Correctional Service Canada | Service correctionnel Canada

Safety, Respect and Dignity for All

La sécurité, la dignité et le respect pour tous

Technical Criteria for Correctional Institutions

ISSUED BY FACILITY PLANNING AND STANDARDS
APRIL 2015

Canada

Correctional Service Canada
Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Technical Criteria for

Correctional Institutions

TABLE OF CONTENTS

Canada

SECTION M – MECHANICAL

SECTION E - ELECTRICAL

SECTION ST – SPECIAL STRUCTURES

APPENDICES – WOMEN'S TECHNICAL REFERENCE GUIDELINE

SECTION WG – GENERAL

SECTION WSP – SITE

Correctional Service Canada | Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Technical Criteria for Correctional Institutions

PREFACE

Canada

The Technical Criteria document was first issued in 1979 to guide construction material and assembly requirements for new builds which were anticipated to address a forecasted inmate population growth. Defining requirements unique to the correctional environment was particularly important as CSC earned a departmental status of a 'knowledgeable client' in its working relationship with Public Works and Government Services Canada when delivering construction projects. During the subsequent period, a Facility and Standards professional staff complement would oversee capital construction projects across all five regions and contribute in keeping the standards current and relevant.

Since its first issue, the Technical Criteria document underwent several reviews which resulted in revisions to all sections. This occurred in the late 1980's and again in the early 2000's. A number of amendments were also issued in the intervening years. The current revision of this document is the third formal undertaking in order to capture a number of required changes and new standards.

Introduction of new or changed standards generally follows a review of outcomes of events such as:

- Incidents in institutions which demonstrate that current standards are no longer effective to ensure safety of the institution or effective custody of inmates,
- Introduction of new weapons or operational protocols which have an impact on facilities,
- CSC and government initiatives in the form of new directives and policies,
- Industry technological advances and the use of these in other jurisdictions as best practices.

When conducting reviews of standards aimed at capturing changes, CSC assesses the following key factors:

- Have technological advances been subject to the proof of time,
- If threat risk assessments are used to substantiate changes, are they evidence based,
- As a steward of public funds, are various options assessed and substantiated and are they supporting a cost effective approach to the delivery of our mandate to provide a safe and secure work and living environment.

The prescriptions in the Technical Criteria document have proven performance based on independent testing and history of actual usage. Standards are based on the best evidence available and for this reason when providing rulings either in the court of law or for any 3rd party review, consistency with standards must be established and achieved. Notwithstanding, special circumstances may lead an institution to require a unique solution. In such case, the institution must submit via their Regional Deputy Commissioner their requests to the Director General Technical Services and Facilities for consideration by an appointed committee composed of the Commissioner, the Senior Deputy Commissioner, the Assistant Commissioner Correctional Operations and Programs and the Assistant Commissioner Corporate Services. Other Executive Committee members may also be asked to participate.

Correctional Service Canada
Service correctionnel Canada

Safety, Respect and Dignity for All

La sécurité, la dignité et le respect pour tous

Technical Criteria for
Correctional Institutions

SECTION G - GENERAL

Canada

G-1 GENERAL - INTRODUCTION

G-2 GENERAL – FIRE AUTHORITIES AND CLASSIFICATION

G-1 GENERAL - INTRODUCTION

1. PURPOSE

1.1 The Purpose of this document is to prescribe proven technical requirements for site and buildings as tested in use or in accordance with recognized standards authorities. Requirements are described by performance and specification and cover the needs unique to correctional facilities. Other governing construction codes and authorities supplement this document.

1.2 This document is to be used for the development of all Men's and Women's CSC institutional design and construction projects. All specialized technical requirements for Women's institutions are denoted within the text of this document and within the Women's Technical Reference Guideline that is in the Appendix.
Community Correctional Centres use separate standards.

1.3 The prescriptions in this document are cross referenced in the CSC "Accommodation Guidelines" which is a separate document used in the planning and design of CSC correctional facilities.

2. CONTEXT

The Technical Criteria contributes to the CSC Corporate Priorities through its prescriptions in infrastructure content and through management and enforcement of construction projects to promote consistency and to achieve fiscal responsibility. The **CSC corporate priorities** are as follows:

- Safe management of eligible offenders during their transition from the institution to the community, and while on supervision
- Safety and security of members of the public, victims, staff and offenders in our institutions and in the community
- Effective, culturally appropriate interventions for First Nations, Métis and Inuit offenders
- Mental health needs of offenders addressed through timely assessment, effective management and appropriate intervention, relevant staff training and rigorous oversight
- Efficient and effective management practices that reflect values-based leadership in a changing environment
- Productive relationships with diverse partners, stakeholders, victims' groups, and others involved in public safety

The Technical Criteria also contributes in mitigating the risks inherent to its mandate to protect society, staff and offenders while preparing and encouraging offenders to be law abiding citizens. The **CSC corporate risk profile statements** are as follows:

- There is a risk that SCC will not be able to respond to the complex, diverse and evolving profile of the offender population.
- There is a risk that CSC will not be able to maintain required levels of operational safety and security in institutions and in the community.
- There is a risk that CSC will not be able to manage significant change related to transformation, legislative changes and fiscal constraints.
- There is a risk that CSC will lose support of partners delivering critical services and providing resources for offenders.
- There is a risk that CSC will not be able to sustain results related to re-offending violently.

3. APPLICATION

3.1 For new construction, adherence to the documented solutions is considered important. Deviations, however, will be considered providing equal performance can be demonstrated. In such cases, requests shall be submitted to the issuing authority, the Director Facility Planning and Standards.

3.2 For renovations, alterations and expansions of existing buildings and systems, conformity to this document may not always be practicable or cost effective due to existing physical features and the age of the facility. In such cases, information contained in this document should be used as guidelines and alternate solutions, with appropriate justification, shall be submitted to the issuing authority.

4. UPDATING

In order to keep the document current, Technical Criteria sections are systematically amended as new information or lessons learned are raised to the issuing authority. The Technical Criteria Document is also periodically reviewed to determine the need for revisions.

5. DOCUMENT DISTRIBUTION

5.1 The document in its final revised version will be available on the Facilities Branch Infonet page. Updates will be posted at this Infonet location when amendments are made.

5.2 Distribution of the Technical Criteria Document will be made in electronic form to listed recipients. Recipients are responsible for broader distribution to parties outside CSC on an as need basis. .

5.3 The office of Director Facility Planning and Standards at NHQ is responsible for issuing the Technical Criteria Document in both official languages.

6. SECURITY REQUIREMENTS FOR CONSTRUCTION

Security requirements, which are critical for construction within occupied institutions, have been established to satisfy the special needs of CSC. Contractors performing construction in operating institutions must conform to the provisions contained in the “Security Requirements” issued by the office of Director Facility Planning and Standards. This document will form part of the specification of the contract documents for works to be undertaken.

7. SECURITY CLASSIFICATION AND HOUSING

In order to provide a general understanding of the security classifications of correctional institutions, the following brief definitions are included. While CSC uses the minimum, medium, maximum etc. designations under the following headers (institution security classification) to classify their institutions[1], there exists another designation (S-X) which describes the types of housing units found at CSC. Because institutions and expansions have been built over time and since the influencing factors may have differed from time to time, there exists an array of unit types. CSC has classed these housing units by an S category ranging from S-2 to S-7, with higher security in ascending order. S-1 refers to Community Correctional Centers, which are not described in this document. S-2 housing matches the minimum designation but may also be found at mediums, S-3 to S-5 match the medium designation, and S-6 and S-7 are at maximum. Multi-level institutions have units at the S-4 and S-5 level but may have added features to address their special purpose. An S designation for housing at a Special Handling Unit has been omitted given the unlikely need for additional capacity at that level. Here is a description of each category:

7.1 Minimum security institutions and housing type (S-2)

Minimum security institutions do not have a defined and fenced perimeter. Internal security is low key with only one 24 hour post referred to as the duty post to which all visitors report to. All buildings are constructed to commercial standards and are free egress. Approximately 15% of CSC beds are located at minimums.

S-2: Housing units resemble apartments, attached or detached houses with each unit housing a maximum of 10 inmates but more typically 5-8, eight being most common (see also G-2 Subsection 4 for special provisions). Houses/apartments provide for a shared living experience and are free egress in accordance with residential occupancy of the NBC. Ease of detection and alarms warn of unauthorized egress after hours.

---

1 Following Commissioner’s Directive #706 of March 15, 2010

7.2 Medium security institutions and housing type(S-3, S-4 & S-5)

Medium security institutions have a double fence perimeter with intrusion detection systems and cameras. Several old institutions still have walls with detection capability. Armed officers in vehicles conduct patrols on the exterior side of the perimeter. Entry into the institution is highly controlled and guarded. Arms are kept only at the perimeter. On the interior, movement and activity areas are moderately controlled. Buildings are generally constructed of harder materials, some having impeded egress. Housing units vary in the degree of security and supervision. Activities are zoned by time of use and fences may separate the zones. Approximately 58% of CSC beds are located at mediums.

S-3: Housing units which provide for a similar living experience as S-2 but where the envelope of each apartment/suite is secured. A number of apartments make up the unit which is supervised by an officer in an open control post. This post allows for the control of traffic to and from the suites but there are no views of the interior of the suites from the location of the control post. A separate office suite is combined with the unit. This type of unit provides for containment at the apartment level but does not secure inmates within the apartment.

S-4: Housing units which are based on the cell block approach but where the ranges are more open to permit better views and encourage interaction. Several ranges make up the unit surrounding a common core but with no physical separation to allow free movement. An open control post is located in the core positioned optimally for sight and sound. The post controls access to cells. A separate office suite is combined with the unit. This type of unit provides for containment at the cell and building level.

S-5: While the S-3 and S-4 medium categories are quite distinct, this housing unit category has a broad collection of unit types and features. As it represents the most secure unit at the medium, the features aim to either control the group sizes or offer a protected control post or may have both of these features. Because the control posts are enclosed with security glass, sound of surrounding area is deadened. A separate office suite is combined with the unit. This type of unit provides for containment at the cell and building level and in many cases at the range level.

7.3 Maximum security institutions and housing type(S-6 & S-7)

Maximum security institutions have perimeters and access points similar to mediums. Arms however are kept not only at the perimeter but also in the interior. Conveyance of arms is highly controlled via tunnels and galleries which connect control posts at key areas. Armed intervention is possible to circulation areas as well as many activity areas from a Control post or gallery. Buildings and activity zones are packed close together or buildings may be interconnected. Due to the incompatibility of many inmates, activities and movement are scheduled and highly controlled. Approximately 15% of CSC beds are located at maximums.

S-6: Housing units at this level are intended to test inmate’s ability to integrate with others and therefore enable CSC to render a decision on candidacy for relocation to a medium. Inmates in these units share common program and occupational areas including gym and yard. The units have armed control posts, containment at the cell and range level but the ranges are more open.

S-7: Housing units at this level vary. All units are designed to have the highest degree of security including armed control posts and containment at the cell and range level. While most units are connected to an interior corridor, the most recently built units are stand alone but attached to the main institution by a fenced corridor. These latter units are provided with more programming capability to make them more autonomous thus reducing movement out of the units. S-7 max units have attached yards to limit movement and group size. Galleries with intervention capability to most activity areas supplement the control post.

7.4 Special Handling Unit (SHU)

Special Handling Unit is essentially a maximum except that movement is even more restricted, activities more limited, and all inmate areas located at ground level with armed intervention possible to all circulation and activity areas. There are approximately 130 beds at this classification and the single facility is an annex to a main institution. A separate similar unit is located in another Region but it has been used as a maximum unit allowing for repurposing if the need arises. The main distinguishing feature of the housing unit is that all cells are located at ground level.

7.5 Multi-level institutions

Multi-level institutions serve a special purpose at CSC. Some accommodate inmates who are new to CSC to be assessed and pen placed. These institutions are referred to as Reception units. There are also Regional Health and Psychiatric centers for temporary stay from main institutions. And finally, there are remote institutions where different security levels are co-located on one site. In the case of mixing classifications, housing type is distinct for each level but activities and programs are generally integrated at the minimum and medium level. Maximums however remain segregated. For special purpose institutions as in the first two examples, the units are self-contained integrating minimum and medium inmates while maxes are generally segregated. There are no firearms in multi-levels except at the perimeter. Maximum units for general population inmates are also equipped with firearms.

Approximately 12% of CSC beds are multi-level.

8. PLANNING FOR EXPANSION IN CAPACITY

The infrastructure of every institution (service and program areas and all utilities: water, sewage, heating electrical, etc.) is designed to meet the needs of the designated rated capacity of an institution and for an expansion of housing accommodation by 25% without significant strain on the original infrastructure. All expansions should nonetheless undergo a review to assure that all current needs can be satisfied by the existing infrastructure.

G-2 GENERAL – FIRE AUTHORITIES AND CLASSIFICATION

1. SCOPE

This section identifies the authorities and use classifications related to fire protection requirements for correctional institutions.

2. GENERAL

This section treats fire protection requirements in the broad sense; specific fire protection requirements are treated in greater detail in the appropriate sections of this document.

3. AUTHORITIES

3.1 Fire Protection Authority Having Jurisdiction

3.1.1 The authority for Fire Protection rests with the respective Departments. Correctional Service Canada projects, including design and construction of new facilities, renovation of existing facilities, and change in use, shall be reviewed by Technical Services and Facilities, Engineering and Maintenance.

3.1.2 Plans and specifications for Correctional Service Canada projects shall be submitted to the Technical Services Directorate at various stages for final approval according to the schedule specified in the Fire Safety Manual 345 prior to tender call. Fire Protection inspections may also be carried out at the substantial completion stage of construction to ensure that fire related building systems are in accordance with the approved contract documents. Any systems requiring remediation must be corrected prior to obtaining approval for user occupancy.

3.2 National Building Code and National Fire Code

CSC projects shall be designed and constructed to meet the requirements of the National Building Code of Canada (NBC). Part 3 of the NBC relates to most of CSC buildings while Part 9 of the NBC is applicable to small buildings including residential built of combustible materials. The National Fire Code (as amended) remains applicable throughout the entire lifecycle of the building.

3.3 Provincial and Municipal Building and Fire Codes

Fire protection regulations as set out by Provincial and Municipal Fire Authorities will also be complied with to the extent that is reasonable and practical and applied without contravening any federal statutes, laws or regulations and without prejudice to the Crown's legal and constitutional rights.

3.4 Commissioner CSC

The Commissioner CSC has the responsibility for the care and custody of inmates under which fire protection forms part of that mandate. Security however remains a principal consideration and as such a balance may at times need to be struck. Technical Services Directorate will bring up potential conflicts and advise on the best resolution.

4. OCCUPANCY CLASSIFICATIONS AND SPECIAL PROVISIONS

4.1 The occupancy classification of buildings is set out in National Building Code (NBC).

4.2 The NBC states that every building or part thereof shall be classified according to its major occupancy as belonging to one of the Groups / Divisions described in NBC Table 3.1.2.1.

The following are examples of occupancy classifications that would apply to buildings having free egress[2]:

Table G-1-1: Examples of Occupancy Classifications Having Free Egress

Examples of Description of *Major Occupancies*	**Group**	**Division**
Recreation (Gymnasia and Fitness)	A	2
Kitchen and dining facilities	A	2
Socialization & Programs (Spiritual, Libraries, Meeting Rooms)	A	2
Medical services	B	2
Living units	C	
Administration	D	
Maintenance and works	F	2
Shops – Industrial & vocational	F	2
Stores, Garages & SIS	F	2

4.3 Any building of any occupancy type in which exits cannot be readily unlocked and/or opened by all occupants is considered to be an impeded egress or contained use building and shall comply with the requirements of the NBC for Group B-1 Occupancies. Typical examples are living units with cells and program buildings where exit doors are locked and require the unlocking by remote control or locally from the interior or exterior by a correctional officer.

4.4 S-2 living units at minimum security institutions which consist of single or double occupancy bedrooms and which allow "Free Egress" shall be classified under the NBC as Group C Occupancy. For reasons of fire emergency evacuation, the maximum occupancy of each living unit or suite shall be 10 residents. This number may be exceeded and be as high as 16 under conditions of population pressures when special provisions are met. One of these provisions is to incorporate a commercial exhaust hood over the stoves in the kitchen located in the suite.

[2] Section 3.1 of the National Building Code of Canada 2010 National Research Council, especially subsection 3.1.2.1, Table 3.1.2.1 and Appendix *A-3.1.2.1.(1)*

Correctional Service Canada | Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Technical Criteria for

Correctional Institutions

SECTION SP - SITE

Canada

SP-1 SITE - SITE PLANNING AND DEVELOPMENT

SP-2 SITE - FENCE

SP-3 SITE - GATES/SALLY PORT

SP-4 SITE - EXTERIOR LIGHTING

SP-5 SITE - TRAFFIC CIRCULATION AND PARKING

SP-6 SITE - TEMPORARY CONSTRUCTION FENCES

SP-1 SITE – SITE PLANNING AND DEVELOPMENT

1. SCOPE

This section outlines planning and development principles and specific definitions of terms related to detention institutions.

2. RELATED SECTIONS

SP–2 – Fence
SP–3 – Gates / Sally Port
SP–4 – Exterior Lighting
SP–5 – Traffic Circulation and Parking

3. INSTITUTIONAL PROPERTY

3.1 There is no specific requirement for demarcation or fencing at the CSC owned property line. Signage at the property limit is recommended. Where signage is used, it shall follow the Federal Identity Program[1].

3.2 Property features such as topographical conditions and existing trees and bushes shall be used to screen CSC institutions from adjoining properties. Landscaping and site development along the main entry road shall be visually appealing.

3.3 Where more than one institution is located on a CSC property, sufficient space shall be allowed between institutions. Minimum security institutions shall be located furthest from that part of a medium or maximum institution where inmate circulation and activities take place.

4. RESERVE OF OPEN LAND

4.1 Where possible and with minimal alterations to natural land and its condition, a reserve of open land shall be provided for a distance of 100 m from the exterior of the outer perimeter fence to facilitate views of an intruder or escapee. Where natural grade changes exist, these shall be retained. Where open land reserves are smaller than the 100 m due to prohibitive site conditions or limiting extent of CSC property, additional security measures may be required, as determined on a project specific basis.

4.2 Landscaping for the first 100 m within the open land reserve shall consist of grasses, trees and shrubs which minimize the potential for screening an intruder or an escapee.

4.3 Due to specific operational requirements, the reserve of open land can extend over structures such as CSC service buildings, parking lots, flag posts and light standards, and site enhancements. These elements should be located close to the main entrance of the institution and away from inmate outdoor circulation and activity areas in order to limit the potential for contraband transfer over the institutional perimeter.

---

1 4.3 – Common-use and operational signs, Federal Identity Program Manual, March 1990
http://www.tbs-sct.gc.ca/fip-pcim/man_4_3-eng.asp

5. NO MAN ZONE

5.1 This zone is the ground area between the outer perimeter fence and the inner perimeter fence. The distance between the perimeter fences is 7.5 m.

5.2 The no man zone ground surface shall have the top soil removed and covered with filter fabric and crushed stone for a depth of at least 200 mm to minimize plant growth.

5.3 This zone is equipped with an in-ground sensor to detect motion. It is a component of the Perimeter Intrusion Detection System (PIDS), referred to as the Motion Detection System (MDS). To minimize false alarms activated by the MDS, the ground surface between the fences shall be graded to prevent pooling of water and run-off shall be collected as described in section SU-1, Storm and Sanitary Sewers.

5.4 This zone is covered by camera surveillance. The cameras will focus on the section of the fence line which has been disturbed. Cameras are an integrated part of the PIDS.

6. BUFFER ZONE

6.1 A 4-meter buffer zone parallel to the interior side of the inner perimeter fence shall be free of all structures, trees, shrubs and roads, except for road access through the perimeter and connecting interior fences where required.

6.2 Where adjacent to playfields, ceremonial grounds, and gardens, this zone shall be marked by signage informing inmates not to trespass. Fencing shall not be used to demarcate this zone as it only serves to obstruct views from the mobile patrols on the outside of the perimeter. As well, the fence may captures balls which may only encourage retrieval resulting in enforcement and imposition of charges.

6.3 The buffer zone is covered by a separate line of PIDS cameras from those used to cover the no man zone. Similar to the no man zone, the cameras will focus on the section of the buffer zone in which the fence has been disturbed.

7. NO BUILDING ZONE

7.1 With the exception of the Gatehouse, no building shall be closer than 12 m to the inner perimeter fence.

8. NO INMATE ZONE

8.1 This is the area along the perimeter fence which is close to the Gatehouse and functions receiving vehicles. Access to inmates here is generally restricted or highly controlled. There is no specific distance to delimit this zone as it varies depending on the site layout configuration.

8.2 Functions allowing controlled access to inmates within this zone include Visits and Private family visits, both shared with outside visitors.

9. SITE PLANNING AND DEVELOPMENT OF AN INSTITUTION

9.1 Planning of facilities and amenities shall be dictated by time of use and user type. Institutional buildings closest to the gatehouse shall accommodate functions which are inaccessible to inmates or where access is supervised. Those functions requiring vehicle access for servicing and supplies shall also be relatively close to the gatehouse while vehicle access routes shall be away from inmate circulation and activity areas. Evening use functions, housing, playfields, gardens, and ceremonial grounds shall be located furthest from the entrance.

9.2 See item 11 for Landscaping and limited access grounds and item 12 for Playfields and yards. Also see Plate SP-1-1 for idealized site plan which illustrates building relationships.

10. SIGNAGE

10.1 All exterior and interior building signage shall conform to the Federal Identity Program (FIP). The FIP Manual is fully available at:

http://www.tbs-sct.gc.ca/fip-pcim/

10.2 The CSC “Search Sign” shall be located at each public entry leading to an institution. The “Search Sign” is a warning sign as prescribed in the Federal Identity Program Manual[2] (Caution!, Attention! under Type 3). The standard is yellow background with black letters. For the purpose of a reading distance of 30 m and a vehicular speed of 30 km/h, “x” is defined as 50 mm. Therefore, the text letters size is 50 mm (x) and the header letters size is 150 mm (3x). The layout is provided in Table 5 – Standard spaces, 50 mm to 200 mm x-height of section 4.3 of the FIP Manual (see footnote 8). The bilingual text is side by side, the official language on the left side being according to the regional practice. As the font and design follows the Federal Government standards the use of the Department signature or CSC badge is optional.

Attention! You are now entering a Correctional Service Canada reserve and all vehicles and persons on this reserve are subject to search.	**Attention!** Vous pénétrez présentement sur une réserve du Service Correctionnel Canada et tout véhicule et personne sur cette réserve sont sujets à être fouillés.

OR

[2] Federal Identity Program Manual – 4.3 Common-use and operational signs, Treasury Board of Canada, Secretariat, March 1990; http://www.tbs-sct.gc.ca/fip-pcim/documents/man_4_3__p1.pdf and http://www.tbs-sct.gc.ca/fip-pcim/documents/man_4_3__p2.pdf
Federal Identity Program Manual – 4.5 Signage typeface, Treasury Board of Canada, January 1988; http://www.tbs-sct.gc.ca/fip-pcim/documents/man_4_5.pdf

Attention! Vous pénétrez présentement sur une réserve du Service Correctionnel Canada et tout véhicule et personne sur cette réserve sont sujets à être fouillés.	**Attention!** You are now entering a Correctional Service Canada reserve and all vehicles and persons on this reserve are subject to search.

Refer to *CAN/CGSB-109.1M-1989*[3] for the sign structure and characteristics.

10.3 All areas restricted only to authorized personnel shall be clearly and boldly identified according to the common-use and operational signs as described in the Federal Identity Program Manual[4]. Refer to section A-9 Interior Signage for interior signage requirements.

11. LANDSCAPING AND LIMITED ACCESS GROUNDS

11.1 Only indigenous plants and locally available materials shall be used.

11.2 All layouts and landscape material shall take into account snow removal, grass cutting, watering and tree and shrub trimming to ensure minimum watering.

11.3 Soft landscaping is encouraged but plant type should be selected so as not to obstruct views. Gentle contouring is also acceptable as are earth berms and timber retaining walls provided they do not facilitate hiding.

11.4 Colour and visual relief can be achieved by the use of flowers beds, which shall be planted and maintained by inmates.

11.5 At medium security level and above, all site furniture shall be secured in place. All walking surfaces shall be of monolithic material or compacted stone dust. Small and light paving materials (brick, concrete pavers, or gravel) shall not be used.

11.6 Positive drainage for the entire site shall be provided with the use of ditches, swales and flumes. All drainage areas shall be designed to be as shallow as possible to allow for ease of maintenance and so not to obstruct visibility.

11.7 The minimum grade slope shall be 3% or gradual slope where natural grade changes exist for grass and landscaped areas.

11.8 Vegetable gardens where provided shall be located in designated areas away from general inmate traffic and playfields. Authorized inmates are permitted access to gardens.

11.9 Fruit trees are not permitted on institutional grounds.

11.10 Sacred Grounds for sweat lodge and ceremonies shall be located in designated areas away from general inmate traffic and playfields. Only authorized inmates are given access to sacred grounds. Firewood used in ceremonies shall be stored under cover and be protected.

---

[3] CAN/CGSB-109.1M-1989 – Signage System, Extruded Aluminum, Federal Identity Program

[4] Page 11 – Federal Identity Program Manual – 4.3 Common-use and operational signs, Treasury Board of Canada, Secretariat, March 1990; http://www.tbs-sct.gc.ca/fip-pcim/documents/man_4_3__p1.pdf

11.11 Snow storage areas shall be located in a manner that does not restrict drainage and visibility. A space wide enough to accommodate tractor power mowers shall be provided between trees and planting beds. Hose bibs shall be provided throughout the site as required on a project specific basis. Underground watering pipes or hoses shall not be used.

12 PLAYFIELDS AND YARDS

Playfields, which often have a high concentration of inmates, generally have their outer bounds located adjacent to the perimeter fence. When planning playfields for new institutions or where housing unit disposition permits at existing, playfields shall be located within an interior courtyard bounded by housing units. Playfields in either location shall be distant from the Gatehouse, service buildings located on the exterior, and parking lots in order not to offer opportunities to covertly approach the perimeter fence line and throw over contraband in proximity of the playfield. Playfields shall also be located distant from Segregation and its yards and from Health Care facilities.

12.2 Playfields are typically grassed except where the activity calls for a hard surface. Compacted fine gravel or stone dust or, a monolithic hard surface such as asphalt is acceptable.

12.3 Mini fenced yards associated with Segregation, maximum security or special population units are provided with an engineered asphalt surface to allow use in all weather, to prevent hiding of contraband, and to facilitate maintenance. The asphalt surface shall extend beyond the containment fence by 900 mm for anti-tunnelling protection and to prevent edge fracture and removal. Poured in place concrete surface may be used on account of seasonal or installation constraints. Use of concrete may be favoured for ease of construction and maintenance where a yard is enclosed by buildings or walls where a wall is intended for screening.

13 FLAG AND FLAGPOST

Rules and protocol for "flying the flag" are fully available at:

http://www.pch.gc.ca/pgm/ceem-cced/etiqtt/101-eng.cfm

Refer to *CAN/CGSB-98.1-2003*[5] for the outdoor use of the National Flag of Canada.

