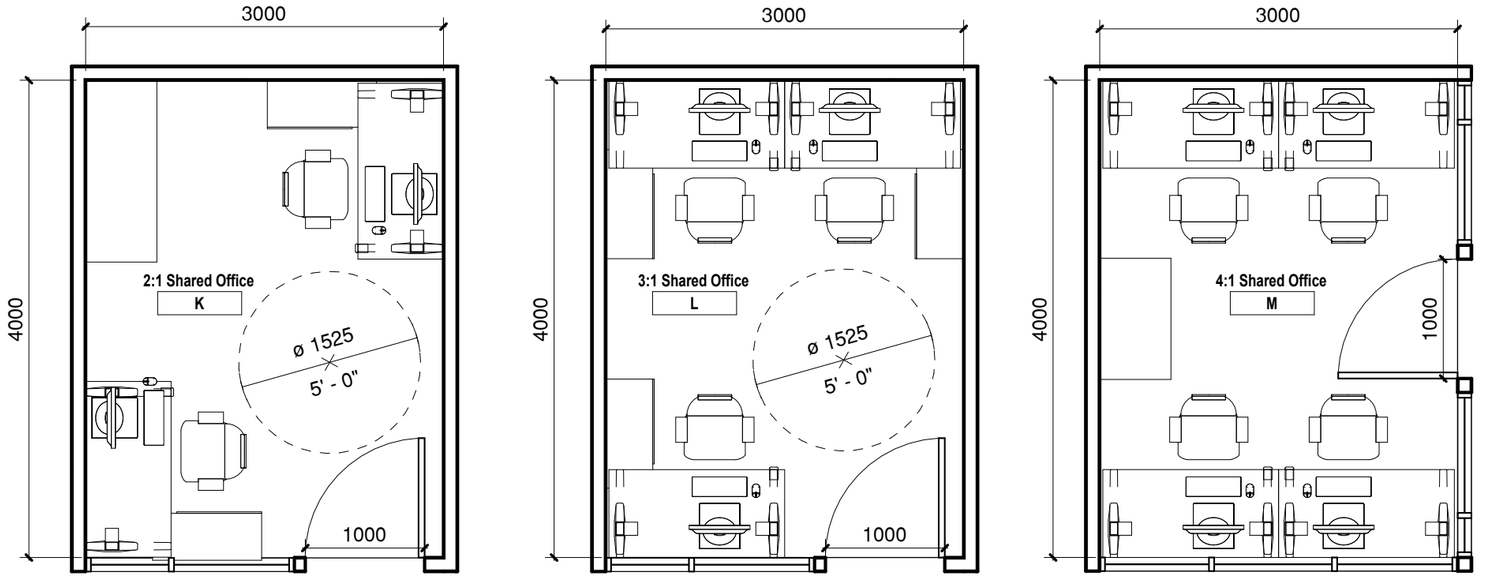




1 Office Tech/Lab Typ.

0 0.5 m 1 m 2 m

UNIVERSITY OF GUELPH



LEGEND

HDMI

HDMI OUTLET

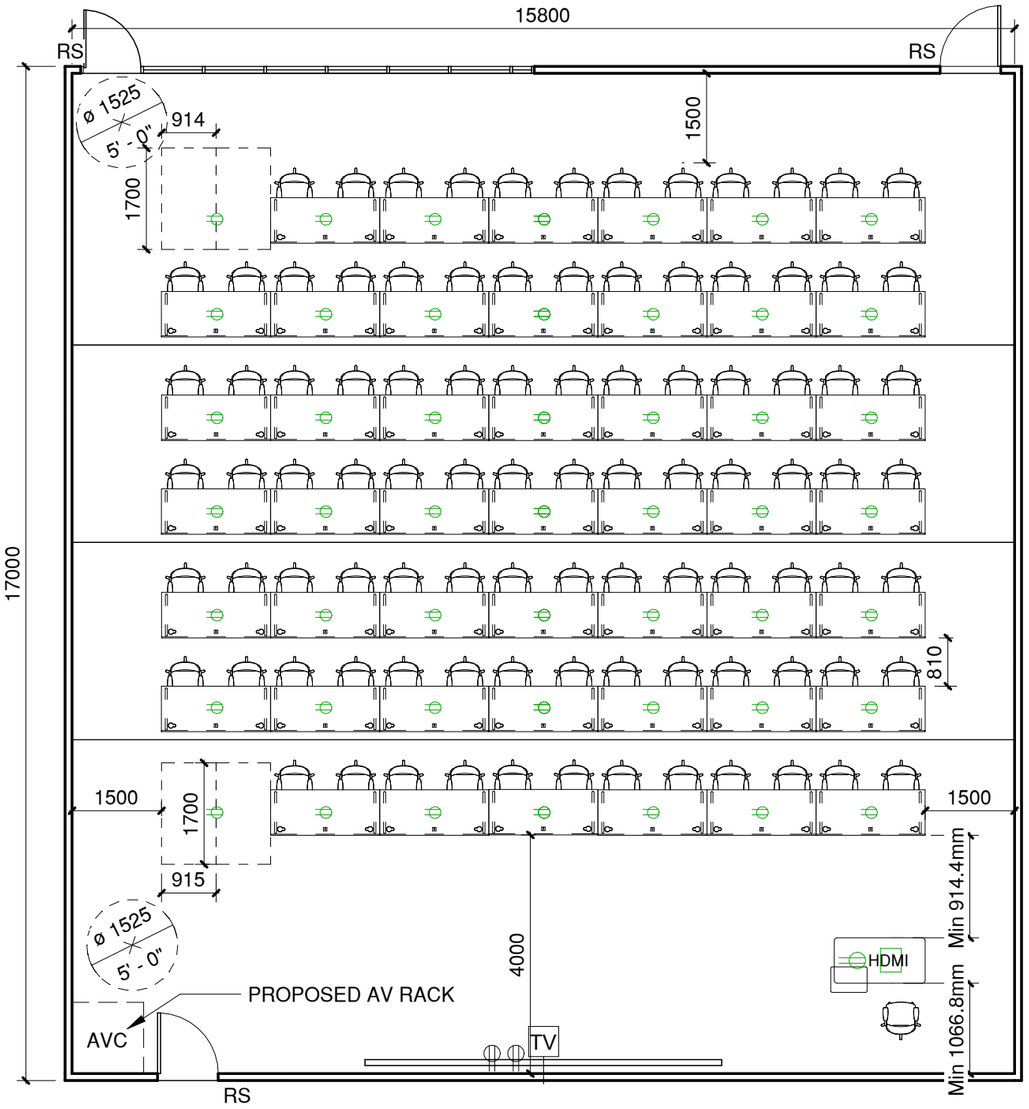
WALL MOUNTED POWER AND DATA

1 Shared Office Typ.

0 0.5 m 1 m 2 m

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2025/09/01

UNIVERSITY OF GUELPH



**NOTE: Classrooms should be designed to be flexible, with the potential to split spaces into smaller rooms. Sizes and seating to be confirmed per project.*

1 Auditorium (100+)

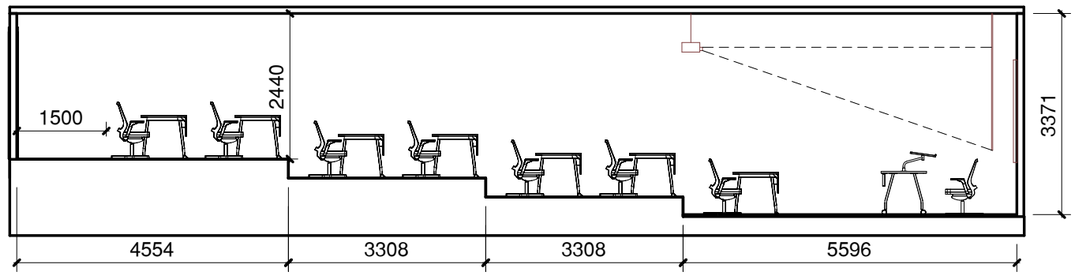
0 1 m 2 m 4 m

LEGEND

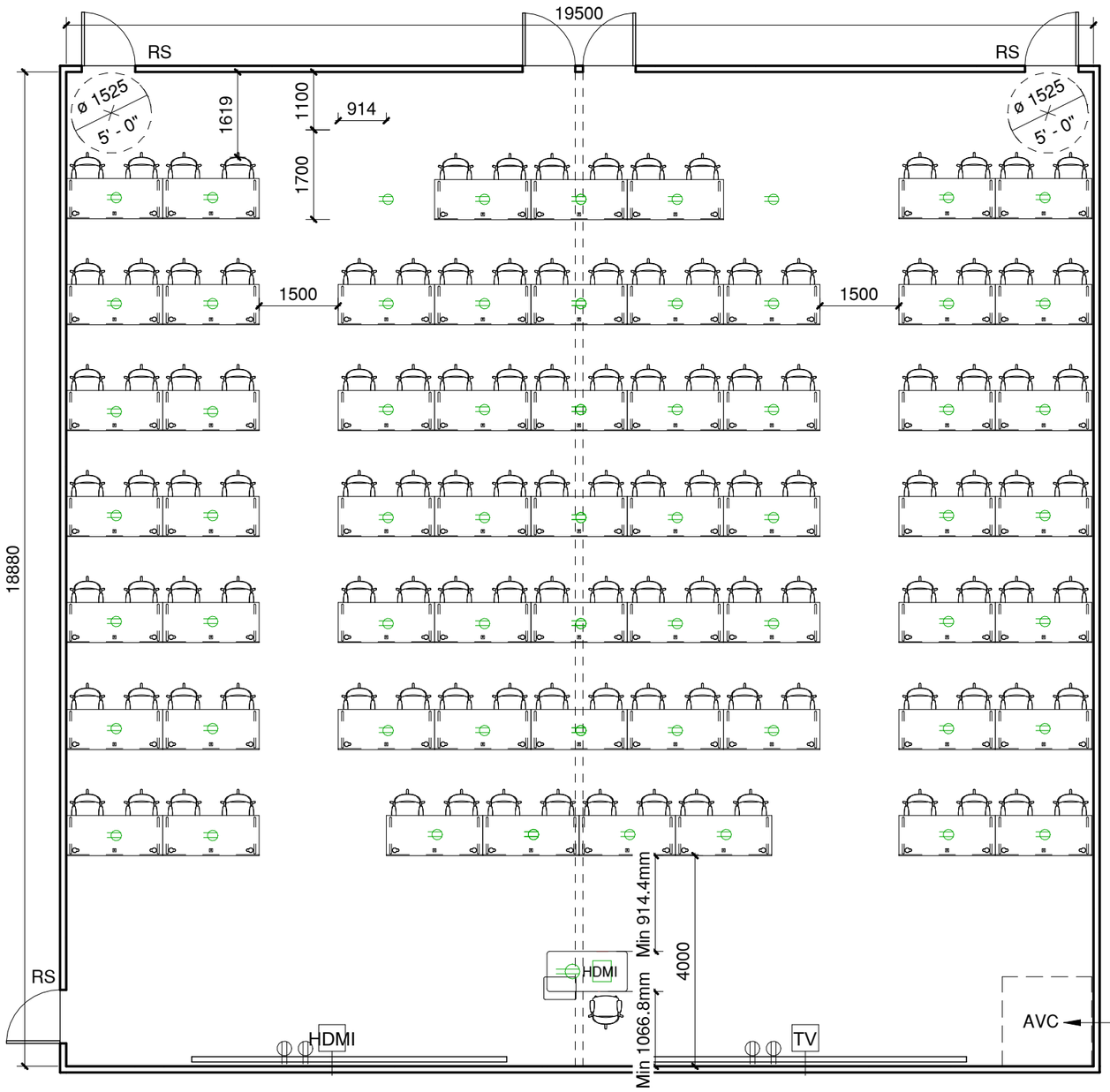
HDMI — HDMI OUTLET

WALL MOUNTED POWER AND DATA

RS — ROOM SCHEDULER



2 Auditorium Section



1 Large Classroom (100+)

0 1 m 2 m 4 m

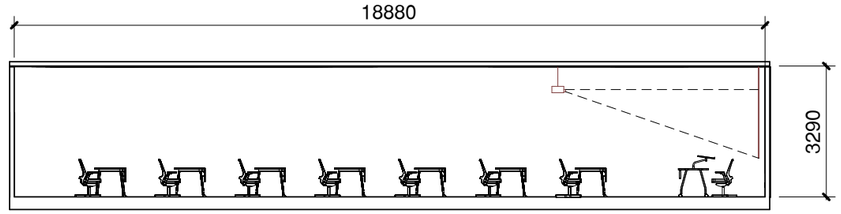
**NOTE: Classrooms should be designed to be flexible, with the potential to split spaces into smaller rooms. Sizes and seating to be confirmed per project.*

LEGEND

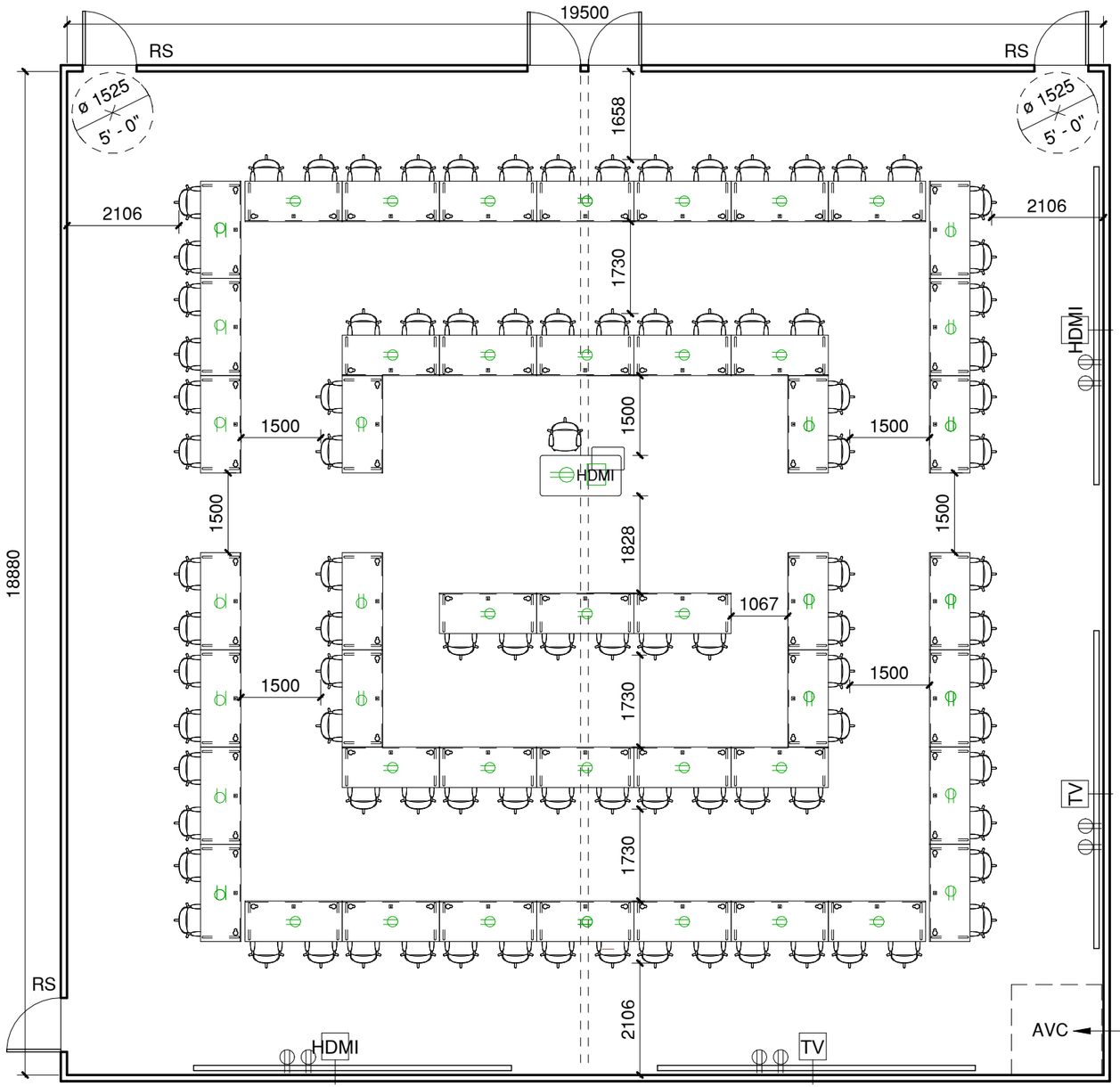
HDMI — HDMI OUTLET

WALL MOUNTED POWER AND DATA

RS — ROOM SCHEDULER



2 Large Classroom Section



1 Large Classroom (100+) O-Ring Configuration

0 1 m 2 m 4 m

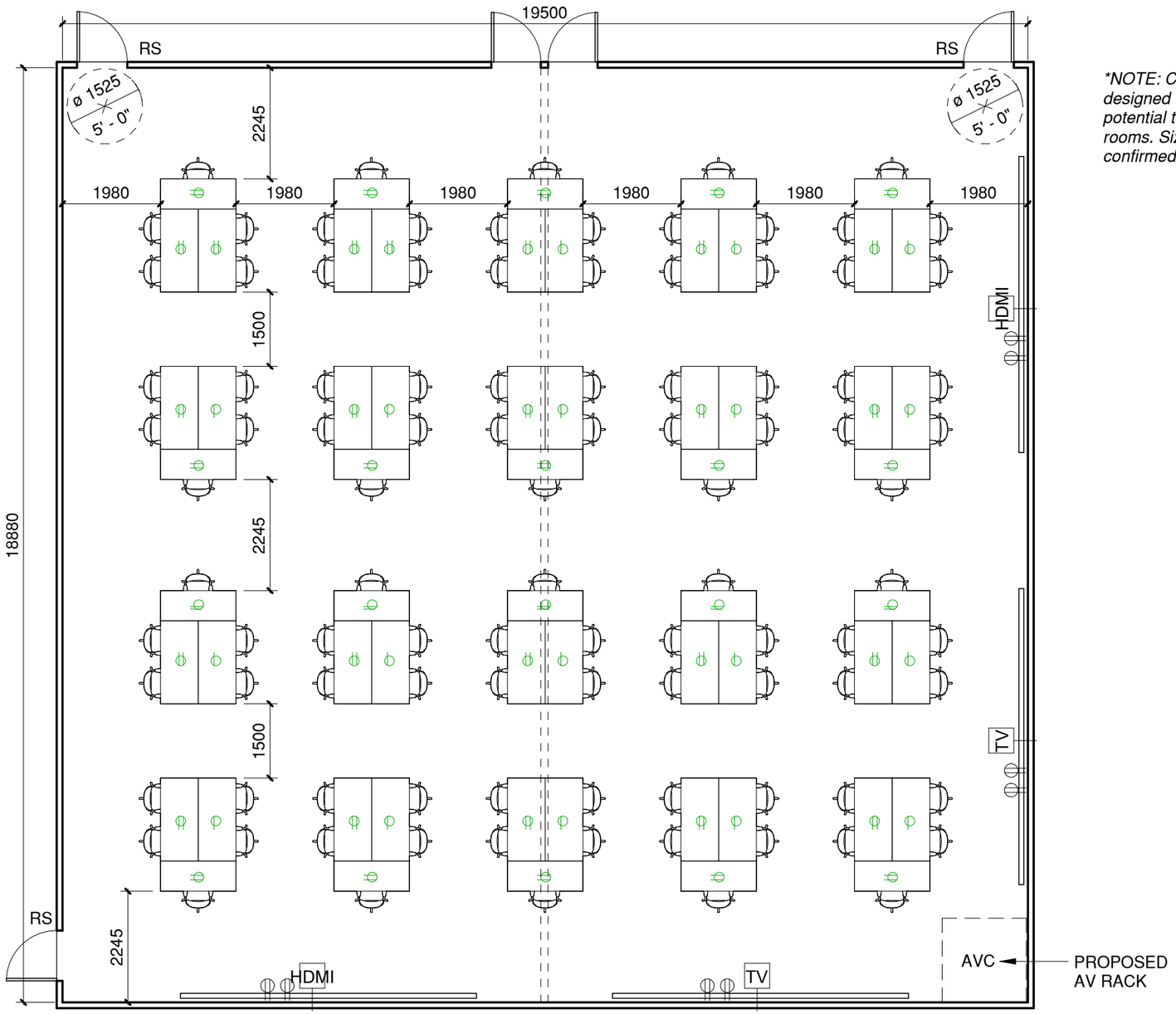
**NOTE: Classrooms should be designed to be flexible, with the potential to split spaces into smaller rooms. Sizes and seating to be confirmed per project.*

