5.0 FUNCTION AND USE

5.1 Classrooms (tiered, non-tiered, lecture halls, large, small, “smart”)

The University has a number of types of classrooms varied by size, shape, tiered/non-tiered, and “smart” capabilities. They range from classrooms to accommodate 30 with loose seating to tiered lecture halls with capacities of upwards of 600 with fixed seating (tablet arms or tables with loose chairs).

5.1.1 General

.1 Unless otherwise required all general purpose classrooms shall be projection capable (data/video projection).

.2 Larger rooms, as programmed, will be “SMART”. This includes instructional podium systems and controls for data and video projection, internet and satellite connection, VCR or DVD drives, laptop connection, room for in situ computer system, control of lighting and sound.

.3 Rooms should be designed for laptop connectivity as a future option, if not programmed for immediate implementation.

.4 All classrooms to comply with the University “Universal Design Guide” and provide alternate seating locations for persons with disabilities.

.5 Whiteboards only may be used in rooms with electronics (e.g. computers, monitors, audio-visual equipment).

5.1.2 Location Within Buildings

.1 Large classrooms should be located near to major entrances on main/ground level to enhance access and egress for both regular classes and for groups using the facilities on a casual basis in the evenings or on weekends. If classrooms are located on higher levels ensure code requirements for exiting are met.

.2 Adequate circulation and “crush” space should be provided outside of rooms and attention during design should be given to ensure that traffic in and out of large group spaces does not conflict, and is unimpeded by architectural obstacles, such as intricate stairs, planters, directories, displays or furnishings.

.3 Consideration should be given to providing small groups spaces adjacent to a large group room – so that discussion groups can be formed and then reconvened into large groups easily. However, each room type must function (access, systems) independently.

.4 Equipment on carts and class materials, may be stored at a central lockable depot.
.5 Halls, vestibules, lounges directly adjacent to classrooms will not contain vending machines. Noise from this equipment interferes with classroom use when doors remain open.

.7 Several smaller classrooms may share a common storage, preparation or projection room. However, care must be taken to ensure that noise does not “leak” from one classroom to another, from or through the common room or space, or through ducts or ceiling routes.

5.1.3 Room Shape

.1 Room shape should be such that students can sit as close as it is feasible to the instructor.

.2 Where instruction originates from the instructor or screen, the two key factors in shape must be visibility of the demonstration area (whiteboards, screens, podium) from all points, and reasonable acoustics.

.3 When projection is used sufficient space should be provided. The first row of seating should be no closer to the screen than twice the screen height (but in no case less than 4 m) and all viewers must be seated within a thirty degree cone around the projection axis. No viewer should be farther than 8 times the screen height from the screen. If multiple screens are intended to be used the thirty degree cone must be considered for each screen.

.4 A lecture room must neither be too long nor too wide, and it should not be echoic. Small rooms should be near-square in plan, preferably slightly longer than wide. With increased size, banking ( tiers) of the seats will be required and fanning of the shape, with widening towards the rear.

.5 Rooms designed for groups in excess of approximately 75 people should NOT be rectangular. A “fan-shaped” room, where such is possible, is a superior shape as it provides better viewing angles and acoustics. (Parallel walls in larger rooms aggravate acoustical problems.) “Fan-shaped” rooms tend to focus student attention of the lecturer and the materials and media used, and provide as many seats as possible within the optimum viewing areas.
.6 Where a “tiered” floor is necessary for seating, aisles should be sloped wherever possible, avoiding “stepped”, to facilitate barrier free access and to make moving of equipment (such as pianos, projectors, etc.) easier. Provide level landings at doors and at the front of rooms.

.7 For a steeply sloped floor, however, it is recognized that steps may be necessary. Ramps in excess of 6½% (1 in 16) are not permitted.

.8 If a room has a longer dimension, the screen should be located on a narrower wall, so that views will be closer to a line perpendicular to the screen surface.

5.1.4 Door Location

.1 All doors must have a minimum clear width of 910 mm (36”). Double doors (each leaf minimum 910 mm) are preferred on larger rooms or where equipment movement is a concern. Mullions should not be used.

.2 In large group classrooms it is preferable to enter the room from the rear.

.3 All doors should incorporate a finger lite, so interruptions to lectures from people "looking for the right room" are avoided.

.4 There must be no threshold to obstruct rolling carts.

5.1.5 Clocks, Bells

.1 A clock visible to the lecturer preferably mounted at the side of the room near the front. They should have a large face in a large room.

5.1.6 Finishes

.1 Resilient flooring is preferred.

.2 The use of quarry tile and other hard, dense corridor surfaces directly outside of lecture rooms should be avoided where possible, since such surfaces generate and transmit traffic noise and because rough surfaces jar projection lamps, and optical or electronic components, when the equipment is moved on carts.

.3 Wall finishes should be constructed from materials which are not easily defaced or damaged, and surfaces should be easily and inexpensively refinished. Additional absorption material will be required for acoustical purposes.

.4 Ceilings should incorporate acoustic tile in a suspended ceiling.

.5 All materials used should be capable of being matched or replaced so that repaired areas are not noticeable.
.6 Avoid wall treatments which create a visual disturbance or attraction which disrupts concentration, or promotes inattentiveness, e.g., strong colours, intricate geometric designs in masonry, and startling lighting effects that distract from the lecture or program being presented.

.7 A variety of colours is desirable from one classroom to the next, and within each classroom. Paint finish should be eggshell or satin gloss.

5.1.7 Furniture

.1 The selection of furniture should be based on the University’s furniture standard, though the furniture type and arrangement must be determined in consideration of the prospective primary users of a room.

.2 The intended use of the room will determine whether fixed seats, moveable tablet arm chairs, or some other furniture is desirable. Various shapes and sizes of tables should be among the furniture considered. Bench/table with loose chairs are preferred. Although the use of tables is preferred due to the greater desk layout space this arrangement requires additional room area and restricts the ability to reconfigure the room. In lecture halls preference to fixed bench tops is given. Minimum width is 600 mm.

.3 In all types of ganged bench/tables, tablet arms include a raceway for future datacom and power to each position to allow networking.

.4 Whatever type of seating is specified, it should be selected to suit the purposes and needs, should be comfortable, rugged and easy to maintain. The selection of seating must consider the widest range of body type and condition (to accommodate the very small and very large or pregnant people). Unless specifically requested, seating should not be upholstered.

.5 If chairs are to be fitted with tablets, they should be of adequate size to facilitate note-taking (preferably to accommodate a laptop computer) and easy to fold away when not in use. They should not impede access to the seat, or movement of people past the seat. When in position, tablets should tilt slightly away from the projection screen. The writing surface should not produce glare or too much contrast with paper. A minimum of 15% of the tablet arms should be left handed. The tablet arms must be strong enough to support a person sitting on them.

.6 Freely rotating chairs are undesirable.

.7 If the classroom does not contain fixed seating, there should be adequate space in moderate size rooms for the instructor to walk among the seats (and students), if he wishes to do so.
Aisles should be planned to ensure minimal interference to lecture by the late arrivals. They should terminate (originate) near the entrances.

Centre aisles should be used only after careful consideration, since normally the best seats for viewing are centrally located within the room.

In specific conditions demonstration benches or tables with compressed air, water, gas and power, may be required. Moveable demonstration tables which can be wheeled out of the way are preferred over fixed.

Lecturer position to incorporate an adjustable height podium wired to lighting and audiovisual controls.

Provide a variety of locations to accommodate wheelchair stations. These should not always be located at the front and/or rear of the room. Co-ordinate the selection of the furniture with the University Universal Design.

Near the primary entrance to a room provide a table/bench/ledge for placement of handouts, notices, etc.

5.1.8 Lighting & Lighting Controls

Controls should be on a podium such that the lecturer would not bend, stretch, walk or lean away from the class to use them. Provide a second location clustered together on the front sidewall for lighting.

Lighting should include, general, high, even illumination for the whole room, plus reduced illumination during projection. Illumination of the lecturer and the lecturer's notes are important during reduced illumination. Light levels should be provided via multi-level switching rather than dimming.

If demonstration benches are provided, special illumination for these is required.

Light switches to control the general room lighting should be located by each and every entrance door.

Light switches to be of the toggle type - not rotary.

Restrict ambient light falling on Audio Visual screens and whiteboards particularly from entrance doors, windows and other variable or constant light sources.

Consideration should be given to providing aisle lighting in rooms having "stepped" aisles.

Lecture theatres with over 100 seats will be provided with special illumination for a sign language translator aide.
5.1.9 Audio/Visual Provisions

.1 All classrooms, large or small, should be designed for the use of media (computer projection, slides projection and 16 mm film, the use of overhead projectors, video playback) and where necessary, sound reinforcement.

.2 Data projectors should be ceiling mounted, with lowering devices for accessibility.

.3 Projection Booths

.1 With the increased use of electronic media the use and need for projection booths is limited. Larger lecture theatres may require control booths for housing equipment.

.2 Design Parameters:

.1 Plate glass window (6 mm polished plate) should be provided across the entire front of the booth (in lieu of portholes which are very inflexible). Window to be slanted to eliminate reflections;
.2 Adequate soundproofing (STC 50) is necessary;
.3 Direct access to the booth from the lecture theatre or the classroom should be provided;
.4 Access to the booth from outside the room may be desirable to eliminate class disruption;
.5 Booth lighting must be capable of being dimmed;
.6 Room lighting should be controlled from the booth;
.7 If an electric screen is used, a switch for the screen should be located in the booth;
.8 In the case of projection booths, two (2) 11 mm projectors are sometimes used, so projection booths should have two (2) duplex outlets - each on a separate circuit provided for the projectors. In addition, a segregated duplex receptacle should be provided for use with sound amplifiers.

.4 Projection Screens

.1 Every screen, whether it is electric ceiling mounted, electric wall mounted or manual pull-down, should be installed so that it can be tilted (to alleviate the keystoning effect that occurs with overhead projectors). Ideally, a screen mounted in a frame which can be tilted is the best solution. To tilt such a screen, a tie-down is necessary - one which will hold the screen firm but which will automatically release the screen when the up switch is activated. The tie-down must have a firm enough grip on the screen so that the screen is not going to bulge out from the tilt angle.
.2 The switch for electrically operated screens must be the type that returns to neutral when released.

.3 Designers should consult with the appropriate University audio visual group when selecting and sizing projection screens.

.4 When screens are installed in ceiling recesses, it is important that the recess be large enough to permit maintenance of the screen, motor and fabric.

