Staff Safety Guidelines For Interior Health Facility Design Projects

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1. Design Philosophy and Scope

Interior Health (IH) supports the planning and design of our facilities to produce an environment of care that is safe for all occupants (clients, staff and visitors). The planning and design of the facility should include provisions for achieving the following objectives related to the health and safety:

- Current provincial and national ergonomic, violence prevention, building and fire codes and occupational health and safety regulatory standards are followed
- The built environment promotes wellness to all users
- The built environment works to mitigate physical, psychological and emotional risks to all occupants
- General “Crime Prevention through Environmental Design” (CPTED) principles are followed to support a safe environment

This document is intended to help guide planning and design decisions impacting staff health and safety for new construction and renovations. It is advised that the information in the guideline be implemented for new construction and major renovations. For all other renovation projects the information is to be considered. As standards are revised and upgraded on a regular basis, existing facility design is not expected to adhere to all of the recommendations found within this document. However, if an existing facility does undergo a renovation these guidelines are to be reviewed and consideration taken to implement within the redesign.
Note: In any case where the guidelines are not deemed appropriate or feasible, alternate options are to be determined and implemented to mitigate risk.

Interior Health safety consultation areas of responsibilities are:

Workplace Health and Safety	Protection Services
• Ergonomic design • Violence prevention design • Occupational hygiene design	• Violence prevention design • Security processes and system design

2. Health and Safety Consultation Process for Facility Design Projects

2.1 Health and Safety Consultation Process

Step 1

Determine if your project involves any high risk areas for staff health and safety design as outlined in section 3.

Step 2

1) If the project **DOES NOT** involve high risk areas for staff health and safety design, **the project design team** is to:
   a. Reference this document and incorporate the staff health and safety design specifications throughout all phases of design planning.
   b. The design team may consult with regional Human Resource Business Partner or Workplace Health and Safety Advisor and Protection Services for additional clarification at any design stage. WHS can share applicable resources and if feasible consult with IH Subject Matter Experts but will not sign-off on design plans at any stage of the project. If design plan sign-off is required, a qualified external consultant should be included in the project.

2) If the project **DOES** involve high risk areas for staff health and safety design, the project design team is to:
   a. Reference this document and incorporate the staff health and safety design specifications throughout all phases of design planning.
   b. Health and Safety consultation must occur. Consultation is dependent on the high risk topic and is to begin at the schematic and design development stages. An external consultant specific to the high risk topic is to work with the design team and fulfil this consultation piece.
   c. The design team may consult with regional Human Resource Business Partner, Workplace Health and Safety Advisor and Protection Services for additional clarification at any design stage. WHS can share applicable resources and if feasible consult with IH Subject Matter Experts but will not sign-off on design plans at any stage of the project. If design plan sign-off is required, a qualified external consultant should be included in the project.

Additionally,

3) The external consultant must have certificated designations and relevant experience in their field. The external consultant may contact Workplace Health and Safety Advisors if additional information is required.
4) All renovation projects must include a qualified professional to consult on identification and remediation of hazardous material such as asbestos, lead and other heavy metals, flammable and other toxic materials. More information on 2 of the most common hazardous materials can be retrieved from WorkSafeBC Safe Work Practices for asbestos and lead.
5) If the project involves technical commissioning of major equipment and mechanical systems, a qualified Occupational Hygienist is to be sourced and consultation added within the scope of the project.
6) As per Workers Compensation Act 130(g) the project is to consult with site Joint Occupational Health and Safety Committee (JOHSC) “to advise the employer on proposed changes to the workplace, including significant proposed changes to equipment and machinery, or the work processes that may affect the health or safety of workers”.

2.2 Workplace Health and Safety Input at Each Design Stage

Area	Stage of Design	Specific Requirements
Ergonomics	Planning	1. Request a summary of staff injury / incident reports from Workplace Health and Safety to identify potential high risk areas and known design implications. 2. Refer to this document to determine Workplace Health and Safety recommended equipment (e.g. section 4.3 – office workstations, section 5.4 – safe patient handling). Review equipment list to ensure staff safety equipment is incorporated. 3. If plans include ceiling lifts, reference the Interior Health Safe Patient Handling Policy and Ceiling Lift Allocations Guidelines and implement accordingly.
	Schematic Design	1. Review plans for ramps. Avoid ramps if at all possible. If not possible recommend ramp incline ratio that is safe for a healthcare environment (maximum 1/20 ratio or 2% grade) and recommend inclusion of midway step. 2. Essential corridor distances and turning radii dimensions shall be maintained. 3. If additional patient convoy equipment (e.g. Cardiac Operating Room patient transport to CSICU) required then promote wider corridors, room entrances and elevator widths.
	Design Development	1. Where ceiling lifts are located, ceiling layout plans shall be reviewed to determine lighting and other ceiling fixtures (e.g. HVAC, sprinklers) do not interfere with optimal ceiling lift gantry location. If charger location is a single point, charger location should be located to prevent carry bar damage/interference with key equipment (e.g. physiological monitors), does not interfere with circulation paths and that associated electrical plug for charger has been included at ceiling height. In open treatment bay areas, coordinate privacy curtain track design with ceiling tracks to ensure patient privacy can be maintained. 2. For workstation/mounted equipment heights/depths/widths, reaching distances and viewing distances implementation of anthropometric standards is required. Refer to section 4. If these ergonomic recommendations can't be implemented, rationale must be provided; the site must be formally made aware of the associated ergonomic risk factors. 3. Review door widths and door swings from both an ergonomic and workflow perspective. Refer to section 7 for recommendations. 4. Review light switch access and ensure switches are user friendly. Request a working sample of light switches from vendors and review the functionality with staff. Determine, with users, areas where flexible lighting levels are needed. 5. Review practical placements of cable, phone and computer data outlets and head wall requirements. In patient care areas, the electrical plugs accessed by staff are to be placed at the approximate height of 910mm (and not at the building code standard of 460mm height) wherever feasible. In office/team care station areas include some electrical and data above work surface counter for phone charging and equipment that may require data and electrical.

Area	Stage of Design	Specific Requirements
Occupational Hygiene and Safety	Schematic Design	1. Determine what areas will require maintenance of critical conditions (such as negative air rooms, dirty/clean laundry areas, reprocessing areas) and storage of toxic materials. 2. Determine any sources of outdoor contaminant to avoid infiltration into building and place intake/exhaust to avoid cross-contamination (e.g. loading docks, ambulance zone, parking zones even at a distance can create contaminant infiltration into building by wind/thermal inversions). 3. Air quality thermal standards and codes shall be in place. 4. Design shall incorporate effects of outdoor conditions on air rates/CO_2 levels specifically in extreme temperature situations involving air conditioning/heating system venting. 5. Determine any sources of hazardous product use and ensure adequate hygiene facilities (eye wash and showers) are in place.
	Design Development	1. Review of the Heating, Ventilation and Air Conditioning (HVAC) system design shall include all components such as condensate drains, water baffles, cooling towers. 2. Adequate access points into HVAC or Local Exhaust Ventilation (LEV) system for inspection, cleaning and servicing shall be available. 3. Placement and specifications of insulation materials shall be adequate and appropriate. 4. Identify high risk equipment/materials from previous incidents of similar operations, and examine equipment manufacturer health and safety information for materials that may contribute to indoor environmental pollution/possible contamination issues (e.g. carpets, adhesives and fire-proofing materials), volatile organic compounds (VOC) emissions, off-gassing options and consult with WHS on mitigation strategies based on findings. 5. Appropriate lighting options and levels shall be chosen based on user needs. Refer to section 9. 6. Appropriate materials etc. shall be chosen to meet noise levels recommended by Canadian Standards Association (CSA) and other design standards.
	Construction Commissioning	1. Determine end-user commissioning processes for all specified equipment and mechanical systems (e.g. smoke tests). 2. All temporary ventilation shall be removed and replaced with long-term ventilation system when construction is complete. 3. Inspect and verify HVAC system components are constructed as designed, critical service and cleaning areas are accessible and insulation is installed according to design. 4. Pre-occupancy indoor air quality (IAQ) testing shall be completed AND once the building is operating at full or close to full capacity. Comparison of the results and recommendations such as American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standards shall be provided to the project manager.
Violence Prevention	Schematic Design	1. Review section 8 of this document and highlight specific needs outlined in CSA for violence prevention. 2. Review Violence Risk Assessment (VRA) – Environmental survey requirements and incorporate design elements into project. • Environmental Survey Tool - General • Environmental Survey Tool – Corporate Departments 3. Include site Joint Occupational Health Safety & Committee (JOHSC) at this stage to provide input into VRA requirements and any additional worker safety operational needs.