LEGEND

HDMI — HDMI OUTLET

WALL MOUNTED POWER AND DATA

RS — ROOM SCHEDULER



Large Classroom (100+) Grouped Configuration

1

0 1 m 2 m 4 m

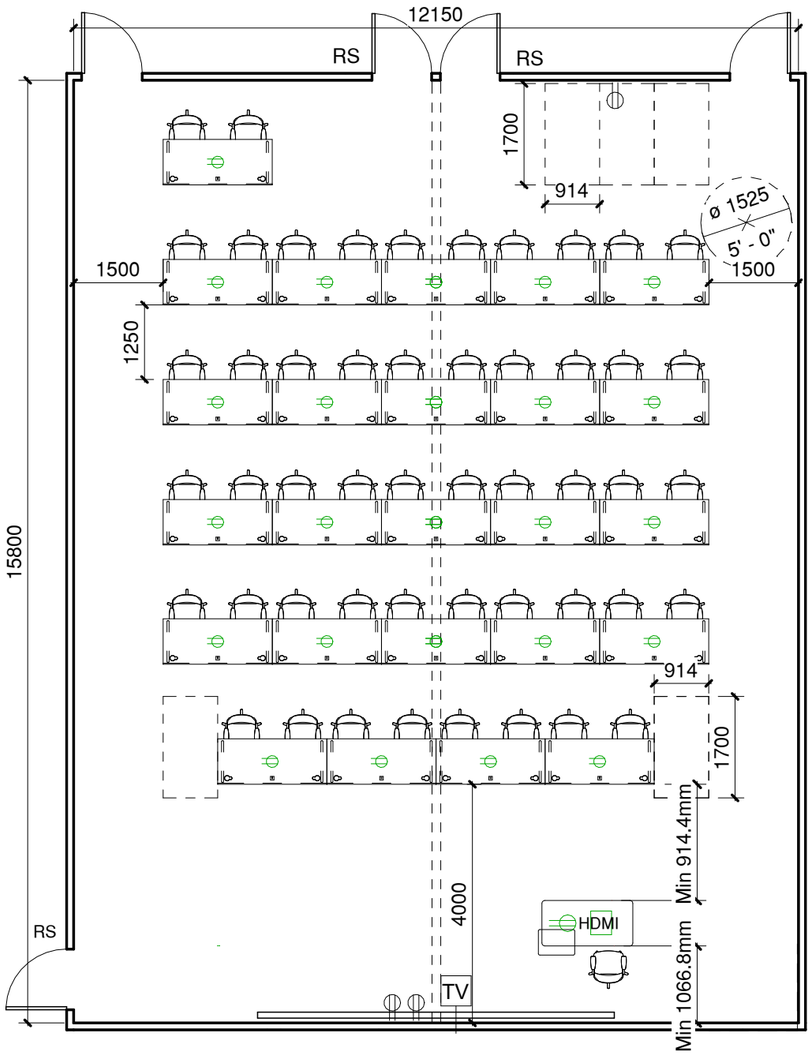
**NOTE: Classrooms should be designed to be flexible, with the potential to split spaces into smaller rooms. Sizes and seating to be confirmed per project.*

LEGEND

HDMI — HDMI OUTLET

WALL MOUNTED POWER AND DATA

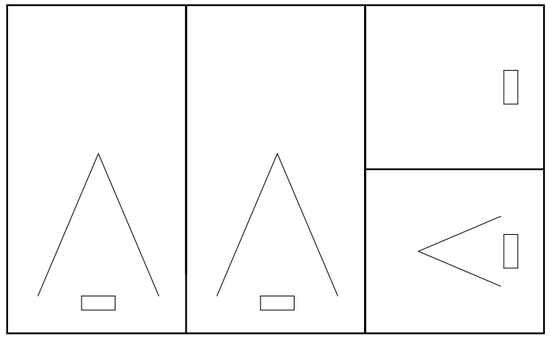
RS — ROOM SCHEDULER



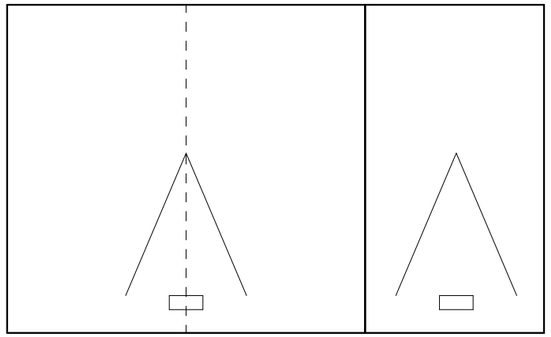
**NOTE: Classrooms should be designed to be flexible, with the potential to split spaces into smaller rooms. Sizes and seating to be confirmed per project.*

1 Classroom (50-80 people)

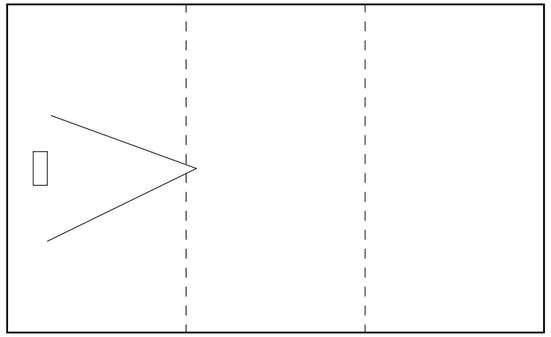
0 1 m 2 m 4 m



2 Medium and 2 Small Lecture Rooms

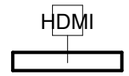


1 Large and 1 Medium Lecture Room

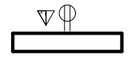


1 Extra Large Lecture Room

LEGEND

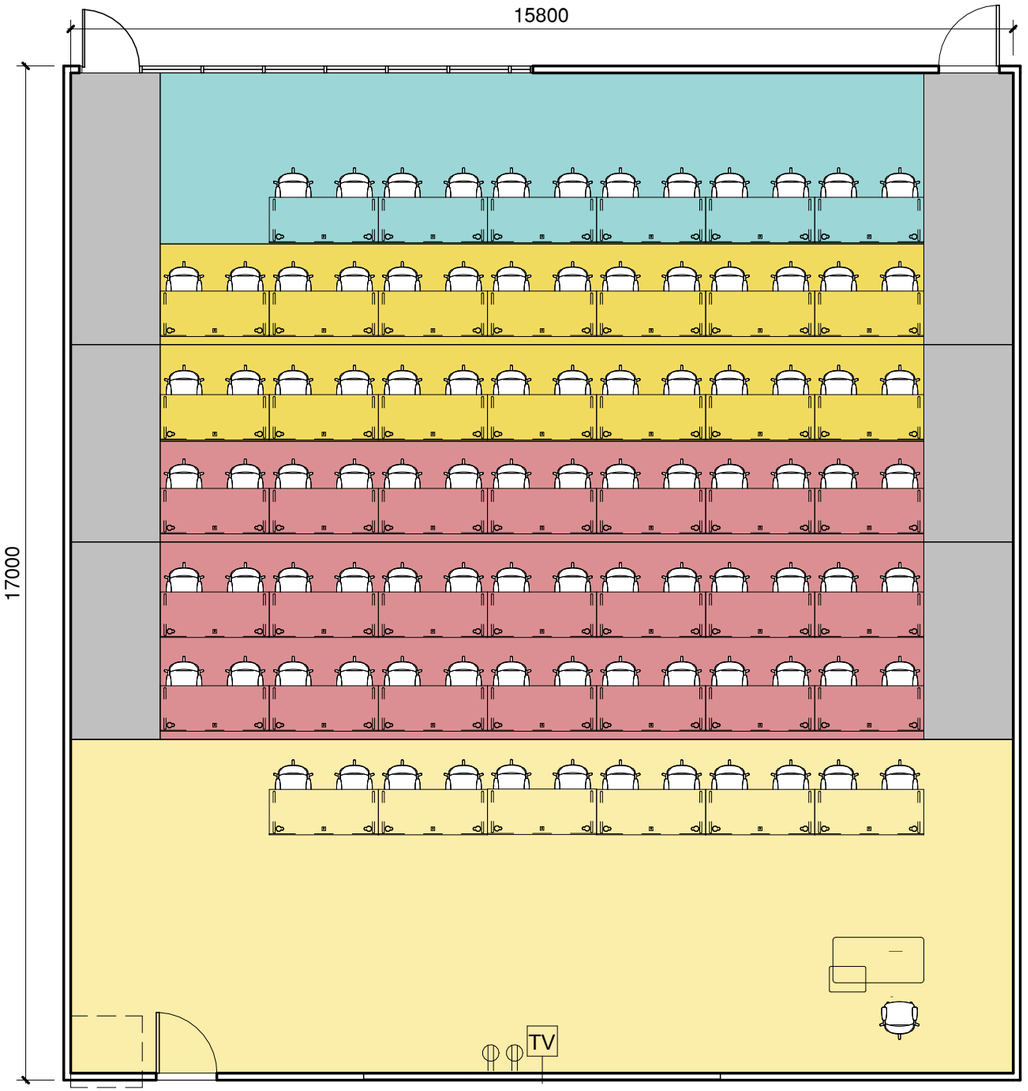


HDMI OUTLET



WALL MOUNTED POWER AND DATA

RS — ROOM SCHEDULER



LIGHTING ZONE 1 (FRONT)

LIGHTING ZONE 2 (SEATING)

LIGHTING ZONE 3 (SEATING)

LIGHTING ZONE 4 (SEATING)

LIGHTING ZONE 5 (AISLES)

**NOTE: Classroom lighting to be adjusted to the proposed layout of the room and confirmed by the Univeristy. All lighting, and window blind controls to be part of AVC within the room.*

1 Classroom Lighting Diagram

0 1 m 2 m 4 m

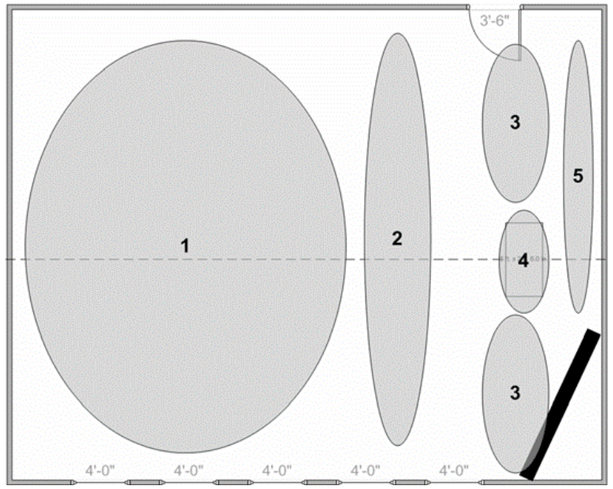


Figure 4. Classroom Lighting Zones

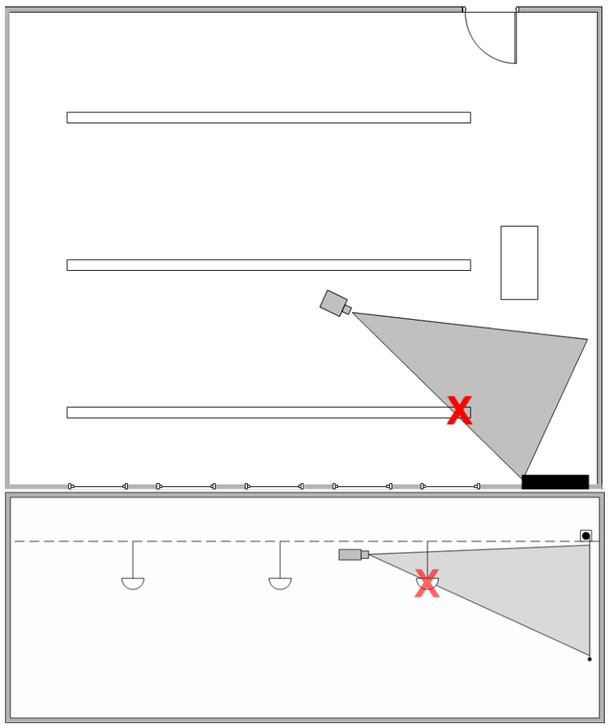


Figure 5. Pendant Luminaries obstruct image path

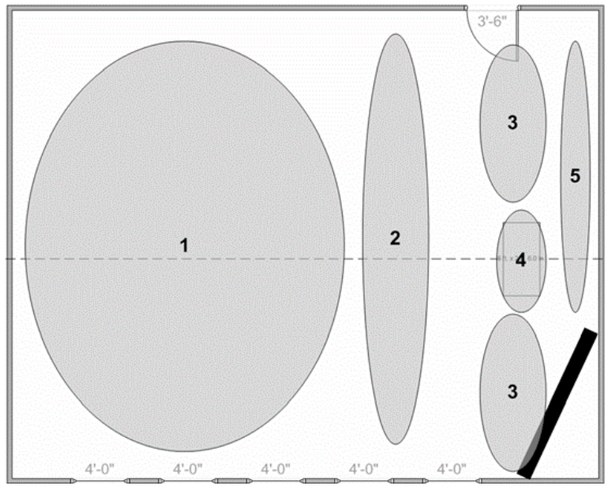


Figure 6. Typical lighting zones in a Multimedia Classroom

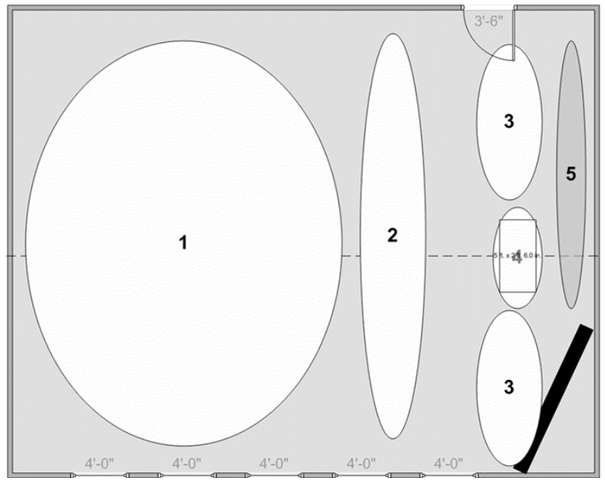


Figure 7. Lighting for Lecture Mode

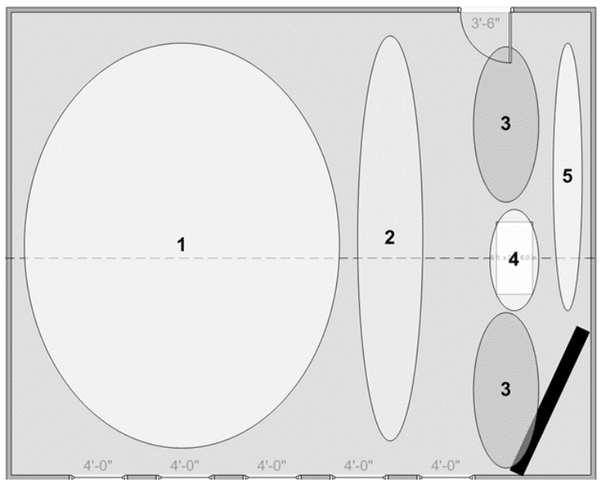


Figure 8. Presentation Mode
Note: Zone-3 accommodates a second screen if needed

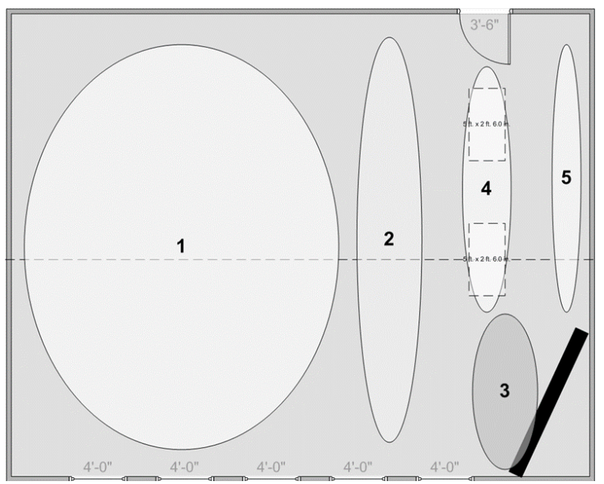
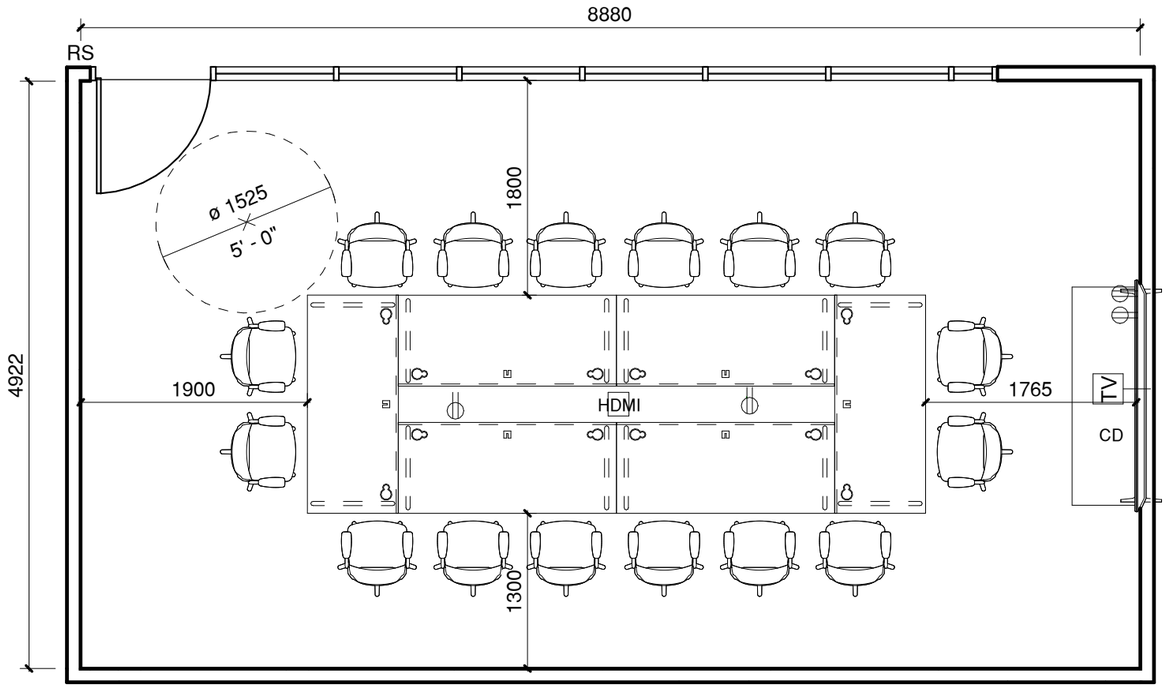
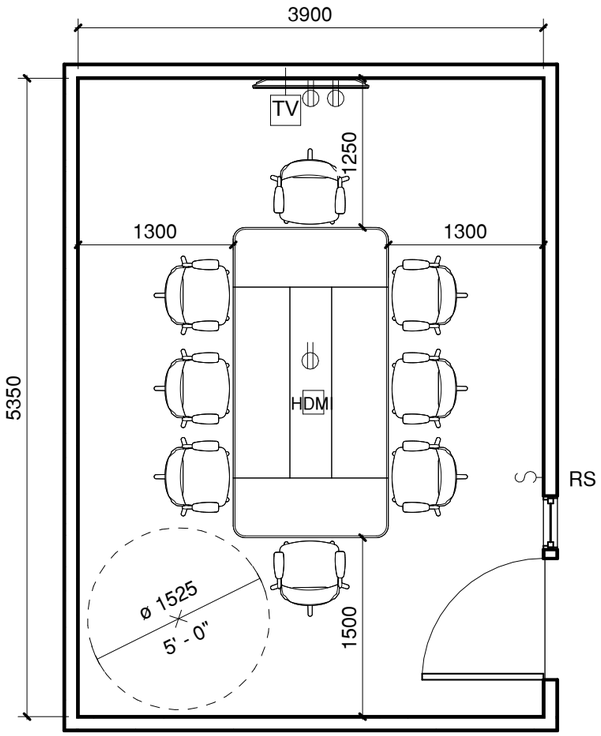


Figure 9. Lighting Zones for a Moveable Podium
Note: in Figure 8, an additional 1-2 ft of board-to-podium clearance helps to isolate the screen from Zone-4 light spillage