.5 To facilitate maintenance on screen motors, a quick disconnection should be used.

.5 Electrical Service

.1 Two (2) duplex receptacles should be provided at the front of the room, preferably on either side and both can be on one circuit, but there should be no other outlets on this circuit.

.2 Two (2) duplex receptacles on the same circuit should be provided at the centre of the rear wall of the room.

.6 35 mm Projectors

.1 35 mm projectors will almost always be located at the rear of a classroom/lecture theatre, in a projection booth if there is one. They will normally be controlled remotely by the lecturer at the front of the classroom. In order to accommodate the remote control, a conduit is to be provided from the rear wall of the classroom (or from the projection booth if there is one) to the front of the classroom, normally located on the front wall, but could terminate in a podium. The conduit is to be terminated in standard duplex receptacle type boxes. Special consideration is necessary for remoter runs longer than about 60 feet.

.7 Sound Reinforcement

.1 For classrooms or lecture theatres over 60 – 75 seats, voice amplification/sound reinforcement is required. This assists with the hearing impaired.

.2 Provision for wireless microphone capability must be included in all permanent sound reinforcement systems.

.3 Four (4) microphone inputs are to be provided.

.4 Amplifiers to be "low-impedance".
.5 System must have the capability of playback and recording. Balanced-tines to be provided.

.6 Amplifier to be located in projection booth or at the front of the classroom in service cabinet if there is no booth.

.7 Speaker lines must never be included in conduit carrying electric power.

.8 Larger rooms require consideration of hearing assist systems. The design of these systems must be undertaken with the University audio-visual support services group.

.9 Generally, rooms that seat over 50 people should have speaker(s) mounted at the front of the room.

.10 To accommodate speakers mounted at the front of the classroom/lecture theatre, a 12 mm conduit for the speaker lines should be provided from the centre of the rear wall of the classroom to the front wall, terminating on each side of the room (for use with permanent installed speakers).
.8 TV Monitors

.1 TV monitors should be hung above reach from floor level. Controls should be lockable. Locking devices on hangers should be used so monitors can be removed only by properly authorized service personnel.

5.1.10 Whiteboards & Tackboards

.1 Whiteboards

.1 The use of whiteboards in lieu of chalkboards is preferred. Chalk dust permeates the environment and creates problems with electronics. Chalkboards are PROHIBITED in any classroom that contains electronic equipment. Porcelain enamel steel whiteboards are recommended.

.2 When doing preliminary design and layouts for any classroom, locations of tackboards, whiteboards and other display surfaces must be predetermined. Whiteboards will usually be at the designated front of the room. Provide as much whiteboard at the front of the room as possible. Two or three levels of sliding whiteboards may be considered. The amount of whiteboard needed depends on the subjects taught.

.3 Whiteboards should be properly illuminated, with no "hot spots" or glare. Where fluorescent lighting is used for this purpose, a valance or trough should enclose the tubes, which should be 450 mm in front of the whiteboard.

.4 Whiteboards should be spacious and sited for optimal visibility from all parts of the room. All classrooms to have whiteboard space that can be used when the screen is down.

.5 Additional whiteboard space may be provided by portable whiteboards. Where such use is contemplated, entrances, (doors, steps, baffles, angled walls, sharp turns) must be planned so there is no obstruction to easy passage of large standing portable whiteboards.

.6 Optimal visibility precludes sitting under overhangs.

.2 Tackboards

.1 Tackboards are used primarily for notices, regulations, or listings. Unless a Faculty justifies more than incidental use of tackboards, they should be restricted to minor areas, as indicated below.

.1 Tackboards, placed just outside the entranceway to classrooms are desired for the posting of room change signs. Tackboards are
better placed in general gathering areas in each building and in hallways if specifically requested.

.2 Installation of tackboards is discouraged at the front of rooms.

5.1.11 Ventilation

.1 It is important in all lecture rooms, and especially so in large group facilities, to design mechanical systems that will provide an adequate number of changes per hour, in order to exhaust stale air and avoid heat build-up from people, lights and/or equipment.

.2 There must be no drafts from the ventilators, and it is preferable that each room have its own thermostat.

.3 The ventilation system must be quiet. Low velocity - large ducting systems are thus more desirable than high velocity systems.

5.1.12 Window Preference

.1 Windowless rooms are preferred because of light control, elimination of outside distraction, and blackout installations, glass breakage, and heat loss. Additional wall space is provided for chalkboard, tackboard or cupboards. Acoustics and temperature controls are simplified. Vandalism is reduced.

.2 If windows are provided in classrooms, they should be fitted with blackout power activated sunshades. If the front of the room is oriented so that windows are on the students' left hand shadows will not be cast by right-handed students when writing. Windows of unusual shape or inaccessible or undesirable locations, are discouraged. For example, windows at the front of a classroom glare in students' eyes and are not permitted.
5.2 Bio/Med/Chem Laboratories (research, undergraduate, demonstration, biocontainment features, chem. rooms, wet/dry labs, computer labs, serviceability (corridors, duct shafts, intersititual))

5.2.1 General

.1 Provide a description of laboratory activities to the Project Manager. The Project Manager will review the design standard requirements with Environmental Health and Safety (EHS). EHS will determine the hazard classification of a laboratory.

.2 Laboratories shall conform with one of the following National Fire Protection Association (NFPA) standards:

.1 NFPA 45 - Standard on Fire Protection for Laboratories Using Chemicals.
.2 NFPA 99 - Standard for Health Care Facilities.

.3 Biohazard containment facilities shall comply with Laboratory B10 Safety Guidelines published by the Laboratory Centre for Disease Control Health Protection Branch, Health Canada.

.4 Biohazard containment devices

.1 Biohazard cabinets shall comply with Biological Standard 49 for Class II Biohazard Cabinetry. Volatile hazardous chemicals are prohibited in biohazard cabinetry unless the cabinet is 100% exhausted to the outside. Minimal use of alcohol to clean the inside of the cabinet is permissible in cabinets that are less than 100% exhausted to the outside. Provide an exhausted biohazard cabinet with a thimble and air gap or another arrangement approved by the cabinet manufacturer.

.2 Laminar flow clean air devices, such as clean benches, shall comply with Institute of Environmental Sciences (IES) standard IES-RP-CC002. Laminar flow clean benches provide only product particle protection. Hazardous physical, chemical or biological agents cannot be safely used in these devices.

5.2.2 Laboratory Design

.1 Compartmentalization of each laboratory unit shall be achieved by providing it with at least a 1 hour fire rated separation from adjacent laboratories, or other areas.

.2 Provide a minimum of two exits in laboratories larger than 200 sq. m., where hazardous materials are used.

.3 Aisles serving a single work area shall be a minimum of 910 mm wide. Double aisles shall be a minimum of 1,820 mm wide. Avoid aisles longer
than 6 m: Arrange furniture for easy access to an exit from any point in the laboratory.

.4 Doors to corridors from laboratories shall swing in the direction of exit.

.5 Faucets, to which a hose or similar device may be attached, shall be provided with an approved vacuum breaker. Alternately, a special laboratory water supply equipped with an RPZ back flow device to separate it from the potable water is preferred. If a laboratory water system is provided, all connected outlets shall be labelled "Not Potable."

.6 A sink mounted eye wash shall be provided in each lab area equipped with a fume hood, and/or laboratories using chemicals. If feasible, control the water supply to a temperature between .15 degrees C and -35- degrees C.

.7 Safety showers to be centralized with multiple showers on one mixing station. Provide floor drain at each safety shower.

.8 In order to facilitate long term maintenance and retain flexibility of reuse of casework, modular casework designed in accordance with University cabinet and millwork standards will be used. The following items are preferred in chemical laboratories and may be required when appropriate:

.1 Modular laboratory furniture with 25 mm epoxy resin benchtop.

.2. Wall cabinets with a continuous enclosed front plane to the ceiling.

.3. Chemical resistant waste lines.

.4. A glassware cleaning sink at least 300 mm deep.

.9 Laboratory floors, walls and doors require the following items to comply with license requirements:

.1 Floors are preferred to be polished concrete. If resilient is used it should be smooth, non-porous, seamless sheet that is resistant to a wide range of chemicals. The sheets shall be coved along walls and permanently placed furnishings. Floor openings shall be sealed watertight.

.2 Walls and doors shall be constructed or painted with a smooth, non-absorbent, washable material.

.3 Lighting fixtures are to be flush mounted with the ceiling and have removable, easily cleaned diffusers.
.10 Provide adequate storage volume for research chemicals and waste. Chemical resistant storage trays shall be furnished to contain a spill of free liquid in the storage unit.

.11 Fume Hood

.1 Provide fume hoods that safely capture hazardous, flammable, corrosive or toxic chemicals, and that will allow for changes in laboratory function and fume hood use.

.2 Refer to the Environmental Health and Safety document titled “Fume Containment Systems, Guidelines for Design, Purchase and Maintenance”.

.3 General Features

.1 Fume hoods in research laboratories must comply with ANSI/AIHA Z9.5 Class A performance standards. Capture efficiency as installed and used must be at least 4AU0.1.

.2 Locate fume hoods in-distant corners of a lab and away from high traffic areas in order to avoid locations of high turbulence and to avoid blocking an exit if there is an emergency.

.3 Provide two units of storage space for each unit of fume hood width. Ventilate half of this space. Provide sufficient protected storage space to accommodate new and waste chemicals. Without adequate storage space, containers of waste chemicals are often boxed and then stacked on the floor where they are subject to breakage that might cause occupant injury.

.4 Do not install heated drying base cabinets under fume hoods.

.4 Supply Air Requirements

.1 PROHIBITED: Auxiliary air supply hoods are prohibited.

.2 Room cross drafts shall be avoided.

.3 In order to yield high ventilation efficiency and minimize turbulence, provide supply air in a diffuse manner from behind the operator. Consider high-volume, low-velocity radial-air-diffusion or pattern-control technology.

.5 Exhaust System Requirements
1. **PROHIBITED**: Fume hood exhaust volumes shall not be modulated or controlled to balance air requirements for air conditioning or heating.

2. Systems shall be installed in accordance with the requirements of NFPA 91, "Standard for the Installation of Blower and Exhaust Systems."

3. High duct velocity results in high noise levels, excessive leakage and high power consumption; therefore, air velocity on the suction of the fan shall be a minimum of 1000 fpm and shall not exceed 2000 fpm under any circumstances. A velocity of 1200 fpm is recommended.