[5] CAN/CGSB-98.1-20011 – National Flag of Canada (Outdoor Use) ICS 99.020.10

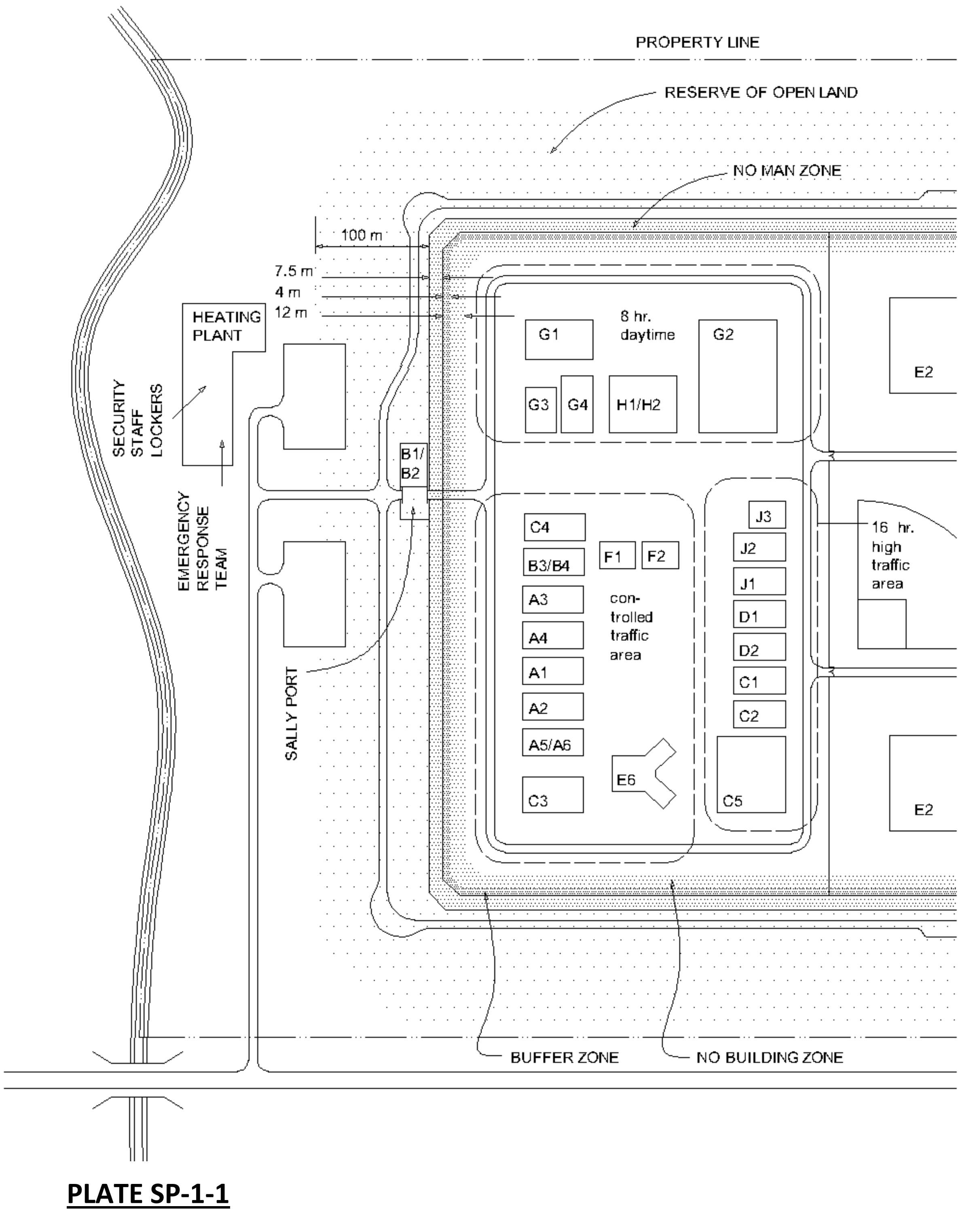
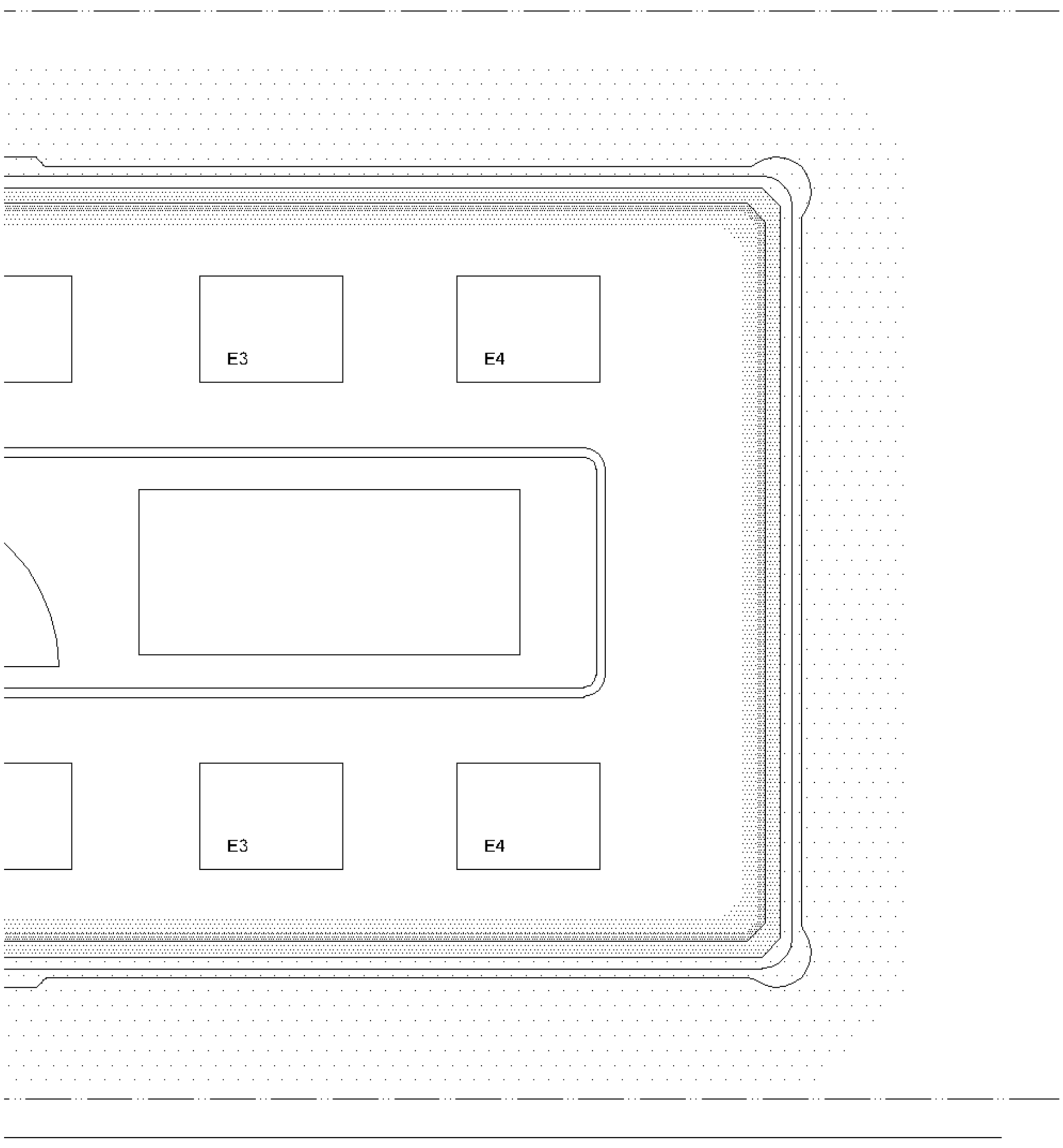

PROPERTY LINE
RESERVE OF OPEN LAND
NO MAN ZONE
100 m
7.5 m
4 m
12 m
HEATING PLANT
SECURITY STAFF LOCKERS
EMERGENCY RESPONSE TEAM
SALLY PORT
B1/ B2
G1
8 hr. daytime
G2
G3
G4
H1/H2
E2
C4
B3/B4
F1
F2
A3
A4
A1
A2
A5/A6
C3
con- trolled traffic area
E6
J3
J2
J1
D1
D2
C1
C2
C5
16 hr. high traffic area
E2
BUFFER ZONE
NO BUILDING ZONE

PLATE SP-1-1


E3
E4
E3
E4

BLE A–1–1 – ORGANIZATION OF DEPARTMENTS

GROUP A – ADMINISTRATION
A1 MANAGEMENT CENTRE
A2 FINANCE
A3 STAFF SERVICES AND TRAINING
A4 ADMINISTRATION AND PERSONNEL
A5 CASE AND SENTENCE ADMINISTRATION
A6 NATIONAL PAROLE BOARD HEARING

GROUP B – SECURITY
B1 EXTERNAL CONTROL (GATEHOUSE)
B2 EMERGENCY RESPONSE TEAM AND ARMOURY
B3 SECURITY ADMINISTRATION
B4 ADMISSIONS AND DISCHARGE

GROUP C – SOCIALIZATION
C1 SOCIAL AND CULTURAL DEVELOPMENT
C2 ARTS AND CRAFTS
C3 PRIVATE FAMILY VISITING
C4 VISITS AND CORRESPONDENCE
C5 RECREATION

GROUP D – SPIRITUALITY
D1 CHAPLAINCY
D2 ABORIGINAL SERVICES

GROUP E – HOUSING
E1 FREE EGRESS – SMALL GROUP ACCOMMODATION (S-2)
E2 RESPONSIBILITY UNITS (S-3)
E3 STRUCTURED SECURITY UNITS – OPEN POST / RANGE (S-4)
E4 STRUCTURED SECURITY UNITS – CLOSED POST / RANGE (S-5)
E5 MAXIMUM SECURITY UNITS (S-6 / S-7)
E6 SEGREGATION UNIT
E7 SPECIAL HANDLING UNIT

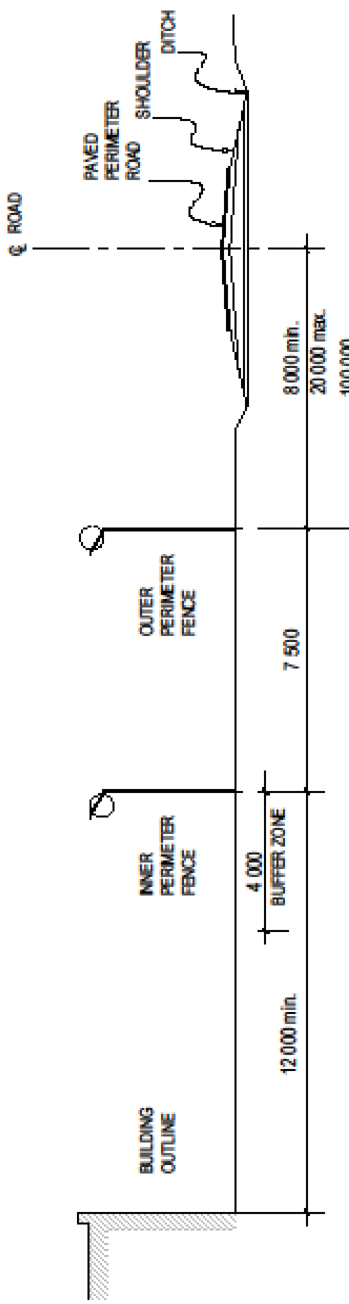
GROUP F – HEALTH CARE
F1 HEALTH CARE CENTRE
F2 MENTAL HEALTH CARE

GROUP G – TECHNICAL SERVICES
G1 MAINTENANCE
G2 FOOD SERVICES
G3 INSTIUTIONAL SERVICES
G4 MATERIAL MANAGEMENT

GROUP H – OCCUPATIONAL DEVELOPMENT PROGRAMS
H1 OCCUPATIONAL DEVELOPMENT PROGRAMS (ODP) CORE
H2 CORCAN

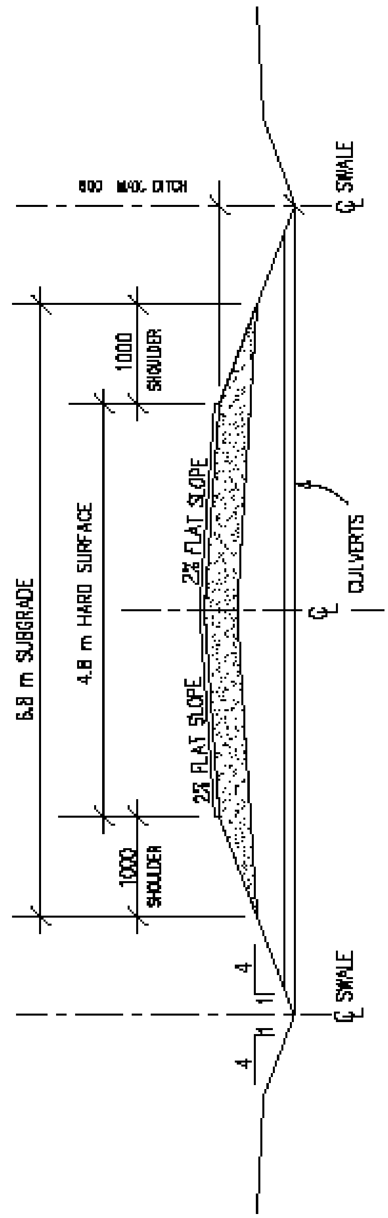
GROUP J – EDUCATION AND PERSONAL DEVELOPMENT

J1 EDUCATION
J2 CORRECTIONAL PROGRAMS
J3 LIBRARY



TYPICAL SECTION THRU FENCE AND ROAD

PLATE SP -1-2 - SECTION THROUGH FENCE AND ROAD



PERIMETER ROAD TYPICAL SECTION

SP-2 SITE - FENCE

1. SCOPE

This section provides performance criteria and conforming specifications for all fences related to institutions of security levels medium, maximum and multi-level inclusive. There are no special requirements for fences at minimum institutions.

It is imperative that all fence projects, either perimeter or interior, are submitted to the office of the Director Facility Planning and Standards at NHQ for review and approval.

2. RELATED SECTIONS

2.1 Technical Criteria Document sections:

SP–1 – Site Planning and Development
SP–3 – Gates/Sally Ports
SP-4 - Exterior Lighting
SP–5 – Traffic Circulation and Parking
ST–1 – Guard Towers
& any sub-section referring to the Perimeter Intrusion Detection System (P.I.D.S.)

2.2 National Master Specification Section

01 35 13.16 – Special Project Procedures for Detention Facilities
28 01 10 – Operation & Maintenance of Electronic Access Control & Intrusion Detection
28 16 00 (13705) – Intrusion Detection
32 31 13 – Chain Link Fences and Gates
32 31 13.53 – High-Security Chain Link Fences and Gates

3. EXTERNAL BOUNDARY FENCES

External boundary (property) lines shall not be fenced unless specific site conditions warrant it. The type of fence in such locations will be project specific.

4. PERIMETER SECURITY FENCES

4.1 Performance Criteria

4.1.1 The institution will be enclosed by a double chain link fence perimeter supported by intrusion detection and camera system, and mobile patrol on the exterior of the perimeter. The perimeter fences form the last physical obstacle to escape from the institution. The design of the fence system shall be such that an escapee shall not be able to breach the perimeter in less than 45 seconds. This time duration is based on a maximum time for the perimeter security mobile patrol to respond after the first signal following a detected disturbance of the fence at the Main communication control post (MCCP). The optimal reaction time for the mobile patrol is 30 seconds.

4.1.2 Fences shall be erected in straight lines from corner to corner for direct viewing by camera. The corners of the perimeter shall be truncated at 45° to allow suitable placement of camera poles and cameras to afford optimal viewing between the fences and on the interior of the Inner Perimeter Fence. In addition, the truncated corners allow for a gentler curve of the patrol road.

4.1.3 To render climbing more difficult, the fence fabric shall be installed on the institution side of the fence posts. Sharp corners of less than 120°, shall be avoided except where fences intersect.

4.1.4 For fences equipped with a Fence Detection System (FDS), the fence shall balance fabric tension to ensure fabric vibration travel across posts while not causing excessive false alarms. Fabric vibration terminates at strain post locations where the fence fabric ends thus allowing zone separations for the PIDS.

4.1.5 Special attention shall be paid to sloped sites to ensure that gaps do not develop between the ground surface and the lower fence rail. Where necessary, due to severe ground slope longitudinally, fencing may be stepped, but the minimum height of the fence shall be maintained at all times. Ground slope across the fence line shall be minimized to prevent erosion under the perimeter fences.

4.1.6 Water shall be prevented from pooling between the perimeter fences, as this could affect the operation of the Motion Detection System (MDS). For special underground drainage requirements relating to perimeter fences, see sections SU-1 Storm and Sanitary Sewers.

4.1.7 Barbed tape concertina (BTC) wire shall be installed in such a manner that it prevents the passage of a person across the barbed coils. (See plates SP-2-2 and SP-2-3).

4.1.8 Where interior fences intersect the Inner Perimeter Fence, the interior fence shall be designed to prevent it from being used to aid in crossing the Inner Perimeter Fence. To achieve this, the interior fence shall be equipped with:

- a Fence detection system (FDS) for a length of 2.5 meters. The fence fabric shall extend for that length and be connected to a strain post so that the vibration does not travel beyond.
- and BTC on both sides on the fence No gap between posts or fabric shall exceed 125 mm.

4.1.9 To inhibit tunnelling under the Inner Perimeter Fence, a ground barrier shall be provided by installing either a continuous concrete footing or a concrete or asphalt sidewalk on the institution side. (See Plate SP-2-1). Roadways crossing perimeter fence lines shall be topped with asphalt which also serves as a ground barrier.

4.1.10 The fence system comprising foundation, line, strain, corner and gate posts shall meet local environmental conditions. Fence systems shall be engineered to resist local wind and snow conditions.

4.1.11 Where a building or other structure interrupts the perimeter fence run, the design to ensure perimeter integrity shall be approved by the issuing authority.

4.1.12 Where a perimeter comprises or integrates a wall, the design to ensure perimeter integrity shall be approved by the issuing authority.

4.2 Conforming Specifications

4.2.1 Perimeter fences shall consist of two (2) parallel fences, erected in straight lines, with a 7.5-m gravel strip between the fence lines. For retrofit installations, where it has been proven that a lesser separation has been effective, the existing spacing shall be maintained. Height of both fences, excluding overhang arms, shall be 3.6 m. Corners shall be truncated and the maximum length of the interior fence on the truncated line shall be 25 m.

4.2.2 No structure, with the exception of the Gatehouse and guard towers, shall be closer than 12 m to the Inner Perimeter Fence.

4.2.3 The area between the perimeter security fences shall be free of topsoil and be graded to a slope of 2% from the interior to the Outer Perimeter Fence. The surface will then be covered with a filter fabric and topped with a mix no larger than 20 mm crushed stone to a depth of 200 mm. For the Outer Perimeter Fence an area of 500 mm on each side of the fence shall be stabilized to a depth of 300 mm with a compaction of 95% corrected maximum dry density to hinder run off erosion and tunnelling by inmates.

4.2.4 All chain link fencing shall be installed in accordance with the *National Master Specification (NMS) 32 31 13* [6] and *CAN/CGSB-138.3-96* standard[7]. Where there is a conflict between the NMS and this criterion, the TCD shall prevail.

4.2.5 Chain link fence fabric shall conform to the following specifications[8]:

4.2.5.1 Wire Size: 4.8 mm (min) (6 Gauge)

4.2.5.2 Size of mesh: 50.8 mm

4.2.5.3 Height of fence fabric: 3600 mm

4.2.5.4 Barbed edges top and bottom

4.2.5.5 Average mass of zinc coating to be not less than 610 g/m^2 of uncoated wire

4.2.5.6 Breaking tensile strength to be 10,000 N•min.

4.2.6 Wire mesh shall be continuous from top to bottom and shall be applied on the institutional compound side of the posts.

4.2.7 Fence fabric shall be pulled taut before fixing in place. Tautness, when fixed in place, is to be established by pull tests. The application of a 12 kg perpendicular pull at the midpoint of the mesh panel (midpoint of posts/rails) shall show a displacement of no more than 30 mm from the fence at rest plane.

4.2.8 Posts, (corner, gate, strain, line) shall conform to *CAN/CGSB-138.2-96* [9], galvanized steel pipe.

4.2.8.1 Posts shall be spaced a maximum of 2.5 m apart.

4.2.8.2 Line post minimal size shall be 73 mm O.D. 8.6 kg/m.

---

6 National Master Specification 32 31 13 – Chain Link Fences and Gates (2004/12/31), there is also specifically Master format reference number 32 31 13.53 for High-Security Chain Link Fences And Gates

7 CAN/CGSB-138.3-96 – Installation of Chain Link Fence

8 Refer also to: CAN/CGSB-138.1-96 – Fabric for Chain Link Fence

9 CAN/CGSB-138.2-96 -- Steel Framework for Chain Link Fence

4.2.8.3 Strain post minimum size shall be 114.3 mm O.D. 15.92 kg/m. Strain posts shall be spaced not more than 60 m apart.

4.2.8.4 Corner and gate post minimum size shall be 143.3 mm O.D. 21.0 kg/m.

4.2.9 Galvanized steel arms shall be provided on all posts where barbed concertina is to be installed, as shown on Plate SP-2-2 and SP-2-3.

4.2.10 Bottom and top rails shall be 42.2 mm O.D. minimum, 3.4 kg/m.

4.2.11 Tie wires shall be 3.7 mm diameter (9 gauge) galvanized steel wire to secure chain link fabric to bottom rail, top rail and line posts at 300 mm spacing.

4.2.12 An intermediate galvanized anchor shall be used to secure the bottom rail to the ground barrier, where such a barrier is installed. This anchor shall limit vertical movement of the bottom rail to a maximum of 125 mm.

4.2.13 Intermediate rails shall not be used.

4.2.14 Tension bars used for holding the ends of the fence fabric at the location of strain posts and corner posts shall be 5 mm x 20 mm minimum x 3600 mm galvanized steel.

4.2.15 Tension bar bands shall be 3 mm x 20 mm minimum galvanized steel and spaced vertically at 300 mm o.c.

4.2.16 Where nuts and bolts are required for fastening, nuts shall face compound exterior and be torqued tight.

4.2.17 Where tension cables are used at corner, end, gate, strain posts, and fittings shall be of galvanized steel.

4.2.18 Barbed tape concertina (B.T.C.) shall be galvanized tape 20 x 0.5 mm clenched around a 2.5 mm diameter spring steel galvanized core wire to form a concertina coil with a nominal exterior coil diameter of 710 mm. The coil, when installed, shall have a minimum diameter of 635 mm. The barbed concertina shall have 20 mm long blade type barbs measured from tip to tip of the blade, and barb clusters shall be spaced approximately 45 mm on centre (see Plate SP-2-3). The concertina shall be formed by clipping adjacent loops of single helical coils together at a minimum of three (3) points on the circumference. Clips shall be galvanized. The resulting coil, when stretched, shall form a cylindrical pattern. The loop spacing shall not exceed 230 mm.

4.2.19 For concertina coil support at fence top, two barbed wires stretched and fixed to post arms shall be provided. Barbed wire shall consist of two strands of 12 gauge wire with 4 point barbs at 130 mm spacing, all galvanized.

4.2.20 Concertina coils are to be turned onto a secondary internal fence for a distance of 2.5 m when such a fence meets the perimeter fence. (See plate SP-2-6).

4.2.21 Installation of barbed tape coils shall be as follows:

4.2.21.1 The barbed tape concertina is to be supported and tied at 230 mm spacing onto each of the barbed wire. Additional coils that are required on fences are to be tied as shown on Plate SP-2-3.

4.2.21.2 A second row of BTC may be installed on fence tops at existing sites due to local conditions with the approval of the issuing authority (see plate SP-2-3)

5. INTERIOR FENCES

5.1 Area and Yard Fences

5.1.1 Performance Criteria

5.1.1.1 Interior fences located at Maximum security institutions and those defining segregation yards at Mediums and Maximums shall be a maximum of 3.6 m in height topped with steel arms, barbed wire, and BTC. Other fenced areas at Medium Institutions may be topped with BTC where the fence separates inmate high activity from vehicle circulation areas and loading bays.

5.1.1.2 The use of fences and those topped with BTC for refuge corridors for staff evacuating housing units will be evaluated based on a Threat Risk Assessment. Proposed works must be submitted for approval to the issuing authority.

5.1.1.3 The use of fences and those topped with BTC for separation of housing unit types in mediums such as S-3, S-4 and S-5 will be evaluated based on a Threat Risk Assessment. Proposed works must be submitted for approval to the issuing authority. See item 6 for Separation of distinct populations as in multi-level

5.1.1.4 Where interior fences intersect the Inner Perimeter Fence, refer to item 4.1.8 above and plate SP-2-6.

5.1.1.5 Tunnelling barriers are not required on interior fences except where they are topped with BTC. Barrier type shall be compacted gravel to 300 mm on either side extending 900 mm.

5.1.1.6 See chapter SP-1 Site Planning and Development, item 12.3 for mini yard ground surface and anti-tunnelling protection.

5.1.1.7 Fences shall not be used to demarcate the buffer zone.

5.1.2 Conforming Specifications

5.1.2.1 Materials shall be similar to those specified for the perimeter fences (see item 4.2).

5.1.2.2 For fences where post steel arms or outriggers are not provided, posts shall be provided with galvanized post caps.

5.1.2.3 Two coils of BTC shall be installed on the top of Segregation exercise yard fence as indicated on Plate SP-2-3. A flat solid wall shall be provided where visibility and contact is at issue with approval of the issuing authority.

6. SEPARATION OF DISTINCT POPULATIONS IN ONE INSTITUTION (MULTI-LEVEL)

Types of Multi-level and Fencing Needs

Multi-level institutions vary in the type of populations they accommodate. Two populations such as minimum and medium may be fully integrated with no physical separation or fencing required. Control and supervision is managed through operational means.

A second type of multi-level institution accommodates several populations, short term and assigned to a specialized program. Inmates here have limited access to the institution at large and have restricted movement. The housing units accommodating these populations are generally self-contained integrating staff and related program areas including mini yards. These units do not require fenced separation as movement outside of the units are under escort and limited to individual or small groups. Yards for these units are fenced and topped with BTC.

A third type of multi-level is where a distinct smaller population as part of a specialized program remains largely in their unit and does not mix with the general population which has normal movement to program and activity areas. The specialized program unit is also self-contained which includes mini yards. The mini yards of this unit are fenced and topped with BTC while the complete unit is separated from the rest of the institution by a fence but without BTC topping. The fenced mini yards here do not form part of the separation fence.

7. EXTERIOR SERVICE COMPOUND FENCE

7.1 Performance Criteria

Where bulk fuel storage (propane and gasoline) is provided, the storage area shall be fenced (see section SP-5, Traffic Circulation and Parking).