Area	Stage of Design	Specific Requirements
Violence Prevention	Design Development	1. As per section 8, recommendations shall be carried out re: ceiling types, ceiling fixture types, wall composition, door hardware, door types, door viewing needs, door access, glass composition, mirror composition, hardware and integral blind needs and other window viewing options, light fixtures etc. as per level of risk identified for the area and per the CSA requirements. 2. Consult Protection Services to provide recommendations on building / area design in line with IAHSS Design Guidelines, and industry best practice. 3. Provide recommendations on building / area design in line with Crime Prevention through Environmental Design (CPTED) principles. Amongst other considerations, Protection Services will typically review the following: • Site lines • Exterior lighting • Appropriate use of closed circuit television (CCTV) cameras, including viewing and recording needs • Access control, including appropriate use of electronic access control measures • Parking and bike storage • Staff and public access routes and movement flow plans 4. VRA design requirements that apply to project shall be all incorporated at the design development stage.
	Commissioning	1. Violence Risk Assessment for new area to be completed by site once operational. Ensure site JOHSC is involved at this stage.

3. High Risk Areas for Staff Health and Safety Impacting Design

In any healthcare organization, there are a number of areas / departments that are considered high-risk, for different reasons. For the purpose of this document, the term “high risk” will strictly focus on areas where there is a higher risk for staff health and safety and design requirements shall be implemented to mitigate risks. Risk mitigation strategies shall be provided for any of the following high risk areas that are included in the design.

3.1 Ergonomic High Risk Areas

1) Client care areas where transferring and repositioning of patients is required
2) Client treatment areas where staff must work in awkward postures to perform the procedure (e.g. conducting ultrasounds and delivering newborns)
3) Work that requires highly repetitive tasks (e.g. inputting for extended periods, precision lab and pharmacy procedures)
4) Work that requires using multiple technologies at one workstation (e.g. reception, triage, switchboard and lab)
5) Support service work that requires moderate to heavy lifting, manoeuvering large carts/equipment into tight spaces and providing maintenance to stationary equipment in tight spaces

3.2 Occupational Safety and Hygiene High Risk Areas

1) Laboratories:
   a. Highest risk area in healthcare for potential exposures
   b. Carcinogenic, caustic and toxic process chemicals used
   c. Specimen fixation with formaldehyde containing substances
   d. Tissue processing and staining with xylene
   e. Biological infectious substances
   f. Specialized ventilation requirements, fume hoods and grossing stations to contain potential aerosolization of biological and chemical contaminants

2) Medical Device Reprocessing:
   a. Hazardous Process Chemicals used, such as parasitic acid and hydrogen peroxide
   b. Specific air pressure standards for clean / dirty rooms
   c. Local exhaust and general exhaust to control exposure to disinfectant chemicals
   d. Heat stress engineering requirements

3) Labour and Delivery:
   a. Anaesthetic gas usage, possibly portable
   b. Special ventilation requirements for medical gas , such as scavenging system for waste anesthetic gases
   c. Possible requirements for storage and transport of specimens in formaldehyde

4) Laundry:
   a. Large volume of concentrated laundering chemicals
   b. Separation of incompatible laundering chemicals (e.g. acid and bleach)
   c. Potential spill containment requirements, sewage and environmental considerations
   d. Any special storage requirement under product Safety Data Sheet (SDS)
   e. Machine guarding and lockout considerations
   f. Lint dust control. Use of high efficiency particulate aerosol (HEPA) vacuum instead of compressed air as a primary method for dust control

5) **Kitchen and Food Services**:
   a. Entrapment of walk-in freezer
   b. Hot surfaces
   c. Lockout and guarding

6) **Ambulatory Care Unit:**
   a. Reprocessing
   b. Special requirements for heating, ventilation and air conditioning (HVAC) system in health care facilities as per CSA Z317.2

7) **Operating Room:**
   a. Medical gas, leak handling, management and monitoring
   b. Medical gas scavenging systems, internal monitoring and function alarming
   c. Specimen fixation, formaldehyde dispensing system, tissue fixation, storage for specimen fixers and fume hood for handling. Local exhaust systems for capture of fugitive vapours
   d. Scavenging system to capture and neutralize laser plume

8) **Maintenance:**
   a. Mechanical rooms and refrigerants
   b. Confined space requirements, egress and emergency escape considerations
   c. Machine guarding and lockout
   d. Carpentry, electrical and plumbing

9) **Diagnostic Imaging:**
   a. Process chemicals used
   b. Ventilation locally for fugitive vapours

10) **Other:**
   a. Areas where fall protection or confined space equipment may be required (e.g. Window washing-anchor points and guardrails where personnel are likely to require access. Roof structure must be designed for safe access and egress)
   b. Areas that require special temperature and/or humidity levels. These areas may include computer / network equipment areas
   c. Areas with potential for excessive noise levels. These areas may include mechanical rooms, laundry service and food service areas
   d. Areas with potential for inadequate lighting levels. These areas may include enclosed stairwells, interior hallways, storage areas and exterior walkways
   e. Areas with potential for slips, trips and falls. These areas may include corridors, stairwells and outdoor walkways

11) **All Areas with Chemicals in Use:**
   a. Hygiene facilities for decontamination (eyewash, shower) to be provided as required in accordance with Occupational Health and Safety Regulation (OHSR) Section 5.88 and 5.89. This is required for all areas that **store** and/or **use** hazardous products. Risk assessments to be conducted in accordance with Table 5-2 and equipment provided in accordance with the requirements of Table 5-3.
      - The Interior Health Emergency Wash Stations Guidelines can be used as a useful tool.

3.3 Violence High Risk Areas

- Emergency Departments
- Mental Health and Substance Use
- Residential Care

If unsure / not identified if the areas included in the project are deemed to be high risk for staff safety, consult Workplace Health and Safety for direction.

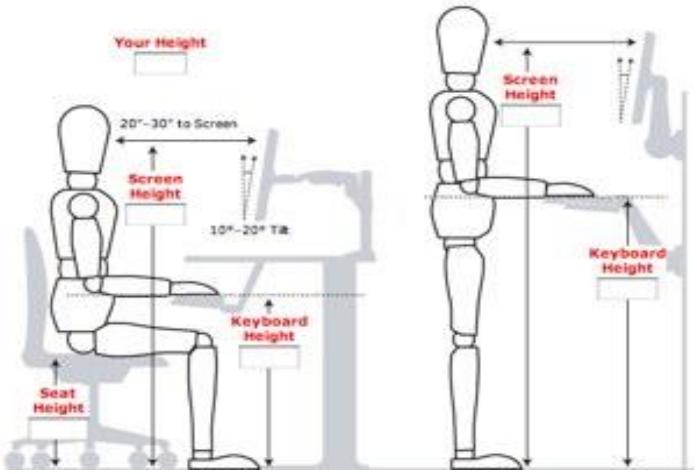
4. Workstation Design Requirements and Recommendations

4.1 Space Allocation

All IH office environments shall be sized according to the "Interior Health Space Guidelines" document.

4.2 Workstation Dimensions and Distances

Modular furniture is recommended over millwork. This will allow for flexibility and adaptability. If fully modular furniture is not practicable in an environment, then components, such as drawer units, keyboard trays and shelving units must be designed to allow for flexibility. Adjustable workstations must be considered in standing workstations and multi-user work areas involving precision work. Where millwork is deemed appropriate, the minimum requirements must be met:



Area	Dimension (mm)	Specification
Sitting Workstation Specifications	730 (+/- 25 mm) 660-810	1. Seated work station height – stationary* 2. Seated work station height – adjustable*
Sitting Workstation Specifications	970 927-1153 (5th percentile women – 95th percentile men) 940-1190 864-940 711-864	1. Standing work height (stationary)* 1) For intermittent use only 2) Not recommended for workers standing at workstation more than 2 hours of their work shift. 2. Standing work height (adjustable)* 1) Recommended option for standing work stations specifically multi-user use where standing longer than 2 hours of work shift. 2) Consider work tasks when determining standing height dimensions. ○ Precision work tasks ○ Light work tasks ○ Heavy work tasks

Area	Dimension (mm)	Specification
General Workstation Specifications	560	1. Height between work surface and bottom shelf (located above work surface) **Note: to allow monitor to easily fit between shelf and desk top, adjust as needed while still considering reach distances**
	900 600	1. Clear leg space underneath a work surface:** - Width - Depth (from desk surface front edge)
	610	1. Minimum work surface depth where: - No monitor and used as writing surface - Monitor on desk top and keyboard tray used (no keyboard on desktop)
	760	1. Minimum work surface depth where: - Monitor and keyboard on desktop (no keyboard tray) - Unit clerk, switchboard and main reception areas
	290	1. Minimum toe clearance (depth) if solely a standing work station and stools will never be used
	1520 910	1. Circulation Space - Minimum space behind chair with person in seated position if staff will be walking behind workstation (e.g. team care station) - Minimum space behind chair with person seated if staff will not be walking behind workstation (e.g. dictation booth)
	1060-1100 330 330 610	1. ***Transaction shelf - Height of transaction shelf from floor - Height between work surface and top of transition shelf - Depth of transaction shelf - Maximum depth between worker and client at transaction interaction space

*These dimensions are based on a desktop lip of 1” and assuming no keyboard tray in place. Adjust for areas with a keyboard tray or desktop lip >1”.

**The space under the work surface shall be free of gables/items that interfere with leg space. Consider cantilevered workspace/minimal brace supports. Use mobile shelving/drawer under work surface to be used for flexibility of space.