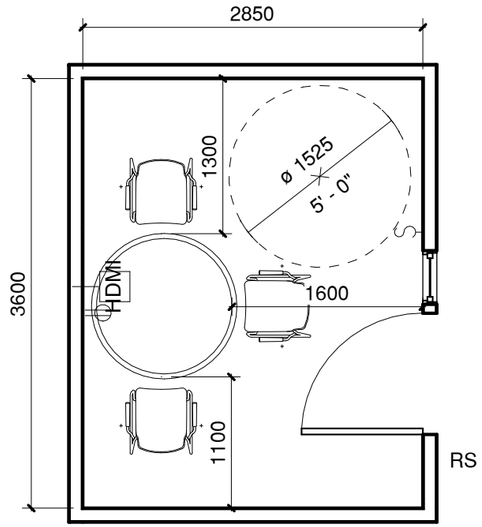
1 Boardroom / Seminar Room

0 0.5 m 1 m 2 m



2 Meeting Room (large)

0 0.5 m 1 m 2 m



3 Meeting Room (3P)

0 0.5 m 1 m 2 m

LEGEND

HDMI — HDMI OUTLET

AVC — AVC

WALL MOUNTED POWER AND DATA

CD — CREDENZA

TV — 85" LCD DISPLAY WITH ELECTRICAL IN WALL

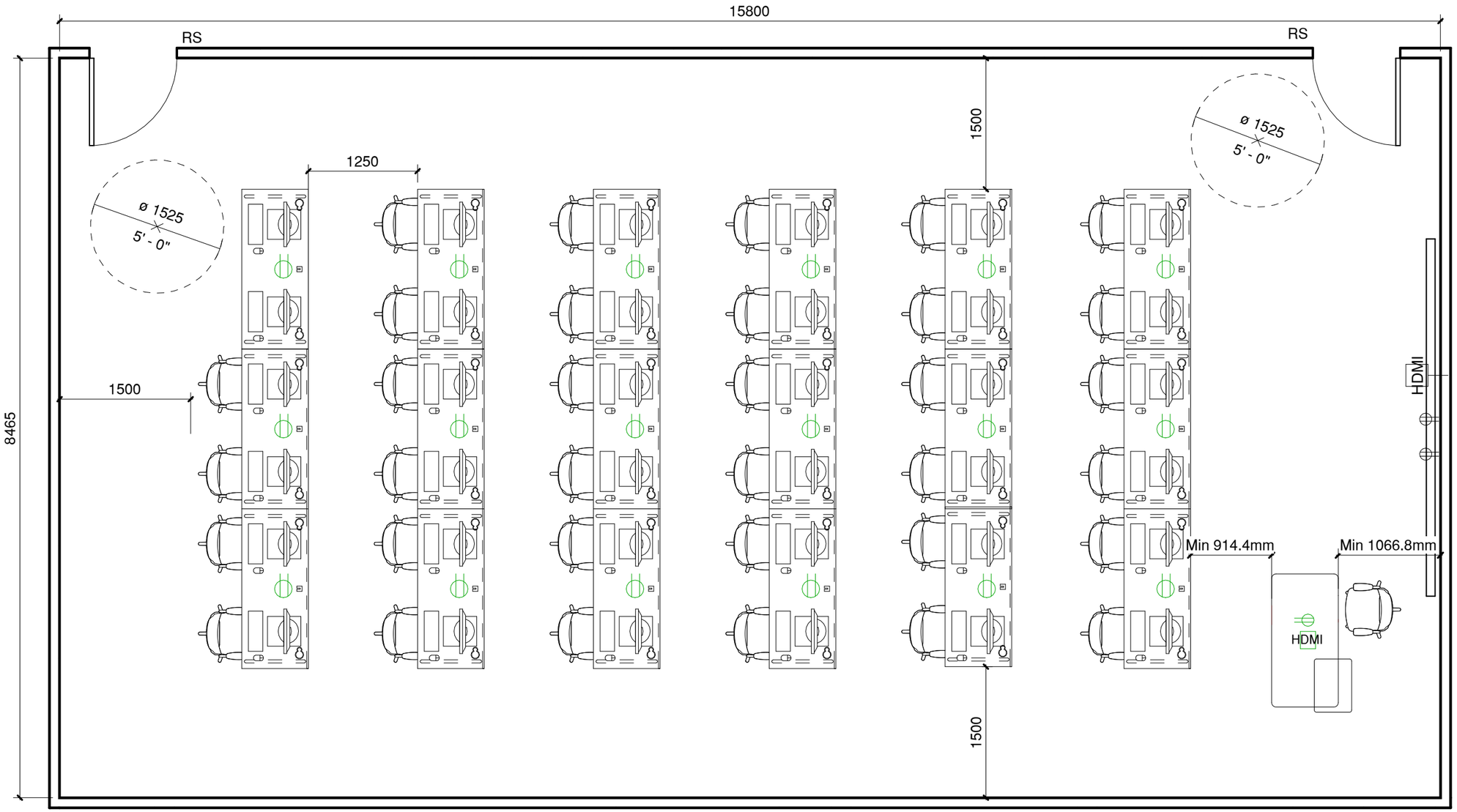
LEGEND

HDMI — HDMI OUTLET

WALL MOUNTED POWER AND DATA

RS — ROOM SCHEDULER

UNIVERSITY OF GUELPH



LEGEND

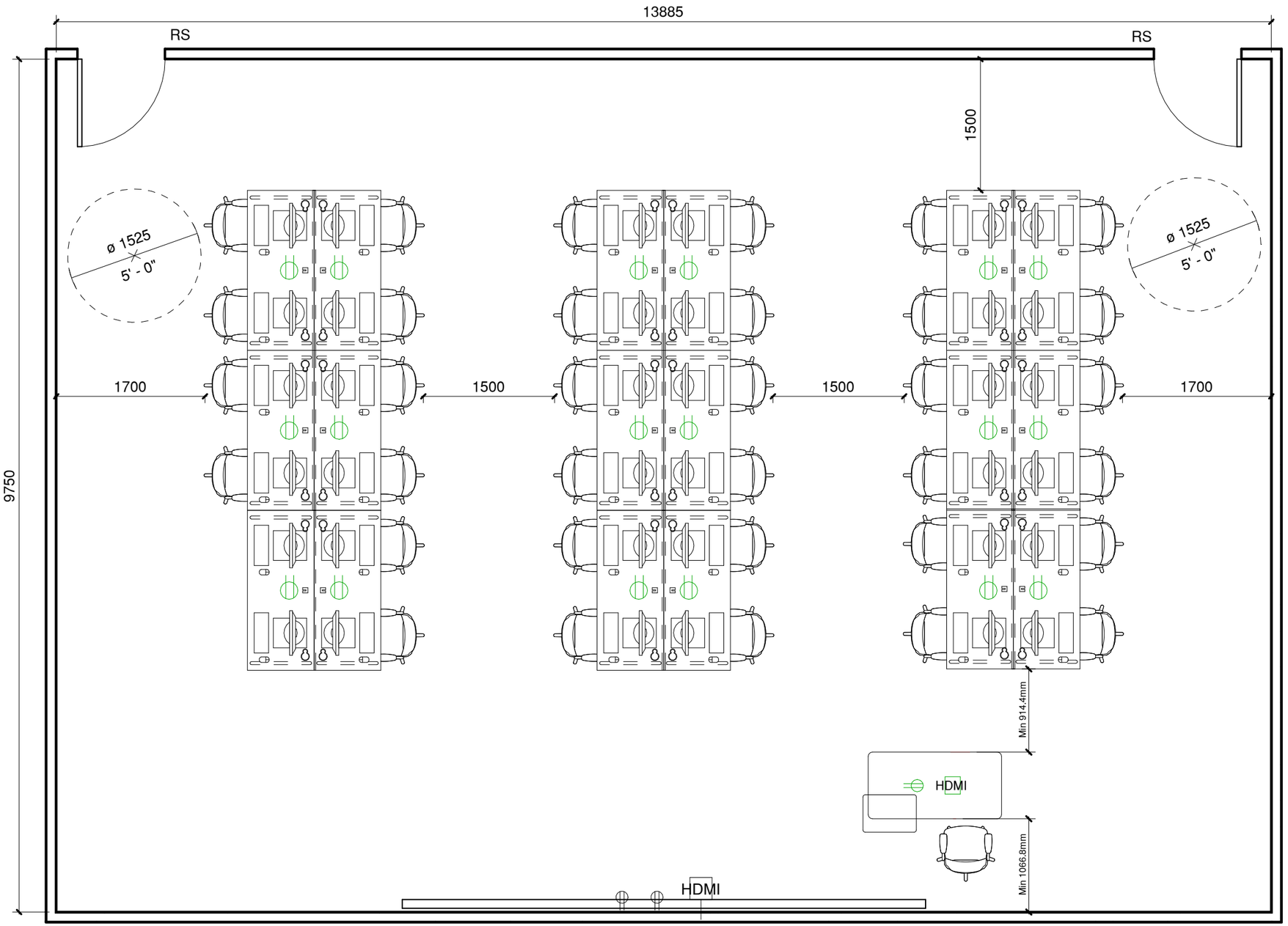
HDMI — HDMI OUTLET

WALL MOUNTED POWER AND DATA

RS — ROOM SCHEDULER

1 12. Computer Lab

0 0.5 m 1 m 2 m



LEGEND

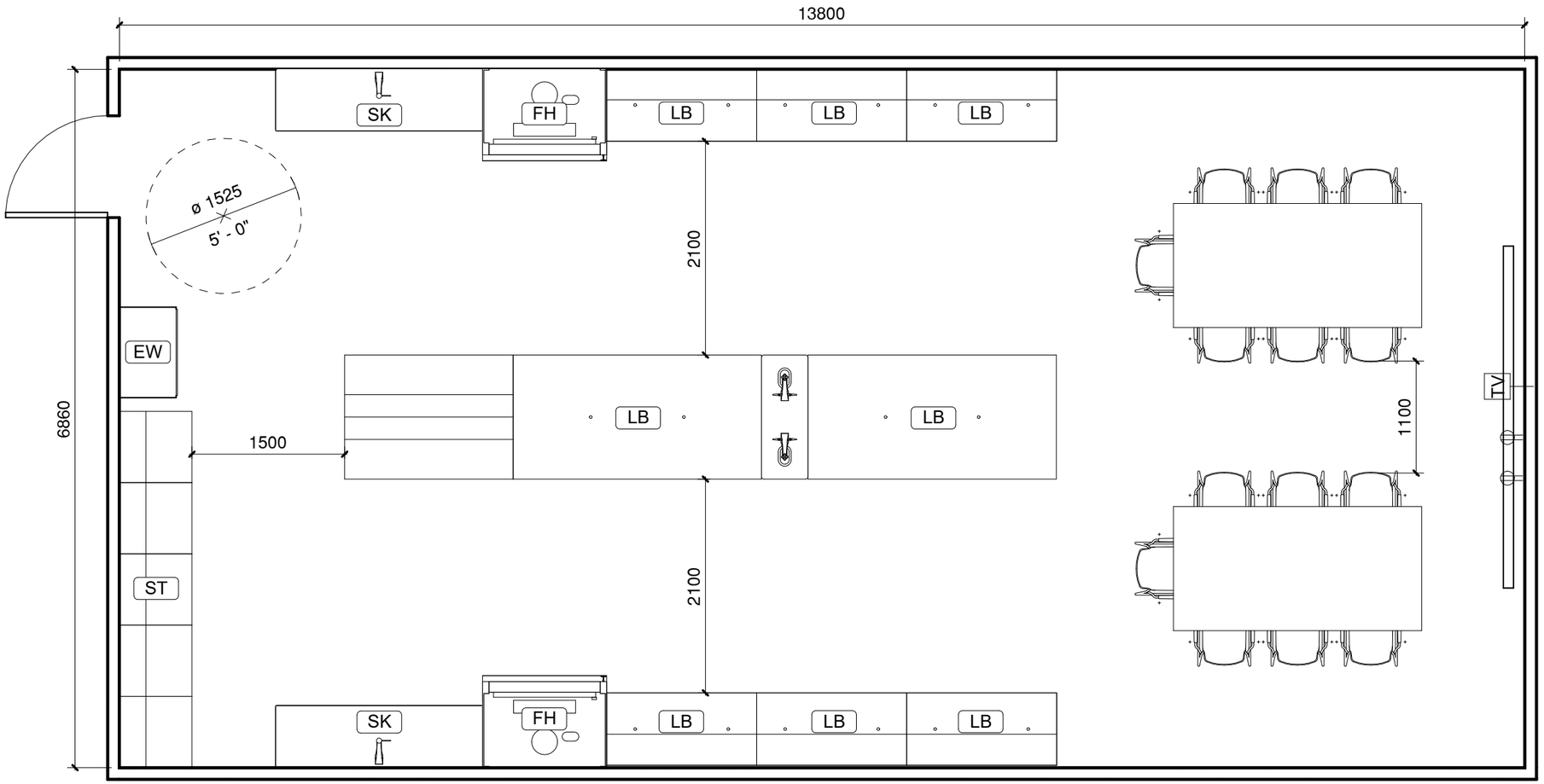
HDMI — HDMI OUTLET

WALL MOUNTED POWER AND DATA

RS — ROOM SCHEDULER

1 Computer Lab Layout 2

0 0.5 m 1 m 2 m

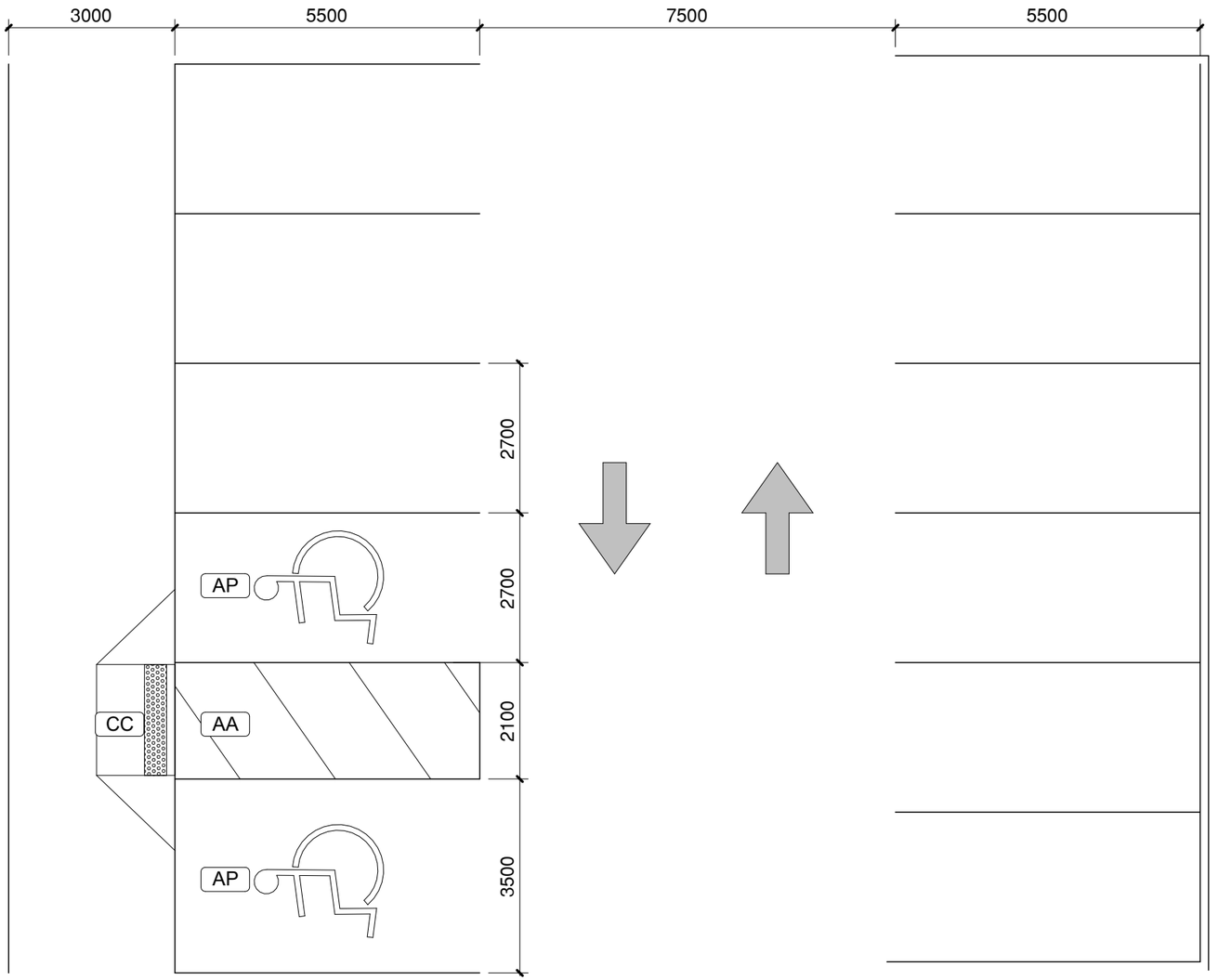


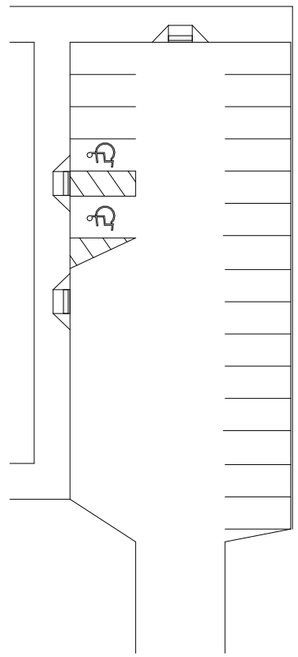
LEGEND

	WALL MOUNTED POWER AND DATA
TV	85" LCD DISPLAY WITH ELECTRICAL IN WALL
FH	FUME HOOD
LB	LAB BENCH
SK	SINK
EW	EYE WASH AND SAFTEY STATION
ST	STORAGE

1 Research Lab

0 0.5 m 1 m 2 m



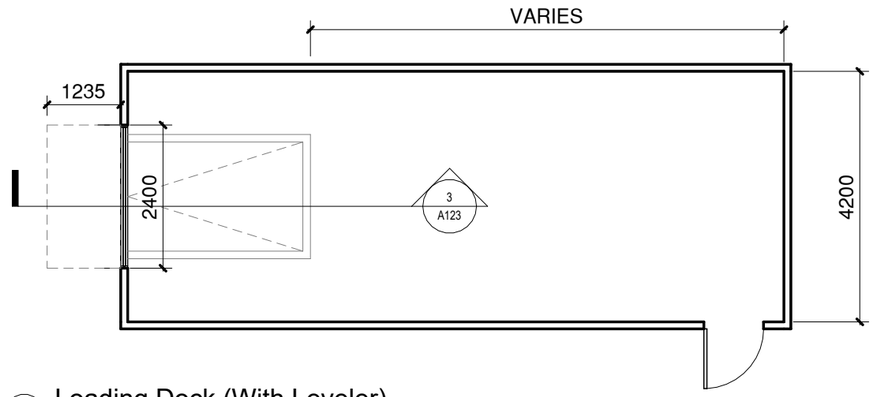


LEGEND

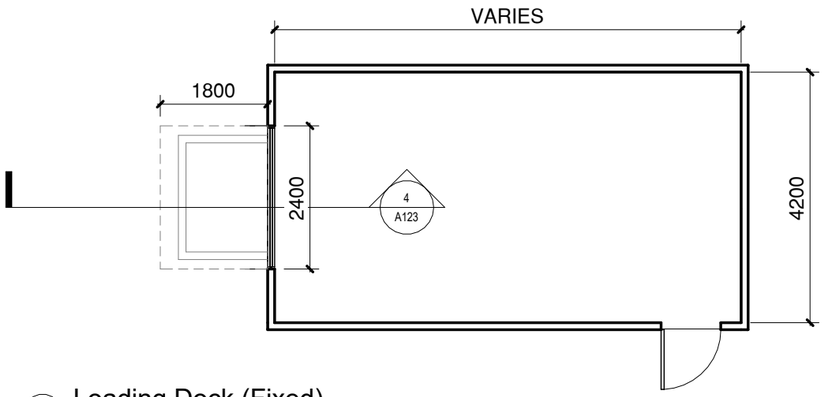
CC	CURB CUT WITH TACTILE PAVING STRIP
AP	ACCESSIBLE PARKING SPACE
AA	ACCESS AISLE