7.2 Conforming Specifications

7.2.1 Materials will be similar to those specified for the perimeter fences (item 4).

7.2.2 Fence height shall be 2.5 m.

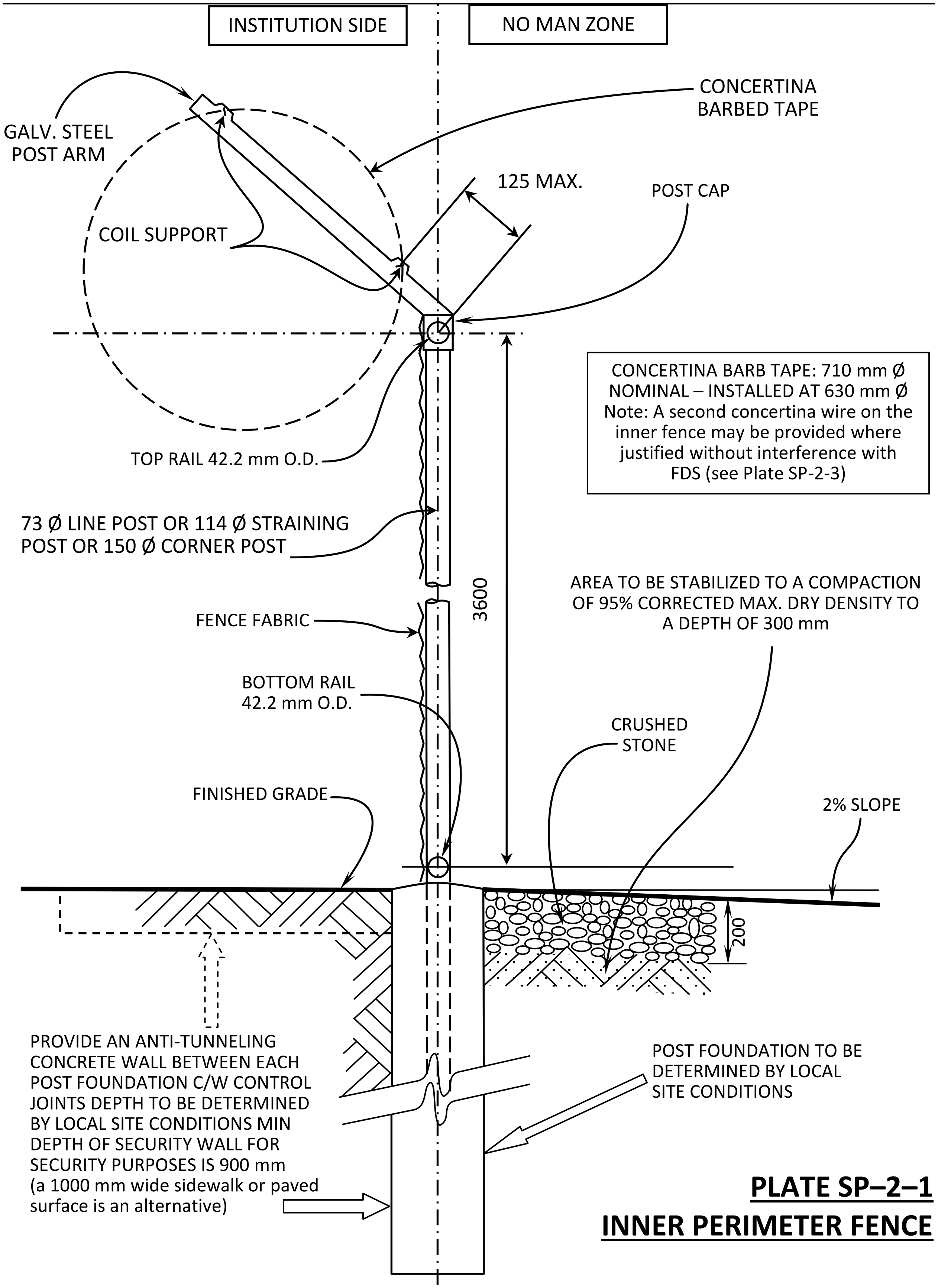


PLATE SP–2–1
INNER PERIMETER FENCE

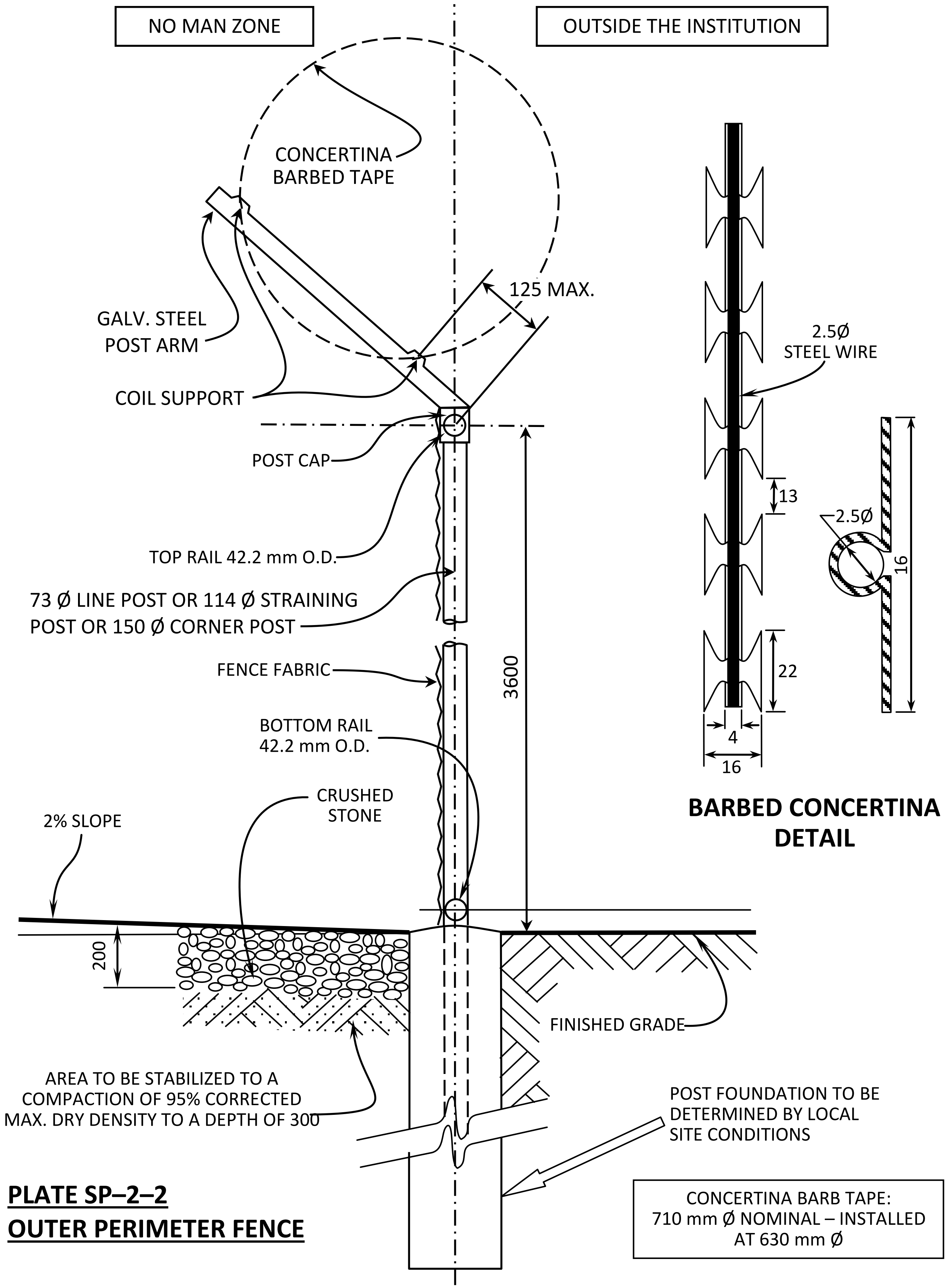
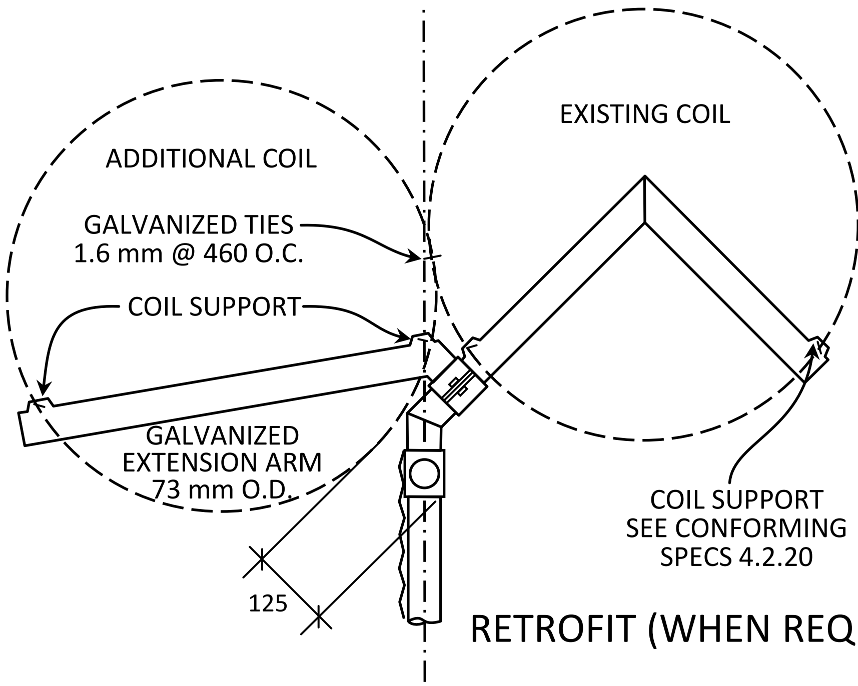
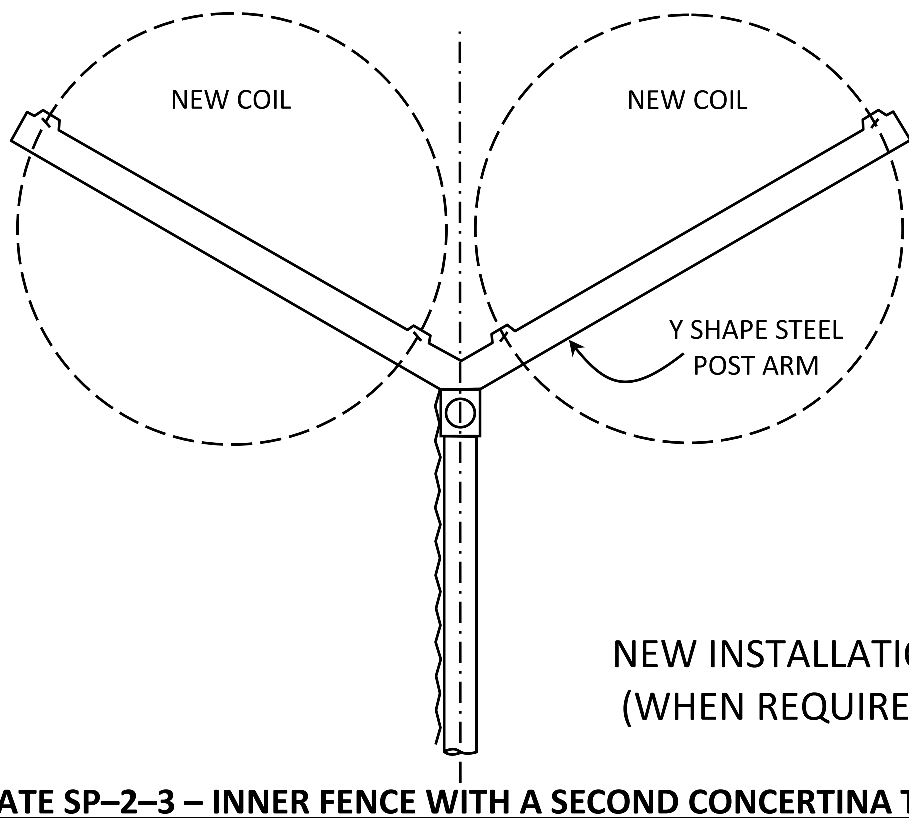


PLATE SP–2–2
OUTER PERIMETER FENCE



RETROFIT (WHEN REQUIRED)



NEW INSTALLATION
(WHEN REQUIRED)

PLATE SP–2–3 – INNER FENCE WITH A SECOND CONCERTINA TAPE

CONCERTINA BARB TAPE: 710 mm Ø NOMINAL – INSTALLED AT 630 mm Ø

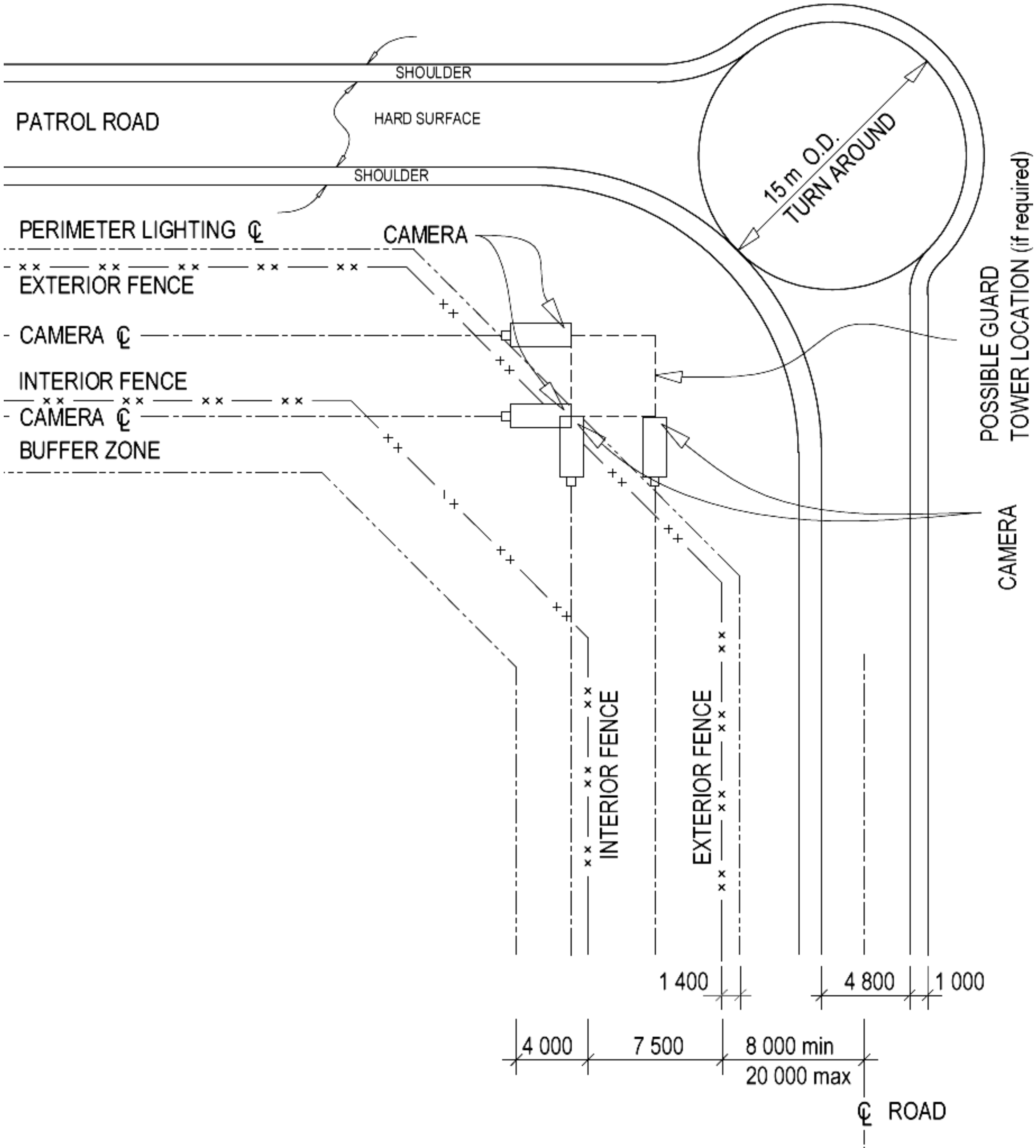


PLATE SP–2–4 – TYPICAL PERIMETER FENCE CORNER WITH TOWER

NOTE: CAMERA LINES ARE FOR INFORMATION PURPOSES ONLY

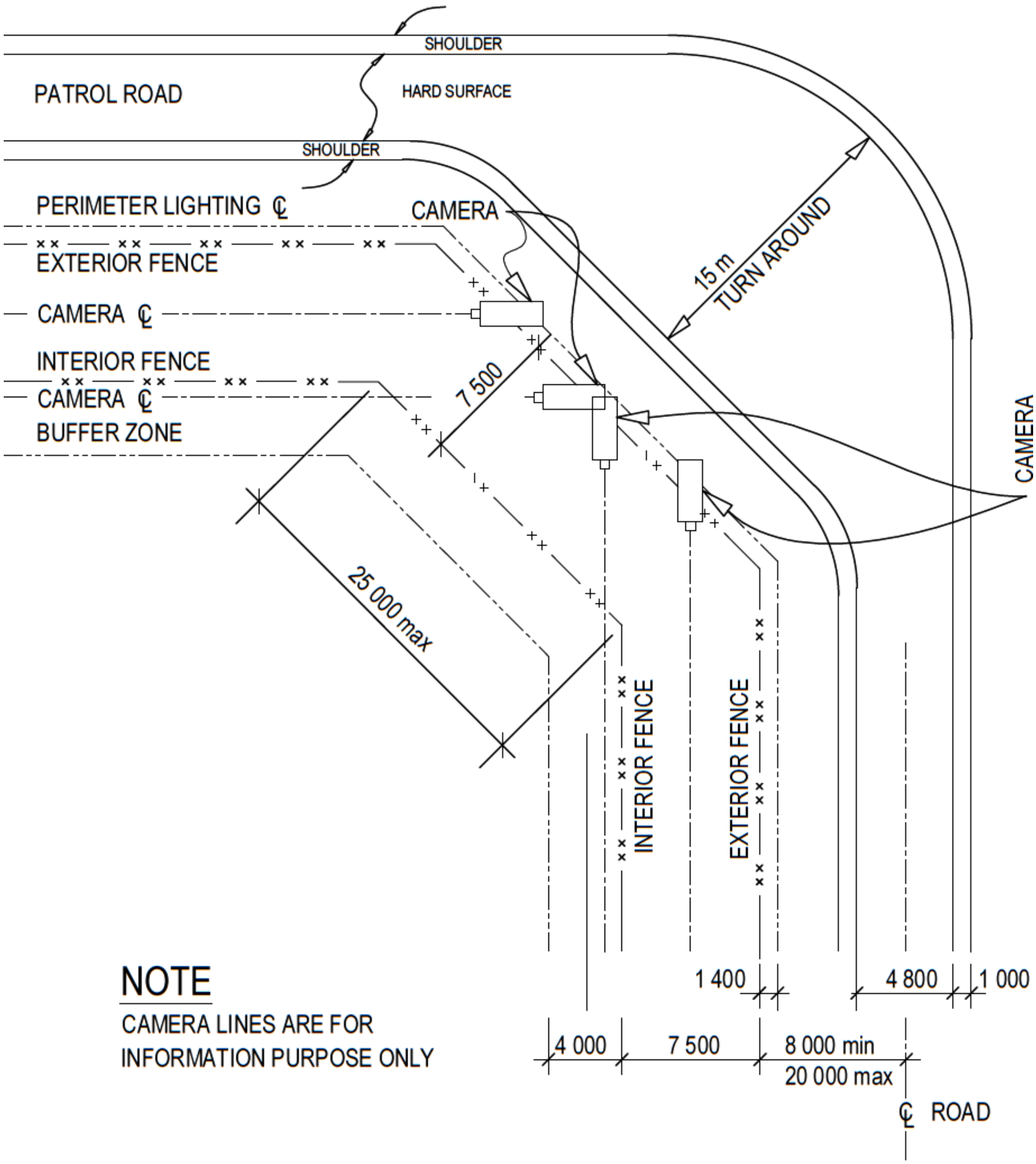


PLATE SP–2–5 – TYPICAL PERIMETER FENCE CORNER WITHOUT TOWER

CAMERAS ARE MOUNTED ON OUTRIGGERS OVER THE CONCERTINA

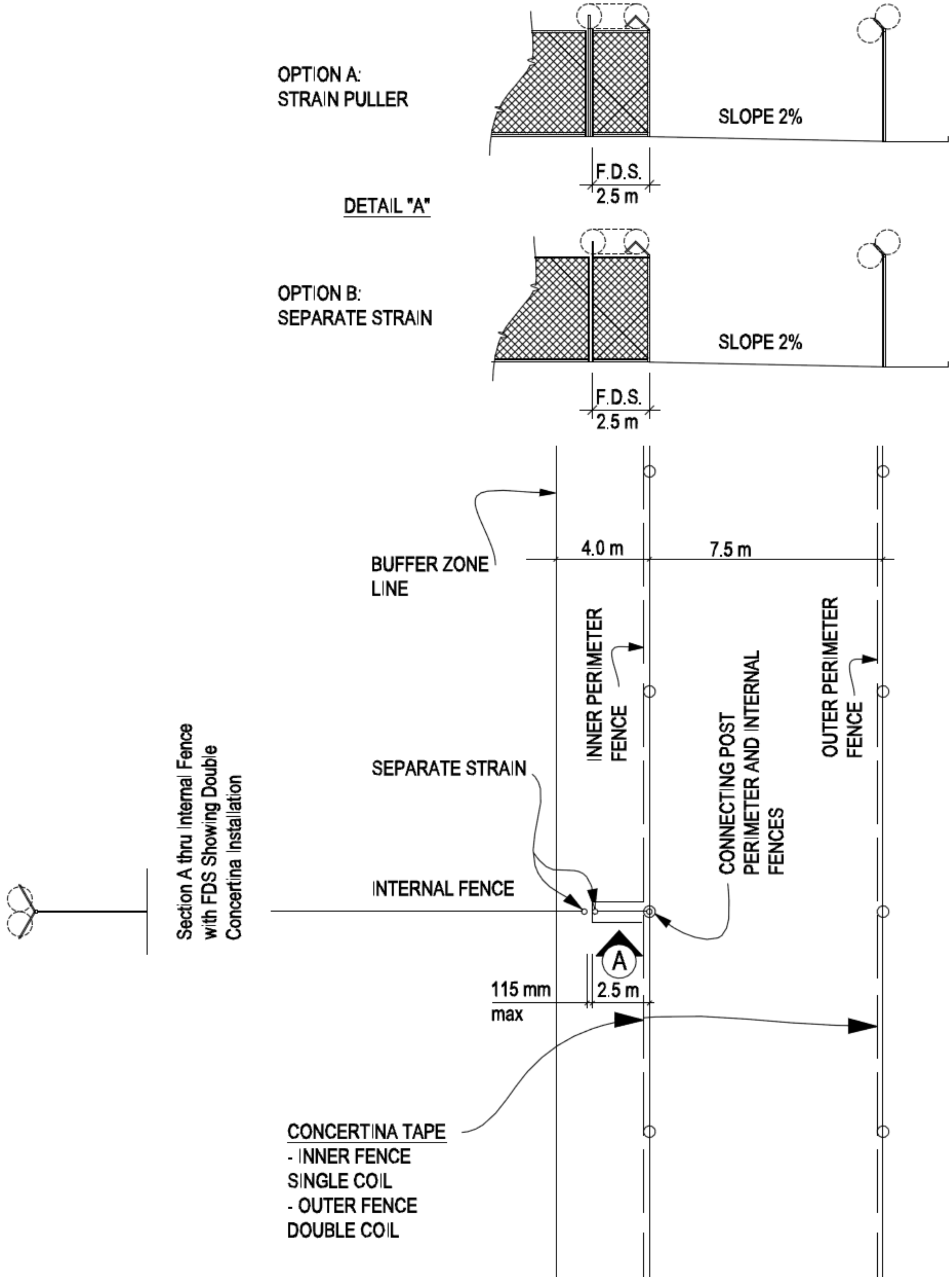


PLATE SP–2–6 – INTERNAL FENCES INTERSECTING THE INNER PERIMETER FENCE – DETAILS

SP-3 SITE – GATES/SALLY PORT

1. SCOPE

This section outlines requirements for vehicle and pedestrian access and egress control for institutions with a secure perimeter as at medium, maximum and multi-level institutions.

Access and egress control for open minimum institutions involves signage and reporting to a 24 hr Duty office but does not include fencing and gates. Refer to A-12 Control posts for functional requirements as well as the CSC Accommodation Guidelines.

It is imperative that all Gate projects, on either perimeter or interior fences, are submitted to the office of the Director Facility Planning and Standards at NHQ for review and approval.

2. RELATED SECTIONS

7.3 Technical Criteria Document sections:

SP–1 – Site Development
SP–2 – Fences
A–6 – Hardware
A–10 – Contraband Control Systems
A–12 – Control Posts and Dedicated Security Routes

2.1 National Master Specification Section

01 35 13.16 – Special Project Procedures for Detention Facilities
08 34 56 – Security Gates
32 31 13 – Chain Link Fences and Gates
32 31 13.53 – High-Security Chain Link Fences and Gates
34 71 13 – Vehicle Barriers
34 71 13.16 – Vehicle Crash Barriers
34 75 13.13 – Active Vehicle Barriers

2.2 ASTM Standards

F2656–07 – Standard Test Method for Vehicle Crash Testing of Perimeter Barriers

3. ACCESS CONTROL SECURITY REQUIREMENTS

3.1 All new institutions equipped with a fenced perimeter shall have one entrance point for pedestrian and vehicle traffic, referred to as the Principal Entrance.

3.2 Because the Principal Entrance may at some time be inoperable, one Emergency Vehicle Entrance shall be provided, to be located at a point convenient for vehicle access. This Emergency Vehicle Entrance can have either a Sliding Gate (Section 5.1) or a Swing Gate (Section 5.2).

3.3 Vehicle access shall be provided into the area between the inner and Outer Perimeter Fences for snow clearing and maintenance of the Motion Detection System (MDS). Snow build up between the fences can adversely affect the operation of the MDS.

4. PRINCIPAL ENTRANCE

4.1 Definition

The Principal Entrance is formed by a Gatehouse for pedestrian traffic control and an open air chain-link fence compound with inter locking gates for vehicle traffic control (vehicle Sally Port). The Gatehouse contains the Principal Entrance Control Post and a reception station from which staff supervise all traffic in and out of the institution and operate by remote control all gates and doors. For detailed requirements see A-12 Control Posts and Dedicated Security Routes. At institutions where a separate vehicle service entrance Sally Port exists, Sally Port gates are remote operated from an adjacent tower or a post within the Sally Port. The tower or ground post officer also observes the inspection of vehicles and assures the safety of the vehicle inspection officer.

4.1.1 All vehicle Sally Ports shall be equipped with sliding gates. The sliding gates shall be remote controlled from the Principal Entrance control post and interlocked to prevent simultaneous unlocking. The sliding gates control must provide for the opening of one of the gate only when the other gate is in its latched position. Both gates shall be also capable of manual unlocking and opening.

4.1.2 Vehicle Sally Ports shall be sized to include an inspection area, to facilitate a thorough inspection of vehicles, which can hold in width two van type trucks (8.5 m min.), and hold one semi trailer truck in length (23 m min.).

4.1.3 In order to prevent forced drive through of vehicles, the exterior gate of the vehicle Sally Port shall be equipped with a crash barrier (see section 4.4 and Plates SP-3-6 to SP-3-8). The width of the Sally Port shall be sized to accommodate the crash barrier in the open position.

4.1.4 All Principal Entrance pedestrian traffic shall be physically separated from vehicular traffic.

4.1.5 Where vehicle access into the area between the perimeter fences is provided from the vehicle Sally Port, the gates shall be swing type, manually operated and lockable with a padlock.