***Not recommended in areas where armbands must be applied or paperwork passed through at seated level.

4.3 Additional Staff Health and Safety Design Considerations for Workstation Areas

Area	Subject	Specification
Workstation Areas Workstation Areas	Ergonomics	1. High risk areas may include: team care stations, reception, triage, admitting areas and pharmacy & laboratory workstations. 2. In work areas requiring transaction with the public or clients, transaction of items (handing things back and forth) must not occur above computer monitor. Particular care must be taken to ensure reaching distance is within safe zone for those staff having to frequently reach to hand out items or apply arm bands. This may require a pass-through. Consider a combined employee/client desktop depth of 30" (760mm) at the pass-through location to reduce excessive reaching. (No individual reach distance should exceed 20" (508mm)). Monitor arms and keyboard trays can work to provide adequate working desktop space. Computer monitor will be positioned at a 45 degree angle to the transaction space. Transaction shelves are not recommended in these areas. 3. L or U shaped desk counters at task intensive workstations (unit clerk, switchboard, admitting, lab and pharmacy) should be considered. Where appropriate consider U-shaped workstations, specifically for tasks that require a lot of counter space. This will decrease excessive reaching and promote increased efficiencies. 4. Precision work areas with multi-users like those found in laboratory, pharmacy, laundry and medical device reprocessing should have adjustable counters (i.e. decontamination sinks, lab processing areas, sorting/folding tables etc.). For other precision work areas, consult with a Workplace Health & Safety subject matter expert to determine needs. 5. Avoid placing pencil drawers in legroom space. Pencil drawers should be part of the 3 drawer mobile unit to be placed at the end of one side of desk. 6. All built-ins slot holders shall be a functional design element with adaptability for slot sizes. Consider commercial desk top holders and/or floor to 1600mm shelving slot system (can be placed outside of care station also) for potential future flexibility. 7. Additional electrical and data plugs shall be placed above desk height near task intensive office user's workstations and throughout team care stations. 8. Computer workstation furniture shall accommodate a multi-user work space and consider modular system design for increased flexibility of space.
	Violence Prevention	1. All reception /care stations identified in areas as high risk for violence (ED triage – initial stage, admitting /patient registration, mental health and substance use team care stations and residential) are to refer to section 8 for specific violence prevention design details.
	Occupational Hygiene and Safety	1. Open concept office environments can be at high risk for noise levels above the recommended 45 dbA (Yantis 2006). Refer to section 9.6 for recommendations on acoustic control. Provision of shared meetings rooms and teleconference spaces is also recommended as are headsets. 2. Refer to section 9 for office environment lighting levels. 3. In office environments fresh air supply must meet the diluted needs of the equipment found in the office space (i.e. printers). Air quality levels are to meet WorkSafeBC Guideline reflected through maintaining CO_2 levels below 1000 ppm. 4. For renovation projects, ensure ventilation needs are met for the new function of the space e.g. storage areas have lower exchange rates and will require upgrade to ventilation if converted to more frequently occupied space/workstation.

4.3.1 Workplace Health and Safety Office Resources and Standards

All furniture and office equipment should comply with the Interior Health Authority's workstation standards as outlined by:

1) BC Clinical and Support Services (PHSA)
2) IH – WHS Recommended Ergonomic Office Equipment
3) All office workstations should be set up according to the IH Office Ergonomic Independent Learning Package and specifically the document How to Make Your Computer Workstation Fit You

5. Patient Care Area Design Requirements and Recommendations

5.1 Space Allocation

Refer to CSA Z-8000-11

5.2 Patient Area Dimensions and Working Distances

Patient handling areas are developed to provide a safe working environment for care staff while completing patient care tasks. The mandatory working distances listed below shall be accommodated to meet safe client handling requirements.

Area	Dimension (mm)	Specification
Inpatient Room See Figure 1	1500 800 1200 1500 1060 800 1500	1. Minimum space for transfer onto bed* 2. Minimum space on non-transfer side* 3. Minimum space between end of bed and next surface 4. Minimum room door width opening 5. Minimum washroom door width opening 6. Minimum space on either side of toilet (wall to middle of toilet bowl) 7. Minimum space in front of toilet (turning radius)
Bariatric Room See Figure 2	1800 1500 1800 1500 1500 600 1118 1800	1. Minimum space for transfer onto bed 2. Minimum space on non-transfer side 3. Minimum space between end of bed and next surface 4. Minimum door opening width (split door preferred of 42” and 18”) 5. Minimum door opening to toilet/shower room** 6. Center of toilet from wall behind (Toilet to accommodate up to 1000lbs – consider floor mounted) 7. Minimum space on one side of toilet for transfer use 8. Minimum space in front of toilet (turning radius)
Tub Room	1100 800 800 9’	1. Minimum distance of transfer side of bathing tub 2. Minimum distance on other side of bathing tub 3. Minimum clearance at end of bathing tub 4. Minimum ceiling clearance to accommodate ceiling lift and weigh scale
Stretcher Shower Room	1800 1200	1. Minimum space on one side 2. Minimum space on other side
Critical Care Room	1500 1200 1500	1. Minimum space for transfer onto bed* 2. Minimum space on non-transfer side 3. Minimum space between end of bed and next surface
Examination / Procedure / Treatment Room See Figure 3	1500 800 800 900 800 1500	1. Minimum space for transfer onto bed 2. Minimum working space on either side of bed 3. Minimum space between end of stretcher and next surface 4. Minimum space between end of stretcher and next surface if procedure involves work at end of stretcher 5. Minimum space circumference around treatment chair 6. Minimum door width

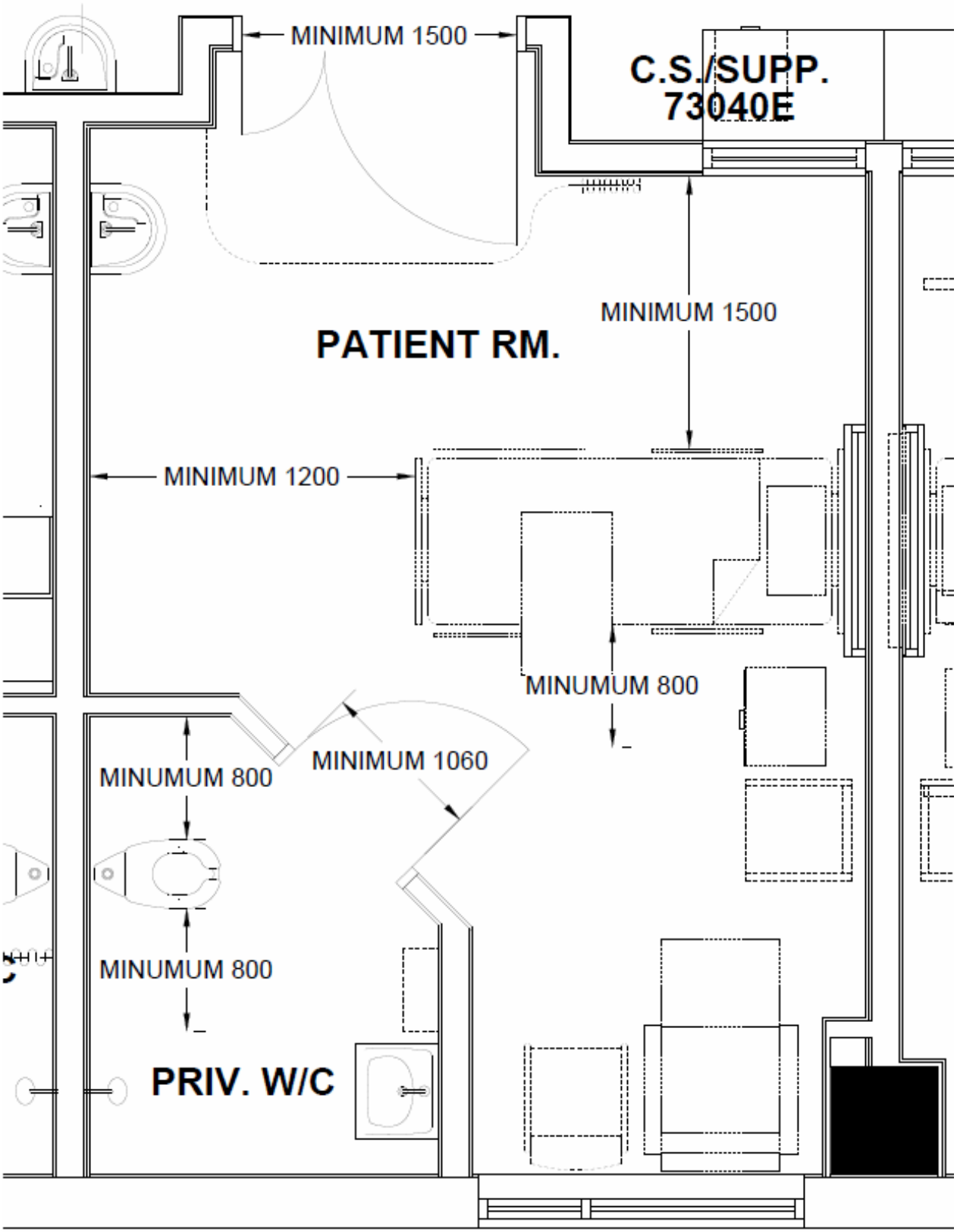
Area	Dimension (mm)	Specification
General Patient Care Storage	655 350 1805 1070	1. Maximum horizontal depth (forward reach) 2. Maximum horizontal depth for frequent reaching 3. Maximum vertical reach height (standing) 4. Maximum vertical reach height (sitting)

*Bed location can be shifted to ensure adequate space on both sides of bed for client care.