4. The average fume hood face velocity shall be 125 ±10 fpm with the vertical-sliding sash at 300 mm above the work surface. Also, on hoods wider than four feet, the safety shield must be in place. Readings shall be measured in the centre of several square grids measured in the plane of the face opening. In addition, individual face velocities shall not exceed 20 percent of the open-face velocity average.

5. In order to minimize the potential that hazardous operations could be conducted when the fume hood is off, fume hoods shall run continuously. Opportunities should be identified with users to shut-off non-critical fume hoods on a scheduled basis through the RCMS.

6. General-purpose fume hoods shall be ducted individually. However, up to four hoods, located in the same room, may be connected to a common exhaust duct leading from that room to an exhaust fan. If more than one hood is connected to an exhaust duct, a balanced, undampered drop must be engineered or blast gate dampers must be provided. Fume hoods provided with filter enclosures shall always be individually ducted.

7. Fire or smoke dampers shall not be included in any chemical fume exhaust duct.

8. Fume hood exhaust systems shall function independently of the general building HVAC system.

9. Provide an independent exhaust system for associated equipment in the same room, such as flammable liquid storage cabinets, biological safety cabinets and atomic absorption units. In exceptional circumstances, associated may be exhausted into the fume hood ductwork. On hoods with filter enclosures,
associated equipment shall be connected between the hood and the filter enclosure.

.6 Exhaust Filter Enclosures

.1 **PROHIBITED**: Proprietary or custom sized filters and pre-filters are prohibited.

.2 Exhaust filters are not normally required or even recommended. However, if a filter is determined to be necessary, comply with the following provisions.

- When a filter enclosure is required it shall be easily accessible from the outside of the hood. Filter enclosure shall provide bag-in/bag-out of filters, so there is no exposure to maintenance staff from collected material.
- On hoods with filter enclosures, provide an indicator in a clearly visible location to indicate pressure drop across the filter.
- The filter enclosure shall be air tight and constructed of stainless steel. It shall use a standard size pre-filter and charcoal and/or HEPA filter.
- To allow for filter loading, the hood's initial, average face velocity with the sash at 450 mm and a clean filter shall be 150 fpm.
.7 Fans and Discharge

.1 PROHIBITED: Square to round fabric connectors are prohibited.

.2 Discharge ducts and fan housing shall be air tight when fans are installed in an equipment room. Fan shafts shall be sealed with a stuffing box shaft seal or equivalent device. Alternatively, install a fan with wheel backplate fins that pulls air into the fan from the shaft opening. Seamless welded ductwork shall be installed on the discharge side of the fan. Transition fittings between the fan housing and discharge ductwork shall be factory fabricated with round connections. Flexible connectors shall have flanged ends and be factory fabricated.

.3 Provide rain protection that does not increase discharge air pressure or deflect air downward.

.4 Stack-design and discharge velocity shall distribute contaminants outside the eddy current envelope of the building. On structures with roof areas at more than one level, discharge ducts within 10 m of a higher level shall terminate at a point at least 3.1 m above the elevation of the higher level.

.5 Consider clustering discharge ductwork or using outside air induction to help dilute discharges and increases effective stack height by increasing air column mass.

.6 Attention must be given to maintaining maximum distance from building fresh air intakes. This means that air intakes on adjacent buildings must also be identified and avoided. At least 30 m should be allowed between fume hood exhausts and fresh air intakes.

.7 Ventilate equipment room where fume hood exhaust fans are located.

.8 Radioisotope Fume Hoods

.1 Contact EH&S for construction requirements pertinent to the user's license.

.2 An exhaust filter enclosure with a pre-filter and a HEPA and/or charcoal filter is usually not required for radioisotope hoods. If required, however, the enclosures must meet the specifications detailed in Section 6.

.9 Perchloric Acid Fume Hoods
.1 PROHIBITED: Connecting Perchloric acid hood ductwork to other exhaust equipment is prohibited.

.2 Perchloric acid fume hoods and exhaust fans to be connected to emergency power.

.3 Hoods and exhaust ductwork shall be constructed of acid resistant, non-reactive, impervious materials. All duct work seams and joints shall be welded and watertight.

.4 Ductwork shall take the shortest and straightest path to the outside. Positive drainage shall be provided back to the hood.

.5 A water spray system shall be provided to wash down the entire exhaust system from the hood interior behind the baffle, through the fan, up to the roofline. The hood work surface shall be watertight with a minimum depression of ½ inch at the front and sides. An integral trough shall be provided at the rear of the hood to collect wash down water and direct it to a drain. The baffle shall be removable for cleaning. Provide a hose bib within 40 feet of the discharge stack to allow for manual wash down.

.6 Provide controls so that the user can easily initiate wash down. Provide an automatic wash down cycle. The duration of the automatic cycle depends on the configuration of the ductwork. Because wash down of a contaminated hood requires up to 24 hours of continuous washing, provide manual override of the automatic cycle.

.7 Provide an easily readable placard on the face of the hood stating: "Wash down often. Perchloric acid (HC104) can violently decompose on contact with organic compounds such as acetic acid, alcohols, ketones, aldehydes, ethers, dialky sulfoxides, paper, wood, grease or oils. Perchloric compounds formed by reaction with heavy metals, alkali metals, ammonium or some organics can be shock sensitive explosives."

.8 Provide an easily readable placard on the exhaust fan in the penthouse and on the discharge stack above the roof stating: "Perchloric acid exhaust system - EXPLOSION HAZARD - verify system has been decontaminated before performing any maintenance work."

5.2.3 Mechanical Requirement

.1 Provide shut-off valves in accessible locations for central supply of flammable, combustible or oxidizing gases. Valves shall be outside of the
areas in which the gases are used. These shut-off valves are in addition to those at the points of supply and use. They may be located adjacent to the corridor exit from the lab or, if security is not a problem, in the corridor.

.2 Storage and supply systems for compressed and liquefied gases shall comply with requirements of the NFPA and ANSI.

.3 Systems for other gases shall comply with manufacturer's recommendations. The Handbook of Compressed Gases by the Compressed Gas Association and the Matheson Gas Data Book by Matheson Gas Products may be consulted as a reference standard.

.4 Controls for air, gas and other utilities shall be colour coded and labelled.

.5 Provide fire extinguishers the basis of the area protected and hazard class (see NFPA 10). Provide a UL listed five-pound multipurpose dry chemical fire extinguisher with at least a 1A20BC rating mounted near an exit for each laboratory unit.

.6 Laboratories using hazardous chemicals shall be under negative pressure, with respect to adjacent areas. No recirculation of exhaust air from laboratories is permitted. One exception is a clean room which shall have an air lock. Do not return air from corridors in laboratory areas; supply air to the corridor only.

.7 Provide at least 30 percent pre-filter and an 80 percent filter meeting ASHRAE 5276 dust spot efficiency filters in the air supply. Air filters shall be located downstream of the fan.

.8 Humidifiers shall be located downstream of fans and filters. Use of steam humidification is required.
.9 A minimum of six air changes per hour is required in labs where hazardous chemicals are used in closed systems or in a fume hood. Where open use of hazardous chemicals is planned, 10 or more air changes per hour shall be necessary.

.10 Special purpose exhaust devices shall be designed with reference to Industrial Ventilation: A Manual of Recommended Practice by the American Conference of Government Industrial Hygienists; use the current edition.

.11 Reagent grade 3 water is adequate for central building distribution. Reagent grade 3 water, as specified by the College of American Pathologists (CAP) or the National Committee for Clinical Laboratory Standards (NCCLS), has resistivity at 25 degrees C of 0.1 megohms/centimetre and a pH between 5.0 and 8.0. If needed, higher grade water can be generated at the point of use.

.12 When infectious agents, human body fluids and general microbiology products are generated, an autoclave shall be designated to handle decontamination. It shall be provided with a dedicated exhaust to control odours. The exhaust system shall include a canopy over the door to the autoclave.

### 5.2.4 Electrical Requirement

.1 Outlets shall be provided for fixed appliances and one duplex shall be provided per each three feet of bench length or more often if required by the program. Identify emergency power outlets in accordance with users.

.2 Provide ground fault circuit interrupters (GFI's) on electrical outlets within six feet of all sinks.
5.3 Washrooms

.1 Locate washrooms close to major student gathering areas, classrooms/lecture halls and/or stairs/entrances.

.2 Access to washrooms is preferred without the use of doors. Ensure privacy by ensuring no direct line of sight from corridor to washroom.

.3 Walls to be full height (to underside structural deck). If washroom located close to/adjacent to instructional space and access is without doors consider adding acoustical absorption to entryway. Consider use of sound masking.

.4 Finishes
   - ceilings to be acoustic tile;
   - walls to be ceramic tile to minimum 2.1 m height;
   - floors to be ceramic tile;
   - counter top to be plastic laminate. Use of stainless steel is not desired
   - provide bracing to countertops at minimum 1200 on centre. Bracing to be wall hung and not extending to floor;
   - toilet partitions are to be ceiling hung.

.5 Fittings and Accessories
   - paper towel, toilet paper, soap dispenser provided by University. Ensure backing is provided in stud partitions;
   - provide full width mirrors with vandal proof clips/mounting;
   - provide either an alcove for waste receptacle or wall area. University will supply freestanding units.

.6 Ensure washroom is provided under negative pressure to control odours.

.7 Lavatories to be underslung. Use of stainless steel bowls is not desired.

.8 Hands free (infrared) flush valves and lavatory faucets are desired.

.9 Lighting to be on motion detectors. Ensure one fixture is on normal power at all times.

.10 All washrooms to have barrier free capability. Provide minimum one unisex washroom per building (preferred one per floor).

.11 Ensure design of countertop accommodates barrier free requirements at all lavatories. Ensure all fitting/accessories are barrier free.
5.4 Support Facilities

5.4.1 Office & Support

.1 Do not locate faculty or administrative offices directly adjacent to student common areas.

.2 Provide a view lite in door or a sidelight.

.3 Provide continuous blocking in walls to allow installation of wall mounted shelving.

.4 Floor finish to be resilient flooring in common areas, carpet in offices and meeting rooms.

.5 Ceiling acoustic tile in a suspended grid.

.6 Provide switching of light fixtures per office.

.7 Provide controls for office heating and ventilation grouped to no more than 3 offices. Do not group with non-office activities.

5.4.2 Records Management

.1 Design floor structure for use of high density shelving.

.2 Light fixtures to be on motion detectors.

.3 Flooring to be resilient.