4.1.6 All pedestrian traffic through the Principal Entrance, including traffic between the vehicle Sally Port and the pedestrian Sally Port, shall be through swing gates. Principal Entrance pedestrian gates shall be remote unlocking, self closing and locking, and capable of manual unlocking.

4.1.7 To allow continuous CCTV coverage of the area between the perimeter fences while maintaining a minimum number of cameras, the Gatehouse building shall be sited on the outside of the Outer Perimeter Fence with one face of the building flush with that Outer Perimeter Fence.

4.1.8 See Plate SP-3-1 for a typical Principal Entrance layout.

4.2 Crash Barriers

4.2.1 Crash barriers for Sally Port sliding gates shall be connected to the interior side of the exterior gate or the rack and pinion rail depending on the gate operator type and shall be operated simultaneously with the remote operation of the gate.

4.2.2 In order to resist vehicle impact, crash barriers shall be made of a steel I-beam or rectangular tubing supported on anti friction rollers on heavy uprights. In a test equivalent to the US Department of State K4 certification[10] (6 804 kg @ 48.3 km/hr or 15,000 lbs @ 30 mph) the vehicle must be inoperable after hitting the crash bar; disabling the vehicle being the main purpose.

4.2.3 Three heavy engineered uprights support the crash barrier and as well serve as bollards protecting the adjacent fence and gate posts. In either open or closed gate position, the crash barrier is supported by 2 uprights.

4.2.4 If crash barriers are used for emergency gates on the perimeter, they shall be made of a simple beam or rectangular tubing with a counter weight mechanically lifted and lockable in closed position with the use of a security padlock.

4.2.5 Gates having integrated crash bar or crash cables system are acceptable if they meet M30 designation of *ASTM F2656-07*[11], K4 certification of the US Department of State (see footnote 1) or the European equivalent.

4.2.6 See Plates SP-3-3 to SP-3-5 for typical Sally Port crash barriers.

5. FENCE GATES

5.1 Vehicle Sliding Gates

5.1.1 The size of each gate shall provide for a 4 m wide x 4.5 m high clear opening.

5.1.2 Gate chain link fabric shall match perimeter fence. (See section SP-2, Fences).

5.1.3 Gate framing members shall be 73 mm O.D. pipe weighing 8.6 kg/m welded and drained.

5.1.4 Motorized gates shall be capable of moving at a speed of 150 mm/s.

5.1.5 Gate shall have three point locking (top, bottom and middle) or be locked by way of rack and pinion mechanism and a vertical channel to clasp the gate.

5.1.6 Locking column shall be equipped with an emergency manual control mechanism located for easy access.

5.1.7 Operator and track shall be protected and electrically heated to ensure all weather operation. In rack and pinion system (or “drive rail” operator) the teeth of the rack can be unprotected provided that they are on the lower side of the rack and visible to the operator.

5.1.8 Outer perimeter gates with connected crash beams shall be designed to take the additional weight into account.

5.1.9 For gates operated by an overhead chain drive system, a guide shall be provided at the bottom of the gate running in a channel.

5.1.10 Motors shall be located low to the ground to facilitate maintenance

5.1.11 All gate components shall be galvanized.

---

[10] US Department of State SD–STD–02.01, Revision A , March 2003, Test Method for Vehicle Crash Gate Testing of Perimeter Barriers and Gates

[11] ASTM F2656–07, Standard Test Method for Vehicle Crash Testing of Perimeter Barriers, M30 Designation: Medium-duty truck (M) 6800 kg @ 50 km/h

5.1.12 All security hardware shall be in accordance with chapter A-6, Hardware of the present document. All other components shall be in accordance with the Fences section of this criterion.

5.1.13 See Plates SP-3-2 and SP-3-3 for a typical gate installation.

5.2 Vehicle Swing Gates (Perimeter and Internal Fences)

5.2.1 Gates shall consist of a pair of 2 m wide by 4.5 m high sections, for an opening of 4 m wide X 4.5 m high, except where municipal by law or sufficient height and width for local emergency vehicles (fire trucks) dictate otherwise[12].

5.2.2 The swing direction of gates shall be based on road access design and snow removal constraints.

5.2.3 Any gap between the bottom rail of a gate and the ground shall not exceed 125 mm. Where gates are located on a fence equipped with a ground barrier, this barrier shall be continuous.

5.2.4 The chain link fabric for gates shall match that of the fence (see section SP-2, Fences).

5.2.5 Gate framing shall be as per item 5.1.3 above.

5.2.6 There shall be three gate hinges and they shall be of standard quality. Foot, mid height, and top locking shall be accomplished with either detention grade cremone locksor engineered mechanism and locked with the use of padlocks.

5.2.7 Plate SP-3-7 illustrates a typical design for vehicle swing gate.

5.3 Pedestrian Gates (Perimeter and Internal Fences)

5.3.1 The size of each swing gate shall provide for a 1.2 m wide x 2.1 m high clear opening.

5.3.2 Items 5.2.2, 5.2.3 and 5.2.4 noted above for vehicle swing gates shall apply.

5.3.3 Swing gate framing members shall be 43 mm O.D. pipe weighing 3.4 kg/m.

5.3.4 Swing gates shall be manually operated with security key locks when gates are used daily. Principal Entrance gates shall be remote unlocked and equipped with closers. Infrequently used gates shall be security padlocked.

12 For example, in Ontario the *Highway Traffic Act* Section 109 stipulate a maximum height of 4.15 m by a width of 2.6 m, which is similar to the 13’-6” (4.12 m) by 8 (2.43 m) in USA.

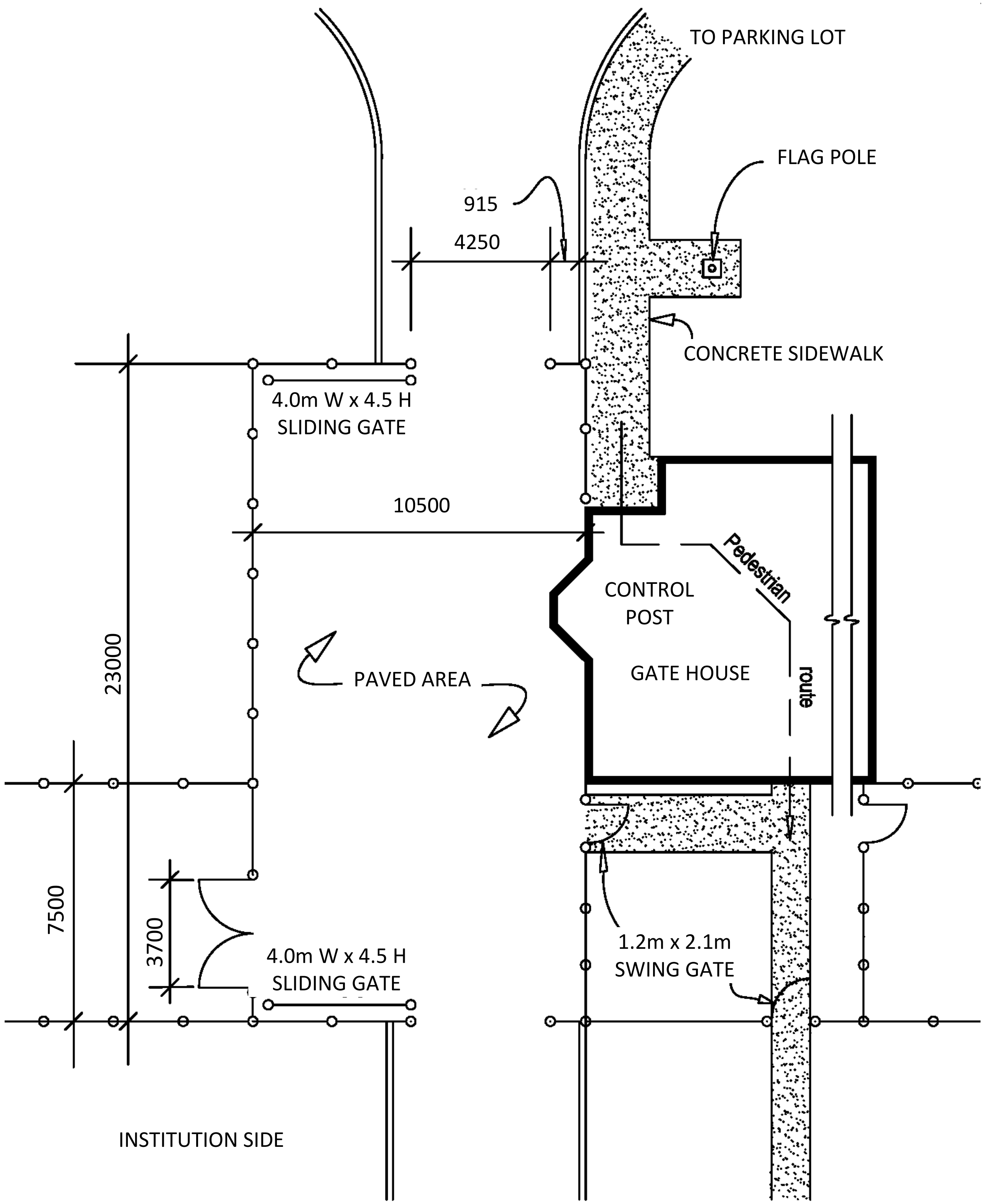
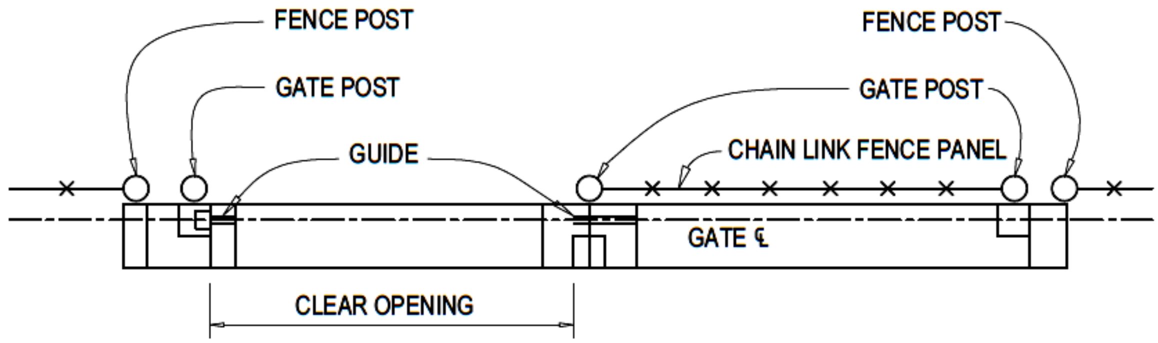
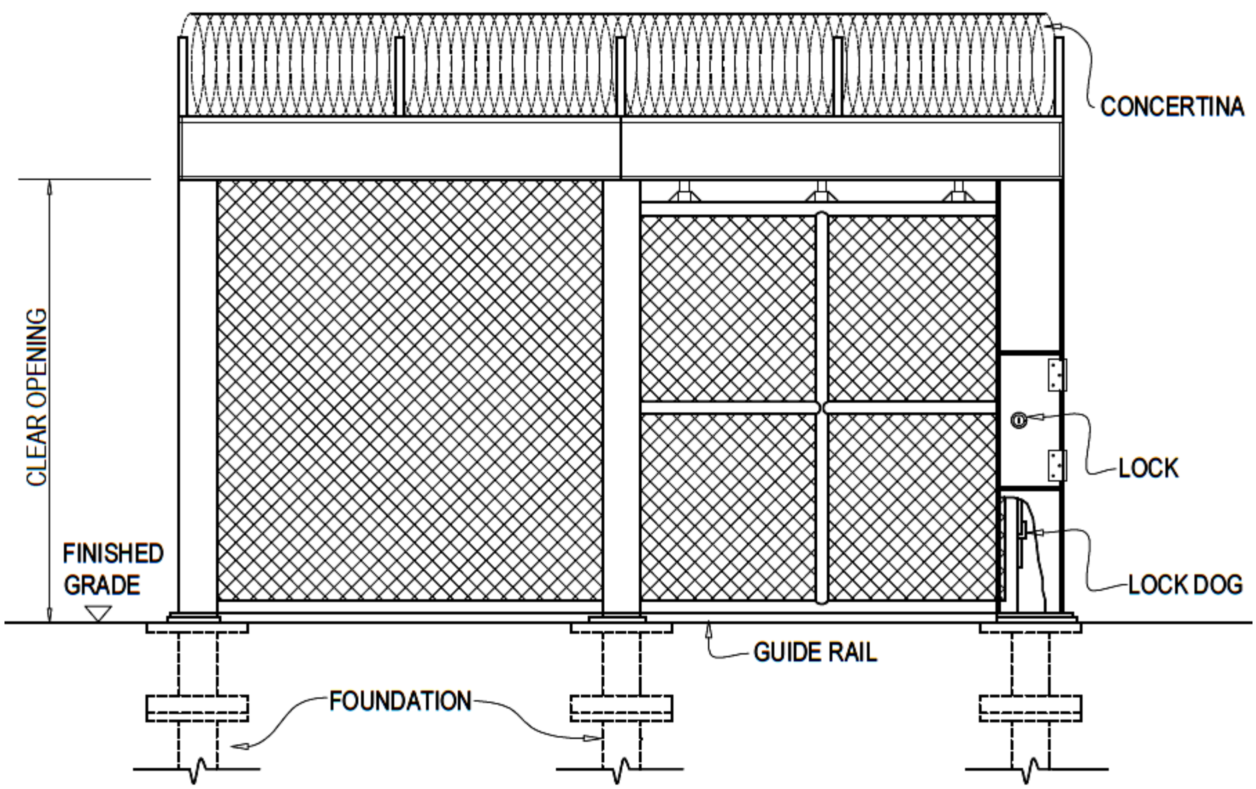