**Opt for open shower with floor drain and no curb, removable hand held showerhead and shower curtain vs. wall to allow maximum assistance. If feasible, include a pony wall to allow ceiling lift access throughout both the patient room and toilet/shower room. All wall-mounted grab bars, sinks and countertops must be structurally rated to support the bariatric client.

Client Ensuite: Opt for open shower with floor drain and no curb, removable hand held showerhead and shower

FIGURE 1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MINIMUM 1500
PATIENT RM.
MINIMUM 1200
MINUMUM 800
MINIMUM 1060
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PRIV. W/C

FIGURE 2

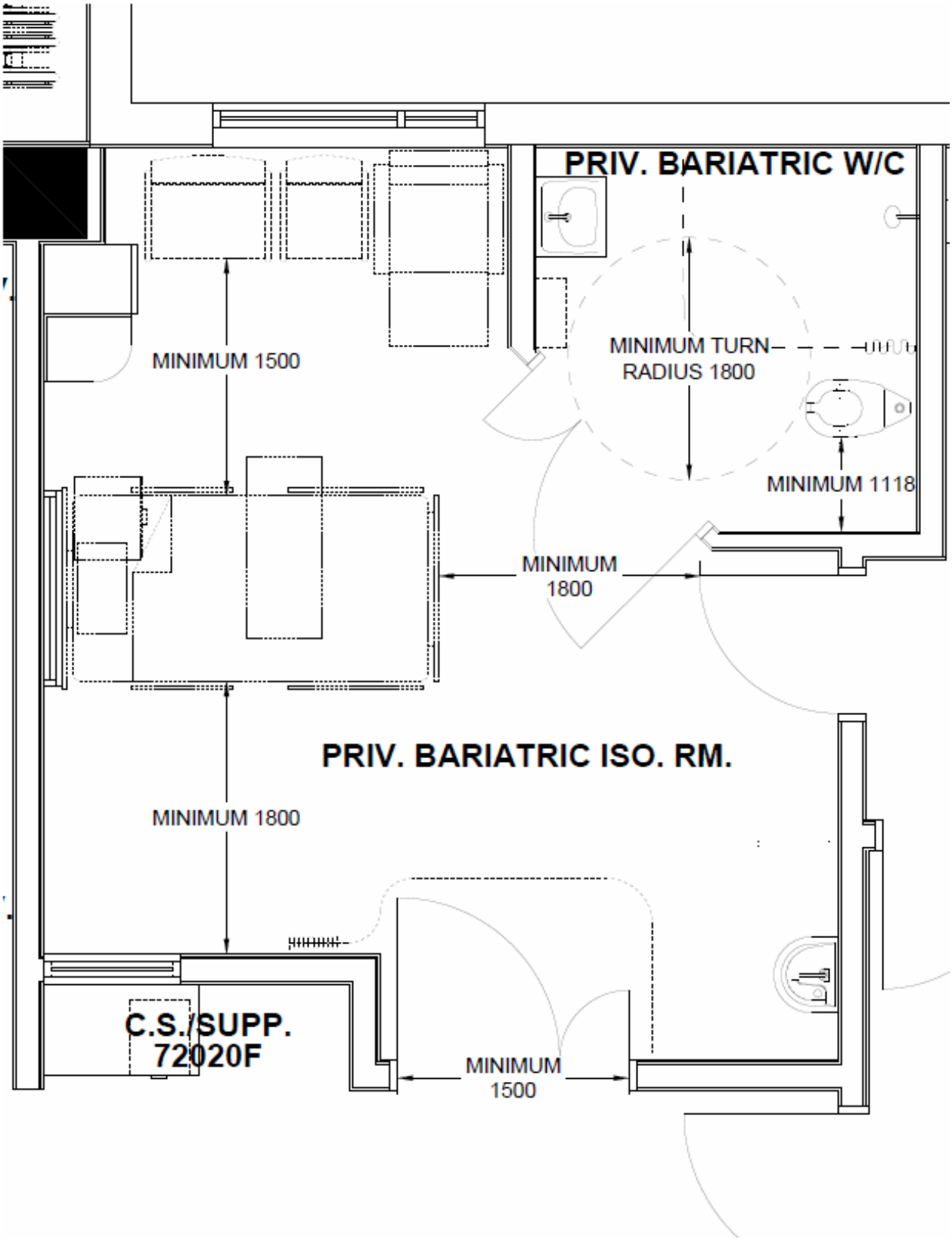
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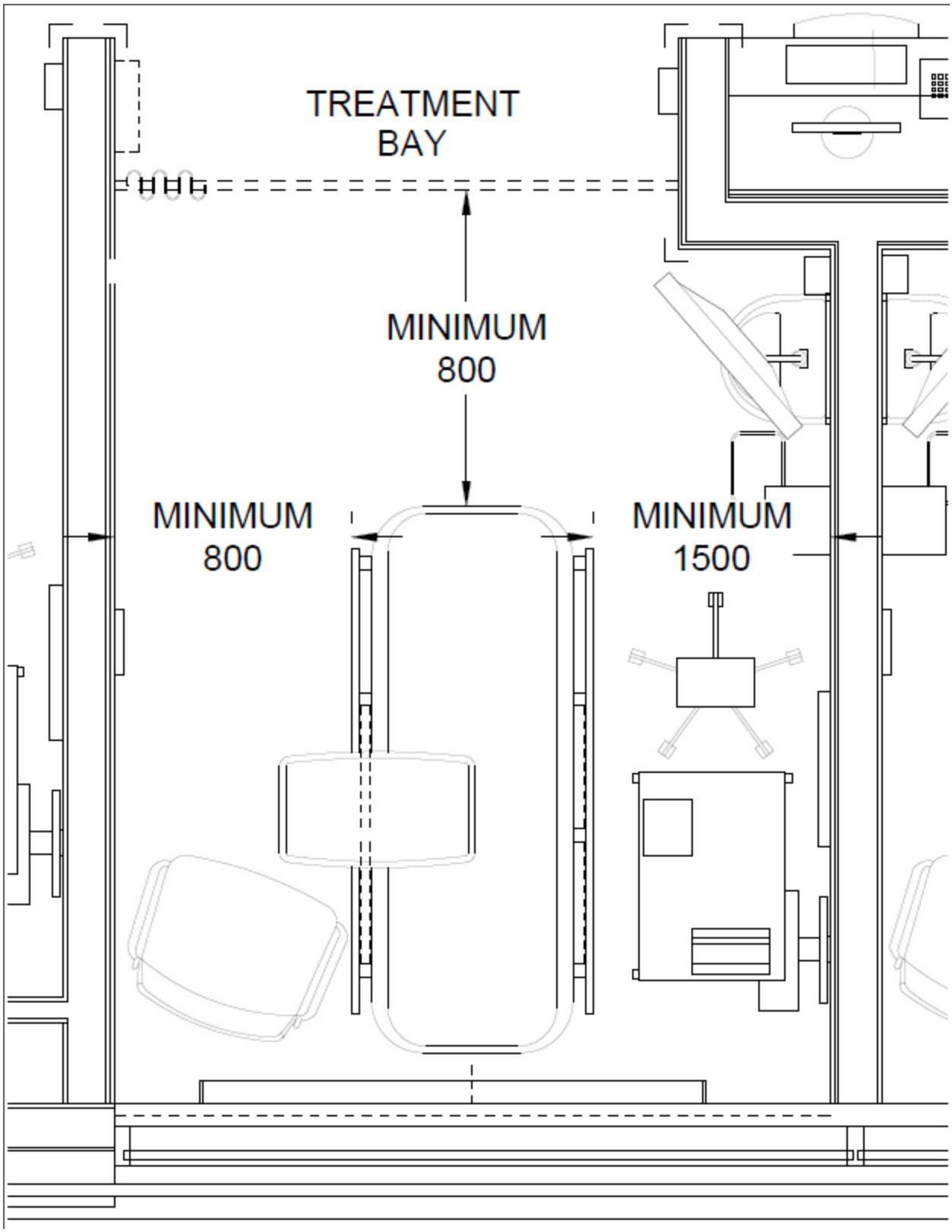
FIGURE 3