1 Parking Spaces

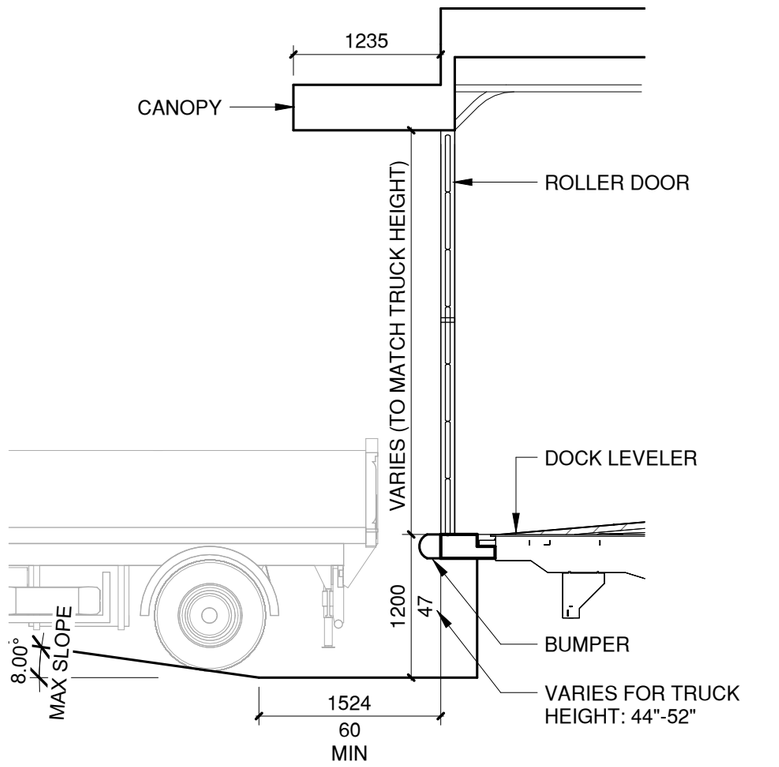
0 1 m 2 m 4 m



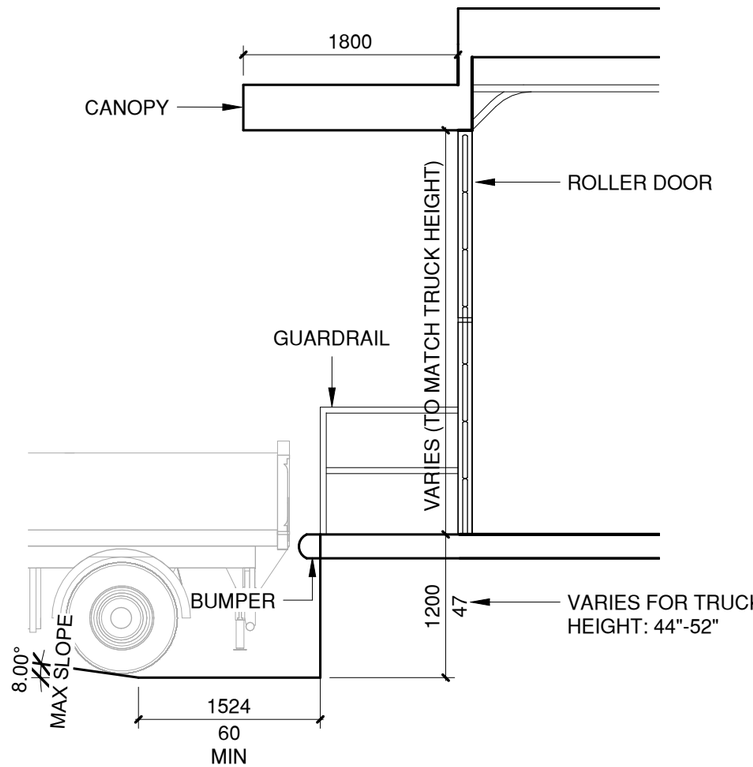
1 Loading Dock (With Leveler)



2 Loading Dock (Fixed)



3 Loading Dock Section (With Leveler)



4 Loading Dock Section (Fixed)

0 1 m 2 m 4 m

LEGEND

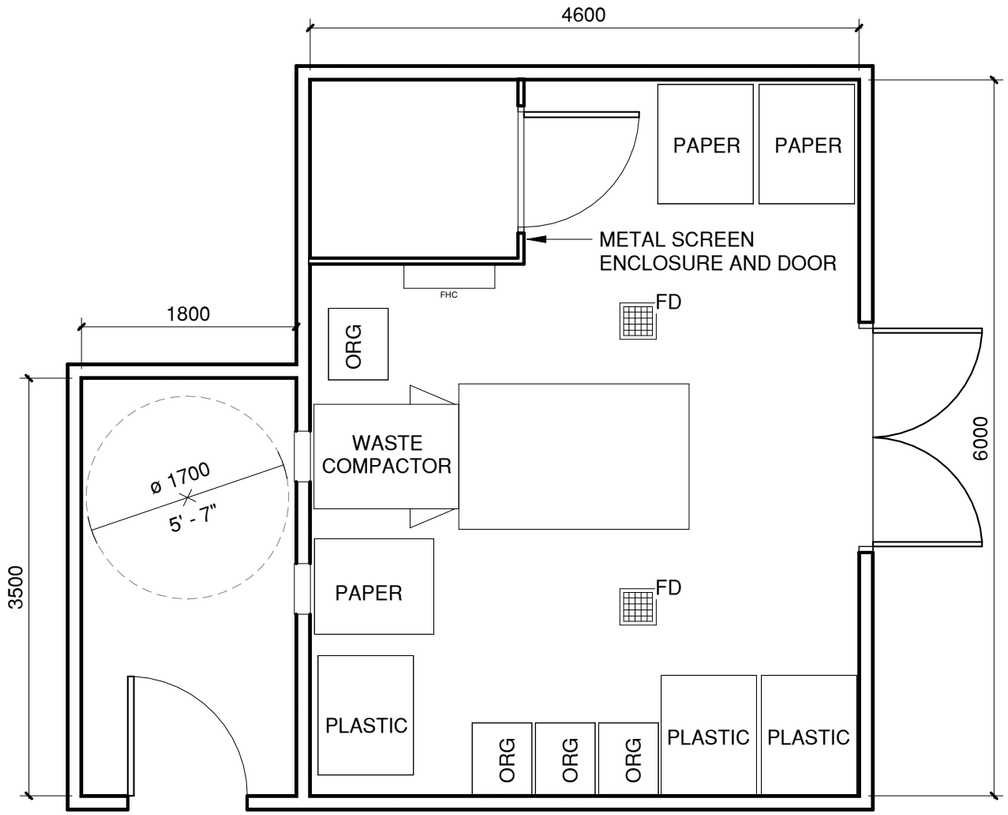
WALL MOUNTED POWER AND DATA

**NOTE: Size loading docks to meet the type of truck used in loading.*

UNIVERSITY OF GUELPH

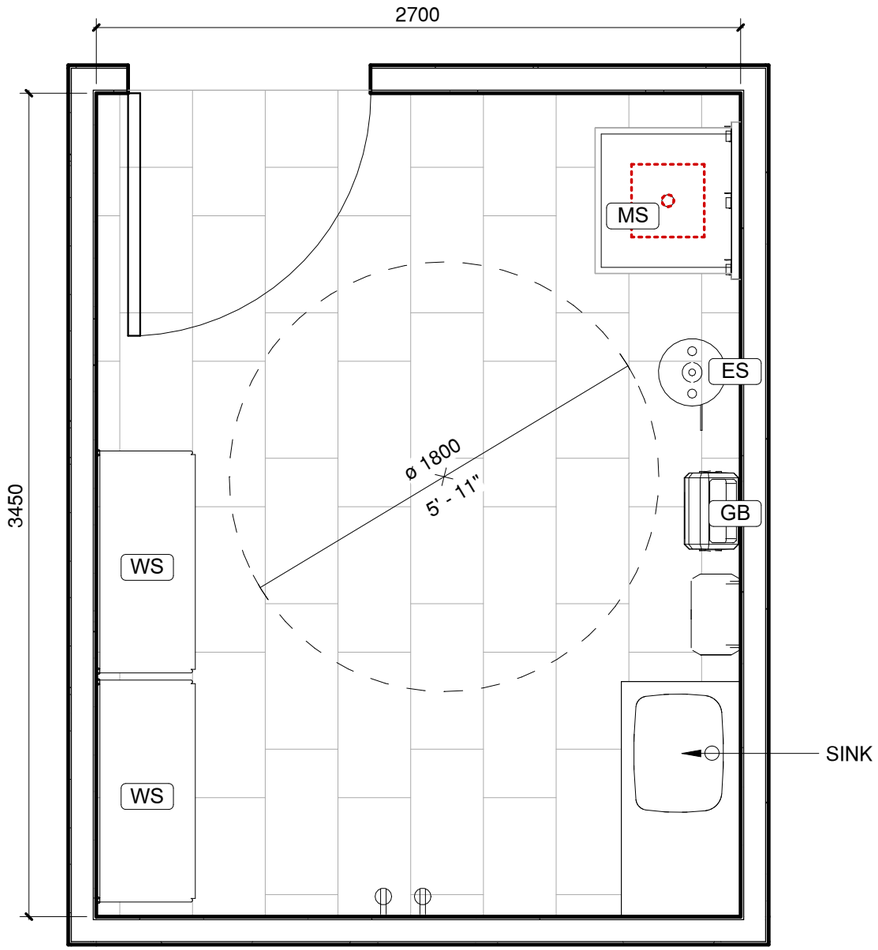
LEGEND

WS	WALL SHELVING
FD	FLOOR DRAIN



1 Garbage Room

0 0.5 m 1 m 2 m



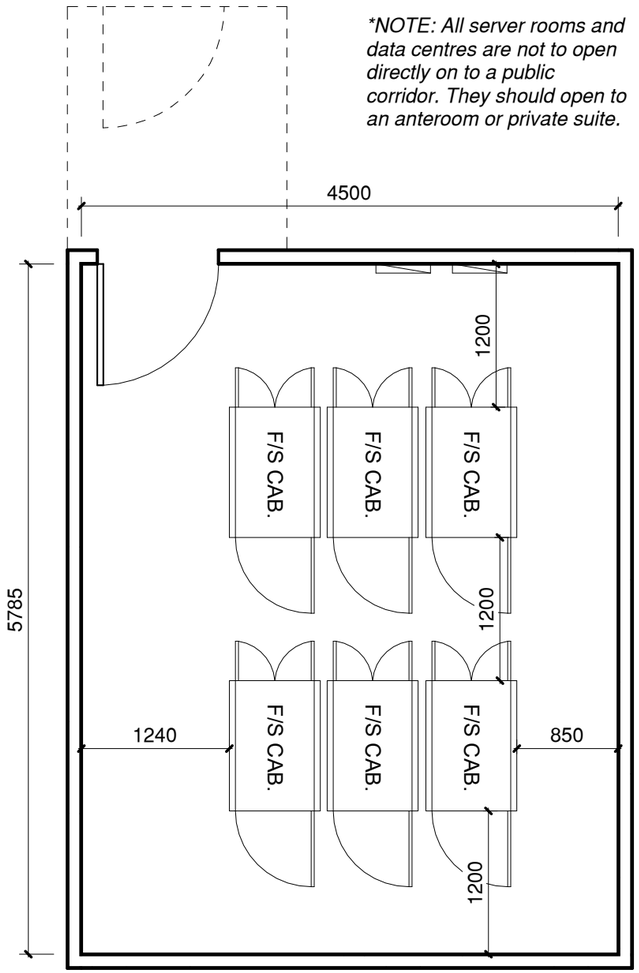
LEGEND

WS	WALL SHELVING
MS	MOP SINK
GB	GARBAGE BIN
ES	EYEWASH STATION

1 Custodial Room

0 0.25 m 0.5 m 1m

**NOTE: All server rooms and data centres are not to open directly on to a public corridor. They should open to an anteroom or private suite.*



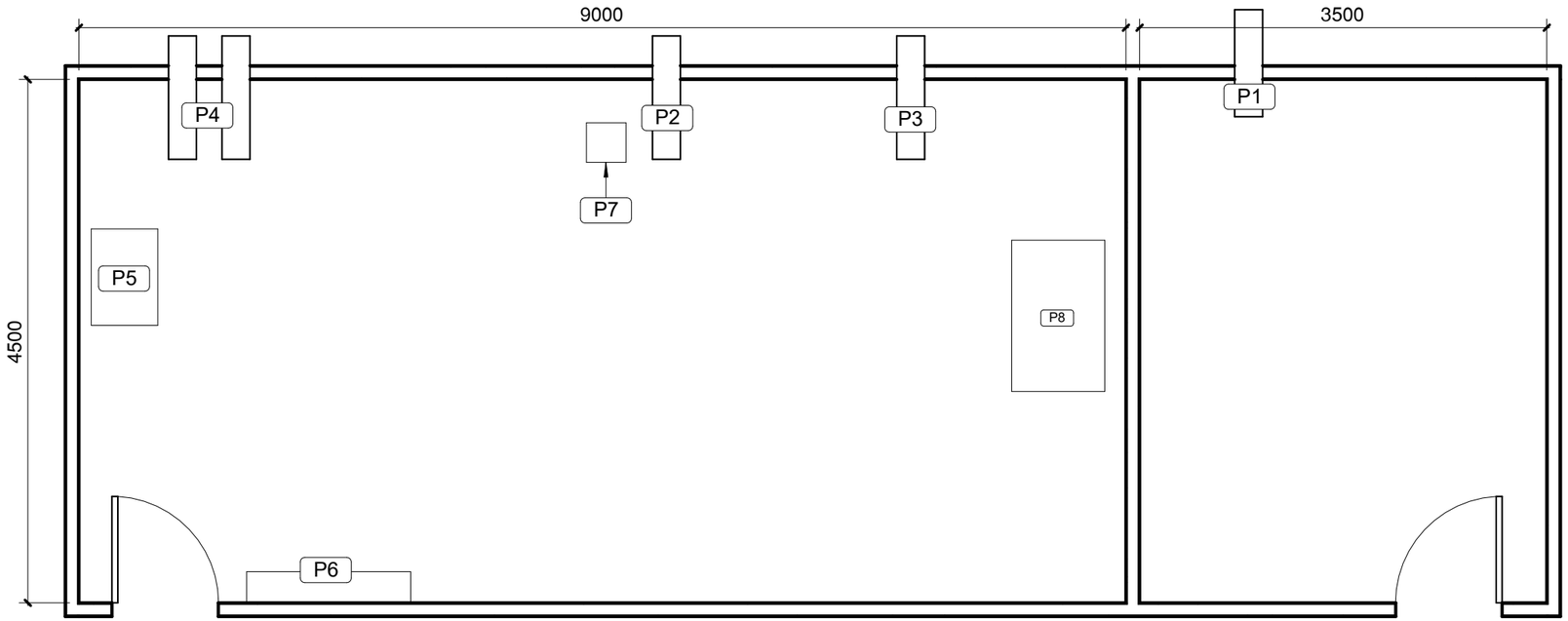
1 Server Room

0 0.5 m 1 m 2 m

LEGEND

HDMI OUTLET

WALL MOUNTED POWER AND DATA



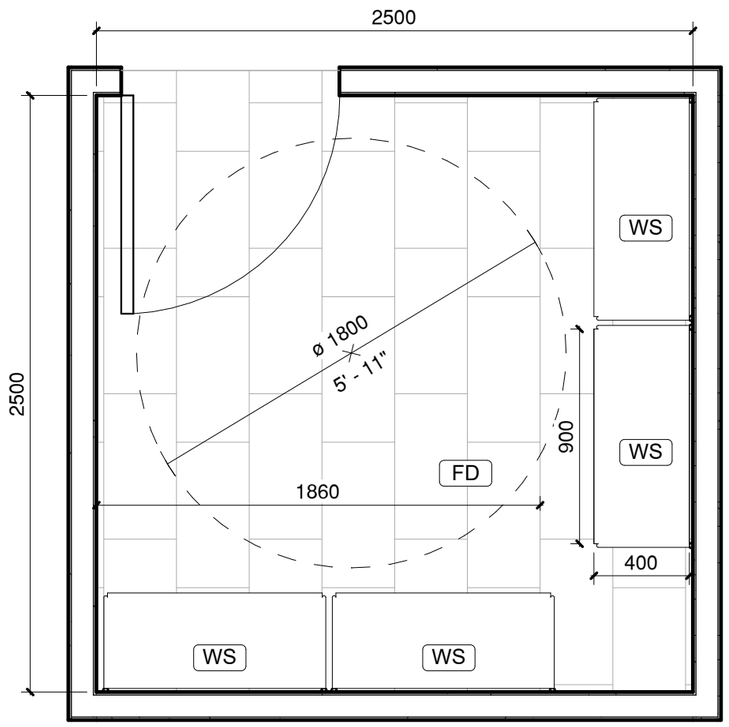
LEGEND

P1 -	STORM PIPE
P2 -	DOMESTIC COLD WATER
P3 -	DOMESTIC HOT WATER
P4 -	FIRE LINES
P5 -	FIRE PUMP
P6 -	SYSTEM CONTROL PANEL
P7 -	WATER METER
P8 -	SPRINKLER

1 Pump / Mechanical Room

0 0.5 m 1 m 2 m

Paint machine room floor in 2 coats of grey enamel using low odor paint If requested by University. Due to possible paint odor concerns, carry out this work in overtime at no cost to the University.



LEGEND

WS	WALL SHELVING
FD	FLOOR DRAIN

1 Storage Room

0 0.25 m 0.5 m 1m

Physical Resources - Campus Planning, Design and Development

Design & Construction Standards – Appendix Items

Room Data Sheets (common spaces)

Version	25-01
Effective Date	September 1, 2025
Approved By	Jill Vigers, Manager, Architectural Design
Signature	

Version	25-01
Effective Date	September 1, 2025
Approved By	Doug Doel, Manager, Electrical Design
Signature	

Version	25-01
Effective Date	September 1, 2025
Approved By	Jill Vigers, Manager, Architectural Design
Signature	

1 How to Read this Section

.1 The following pages of sample Room Data Sheets (RDS) are to be read as samples, and not the exact result of any project within the University. Read the RDS in conjunction with the sample plans in the previous section.

.2 They do not eliminate the responsibility of Project Teams to consult with user groups and the University's Internal Stakeholders for the successful planning and implementation of projects.

.3 They are meant to illustrate the basis of design of rooms where the University has consistent problems that require addressing.

.4 Regulations such as CSA and OBC constantly change and improve, as such it is the Consultant's responsibility to ensure compliance with all necessary codes.

.5 If adjustments are required to any of the spaces illustrated in the next pages, Consults are to bring it to the attention of the University of Guelph Project Managers.

2 Version Control Summary

Revision No.	Effective date	Section/ Page	Brief Description of Revision
0	09/01/2025	Whole section	Design and Construction Standards Modernization
1			
2			
3			
4			

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2024/12/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Gender Neutral Universal Washroom - Barrier Free
Room Layout Template: 8.2.2

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): 2.9sqm
Program Area (sm/sf):

GENERAL

Hours of Operation: 8 **Days Per Week:** 7
Occupants: Others: 1 Occupant
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading:
Provide steel support for floating countertops & blocking for wall mounted accessories.

Special Room Notes:
Route to universal washrooms must be barrier free and easily accessible

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): 3100 Width (mm): 3215 Height (mm): 3048
Notes: Standard washroom dimensions 2769 L x 1562 W x 3048 H - Turning circle 1800mm

ADJACENCIES/LINES OF SIGHT
Multi stall washrooms. Public corridors

INTERIOR FINISHES

	Material	Notes
Floor Material	Kerdi, Ceramic tiles, speckled preferred	1% slope, non-sanded epoxy grout
Base Material	Ceramic Tile	
Wall Material	Kerdi Board or similar	Complete corners with alum 'Schluter
Wall Finish	Epoxy paint or Ceramic tile (preferred)	Light colour non-sanded epoxy grout
Ceiling Material	Drywall	
Ceiling Finish	Epoxy Paint	

WALL PROTECTION
☑ SS Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection
Other:

WINDOWS - EXTERIOR
# of Windows: 0
☐ Privacy Film ☐ Motorized Control ☐ Roller Shades
☐ Blackout Blinds ☐ Operable
Other:

WINDOWS - INTERIOR
# of Windows: 0
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

DOORS
Door
☑ 1 Leaf ☑ Solid Core Wood ☐ Stainless Steel
☑ Hollow Metal ☐ Aluminum
Finish: Paint Other: Insulated Hollow Metal Door

Frame
☑ Hollow Metal ☐ Stainless Steel ☐ Aluminum
☐ Solid Core Wood Finish:
Other:

Hardware
☑ Auto Operator ☑ Kick Plate Kick Plate Height : 12"
☐ Emergency Button ☑ Lockable Function: Storeroom
☐ Push to Lock ☐ Card Reader Finish: SS
Other:

ACCESSORIES
☑ Coat/Robe Hook ☑ Hand Dryer ☐ Sharps Container
☑ Grab Bars ☐ Lockers ☑ Waste & Recycling Receptacle
☐ Grab Bars (Folding) ☐ Locker Bench ☑ Sanitary Napkin Disposal
☑ Toilet Paper Dispenser ☑ Mirror (Over-counter) ☐ Waste Disposal
☑ Soap Dispenser ☐ Mirror (Full) ☐ Lift
☑ Hand Sanitizer ☐ Mirror (Tilted) ☐ Shower Seat
Other: Locate paper towel dispenser as far from toilet as possible, metal shelf per code.

MILLWORK
Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Solid Doors ☐ Lockable
☐ Open, no shelving ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes
Solid Surface Countertops non-porous filled polymer through body colour, 13mm min thickness

REMARKS / SPECIAL FEATURES
For universal washrooms, allow for transfer space.
Ceramic tile on walls is required to a minimum of halfway up walls for ease of cleaning.
Handle on doors to be installed on metal plate for ease of disinfecting.
Custodial to insert hinge doorstop on doors instead of full hinges.
Insulate washroom walls for sound attenuation.