.4 Ceiling acoustic tile in a suspended grid.
5.5 Recreational Space

5.5.1 Gymnasium

.1 Finishes

.1 Wall surfaces to be flush (no protruding columns) to 2.4m above finish floor and non-abrasive. Provide impact protection to a minimum 2.4 m above finish floor.

.2 Corners and external angles to 2.4 m height to be bullnosed or chamfered.

.3 Clear height to be minimum 6.7 m, 9.1 m preferred. Exposed structure preferred using acoustic deck.

.4 Floor slabs to be depressed to allow NO change in elevation between finish floor system in gymnasium and adjacent rooms.

.5 Floor system to be ‘area-elastic’ or ‘composite’ surfaces for gymnasium with a sports priority (including court sports, e.g. volleyball, basketball, indoor soccer, badminton). Preferred is the ‘area-elastic’ hardwood floor system designed to DIN Standards.

.6 Multi-purpose gymnasium floor with a non-sports priority as synthetic floor with ‘point-elastic’ surface is recommended.

.7 **PROHIBITED** – use of suspended ceiling or glue-on ceiling tiles. (These products are susceptible to damage from the games.)

.8 Confirm games line requirements with client.

.2 Doors and Windows

.1 Use of windows is not desired due to glare problems. If windows are used locate sill above 4.3 m and in locations to avoid distraction to athletes. Glazing to incorporate tempered or wired glass.

.2 Doors to open out. Provide vision panel with tempered or wired glass in all doors.

.3 Operable windows to open out.
.3 Equipment
  .1 Confirm requirements for sports equipment/bleachers with client/program.
  .2 Basketball backstops to be retractable.
  .3 Provide storage for removable equipment (e.g. balls, nets and posts).

.4 Heating and Ventilation
  .1 Provide separate thermostatic controls.

5.5.2 Multipurpose Rooms (Non-sports)
  .1 Finishes
    .1 Floor may be resilient flooring (tile or sheet) or carpet.
    .2 Ceiling space to be accessible, preferred is use of acoustic tile in suspended grid.
    .3 Protect walls with a chair rail or wall protection to 1 m.
    .4 Provide window treatment to allow darkening of room.

  .2 Heating and Ventilation
    .1 Provide separate thermostatic controls.

  .3 Electrical
    .1 Provide separate switching for lighting in room.
    .2 Provide motion sensors, minimum one light fixture to be on all the time.
    .3 Light levels shall be via multi-level switching rather than dimming.

5.5.3 Change Rooms
  .1 Finishes
    .1 Floor to slope to drain. Finish to be seamless floor (slip resistant) with integral base.
    .2 Walls to be concrete block with paint finish.
    .3 Ceiling gypsum wallboard, paint finish.
.2 Equipment/Fittings

.1 Provide lockable half height lockers. Lockers to be steel with baked enamel finish. Provide sloped top.

.2 Provide bench opposite lockers.

.3 Provide minimum one full height mirror near entrance/exit.

.4 Provide tackboard near entrance/exit.

.3 Electrical

.1 Provide motion sensors for lighting. Minimum one fixture to be on at all times.

5.5.4 Shower Room

.1 Design

.1 Provide gang showers.

.2 Adjacent to shower area provide dry-off area. Finishes similar to shower room. Provide robe/towel hooks.

.2 Finishes

.1 Floor to slope to drains. Finish to be slip resistant with integral base. Provide a waterproof membrane below floor finish.

.2 Wall finish to be ceramic tile or seamless epoxy.

.3 Ceiling to be impervious to water. Paint with an epoxy paint.

.3 Electrical

.1 Provide motion sensors for lighting. Minimum one fixture to be on at all times.
5.6 Libraries

5.6.1 General

.1 Avoid fixed partitions and built-in fixtures to allow future flexibility.

.2 Windows are desired for psychological reasons but need to be located to minimize glare and uneven light in stack and reading areas. In stack areas consider clerestory windows (above 2.1 m) allowing the use of the wall below for shelving.

.3 Provide only one main entrance to libraries. Locate main desk with unobstructed visibility of entrance. If a secondary entrance/exit is required locate within full view of main desk.

.4 Provide area for exhibits between the entrance and main desk.

5.6.2 Structural

.1 Use large structural spans, minimize obstructions to allow flexibility and ease of control.

.2 Building code typically requires a design live load of 7.2 KPa. Confirm with the user groups that this will be appropriate.

5.6.3 HVAC

.1 Indoor design temperature to be 22°C to 24°C.

.2 Minimum outdoor air ventilation rate to be 8 ℓ/sec per person.

.3 Provide minimum of 5 air changes per hour.

.4 Schedule humidity set point based on outdoor conditions. Determine maximum reset settings based on building envelope design and humidity tolerance.

5.6.4 Electrical

.1 Select and locate luminaires in co-ordination with stacking arrangements.

.2 Provide task lighting on work areas and in study carrels.

.3 Review with users requirements for data requirement both within staff and student accessible areas.
5.7 Service Facilities

5.7.1 Recycling

.1 Provide niches (minimum one per floor) in central locations on each floor for recycling facilities. For large footprint building additional niches are required. Niche to be able to accommodate recycling facilities (containers for cans/bottles, newspaper, office paper and waste) without impacting on adjacent uses. Locate adjacent to major circulation routes. Provide exhaust ventilation in the niches.

.2 In student residences provide recycling rooms in a central location, one per floor.

.3 Provide a room adjacent to Service Entrance for receiving and storing recycled materials. Confirm with Facility Management area requirements. Allow shelving for storage of spent fluorescent lamps. Do not interfere with recycling hampers.

5.7.2 Housekeeping

.1 Housekeeping Room

.1 On main floor of each building provide a primary housekeeping room. Size, 18 sq. m., to accommodate all equipment (auto scrubber, carpet extractor, vacuum cleaner, floor buffer) and storage of materials (toilet paper, towels, maintenance materials) required for regular maintenance of building finishes.

.2 Include: - floor mounted janitor mop sink. Provide hose faucet with 1,200 mm of hose.
- mop rack;
- GFI outlets;
- 500 mm wide shelving for cleaning supplies.

.3 Provide a 910 mm door for access to room. Door to open out.

.4 Provide wall protection to 1,200 mm above finish floor.

.5 If room is used for recharging battery operated equipment, provide adequate ventilation.

.2 Housekeeping Closet (per floor)

.1 Provide housekeeping closet (minimum one per floor). Housekeeping closets to be minimum 10 sq. m. square (size of room will vary dependent on equipment and supplies stored on floor).
.2 Include: - a janitor mop sink with wall protection to 1,200 mm above sink.
    Provide hose faucet with 1,200 mm of hose.
    - mop rack;
    - GFI outlets;
    - shelving for cleaning supplied.

.3 Provide wall protection to 1,200 mm above finish floor.

.4 Access to closet via a 910 mm door. Door to open out.

5.7.3 Maintenance Room

.1 Provide a maintenance room adjacent to service entrance. Room to be minimum 10 sq. m. (size of room will vary dependant on building size).

.2 Provide wall protection to 1.2 m above finish floor.

.3 Provide double doors to facilitate movement of equipment. Do not incorporate a mullion in the doors.

.4 Provide service counter one side of room complete with dedicated power to all over-counter outlets at 600 o/c.

5.7.4 Service Entrance

.1 Provide dedicated service entrance (loading area) at rear of building. Service entrance to be accessible from the service drive and located adjacent to the waste disposal, maintenance and holding rooms.

.2 Access to building to be via double 1,200 mm wide doors or insulated overhead doors 2,400 mm wide by 2,150 mm high. (Where an overhead door is provided, provide a separate main door.) Number of doors to be determined by building size.

.3 Provide an 1,800 mm deep apron between access doors and face of loading dock where double doors used. Apron to have wall protection to minimum 1,200 mm above apron floor. Apron not required at overhead doors.

.4 At loading dock, recess truck bay to accommodate flat bed of truck. Provide a dock leveller with a 2,300 kg capacity to allow roll-off from truck bed.

.5 Provide 200 mm steel concrete filled pipe bollards adjacent to loading area to protect building.

.6 Provide a room full width of access/loading doors minimum 3.1 m deep. Provide wall protection to 1,200 mm above. Provide double doors to building circulation.
5.7.5 Holding Room

.1 For large buildings (over 10,000 sq. m.) provide a holding room of 50 sq. m. adjacent to Service Entrance. (Holding room will be used for temporary storage of materials/equipment during restacking and renovations.)

.2 Provide double doors to holding room.

.3 Provide wall protection to 1,200 mm above finish floor.

5.7.6 Waste Disposal

.1 Verify with Facility Management the requirements for waste collection and the method of disposal, compaction and holding. Requirements will vary depending on program needs and size of building.

.2 Where volume of waste warrants, a stationary compactor will be located adjacent to Service Entrance. For lower volume a dumpster located outside of the building adjacent to the Service Entrance will be used. Space for dumpster to allow loading of dumpster without requirement of manual lifting.

5.7.7 Linen/Trash Chutes

.1 PROHIBITED – linen or trash chutes are prohibited.

.2 Linen and trash to be collected in containers and taken to holding rooms located adjacent to Service Entrance.

5.7.8 Service Elevators

.1 In building over two stories provide service elevator adjacent to Service Entrance. In smaller buildings, service elevator may also function as a passenger elevator.

.2 Provide direct access to all floors of building including floors where mechanical and electrical rooms are located.

.3 Service elevator to be 1.7 m x 2.3 m x 2.44 m high (clear dimensions). Provide a cab door 1.2 m wide and 2.3 m high.

.4 If elevator opens directly to a mechanical room of building service area, a keyed switch to be used to access that landing.

5.7.9 HVAC for Service Facilities

.1 Design indoor temperature to 20°C - 30°C.

.2 Provide outdoor air ventilation system to maintain desired space temperature. Do not use chilled water or other mechanical cooling.
5.7.10 Electrical for Service Facilities

.1 Provide a minimum of one duplex receptacle serviced on emergency power within each room.

.2 Co-ordinate location of all luminaires within rooms with installed piping and conduit.

5.7.11 Access Panels/Doors

.1 Wherever valves, clean-outs, dampers, controls, and other mechanical and electrical components are concealed in ceilings or walls and require servicing, adjustment or replacement, provide 600 x 600 mm hinged, lockable (keyed to University system) panels. Panels shall be located in close proximity to the equipment to be serviced. There shall be no equipment located on the floor beneath the access panels and/or doors that would restrict the placement of a ladder or other lift device needed to service equipment above the ceiling. Panel material and finish shall be resistant to damage or soil by normal anticipated use.