5.3 Additional Staff Health and Safety Design Considerations for Patient Care Areas

Area	Subject	Specification
Patient Care Areas– General	Ergonomic	1. Planning for bed clearances shall take into account the dimensions of the bed. Distances around beds are based on a bed width of 1000mm for a standard hospital bed and 1200 mm for a bariatric bed. If different bed sizes are used, the distances shall be adjusted to accommodate the actual bed size. 2. All client washroom doors must be dual swing or barn door style to ensure patients can't get trapped in the room. Refer to section 7 for additional door specifications and hardware. 3. The manufacturer's specifications for space requirements shall be consulted prior to the design and construction of bariatric patient areas. 4. Consideration should be given to using the same to using the same lift manufacturer's products throughout a facility for more seamless client care (e.g. slings can be kept under client, simpler inventory management, increased familiarity for workers). 5. Provide storage space of sufficient size, suitable type and in close proximity to point of use for portable equipment; floor lifts, slings, wheelchairs and any other additional equipment. Storage space/alcoves (in addition to corridor width) and charging outlets shall be provided for the appropriate number of floor and/or sit-to-stand lifts. Storage space for slings shall be provided on the unit and in patient rooms. A dedicated sling hook should be installed within each client room. Electrical outlets adjacent to point of use shall be required for air-assisted lateral transfer devices. 6. If a mobile lift is expected to achieve a client lift and transfer between furnishings and equipment (e.g. recliner chair, stretcher, x-ray table, bed, tub), ensure the base of the lift is compatible with the furnishings/equipment (i.e. fits underneath the base or slides around the furniture/equipment legs) for appropriate and safe positioning of the client. If the base of the lift is incompatible with the furnishings/equipment, either alternate furnishings/equipment needed, or a ceiling lift should be installed in the area. 7. Dedicated work space should be provided within the inpatient unit for support service staff such as clinical pharmacist and therapists and students in teaching hospitals. 8. Standardized rooms are preferred where ever feasible. 9. Consult with pharmacy for narcotics stored at the bedside. A non-mobile locked narcotic cupboard may be required e.g. post-anesthetic recovery (PAR) or intensive care unit (ICU).
	Violence Prevention	1. Refer to section 8 for related violence prevention design details. 2. Adhere to applicable CSA standards and all other applicable codes/practices.

Area	Subject	Specification
	Occupational Hygiene and Safety	1. Refer to ASHRAE 170-2008 Ventilation for Healthcare Facilities and CSA standard special requirements for HVAC systems in HC 2003 need to be adhered to. 2. Refer to section 9 for care areas that contain gases (e.g. labour and delivery, OR and ambulatory care procedure rooms), negative air room requirements and, HVAC system requirements. 3. All areas where staff may be exposed to high risk biological or chemical hazards shall have isolation/decontamination areas installed. 4. Emergency area shall consider negative pressure rooms adjacent to side waiting areas that can provide airborne containment until suspected airborne patients are admitted into negative pressure rooms within emergency department. 5. Emergency area shall consider containment area with shower, separate plumbing, negative air for contaminated patients that require decontamination prior to entry into the facility. Preference is to have an anteroom prior to entry and storage area containing needed equipment in close proximity. 6. Negative pressure rooms shall be considered for clinical care areas such as intensive care unit, operating room, post anesthetic recovery, inpatient units (cardiopulmonary and wherever bronchoscopies or aerosol generating medical procedures are being performed by respiratory therapist). 7. HVAC grilles over patient beds/stretchers shall have the appropriate diffuser so air will not blow down directly onto the patient/staff. 8. Ensure adequate ventilation and requirements met for areas involving specialized tooling and/or dust control (e.g. laser procedure, grinding in operating room and physical therapist/occupational therapist areas where applicable). 9. Do not carpet areas that house or provide a service to patients or where there is a high likelihood of contamination with blood or body fluids. In area where carpeting is acceptable, the carpet should be cleanable with hospital-grade cleaners and disinfectants and be fast-drying which can reduce the likelihood of mould accumulation. 10. Surfaces, furnishing and finishes should be made of materials that can be easily maintained and repaired; be cleanable with hospital-grade detergents, cleaners and disinfectants (except furnishings in residential facilities where the furniture is supplied and used exclusively by one single resident); be smooth, nonporous, seamless, fast drying, and unable to support microbial viability.
Patient Care Areas – Specific	General	In addition to the guidelines for general patient care areas, **Clean Supply Rooms** should: 1. Be readily available in each patient care area. 2. Be separate from soiled area. 3. Be easily available to staff. 4. Contain a work counter and a dedicated hand washing sink if used for preparing patient care items, but placed in a manner to prevent splash onto clean supplies. **Soiled Utility Rooms/ Workrooms** should: 1. Be readily available close to point-of-care in each patient care area; 2. Be separate from clean supply/storage areas. 3. Contain a work counter, a clinical sink, and a dedicated hand washing sink. 4. Be sized adequately for the tasks required.

5.4 Safe Patient Handling Resources and Standards

5.4.1 Safe Patient Handling Policy and Equipment Allocation Guidelines

Refer to the organizational Safe Patient Handling Policy and IH Safe Patient Handling Equipment Recommendations and Allocation Guidelines for safe patient handling equipment recommendations and ceiling lift coverage.

6. General Design Specifications for Support Service Areas

6.1 Space Requirements and Recommendations

Refer to CSA Z-8000-18

a. Housekeeping

Area	Subject	Specifications
Housekeeping Rooms	General	1. Provide a shelf positioned above floor scrubbers deep enough to hold battery packs for these machines and high enough to allow equipment to fit below (min1500 mm height). Power must be provided above shelf to charge battery pack. These batteries will stay positioned on shelf and will have a cord dropping down from the shelf to plug into the machines (ensure length of plug able to reach between shelf and machine) to reduce excessive reaching. 2. Provide a floor drain in room or incorporate the mop sink drain as a room drain. 3. Door hardware to include hold open function 4. Detergent dispenser needs cold water outlet with backflow preventer. Back flow preventer to be concealed behind access panel. 5. Hand wash sink in room cannot be within a one meter of any fixed item unless protective barrier is placed on side of sink. 6. Housekeeping staff have card reader, not store room function hardware. 7. Non-skid flooring is required. 8. Floor mop sink in each housekeeping room must be of an adequate size, depth and access to support the floor buffers and other required housekeeping equipment. 9. Plumbed, tempered eye wash station is required as per OHSR 5.85-5.96 (Table 5-2, 5-3).
General	Ergonomics	1. Receptacles for housekeeping must be staggered on alternate sides of the hallways throughout the facility and spaced a maximum of 10 meters apart and as required for complete coverage of the building. 2. Duplex receptacle is required at each stairwell landing. 3. Each specialized treatment area (e.g. operating rooms) must have a dedicated duplex receptacle for housekeeping. 4. Each unit/area must work with housekeeping/laundry to identify and allocate storage space and corridor alcoves to house all necessary bins and carts required to support that area. Storage of these items in the corridor is not acceptable in newly renovated/built spaces and creates hazards for staff manoeuvering equipment and patients.
	Violence Prevention	Refer to section 8.
	Occupational Hygiene and Safety	Refer to section 9 for requirements on areas that use chemical liquids.

b. Pharmacy

Area	Subject	Specifications
General Pharmacy	Ergonomics	Refer to OHSAH Ergonomic Guide for Hospital Pharmacies and to Section 4, for workstation considerations (i.e. adjustable counters for precision work).
	Violence Prevention	1. Pharmacy Departments 1.1 Refer to CSA Standard Z8000-11 and ensure 2013 Canadian Pharmacy standards are incorporated. 1.2 Refer to section 8 for violence considerations in office environments such as counter/desk specifications.
		2. Medication Rooms 2.1 Contact Pharmacy Services for the most current medication room standards in acute care facilities. • Be enclosed to limit distraction. • Have site lines to key patient areas – this may require use of large windows or full glass panel doors in spaces not obstructed by the drug dispensing equipment. • Glass should be shatter or temper proof with a security film. 2.2 Consider medication room design to include features and serve as safe room also. Refer to section 8 – General (4).
	Occupational Hygiene and Safety	Specific consideration must be given to storage and handling of hazardous/cytotoxic drugs as outlined in the BC Health Authorities' Exposure Control Plan for Hazardous Drugs. To ensure the safety of staff who prepare hazardous drugs, refer to WorkSafeBC (WSBC) Occupational Health and Safety Regulation: • Section 6.53 Drug Preparation and Administration • WSBC Occupational Health and Safety Guidelines, Section G6.53(1) Biological Safety Cabinets (BSC) • WSBC Occupational Health and Safety Guidelines, Section G30.12 – Biological Safety Cabinets • WSBC Occupational Health and Safety Regulation, Section 5.85 – 5.96 – Emergency Washing Facilities

6.2 Laundry Services

Area	Subject	Specifications
General Laundry	Ergonomics	Refer to OHSAH Ergonomic Guide for Hospital Laundries
	Occupational Hygiene	Refer to section 9 of this document for dirty/clean room requirements.

6.3 Laboratory

Refer to Canadian Biosafety Standards 2nd Edition

Area	Subject	Specifications
General Laboratory	Ergonomics	1. Refer to Ergonomic Guidelines for Healthcare Laboratory and to section 4, for workstation considerations (i.e. adjustable counters for precision work).