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2024/12/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Gender Neutral Universal Washroom - Barrier Free
Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING
Fixtures
☐ Sink - Stainless Single ☑ Faucet - Gooseneck ☐ Kitchen Sink - SS Single
☐ Sink - Stainless Double ☐ Faucet - Laboratory ☐ Kitchen Sink - SS Double
☐ Sink - Handwash ☐ Counter Mount ☐ Kitchen Sink - SS Triple
☐ Sink - Flushing Rim ☑ Wall Mount ☐ Corrosion Resist. Fittings
☑ Sink - Lavatory ☐ Toilet - Bariatric ☐ Shower
☐ Sink - Barrier Free ☑ Toilet - Standard ☐ Emergency Shower
☐ Eye Wash ☐ Urinal ☐ Water Closet
Other:

Drains
☑ Floor Drain ☐ Equipment Drain ☐ Corrosion Resist. Fittings
☐ Shower Drain ☐ Trench Drain ☐ Acid Neutralizer
☐ Flushing Rim Floor Drain ☐ Grease Interceptor
Other:

Water
☑ Domestic Hot ☐ Tempered Hot ☐ Distilled
☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

HVAC
Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☐ Exhaust/Return ☑ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 9 Room Classification: II Indoor Temp Range °C: 22-24
Other: Dedicated san. exhaust cannot duct into other occupancies

CONTROLS

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other:

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Room Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☐ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☑ Weatherproof
Notes:

Lighting
General Illumination Levels: 300-500 LUX
☐ Dimmable ☑ LED ☐ Specialty Light
☐ Task ☑ Emergency Other:
Other:

Lighting Control
☐ Vacancy Sensor ☑ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☑ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems
☐ Teleconference ☐ EPIC ☐ Point of Sale
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ Pyxis ☐ Sound Reinforcement
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other: Confirm CCTV requirements with staff

EQUIPMENT / FF & E

General Notes:
Emergency Call System for Universal Washroom as per Ontario Building Code.
If the washroom has wall exposure to outside, a heating component is recommended such as electrical baseboard heater.
Air change/Hr based on quantity of the plumbing fixtures as per ASHRAE code.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2024/12/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Single Washroom
Room Layout Template: 8.2.3

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): 3sqm
Program Area (sm/sf):

GENERAL

Hours of Operation: 8 **Days Per Week:** 7
Occupants: Others: 1 Occupant
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: Provide steel support for floating countertops & blocking for wall mounted accessories.

Special Room Notes:

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): 2000 Width (mm): 1500 Height (mm): 3048
Notes: Minimum Dimensions for stall - XX

ADJACENCIES/LINES OF SIGHT
Public corridors. Private areas.

INTERIOR FINISHES

	Material	Notes
Floor Material	Kerdi, Ceramic tiles, speckled preferred	1% slope, non-sanded epoxy grout
Base Material	Ceramic Tile	
Wall Material	Kerdi Board or similar	Complete corners with alum 'Schluter
Wall Finish	Epoxy paint and Ceramic tile (preferred	Light colour non-sanded epoxy grout
Ceiling Material	Drywall	
Ceiling Finish	Epoxy Paint	

WALL PROTECTION
☑ SS Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection
Other:

WINDOWS - EXTERIOR
# of Windows: 0
☐ Privacy Film ☐ Motorized Control ☐ Roller Shades
☐ Blackout Blinds ☐ Operable
Other:

WINDOWS - INTERIOR
# of Windows: 0
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

DOORS
Door
☑ 1 Leaf ☑ Solid Core Wood ☐ Stainless Steel
☑ Hollow Metal ☐ Aluminum
Finish: Paint Other: Insulated Hollow Metal Door

Frame
☑ Hollow Metal ☐ Stainless Steel ☐ Aluminum
☐ Solid Core Wood Finish: Paint
Other:

Hardware
☐ Auto Operator ☑ Kick Plate Kick Plate Height : 12"
☐ Emergency Button ☑ Lockable Function: Storeroom
☐ Push to Lock ☐ Card Reader Finish: SS
Other:

ACCESSORIES
☑ Coat/Robe Hook ☐ Hand Dryer ☐ Sharps Container
☐ Grab Bars ☑ Lockers ☑ Waste & Recycling Receptacle
☐ Grab Bars (Folding) ☐ Locker Bench ☑ Sanitary Napkin Disposal
☑ Toilet Paper Dispenser ☑ Mirror (Over-counter) ☐ Waste Disposal
☑ Soap Dispenser ☐ Mirror (Full) ☐ Lift
☐ Hand Sanitizer ☐ Mirror (Tilted) ☐ Shower Seat
Other: Adult Change Table

MILLWORK
Lower Special Height:
☐ Open Shelving ☐ Drawers ☑ Countertop
☐ Open, no shelving ☑ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Solid Doors ☐ Lockable
☐ Open, no shelving ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes
Solid Surface Countertops non-porous filled polymer through body colour, 13mm min thickness

REMARKS / SPECIAL FEATURES
Ceramic tile on walls is required to a minimum of halfway up walls for ease of cleaning.
Handle on doors to be installed on metal plate for ease of disinfecting.
Custodial to insert hinge doorstop on doors instead of full hinges.

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2024/12/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Single Washroom
Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING
Fixtures
☐ Sink - Stainless Single ☑ Faucet - Gooseneck ☐ Kitchen Sink - SS Single
☐ Sink - Stainless Double ☐ Faucet - Laboratory ☐ Kitchen Sink - SS Double
☐ Sink - Handwash ☐ Counter Mount ☐ Kitchen Sink - SS Triple
☐ Sink - Flushing Rim ☑ Wall Mount ☐ Corrosion Resist. Fittings
☑ Sink - Lavatory ☐ Toilet - Bariatric ☐ Shower
☐ Sink - Barrier Free ☑ Toilet - Standard ☐ Emergency Shower
☐ Eye Wash ☐ Urinal ☐ Water Closet
Other:

Drains
☑ Floor Drain ☐ Equipment Drain ☐ Corrosion Resist. Fittings
☐ Shower Drain ☐ Trench Drain ☐ Acid Neutralizer
☐ Flushing Rim Floor Drain ☐ Grease Interceptor
Other:

Water
☑ Domestic Hot ☐ Tempered Hot ☐ Distilled
☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

HVAC
Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☐ Exhaust/Return ☑ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 9 Room Classification: II Indoor Temp Range °C: 22-24
Other:

CONTROLS

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other:

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Room Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☐ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☑ Weatherproof
Notes:

Lighting
General Illumination Levels: 300-500 LUX
☐ Dimmable ☑ LED ☐ Specialty Light
☐ Task ☑ Emergency Other:
Other:

Lighting Control
☐ Vacancy Sensor ☑ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☑ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems
☐ Teleconference ☐ EPIC ☐ Point of Sale
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ Pyxis ☐ Sound Reinforcement
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other: Confirm CCTV requirements with staff

EQUIPMENT / FF & E

General Notes:
If the washroom has wall exposure to outside, a heating component is recommended such as electrical baseboard heater.
Air change/Hr based on quantity of the plumbing fixtures as per ASHRAE code.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2024/12/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Multistall Washroom
Room Layout Template: 8.2.4

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): 40sqm
Program Area (sm/sf):

GENERAL

Hours of Operation: 8 **Days Per Week:** 7
Occupants: Others: Multiple - Varies
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading:
Provide steel support for floating countertops & blocking for wall mounted accessories.

Special Room Notes:
Route to accessible stalls must be barrier free and easily accessible

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): 2000 Width (mm): 1500 Height (mm): 3048
Notes: Minimum Dimensions for stall - 700x1500

ADJACENCIES/LINES OF SIGHT
Public corridors.

INTERIOR FINISHES

	Material	Notes
Floor Material	Kerdi, Ceramic tiles, speckled preferred	1% slope, non-sanded epoxy grout
Base Material	Ceramic Tile	
Wall Material	Kerdi Board or similar	Complete corners with alum 'Schluter
Wall Finish	Epoxy paint or Ceramic tile (preferred)	Light colour non-sanded epoxy grout
Ceiling Material	Drywall	
Ceiling Finish	Epoxy Paint	

WALL PROTECTION
☑ SS Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection
Other:

WINDOWS - EXTERIOR
# of Windows: 0
☐ Privacy Film ☐ Motorized Control ☐ Roller Shades
☐ Blackout Blinds ☐ Operable
Other:

WINDOWS - INTERIOR
# of Windows: 0
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

DOORS
Door
☑ 1 Leaf ☑ Solid Core Wood ☐ Stainless Steel
☑ Hollow Metal ☐ Aluminum
Finish: Paint Other: Insulated Hollow Metal Door

Frame
☑ Hollow Metal ☐ Stainless Steel ☐ Aluminum
☐ Solid Core Wood Finish: Paint
Other:

Hardware
☐ Auto Operator ☑ Kick Plate Kick Plate Height : 12"
☐ Emergency Button ☑ Lockable Function: Storeroom
☐ Push to Lock ☐ Card Reader Finish: SS
Other:

ACCESSORIES
☑ Coat/Robe Hook ☑ Hand Dryer ☐ Sharps Container
☐ Grab Bars ☐ Lockers ☑ Waste & Recycling Receptacle
☐ Grab Bars (Folding) ☐ Locker Bench ☑ Sanitary Napkin Disposal
☑ Toilet Paper Dispenser ☐ Mirror (Over-counter) ☐ Waste Disposal
☑ Soap Dispenser ☐ Mirror (Full) ☐ Lift
☑ Hand Sanitizer ☐ Mirror (Tilted) ☐ Shower Seat
Other: Locate paper towel dispenser as far from toilet as possible

MILLWORK
Lower Special Height:
☐ Open Shelving ☐ Drawers ☑ Countertop
☐ Open, no shelving ☑ Solid Doors ☐ Lockable
Upper
☐ Open Shelving ☐ Solid Doors ☐ Lockable
☐ Open, no shelving ☐ Glass Doors
Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes
Solid Surface Countertops non-porous filled polymer through body colour, 13mm min thickness

REMARKS / SPECIAL FEATURES
Toilet partition supports to be full height.
Ceramic tile on walls is required to a minimum of halfway up walls for ease of cleaning.
Handle on doors to be installed on metal plate for ease of disinfecting.
Custodial to insert hinge doorstop on doors instead of full hinges.
Insulate washroom walls for sound attenuation.

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2024/12/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Multistall Washroom
Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING
Fixtures
☐ Sink - Stainless Single ☑ Faucet - Gooseneck ☐ Kitchen Sink - SS Single
☐ Sink - Stainless Double ☐ Faucet - Laboratory ☐ Kitchen Sink - SS Double
☐ Sink - Handwash ☐ Counter Mount ☐ Kitchen Sink - SS Triple
☐ Sink - Flushing Rim ☑ Wall Mount ☐ Corrosion Resist. Fittings
☑ Sink - Lavatory ☐ Toilet - Bariatric ☐ Shower
☐ Sink - Barrier Free ☑ Toilet - Standard ☐ Emergency Shower
☐ Eye Wash ☐ Urinal ☐ Water Closet
Other:

Drains
☑ Floor Drain ☐ Equipment Drain ☐ Corrosion Resist. Fittings
☐ Shower Drain ☐ Trench Drain ☐ Acid Neutralizer
☐ Flushing Rim Floor Drain ☐ Grease Interceptor
Other:

Water
☑ Domestic Hot ☐ Tempered Hot ☐ Distilled
☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

HVAC
Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☐ Exhaust/Return ☑ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 9 Room Classification: II Indoor Temp Range °C: 22-24
Other: Dedicated san. exhaust cannot duct into other occupancies

CONTROLS

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other:

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Room Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☐ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☑ Weatherproof
Notes:

Lighting
General Illumination Levels: 300-500 LUX
☐ Dimmable ☑ LED ☑ Specialty Light
☐ Task ☐ Emergency Other:
Other:

Lighting Control
☐ Vacancy Sensor ☑ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☑ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems
☐ Teleconference ☐ EPIC ☐ Point of Sale
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ Pyxis ☐ Sound Reinforcement
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other: Confirm CCTV requirements with staff

EQUIPMENT / FF & E

General Notes:
If the washroom has wall exposure to outside, a heating component is recommended such as electrical baseboard heater.
Air change/Hr based on quantity of the plumbing fixtures as per ASHRAE code.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2024/12/18 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Showers with lockers
Room Layout Template: 8.2.5

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): ~40sqm
Program Area (sm/sf):

GENERAL

Hours of Operation: 8 **Days Per Week:** 5
Occupants: Others: Multiple - Varies
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading:
Provide steel support for floating countertops & blocking for wall mounted accessories and millwork.

Special Room Notes:
Route to accessible showers must be barrier free and easily accessible

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): 2000 Width (mm): 1500 Height (mm): 3048
Notes: Minimum Dimensions for shower - 900x900

ADJACENCIES/LINES OF SIGHT
Private areas.

INTERIOR FINISHES

	Material	Notes
Floor Material	Kerdi, Ceramic tiles, speckled preferred	1% slope, non-sanded epoxy grout
Base Material	Ceramic Tile	
Wall Material	Kerdi Board or similar	Complete corners with alum 'Schluter
Wall Finish	Epoxy paint or Ceramic tile (preferred)	Light colour non-sanded epoxy grout
Ceiling Material	Drywall	
Ceiling Finish	Epoxy Paint	

WALL PROTECTION
☑ SS Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection
Other:

WINDOWS - EXTERIOR
# of Windows: 0
☐ Privacy Film ☐ Motorized Control ☐ Roller Shades
☐ Blackout Blinds ☐ Operable
Other:

WINDOWS - INTERIOR
# of Windows: 0
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

DOORS
Door
☑ 1 Leaf ☑ Solid Core Wood ☐ Stainless Steel
☑ Hollow Metal ☐ Aluminum
Finish: Paint Other: Insulated Hollow Metal Door

Frame
☑ Hollow Metal ☐ Stainless Steel ☐ Aluminum
☐ Solid Core Wood Finish: Paint
Other:

Hardware
☐ Auto Operator ☑ Kick Plate Kick Plate Height : 12"
☐ Emergency Button ☑ Lockable Function: Storeroom
☐ Push to Lock ☐ Card Reader Finish: SS
Other:

ACCESSORIES
☑ Coat/Robe Hook ☐ Hand Dryer ☐ Sharps Container
☐ Grab Bars ☑ Lockers ☑ Waste & Recycling Receptacle
☐ Grab Bars (Folding) ☑ Locker Bench ☑ Sanitary Napkin Disposal
☑ Toilet Paper Dispenser ☑ Mirror (Over-counter) ☐ Waste Disposal
☑ Soap Dispenser ☐ Mirror (Full) ☐ Lift
☑ Hand Sanitizer ☐ Mirror (Tilted) ☐ Shower Seat
Other: Locate paper towel dispenser as far from toilet as possible.

MILLWORK
Lower Special Height:
☐ Open Shelving ☐ Drawers ☑ Countertop
☐ Open, no shelving ☑ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Solid Doors ☐ Lockable
☐ Open, no shelving ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes
Solid Surface Countertops non-porous filled polymer through body colour, 13mm min thickness

REMARKS / SPECIAL FEATURES
Shower walls, ceiling, and floors shall be finished with large format "Glaze" or Ceramic Tile.
Better ventilation to reduce mold issues.
Insulate washroom walls for sound attenuation.

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2024/12/18 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Showers with lockers
Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING
Fixtures
☐ Sink - Stainless Single ☑ Faucet - Gooseneck ☐ Kitchen Sink - SS Single
☐ Sink - Stainless Double ☐ Faucet - Laboratory ☐ Kitchen Sink - SS Double
☐ Sink - Handwash ☐ Counter Mount ☐ Kitchen Sink - SS Triple
☐ Sink - Flushing Rim ☑ Wall Mount ☐ Corrosion Resist. Fittings
☑ Sink - Lavatory ☐ Toilet - Bariatric ☑ Shower
☐ Sink - Barrier Free ☑ Toilet - Standard ☐ Emergency Shower
☐ Eye Wash ☐ Urinal ☐ Water Closet
Other:

Drains
☑ Floor Drain ☐ Equipment Drain ☐ Corrosion Resist. Fittings
☐ Shower Drain ☐ Trench Drain ☐ Acid Neutralizer
☐ Flushing Rim Floor Drain ☐ Grease Interceptor
Other:

Water
☑ Domestic Hot ☐ Tempered Hot ☐ Distilled
☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

HVAC
Provide supply air as required by Code and humidity levels.

Air Pressure
☐ Positive ☐ Neutral ☐ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☐ Std. Diffusers/Grilles
☐ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation

Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 9 Room Classification: II Indoor Temp Range °C: 22-24
Other: Dedicated san. exhaust cannot duct into other occupancies

CONTROLS

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other:

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Room Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☐ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☑ Weatherproof
Notes:

Lighting
General Illumination Levels: 300-500 LUX
☐ Dimmable ☑ LED ☐ Specialty Light
☐ Task ☑ Emergency Other:
Other:

Lighting Control
☐ Vacancy Sensor ☑ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☑ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems
☐ Teleconference ☐ EPIC ☐ Point of Sale
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ Pyxis ☐ Sound Reinforcement
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other: Confirm CCTV requirements with staff

EQUIPMENT / FF & E

General Notes:
If the washroom has wall exposure to outside, a heating component is recommended such as electrical baseboard heater.
Air change/Hr based on quantity of the plumbing fixtures as per ASHRAE code.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Prayer/Wellness/Lactation/Meditation Room
Room Layout Template: 8.2.6

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): ~6sqm
Program Area (sm/sf):

GENERAL

Hours of Operation: 8 **Days Per Week:** 5
Occupants: Others: Multiple - Varies
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: Provide steel support for floating countertops & blocking for wall mounted accessories and millwork.

Special Room Notes:

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): 2350 Width (mm): 2350 Height (mm): 3048
Notes:

ADJACENCIES/LINES OF SIGHT
Public areas, wellness lounge.

INTERIOR FINISHES

	Material	Notes
Floor Material	Walk-Off Carpet Tile	Colour as specified
Base Material	Johnsonite Tightlock or bound carpet	
Wall Material	Kerdi Board or similar	Extend to U/S of slab. Min STC52
Wall Finish	Paint	Colour as specified
Ceiling Material	Lay-in Acoustic Tile	600 mm x 1200 mm grid
Ceiling Finish		

WALL PROTECTION
☑ SS Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection
Other:

WINDOWS - EXTERIOR
# of Windows: 0
☐ Privacy Film ☐ Motorized Control ☐ Roller Shades
☐ Blackout Blinds ☐ Operable
Other:

WINDOWS - INTERIOR
# of Windows: 0
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

DOORS
Door
☑ 1 Leaf ☑ Solid Core Wood ☐ Stainless Steel
☑ Hollow Metal ☐ Aluminum
Finish: Paint Other: Insulated Hollow Metal Door

Frame
☑ Hollow Metal ☐ Stainless Steel ☐ Aluminum
☐ Solid Core Wood Finish: Paint
Other:

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Emergency Button ☑ Lockable Function: Storeroom
☐ Push to Lock ☐ Card Reader Finish: SS
Other:

ACCESSORIES
☑ Coat/Robe Hook ☑ Hand Dryer ☐ Sharps Container
☐ Grab Bars ☐ Lockers ☑ Waste & Recycling Receptacle
☐ Grab Bars (Folding) ☐ Locker Bench ☐ Sanitary Napkin Disposal
☐ Toilet Paper Dispenser ☑ Mirror (Over-counter) ☐ Waste Disposal
☑ Soap Dispenser ☐ Mirror (Full) ☐ Lift
☑ Hand Sanitizer ☐ Mirror (Tilted) ☐ Shower Seat
Other:

MILLWORK
Lower Special Height:
☐ Open Shelving ☑ Drawers ☑ Countertop
☐ Open, no shelving ☑ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Solid Doors ☐ Lockable
☐ Open, no shelving ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes
Solid Surface Countertops non-porous filled polymer through body colour, 13mm min thickness

REMARKS / SPECIAL FEATURES
Insulate walls for sound attenuation.

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2024/12/18 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Prayer/Wellness/Lactation/Meditation Room

MECHANICAL

PLUMBING
Fixtures
☐ Sink - Stainless Single ☑ Faucet - Gooseneck ☑ Kitchen Sink - SS Single
☐ Sink - Stainless Double ☐ Faucet - Laboratory ☐ Kitchen Sink - SS Double
☐ Sink - Handwash ☐ Counter Mount ☐ Kitchen Sink - SS Triple
☐ Sink - Flushing Rim ☑ Wall Mount ☐ Corrosion Resist. Fittings
☐ Sink - Lavatory ☐ Toilet - Bariatric ☐ Shower
☐ Sink - Barrier Free ☐ Toilet - Standard ☐ Emergency Shower
☐ Eye Wash ☐ Urinal ☐ Water Closet
Other:

Drains
☑ Floor Drain ☐ Equipment Drain ☐ Corrosion Resist. Fittings
☐ Shower Drain ☐ Trench Drain ☐ Acid Neutralizer
☐ Flushing Rim Floor Drain ☐ Grease Interceptor
Other:

Water
☑ Domestic Hot ☐ Tempered Hot ☐ Distilled
☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

HVAC
Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☐ Std. Diffusers/Grilles
☐ Exhaust/Return ☑ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 9 Room Classification: II Indoor Temp Range °C: 22-24
Other: Dedicated san. exhaust cannot duct into other occupancies

CONTROLS

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other:

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Room Numbers: To be confirmed by project

Room Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☐ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☑ Weatherproof
Notes:

Lighting
General Illumination Levels: 300-500 LUX
☐ Dimmable ☑ LED ☐ Specialty Light
☐ Task ☑ Emergency Other:
Other:

Lighting Control
☐ Vacancy Sensor ☑ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☑ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems
☐ Teleconference ☐ EPIC ☐ Point of Sale
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ Pyxis ☐ Sound Reinforcement
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other: Confirm CCTV requirements with staff

EQUIPMENT / FF & E

General Notes:

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Reception
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation:
Days Per Week: Varies
Occupants: Staff: Varies Others: Varies

Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: Provide blocking for wall-mounted A/V

Special Room Notes: Consider requirements by project.