.2 Consideration shall be given to providing service platforms when frequent inspection or service is necessary on equipment such as kitchen duct clean-outs.

.3 Provide roof access scuttle or an access door, accessible from a non-public area, for access to all major roof areas where rooftop equipment needs to be serviced.
5.8 Mechanical and Electrical Rooms

5.8.1 General

.1 Provide painted plywood backboards on all walls of electrical rooms.

.2 Provide double doors for all major mechanical and electrical rooms to facilitate maintenance of equipment.

.3 Mechanical and electrical equipment rooms to be designed and constructed with adequate access to and clearance around equipment so that routine preventative maintenance can be conducted. The following list provides some examples of unsatisfactory mechanical room design and construction:

- In order to access a piece of equipment, maintenance personnel must crawl under or over ductwork.
- Piping is run across mechanical room floors.
- Where light fixtures are located in high ceilings and atriums, the only way to relamp or repair the fixture is to install temporary scaffolding or use a mechanical lift.
- Equipment is located above other pieces of equipment in such a way that it is not possible to access the upper equipment.
- Equipment is located in such a way that maintenance personnel have to stand on other pieces of equipment or piping in order to conduct maintenance service.
- Clearance around equipment is so inadequate a wall may need to be removed in order to access a motor for repair or replacement.

.4 Provide a wall mounted service sink with hose attachment to all mechanical rooms.

.5 Provide floor drains at all pumps, chillers and air handling units. Slope floor to drains.

.6 Provide service platforms to equipment when service time is greater than 20 minutes.

.7 Include means to provide access for future equipment replacement (access panels, knock-out panels).
5.8.2 HVAC

.1 Design indoor temperature to 20ºC - 30ºC.

.2 Provide outdoor air ventilation system to maintain desired space temperature. Do not use chilled water or other mechanical cooling.

5.8.3 Electrical

.1 Provide a minimum of one duplex receptacle serviced on emergency power within each mechanical and electrical room.

.2 Co-ordinate location of all luminaires within mechanical and electrical rooms with installed piping and conduit. Lighting controlled by occupancy sensor.

.3 Provide oversize cable opening/conduits through walls/floors/ceiling to all data/telephone rooms to allow addition of cabling. Ensure openings are firestopped. Firestopping preferred to be reused and repenetrated.
5.9 Health, Safety, Environment and Security

5.9.1 EHS Requirement

Refer to Section 5.2 “Bio/Med/Chem Laboratory”

5.9.2 Fall Protection

.1 Review fall protection anchorage requirements with Facilities Management. Each employee on a walking/working surface (horizontal and vertical surfaces) with unprotected side or edge, which is 1,800 mm or more above a lower level, shall be protected from falling by the use of guardrail systems with toe boards or a personal fall arrest system. Examples of such work include, but are not limited to:

.1 maintenance on rooftop, such as: roof repair, unplugging roof drains, other building system maintenance;

.2 work platforms that are designed to access and maintain specific equipment;

.3 or any other walking and working surface not otherwise addressed with a possibility to fall more than 1,800 mm to another level/surface.

.2 Anchorage used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms, and capable of supporting at least 2,300 kg per employee attached.

5.9.3 Waste Management

.1 Indoor spaces

Designs for new or renovated spaces must consider placement of recycling containers. Public, lobby and lounge spaces require a system of depots for source-separation of waste that do not impede traffic flow. As a minimum paper, glass, plastics and metals collection must be provided. Offices and residence rooms require personal recycling and waste containers, as well as garbage/recycling rooms or centralized common disposal areas.

Refer also to Section 5.7, Service Facilities.

.2 Food Outlets

Any new food service areas require containers and space for the collection of source separated waste similar to that required for Indoor Spaces.
.3 Central Waste Facilities

New building construction requires sufficient space for the consolidation of and access to recycled materials and garbage.

Refer also to Section 5.7 “Service Facilities”.

.4 Outdoor Spaces

Outdoor public quads and walkways require a system of depots for source separation, the number of depots being dependent on the volume of pedestrian traffic.

5.9.4 Emergency Eyewash and Safety Showers

.1 Provide eyewash and/or safety showers in areas where exposure to/or contact with corrosive chemicals may occur. Possible locations include laboratories, battery recharge operation and corrosive dip tanks.

.2 Locate eyewash and/or safety showers so that maximum distance from hazard does not exceed 30 m and can be reached within 10 seconds. Locate within same room as hazard such that occupant need not pass through a doorway or weave through equipment to reach eyewash and/or safety shower.

.3 Locate eyewash and/or safety shower adjacent to normal path of egress, i.e. located near corridor door.

.4 Provide tempered potable water to eyewash and safety shower.

.5 Activation device to be uniform throughout building.

5.9.5 Safety and Security

Personnel safety and security are important values that can be achieved and enhanced by prudent planning and design. As outlined in “Design Guide to a Safer City” prepared by the City of Edmonton Planning and Development, dated December 1995 the following planning and design factors enhance personnel safety and security.

Awareness Of The Surrounding Environment
The ability to see and to understand the surrounding environment through unobstructed sightlines, adequate lighting and pointing out possible situations to avoid confined and hidden areas.
Visibility By Others
The ability to be seen by others, reducing isolation, improving the land use mix, intelligent use of activity generators, and creating a sense of ownership through maintenance and management of the built environment.

Finding Help
The ability to communicate, find help, or escape when in danger through improved signs and design.

The following features should be paid attention to enhance personnel safety and security and respond to the planning and design factors.

.1 Lighting and Visibility

Light fixtures shall be placed so as to eliminate entrapment spots and shall provide a uniform level of lighting minimizing the contrast between light and shadow. Light fixtures which can withstand vandalism and which can be easily maintained shall be provided.

Perimeter wall surfaces should be light in colour, which would improve visibility in interior public spaces.

Areas of special attention:

.1 Washrooms

.1 There must be at least two lighting fixtures, of which one should be on at all times and connected to emergency power.

.2 The light switches for the washroom must be controlled. The switches shall either be secure key switches or shall be located within a locked controlled location. They may also be located in an electrical panel, however the breakers or the panel should be locked. This would prevent a person from closing the lights when someone else is still within the washroom.

.3 Natural light should be provided if at all possible.

.2 Stair Lighting

.1 General lighting in stairways shall be connected to emergency power.
.3 Parking Areas (Surface and Underground)

.1 Lighting levels must be adequate to avoid contrast between light and shadow, to eliminate entrapment spots.

.2 Perimeter wall surfaces and under slab areas shall be light coloured so as to provide maximum reflection.

.3 The lighting level in underground parking garages shall be a minimum of 0.5 lux.

.4 Some lighting fixtures in underground parking garages shall be connected to emergency power.

.4 Pathways (Interior and Exterior)

.1 Lighting levels must be adequate to allow an individual to see and identify a person 15 m ahead.

.2 Lighting levels shall be adequate to provide minimum contrast between light and shadow.

.3 Lighting levels shall be maintained along a pathway so that promise of safety at the beginning of the path is maintained along its length.

.4 Temporary lighting shall be provided on hoarding around construction sites.

.5 The designer shall consider providing low level lighting within the shrubbery and landscaping.

.2 Sightlines

All university buildings and surrounding areas must be designed so as to maximize lines of sight ahead, behind and to the sides. Consultants should utilize barrier materials which are visually permeable and use reflective surface at comers to improve visibility.

Maximize clear glazing in areas such as stairwells, elevator lobbies and entrances to offices and work areas.

Landscape material should be selected and located so as not to impede long views.

Building exterior design and placement should maximize overlook and casual surveillance of public spaces.

Areas of special attention:
.1 Corridors

.1 Hidden recesses in corridors shall be eliminated.

.2 In curved or angled corridors, mirrors or mirrored surfaces should be provided to allow a view further ahead.

.3 Wheelchair ramps are to be as open and transparent as possible. The sides of ramps shall not be constructed of a solid material. A transparent material or pickets providing views through and beyond the ramp shall be used. If the ramp is placed adjacent to a solid wall, the other side should be transparent.

.2 Reception or Reference Areas

.1 Reception or reference areas shall not be isolated from other offices or areas. Sight lines shall be provided between reception areas and surrounding spaces providing casual surveillance.

.3 Computer laboratories (and other labs)

.1 In computer laboratories and other areas, it is important to be able to see into these spaces from the corridor, giving people passing by an unobstructed sight line into the spaces and vice versa. In an internal workstation configuration, glass shall be provided in doors and in glazing panels beside doorways.

.2 The designer must find solutions which provide proper sight lines, and minimize noise and provide adequate acoustic privacy.

.4 Library Stacks

.1 There must be an ability to see around edges and through stacks.
.5 Laundry rooms

.1 Laundry rooms shall be located adjacent to high activity areas such as stores, lounges, recreation rooms etc. There shall be windows located in the doors or walls, so that the other occupants and people passing by can see into the space, providing casual surveillance.

.6 Service areas

.1 As with laundry rooms, service areas, typically low traffic areas, shall be located adjacent to high volume, high traffic areas so that the people occupying that space are not completely isolated.

.3 Entrapment and Movement Predictors

Areas of entrapment are to be avoided. Such areas are single entrance/exit offices in areas of low traffic or vulnerable areas such as where student counselling takes place or areas where researchers work at night or during off hours. Other potential areas of entrapment are: unlit recesses, corners or alcoves; small structures (sheds, storage areas) which are unlit or unlocked.

Washrooms which are located in low activity areas can be entrapment areas, especially if the entrance configuration is complicated and communication to a corridor is difficult. Single use washrooms are better choices in low activity areas.

Incorporate clear glass panes in doors to stairwells, corridors and entrances. Alternative pedestrian route's, multiple exits and choices in direction should be provided wherever possible.

Structures which create entrapment spots shall be avoided. In enclosed public spaces, columns, rather than shear walls, should be used as structural members.

In any area where entrapment is an issue, consideration must be given to communication needs, particularly for emergency assistance.
Areas of special attention:

.1 Corridors
   .1 Corridors with unlit recess shall be avoided. Long corridors should have midway exit possibilities. There should be a choice for exiting or going back.

.2 Library Stacks
   .1 Stacks must be arranged so as to avoid people becoming trapped in the stack area.
   .2 Entrapment areas must be avoided and proper sight lines maintained.
   .3 Moveable stacks must be designed so as to avoid people becoming trapped between them.