PLATE SP–3–1 – TYPICAL SALLY PORT ARRANGEMENT

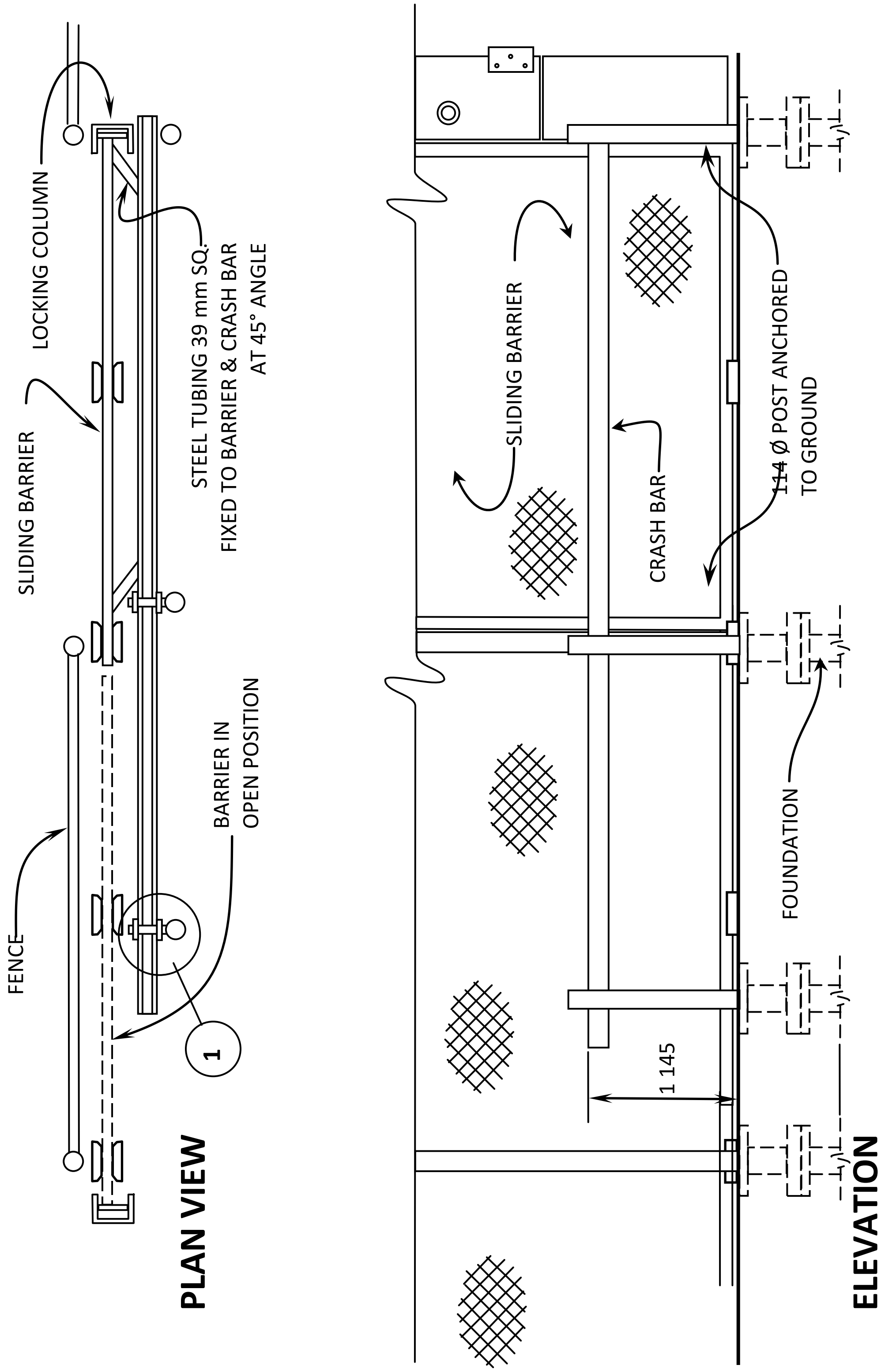


TOP VIEW



FRONT VIEW

PLATE SP–3–2 – FENCE GATE WITH OVERHEAD CHAIN DRIVE INNER PERIMETER FENCE



SP–3–3 – FENCE GATE WITH OVERHEAD CHAIN DRIVE OUTER PERIMETER FENCE

BEAM, TRACK, AND
TROLLEY MECHANISM
SUPPORTING
MOVEABLE GATE

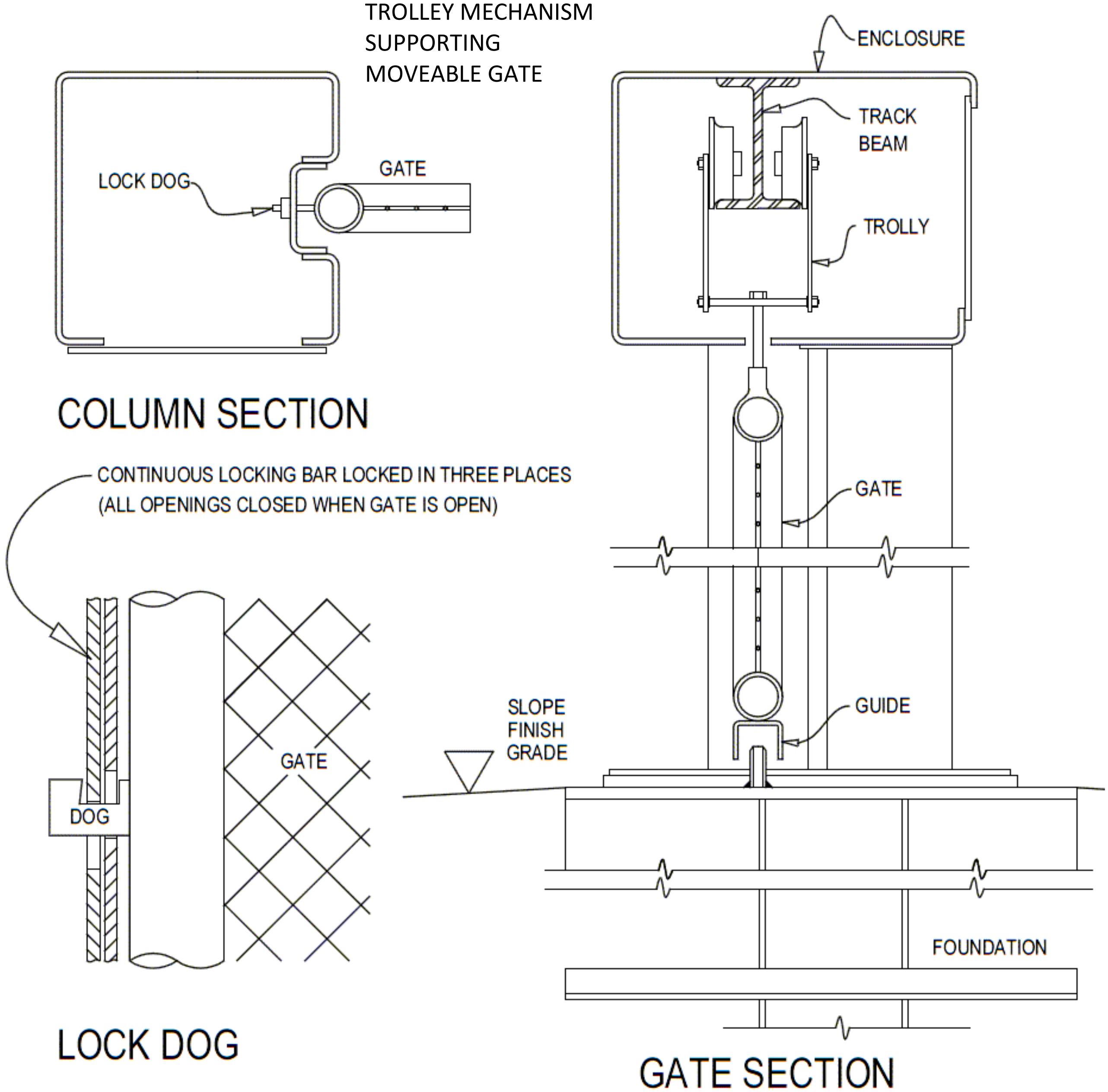


PLATE SP–3–4 – FENCE GATE WITH OVERHEAD CHAIN DRIVE – DETAILS

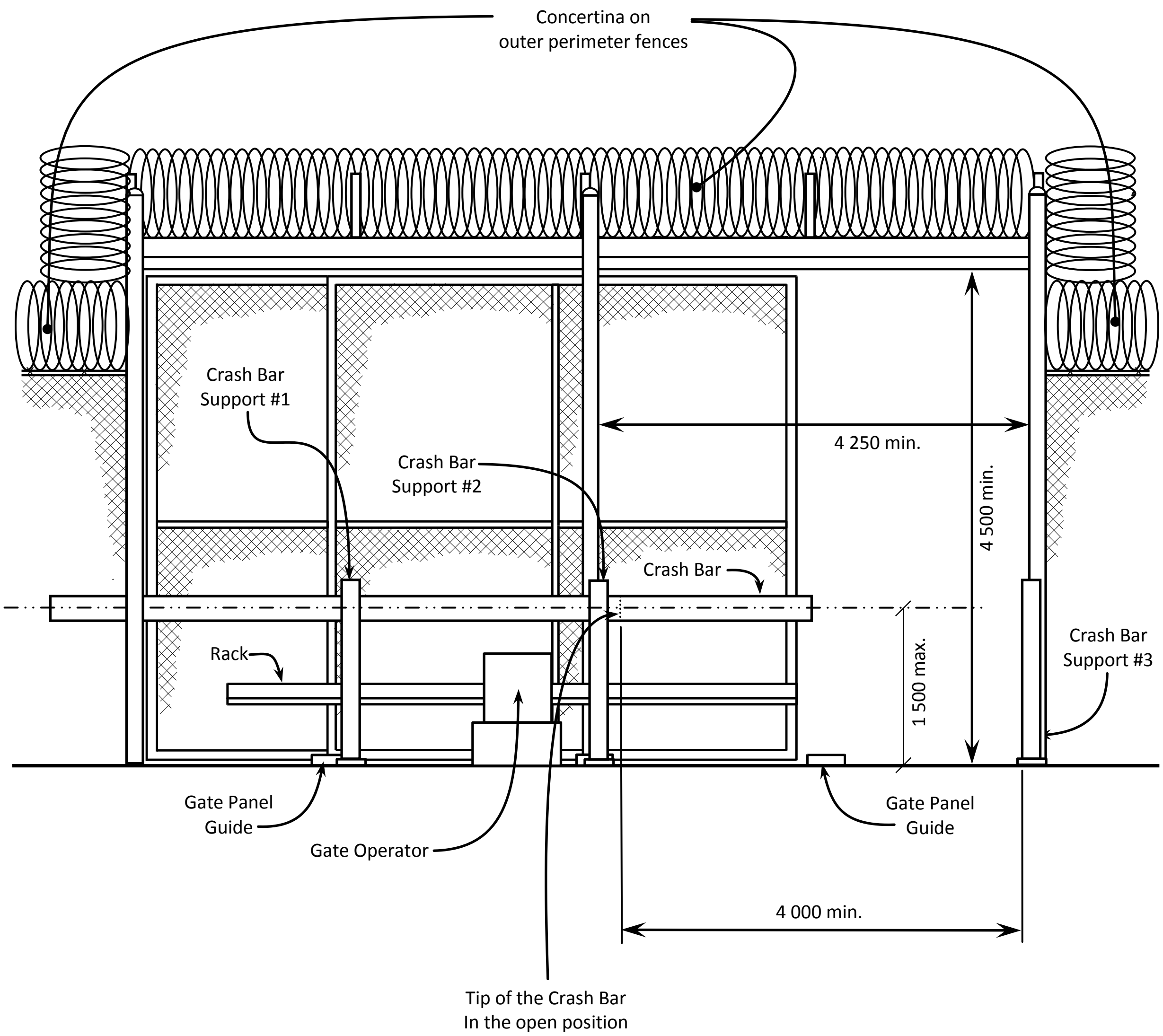


PLATE SP–3–5 – FENCE GATE WITH RACK & PINION – INSIDE ELEVATION OUTER PERIMETER FENCE

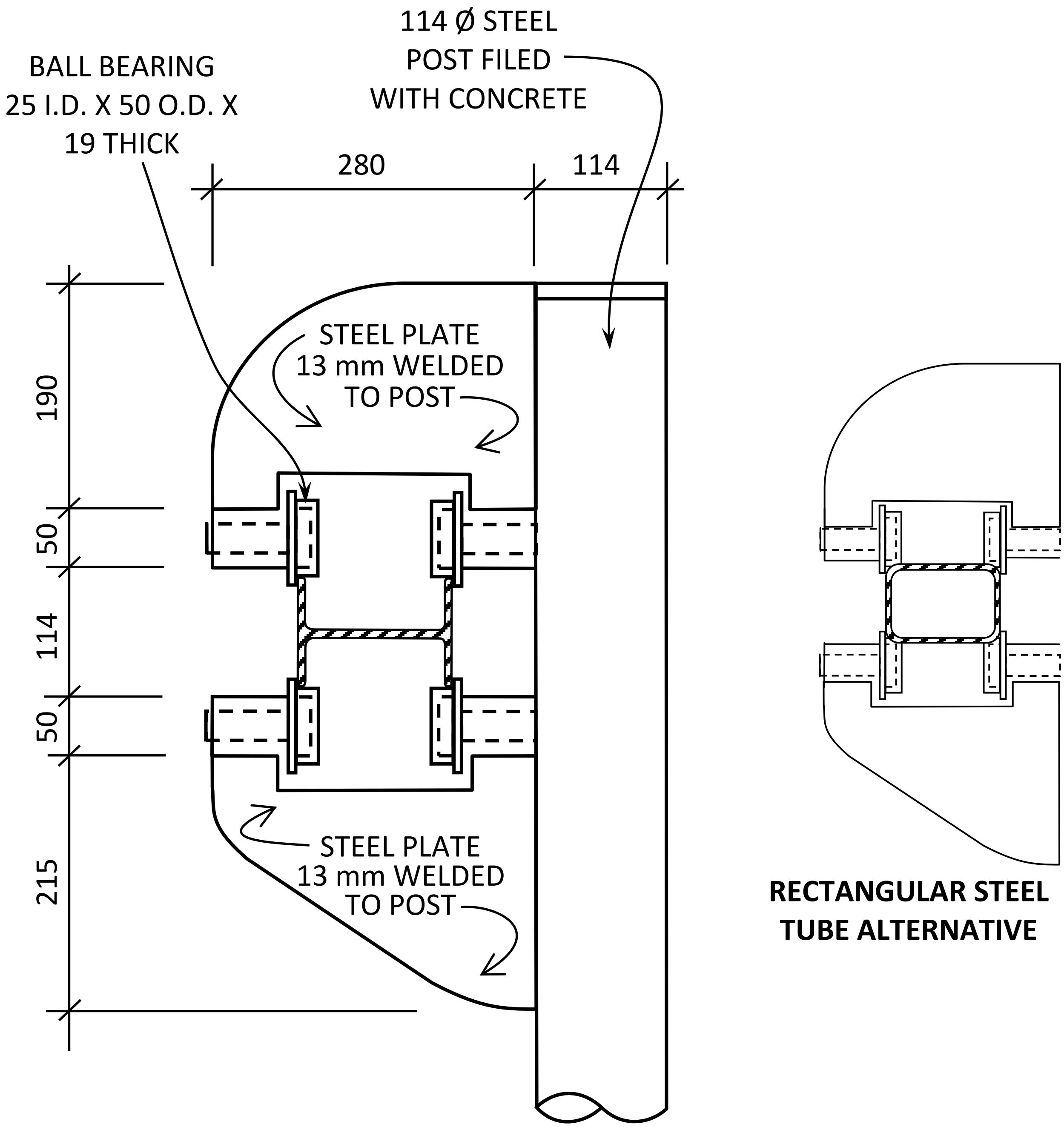


PLATE SP–3–6 – CRASH BAR DETAILS

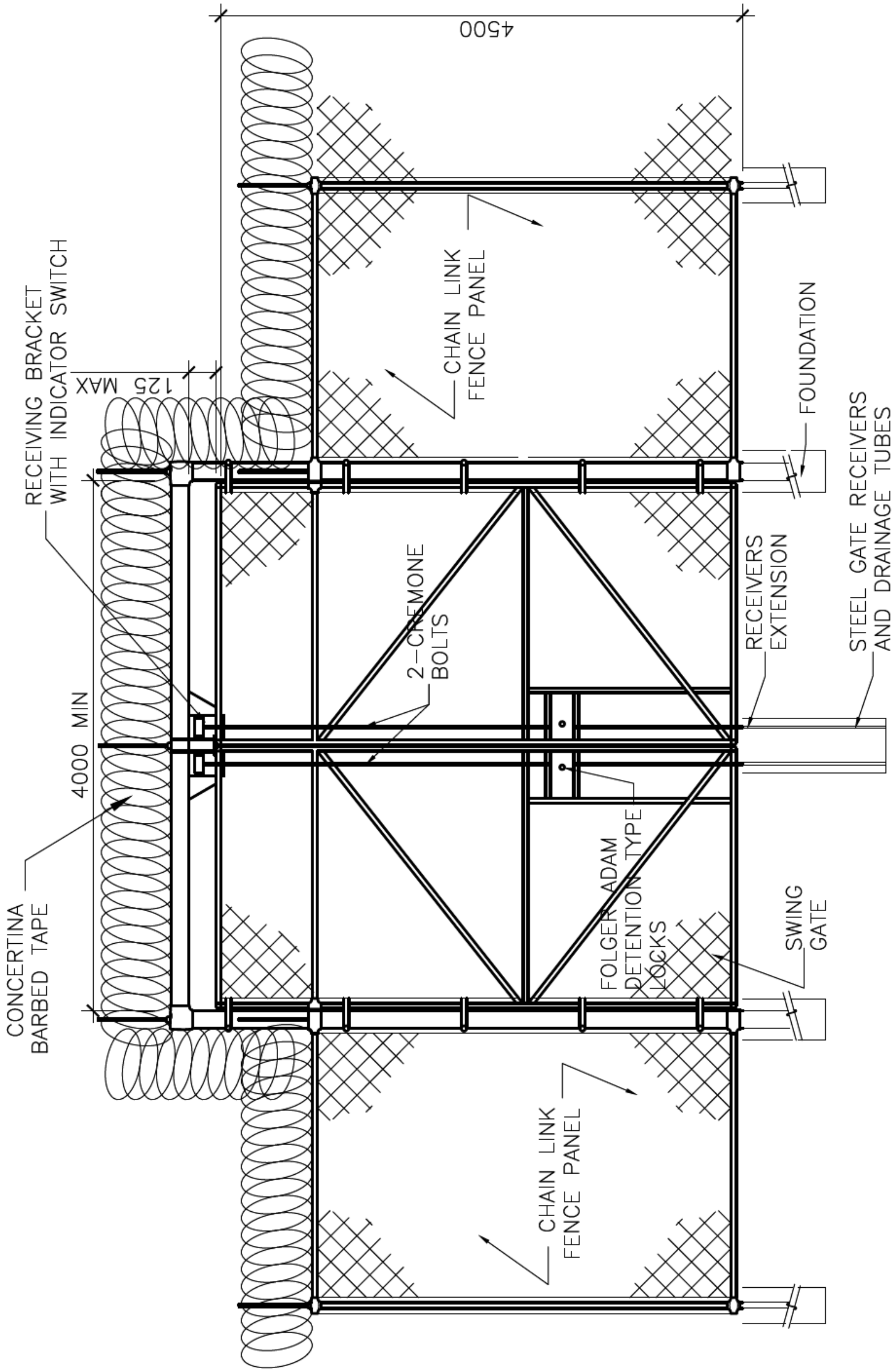


PLATE SP–3–7 – VEHICLE SWING GATE (EMERGENCY GATE)

SP-4 SITE – EXTERIOR LIGHTING

1. SCOPE

This section outlines the requirements for site lighting including perimeter fence lighting and provides design guidelines for the following:

- Type of lighting systems and standards.
- Recommendations for lighting levels.
- Quality of illumination.
- Recommendations for control of glare.
- Recommendations for uniformity and brightness control of the environment.

• RELATED SECTIONS

SP–2 – Fences
SP–5 – Traffic Circulation
E–1 – General Electrical Engineering and Electrical Distribution
E–7 – Emergency Electrical
ST–1 – Guard Towers

2. GENERAL REQUIREMENTS

3.1 Exterior lighting is provided for safety and security within institutional grounds; to assist in the visual detection of escape attempts, and to permit the use of exterior amenities after daylight.

3.2 Exterior lighting shall be situated to minimize light entering sleeping areas.

3.3 Exterior lighting systems shall be designed to caste a practicably uniform level of lighting, free of shadows or dark spots and with minimal glare.

3.4 Energy saving features and systems shall be used in accordance with government policy.

3.5 Levels of illumination herein presented refer to average and avg./min. ratio values for either horizontal, ground level, or vertical illumination, unless otherwise stated. Local conditions may make it necessary to adjust values.

3.6 Lighting is provided to assist CCTV and vehicle patrol monitoring on the perimeter.

3.7 Systems shall be designed to withstand a wind velocity of 160 km/h and ice loading characteristic of the area in which the institution is located.

3.8 All security lighting systems shall be equipped with automatic control and manual override. The manual override shall reset itself to the automatic mode after it has been left in the manual mode for 24 hours. Recreational lighting controls shall be manual only.

3. APPLICATIONS

Exterior lighting is designed to provide illumination of the following:

- Signage
- Entranceways and exits, including exterior stairways and ramps
- Pedestrian walks
- Institutional Grounds
- Parking lots and roadways
- Outdoor amenity areas
- Perimeter fences (and walls).

4. PERFORMANCE REQUIREMENTS

5.1 Security Lighting

5.1.1 Lighting requiring Emergency Power Source

5.1.1.1 Perimeter Fence Lighting System - Special requirements for the perimeter system are covered in item 5.2.

5.1.1.2 Medium and Maximum security institutions. – the entire area within the inner perimeter fence illuminated to 10 ℓx average to allow silhouetting surveillance.

5.1.2 Illumination

5.1.2.1 Entrances and Sally Ports shall be illuminated to allow recognition of persons entering the institution after daylight hours. Fixture placement shall not impede optimal visibility. The Entrance and Sally Ports shall generally have an illumination level matching that of the perimeter fence.

5.1.2.2 Glare Control -.Lighting system shall be engineered to ensure that spill light will not produce a glare problem without affecting the minimum illumination levels.

5.1.2.3 Uniformity – The placement of the luminaires should be arranged so as to ensure good uniformity of illumination over the area illuminated. Uniformity is expressed as the ratio of average illumination to minimum. In the area between perimeter fences the ratio should not exceed 3:1.

5.1.2.4 Luminaires – Exterior security lighting fixtures shall be based on the following requirements:

a) Shatterproof lenses and vandal resistant housings
b) Non yellowing lenses
c) Pole, luminaires and brackets capable of withstanding the force of 160 km/h wind
d) Lighting fixtures location to facilitate replacement of components.

5.1.2.5 Electrical System – The electrical system must meet the following minimum requirements.

a) The security lighting system including the perimeter fence lighting shall be connected to the standby power system for continuity of service.
b) Grounding methods shall meet the requirements of the Canadian Electrical Code, *CSA C22.1 2012* [1].
c) Protect each phase with dedicated single phase circuit breaker. This will prevent the possibility of a fault on one phase affecting the other two.

5.1.2.6 Codes and Standards – Installation shall comply with the latest edition of the Canadian Electrical Code, Part 1, *CSA C22.1-2012* (see footnote 1) and any applicable local or provincial regulation. Requirements outlined herein however, shall take precedence.

5.2 Perimeter Fence Lighting

5.2.1 General

5.2.1.1 Security Lighting for Perimeter Fences shall:

a) Discourage or deter escape attempts.
b) Make detection certain should an escape be attempted within the immediate area of the perimeter fence.
c) Avoid glare that can impact good visibility while not adversely affecting surrounding area.
d) Ensure high system reliability.
e) Meet levels of illumination indicated in Plates SP-4-2 and SP-4-6.
f) Have automatic control.
g) Consist of poles, lighting equipment and components located outside the double security fences and be made vandal or sabotage proof.
h) Be connected to the standby power system for continuity of service.
i) Provide minimum illumination level of 10 ℓx to the centre line of the perimeter road (typically between 8 m and 20 m from the edge of the outer perimeter fence).

5.2.2 Design

Perimeter Fence Lighting System shall be designed to achieve and maintain lighting quality based on the following factors and considerations:

5.2.2.1 Institutions are typically located in remote areas with little light from off property. Therefore, the lighting system shall autonomously enable clear viewing within the illuminated area of the fence line.

5.2.2.2 The height of the perimeter fences, the distance between fences and any structures such as guard towers or CCTV towers will impact the design of the security lighting system pertaining to the height of the poles and the mounting height of the fixtures.

5.2.2.3 A maintenance factor shall be applied in the design calculation to make allowance for luminaire dirt and any depreciation. Also consider weather conditions which will adversely affect visibility.

5.2.3 Luminaire Type

5.2.3.1 LED Luminaires– The current choice for lighting is Light Emitting Diode (LED) These will normally be fully operable between -40°C (or less) and + 50°C (or more) and emit a white or bluish bright light of superior quality which enhances vision and colour distinction. See Plate SP-4-6 for LED layout. LED Luminaires are specified as follows:

a) Mounted directly onto posts at a 9m of height.
b) Type Short II diffusion pattern.
c) 100 000 hours or higher rated lifetime.
d) Colour temperature between 4000K and 5700K.
e) 90 lumens/Watt or better
f) CRI ≥80
g) Corrosion resistant finish of all materials of the fixture.
h) Integral 10kV surge protection in accordance to IEEE/ANSI C62.412
i) Power factor of 0.9 or greater.
j) Total harmonic distortion of 20% or lower.
k) IP66 rated fixture
l) Meets ANSI C136.31-2001 standard for vibration resistance
m) Designed to operate at temperature from -40°C.

n) cULus listed.
o) LED modules and driver to meet **CSA-C22.2 No. 250.13-12**
p) LM-79 and LM-80 tested.
q) Valid IES photometric data file.
r) 10 years warranty on all parts.

5.2.3.2 Low Pressure Sodium is being used in most existing CSC institutions for perimeter lighting. See Plate SP-4-2 and SP-4-3 for layout.
Sodium Luminaires, Lamps and Ballasts – Sodium lamps are specified as follows:

a) Type 135 W SOX low pressure sodium, with separate ballast, available from Philips series SDP 828 or approved equal.
b) With “unitized” cast aluminium housing free of welds, butt joints and lapped corners with baked enamel finish, anodized aluminium reflector and a clear acrylic diffuser.
c) With HRC fuse rating as per ballast manufacturer and installed in the transformer base for protection of each luminaire.
d) With stainless steel hardware on the outside and corrosion resistant finish of all materials inside the fixture.
e) With an optical system protected by a neoprene gasket to keep out dust and moisture.
f) With guard for protection against excessive vibration by using porcelain lampholder and a spring steel plastic coated lamp support.
g) With a T-21 bulb providing 21,500 lm output (minimum) and an average rated life of 15,000 hours.
h) With ballasts designed and manufactured to meet *CSA C22.2 No. 74-96 (R2005)*[13], *ANSI Standard C82.1-2004*[14] and CBM Standard. Ballast rated voltage shall match supply current voltage and voltage ratings of the lamps. Ballasts to have a power factor correction to a minimum of 90%.
i) With ballasts designed to operate 135 W low pressure SOX sodium lamps at minus 40°C and to maintain lamp wattage within 8% of nominal with a supply line fluctuation of 20%.
j) With ballast of constant wattage auto transformer type.

5.2.4 Poles are specified as follows:

5.2.4.1 Octagonal tapered of steel complete with transformer bases, eye bolts and gasketed electrical outlet boxes.
5.2.4.2 Hot dipped galvanized on interior and exterior surfaces as per *ASTM A123–09 and* hot dipped galvanized anchor bolts and hardware accessories where possible.
5.2.4.3 Height and luminaire spacing to match type of lighting system as shown on Plates SP-4-3 & SP-4-6.

13 CAN/CSA-C22.2 No. 74-96 (R2005) – Equipment for Use with Electric Discharge Lamps
14 ANSI C82.1-2004 – American National Standard for Lamp Ballasts – Line Frequency Fluorescent Lamp Ballasts

5.2.4.4 Hardwood plywood template for retaining anchor bolts when grouting them in place in the concrete base.

5.2.4.5 With non-shrink grout.

5.2.4.6 Transformer base plates drilled in the manufacturer's plant to match the anchor bolt configuration set in the bases.

5.2.4.7 Access doors in the transformer bases are c/w gasket and use tamperproof hardware for securing doors in place.

5.2.4.8 Transformer base oriented so that their access doors are parallel to but facing away from the fence.

5.2.4.9 Yellow PVC guards installed on the guy wires on the anchor poles terminating the linear sections of the spans (applies to catenary system where used).

5.2.4.10 For grounding requirement specify:

a) 10 mm threaded copper grounding stud welded to the inside of each transformer base at the back and above the bottom of the door opening. Ground studs are supplied complete with two nuts, one lock washer and one copper clamp type lug for minimum 13 mm^2 stranded bare copper wire.

b) Ground studs welded to the transformer bases in such a manner as to present a smooth surface on the exterior of the bases.

5.2.4.11 Aluminium nameplate located one foot above its base to include the manufacturer's name or identification mark, year of manufacture, pole length and ordering reference number.

5.2.4.12 Shims for levelling consisting of one 1.5 mm and two “U” shaped 3 mm.

5.2.5 Catenary System

Only to be used for low pressure sodium light system as illustrated SP–4–3. In specifying the catenary system, consider the following requirements:

5.2.5.1 The system shall be capable of withstanding a wind velocity of 160 km/h and ice loading characteristics of the area and a luminaire dead weight of not less than 9 kg and a projected area of 0.3 m^2

5.2.5.2 Maintain total linear balance by anchoring the terminal poles of each linear section as shown in Plates SP-4-4 & SP-4-5.

5.2.5.3 The catenary (upper) and the messenger (lower) cables shall be 9 mm nominal diameter.

5.2.5.4 The strainer (vertical) and suspension cables shall be a minimum 3 mm diameter stainless steel.

5.2.5.5 Electrical cable assembly shall spiral around the messenger cable. Electrical cable shall be XLPE insulated stranded copper conductors in multi cord cable assembly with overall PVC jacket.

5.2.5.6 Provide 3 luminaires in each span of 30 m as shown in Plates SP-4-2 and SP-4-3 resulting in a luminaire every 10 m.

5.2.5.7 All hardware including turnbuckles, wire rope, clamps, etc., to be hot dipped galvanized steel.

5.2.6 Pole Mounted Luminaires and Lamps

5.2.6.1 Distance between luminaires shall be based on Light diffusion modelling using approved lighting, their manufacturers and fixtures. Plate SP-4-6 illustrates existing installation characteristics for pole mounted luminaires.

5.2.7 Controls

Perimeter fence lighting shall be controlled by a photo cell and meet the following requirements:

5.2.7.1 A photo control unit shall automatically turn on the security fence lighting system.

5.2.7.2 The weatherproof unit capable of operating over a range of -60°C to +55°C shall be mounted on a fence lighting pole located closest to the Gatehouse.

5.2.7.3 The control shall energize the lamps on a preset (adjustable) value.

5.2.7.4 A manual control override turns the lights on and off as required.

5.2.7.5 The system shall operate on stand-by power and "be fail-secure".

5.2.7.6 Controls shall be connected in parallel with the "ON" contacts of the "ON OFF" selector switch located as specified.

5.2.7.7 The photo control shall have a standard NEMA twist lock plug.

5.2.7.8 The photocell shall be temperature stabilized pre-aged and hermetically sealed.

5.2.7.9 The Installation Contractor shall adjust the photo control unit to switch on at not less than 40 ℓx. The unit shall be rated 1000 W incandescent, 120 volts, 60 HZ and CSA approved.

5.3 Other Exterior Lighting

5.3.1 Luminaire type - Lighting type shall be selected based on energy efficiency, economy and accepted practices for Recreational Areas, Parking Lots, Signage, Roads and sidewalks, Building entranceways and exits, and Institutional grounds. Luminaires must be fully operable between -40°C (or less) and + 50°C (or more).

5.3.2 Illumination Levels - The light levels requirements should be adapted for an LED technology conversion according to ***I.E.S. Handbook 10th Edition***

5.3.2.1 Recreation area illumination system shall be installed on a project specific basis so as to form an integral system as part of the exterior lighting system. Illumination levels for recreational purposes are approximately 70 ℓx.

Illumination levels for the following recreational activity areas are (Total Area 22,736 m², see Plate 2 for typical layout):

a) Softball Diamond - 18 x 18 m overall with 73 m outfield radius, Infield 100 ℓx, outfield 70 ℓx.
b) Hockey Rink - 60 x 26 100 ℓx.
c) Running Track – 50 ℓx
d) Games / fitness as established on a project specific basis illuminated to a maximum of 100 ℓx.
e) Dedicated mini yards connected to living areas -70 lx.

5.3.2.2 Parking Lots, Institutional Grounds. Roads and sidewalk illumination levels:

a) Average Illumination Levels – 10 lx.

b) Illumination Uniformity – Maintain a maximum ratio of average lux to minimum lux of 3:1.
c) Illumination Quality – To minimize shadows especially between parked cars illuminate each point from at least two luminaire locations.

5.3.3 Signage, Building entranceways and exits

5.3.3.1 Direct lighting with similar luminaires to that for sidewalks and roads will serve to illuminate the target door or sign to a higher level.

5.3.4 Controls

5.3.4.1 The recreational lighting controls shall be manually switched on and off as required from a specified location.

5.3.4.2 All other exterior lighting shall be controlled by photocell or astronomical dial time clock with manual bypass from a specified location. Lighting controls shall be separated for each use.

5.3.5 Poles and Masts

5.3.5.1 Specify that all poles and masts used as light standards shall be fabricated from steel conforming to *CSA Standard G40.21-04 (R2009)*[15] Type T, grade 60T, Low silicon, 60,000 psi yield strength. Do not use concrete poles and masts.

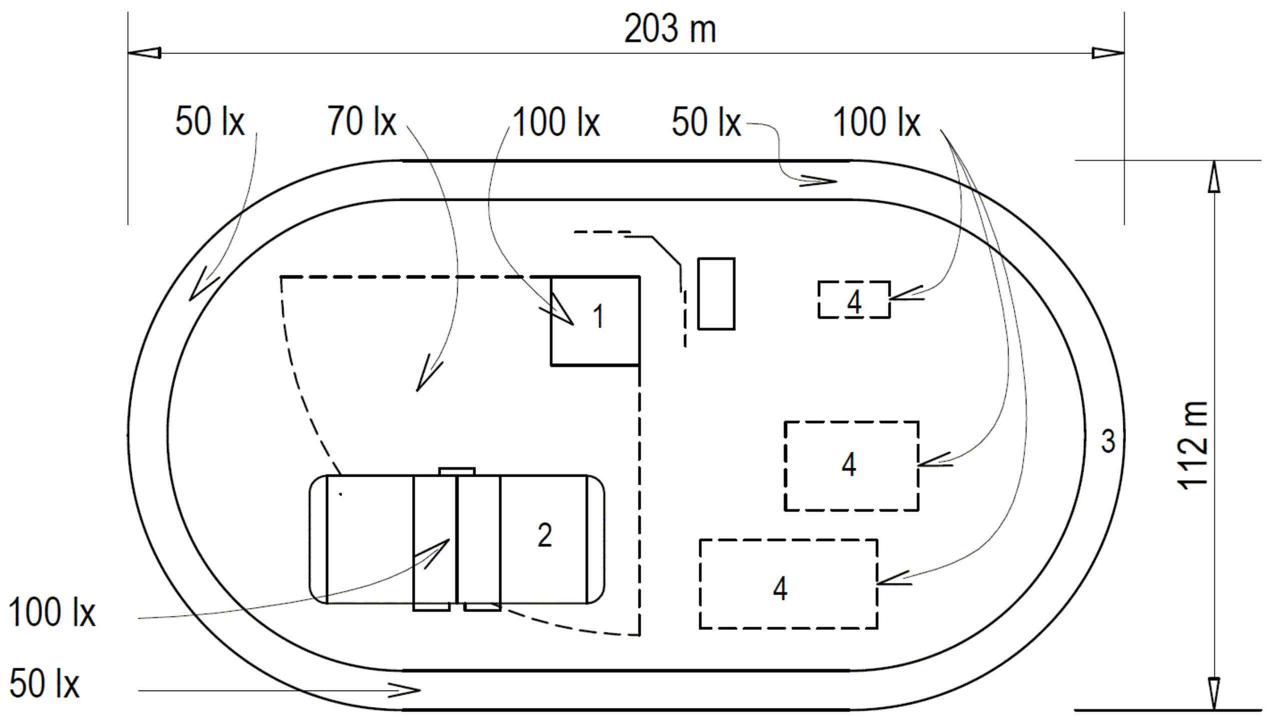
5.3.5.2 Avoid having steps on poles and masts.

5.3.5.3 Minimum height of post for pedestrian walks 3.05 m, for parking lots 6.1 m.

5.3.5.4 The lighting system should incorporate a method by which luminaires on high standards (poles) may be easily and economically maintained.

5.3.5.5 High Standards (30 m poles) are not necessary for Minimum Institution but the pole height should be less than 13 m.