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS

Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT

Reception spaces to have visual lines of sight to corridors and surrounding areas.

INTERIOR FINISHES

	Material	Notes
Floor Material	Fiber Reinforced Laminate	
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	standard random fissure acoustic tile	
Ceiling Finish	N/A	

WALL PROTECTION

☑ Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other:

WINDOWS - EXTERIOR

# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other: Provide daylight where possible

WINDOWS - INTERIOR

# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other: Privacy Glazing Film

REMARKS / SPECIAL FEATURES

Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
Provide complete accessibility, including 150mm turning circle at multiple locations.
Confirm casework requirements with user group.

DOORS

Door

☑ 1 Leaf ☑ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☐ STC Rating ☐ Glass Finish:
Other:

Frame

☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other:

Hardware

☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Card Reader ☑ Lockable Function: Classroom
Finish: MAG Lock:
Other: Review security reqs with user groups and campus security

ACCESSORIES

☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☑ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☑ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other:

MILLWORK

Lower Special Height:

☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper

☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height

☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

Room Name: Reception

MECHANICAL

PLUMBING

Fixtures

☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains

☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water

☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES

☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure

☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☑ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☑ Local Control ☐ Equip. Heat Dissipation

Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C: 22-24
Other: 20 CFM/per person of ventilation airflow

CONTROLS

Dedicated temperature control

FIRE PROTECTION

☑ Standard to Code Other:

Type

☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head

☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

Room Numbers: To be confirmed by project

ELECTRICAL

Patient Classification

☐ Basic ☐ Intermediate ☐ Critical ☐ N/A
Other:

Power

☑ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes: Provide emergency power at headwall

Lighting

General Illumination Levels: 300-500 LUX

☐ Dimmable ☑ LED ☑ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☑ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control

☐ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm

☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)				
Telephone (TDM)				
Computer				
Printer				
Copier				
Multifunctional Station				
Future				

Other: Verify network / digital requirements with UofG

Additional Systems

☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☑ Clock - Primex ☐ Sound Masking
☑ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security

☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:

AV requirements to be confirmed by UofG

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Department:

Room Name: Kitchenette

Room Layout Template:

Room Numbers: To be confirmed by project

Program Net Area (nsm/nsf): Project Specific

Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation:

Days Per Week:

Occupants: Staff: 1 Others:

Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted

Acoustic Control: ☐ None ☑ Normal ☐ Confidential

Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: N/A

Special Room Notes:

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS

Length (mm): Width (mm): Height (mm):

Notes:

ADJACENCIES/LINES OF SIGHT

Staff lounge, locker room, washrooms

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient sheet vinyl flooring	
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	Moisture resistant
Wall Finish	Paint	
Ceiling Material	ACT	
Ceiling Finish	N/A	

WALL PROTECTION

☑ Corner Guard ☐ Chair Rail ☐ Handrail

☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding

☐ RF Shielding

Other:

WINDOWS - EXTERIOR

# of Windows: 1

☐ Translucent ☐ Smart Glass ☐ Operable

☐ Radiation Protection ☐ Blackout Blinds ☑ Roller Shades

☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant

☐ Clear Glass Other:

WINDOWS - INTERIOR

# of Windows:

☐ Translucent ☐ Smart Glass ☐ Privacy Film

☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through

☐ Operable ☐ Roller Shades ☐ Radiation Protection

☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass

Other: Glazing film required

REMARKS / SPECIAL FEATURES

Provide AODA requirement for kitchen sink.
At least one window, exterior or interior, must be provided. If a glass / hollow partition are used, partial or full coverage privacy film must be provided.
Provide complete accessibility, including 150mm turning circle at door.
Confirm casework requirements with user group.

DOORS

Door

☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven

☑ Hollow Metal ☑ Solid Core Wood ☑ Aluminum

☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel

☐ STC Rating ☑ Glass Finish:

Other:

Frame

☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum

☐ Lead Lined ☐ Vision Type ☐ Stainless Steel

Finish: Paint Other:

Hardware

☐ Auto Operator ☐ Kick Plate Kick Plate Height :

☑ Card Reader ☑ Lockable Function: Storeroom (CR), Passage (no CR

Finish: MAG Lock:

Other:

ACCESSORIES

☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container

☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle

☐ IV Track(s) ☑ Paper Towel Dispenser ☐ Sanitary Napkin Disposal

☑ Coat/Robe Hook ☐ Toilet Paper Dispenser ☑ Multistream Waste Disposal

☐ Grab Bars ☑ Soap Dispenser ☐ Lockers

☐ Headwall ☑ Hand Sanitizer ☐ Locker Bench

☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift

☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)

☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)

☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult

☐ Projection Screen ☐ Apron Rack ☐ Shredder

☐ Smartboard ☐ Mop Rack

Other:

MILLWORK

Lower Special Height:

☑ Open Shelving ☑ Drawers ☑ Countertop

☐ Open, no shelving ☑ Solid Doors ☐ Lockable

Upper

☑ Open Shelving ☑ Microwave Shelf ☑ Solid Doors

☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height

☑ Open Shelving ☑ Solid Doors ☐ Glass Doors

☐ Lockable ☐ Open, no shelving Other:

Finishes

Solid surface countertop and backsplash, HPL finished millwork

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Kitchenette

Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures

☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple

☐ Sink - Stainless Double ☑ Faucet - Gooseneck ☐ Corrosion Resist. Fittings

☑ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower

☐ Sink - Flushing Rim ☑ Counter Mount ☐ Emergency Shower

☐ Sink - Lavatory ☑ Wall Mount ☐ Dialysis Box

☐ Sink - OR Scrub ☑ Controls - Manual ☐ Toilet - Bariatric

☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard

☐ Casting Sink ☑ Controls - Floor Pedal ☐ Eye Wash

☐ ICU Sink ☐ Kitchen Sink - SS Single ☑ Bottle Filling Station

☐ Ice Machine ☑ Kitchen Sink - SS Double

Other:

Drains

☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor

☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings

☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer

Other:

Water

☑ Domestic Hot ☐ Tempered Hot ☐ Distilled

☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized

Other: Temperature Range: 48.9 C

GASES

☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air

☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum

☐ Nitrogen ☐ Natural Gas ☐ Compressed Air

Other:

Location of Gases:

HVAC

Air Pressure

☐ Positive ☑ Neutral ☐ Negative

☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles

☐ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood

☐ Local Control ☐ Equip. Heat Dissipation

Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: 2 Relative Pressure: Neutral

Total Air Exchange/Hr: 6 Room Classification: III Indoor Temp Range °C: 20-24

Other: 20 CFM/per person of ventilation airflow

CONTROLS

FIRE PROTECTION

☑ Standard to Code Other:

Type

☑ Wet ☐ Pre-Action System

☐ Special Agent ☐ Additional Extinguishers

Other:

Sprinkler Head

☐ Upright ☐ Pendent Finish:

☑ Concealed ☐ Semi-Recessed

Other:

ELECTRICAL

Patient Classification

☐ Basic ☐ Intermediate ☐ Critical ☑ N/A

Other:

Power

☑ Normal ☐ Emergency Power ☐ Isolated Power

☐ UPS ☐ Weatherproof

Notes:

Lighting

General Illumination Levels:

☑ Dimmable ☑ LED ☑ Emergency

☐ Exam Light ☐ Night Lighting ☐ Specialty Light

☐ Task ☐ Overbed Light Other:

☐ Surgical

Other:

Lighting Control

☑ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch

0-10V Dimming: Other:

Fire Alarm

☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:

☐ RFAA ☑ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems

☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry

☐ Videoconference ☑ Clock - Primex ☐ Sound Masking

☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement

☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment

☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube

Other:

Security

☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV

☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio

Other:

EQUIPMENT / FF & E

General Notes:

Smudge resistant FF&E: fridge, commercial microwave, other devices to suit user requirements.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Workstation
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation:
Days Per Week:
Occupants: Staff: 1 Others:
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: N/A

Special Room Notes: Confirm area and desk requirements with U of G per RFP and program requirements.

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT
Workstations to have visual and acoustic privacy from corridors and surrounding areas.

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient sheet vinyl flooring	
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	ACT	
Ceiling Finish	N/A	

WALL PROTECTION
☐ Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other:

WINDOWS - EXTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other: Provide daylight where possible.

WINDOWS - INTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

REMARKS / SPECIAL FEATURES
Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
Confirm casework requirements with user group.

DOORS

Door
☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven
☐ Hollow Metal ☑ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☑ STC Rating ☐ Glass Finish:
Other: Provide sound attenuation in sensitive programs.

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other:

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Card Reader ☑ Lockable Function: Office
Finish: MAG Lock:
Other:

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other:

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Workstation

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☑ Neutral ☐ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☑ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: 2 Relative Pressure: Neutral
Total Air Exchange/Hr: 6 Room Classification: III Indoor Temp Range °C: 20-24
Other: 20 CFM/per person of ventilation airflow

CONTROLS

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

Room Numbers: To be confirmed by project

ELECTRICAL

Patient Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☑ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes:

Lighting
General Illumination Levels:
☐ Dimmable ☑ LED ☐ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☑ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☑ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)	☑			
Telephone (TDM)				
Computer	☑			
Printer	☑			
Copier				
Multifunctional Station				
Future	☑			

Other: A/V infrastructure to be reviewed with used group and UofG

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Admin Office Typical
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation: **Days Per Week:**
Occupants: Staff: 1 Others:
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: N/A

Special Room Notes: Confirm area and desk requirements with U of G per RFP and program requirements.

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT
Private offices to have visual and acoustic privacy from corridors and surrounding areas.

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient sheet vinyl flooring	
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	ACT	
Ceiling Finish	N/A	

WALL PROTECTION
☐ Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other:

WINDOWS - EXTERIOR
# of Windows: 1
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☑ Clear Glass Other: Provide daylight where possible.

WINDOWS - INTERIOR
# of Windows: 1
☐ Translucent ☐ Smart Glass ☑ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other: Glazed interior partition may be used.

REMARKS / SPECIAL FEATURES
Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
Provide complete accessibility, including 150mm turning circle at door
Confirm casework requirements with user group.

DOORS

Door
☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven
☐ Hollow Metal ☑ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☑ STC Rating ☐ Glass Finish:
Other: Provide sound attenuation in sensitive programs.

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other:

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Card Reader ☑ Lockable Function: Office
Finish: MAG Lock:
Other:

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other:

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

Room Name: Admin Office Typical

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☑ Neutral ☐ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☑ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: 2 Relative Pressure: Neutral
Total Air Exchange/Hr: 6 Room Classification: III Indoor Temp Range °C: 20-24
Other: 20 CFM/per person of ventilation airflow

CONTROLS

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

Room Numbers: To be confirmed by project

ELECTRICAL

Patient Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☑ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes:

Lighting
General Illumination Levels:
☐ Dimmable ☑ LED ☐ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☑ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☑ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)	☑			
Telephone (TDM)				
Computer	☑			
Printer	☑			
Copier				
Multifunctional Station				
Future	☑			

Other: A/V infrastructure to be reviewed with used group and UofG

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/21 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Auditorium
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation:
Days Per Week: Varies
Occupants: Staff: Varies Others:
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading:
Provide blocking for wall-mounted A/V

Special Room Notes:
Consider requirements by project, including writable surfaces.

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT
Classrooms to have visual and acoustic privacy from corridors and surrounding areas.

Provide wider corridors outside classrooms to allow for student break-out/waiting/crush space between classes

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient sheet vinyl flooring	
Base Material	Intergrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	ACT	
Ceiling Finish	N/A	

WALL PROTECTION
☑ Corner Guard ☑ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other:

WINDOWS - EXTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other:

WINDOWS - INTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other: Privacy Glazing Film

REMARKS / SPECIAL FEATURES
Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
provide complete accessibility, including 150mm turning circle at multiple locations.
Confirm casework requirements with user group.

DOORS

Door
☑ 1 Leaf ☑ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☐ STC Rating ☐ Glass Finish:
Other:

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other:

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Card Reader ☑ Lockable Function: Classroom
Finish: MAG Lock:
Other: Review security reqs with user groups and campus security

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☑ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☑ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☑ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other: Magnetic whiteboard. Projection screen.

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/21 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Auditorium

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☑ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☑ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C: 22-24
Other: 20 CFM/per person of ventilation airflow

CONTROLS
Dedicated temperature control

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

Room Numbers: To be confirmed by project

ELECTRICAL

Patient Classification
☐ Basic ☐ Intermediate ☐ Critical ☐ N/A
Other:

Power
☑ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes: Provide emergency power at headwall

Lighting
General Illumination Levels: 300-500 LUX
☐ Dimmable ☑ LED ☑ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☑ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☐ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)				
Telephone (TDM)				
Computer				
Printer				
Copier				
Multifunctional Station				
Future				

Other: Verify network / digital requirements with UofG

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☑ Videoconference ☑ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:
Projector, TV, AV requirements to be confirmed by UofG.
Min. sound rating of NC 30, including between floor sound dampening.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/21 PTF/SAP NO. :

U of G | Physical Resources

Department:

Room Name: Classroom

Room Layout Template:

Room Numbers: To be confirmed by project

Program Net Area (nsm/nsf): Project Specific

Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation:

Days Per Week: Varies

Occupants: Staff: Varies Others: Varies

Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted

Acoustic Control: ☐ None ☑ Normal ☐ Confidential

Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading:

Provide blocking for wall-mounted A/V

Special Room Notes:

Consider requirements by project, including writable surfaces. Provide wider corridors outside classrooms to allow for student break-out/waiting/crush space between classes

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS

Length (mm): Width (mm): Height (mm):

Notes:

ADJACENCIES/LINES OF SIGHT

Classrooms to have visual and acoustic privacy from corridors and surrounding areas.
Locate classrooms away from indoor noise generating equipment and activities such as washrooms, mechanical rooms.

INTERIOR FINISHES

	Material	Notes
Floor Material	Fiber Reinforced Laminate	Carpet tile is prerferd in flat classrooms
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	standard random fissure acoustic tile	
Ceiling Finish	N/A	

WALL PROTECTION

☑ Corner Guard ☑ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding

Other: Tack strips: Incorporate to avoid tape damage to walls in applicable classrooms.

WINDOWS - EXTERIOR

# of Windows:

☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other: Provide daylight where possible. Not behind lectern.

WINDOWS - INTERIOR

# of Windows:

☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass

Other: Privacy Glazing Film

REMARKS / SPECIAL FEATURES

Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
provide complete accessibility, including 150mm turning circle at multiple locations.
Confirm casework requirements with user group.

DOORS

Door

☑ 1 Leaf ☑ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☐ STC Rating ☐ Glass Finish:
Other:

Frame

☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other:

Hardware

☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Card Reader ☑ Lockable Function: Classroom
Finish: MAG Lock:
Other: Review security reqs with user groups and campus security

ACCESSORIES

☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☑ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☑ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☑ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☑ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other: 16' Black Chalkboard. Podium

MILLWORK

Lower Special Height:

☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper

☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height

☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/21 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Classroom

Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures

☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains

☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water

☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES

☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:

Location of Gases:

HVAC

Air Pressure

☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☑ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☑ Local Control ☐ Equip. Heat Dissipation

Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative

Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C: 22-24

Other: 20 CFM/per person of ventilation airflow

CONTROLS

Dedicated temperature control

FIRE PROTECTION

☑ Standard to Code Other:

Type

☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head

☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Patient Classification

☐ Basic ☐ Intermediate ☐ Critical ☐ N/A
Other:

Power

☑ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes: Provide emergency power at headwall

Lighting

General Illumination Levels: 300-500 LUX

☐ Dimmable ☑ LED ☑ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☑ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control

☐ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm

☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)				
Telephone (TDM)				
Computer				
Printer				
Copier				
Multifunctional Station				
Future				

Other: Verify network / digital requirements with UofG

Additional Systems

☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☑ Videoconference ☑ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security

☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:

Projector, TV, AV requirements to be confirmed by UofG
Ambient noise level in classrooms shall not exceed a NC-45 or 35dB
Min. sound rating of NC 30, including between floor sound dampening.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Boardroom / Seminar Room
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation: **Days Per Week:**
Occupants: Staff: Others:
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☐ Normal ☑ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: Provide blocking for wall-mounted A/V

Special Room Notes: N/A

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT
Meeting rooms to have visual and acoustic privacy from corridors and surrounding areas.

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient sheet vinyl flooring	
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	ACT	
Ceiling Finish	N/A	

WALL PROTECTION
☑ Corner Guard ☑ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other:

WINDOWS - EXTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other:

WINDOWS - INTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☑ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

REMARKS / SPECIAL FEATURES
Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
8-24 person meeting room 85" LCD display.
All electrical in wall behind TV, connected to surface track.
Provide complete accessibility, including 150mm turning circle at door
Confirm casework requirements with user group.

DOORS

Door
☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven
☐ Hollow Metal ☑ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☑ STC Rating ☐ Glass Finish:
Other: May include demountable systems. PC350 systems may be used

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other: May include demountable systems PC350

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Card Reader ☑ Lockable Function: Classroom
Finish: MAG Lock:
Other: Review security reqs with user groups and campus security

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☑ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☑ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other:

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Boardroom/ Seminar Room

Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☑ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☑ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C: 20-24
Other: 20 CFM/per person of ventilation airflow

CONTROLS
Dedicated temperature control

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Patient Classification
☐ Basic ☐ Intermediate ☐ Critical ☐ N/A
Other:

Power
☑ Normal ☑ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes:

Lighting
General Illumination Levels:
☑ Dimmable ☑ LED ☐ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☑ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other: Dimmer switch

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other: A/V infrastructure to be reviewed with used group and UofG

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☑ Videoconference ☑ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:
AV Equipment + TV connected to Floor Box

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/21 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Large Meeting Room
Room Layout Template: Large Meeting Room

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation: **Days Per Week:**
Occupants: Staff: Others:
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☐ Normal ☑ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: Provide blocking for wall-mounted A/V

Special Room Notes: N/A

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT
Meeting rooms to have visual and acoustic privacy from corridors and surrounding areas.

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient sheet vinyl flooring	
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	ACT	
Ceiling Finish	N/A	

WALL PROTECTION
☑ Corner Guard ☑ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other:

WINDOWS - EXTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other:

WINDOWS - INTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☑ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

REMARKS / SPECIAL FEATURES
Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
6-14 person meeting room 85" LCD display.
All electrical in wall behind TV, connected to surface track.
Provide complete accessibility, including 150mm turning circle at door
Confirm casework requirements with user group.

DOORS

Door
☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven
☐ Hollow Metal ☑ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☑ STC Rating ☐ Glass Finish:
Other: May include demountable systems. PC350 systems may be used

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other: May include demountable systems PC350

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Card Reader ☑ Lockable Function: Classroom
Finish: MAG Lock:
Other: Review security reqs with user groups and campus security

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☑ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☑ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☑ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☑ Projection Screen ☐ Apron Rack ☐ Shredder
☑ Smartboard ☐ Mop Rack
Other: Magnetic whiteboard.

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/21 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Large Meeting Room

Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☑ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☑ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C: 20-24
Other: 20 CFM/per person of ventilation airflow

CONTROLS
Dedicated temperature control

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Patient Classification
☐ Basic ☐ Intermediate ☐ Critical ☐ N/A
Other:

Power
☑ Normal ☑ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes:

Lighting
General Illumination Levels:
☑ Dimmable ☑ LED ☐ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☑ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other: Dimmer switch

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)				
Telephone (TDM)				
Computer				
Printer				
Copier				
Multifunctional Station				
Future				

Other: A/V infrastructure to be reviewed with used group and UofG

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☑ Videoconference ☑ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:
AV Equipment + TV connected to Floor Box

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/21 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Small Meeting Room
Room Layout Template: Small Meeting Room

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation: **Days Per Week:**
Occupants: Staff: Others:
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☐ Normal ☑ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: Provide blocking for wall-mounted A/V

Special Room Notes:

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT
Meeting rooms to have visual and acoustic privacy from corridors and surrounding areas.

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient sheet vinyl flooring	
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	ACT	
Ceiling Finish	N/A	

WALL PROTECTION
☑ Corner Guard ☑ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other:

WINDOWS - EXTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other:

WINDOWS - INTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☑ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

REMARKS / SPECIAL FEATURES
Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
4-6 person meeting rooms 55" LCD display.
Provide complete accessibility, including 150mm turning circle at door
Confirm casework requirements with user group.