.3 External paths
   .1 External paths shall be designed and located to avoid entrapment areas. Appropriate signage should be located so as to identify a choice in direction or route, and where each will lead.
   .2 All unnecessary corners, planters, walls and fences which could produce entrapment spots shall be eliminated.
   .3 Pathways which force users to go past entrapment areas shall be avoided. Paths shall be designed to allow users several alternate means of movement and a means of escape.

.4 Edges of Buildings
   .1 Recesses and unlit areas shall be avoided. Reflective surfaces should be provided at corners where appropriate. Proper lighting shall be provided to avoid dark entrapment areas.

.5 Construction zones with hoarding
   .1 On construction sites, entrapment areas are created by hoarding which is not or cannot be properly secured. As well, inadequately signed or inappropriately signed sites can create entrapment areas. For example, when a construction area interferes with a well travelled path (formal or informal), a safe and usable alternate path must be clearly indicated and properly lit.
   .2 Proper lighting must be provided on hoarding.
.6 Underpasses

.1 Underpasses should be avoided. However, where underpasses are required, they should be wide, well lit and provide an opportunity for a change in direction.

.4 Predictable Routes

Predictable routes offer no alternative for pedestrian. An attacker can predict where the pedestrian will end up once they are on the path. Examples include pedestrian tunnels, pedways, staircases. Predicted routes are of particular concern when they are also isolated or terminate in entrapment areas. Some design options include:

.1 improving visibility of and to the predictable routes;
.2 adequate lighting;
.3 providing emergency telephone, panic hardware or electronic surveillance;
.4 improving sightlines along the route;
.5 identification of alternate routes at the entrance to the predictable routes.

.5 Isolation

Isolated activities and those which occur during off hours, such as laundry facilities, shall be located next to high volume, randomly attended activities such as lounges, TV rooms etc. The following measures should be incorporated into the design:

.1 In areas of low pedestrian traffic, clear, concise and highly visible signage should be used. Clear directions to the nearest communication device/must be given.

.2 Wherever it is deemed necessary, alert stations (emergency telephones) and/or formal surveillance (i.e. audio or video monitors) should be used to aid in emergency situations.

.3 Surface parking lots located behind or beside buildings must have sightlines to nearby assistance within the building.

.4 Clear, concise, diagrammatic building plans should be provided inside the building entrance identifying the location of washrooms, telephones, reception areas, public spaces, cafeterias and lecture halls. Sufficient information, identifying the nearest staffed area or exit should be provided at major decision points within the building.

.6 Access Control

The issue of access control is extremely critical. A number of buildings are occupied during normal working hours and are locked for the evening and
during the night. However, other buildings have classes held late into the
evenings, and in some cases students work in libraries late into the night.
Some of the items to be considered should include:

.1 Access control needs to be designed in a way that permits staff to
maintain a separation between public, semi-public and private areas.
.2 A system shall have wide flexibility and the ability to accommodate
change, at relatively low cost.
.3 Main entrances should be designed to be barrier free and easily used by
all.
.4 Special attention regarding access control shall be given to libraries,
student residences and academic buildings used after normal building
hours.
.5 Research area to be considered private and to have access control at all
times.
.6 The main lobby and entrance is preferred to open onto a properly staffed
reception/office area allowing casual surveillance of the entrance to the
building.

.7 Communication

The need to communicate and to be able to call for assistance in cases of
emergency is extremely important. A means of communication shall be
provided in areas of greatest vulnerability where confrontation may potentially
occur including cash collection locations, library fine counters, reception
counter areas, parking kiosk and other areas where confrontational discussions
may occur.

A number of design options could be considered, a final system selection being
dictated by the specific situation following discussions with the University
during the design phase. Some of the design options include:

.1 provision of alert buttons;
.2 providing a network communication system through the computer local
area network. A distress call could be punched in on the computer and
come up on screens in adjacent offices;
.3 providing emergency phones in problematic areas or isolated areas
connected to the Campus Police;
.4 providing a public address system in buildings to facilitate internal
building communication;
.5 maintaining clear sightlines between these areas and adjacent office.

.8 Activity Generators/Activity Mix

High risk and/or low activity areas should not be isolated but located near or
adjacent to high activity areas, e.g. laundry rooms adjacent to common rooms.
This should be considered in the following situations:
.1 Within academic buildings, administrative staff should be located close to academic offices.

.2 There are situations where the office areas and reception areas are far removed from the main doors or entrances to the building. This allows for anyone to enter the building at anytime and leaves the reception area in a very isolated situation. This should be avoided.

.3 Childcare facilities are sometimes situated in isolated locations. They should be located within high activity buildings.

.4 Special attention shall be paid to the location of pathways, entrances and exits for people with mobility difficulties.

An excellent resource for further direction on safety and security principles, areas of concern and checklist is the aforementioned “Design Guide to a Safer City” available from the City of Edmonton.
5.10 Other

5.10.1 Animal Holding

.1 Application

These guidelines on animal holding are only in regards to facilities within teaching and laboratory facilities and do not include facilities at the University Farm.

.2 Architectural

.1 All finishes to be washable and durable.

.2 Floors

.1 Welded sheet resilient, quarry tile or seamless epoxy flooring.
.2 Flooring to be non-slip.
.3 Incorporate integral cove base minimum 150 mm high.
.4 Sub-floor to be concrete. Slope to drain as required.

.3 Walls

.1 Epoxy paint to 2,400 mm above finish floor.
.2 Material to be abuse resistant gypsum wall or concrete block.

.4 Ceilings

.1 Painted gypsum wallboard or mylar coated resilient tile.
.2 Suspension system to be humidly, corrosion and chemical resistant.

.5 As the majority of the finishes are hard special measures need to be taken to control noise. Incorporate sound absorption on wall surfaces.

.6 Where possible incorporate natural light into holding areas. Locate windows above 1,800 mm above finish floor. Operable windows to be hinged at sill (hopper type).

.3 Mechanical

.1 Provide 10 – 15 room air changes per hour. Provide separate exhaust vented directly to the outside. Maintain holding room under negative pressure.

.2 Maintain temperature at 16 - 26ºC and humidity at 30 – 70%.

.3 Consider use of in-floor radiant heat.
4 Electrical

5.10.2 Commercial Vending

1 General

1 Janitorial

1 Provide separate janitorial area not shared with building housekeeping services.

2 Flooring to be seamless resistant or epoxy with integral 150 mm high base.

3 Provide floor level janitorial sink. Provide wall protection to 2,400 mm above finish floor at janitor sink.

4 Provide corrosion resistant shelving.

2 Equipment

1 PROHIBITED – installation of equipment directly over waste connections.

2 Equipment mounted on legs to be provide minimum 100 mm unobstructed clearance below unit.

3 Finishes

1 All finishes to be washable and durable.

2 Flooring

1 Seamless flooring or quarry tile.

2 Flooring to be non-slip in walk area only. Do not install non-skid flooring under equipment.

3 Slope flooring to drain.

4 Incorporate integral cove base, 150 mm high.
.3 Walls

.1 Glazed ceramic tile to 2,100 mm above finish floor. Semigloss paint above.
.2 At wall areas subject to high moisture levels (pre-rinse areas) wall substrate to be water-resistant.

.4 Ceiling

.1 Mylar coated ceiling tile.
.2 Suspension system to be humidity and corrosion resistant.
5.11 Acoustics

5.11.1 General

1. The intent of these guidelines is to ensure that the acoustic environment is conducive to learning and is compatible with the needs and comfort of students and faculty.

2. All instructional spaces should be designed for the attainment of high speech intelligibility.

3. Do not locate instruction spaces adjacent to or below areas that generate high sound or impact levels such as mechanical rooms, large open staircases, galleries, washrooms, lunch rooms, assembly areas, gymnasiums, music rooms, etc.

5.11.2 Definitions

The following are definitions of common parameters used to describe the acoustic characteristics of building environments, materials and assemblies:

- Sound Transmission Class (STC): a single number rating of the sound transmission loss properties of a wall, floor, window or door. A good reference for wall and floor STC ratings is the Alberta Building Code.

- Ceiling Attenuation Class (CAC): a single number rating that indicates how well suspended ceiling systems attenuate airborne sound between two rooms having a common plenum.

- Noise Reduction Coefficient (NRC): a single number rating of the sound absorptive properties of a material ranging from 0.01 (negligible absorption) to 0.99 (very high absorption) rounded to the nearest 0.05. Manufacturers of ceiling boards, wall panels and various sound absorptive finishes will usually list the NRC rating in their product information.

- Room Criteria (RC): a rating of HVAC system noise used as a design goal and for qualifying field installations (was previously referred to as NC).

- Reverberation Time (RT): RT, a key determinant of speech. Intelligence is a measure of the persistence of sound in a room after the sound source has stopped. RT is evaluated by measuring the time required for sound to decay by a predetermined amount. A longer reverberation time indicates a more reverberant space.
5.11.3 Acoustical Requirements

<table>
<thead>
<tr>
<th>Space</th>
<th>STC</th>
<th>NRC (ceiling)</th>
<th>RC (mech. system noise)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>50</td>
<td>0.60/0.70</td>
<td>35</td>
</tr>
<tr>
<td>Offices</td>
<td>45</td>
<td>0.55</td>
<td>35/40</td>
</tr>
<tr>
<td>Common areas (lounges, cafeterias)</td>
<td>55</td>
<td>0.60</td>
<td>40</td>
</tr>
<tr>
<td>Gymnasiuims</td>
<td>60</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Washrooms</td>
<td>55</td>
<td>0.80</td>
<td>45</td>
</tr>
<tr>
<td>Computer Labs</td>
<td>50</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>Music Practise</td>
<td>65</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>Laboratories</td>
<td>50</td>
<td>0.60</td>
<td>35</td>
</tr>
<tr>
<td>Student Bedrooms</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Rooms (garbage holding, mechanical)</td>
<td>55/60</td>
<td>0.80</td>
<td>30</td>
</tr>
<tr>
<td>Libraries</td>
<td>60</td>
<td>0.80</td>
<td>30</td>
</tr>
</tbody>
</table>

5.11.4 Classrooms/Lecture Halls

.1 A fair number of room change requests are received from those instructors assigned to rooms with poor acoustic provision because of excessive noise. It should be assumed that any classroom will eventually, if not regularly, be used for the showing of films/video, and that the noise level should be contained. Therefore, acoustic design and materials should always be incorporated in classroom construction. On larger or uniquely shaped rooms an acoustical consultant should be consulted.

.2 In larger group lecture rooms or multi-media classrooms a stepped ceiling which disperses sound may enhance the acoustical setting. Avoid curved walls and ceilings, however, which may focus sound or cause unexpected echoes (in addition, care should be taken to assure that projection lines, and viewing or sightlines are not obstructed by stepped ceilings).