	Occupational Hygiene	1. Refer to section 9 for requirements on areas that process chemical liquids and gases are used. 2. Refer to BC Fire Code (most updated copy) for allowable maximum volume of flammable substances stored inside a single fire compartment. 3. Morgue requires special consideration for tasks performed and extent of the storage of specimen fixation. Specialized ventilated cabinets for the quantities of stored specimens as well as specific ventilation and disposal controls when specimens are disposed of.

7. General Design Specifications for Circulation Spaces

7.1 Space Requirements and Recommendations

Refer to CSA Z-8000-18

7.2 Corridors/Circulation Dimension

1. Material circulation routes shall be kept separate where possible from patients/staff/public circulation routes.
2. Door widths shall be dependent on the people/equipment loads anticipated.
3. Stairways shall be used to augment personnel movement between floors.
4. Design corridors to be level. No ramps are permitted unless approved by authority.

Minimum Corridor Widths	(mm)
1. Public circulation areas (clear space – additional width required for storage spaces and sitting alcoves)	2440
2. Patient care circulation areas (clear space – additional width required for storage spaces and sitting alcoves)	2440
3. Logistics / material handling service areas	2000
4. Loading zone areas	3600
5. Administrative / office spaces	1500
6. Patient care convoy (i.e. patient, staff, equipment or Cardiac Surgery Intensive Care Unit	3050

7.3 Door Dimensions, Access Control and Hardware

1. Door openings of adequate width shall be provided to suit the intended purpose of rooms on either side of the door and also allow movement of people and equipment associated with those rooms. Avoid doors swinging into corridors in a manner that may obstruct traffic flow or reduce the corridor width, except doors to spaces that are used infrequently and are not subject to occupancy such as small closets.
2. At all doors, where patient wheelchair/stretcher/bed movement is required, including doors into/between major departments/activity areas automatic doors activated by disabled accessible push-button controls located on the inside and outside of both sets of doors shall be provided (also provide manual push/pull option on both sides of doors).
3. Apply door sizes and designs consistently to rooms of similar use, location and configuration.
4. Provide glazing in doors or sidelights in such a way that they allow patient observation and operational safety of the spaces they serve.
5. In areas where security is considered paramount, achieve security with the appropriate location, configuration, materials, construction, detailing of doors and hardware. Refer to section 9.

Minimum Door Widths	(mm)
1. Lounges and waiting areas	1220
2. Clinical where NO pallet/stretcher/bed pass through	1065
3. Clinical where beds pass through	1500
4. Movement of large equipment (All mechanical and electrical rooms)	914 x2 (dbl. doors)

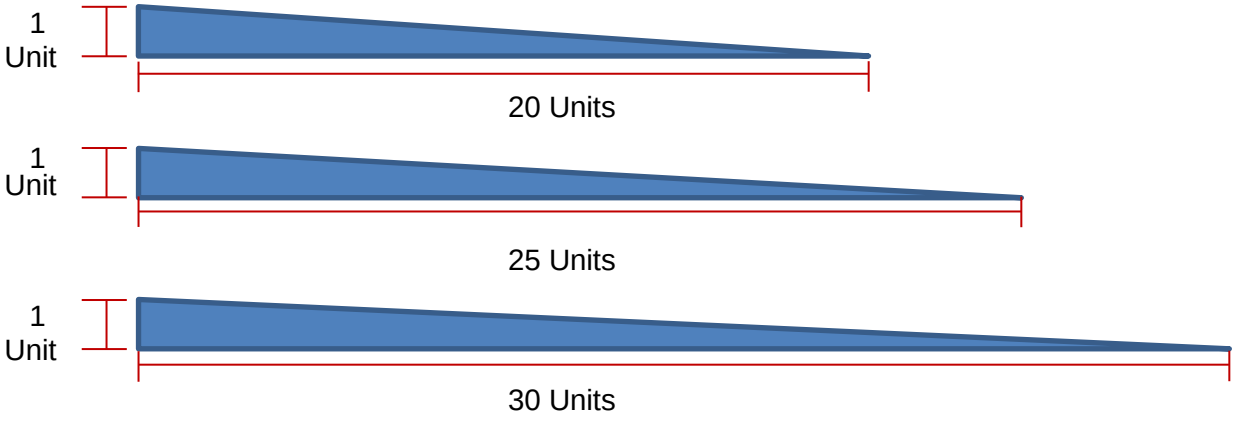
7.4 Ramps, Slopes, Rise & Run

7.4.1 Ramp Dimensions

1. Ramps will be avoided if at all possible.
2. If a ramp must be included it will not be permitted with greater than a 1:20 incline ratio and will have a midway step rest, if appropriate, and the appropriate handrails provided.

7.4.2 Slope, Rise & Run

1. Slope is defined as the ratio of vertical distance (rise) to horizontal distance (run) so a greater number means a greater incline.
2. Ideally, the incline should have a slope of less than 1:20; (example 1:25, 1:30) but will not be greater than 1:20, see table below.



Slope	Maximum Rise	Minimum Run
1:16 to < 1:20	76cm (30 in.)	12m (40 ft.)

Recommended maximum rise and minimum runs for slops (from BC Building Code, Article 3.8.3.3)

7.5 Elevators

7.5.1 Elevator Dimensions

1. Provide car enclosure with minimum clear internal (finished panel to panel) dimensions of 2134 mm (7'-0") wide, 3050 mm (10'-0") deep, minimum overall height of 2745 mm (9'-0") with minimal threshold gap at door to prevent wheeled equipment ease of movement across. This allows adequate room for bariatric stretcher and care team.
2. In specialized care areas, width must also accommodate convoy of patient, staff and associated equipment (e.g. transport to Intensive Care Units)

7.5.2 Safety Features

1. Provide staff / users with an ability to communicate to facilities maintenance from inside the elevator, in the event of a disruption to the elevator service.
2. Consideration may be given to include a verification requirement within the elevator cab for after public hours or specific floor access.
3. MDR/OR access elevators - for newly built facilities it is optimal to have separate, dedicated clean and soiled MDR service elevators each located in its own shaft to access the OR directly.

8. Design Specifications for High Risk Areas in Violence

As outlined in section 2, for the purpose of this document, high risk areas impacting staff safety for violence include Emergency Departments, Mental Health and Substance Use Departments, Long Term Care Centers and/or others areas with high incidents of violence as determined by Protection Services or WHS.

The following are general guidelines and consideration only for high risk areas in violence. Protection Services should be consulted at all stages of planning, design and implementation for full recommendations and consultation on a case-by-case basis.

Area	Subject	Specifications
General	Overall Design Considerations	1. Adhere to applicable CSA standards and other applicable / governing policies / legislation, including but not limited to local and national fire codes, building codes and by-laws. 2. The design should generally support measures for personal safety, and be void of areas where a staff-member could become trapped by an aggressor. a) minimizing the number of entry and exit points used by the public; b) the ability for staff to screen access into the area using technology and/or process. (i.e.incorporating an access control system such as electric strike and card readers to all perimeter doors, considering an intercom system between visitor area and staff work area so that staff can interview visitors to ensure appropriate entry into the area); and c) location of high risk areas in relation to other departments on site. 3. Consideration is to be given as the type of furniture, artwork, and other objects used through the area so as to limit the ability of furniture/objects to be thrown or used as a potential weapon.
General		1. Clinical/staff spaces are clearly identified and separated from public spaces by signage, and/or a secure physical barrier (e.g. door, counter, and wall or glass partition). 2. The floor layout in both clinical and public areas should provide clear sight lines from control points (e.g. a team care station or reception desk) to entrances, waiting areas, and circulation routes. Consider use of CCTV or mirrors to assist in achieving visibility. Lighting should be considered to provide sufficient illumination (avoid shadows) to see all spaces in an area and meet user's needs. 3. Ensure there is a reliable and accessible means for staff to summons help. 4. As permitted by fire codes, stairwells should be secured and not accessible by patients from immediately inside the high risk department / area. 5. Rooms where staff could be meeting with potentially aggressive persons should be designed to allow staff to be closest to an exit point and provide visibility from outside of the room. If multiple exit points are feasible, this would be the preferred option. Room design and configuration should allow for staff to be positioned closest to the door for quick exit. 6. Where deemed necessary /appropriate, only glass that is shatter-proof or laminated with a security film for protection should be used. 7. An area designated as a safe zone should be provided for staff and patients to retreat to should a threatening situation occur. This room, at a minimum, should have an ability to see through (peephole, or window), phone or other means to summons help and be able to be locked. This room could be the team care station if properly equipped or a room within or adjacent to a nursing station such as a medication room.