[15] CSA G40.20-04/G40.21-04 (R2009) – General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

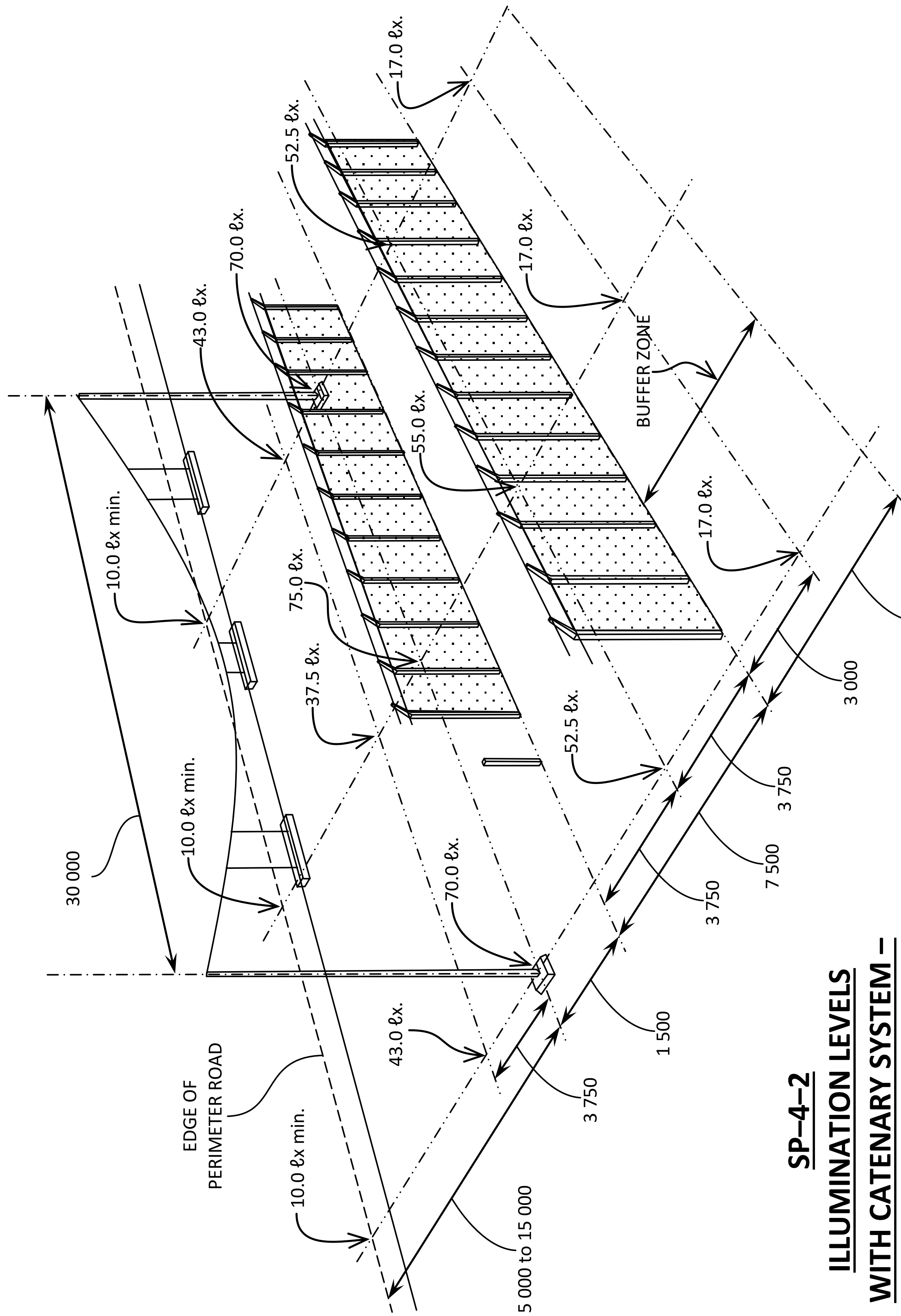


ALLOCATION FOR ILLUMINATION AND LIGHTING LEVELS

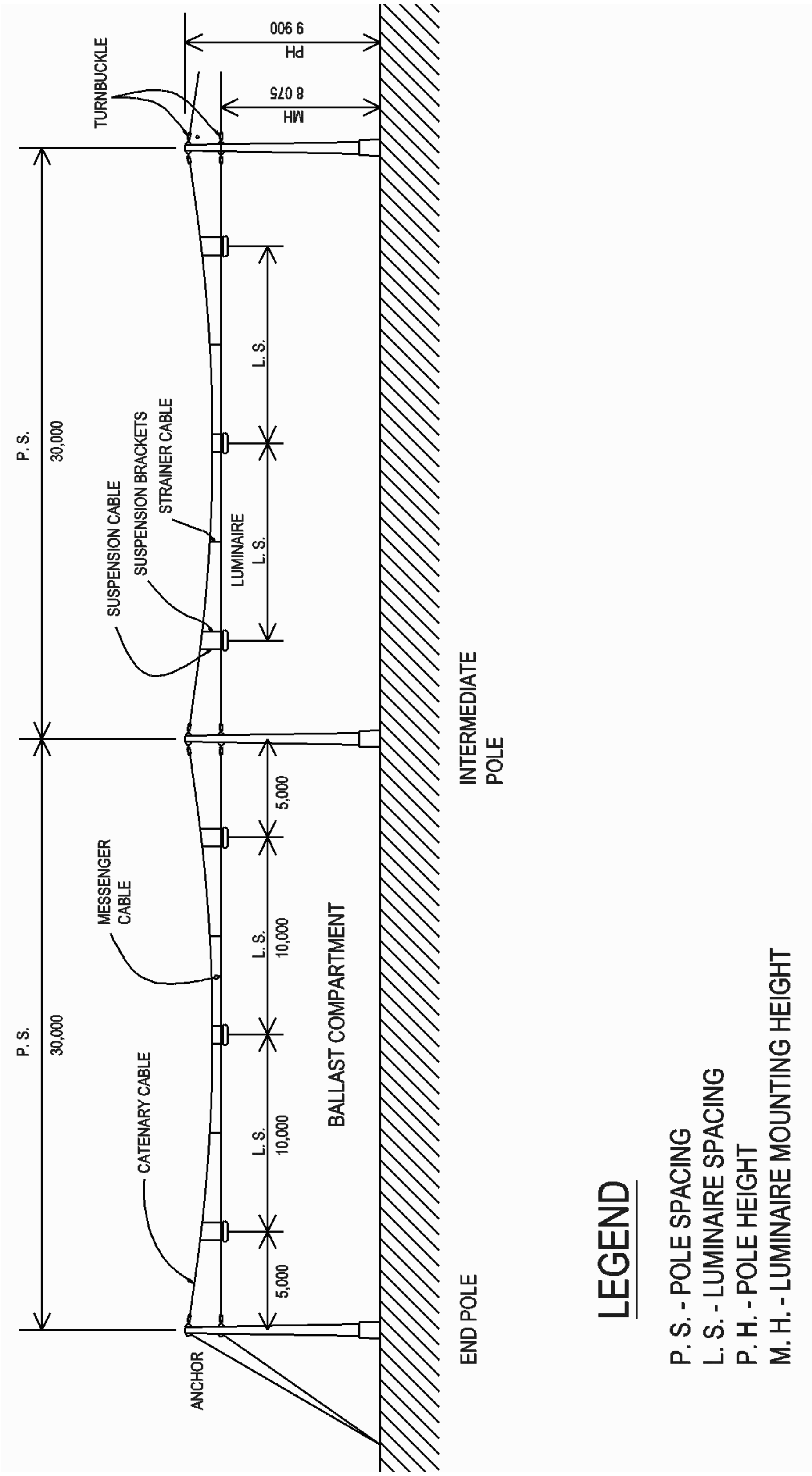
1. SOFTBALL DIAMOND 18 X 18 – 73 m OUTFIELD 4 183 m² (100 ℓx INFIELD, 70 ℓx OUTFIELD)
2. ICE HOCKEY RINK 60 X 25 m, 155 m² (100 ℓx)
3. TRACK LENGTH NON-STANDARD (50 ℓx)
4. SMALL GAMES – VARIOUS, TOTAL 1 343 m²

APPROXIMATE FIELD SIZE 22 736 m²

SP–4–1 – ATHLETIC FIELD LIGHTING



SP–4–2
ILLUMINATION LEVELS WITH CATENARY SYSTEM – ISOMETRIC VIEW



SP–4–3 – CATENARY SYSTEM – SIDE VIEW

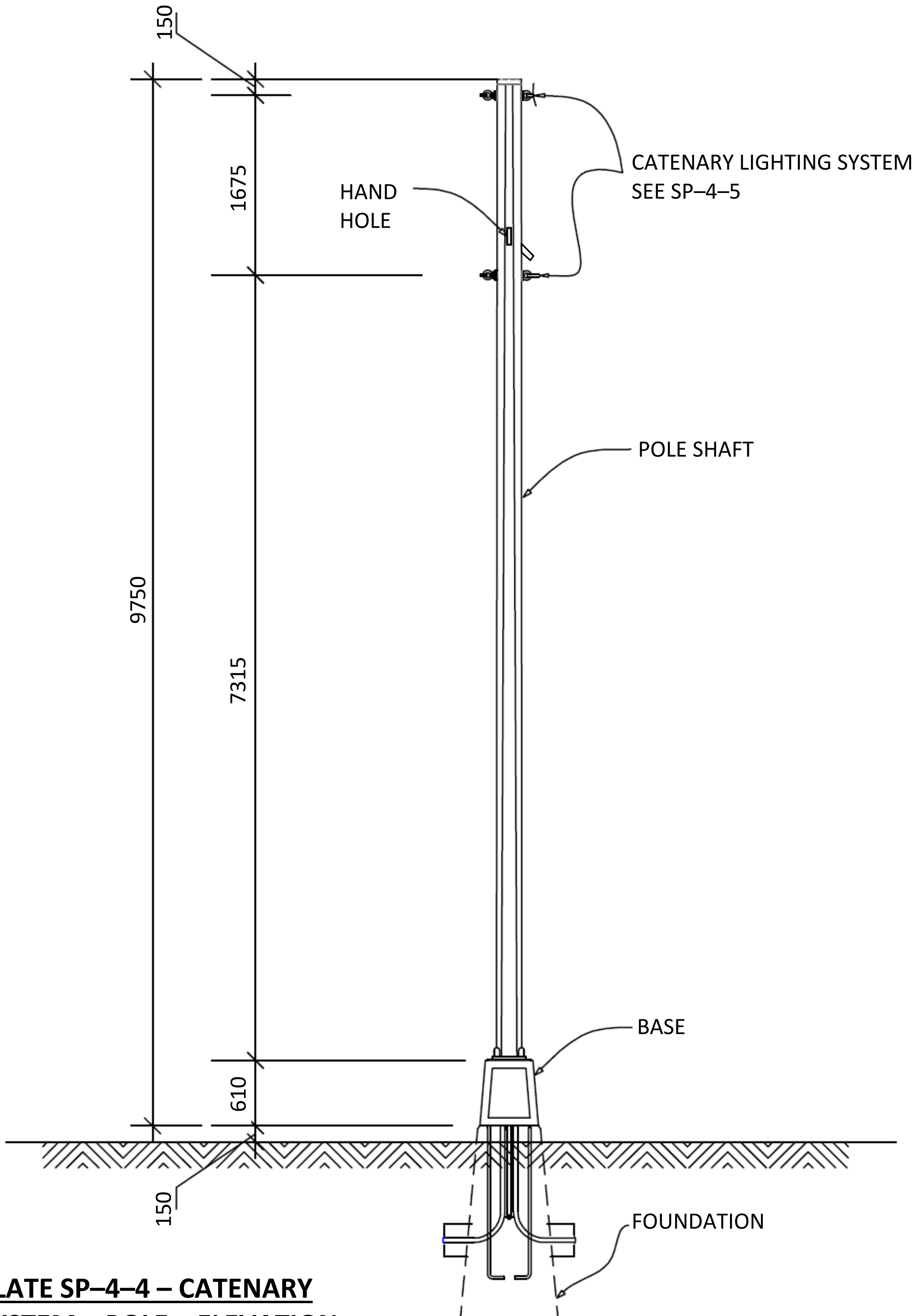
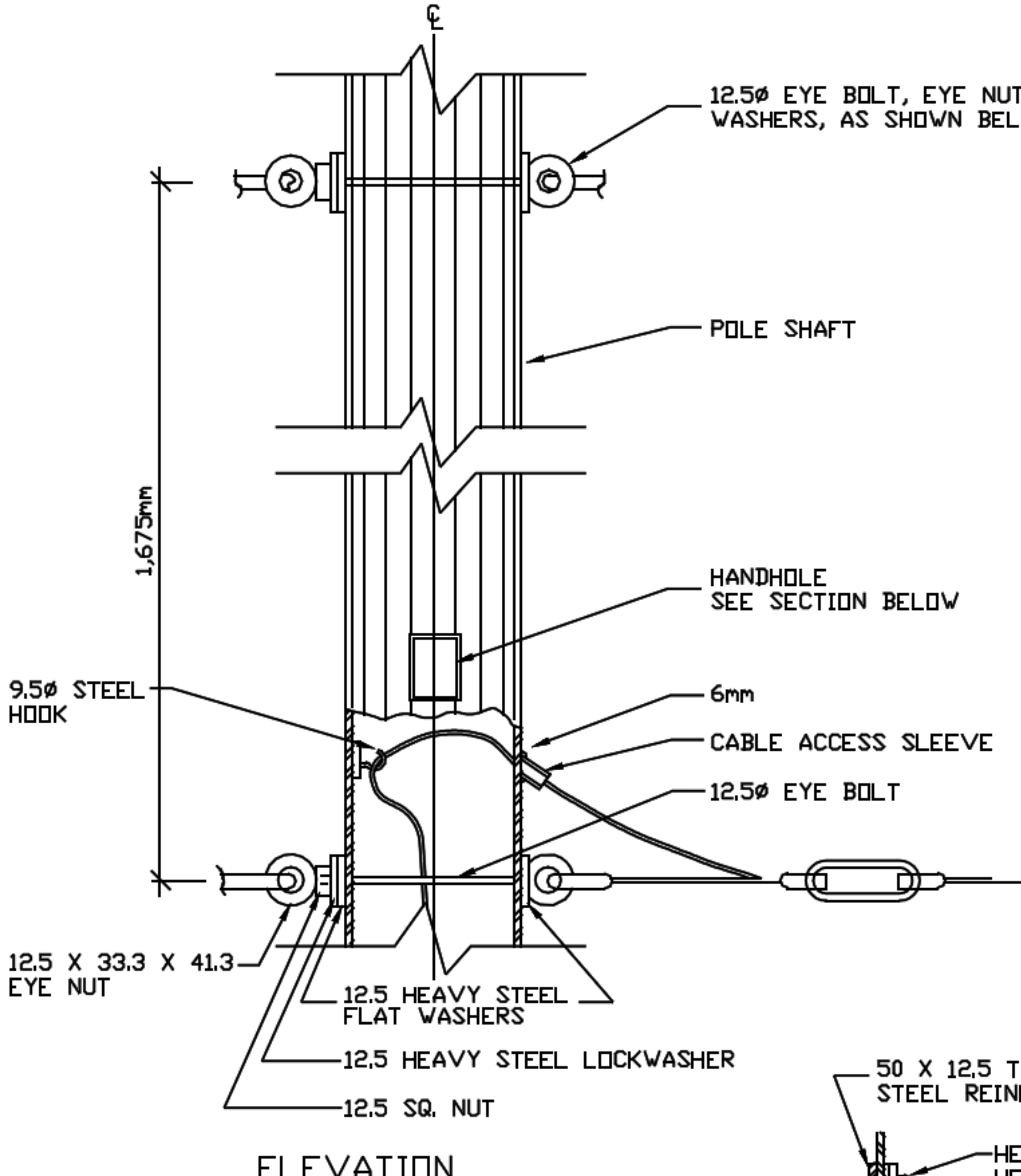
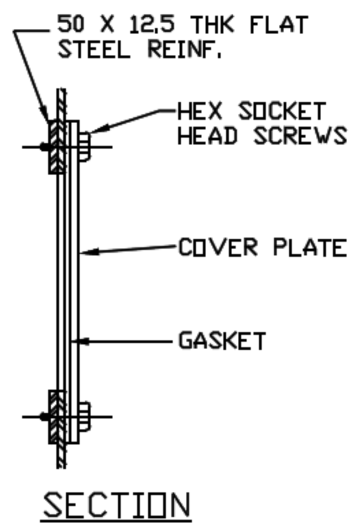


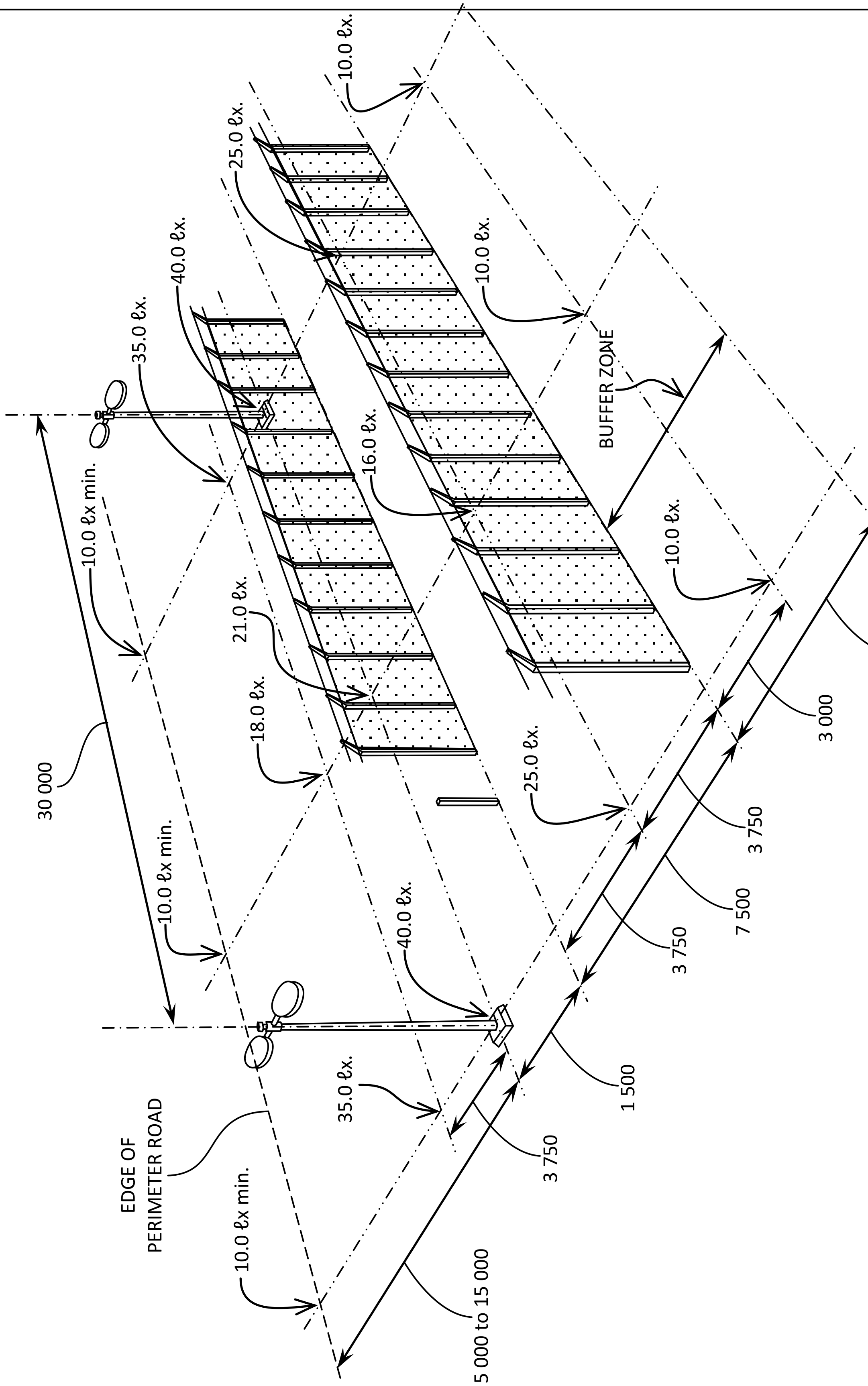
PLATE SP–4–4 – CATENARY SYSTEM – POLE – ELEVATION





NOTE
PROVIDE FACILIIES FOR GUY WIRES ON STANDARDS DESIGNATED AS 'END' POLES AND SPECIAL DESIGN CONSIDERATION FOR THIS PURPOSE.

SP–4–5 – CATENARY SYSTEM – POLE DETAIL



SP–4–6 – ILLUMINATION LEVELS – POLE MOUNTED LUMINAIRES – ISOMETRIC VIEW

SP-5 SITE – TRAFFIC CIRCULATION AND PARKING

1. SCOPE

This section outlines requirements for vehicle and pedestrian circulation and for vehicle parking inside and outside correctional institutions.

2. RELATED SECTIONS

SP–1 – Site Development

SP–2 – Security Fences

ST–1 – Guard Towers

SP–3 – Gates/Sally Ports

SP–4 – Lighting

3. CIRCULATION SECURITY REQUIREMENTS

3.1 Outside the Institutional Perimeter

3.1.1 For ease of control, there shall be only one roadway providing access to the institution from a public thoroughfare.

3.1.2 All parking, including that of staff, visitor and CSC owned vehicles, shall be located on the exterior of the institution and in proximity to the Principal Entrance.

3.1.3 A dedicated perimeter patrol road shall be provided which will allow a rapid patrol vehicle response and which will have a minimum number of crossings. This road shall also be used for access into the institution via the Emergency Vehicle Entrance or a dedicated construction entrance and as well for maintenance of systems related to perimeter security.

3.1.4 Pedestrian walks shall only be provided from the parking area to the Principal Entrance.

3.2 Inside the Institutional Perimeter

3.2.1 A pedestrian circulation network shall connect all buildings. At the Maximum security level, the network may be fenced, enclosed (unheated) or be part of the building for optimum movement control. Consideration of enclosed networks must be based on security requirements only; they are not intended to provide shelter from the elements for pedestrian movements from one activity area to another.

3.2.2 Fire vehicle access shall be in accordance with applicable authorities. Two different access routes, one to the Principal Entrance, one to the Emergency Vehicle Entrance shall be provided with clear signage (see SP-3:3.2).

3.2.3 Vehicle roadways are required for service functions and shops. Vehicle movement shall be separated from inmate circulation and located away from outdoor inmate activity areas.

3.2.4 Vehicle loading and unloading zones shall be centralized where possible, or located in proximity to one another to facilitate their control. Loading zones shall be located away from inmate movement and exterior activity areas, and shall be close to the Principal Entrance or Service Entrance where applicable.

4. DESIGN REQUIREMENTS

4.1 Roadways (Other than Perimeter Patrol Road)

4.1.1 The access road shall be integrated into the public road system; it shall not provide hazardous crossings nor cause undue congestion during peak hour movements.

4.1.2 All roads shall be asphalt paved unless local conditions dictate otherwise.

4.1.3 The minimum widths of paved surfaces shall be as follows:

- One way single lane: 3.5 m
- Infrequently used access ways: 4.8 m
- Two way double lane: 7.0 m

4.1.4 Roadway curbs shall not be used.

4.1.5 Drainage, turning radii, prepared shoulders and intersections shall conform to local municipal standards.

4.1.6 Pedestrians and vehicles shall share the same traffic surfaces except as provided for above.

4.1.7 Roadways shall be illuminated as per section SP-4 Exterior Lighting.

4.2 Perimeter Patrol Road

4.2.1 The perimeter patrol road shall encircle the complete perimeter at a distance of 8 m (minimum) to 20 m (maximum) from the face of the Outer Perimeter Fence to the centre line of the road.

4.2.2 The paved width of the patrol road shall be 4.8 m, with a prepared shoulder of 1 m on each side.

4.2.3 The patrol road surface elevation shall not be lower than the ground elevation between the perimeter security fences.

4.2.4 The area between the patrol road and the perimeter fence shall be clear of all obstructions, except for guard towers where applicable.

4.2.5 The roadway shall be generally straight; curves shall be mild and sufficiently banked to permit moderate speeds. Optimal response time for a patrol vehicle to travel one half of the perimeter circumference is 30 seconds by one of two vehicles (one vehicle patrols on the morning shift). Patrol road system should allow for a maximum response time of 45 seconds.

4.2.6 The patrol road shall have turn-arounds on each side of the institution as well as at each corner of the perimeter fence. Generally, turn-arounds are provided at approximately 150-m intervals. See Plates SP–2–4, SP–2–5 and SP–5–1. All turn-arounds shall be paved and sized to allow for a vehicle to turn a full circle. Vehicle turning radius is assumed to be 7.5 m.

4.2.7 The patrol road when used for truck movement to construction sites via dedicated access points other than the principle entrance shall be widened at the location of the entrance gates in order to facilitate vehicles turns and to not obstruct patrol vehicle movement as trucks await entry.

4.2.8 Drainage for the patrol road shall consist of flanking shallow and broad swales to permit vehicle access onto the terrain on either side of the road. Maximum slope for the swale shall be 25% (1:4), to a maximum depth of 600 mm (Plate SP-5-2). The minimum grade cross-slope of the paved surface shall be 2% [16]. See Plate SP-1-2 for a perimeter fences and patrol road general layout and SP-1-3 for a cross-section detail of the road.

4.2.9 Culverts over 350 mm in diameter shall be provided with grilles to prevent their use as hiding places by inmates. Clear grille openings in any one direction shall not exceed 125 mm by 610 mm in the other direction (see details in M-4: 8.2).

4.2.10 Illumination of the patrol road shall be satisfied by perimeter fence lighting as per Section SP-4 Exterior Lighting.

4.3 Pedestrian Walkways

4.3.1 Walkways shall be of monolithic material such as asphalt, concrete, or compacted stone dust. Small or thin pavers which can be lifted or broken shall not be used.

4.3.2 Walkway design shall allow for movement of handicapped persons and snow removal equipment s well as projected traffic volume.

4.4 Parking (Other than for CSC Vehicles)

4.4.1 Inmate visitor parking and staff parking shall be separately demarcated. Inmate visitor parking stalls shall be provided at a ratio of 50% of the maximum number of inmates allowed in the visits area at one time (visit capacity); such visit capacity shall be identified on a project specific basis. For optimal time of use distribution, the visitor parking lot shall also accommodate official visitor cars.

4.4.2 The number of staff parking stalls shall be provided at the rate of 1.2 multiplied by the peak weekday shift. Staff complement shall be identified on a project specific basis.

4.4.3 Barrier-free parking shall be located close to the gatehouse and be combined for use by staff and visitors. The number of stalls shall be based on established need ranging from a minimum of 2 to a maximum of 4.

4.4.4 Parking areas shall be asphalt paved unless local conditions dictate otherwise.

4.4.5 Curbs shall not be used, although pre-cast wheel stops are permitted.

4.4.6 Landscape islands and trees are permitted but dense planting shall be avoided.

---

16 American Association of State Highway and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, 5th Edition, 2004 – AASHTO GD-2 A Policy on Geometric Design of Rural Highways, 1965 – Transport Association of Canada also refers to this document

4.4.7 Parking stall dimensions (including barrier-free) and drainage provisions shall conform to governing standards.

4.4.8 Parking areas shall be illuminated as per section SP-4 Exterior Lighting.

4.5 Parking for CSC Vehicles

4.5.1 A CSC vehicle parking compound shall be provided, located on the outside of the perimeter fence; size shall be defined on a project specific basis.

4.5.2 The parking compound shall be located in proximity to the Principal Entrance and the perimeter patrol road for ease of periodic surveillance.

4.5.3 The parking compound shall house fuel dispensing pumps and tanks. The compound shall be protected by bollards and a 2.5m high fence.

4.5.4 Fuel shall be stored in registered tanks in accordance with the Storage Tank Systems for Petroleum Products & Allied Petroleum Products Regulations[17]. The fuel storage tanks (preferably aboveground) will be located adjacent to the fuel pumps and the distribution lines shall also be aboveground, where feasible.

4.5.5 The parking compound shall be illuminated as per section SP-4 Exterior Lighting.

4.6 Electrical Outlets for Engine Blocks

Institutions are typically located in isolated areas in climate zones having sustained low temperatures, frequently -20°C or less. In such situations, a decision to determine whether electrical outlets for engine blocks are required is based on the following:

4.6.1 CSC Vehicles

CSC institutions, by their very nature, situation, and role, differ from other government installations. The intent is that institutions have ready to run CSC vehicles for everyday operations including escort or transfer of inmates. Consequently, electrical outlets for block heaters are mandatory.

4.6.2 Staff Vehicles
The provision of outlets must be consistent with local practices. For this, a survey of other Government buildings and local area business and plants will determine the need to provide electrical outlets for block heaters.

4.6.3 Other Vehicles
Electrical outlets for block heater shall not be provided for visitor parking or for other short term parked vehicles.

4.6.4 Parking Electrical Outlets General Requirements

Where provided, electrical outlets may be controlled by timer or by a programmable controller.