.3 Do not locate doors in common wall between classrooms. Where this is necessary consider double doors or a sound-lock vestibule with full perimeter acoustic seals.

.4 Wall baffles, and/or acoustic treatment of ceilings and walls should be considered for large group rooms.

.5 Air condition and mechanical noise must be minimized through the use of sound trap.

.6 Isolate as far as practicable through the use of full height walls. Provide a complete air seal at metal deck, piping, ductwork and conduit junctions and penetrations.
.7 Projection rooms should be isolated from lecture rooms – two entrances should be considered for projection rooms: one from the outside corridor, and one into the lecture room from the projection room. Door between projection room and lecture hall should be solid core with full perimeter seals. Window to include an operable portion, other portion fixed, both double glazed units.

.8 Use of operable partitions will generally not provide sufficient sound isolation for adjacent classrooms to function without interruption and should be avoided. If operable walls must be provided, products with STC 50 or better must be used.

.9 Amplification equipment should be specified when reinforcement is needed, particularly when music reproduction and film projection is undertaken. A simple portable amplification system should be available when needed. Controls should be convenient, simple and all in one place. As many controls as possible should be “pre-set” to optimum levels for the respective media to be used.

.10 In larger classrooms wireless microphones are required where voice reinforcement is necessary, so that the lecturer’s movements are not inhibited or impeded by microphone cables.

.11 Microphone inputs should be provided at front of rooms (instructors position) and side and/or rear wall locations in those rooms requiring sound reinforcement.

5.11.5 Office

.1 Where speech privacy is important, walls should be full height and sealed to structure. Where this is not possible a ceiling with a CAC 40 must be provided.

.2 Where speech privacy is required interior windows require a STC similar to the walls. This will typically require double glazing with sealed units and/or air spaces that are larger than normal.

5.11.6 Common Area

.1 Locate student gathering areas away from instructional areas and close to other noise generating activities such as open stairwells, major building centres.

.2 Partitions to be full height. STC rating to reflect adjacent areas requirement.
5.11.7 Gymnasium

.1 Consider use of acoustic roof deck and/or impact resistant acoustic panels.

.2 **PROHIBITED**—glue on ceiling tiles.

.3 Consider use of additional sound absorptive material to upper portion of sidewalls. Treatment should have a minimum NRC 0.70.

.4 On gymnasiums larger than two full-size basketball courts involve an acoustical consultant.

5.11.8 Washrooms

.1 Provide a double plumbing wall between washrooms and instruction space. Ensure structural separation is maintained and piping is attached ONLY to washroom side of the double wall.

.2 Where washroom doors are not provided provide sound absorption materials to walls (minimum NRC 0.85) and indirect view lines at entry.

5.11.9 Computer Labs

.1 Refer to Classroom for requirements.

5.11.10 Music Practise Rooms

.1 In one or two person practise rooms all wall surfaces should have a sound absorptive finish with a minimum NRC 0.80 to minimize rooms resonance.

.2 Group practise rooms will benefit from adjustable acoustics providing a more live setting. Consult an acoustical consultant for recommendations on shape, materials and acoustical treatment.

.3 Provide steel or solid core doors with full perimeter seals.

.4 Partitions to be full height.

.5 Avoid mechanical ducting that promotes “cross-talk” between practise rooms.
5.11.11 Mechanical Considerations/Noise and Vibration Control

.1 General

.1 Refer to the following references for additional guidance:

- ASHRAE Handbooks, most-current version

.2 System Components and Layout:

.1 Consider impact of mechanical noise on nearby residences or other noise-sensitive properties. Silence or strategically locate outdoor mechanical equipment or intake/exhaust openings to meet City noise by-law requirements (50 dBA night-time Leq). For remote facilities, in the absence of a noise by-law design systems to a maximum noise level of 55 dB(A) at the facility property line.

.2 Locate rooftop equipment over corridors or other non-critical areas; avoid placing equipment over instructional space. (If required for external review, have available any details describing acoustic treatment, duct configuration and roof penetrations for any rooftop installations.)

.3 Locate mechanical room or main air handling equipment away from noise sensitive areas such as instructional spaces. Ensure large equipment is equipped with vibration isolation hardware appropriate to its location.

.4 For an air-handling unit that draws intake air from the room it is contained within, allow sufficient clearance between the air-intake and the facing wall. The clearance should not be less than the maximum dimension of the intake grill.

.5 Locate an in-duct silencer within the mechanical room as close as possible to the wall that the duct penetrates. For walls that are not fire-rated, part of the silencer should penetrate the wall.

.6 Avoid locating duct shafts in lecture rooms.

.7 Maintain adequate spacing between ductwall and the nearest wall(s): the clearance should equal 10% of the duct's larger dimension OR 150 mm, whichever is larger.

.8 Use masonry construction for large mechanical shaft walls that are common to occupied areas.
.9 Whenever possible, design the system layout so that any medium-velocity ducts and terminal boxes are in non-instructional areas such as corridors.

.10 Use flexible connections between fans, plenums and all related ductwork.

.11 Provide smooth airflow conditions near the fan units to minimize air turbulence. Large, rectangular ductwork with medium and high air velocities can create low frequency duct rumble. Spiral-wound, round duct is preferred for air velocities over 9 m/s or where excessive turbulence is anticipated.

.12 Select terminal box on basis of both in-duct and radiated noise level. Manufacturer's VAV box noise data often assumes the equipment is located above a mineral fibre suspended ceiling and assumes the use of acoustically lined duct. Ensure that design conditions correspond with these requirements.

.13 Suspend terminal box and other similar equipment independently from deck above (do not permit to rest on suspended ceiling grid).

.14 Plan separate supply feeder duct into each room from main supply trunk over corridor (one common trunk-duct directly above rooms with short take-off(s) into each room is unacceptable).

.15 Select diffusers/air outlets so that the combined sound from all diffusion in a room meets the design criterion. Noise from a single diffuser will typically need to be 6 - 10 dB lower than RC(N) criteria.

.16 Locate balancing damper at least 2 meters upstream of diffuser/outlet.

.17 Provide at least 600 mm of straight duct ahead of diffuser inlet.

.18 Placement of Return-Air grilles. (1) Where classroom doors are located immediately adjacent (along a Corridor) or directly opposite (across a Corridor), keep ceiling-mounted return-air grilles within the rooms as far apart as feasible or, in the case of a series of classrooms or offices, evenly spaced from one another. Return air grilles need not be directly above the room entry. (2) Where a wall between a Classroom (or Office) and a Corridor continues above the ceiling to the roof-deck, openings in the wall above the ceiling for return-air need not be directly adjacent to the return-air grille in the classroom/office ceiling. Even distribution along the Corridor is suggested. For particularly noise-sensitive areas, include a sound trap (Z- or L-shaped) in this opening; there should not be line-of-sight through the sound-trap.

.19 Where perimeter heat cabinets are planned, ensure the use of non-continuous cabinets that terminate at intersecting walls. Discontinue use
of fins at all wall junctions and provide for a complete airtight seal where the heating pipe passes through the wall.

.20 For renovation of spaces using perimeter heating cabinets equipped with air-induction coils, induction unit MUST be moved/relocated if situated where a new wall is to come. Continue wall/partition in through cabinet with airtight seal around piping.

.21 Locate furnaces outside of lecture rooms or in suitable closet to ensure background noise level criteria are maintained. Provide adequate silencing of supply and return air from furnaces. Utilize acoustically lined plenum ducting or transfer ducts as applicable.

.22 The use of heat pumps should only be considered where all other options have been reviewed as non-viable. Locate units outside instructional spaces.

.23 Do not use in-wall ventilation in lecture rooms unless the equipment has certified noise data indicating that the background noise criteria can be achieved at a distance of 1 metre from the unit.

.3 Plumbing Noise

.1 Use a resilient sleeve around supply pipes with oversized clamps fastened to structure, in areas where water flow noise may be a disturbance. Sleeves comprised of 12 mm thick closed-cell elastomeric pipe insulation or proprietary resilient pipe fasteners are acceptable. Do not use hard plastic sleeves.

.2 Clamps supporting risers should be separated from the floor with a vibration isolator and should be oversized to accommodate a full-surround isolating layer between pipe-wall and clamp.

.3 Ensure that pipes penetrating through drywall partitions are not rigidly connected to the structure. Provide a sleeve at the wall opening, leaving an air space around the pipe, and seal with a resilient caulking.

.4 Where double plumbing walls are used (e.g. washrooms), attach supply piping only to the fixture side of the wall structure.

.5 Consider the use of pressure reducing valves (PRV's) in the system to minimize plumbing noise for noise sensitive areas. Size PRV's to limit the pressure at fixtures to 375 kPa.

.6 Divide water supply lines at the riser with each room fed separately. Tee takeoffs serving back-to-back fixtures in separate washrooms should be avoided.
.7 Install water hammer arrester adjacent to any quick-acting solenoid valves.

.4 Vibration Isolation

.1 Use the current ASHRAE Applications Handbook as a general guide for selecting vibration isolators and concrete inertia bases.

.2 Use flexible connectors on pumps requiring vibration isolation from related piping. Twin sphere neoprene rubber flex connectors are the preferred type.

.3 Locate rooftop mechanical equipment on a stiff portion of a lightweight roof to eliminate resonance problems. Vibration problems can usually be avoided if the static deflection of the spring isolator is at least 15 times the structural deflection of the roof caused by equipment loading. Coordinate with structural consultant.

.4 Locate emergency generators at grade level to avoid structural vibration problems.

.5 Other Areas

.1 For woodworking areas provide dust collection equipment that maintains a safe working environment, in particular with respect to noise and exposure to wood dust.
5.12 Heritage

A facility will be considered for retention based upon its significance within the University and/or its historical merit (building design, environment and/or history). If the building is to be removed, significant elements may be selected and retained for inclusion in a new building. At the least, a new building will house a publicly visible photo archive of the original facility.

For buildings that are retained the following guidelines must be followed for the renovation/rehabilitation of the building.

5.12.1 Original Character

The original distinctive qualities and character of the building should be preserved. The removal or alteration of any historical materials or features should be avoided whenever possible. Alterations which are not based on historical fact or which recreate an earlier or a later design idiom shall be discouraged.

Changes may have occurred over time. These alterations are evidence of the history and development of the building. Because this evolution may have acquired a significance in its own right, alterations to the original building materials which have been thoroughly tested and found satisfactory in situ, shall be used.