Area	Subject	Specifications
	Workstations Within High-Risk Areas	1. Adequate counter height / width to prevent a person from easily jumping over it. This may require incorporation of safety glass above the counter to an 1100mm height (minimum) that can be opened or cut out for pass through to accommodate wheelchair access. 2. Clear sight lines of incoming visitors/customers or visual monitoring of the entrance/exits from the central care station/reception.
	Technology Considerations	1. Ability for staff to quickly and reliably summon help 2. Consideration for CCTV cameras where appropriate. 3. If applicable, security camera monitors should be located so they are visible only to staff, but not to patients or the public.
	Access	1. Ability to restrict access to the facility / department 2. Consideration to limit traffic flow and general access to the high risk area on an as-needed basis, and to prevent a general thoroughfare.
	Seclusion Rooms	1. If a department / area is deemed appropriate to have a seclusion room as per Ministry of Health requirements, all design specifications should meet current BC MOH standards.
Department Specific	Emergency Department Specific	In addition to overall design guidelines: 1. CCTV coverage to record people entering and leaving the Emergency Department through main entrances. 2. Ability to easily restrict access to the Emergency Department in the event of a high-risk patient or potential threat situation. 3. Ambulance / first responder entrance is separate from the public entrance. 4. Staff areas including triage, registration and admitting, are physically separate from the waiting room.
	Mental / Behavioral Health Specific	In addition to overall design guidelines: 1. Fire extinguishers should be accessible only to staff to prevent improper use by patients or a potential weapon. 2. Medical gas controls should be covered with tamper-proof materials and only accessible by staff to prevent potential hazard. 3. Department should be designed to limit the risk of hanging, with special consideration for door handles, hooks, curtain rods, sprinkler heads, and other design features to limit hazards. 4. Window coverings should be tamper-proof and designed to limit hazards. 5. Furniture should be weighted, able to withstand abuse, and tamper-resistant to avoid removal of pieces to fashion weapons. 6. Medical gas controls should be covered with tamper-proof materials and only accessible by staff to prevent potential hazard. 7. Department should be designed to limit the risk of hanging, with special consideration for door handles, hooks, curtain rods, sprinkler heads, and other design features to limit hazards. 8. Window coverings should be tamper-proof and designed to limit hazards. 9. Furniture should be weighted, able to withstand abuse, and tamper-resistant to avoid removal of pieces to fashion weapons. 10. Ceilings should be at least 9 feet high, should be non-accessible solid gypsum board ceiling. Provide key-lockable access panels at all locations where access is required to prevent potential hazards.

Area	Subject	Specifications
	Mental / Behavioral Health Specific	1. Construction material that may be removed and used as a potential weapon or for self-harm, without the use of tools is strongly discouraged. (e.g. baseboards) 2. Outdoor areas (e.g. enclosed courtyards, fenced areas adjacent to the treatment unit, or open campus) - careful consideration should be given to exterior landscaping and furniture. Avoid climbable fences, shrubs planted together, landscape or decorative rocks. Ensure all furniture is anchored down and heavy to lift. Provide decking composed of fire resistant, easy to clean and tamper-proof material, tamper and weather proof exterior lighting. 3. Secure rooms within designated Mental Health facilities are to meet the design specifications found within Provincial Quality, Health & Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities (2014).
	Outdoor Enclosed/Fenced Area (within high-risk for violence areas)	In addition to overall design guidelines: 1. Outdoor areas (e.g. enclosed courtyards, fenced areas adjacent to the treatment unit, or open campus) - careful consideration should be given to exterior landscaping and furniture. Avoid climbable fences, shrubs planted together, landscape or decorative rocks. Ensure all furniture is anchored down and heavy to lift. Provide decking composed of fire resistant, easy to clean and tamper-proof material, tamper and weather proof exterior lighting.

8.1 Parking Lot, Building Perimeter

Ensure project has received input from Protection Services

9. Design Specifications for High Risk Areas/Systems in Occupational Hygiene and Safety

Areas/Systems		Specification
General	**Areas where critical conditions must be maintained.** These areas may include negative pressure rooms, dirty & clean laundry areas and medical device reprocessing	1. Refer to CSA Z8000-18 Section 10.2 Environmental Services and Section 10.7 Medical Device Reprocessing. 2. Ensure that the monitoring is set correctly with ease of use and ventilation and thermal specifications meet the functional needs of the room. 3. If any design changes occur after the design has been finalized, such as added equipment, process flow etc., it is mandatory that the design be re-reviewed by appropriate subject matter experts to determine the practicality of implementation and ensure required modifications are added and agreed to by all parties.
	Areas that require special temperature and/or humidity levels. These areas may include computer/network equipment areas.	1. Refer to individual equipment standards
	HVAC Systems	1. Ensure energy conservation does not override the pressure balancing relationships or the minimum number of air changes required as found in table 7-1 ASHRAE standard 170-2008. 2. Ensure that all HVAC exhaust points are isolated from doorways, service entries and any possibility of entrainment or public exposures. 3. Ensure design of HVAC system includes all components; condensate drains, water baffles and cooling towers. 4. Ensure adequate access points into HVAC system are in place for inspection, cleaning and servicing with sufficient space to work and maintain equipment within the system. 5. Ensure placement and specifications of insulation materials are adequate and appropriate. 6. HVAC air intake must not be located in proximity to an area where vehicles or motorized equipment is likely to idle for any length of time. 7. Ensure air quality thermal standards and codes are in place and thermal air quality sensors and set points are located based on location of occupants and equipment to ensure the thermal level reflects the true requirement of the work area (e.g. occupancy, wall placements, furniture location, local ventilation and window location). 8. Ensure that inlets and outlets are placed within the rooms in such a way that it will aid in removing the possible contaminants produced in the room and supply enough fresh air dilution to minimize exposure. 9. Ensure that the design incorporates the effects of outdoor conditions on fresh air rates/CO2 levels specifically in extreme temperature situations involving air conditioning/heating system venting. 10. Ensure that the duct system is free of all construction debris and filters are in place prior to starting up system. 11. If HEPA filters are used within the HVAC system they should have monitoring system in place to indicate pressure drops supporting replacement.

Areas/Systems		Specification
Department Specific	**Areas where process chemical liquids or gases are used.** 1. Laboratories 2. Medical Device Reprocessing 3. Labour and Delivery 4. Laundry 5. Ambulatory Care Unit 6. Operating Room 7. Maintenance (refrigerants) 8. Housekeeping 9. Emergency Departments 10. Dietary	1. Storage requirements for hazardous materials: • A list of the hazardous materials should be provided to Occupational Hygienist to review and recommend proper storage containment including proper storage ventilation (exhausting, negative pressure and cabinetry design). • Minimize distance between storage of materials and point of use reducing transport risks. • Ensure flammable liquid storage areas are designed in compliance with BC Fire Code. 2. Ensure that incompatible equipment, environmental conditions and chemicals are identified, assessed and controlled 3. Refer to CSA Z305.12 (2006) and ISO 11625 (2007) for storage requirements. 4. Enclosed Process Instrumentation: • Process equipment reviewed by qualified person to ensure design maximizes exposure control of process chemicals. • Equipment should be selected as to minimize quantities and volumes of products used. 5. Plumbed, tempered eye wash station is required as per OHSR 5.85-5.96 (Table 5-2, 5-3). 6. Locally Exhausted Ventilation, • Dedicated local exhaust systems must be considered in all instances where hazardous process chemicals are used. • Dedicated local exhaust should be designed to meet the current and relevant recommendations for source capture, direct exhaust and elimination and/or scrubbing and function alarming. • Consider environmentally safe methods/products for disposal, spills and sewage. • Clean/Dirty Room Pressure Balance - ensure that the design of the ventilation system provides air movement that is from clean to less clean. • Qualified Occupational Hygienist involved in technical commissioning process are to review areas where process chemical gases or liquids are used by conducting a monitoring survey of the effectiveness of the engineering controls upon commissioning, as well as, an evaluation of the worker exposure once department is in full operation.
	Areas where fall protection or confined space equipment may be required	1. The use of fall protection equipment will require the implementation of a fall protection plan, ensure all equipment are inspected and used as per design. Other requirements surrounding the use of fall protection are listed under WorkSafeBC Regulation S.11. 2. Where confined space may be accessed for job tasks/activities, a confined space entry plan or procedure shall be in place that address below items but not limited to: • Access and egress; • Communication • Atmosphere gas testing • Emergency response and rescue WorkSafeBC Regulation S.9 indicate all regulatory requirements for Confined Space Entry

Areas/Systems		Specification
	Areas with potential for excessive noise levels. These areas may include mechanical rooms, laundry service and food service areas.	1. WHS recommends a max noise level of 45dbA (Yantis, 2006) or less (not the 8 hour time weighted average noise exposure limit of 85 dBA Lex specified in the Occupational Health and Safety regulation.. 2. Ensure the best sound absorbing materials are utilized in the ceilings and walls (e.g. acoustic ceiling tiles, varying heights of sound absorbing fabric panel, cork flooring, insulating pipes and machinery and installing white noise machines above ceiling). 3. Ensure flooring material is suitable to reduce noise while still being able to be cleaned easily and provide non-slip surface. 4. Consult a professional acoustical engineer on consideration of rounded corners where deemed appropriate. 5. Ensure small noisy pieces of equipment are placed on rubber noise absorbing pads. 6. Ensure noisy equipment is not concentrated into one area. Work with LEAN to ensure process/increased efficiency does not increase and exceed required noise levels.
	Areas with potential for inadequate lighting levels. These areas may include enclosed stairwells, interior hallways, storage areas and exterior walkways.	1. Ensure that all locations are assessed with regard to the processes occurring within the work area and the lighting is meeting the requirements of the WorkSafeBC OHS Regulation Section 4.65 Illumination Table 4-1. 2. Ensure lighting in key areas (patient rooms, laboratories) is adjustable to allow for levels to be set depending upon needs. 3. Ensure that whenever possible natural light is used to its fullest extent to reduce the need for artificial lighting. Where this is not feasible consider sunlight tubes. 4. Where feasible, offices and other enclosed spaces (meeting rooms, file rooms and treatment rooms etc.) shall be placed in the core of the work space with the open workspaces organized along the windows to maximize the amount of natural light penetrating the interior of the work environment. 5. When applicable and appropriate, natural light is preferred over artificial light to increase staff comfort level, which may be achieved by “side-light” window adjacent to the door allowing natural light to flow into space, door with window, sun tubes, or skylights. 6. Ensure stairways are lit sufficiently to reduce tripping hazards. Table 4-1 in the WorkSafeBC OHS Regulations. 7. Ensure the utilization of full spectrum or near full spectrum lighting is incorporated whenever possible to ensure eye stress is lessened and colour observations are accurate. 8. Avoid blind corners were possible or install mirrors to limit blind corners.