17 Tank Systems for Petroleum Products & Allied Petroleum Products Regulations (SOR/2008-197). Regulation under the Department of Justice Canada. http://laws.justice.gc.ca/eng/SOR-2008-197/index.html

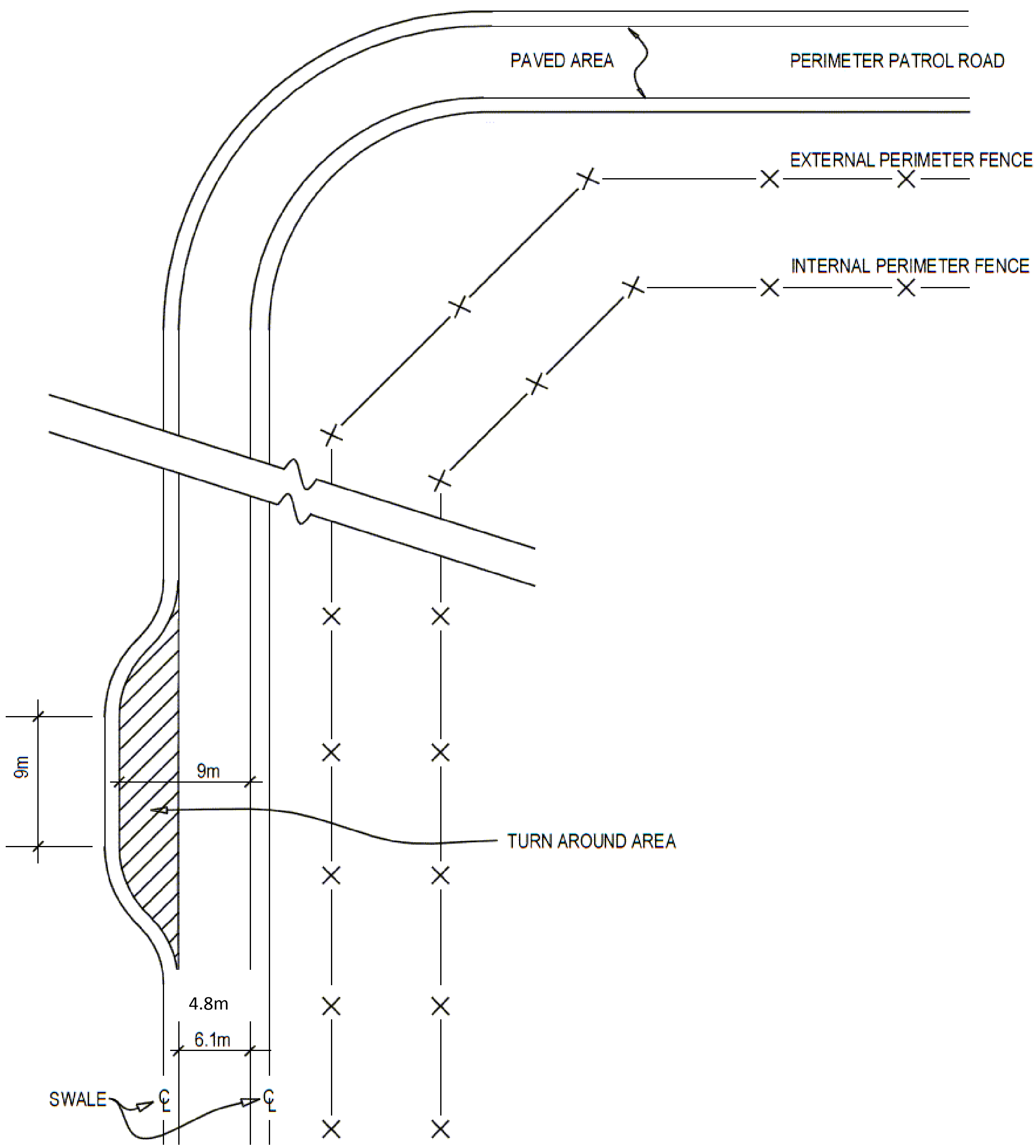


PLATE SP–5–1 – OPTIONS FOR TURN-AROUND

SP-6 SITE – TEMPORARY CONSTRUCTION FENCES

1. SCOPE AND DEFENITIONS

This section provides performance criteria and relevant specifications for all temporary construction fences for minimum, medium, maximum and multi-level Institutions.

Several options for temporary fences are available. Their selection must weigh the following factors: location of construction, the risk of breach, and the duration of construction. Fence types include:

Type 1`Minimum institution construction fence is used primarily as a physical barrier to prevent unauthorized persons access to the site for reasons of safety and to protect the contractor's assets. This fence is no different from that used in the community.

Type 2 Fence is used in restricted and highly controlled inmate areas such as where routine vehicle movement takes place for deliveries at medium and higher level institutions and therefore where breach concerns should not be elevated. This fence therefore serves to prevent unauthorized access for similar reasons as above and as such the fence type is also as above. Construction truck traffic is via the main entrance vehicle Sally Port where it is inspected for contraband. Type 2 Fence shall also be used where construction duration is short term as for a repair or replacement of existing systems or where the work site shifts by phase from building to building. The institution in this case will schedule inmate movement and activities so as to mitigate risk of breach. Truck traffic to the site will be escorted from the main entrance. Type 2 fence may be used as an alternative to Type 3 assuring adequate security where required by being topped with BTC.

Type 3 Fences is used in inmate movement and activity areas at medium and higher level institutions and where breach is possible. Construction truck traffic is via the main entrance vehicle Sally Port where it is inspected for contraband. Trucks are escorted to the construction site. This fence is used for long term projects which have a substantial scope and cost. Fences here must assure appropriate security based on assessed risk.

Type 4 Fence is used for long term projects which are in proximity to the perimeter fence, a secured fence compound shall be constructed which is integrated with the perimeter, effectively forming an extension of the inner perimeter fence. This fence will be fitted with a Fence detection system and covered by camera and lighting integrated with the PIDS. A dedicated Sally Port will be constructed on the perimeter fence line for construction truck traffic to be controlled by contracted commissionaires.

2. RELATED SECTIONS

2.1 Technical Criteria Document sections:

SP-1 - Site Development
SP-2 - Fences
SP-3 - Gates/Sally Ports
SP-4 - Exterior Lighting
SP-5 - Traffic Circulation and Parking

2.2 Other CSC document

Statement of Technical Requirements – Temporary Construction Fences at Medium and Maximum Security Institutions, Correctional Service Canada, Technical Services Branch – Electronic Systems, Issue 5, April 8, 2011.

2.3 National Master Specification section:

01 35 13 – Security Requirements (prior to 2004: 01003 – Security Requirements)
01 56 26 – Temporary Fencing
01 56 36 – Temporary Security Enclosures

3. PERFORMANCE CRITERIA

3.1 Type 1 Fence

This fence type shall be a self supporting welded mesh sectional fence typically available by rental (‘Modu-loc’ or similar). The height of the fence shall be no less than 1800 mm high but may be higher depending on local availability. The fence must be stable and self supporting. Welded wire mesh is considered to be non-climbable due to its mesh size which inhibits the insertion of foot to aid climbing. The top of the fence also has its vertical wire projecting over the top rail to discourage breach. Matching vehicle gates are padlocked after work hours. The temporary construction fence shall be removed from the institution by the contractor after construction is completed.

3.2 Type 2 Fence

This fence type shall be similar to the above but with a height of 2400 mm. This fence must not come in contact with the perimeter fence nor be closer than 12m to the perimeter fence so as not to interfere with PIDS camera viewing on the interior side of the institution. The temporary construction fence shall be removed from the institution by the contractor after construction is completed. Type 2 fence security can be enhanced by topping it with BTC rendering it an alternative to Type 3 fence which shall be considered as a measure to reduce project cost.

3.3 Type 3 Fence

This fence type shall be similar to a standard woven mesh interior fence, be 3.6m high, and be topped with BTC where required. This fence shall be installed on site with all posts set in concrete and with the ground surfaced with compacted gravel. Matching swing type vehicle gates shall be padlocked after hours. As for type 2 fence, this fence must not come in contact with the perimeter fence nor be closer than 12m. Truck access to this compound shall be via the Main entrance with all vehicles escorted. The temporary construction fence shall be dismantled by the contractor after construction is completed but parts such as the fabric may be left at the institution in accordance with the contract documents.

3.4 Type 4 Fence

This type of fence forms part of the perimeter and as such requires special provisions as follows:

3.4.1 This is a single fence of the same design as an Inner Perimeter Fence (see Plate SP-6-6) and conforms to Chapter SP-2 - Fences, performance criteria 4.1 except for anti-tunnelling which is achieved by compacted gravel surface for 1m distance on each side of the fence.

3.4.2 A Fence Detection System (FDS) is required and connected to the Main Communication Control Post (MCCP).

3.4.3 Cameras are required to monitor the fence line and connected to the MCCP and lighting may be required to enhance viewing.

3.4.4 A dedicated vehicular entrance is required similar to the main entrance Sally Port comprising three (3) gates (see Plate Sp-6-7, Detail 1):

a) Gate 1: Temporary gate for the outer perimeter fence,

b) Gate 2: Temporary gate for the inner perimeter fence,

c) Gate 3: Temporary gate in a temporary fence to form a vehicle Sally Port.

At any time, at least two gates of the temporary vehicular Sally Port are secured, with padlocks and keys under the control of a Commissionaire. A commissionaire's temporary hut is required within the Sally Port.

3.4.5 The fence must be clear of any building by 12 m but a shorter clearance may be considered since the compound is always protected by a double fence between it and the exterior of the institution.

3.4.6 The fence and systems must be dismantled and handed to the institution in accordance with the contract documents after the construction is completed. All systems must be reinstated to the original state and function.

4 RELEVANT SPECIFICATIONS

4.1 Type 1 Fence

Rental construction protection fence comes with welded wire mesh and components conforming to ASTM F2919 Welded Mesh Fence specification. Mesh is galvanized steel no larger than 50X150mm (vertically long rectangle) with vertical wire projecting and exposed at top. Fence must be at least 1800mm high and secured with pins inserted in the ground through the 'T' base support. Sections of fence must be securely clamped together to ensure that the each fence run acts as a continuous barrier which will resist lateral forces and separation. Sloped runs must be protected by mesh panels to ensure continuity of barrier from ground up.

4.2 Type 2 Fence

This fence is similar to Type 1 above but shall be 2400mm high. Ground along the fence run shall be surfaced with compacted gravel. 'Barbed tape concertina' (BTC) where required and used as an alternative to Type 3 fence shall be as per SP-2-4.2 except that it could be directly attached with galvanized twist ties or clips to the top rail or wire resting against the mesh on the threat side. Use of steel arms fastened to the posts may also be considered for the support of 2 barbed wires and BTC.

4.3 Type 3 Fence

This fence conforms to the criteria set out in SP-2 for perimeter fences. It shall be topped by steel arms supporting 2 strands of barbed wire and BTC. The arms shall have 2 strands of barbed wire with the BTC cradled between. Steel arms lean towards the threat side.

4.4 Type 4 Fence

The following pertains to a single fence extension of the inner perimeter fence:

4.4.1 This fence is continuous connected to the inner perimeter fence at each end. It shall conform to the specification for an interior fence as in "Chapter SP-2 – Fence, Conforming Specifications 4.1.8 and 4.2." and relevant plates; only exception being that the BTC needs to be installed only on the threat side at the first intersecting panel.

4.4.2 The three temporary construction gates must conform to "Chapter SP-3 - Gates and Sally Port, 5. – Fence Gates, 5.2 Vehicle Swing gates". Gate 2 (the gate on the Inner Perimeter Fence) requires FDS that can be masked during construction hours and unmasked for all other times. The gate FDS must connect to the MCCP.

4.4.3 Motion Detection System (MDS) cable exists within the No Man Zone between the fences. This cable has to be protected from heavy trucks and machinery at the crossing by installing an asphalt pad of 150 mm thick without disturbing the gravel surface over the MDS cables (see Plate SP-6-7). This material can be removed following construction. It is also important to limit the use of salt during winter months. Excess salt will drain to the sides and seep into the surrounding surface adversely affecting the MDS cable's RF field.

4.4.4 A temporary microwave system covers the vehicle crossing area within the No Man Zone.

4.4.5 Temporary gates may be installed between the perimeter fences at the Sally Port crossing to allow maintenance vehicles to circulate, these gates must be designed to not interfere with both the MDS and the temporary microwave systems.

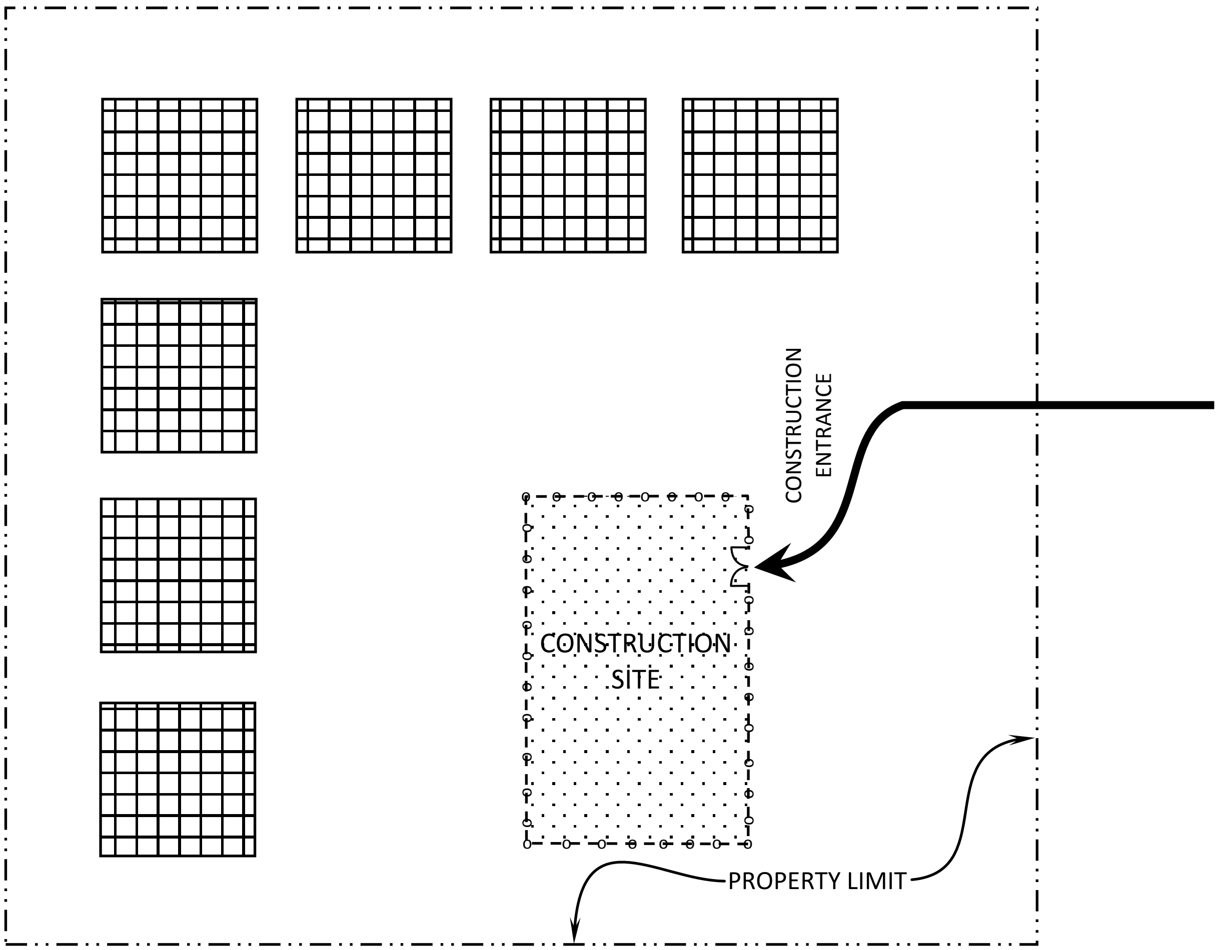


PLATE SP–6–1 – TYPE 1 FENCE

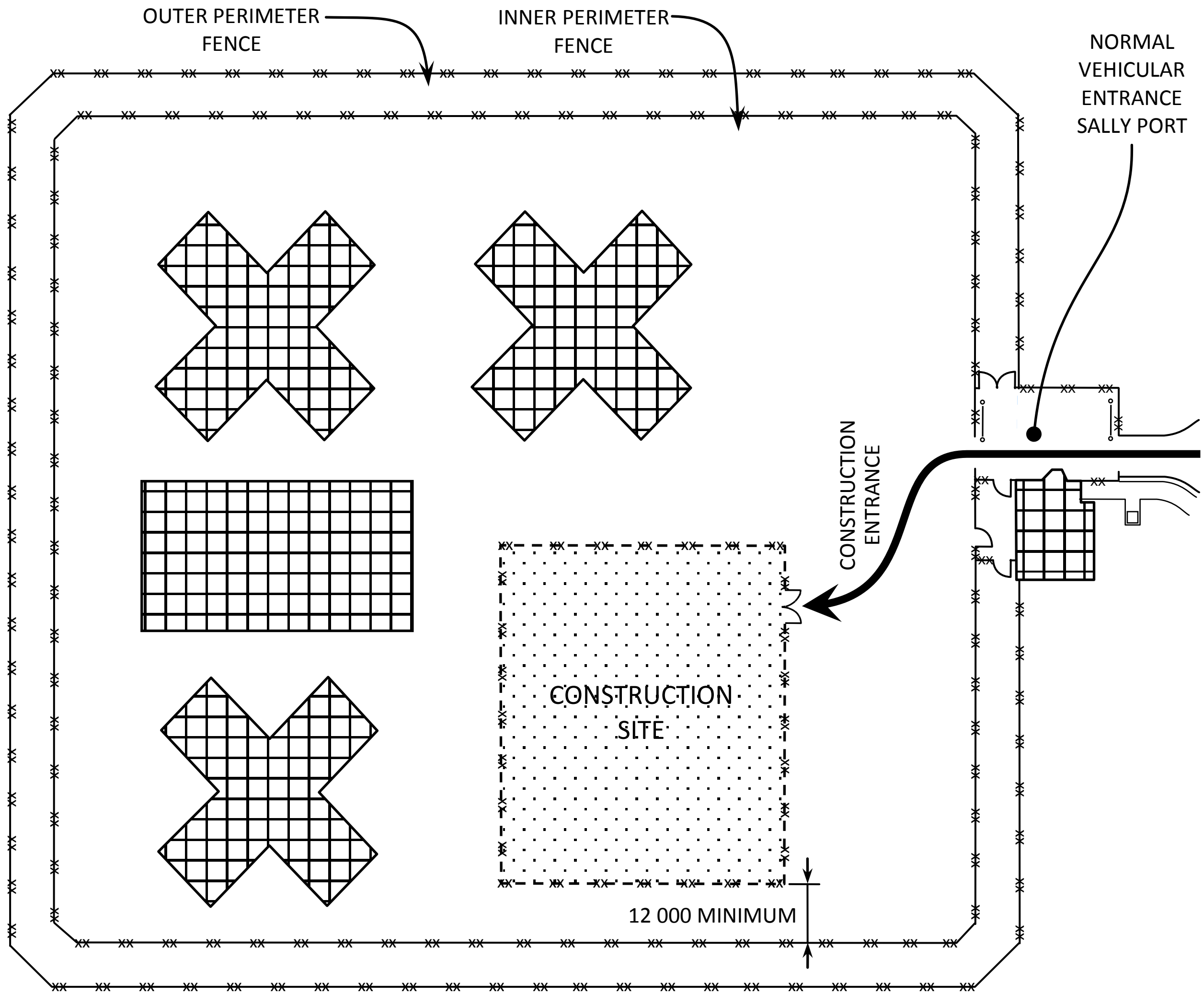
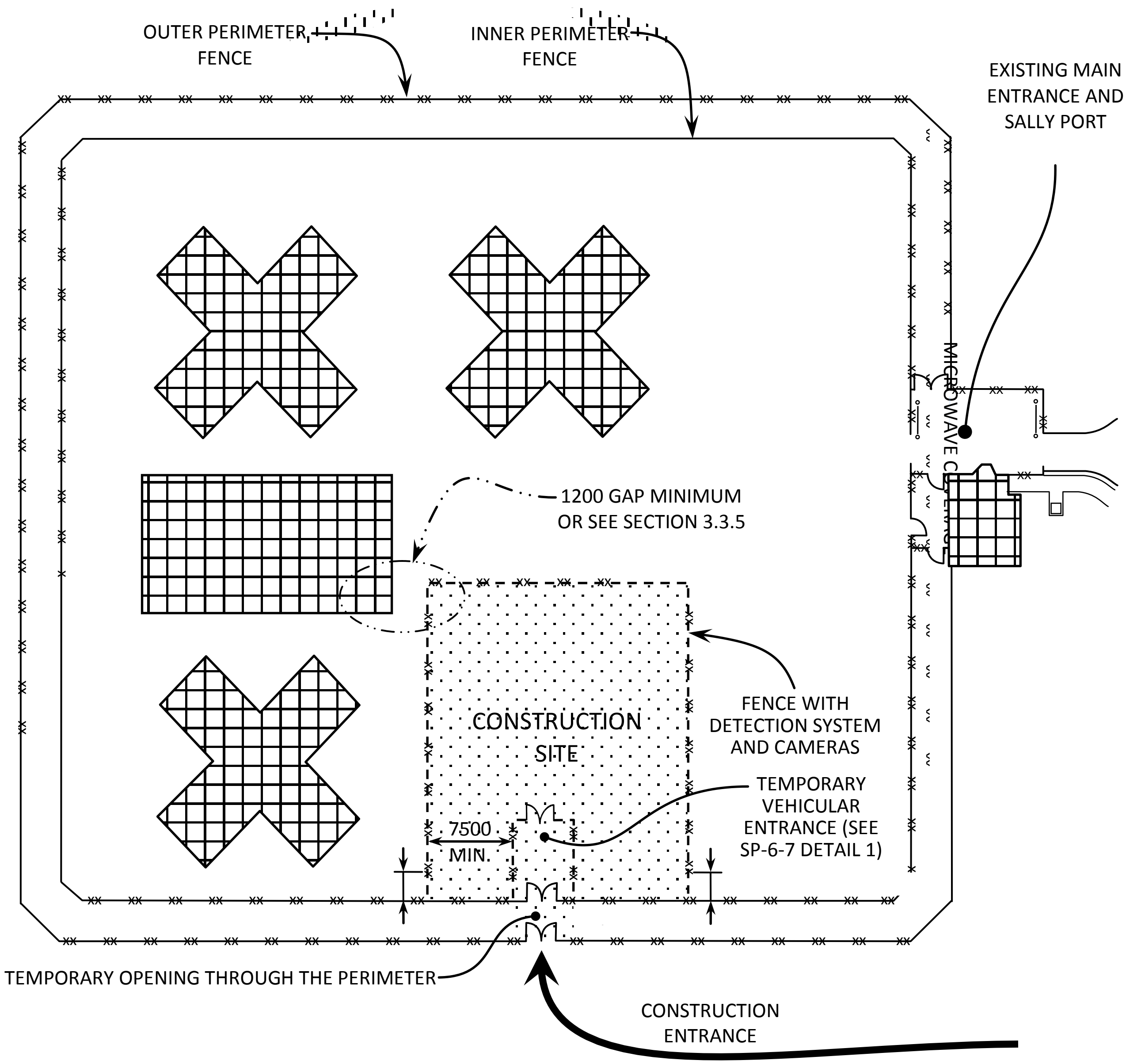
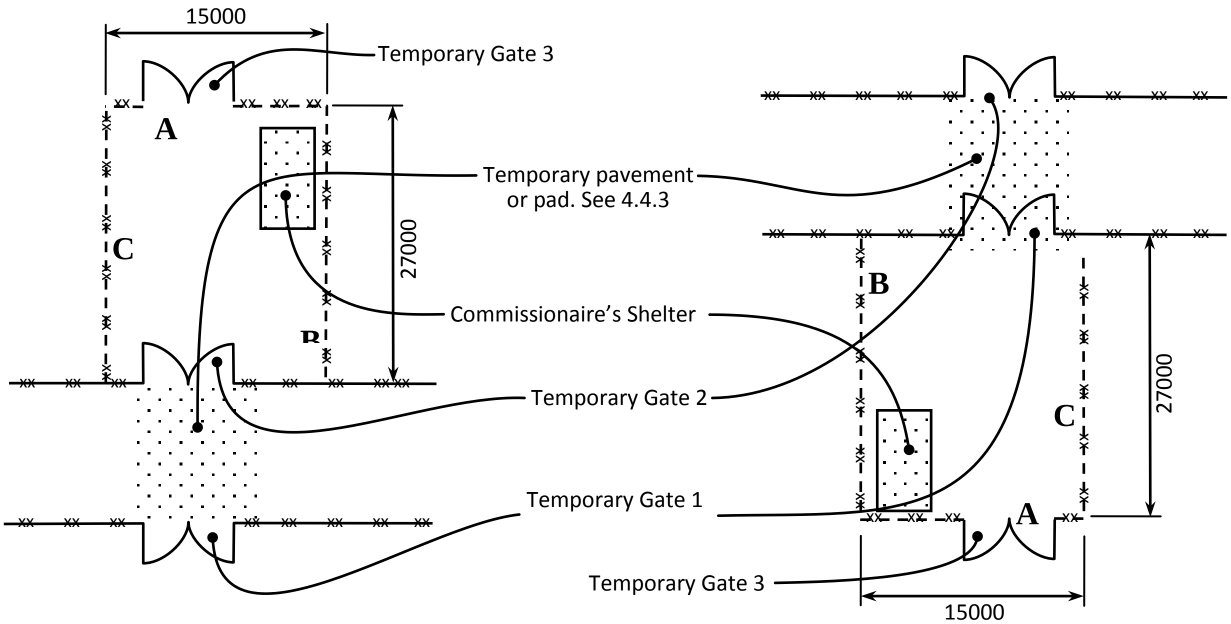


PLATE SP–6–2 – TYPE 2 AND 3 FENCE

PLATE SP–6–3 – TYPE 4 FENCE

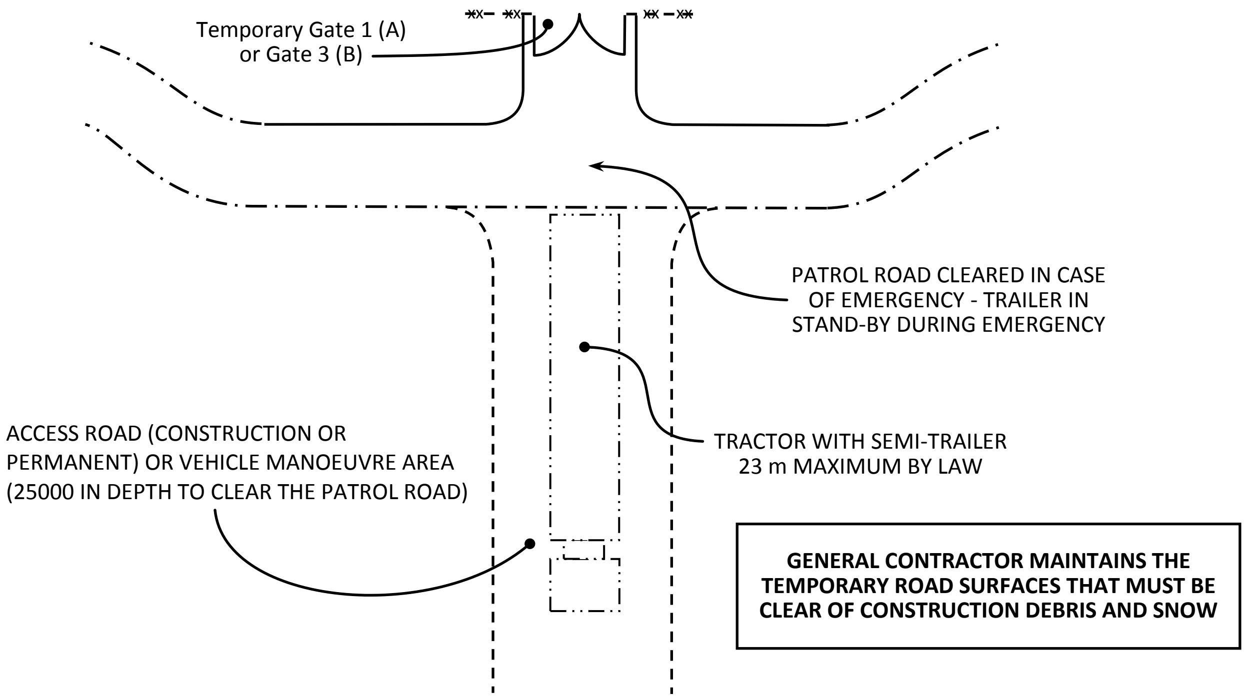




A – INSIDE THE INSTITUTION **B – OUTSIDE THE INSTITUTION**

SP–6–4 – TYPE 4 FENCE –

ENTRANCE OPTIONS



SP–6–5 – TYPE 4 FENCES –
VEHICLE ACCESS DETAIL

Correctional Service Canada Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Technical Criteria for Correctional Institutions

SECTION SU – SITE UTILITIES

Canada

SU-1 SITE UTILITIES – STORM AND SANITARY SEWERS

SU-2 SITE UTILITIES – WASTEWATER (SEWAGE) TREATMENT

SU-3 SITE UTILITIES – WATER UTILITY

SU-4 SITE UTILITIES – POWER SUPPLY AND ELECTRICAL POWER DISTRIBUTION

SU-1 SITE UTILITIES – STORM AND SANITARY SEWERS

1. SCOPE

This section sets out technical guidelines and criteria for storm and sanitary sewers serving CSC Institution properties.