Distinctive stylistic features and examples of skilled craftsmanship should be preserved and treated sensitively. Deteriorated architectural features should be repaired rather than replaced whenever possible. Where replacement is necessary, the new material should match the original as to composition, colour, texture, design, etc. The repair or replacement of architectural features should be based on a sound knowledge of the original characteristics of the feature. Such knowledge should be based on historical or pictorial evidence and not upon conjecture.

5.12.2 Recording

Prior to undertaking any alterations, particularly in cases where alterations may threaten the building fabric (underpinning, moving structures), compile a complete record of the architectural features of the building. Measured drawings and photographs of details may prove invaluable if major features are damaged or lost during the subsequent repair work.

5.12.3 Cleaning

In all cases, surface cleaning should be undertaken with the gentlest means available. Sandblasting in particular, but also other cleaning methods, damage historic buildings and should not be undertaken without thorough testing prior to use on a building. Sandblasting is NOT recommended on brick, stone or wood. In all instances, it should be ascertained that a building exterior is really in need of cleaning prior to undertaking the work.
5.12.4 Design and Detail

When the introduction of new elements or materials are necessary to stabilize or preserve a historic resource, alterations should be undertaken such that the new materials, should they fail, may be removed at a later date without damage to the original fabric of the structure. Where this is not possible (i.e., use of epoxy) only those methods and materials which have been thoroughly tested and found satisfactory in situ, should be used.

In some historic structures, poor construction details or inappropriate materials resulted in rapid deterioration of certain building elements. In these instances, accurate reconstruction of the original detail will inevitably result in the failure of the element. Therefore, reconstruction should be undertaken in such a fashion as to duplicate the original appearance as closely as possible while using details based on sound construction practice which have no deleterious implications to adjacent materials or structure.

Contemporary design for alterations and additions to existing heritage buildings shall not be discouraged when such alterations and/or additions do not diminish the overall character and such design is compatible with the size, scale, colour, material, and character of the building, neighbourhood or environment.

5.12.5 Fire and Life Safety

At no time should the life and safety of occupants be deemed of lesser importance than the preservation of the original fabric of the building. The required life and safety standards are those required by the current Code. However, notwithstanding these Code requirements, where the essential character of the structure is threatened by changes for Code reasons, every effort should be made to achieve an equivalent safety standard by alternate means so as to minimize the impact on the historic fabric.
5.13 Circulation

5.13.1 Site

.1 Pedestrian Walkway
.2 Private Vehicles Access
.3 Service Vehicle Access
.4 Parking Lots

- under development

5.13.2 Building Circulation

.1 Building Entrances

.1 Primary building entrances to be located to reflect pedestrian routes and vehicular drop-off. All primary entrances to provide barrier free access.

.2 Barrier free door operators are to be incorporated into each designated barrier free access. Push button operation for leaf type doors is to be utilized. High traffic use entries are to incorporate sliding barrier free entry doors with infrared activation devices. High traffic use are doors with 500 cycles per day.

.3 Additional free floor space is to be made available adjacent to each barrier free point of entry within the vestibule. This space is to be designated for at least two wheelchair positions for disabled adult or alternative transportation pick-up. These areas are to have clear view of the designated vehicular pick-up/drop-off. Public telephones to be located adjacent to these locations for contacting private or public transportation sources.

.4 All building entrances to be protected with a vestibule. The distance between the doors in vestibule with barrier free door operator is to be sufficient to allow the cycling of the door operators, such that only one door is open at a time. The maximum distance between doors required is 8 m.

.5 Primary entrances to incorporate walk-off aluminium grilles with deep recessed pans. Grilles to be continuous door to door the width of the travelled area.

.6 Primary entrances to be fully glazed with clear view into building and to drop-off areas.

.7 Secondary and service entrances to include a finger lite in the doors.

.8 Provide building directory signage at each primary building entry. Provide tackable panels for postings and announcement at that same location.
.9 Adjacent to a primary building entry consider providing display and recognition features (i.e. trophy case).

.10 The primary entrance and lobby to buildings should, where possible, provide visual access from staffed reception and/or office areas allowing for the maintenance of casual surveillance of the primary entry to the building.

.2 Pedway/Connection Bridges

.1 Minimize ramp within pedways to less than 2%. Ensure sufficient level area (in excess of minimum code requirements) is provided on both sides of doors for queuing.

.2 Provide acoustical attenuation within pedways.

.3 For personal safety fully glaze pedways to minimize hidden conditions.

.4 Floor finishes to be non-slip.

.5 Doors:

.1 Doors into pedways to be paired with barrier free operations on at least one leaf. Separate doors with a removable mullion.

.2 Door finish to be maintenance free (anodized aluminium in lieu of painted metal).

.3 Preferred to have door fully glazed. At a minimum provide a finger lite viewable both from a standing/walking position and from a wheelchair.

.6 Structural isolate pedway from adjacent building structure to minimize differential movement.

.7 Provide independent HVAC systems separate from adjacent buildings for pedway.
5.13.3 Corridors

.1 The corridor circulation system is to be continuous from the primary or barrier free entry to all points of the building and connect through all areas of the floor plate requiring public access.

.2 Public corridors to be of sufficient width to accommodate the designated building occupant load with additional width requirements to accommodate wheelchair traffic in both directions.

.3 Projections into corridors should be limited to widths not exceeding 100 mm (4"). Service elements such as fire hose cabinets, recycling centre, drinking fountains, etc., should be recessed where possible. If protruding elements must be incorporated their locations should be limited to off traffic areas.

.4 Where possible corridors should be a minimum of 1,500 mm (5'-0") in clear width. In areas serving assembly areas (classrooms etc.) the minimum corridor width is 2,400 mm.

5.13.4 Stairs

.1 Design criteria to be incorporated into interior stairs include the following:

- clear visible sight lines throughout the stair enclosure to minimize concealed enclosure or alcove configurations;
- installation of durable surface finishes to address a high pedestrian traffic volumes anticipated in stairs designed for vertical circulation and exiting;
- appropriate light levels to ensure clear visibility in the horizontal and verticals dimension;
- view lights incorporated into access doors to ensure clear line of sight in direction of travel;
- selection of floor materials that incorporate a non-slip finish with visual distinctive contrast colour and/or texture incorporated into changes in vertical dimension (at stair nosings);
- consideration of use of stairs at a higher level of use than defined by the Code. (Stairs are often the preferred mode of travel by the students – the width should be size to reflect this reality.).

5.13.5 Vending/Locker Nodes

.1 On all teaching or laboratory facilities provide vending and student locker areas. Locate close to areas of high volume traffic including elevators, stairs and entrances.

.2 Design vending and locker areas to ensure good viewlines from adjacent areas. Use of partial height walls (less than 1,200 mm high) and glazing is encouraged.
.3 Within vending and locker areas provide shelving for temporary placing of knapsacks, books, etc. Design shelving to minimize vandalism.
5.14 Facility Access (Keying)

.1 Clear approach and understanding of access control to University facilities must be considered. A number of buildings are occupied during normal working hours and are secured for the evening. A large number of buildings however maintain classes at night or evenings with students accessing libraries and other support services during night and off peak hours. University teaching and research staff also require various levels of access to numerous facilities each requiring various levels of security. A number of design principles need to be considered when addressing access control. These include the following:

- Access control needs to be designed to permit staff to maintain a separation between public, semi-public and private areas. These higher levels of access should be limited to interiors of suites within a building. Direct access to secure areas from major circulation corridors within a building should be avoided.
- The method of controlling access should incorporate card and keypad access control hardware currently utilized by University Facility Management Services. Consider incorporation of systems which provide flexibility of use and can accommodate immediate change.
- Special attention and consideration for access control shall be given for facilities that require 24 hour 7 day access such as libraries, student residences and academic buildings utilized beyond normal building hours.

.2 The University Access Central System (UAAC) is not a product of today’s major cared access control system manufacturers. With its origins in the mid 1980’s, the UAAC has been and continues to be supported by local Edmonton hardware and software suppliers and University staff. A new generation of access control panel was developed in 2001/2002 and is being implemented in all new installations.

.3 The UAAC in a building consists of one or more Access Control Units (ACU’s) in a building connected to a network of local door controllers which in turn are connected to end devices such as card readers, electric locks, door switches, exit devices, elevator controllers, etc.

.4 In general terms, on large capital projects, the University supplies, installs and terminates the UAAC access Control Unit (ACU), local door controllers and card readers. The University also builds the UAAC software database and graphics, prepares elements of the system documentation and commissions the UAAC. All other elements of the UAAC including door position switches, electrical locks, request to exit devices, elevator modifications, conduit, wire, etc. And associated terminations are undertaken by the project door hardware, electrical and elevator contractors selected through competitive tendering.

On smaller retrofit projects the entire project is typically co-ordinated and executed using University staff. Project Managers are encouraged to contact the UAAC Design Co-ordinator at the beginning of a project to discuss and agree on an appropriate scope of work between electrical contractors, door hardware contractors, elevator contractors and University staff.
.5 UAAC Designer Co-ordinator – heads up the UAAC Engineering Group. Responsible for co-ordination with the design consultant to design the access control system and prepare specifications including door lists, door details and floor plans. Arranges for purchase of University supplied UAAC equipment.

.6 Design Process

.1 A risk analysis must be completed to determine the requirement for access control and security systems and to determine if any additional measures such as training, revised policies and procedures, area re-design, etc. are required to ensure that the risks identified are being addressed in an appropriate manner. Depending on the complexity of the project this risk analysis could be completed internally by the department, in conjunction with the UAAC Design Co-ordinator or by a security task force.

.2 Once the risk analysis has been completed the UAAC Design Co-ordinator meets with the Consultants to review the design proposed for the new building/retrofit project. In the case of small retrofits the UAAC Design Co-ordinator will determine the electrical and door hardware requirements with University trades.

.3 The electrical drawings are reviewed and comments submitted. This includes a set of floor plans showing each door and what devices are to be installed at each door.

.4 The UAAC Design Co-ordinator works with the Consultants to develop door detail drawings indicating the proposed configuration for all security doors.

.5 A specification is produced to cover the installation of the UAAC wiring and devices and is forwarded for inclusion in the building specification.

.7 General Design Considerations

.1 In the majority of cases the card readers are to be compatible with the University’s ONEcard. Depending on the application and the outcome of the risk analysis, other card technologies may be appropriate. The preferred approach, if not ONEcard, is HID proximity card technology. Contact the UAAC Design Co-ordinator for specific details.