Areas/Systems		Specification
	Areas with potential for slips, trips and falls. These areas may include corridors, stairwells, outdoor walkways, etc.	1. Refer to CSA Z8000-11 Sections 7.6.6.1.3 and 7.7.4.1 2. Ensure all walking surfaces, inside and outside, are free from surface irregularities. 3. Ensure that when designing entryways, outdoor stairs, etc. consideration is given to the possible changes in weather and how it would affect the walking surface. 4. Ensure that outdoor stairways meet building code requirements and outdoor areas are designed to reduce ice and snow accumulation. 5. Ensure that lighting is sufficient to allow for eyes to notice changes in depth or height of obstacles encountered. 6. Ensure that handrails meet the required codes and that they are placed in such a way that they can be recognized immediately as a safety precaution (i.e. wider stairs may require a railing in the middle of the stairs as well as on the sides). 7. Ensure that floor material has sufficient friction to prevent slipping by using of non- glare and slip-resistant surfaces (coefficient of friction should be above 0.5). 8. Ensure areas around safety showers or eyewash stations are not prone to spillage. 9. Ensure that any floor mounted electrical receptacles will not create a tripping hazard when in use. 10. Ensure that there is enough storage capacity to prevent storage of materials in hallways that may create a tripping hazard. 11. Ensure all drains are aligned correctly to prevent spillage onto general floor areas. 12. Properly designed steps, ramps, and railings; Recommended stair dimensions, adequate handrails and lighting to decrease the risk of slip/trip/falls are to follow the National Building Code of Canada Section 9.8.2.1-9.8.4.6 Stairs, Ramps, Handrails and Guard. Also refer to WorkSafeBC OHS Regulations Section 4.62 and publications Slip, Trip, and Fall Prevention for Healthcare Workers Department of Health and Human Services, CDC/NIOSH (Bell, et. al. 2010)

10.References and Resources

10.1 Regulations and Guidelines for Design

WorkSafeBC Occupational Health and Safety Regulation
Refer to all applicable sections with specific attention to the following:
Part 4 – General Conditions
Part 5 – Chemical Agents and Biological Agents
Part 6 – Substance Specific Requirements
Part 7 – Noise, Vibration, Radiation and Temperature
Part 11 – Fall Protection
Part 30 - Laboratories

Canadian Standards Association (2011). Z8000-18 Canadian Health Care Facilities.
Ergonomic related sections-7.6, 7.8, 8.1-8.8, 9.1-9.8, 9.10, 10.1-10.2, 11.1

Violence prevention related sections - 8.2 Planning and design principles, 7.6, 7.6.1.2, 7.6.1.3, 7.7, 7.7.1, 7.7.1.3, 7.7.1.4, 7.7.2, 7.7.2.1-.7, 9.4.3.8, 9.4.3.8.1, 9.4.2.2.7, 9.4.2.4.9, 9.4.3.8.3, 9.4.3.8.5, 9.5.3.19, 9.7.3.12, 9.11.3.9.1

Canadian Standards Association (2006). Z305.12 "Safe storage, handling and use of portable oxygen systems in residential buildings and health care facilities"

ANSI/ASHRAE standard 170 (2008) Ventilation for Health Care Facilities

ANSI/SHRAE std. 62.1 (2007) Ventilation for Acceptable IAQ (note that CSA Z8000-11 references the 62.1-2001 ANSI/ASHRAE standard)

ISO 11625 (2007). Standard for storage of gases.

BC Fire Code

International Association of Healthcare Security & Safety (IAHSS) Industry and Design Guidelines http://www.iahss.org/?page=guidelines

Any and all applicable fire codes/regulations for compressed gases and storage.

Provincial Safe Resident Handling Standards for Musculoskeletal Injury Prevention in British Columbia (2012). Interior Health, Northern Health, Vancouver Island Health, Fraser Health, Vancouver Coastal Health, Providence Health, Provincial Health Services

Provincial Hand Hygiene Working Group (2013). Best Practices for Hand Hygiene Facilities and Infrastructure in Healthcare Settings.

BC MOH Secure Rooms and Seclusion Standards and Guidelines (2012).

Provincial Quality, Health & Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities (2014)

"Code Plus – Physical Design Components for an Elder Friendly Hospital" (Parke & Friesen, 2012).

IH Standards for Medication Rooms for Acute Care Facilities Decision Brief (2014). Refer to Appendix 13.2

IH Emergency Wash Stations Guidelines (2020).

10.2 Ergonomics

10.2.1 General Ergonomics

Kroemer, Karl H. E. (1999) The Occupational Ergonomics Handbook: Chapter 9 Engineering Anthropometry. CRC Press.

Kroemer, K.H.E., (1999). Engineering Anthropometry. In Karwowski, W. & Marras W. (Eds.), *Occupational Ergonomics Handbook (pp: 139-165)*. CRC Press.

10.2.2 Ergonomics in Healthcare Facility Design

Ergonomic Challenges in Hospital Ancillary Departments, 9-23 Ergonomic Design in the Workplace in Healthcare Facilities.

American Institute of Architecture/Facilities Guideline Institution (2010). *Guidelines for Design and Construction of Healthcare Facilities*

Fraser Health Authority (2016). Safe Client Handling Equipment and Design Innovation: Appendix C

M. Matz, K. McCoskey and M. Martin, Safe Patient Handling and Mobility (SPHM) Technology - Coverage & Space Recommendations, United States: Veterans Health Administration (VHA), 2016 Revision.

Ceiling and Mobile Client Lift Guidelines for AHS Facilities: Alberta Health Services (AHS), 2018.

10.2.3 Specific Areas within Healthcare

Follow this link to locate resources under ‘Ergonomics Department Specific Resources’.

10.3 Violence Prevention in Healthcare Design

Psychogeriatric inpatient unit design: a literature review, 2011, J. Dobrohotoff and r. Llewellyn-jones

Gamble L. A Macro-Ergonomic Approach into Staff Duress, Nurse Call, and Staff to Staff Communication Systems Acquisition and Utilization in Healthcare. Proceedings of the Association of Canadian Ergonomics Conference Oct. 2006.

Follow this link to locate resources under ‘Violence Prevention Risk Assessment, Working Alone’

WorkSafeBC (2012 Edition) Working Alone - A Handbook for Small Business http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/BK131.pdf

York T. & MacAlister D. (2015) *Hospital and Healthcare Security 6th Edition*

10.4 Safety and Occupational Hygiene in Healthcare Design

Illuminating Engineering Society. (2006). *Lighting for hospitals and healthcare facilities*.

ASHRAE. (2013). HVAC design manual for hospitals and clinics. (2nd edition). Atlanta, GA:

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Ozanne-Smith, J., Guy, J., Kelly, M., & Clapperton, A. (2008). The relationship between slips, trips and falls and the design and construction of buildings. *Monash University Accident Research Centre*, *Report No. 281*, Retrieved from http://www.monash.edu.au/miri/research/reports/muarc281.pdf

The lighting handbook. (10th ed.). Illuminating Engineering Society.

Tijunelis, M. A., Fitzsullivan, E., & Henderson, S. O. (2005). Noise in the ed. *The American Journal of Emergency Medicine*, *23*(3), doi: http://dx.doi.org/10.1016/j.ajem.2005.02.037

U.S. Environmental Protection Agency, Office of Noise Abatement and Control and Office of the Scientific Assistant. (1979). Noise effects handbook: A desk reference to health and welfare effects of noise (EPA 500-9-82-106). Retrieved from National Association of Noise Control Officials website: http://www.nonoise.org/library/handbook/handbook.htm

World Health Organization. (1995). Guidelines for community noise. Stockholm, Sweden: Stockholm University and Karolinska Institute. Retrieved from http://whqlibdoc.who.int/hq/1999/a68672.pdf