DOORS

Door
☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven
☐ Hollow Metal ☑ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☑ STC Rating ☐ Glass Finish:
Other: May include demountable systems. PC350 systems may be used

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other: May include demountable systems PC350

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Card Reader ☑ Lockable Function: Classroom
Finish: MAG Lock:
Other: Review security reqs with user groups and campus security

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☑ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☑ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☑ Projection Screen ☐ Apron Rack ☐ Shredder
☑ Smartboard ☐ Mop Rack
Other: Magnetic whiteboard.

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/21 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Small Meeting Room

Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☐ Std. Diffusers/Grilles
☑ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☑ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C: 20-24
Other: 20 CFM/per person of ventilation airflow

CONTROLS
Dedicated temperature control

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Patient Classification
☐ Basic ☐ Intermediate ☐ Critical ☐ N/A
Other:

Power
☐ Normal ☑ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes:

Lighting
General Illumination Levels:
☑ Dimmable ☑ LED ☐ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☑ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other: A/V infrastructure to be reviewed with used group and UofG

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☑ Videoconference ☑ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:
AV Equipment connected to Floor Box

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Computer lab
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation:
Days Per Week: Varies
Occupants: Staff: Varies Others: Varies

Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading:

Special Room Notes:
Consider requirements by project.

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT

INTERIOR FINISHES

	Material	Notes
Floor Material	Fiber Reinforced Laminate	Carpet tile is perfered
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	standard random fissure acoustic tile	
Ceiling Finish	N/A	

WALL PROTECTION
☑ Corner Guard ☑ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other: Tack strips: Incorporate to avoid tape damage to walls in applicable classrooms.

WINDOWS - EXTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other: Provide daylight where possible.

WINDOWS - INTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other: Privacy Glazing Film

REMARKS / SPECIAL FEATURES

Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
Provide complete accessibility, including 150mm turning circle at multiple locations.
Confirm casework requirements with user group.

DOORS

Door
☑ 1 Leaf ☑ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☐ STC Rating ☐ Glass Finish:
Other:

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other:

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☐ Card Reader ☑ Lockable Function: Classroom
Finish: MAG Lock:
Other: Review security reqs with user groups and campus security

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☑ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other:

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Computer Lab

Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☑ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☑ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C: 22-24
Other: 20 CFM/per person of ventilation airflow

CONTROLS
Dedicated temperature control

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Patient Classification
☐ Basic ☐ Intermediate ☐ Critical ☐ N/A
Other:

Power
☑ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes: Provide emergency power at headwall

Lighting
General Illumination Levels: 300-500 LUX
☐ Dimmable ☑ LED ☑ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☑ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☐ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)				
Telephone (TDM)				
Computer				
Printer				
Copier				
Multifunctional Station				
Future				

Other: Verify network / digital requirements with UofG

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☑ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:
Projector, TV, AV requirements to be confirmed by UofG
Ambient noise level in rooms shall not exceed a NC-45 or 35dB

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Research Lab
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): Project Specific to the number of seats

GENERAL

Hours of Operation:
Days Per Week: Varies
Occupants: Staff: Varies Others: Varies
Access: ☐ Unrestricted ☐ Limited Access ☑ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading:

Special Room Notes:
Consider requirements by project.

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT

INTERIOR FINISHES

	Material	Notes
Floor Material	Fiber Reinforced Laminate	
Base Material	Integrated resilient vinyl flooring	
Wall Material	GWB	
Wall Finish	Paint	
Ceiling Material	standard random fissure acoustic tile	
Ceiling Finish	N/A	

WALL PROTECTION
☑ Corner Guard ☑ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other:

WINDOWS - EXTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other: Provide daylight where possible.

WINDOWS - INTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other: Privacy Glazing Film

REMARKS / SPECIAL FEATURES

Refer to furniture vendor and program requirements for furniture.
Locate furniture, table and comms / date outlets in plan.
Provide complete accessibility, including 150mm turning circle at multiple locations.
Confirm casework requirements with user group.

DOORS

Door
☑ 1 Leaf ☑ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☐ STC Rating ☐ Glass Finish:
Other:

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Other:

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height :
☑ Card Reader ☑ Lockable Function: Lab
Finish: MAG Lock:
Other: Review security reqs with user groups and campus security

ACCESSORIES
☐ Curtain Track(s) ☑ Glove Dispenser ☑ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle
☐ IV Track(s) ☑ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☑ Multistream Waste Disposal
☐ Grab Bars ☑ Soap Dispenser ☐ Lockers
☐ Headwall ☑ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☑ Projection Screen ☐ Apron Rack ☐ Shredder
☑ Smartboard ☐ Mop Rack
Other:

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Research Lab
Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☑ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☑ Sink - Handwash ☑ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☑ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☑ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☑ Controls - Floor Pedal ☑ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☑ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☑ Domestic Hot ☐ Tempered Hot ☐ Distilled
☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☐ Exhaust/Return ☑ Dedicated Exhaust ☑ Fumehood
☑ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C: 22-24
Other: 20 CFM/per person of ventilation airflow

CONTROLS
Dedicated temperature control

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other: Dry

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Patient Classification
☐ Basic ☑ Intermediate ☐ Critical ☐ N/A
Other:

Power
☑ Normal ☐ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes:

Lighting
General Illumination Levels: 300-500 LUX
☐ Dimmable ☑ LED ☑ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☑ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☐ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☑ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☑	☐	☐	

Other: Verify network / digital requirements with UofG

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☑ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:
Technical and AV requirements to be confirmed by UofG
Ambient noise level in rooms shall not exceed a NC-45 or 35dB

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/20 PTF/SAP NO. :

U of G | Physical Resources

Department:

Room Name: Parking

Room Layout Template:

Room Numbers:

Program Net Area (nsm/nsf): Project Specific

Program Area (sm/sf): To be confirmed by project

GENERAL

Hours of Operation: 24 **Days Per Week:** 7

Occupants: Staff: 2 Others:

Access: ☑ Unrestricted ☐ Limited Access ☐ Restricted

Acoustic Control: ☑ None ☐ Normal ☐ Confidential

Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading:

Special Room Notes:

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS

Length (mm): Width (mm): Height (mm):

Notes:

ADJACENCIES/LINES OF SIGHT

Provide accessible parking spaces close to entrance to buildings.

INTERIOR FINISHES

	Material	Notes
Floor Material	Concrete	
Base Material		
Wall Material		
Wall Finish		
Ceiling Material		
Ceiling Finish		

WALL PROTECTION

☐ Corner Guard ☐ Chair Rail ☐ Handrail

☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding

☐ RF Shielding

Other:

WINDOWS - EXTERIOR

# of Windows:

☐ Translucent ☐ Smart Glass ☐ Operable

☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades

☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant

☐ Clear Glass Other:

WINDOWS - INTERIOR

# of Windows:

☐ Translucent ☐ Smart Glass ☐ Privacy Film

☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through

☐ Operable ☐ Roller Shades ☐ Radiation Protection

☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass

Other:

REMARKS / SPECIAL FEATURES

Provide adequate EV chargers as required.

DOORS

Door

☐ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven

☐ Hollow Metal ☐ Solid Core Wood ☐ Aluminum

☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel

☐ STC Rating ☐ Glass Finish:

Other:

Frame

☐ Hollow Metal ☐ Solid Core Wood ☐ Aluminum

☐ Lead Lined ☐ Vision Type ☐ Stainless Steel

Finish: Other:

Hardware

☐ Auto Operator ☐ Kick Plate Kick Plate Height :

☐ Card Reader ☐ Lockable Function:

Finish: MAG Lock:

Other:

ACCESSORIES

☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container

☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle

☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal

☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal

☐ Grab Bars ☐ Soap Dispenser ☐ Lockers

☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench

☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift

☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)

☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)

☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult

☐ Projection Screen ☐ Apron Rack ☐ Shredder

☐ Smartboard ☐ Mop Rack

Other:

MILLWORK

Lower Special Height:

☐ Open Shelving ☐ Drawers ☐ Countertop

☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper

☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors

☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height

☐ Open Shelving ☐ Solid Doors ☐ Glass Doors

☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/20 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Parking

MECHANICAL

PLUMBING

Fixtures

☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple

☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings

☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower

☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower

☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box

☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric

☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard

☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash

☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station

☐ Ice Machine ☐ Kitchen Sink - SS Double

Other:

Drains

☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor

☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings

☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer

Other:

Water

☐ Domestic Hot ☐ Tempered Hot ☐ Distilled

☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized

Other: Temperature Range:

GASES

☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air

☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum

☐ Nitrogen ☐ Natural Gas ☐ Compressed Air

Other:

Location of Gases:

HVAC

Air Pressure

☐ Positive ☐ Neutral ☐ Negative

☐ Air Pressure Monitor ☐ Air Recirculation ☐ Std. Diffusers/Grilles

☐ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood

☐ Local Control ☐ Equip. Heat Dissipation

Relative Humidity (%): - Outdoor Air Changes/Hr: - Relative Pressure: Neutral

Total Air Exchange/Hr: - Room Classification: - Indoor Temp Range °C: -

Other:

CONTROLS

D

FIRE PROTECTION

☐ Standard to Code Other:

Type

☐ Wet ☐ Pre-Action System

☐ Special Agent ☐ Additional Extinguishers

Other:

Sprinkler Head

☐ Upright ☐ Pendent Finish:

☐ Concealed ☐ Semi-Recessed

Other:

Room Numbers:

ELECTRICAL

Patient Classification

☐ Basic ☐ Intermediate ☐ Critical ☑ N/A

Other:

Power

☑ Normal ☐ Emergency Power ☐ Isolated Power

☐ UPS ☐ Weatherproof

Notes: Provide power to lighting and EV chargers

Lighting

General Illumination Levels: 200-500 LUX

☐ Dimmable ☐ LED ☑ Emergency

☐ Exam Light ☑ Night Lighting ☐ Specialty Light

☐ Task ☐ Overbed Light Other:

☐ Surgical

Other:

Lighting Control

☐ Vacancy Sensor ☐ Occupancy Sensor ☐ Wall Switch

0-10V Dimming: Other:

Fire Alarm

☐ Audible Alarm Signal ☐ Visual Alarm Signal Other:

☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)				
Telephone (TDM)				
Computer				
Printer				
Copier				
Multifunctional Station				
Future				

Other:

Additional Systems

☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry

☐ Videoconference ☐ Clock - Primex ☐ Sound Masking

☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement

☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment

☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube

Other:

Security

☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV

☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio

Other:

EQUIPMENT / FF & E

General Notes:

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/20 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Loading Dock
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): To be confirmed by project

GENERAL

Hours of Operation: 24 **Days Per Week:** 7
Occupants: Staff: 1 Others:
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☑ None ☐ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: N/A

Special Room Notes:

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): Width (mm): Height (mm):
Notes:

ADJACENCIES/LINES OF SIGHT
Located in back of house.

INTERIOR FINISHES

	Material	Notes
Floor Material	Epoxy	Non-Slip, 1% slope
Base Material	Integrated epoxy core	
Wall Material	GWB	
Wall Finish	Paint	HWC min. 1200 mm af; paint above
Ceiling Material	GWB	
Ceiling Finish	Paint	

WALL PROTECTION
☑ Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other:

WINDOWS - EXTERIOR
# of Windows: 0
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other:

WINDOWS - INTERIOR
# of Windows: 0
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

REMARKS / SPECIAL FEATURES

DOORS

Door
☐ 1 Leaf ☑ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☑ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☐ STC Rating ☐ Glass Finish: Paint
Other: Roller door

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Paint Other:

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height : 12"
☐ Card Reader ☐ Lockable Function: Storeroom
Finish: SS MAG Lock:
Other: N/A

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other:

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes
Solid Surface Countertops non-porous filled polymer through body colour, 13mm min thickness

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/20 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Loading Dock
Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☐ Exhaust/Return ☑ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C:
Other: dedicated san. exhaust cannot duct into other occupancies

CONTROLS

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other:

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

ELECTRICAL

Room Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☑ Normal ☐ Emergency Power ☐ Isolated Power
☑ UPS ☐ Weatherproof
Notes:

Lighting
General Illumination Levels: 300 LUX
☐ Dimmable ☑ LED ☐ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☐ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other: Confirm CCTV requirements with staff

EQUIPMENT / FF & E

General Notes:

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Garbage Room
Room Layout Template:

Room Numbers:
Program Net Area (nsm/nsf): 8 sqm (7 sm min.)
Program Area (sm/sf):

GENERAL

Hours of Operation: 24 **Days Per Week:** 7
Occupants: Staff: 1 Others:
Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted
Acoustic Control: ☑ None ☐ Normal ☐ Confidential
Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: N/A

Special Room Notes:

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): 3500 Width (mm): 2200 Height (mm): 3048
Notes: Clear area exclusive of fixed casework; min. 1800 turning circle one side

ADJACENCIES/LINES OF SIGHT
Janitor's room (complete barriers between)

INTERIOR FINISHES

	Material	Notes
Floor Material	Epoxy	Non-Slip, 1% slope
Base Material	Integrated epoxy core	
Wall Material	GWB	
Wall Finish	Paint	HWC min. 1200 mm af; paint above
Ceiling Material	GWB	
Ceiling Finish	Paint	

WALL PROTECTION
☑ Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☑ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other: Stainles steel half-wall shield around mop sink

WINDOWS - EXTERIOR
# of Windows: 0
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other:

WINDOWS - INTERIOR
# of Windows: 0
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

REMARKS / SPECIAL FEATURES
Floor sloping to drain, ensure no areas where water may pool

DOORS

Door
☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☑ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☐ STC Rating ☐ Glass Finish: Paint
Other:

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Paint Other:

Hardware
☑ Auto Operator ☑ Kick Plate Kick Plate Height : 12"
☑ Card Reader ☐ Lockable Function: Storeroom
Finish: SS MAG Lock:
Other: N/A

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☑ Waste & Recycling Receptacle
☐ IV Track(s) ☑ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☑ Multistream Waste Disposal
☐ Grab Bars ☑ Soap Dispenser ☐ Lockers
☐ Headwall ☑ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☑ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other: Confirm accessories with univeristy

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☑ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☑ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes
Solid Surface Countertops non-porous filled polymer through body colour, 13mm min thickness

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Garbage Room

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☑ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☑ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☑ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☑ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☑ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other: Wall-mounted handwash sink w/ foot pedal control, janitor mop sink w/ wrist blade faucet

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☑ Domestic Hot ☐ Tempered Hot ☐ Distilled
☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☐ Neutral ☑ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles
☐ Exhaust/Return ☑ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative
Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C:
Other: dedicated san. exhaust cannot duct into other occupancies

CONTROLS

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other:

Sprinkler Head
☐ Upright ☐ Pendent Finish:
☑ Concealed ☐ Semi-Recessed
Other:

Room Numbers: To be confirmed by project

ELECTRICAL

Room Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☑ Normal ☐ Emergency Power ☐ Isolated Power
☑ UPS ☐ Weatherproof
Notes:

Lighting
General Illumination Levels: 300 LUX
☐ Dimmable ☑ LED ☐ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☐ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other: Confirm CCTV requirements with staff

EQUIPMENT / FF & E

General Notes:
Confirm storage and equipment requirements with staff.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/22 PTF/SAP NO. :

U of G | Physical Resources

Department:

Room Name: Janitor Room

Room Layout Template:

Room Numbers:

Program Net Area (nsm/nsf): 8 sqm (7 sm min.)

Program Area (sm/sf):

GENERAL

Hours of Operation: 24 **Days Per Week:** 7

Occupants: Staff: 1 Others:

Access: ☐ Unrestricted ☐ Limited Access ☐ Restricted

Acoustic Control: ☐ None ☑ Normal ☐ Confidential

Vibration Sensitivity: ☐ Low ☑ Medium ☐ High

Structural Loading:

Ensure blocking for wall mounted accessories and shelves

Special Room Notes:

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS

Length (mm): 3500 Width (mm): 15002200 Height (mm): 3048

Notes: Large enough for 600 x 600 mop sink

ADJACENCIES/LINES OF SIGHT

Public corridors. Private areas.

INTERIOR FINISHES

	Material	Notes
Floor Material	Epoxy	Non-Slip, 1% slope
Base Material	Integrated epoxy core	
Wall Material	GWB	
Wall Finish	Paint	HWC min. 1200 mm af; paint above
Ceiling Material	GWB	
Ceiling Finish	Paint	

WALL PROTECTION

☑ Corner Guard ☐ Chair Rail ☐ Handrail

☐ Bumper Rail ☑ Sheet Wall Protection ☐ Lead Shielding

☐ RF Shielding

Other: Stainles steel half-wall shield around mop sink

WINDOWS - EXTERIOR

# of Windows: 0

☐ Translucent ☐ Smart Glass ☐ Operable

☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades

☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant

☐ Clear Glass Other:

WINDOWS - INTERIOR

# of Windows: 0

☐ Translucent ☐ Smart Glass ☐ Privacy Film

☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through

☐ Operable ☐ Roller Shades ☐ Radiation Protection

☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass

Other:

REMARKS / SPECIAL FEATURES

Floor sloping to drain, ensure no areas where water may pool

Full height shelving preferred, do not put shelving above floor mounted mop sink.

DOORS

Door

☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven

☑ Hollow Metal ☑ Solid Core Wood ☐ Aluminum

☐ Lead Lined ☑ Vision Panel ☐ Stainless Steel

☐ STC Rating ☐ Glass Finish: Paint

Other:

Frame

☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum

☐ Lead Lined ☐ Vision Type ☐ Stainless Steel

Finish: Paint Other:

Hardware

☐ Auto Operator ☑ Kick Plate Kick Plate Height : 12"

☐ Card Reader ☑ Lockable Function: Storeroom

Finish: SS MAG Lock:

Other: Door closer required; provide door edge protection for solid core wood doors

ACCESSORIES

☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container

☐ Privacy Curtain(s) ☐ Mask Dispenser ☑ Waste & Recycling Receptacle

☐ IV Track(s) ☑ Paper Towel Dispenser ☐ Sanitary Napkin Disposal

☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal

☐ Grab Bars ☑ Soap Dispenser ☐ Lockers

☐ Headwall ☑ Hand Sanitizer ☐ Locker Bench

☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift

☐ Chart Rack ☐ Chemical Dispenser ☑ Mirror (Over-counter)

☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)

☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult

☐ Projection Screen ☐ Apron Rack ☐ Shredder

☐ Smartboard ☑ Mop Rack

Other:

MILLWORK

Lower Special Height:

☐ Open Shelving ☐ Drawers ☐ Countertop

☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper

☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors

☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height

☐ Open Shelving ☐ Solid Doors ☐ Glass Doors

☐ Lockable ☐ Open, no shelving Other:

Finishes

Solid Surface Countertops non-porous filled polymer through body colour, 13mm min thickness

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/22 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Janitor Room

Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures

☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple

☐ Sink - Stainless Double ☑ Faucet - Gooseneck ☐ Corrosion Resist. Fittings

☑ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower

☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower

☐ Sink - Lavatory ☑ Wall Mount ☐ Dialysis Box

☐ Sink - OR Scrub ☑ Controls - Manual ☐ Toilet - Bariatric

☑ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard

☐ Casting Sink ☑ Controls - Floor Pedal ☑ Eye Wash

☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station

☐ Ice Machine ☐ Kitchen Sink - SS Double

Other: Wall-mounted handwash sink w/ foot pedal control, janitor mop sink w/ wrist blade faucet

Drains

☑ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor

☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings

☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer

Other:

Water

☑ Domestic Hot ☐ Tempered Hot ☐ Distilled

☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized

Other: Temperature Range: 48.9 C

GASES

☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air

☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum

☐ Nitrogen ☐ Natural Gas ☐ Compressed Air

Other:

Location of Gases:

HVAC

Air Pressure

☐ Positive ☐ Neutral ☑ Negative

☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles

☐ Exhaust/Return ☑ Dedicated Exhaust ☐ Fumehood

☐ Local Control ☐ Equip. Heat Dissipation

Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative

Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C:

Other: dedicated san. exhaust cannot duct into other occupancies

CONTROLS

FIRE PROTECTION

☑ Standard to Code Other:

Type

☑ Wet ☐ Pre-Action System

☐ Special Agent ☐ Additional Extinguishers

Other:

Sprinkler Head

☐ Upright ☐ Pendent Finish:

☑ Concealed ☐ Semi-Recessed

Other:

ELECTRICAL

Room Classification

☐ Basic ☐ Intermediate ☐ Critical ☑ N/A

Other:

Power

☑ Normal ☐ Emergency Power ☐ Isolated Power

☐ UPS ☐ Weatherproof

Notes:

Lighting

General Illumination Levels: 300 LUX

☐ Dimmable ☑ LED ☐ Emergency

☐ Exam Light ☐ Night Lighting ☐ Specialty Light

☐ Task ☐ Overbed Light Other:

☐ Surgical

Other:

Lighting Control

☐ Vacancy Sensor ☑ Occupancy Sensor ☑ Wall Switch

0-10V Dimming: Other:

Fire Alarm

☐ Audible Alarm Signal ☐ Visual Alarm Signal Other:

☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems

☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry

☐ Videoconference ☐ Clock - Primex ☐ Sound Masking

☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement

☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment

☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube

Other:

Security

☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV

☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio

Other: Confirm CCTV requirements with staff

EQUIPMENT / FF & E

General Notes:

Confirm storage and equipment requirements with staff.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/22 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Server Room
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): To be confirmed by project

GENERAL

Hours of Operation: 24 **Days Per Week:** 7
Occupants: Staff: 2 Others:
Access: ☐ Unrestricted ☐ Limited Access ☑ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☐ Low ☑ Medium ☐ High

Structural Loading:
Allow for fire rated blocking where applicable

Special Room Notes:
Ensure adequate cooling and sound attenuation is provided.

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): 4000 Width (mm): 3000 Height (mm): 3000
Notes: Ensure space for 4-post racks w/ access from all sides.

ADJACENCIES/LINES OF SIGHT
Electrical Closet

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient epoxy	Anti-static
Base Material	Resilient Cove Integral Epoxy Cove	Anti-static
Wall Material	GWB	Impact resistant
Wall Finish	GWB	Standard washable
Ceiling Material	ACT or Open Ceiling	
Ceiling Finish	paint	

WALL PROTECTION
☑ Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other: Completely seal room floor to underside of slab above.

WINDOWS - EXTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other:

WINDOWS - INTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

REMARKS / SPECIAL FEATURES

DOORS

Door
☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☑ STC Rating ☐ Glass Finish: Paint
Other:

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Paint Other:

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height : 12"
☑ Card Reader ☑ Lockable Function:
Finish: $$ MAG Lock: Storeroom
Other: Review security reqs with user groups and campus security

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other:

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/01/22 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Server Room

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☑ Neutral ☐ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☐ Std. Diffusers/Grilles
☐ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): - Outdoor Air Changes/Hr: - Relative Pressure: Neutral
Total Air Exchange/Hr: - Room Classification: III Indoor Temp Range °C: -
Other: Temperature and relative humidity are to be controlled within IT equipment tolerances.

CONTROLS
Dedicated temperature control

FIRE PROTECTION
☑ Standard to Code Other:

Type
☐ Wet ☑ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other:

Sprinkler Head
☐ Upright ☑ Pendent Finish:
☐ Concealed ☐ Semi-Recessed
Other:

Room Numbers:

ELECTRICAL

Patient Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☑ Normal ☑ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes: Provide emergency power at headwall

Lighting
General Illumination Levels: 200-500 LUX
☐ Dimmable ☑ LED ☑ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☑ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☐ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other: Confirm data requirments with UofG security and IT.

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:
Ensure all outlets and their circuits are labeled with labels.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Department:

Room Name: Mechanical Room

Room Layout Template:

Room Numbers: To be confirmed by project

Program Net Area (nsm/nsf): Project Specific

Program Area (sm/sf): To be confirmed by project

GENERAL

Hours of Operation: 24 **Days Per Week:** 7

Occupants: Staff: 2 Others:

Access: ☐ Unrestricted ☐ Limited Access ☑ Restricted

Acoustic Control: ☐ None ☑ Normal ☐ Confidential

Vibration Sensitivity: ☐ Low ☐ Medium ☑ High

Structural Loading:

Allow for fire rated blocking where applicable

Special Room Notes:

Ensure adequate cooling and sound attenuation is provided.

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS

Length (mm): 4000 Width (mm): 3000 Height (mm): 3000

Notes:

ADJACENCIES/LINES OF SIGHT

Electrical Closet
Not accessible directly from public corridor

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient epoxy	Anti-static
Base Material	Resilient Cove Integral Epoxy Cove	Anti-static
Wall Material	GWB	Impact resistant
Wall Finish	GWB	Standard washable
Ceiling Material	ACT or Open Ceiling	
Ceiling Finish	paint	

WALL PROTECTION

☑ Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding

Other: Completely seal room floor to underside of slab above.

WINDOWS - EXTERIOR

# of Windows:

☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other:

WINDOWS - INTERIOR

# of Windows:

☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass

Other:

REMARKS / SPECIAL FEATURES

DOORS

Door

☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☑ STC Rating ☐ Glass Finish: Paint

Other:

Frame

☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel

Finish: Paint Other:

Hardware

☐ Auto Operator ☐ Kick Plate Kick Plate Height : 12"
☑ Card Reader ☑ Lockable Function:

Finish: $$ MAG Lock: Storeroom

Other: Review security reqs with user groups and campus security

ACCESSORIES

☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack

Other:

MILLWORK

Lower Special Height:

☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper

☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height

☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/10 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Mechanical Room

Room Numbers:

MECHANICAL

PLUMBING

Fixtures

☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double

Other:

Drains

☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer

Other:

Water

☐ Domestic Hot ☐ Tempered Hot ☐ Distilled
☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized

Other: Temperature Range:

GASES

☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air

Other:

Location of Gases:

HVAC

Air Pressure

☐ Positive ☑ Neutral ☐ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☐ Std. Diffusers/Grilles
☐ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation

Relative Humidity (%): - Outdoor Air Changes/Hr: - Relative Pressure: Neutral

Total Air Exchange/Hr: - Room Classification: III Indoor Temp Range °C: -

Other: Temperature and relative humidity are to be controlled within IT equimpent tolerances.

CONTROLS

Dedicated temperature control

FIRE PROTECTION

☑ Standard to Code Other:

Type

☐ Wet ☑ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers

Other:

Sprinkler Head

☐ Upright ☑ Pendent Finish:
☐ Concealed ☐ Semi-Recessed

Other:

ELECTRICAL

Patient Classification

☐ Basic ☐ Intermediate ☐ Critical ☑ N/A

Other:

Power

☑ Normal ☑ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof

Notes: Provide emergency power at headwall

Lighting

General Illumination Levels: 200-500 LUX

☐ Dimmable ☑ LED ☑ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical

Other:

Lighting Control

☑ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch

0-10V Dimming: Other:

Fire Alarm

☐ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☑ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMd	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other: Confirm data requirments with UofG security and IT.

Additional Systems

☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube

Other:

Security

☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio

Other:

EQUIPMENT / FF & E

General Notes:

Ensure all outlets and their circuits are labeled with labels.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/20 PTF/SAP NO. :

U of G | Physical Resources

Department:
Room Name: Pump Room
Room Layout Template:

Room Numbers: To be confirmed by project
Program Net Area (nsm/nsf): Project Specific
Program Area (sm/sf): To be confirmed by project

GENERAL

Hours of Operation: 24 **Days Per Week:** 7
Occupants: Staff: 2 Others:
Access: ☐ Unrestricted ☐ Limited Access ☑ Restricted
Acoustic Control: ☐ None ☑ Normal ☐ Confidential
Vibration Sensitivity: ☐ Low ☑ Medium ☑ High

Structural Loading:
Allow for fire rated blocking where applicable

Special Room Notes:
Ensure adequate cooling and sound attenuation is provided.

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS
Length (mm): 4000 Width (mm): 3000 Height (mm): 3000
Notes:

ADJACENCIES/LINES OF SIGHT
Not accessible directly from public corridor

INTERIOR FINISHES

	Material	Notes
Floor Material	Resilient epoxy	Anti-static
Base Material	Resilient Cove Integral Epoxy Cove	Anti-static
Wall Material	GWB	Impact resistant
Wall Finish	GWB	Standard washable
Ceiling Material	ACT or Open Ceiling	
Ceiling Finish	paint	

WALL PROTECTION
☑ Corner Guard ☐ Chair Rail ☐ Handrail
☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding
☐ RF Shielding
Other: Completely seal room floor to underside of slab above.

WINDOWS - EXTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Operable
☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades
☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant
☐ Clear Glass Other:

WINDOWS - INTERIOR
# of Windows:
☐ Translucent ☐ Smart Glass ☐ Privacy Film
☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through
☐ Operable ☐ Roller Shades ☐ Radiation Protection
☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass
Other:

REMARKS / SPECIAL FEATURES

DOORS

Door
☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel
☑ STC Rating ☐ Glass Finish: Paint
Other:

Frame
☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum
☐ Lead Lined ☐ Vision Type ☐ Stainless Steel
Finish: Paint Other:

Hardware
☐ Auto Operator ☐ Kick Plate Kick Plate Height : 12"
☑ Card Reader ☑ Lockable Function:
Finish: $$ MAG Lock: Storeroom
Other: Review security reqs with user groups and campus security

ACCESSORIES
☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container
☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle
☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal
☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal
☐ Grab Bars ☐ Soap Dispenser ☐ Lockers
☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench
☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift
☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)
☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)
☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult
☐ Projection Screen ☐ Apron Rack ☐ Shredder
☐ Smartboard ☐ Mop Rack
Other:

MILLWORK

Lower Special Height:
☐ Open Shelving ☐ Drawers ☐ Countertop
☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper
☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors
☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height
☐ Open Shelving ☐ Solid Doors ☐ Glass Doors
☐ Lockable ☐ Open, no shelving Other:

Finishes

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/20 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Pump Room

MECHANICAL

PLUMBING

Fixtures
☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple
☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings
☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower
☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower
☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box
☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric
☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard
☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash
☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station
☐ Ice Machine ☐ Kitchen Sink - SS Double
Other:

Drains
☑ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor
☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings
☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer
Other:

Water
☑ Domestic Hot ☐ Tempered Hot ☐ Distilled
☑ Domestic Cold ☐ Reverse Osmosis ☐ Deionized
Other: Temperature Range:

GASES
☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air
☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum
☐ Nitrogen ☐ Natural Gas ☐ Compressed Air
Other:
Location of Gases:

HVAC

Air Pressure
☐ Positive ☑ Neutral ☐ Negative
☐ Air Pressure Monitor ☐ Air Recirculation ☐ Std. Diffusers/Grilles
☐ Exhaust/Return ☐ Dedicated Exhaust ☐ Fumehood
☐ Local Control ☐ Equip. Heat Dissipation
Relative Humidity (%): - Outdoor Air Changes/Hr: - Relative Pressure: Neutral
Total Air Exchange/Hr: - Room Classification: III Indoor Temp Range °C: -
Other: Temperature and relative humidity are to be controlled within IT equipment tolerances.

CONTROLS
Dedicated temperature control

FIRE PROTECTION
☑ Standard to Code Other:

Type
☑ Wet ☐ Pre-Action System
☐ Special Agent ☐ Additional Extinguishers
Other:

Sprinkler Head
☐ Upright ☑ Pendent Finish:
☐ Concealed ☐ Semi-Recessed
Other:

Room Numbers:

ELECTRICAL

Patient Classification
☐ Basic ☐ Intermediate ☐ Critical ☑ N/A
Other:

Power
☑ Normal ☑ Emergency Power ☐ Isolated Power
☐ UPS ☐ Weatherproof
Notes: Provide emergency power at headwall

Lighting
General Illumination Levels: 200-500 LUX
☐ Dimmable ☑ LED ☑ Emergency
☐ Exam Light ☐ Night Lighting ☐ Specialty Light
☐ Task ☐ Overbed Light Other:
☐ Surgical
Other:

Lighting Control
☑ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch
0-10V Dimming: Other:

Fire Alarm
☐ Audible Alarm Signal ☐ Visual Alarm Signal Other:
☐ RFAA ☑ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other: Confirm data requirments with UofG security and IT.

Additional Systems
☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry
☐ Videoconference ☐ Clock - Primex ☐ Sound Masking
☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement
☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment
☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube
Other:

Security
☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV
☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio
Other:

EQUIPMENT / FF & E

General Notes:
Ensure all pipes are labeled with labels.

ROOM DATA SHEET Page 1 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/21 PTF/SAP NO. :

U of G | Physical Resources

Department:

Room Name: Storage Room

Room Layout Template:

Room Numbers:

Program Net Area (nsm/nsf): 6 sqm

Program Area (sm/sf):

GENERAL

Hours of Operation: 24 **Days Per Week:** 7

Occupants: Staff: 1 Others:

Access: ☐ Unrestricted ☑ Limited Access ☐ Restricted

Acoustic Control: ☑ None ☐ Normal ☐ Confidential

Vibration Sensitivity: ☑ Low ☐ Medium ☐ High

Structural Loading: N/A

Special Room Notes:

ARCHITECTURAL

CRITICAL ROOM DIMENSIONS

Length (mm): 2500 Width (mm): 2500 Height (mm): 3048

Notes: Clear area exclusive of fixed casework; min. 1800 turning circle one side

ADJACENCIES/LINES OF SIGHT

Janitor's room (complete barriers between)

INTERIOR FINISHES

	Material	Notes
Floor Material	Epoxy	Non-Slip, 1% slope
Base Material	Integrated epoxy core	
Wall Material	GWB	
Wall Finish	Paint	HWC min. 1200 mm af; paint above
Ceiling Material	GWB	
Ceiling Finish	Paint	

WALL PROTECTION

☑ Corner Guard ☐ Chair Rail ☐ Handrail

☐ Bumper Rail ☐ Sheet Wall Protection ☐ Lead Shielding

☐ RF Shielding

Other:

WINDOWS - EXTERIOR

# of Windows: 0

☐ Translucent ☐ Smart Glass ☐ Operable

☐ Radiation Protection ☐ Blackout Blinds ☐ Roller Shades

☐ Fire Rated Glass ☐ Motorized Control ☐ Impact Resistant

☐ Clear Glass Other:

WINDOWS - INTERIOR

# of Windows: 0

☐ Translucent ☐ Smart Glass ☐ Privacy Film

☐ Glazed Side Light ☐ Two-Way ☐ Pass-Through

☐ Operable ☐ Roller Shades ☐ Radiation Protection

☐ Fire Rated Glass ☐ Impact Resistant ☐ Clear Glass

Other:

REMARKS / SPECIAL FEATURES

Floor sloping to drain, ensure no areas where water may pool

DOORS

Door

☑ 1 Leaf ☐ 2 Leaf ☐ 2 Leaf / Uneven

☑ Hollow Metal ☑ Solid Core Wood ☐ Aluminum

☐ Lead Lined ☐ Vision Panel ☐ Stainless Steel

☐ STC Rating ☐ Glass Finish: Paint

Other:

Frame

☑ Hollow Metal ☐ Solid Core Wood ☐ Aluminum

☐ Lead Lined ☐ Vision Type ☐ Stainless Steel

Finish: Paint Other:

Hardware

☑ Auto Operator ☑ Kick Plate Kick Plate Height : 12"

☑ Card Reader ☐ Lockable Function: Storeroom

Finish: SS MAG Lock:

Other: N/A

ACCESSORIES

☐ Curtain Track(s) ☐ Glove Dispenser ☐ Sharps Container

☐ Privacy Curtain(s) ☐ Mask Dispenser ☐ Waste & Recycling Receptacle

☐ IV Track(s) ☐ Paper Towel Dispenser ☐ Sanitary Napkin Disposal

☐ Coat/Robe Hook ☐ Toilet Paper Dispenser ☐ Multistream Waste Disposal

☐ Grab Bars ☐ Soap Dispenser ☐ Lockers

☐ Headwall ☐ Hand Sanitizer ☐ Locker Bench

☐ Pamphlet Rack ☐ Clorox Dispenser ☐ Ceiling Patient Lift

☐ Chart Rack ☐ Chemical Dispenser ☐ Mirror (Over-counter)

☐ Whiteboard ☐ Face Shield Dispenser ☐ Mirror (Full)

☐ Television Bracket ☐ Hairnet Dispenser ☐ Change Table - Adult

☐ Projection Screen ☐ Apron Rack ☐ Shredder

☐ Smartboard ☐ Mop Rack

Other: Confirm accessories with univeristy

MILLWORK

Lower Special Height:

☐ Open Shelving ☐ Drawers ☐ Countertop

☐ Open, no shelving ☐ Solid Doors ☐ Lockable

Upper

☐ Open Shelving ☐ Microwave Shelf ☐ Solid Doors

☐ Open, no shelving ☐ Lockable ☐ Glass Doors

Full Height

☐ Open Shelving ☐ Solid Doors ☐ Glass Doors

☐ Lockable ☐ Open, no shelving Other:

Finishes

filled polymer through body colour, 13mm min thickness

ROOM DATA SHEET Page 2 of 2

PROJECT: University of Guelph - Design Standards

DATE: 2025/03/21 PTF/SAP NO. :

U of G | Physical Resources

Room Name: Storage Room

Room Numbers: To be confirmed by project

MECHANICAL

PLUMBING

Fixtures

☐ Sink - Stainless Single ☐ Counterop Ice Machine ☐ Kitchen Sink - SS Triple

☐ Sink - Stainless Double ☐ Faucet - Gooseneck ☐ Corrosion Resist. Fittings

☐ Sink - Handwash ☐ Faucet - Laboratory ☐ Shower

☐ Sink - Flushing Rim ☐ Counter Mount ☐ Emergency Shower

☐ Sink - Lavatory ☐ Wall Mount ☐ Dialysis Box

☐ Sink - OR Scrub ☐ Controls - Manual ☐ Toilet - Bariatric

☐ Sink - Janitor Floor Mnt ☐ Controls - Electronic ☐ Toilet - Standard

☐ Casting Sink ☐ Controls - Floor Pedal ☐ Eye Wash

☐ ICU Sink ☐ Kitchen Sink - SS Single ☐ Bottle Filling Station

☐ Ice Machine ☐ Kitchen Sink - SS Double

Other:

Drains

☐ Floor Drain ☐ Equipment Drain ☐ Grease Interceptor

☐ Shower Drain ☐ Plaster Trap Drain ☐ Corrosion Resist. Fittings

☐ Flushing Rim Floor Drain ☐ Trench Drain ☐ Acid Neutralizer

Other:

Water

☐ Domestic Hot ☐ Tempered Hot ☐ Distilled

☐ Domestic Cold ☐ Reverse Osmosis ☐ Deionized

Other: Temperature Range:

GASES

☐ Oxygen ☐ Nitrous Oxide ☐ Medical Air

☐ CO2 ☐ Gas Scavenging ☐ Medical Vacuum

☐ Nitrogen ☐ Natural Gas ☐ Compressed Air

Other:

Location of Gases:

HVAC

Air Pressure

☐ Positive ☐ Neutral ☑ Negative

☐ Air Pressure Monitor ☐ Air Recirculation ☑ Std. Diffusers/Grilles

☐ Exhaust/Return ☑ Dedicated Exhaust ☐ Fumehood

☐ Local Control ☐ Equip. Heat Dissipation

Relative Humidity (%): 30-60 Outdoor Air Changes/Hr: - Relative Pressure: Negative

Total Air Exchange/Hr: 10 Room Classification: III Indoor Temp Range °C:

Other: dedicated san. exhaust cannot duct into other occupancies

CONTROLS

FIRE PROTECTION

☑ Standard to Code Other:

Type

☑ Wet ☐ Pre-Action System

☐ Special Agent ☐ Additional Extinguishers

Other:

Sprinkler Head

☐ Upright ☐ Pendent Finish:

☑ Concealed ☐ Semi-Recessed

Other:

ELECTRICAL

Room Classification

☐ Basic ☐ Intermediate ☐ Critical ☑ N/A

Other:

Power

☑ Normal ☐ Emergency Power ☐ Isolated Power

☑ UPS ☐ Weatherproof

Notes:

Lighting

General Illumination Levels: 300 LUX

☐ Dimmable ☑ LED ☐ Emergency

☐ Exam Light ☐ Night Lighting ☐ Specialty Light

☐ Task ☐ Overbed Light Other:

☐ Surgical

Other:

Lighting Control

☐ Vacancy Sensor ☐ Occupancy Sensor ☑ Wall Switch

0-10V Dimming: Other:

Fire Alarm

☑ Audible Alarm Signal ☐ Visual Alarm Signal Other:

☐ RFAA ☐ Smoke/Heat Detector

COMMUNICATIONS AND SECURITY

Data Outlets:	Outlet Type: Data	BioMo	TDM	Additional Info.
Telephone (VOIP)	☐	☐	☐	
Telephone (TDM)	☐	☐	☐	
Computer	☐	☐	☐	
Printer	☐	☐	☐	
Copier	☐	☐	☐	
Multifunctional Station	☐	☐	☐	
Future	☐	☐	☐	

Other:

Additional Systems

☐ Teleconference ☐ EPIC ☐ Patient Monitor/Telemetry

☐ Videoconference ☐ Clock - Primex ☐ Sound Masking

☐ Intercomm ☐ PACS Diagnostic ☐ Sound Reinforcement

☐ Nurse Call System ☐ PACS Viewing ☐ Patient Entertainment

☐ Point of Sale ☐ Pyxis ☐ Pneumatic Tube

Other:

Security

☐ Intrusion Detection ☐ Door Alarm - Local ☐ CCTV

☐ Panic Duress ☐ Door Alarm - Network ☐ CCTV w/Audio

Other: Confirm CCTV requirements with staff

EQUIPMENT / FF & E

General Notes:

Confirm storage and equipment requirements with staff.