2. RELATED SECTIONS

SP–1 – Site Planning and Development
SP–5 – Traffic Circulation & Parking
SU–2 – Wastewater (Sewage) Treatment
SU–3 – Water Utility
M–2 – Plumbing Requirements

3. DESIGN CONSIDERATIONS

3.1 General

Design of storm and sanitary sewers shall be based on good engineering practice and conform with all applicable codes, regulations and standards in the specific locality of the work. In addition, the following requirements of CSC shall be given special consideration:

3.1.1 Imminent and future development plans

3.1.2 Project specific security requirements

3.1.3 Operation and maintenance aspects as related to the special requirements of a C.S.C. institution.

Institution sewerage systems are often used by inmates to dispose of contraband, clothing and other bulky items which may block sewer pipes, manholes, pumps and treatment equipment.

Screening or comminution equipment must be installed at suitable locations in the collection system. Such equipment shall be power operated, automated (requiring minimum operator manipulation).

3.1.4 Separate sanitary and storm sewer systems will be used and, insofar as is feasible, sewers will be at such a depth as to admit contributing flows by gravity.

3.1.5 Pumping Stations

3.1.5.1 Consider the implications of power failure and of exceeding the pumping capacity.

3.1.5.2 Provide high and low sewage level alarms properly identified to the technical services work station and if this station is not manned on a 24 hour day basis, to the Main Communication Control Post (MCCP).

3.2 Estimation of Flow Quantities

Determine the quantity of wastewater based on the following as appropriate:

3.2.1 Storm - select a storm frequency consistent with the actual or anticipated land use, suggested:

3.2.1.1 50 year maximum for main conduits and high value areas

3.2.1.2 10 year for upstream connecting conduits.

3.2.2 Sanitary

3.2.2.1 The average daily domestic water consumption shall be based on the monitoring data collected by each institution. Where data is not available, the consumption shall be based on 550 ℓ/day/user. The total users shall be the total inmate population plus one third of the total institution staff.

Water requirements for food preparation and dishwashing are included in this allowance.

3.2.2.2 Water requirements for laundry and industrial shall be based on accepted practice,historical data and manufacturers' recommendations. Estimate the minimum and maximum flows where they cannot be measured using the following relationships:

- Maximum daily: Average daily x 2.50
- Minimum daily: Average daily x 0.75
- Peak: Mean rate during the maximum 15 minutes for any 12 month period. For CSC Institutions take at 4 times the average daily.

3.2.2.3 The population and industry estimates should be those anticipated during the design period, which should not be less than 25 years for sewer mains.

3.2.2.4 The above consumption may be modified in accordance with reliable historical data from existing similar institutions.

4. SECURITY CONSIDERATIONS

4.1 Surface Drainage

4.1.1 Inside Perimeter Fence

Minimize the use of open channels in areas within the perimeter. In general, surface drainage will be by buried storm sewers. The use of culverts must be submitted to C.S.C. for approval.

4.1.2 Outside Perimeter Fence

For the area 100 m outside the perimeter fence, open channels, wide and shallow rather than narrow and deep shall be used whenever practical. Where culverts are required they shall not permit the entry of an inmate as a possible hiding place. This may be achieved by the use of multiple small culverts rather than a single large size or the installation of metal bars at outlet.

4.2 Manhole Covers

In Medium and Maximum institutions all manholes and catch-basins within the perimeter fence shall be secured with special fastenings to prevent unauthorized entry.

Specify standard covers and frames to be modified as follows: (See Figure SU-1-1)

4.2.1 Covers: Drill three equidistant 20 mm holes near the perimeter to receive 16 mm stainless steel hexagon head bolts. Countersink for washers and bolt heads to ensure a flush installation.

4.2.2 Frame: Drill and tap frame to receive the bolts from the cover. Specify lugs if necessary for this purpose.

4.3 Perimeter Fence Crossings

4.3.1 To prevent possible escape routes, minimize the number of sewer pipes larger than 350 mm OD within the perimeter fence by locating larger mains outside the fence with branch connector lines from within.

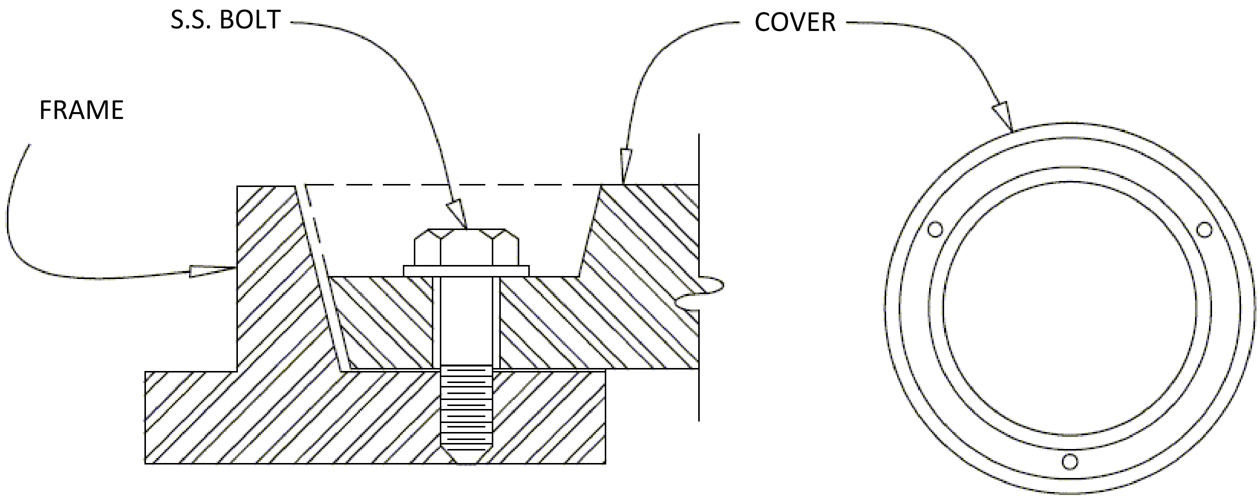
4.3.2 For a Medium and Maximum institution, if a sewer line larger than 350 mm OD is required to cross the perimeter fences, insure that it cannot be used as an escape route. An acceptable solution is to provide distributing manholes on both sides of the fences and run the required number of 350 mm OD (or smaller) pipes joining the two manholes. Refer to Plates SU-1-2 and SU-1-3 and table 1 for details.

4.4 Perimeter Intrusion Detection System (PIDS)

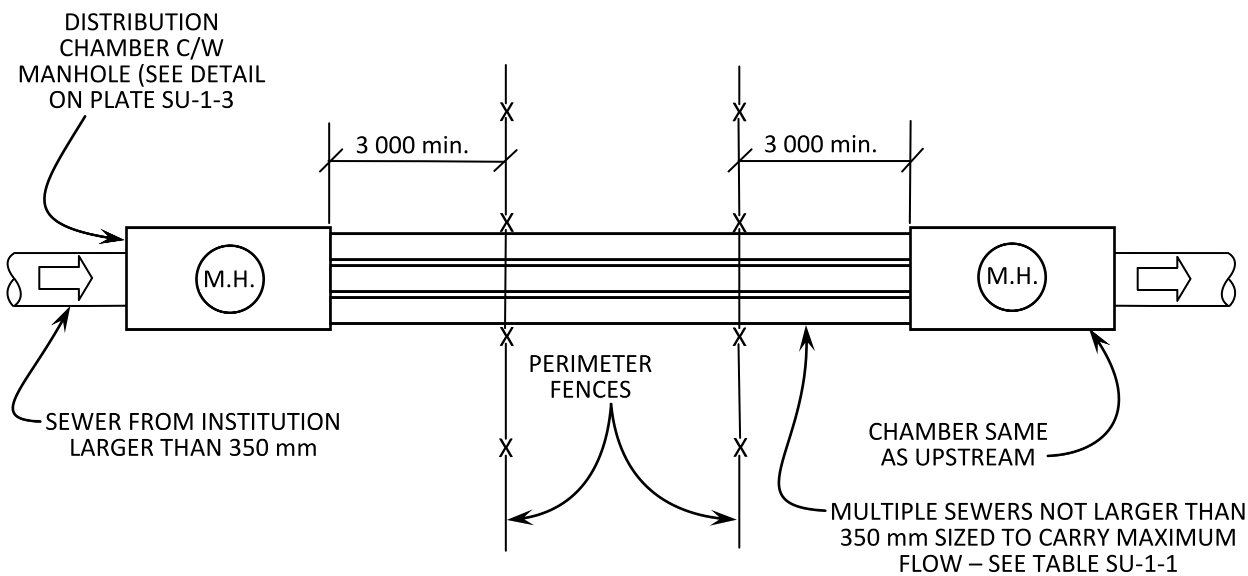
Requirements

4.4.1 Since the PIDS (Motion detection in-ground system) may be affected by both metal pipes and variable flowing liquids, all pipes crossing the perimeter fence for Medium and Maximum institutions shall be a minimum of 1.5 m below grade. This requirement need not be followed at the sally port.

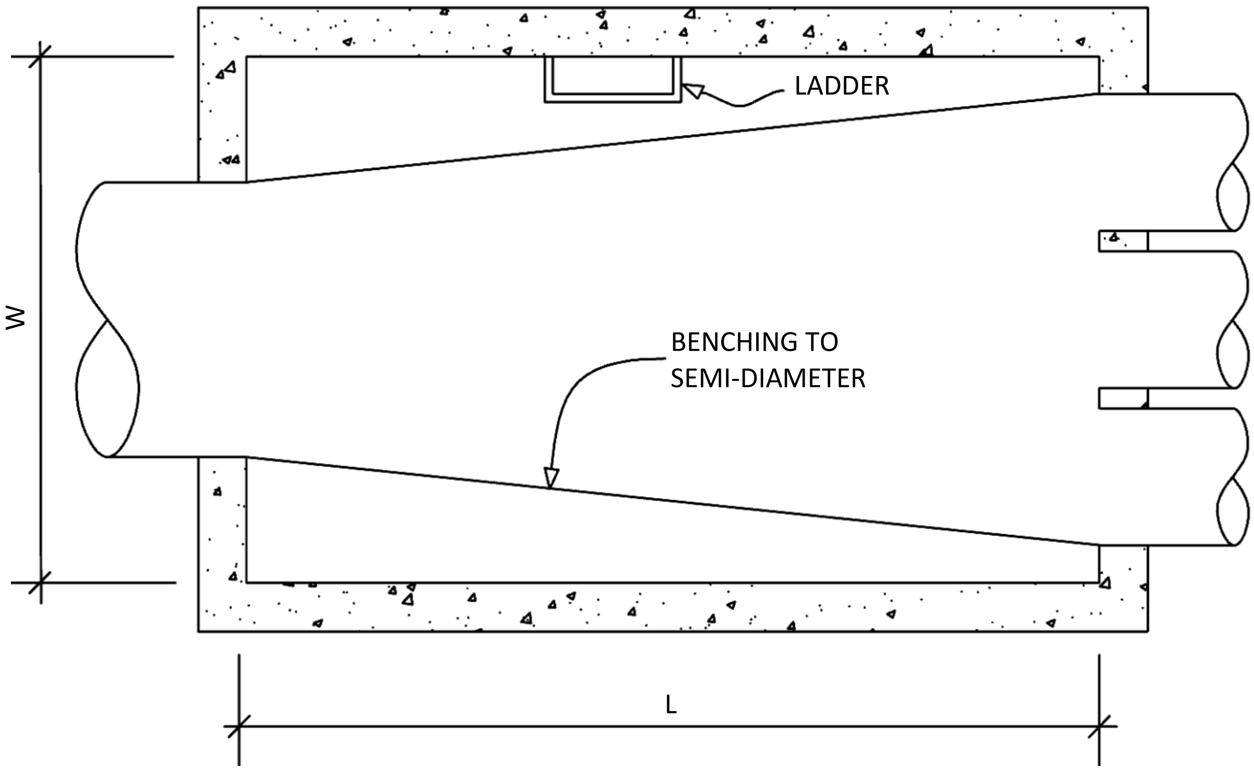
4.4.2 Any liquid flow with changing mass, such as varying flow in partly filled sewer or storm drainage pipes, must also be a minimum of 1.5 m below grade even if the pipes are non metallic.



SU–1–1 – SECURITY MANHOLE COVER



SU–1–2 – LARGE SEWERS CROSSING PERIMETER FENCES – GENERAL LAYOUT PLAN



SU–1–3 – LARGE SEWERS CROSSING PERIMETER FENCES – DISTRIBUTION CHAMBER DETAIL

TABLE SU–1–1 – DISTRIBUTION CHAMBER DIMENSIONS

INLET DIAMETER mm OD	NO. OUTLET PIPES	H mm	W mm			L mm
			1 Tier	2 Tier		
350 to 500	2	30	1 100			2.0 W
600	3	30	1 600			2.0 W
700	4	30	2 000			2.0 W
750	5 (3 + 2)	40		1 600		2.5 W
800	6 (3 + 3)	40		1 600		2.5 W
900	7 (4 + 3)	45		2 000		2.5 W

H = Difference in invert levels between inlet and lowest tier outlet
W = Chamber width internal
L = Chamber length internal

SU-2 SITE UTILITIES – WASTEWATER (SEWAGE) TREATMENT

1. SCOPE

The intent of this section is to set out technical guidelines and criteria for wastewater treatment facilities serving CSC Institution properties.

2. RELATED DOCUMENTS

This section should be read in conjunction with the following as applicable:

SP–1 – Site Planning and Development
SU–1 – Storm and Sanitary Sewers
SU–3 – Water Utility
M–2 – Plumbing Requirements

3. DESIGN CONSIDERATIONS

3.1 This section deals with property sanitary wastewater treatment systems including pre-treatment, (screening, comminution and grit removal), primary treatment, secondary treatment and the disposal of the products of treatment.

3.2 Storm water will not be treated unless there are exceptional environmental requirements.

3.3 All drainage infrastructure and wastewater treatment facilities shall be designed and constructed in accordance with CSC's CD 318-6[1], all applicable Federal, Provincial and local legislation, regulations codes and standards.

3.4 The quantity of wastewater to be treated shall be determined from potable water use data for each institution or from reliable data from existing similar institutions. The design period should not exceed 20 years.

3.5 All treatment plant shall be designed with a level of redundancy in each treatment components to allow for repair and maintenance without requiring bypass or shut down.

3.6 Loadings forecasts wastewater treatment systems may be based on reliable historical data from existing similar institutions or in the absence of such data use the following:

	Allowance per person	
	BOD	SS
Inmates/Patients	0.175 kg/day	0.20 kg/day

3.7 The minimum criteria for wastewater treatment shall meet the requirements as set out in CSC's Management of Wastewater Treatment Systems Guideline CD318-06, the Environment Canada Wastewater Systems Effluent Regulations and local (provincial/ municipal) discharge criteria.

3.8 Sewage systems discharging to on site lagoons shall include screening and will not rely solely on comminution.

3.9 High and low level sewage alarms shall be installed and properly transmitted to a station that is manned on 24 hours a day.

---

[1] CD 318 – Guidelines 318-6 – Management of Wastewater Treatment Systems (2003-06-11)

4. SECURITY

4.1 Treatment plant installations shall be designed so as to prevent unauthorized entry.

4.2 Suitable remote monitoring and warning devices shall be provided at the technical services work station and if this is not manned on a 24 hour basis critical alarms shall be run to the Main Communication Control Post (MCCP).

4.3 Assess the implications of power failure and where warranted connect to emergency standby power facilities. Redundant pump and other critical components shall have control systems that provide for automatic lead lag rotation and engagement in the event of failure of the primary unit.

4.4 It cannot be stressed too strongly that wastewater treatment at CSC Institutions is not the same as wastewater treatment under normal municipal circumstances. Inmate behaviour may lead to deliberate vandalism and misuse of system and must be considered. As such wastewater treatment technology used should be able to effectively deal with significantly higher plastic and fabric loads; shall be industry standard with wide industry usage and local serviceability.

SU-3 SITE UTILITIES – WATER UTILITY

1. PURPOSE

1.1 The intent of this section is to set out technical guidelines and criteria for domestic and fire protection water supplies serving CSC Institution properties.

1.2 This criterion is to be used to supplement Public Works Canada, , applicable plumbing, building and Fire code requirements. In particular, potable water systems shall be designed and constructed to meet Health Canada's Drinking Water Guidelines and to support the applicable system requirements specified in the most recent version Health Canada's publication *Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction*[1].

1.3 Departures from this Document shall be supported by explanation and data satisfactory to CSC and all authorities having jurisdiction.

1.4 Design of the site fire protection systems are subject to the approval of CSC Engineering and Maintenance, Chief Fire Protection Engineer. All codes should be respected, but the Chief Fire Protection Engineer has the final decision.

2. RELATED DOCUMENTS

2.1 This section should be read in conjunction with the following TCD sections as applicable:
SP–1 – Site Planning and Development
SP–5 – Traffic Circulation and Parking
SU–1 – Storm and Sanitary Sewers
SU–2 – Wastewater Treatment
M–2 – Plumbing
M–3 – Fire Protection

2.2 In addition the following will be observed as applicable:
2.2.1 PWGSC Design and Construction Branch Standards and Guidelines
2.2.2 Government of Canada Master Specifications
2.2.3 Canadian Guidelines for Drinking Water Quality
2.2.4 Provincial Drinking Water Guidelines
2.2.5 Guidance for Providing safe drinking water in areas of federal jurisdiction
2.2.6 Local applicable codes and requirements

3. SCOPE

The scope of the design work of project water utility systems includes the following:

- Connections to the building systems 2 m outside the building
- Site distribution and metering
- Connections to public utility main(s)
- CSC owned and operated water supply and treatment system
- Domestic and fire protection water storage.

4. INSPECTION

Establish responsibility regarding payments and inspectional requirements to obtain final approvals by the authorities having jurisdiction.

---

[1] Health Canada – Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction - Version 1 – 2005, ISBN: H128-1/05-440E, Cat. No.: 0-662-41691-0
http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/guidance-federal-conseils/index-eng.php

5. EMERGENCY POWER

All water treatment and supply equipment, alarm, controls, and accessories requiring electrical power should be supplied with emergency secondary power supply.

6. BASIC DESIGN REQUIREMENTS

Establish contact with local utility company, municipality environmental protection agency, and municipal fire department to obtain the following information:

6.1 Existing water main(s) location, size and elevation

6.2 Utility water residual pressure for the Project flow requirements.

6.3 Allowable, water capacity supplied by the utility company, and security of supply

6.4 Requirements relating to water metering system

6.5 Requirements relating to the division of responsibility with regard to the extent of work to be provided by the Utility and/or User.

6.6 Requirements relating to the type and quality of the materials utilized for the site water systems.

6.7 Requirements relating to the acceptable minimum and maximum sizes of the Project water connection(s) to the utility main(s).

6.8 Requirements relating to the acceptable type and process system of the water treatment and make up facilities, if required.

6.9 Requirements relating to the water disinfection system.

6.10 Location of the existing fire hydrants.

6.11 Thread standards for the site fire hydrant and fire department connections.

7. WATER DISTRIBUTION AND FIRE HYDRANT

7.1 Consider separate domestic and fire protection water distribution systems.

7.2 Site water distribution system should be designed forming sectionalized loops and providing at least two service connections to each major building.

7.3 Water meter assemblies should be located in pits or buildings, accessible to the utility company generally outside the perimeter fence.

7.4 Site distribution loop used for domestic water system only should be of the size required by consumption, but should not be smaller than 100 mm in diameter.

7.5 Site distribution loop used for domestic and fire protection water should be at least 200 mm in diameter. Give justification for any recommendation of main sizes larger than 250 mm.

7.6 Water pressure in the site distribution loop should not be less than 50 PSIG.

7.7 Design and specify adequate number of loop sectionalizing valves, as required by the building and loop layout.

7.8 All bends, fire hydrants and branch 'tees' in the underground distribution lines should be designed with the required trust blocks.

7.9 Valves controlling water supply, including sectional valves, with the exception of those controlling an individual hydrant, shall be the “Post Indication Type” sectional valves and shall be designed so that the majority of hydrants may remain in service during a water outage caused by a break or maintenance.

7.10 Except as otherwise stated in this document, hydrants (including associated piping and valves) shall be designed and installed per the requirements of NFPA 24 “Standard for the Installation of Private Fire Service Mains and their Apparatus”.

7.11 Fire department connections shall be located in supervised areas and accessible to fire department apparatus at all times.

7.12 Fire department connections shall be located so that the distance from a fire department connection to a hydrant does not exceed 45 m and is unobstructed.

8. WATER QUANTITIES

8.1 Domestic Water Consumption shall be based on the following:

8.1.1 The average daily domestic water consumption shall be based on existing potable water use data for the institution or existing similar institutions. Data must be verified for specific locations / institutions. A range for consumption may vary between 300-600 litres/day. The total users shall be the total inmate population plus one third of the total institution staff. Water requirements for laundries, food preparation and dishwashing are included in this allowance.

8.1.2 Water requirements for large scale laundry facilities, industrial and irrigation shall be added to the above amount and shall be based on accepted practice, historical data and manufacturers' recommendations.

8.1.3 Estimate the minimum and maximum flows where they cannot be measured using the following relationships:

- Maximum daily: Average daily x 2.50
- Minimum daily: Average daily x 0.75
- Peak: Mean rate during the maximum 15 minutes for any 12 month period. For CSC Institutions take at 4 times the average daily.

8.1.4 The above consumption may be modified in accordance with reliable historical data from existing similar institutions.

8.2 Water required for fire protection shall be as outlined in M-3:6 – SPRINKLER SYSTEM.

9. WATER SUPPLY

To guard against interruption of service the water supply shall meet the following requirements:

9.1 When available the water supply shall consist of two separate connections to different municipal utility mains with adequate quantity to meet fire protection requirements.

9.2 Where only one connection is practical from a municipal supply or if the quantity is not adequate to meet the fire requirements, supplement municipal supply with on site storage tanks or reservoirs and pumping system. See M-3:9 – FIRE PUMPS for fire pump requirements.

9.3 Where no municipal supply is available, provide a private supply and on site storage with pumping systems.

10. WATER TANK

10.1 The capacity of the water storage tank shall meet the requirements of both the domestic water supply and fire protection water unless non potable water supply is used for fire protection.

10.2 Domestic water storage shall be not less than 24 hours reserve of the average calculated water consumption.

10.3 Fire protection water quantity shall be as specified in M-3:6 – SPRINKLER SYSTEM.

10.4 Design system with at least two tanks or compartments and a separate pump well so that one compartment or tank can be cleaned or repaired while the other can continue to provide water service.

10.5 Water storage tanks shall include, as a minimum, flow through operations and consideration will be given to including active mixing technologies.

10.6 Any pumps or fittings in storage tanks, shall be designed and installed such that they may be serviced or replaced without having to drain or enter the tank.

10.7 All potable water storage tanks shall have securely locking access doors or lids. The lock shall be such that tampering will leave an indication.

10.8 Storage tanks located outside shall be located inside a chain link security fence with Bollards on all four corners.

11. PRIVATE WATER SUPPLY

11.1 General

11.1.1 Where a municipal water supply is not available, a private supply must be found and a thorough survey of all possible sources shall be made by a qualified hydrogeologist and certified well driller.

11.1.2 Where adequate supply of non potable water is available consider separate fire protection and domestic water supply and storage systems.

11.1.3 Prior to undertaking any groundwater investigations, the local authority responsible for granting groundwater permits shall be consulted

11.2 Wells

11.2.1 Prior to undertaking any groundwater investigations, communication with local authority responsible for granting groundwater permits is required.

11.2.2 All local (municipal or provincial) well drilling requirements, including reporting requirements, shall be followed.

11.2.3 The design and construction of a well shall follow the recommendations in Health Canada's *Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction* (see footnote 1) in addition to applicable best management practices.

11.2.4 The design and construction of the well(s) shall be adapted to the geologic and the ground water conditions existing at the site of the well in order to provide a sufficient and safe water supply, and to conserve the ground water resource.

11.3 Water Treatment

11.3.1 Water treatment technologies will be designed based on the raw water analysis and results from a vulnerability assessment.

11.3.2 Treatment should aim to reduce corrosion in the distribution system while ensuring final water quality conforms to the Canadian Drinking Water Quality Guidelines.

11.3.3 Water sampling taps will be provided between each treatment technology to allow monitoring of treatment efficiency.

11.3.4 Disinfection will be applied to all finished water such that a disinfection residual in the distribution system conforms to the requirements listed in CD 318-10[2].

Water softening should be considered when calcium carbonate ($CaC0_3$) concentrations in the water exceed 150 parts per million or where required by authorities having jurisdiction.

[2] CD 318 – Guidelines 318-10 – Drinking Water Quality Management (DWQM) (2009-10-28)

11.3.5 When water softening is required consider designing a dual distribution system throughout the building, each with header type mains, i.e. a hard water and a soft water system. Connect water closets and urinals to the hard water system. Connect domestic hot water tank, boiler feed water, humidification systems, make up and fill, etc. to the soft water system.

SU-4 SITE UTILITIES – POWER SUPPLY AND ELECTRICAL POWER DISTRIBUTION

1. SCOPE

This section outlines the performance requirements and design guidelines for the electrical power supply and distribution system.

2. RELATED DOCUMENTS

2.1 This section should be read in conjunction with the following TCD sections as applicable:

SP–1 – Site Development
SP–4 – Site - Exterior Lighting
E–1 – General Electrical Engineering & Electrical Distribution

2.2 In addition, the Canadian Electrical Code Part I[1] will be observed as applicable:

2.2.1 Where this document is more stringent or contradicts a code or standard this document shall override. Approval from CSC must be obtained before any variations from this document are incorporated into any designs.

2.2.2 For the purpose of this document, "High Voltage" is 750 volts and above.

3. POWER SUPPLY AUTHORITY

3.1 The following details regarding the power supply available and point of connection shall be obtained from the local Power Authority.

3.1.1 System Data:
- Voltage, configuration, insulation level and neutral grounding arrangement.
- Available system short circuit present and ultimate future. Values should be both 3 phase bolted fault and line to ground fault.

3.1.2 System operating information:
- Voltage regulation.
- Operating procedures, capacitor switching
- Determine if re-closures are used and whether single or 3 phase.
- Restrictions or requirements with regard to maximum relay settings or fuse sizes at customers service for co ordination.
- Available records concerning history of failures, repair times, duration of power outages.

3.1.3 System connection information:
- Location and type of connection overhead or underground.
- Whether transformer vault required or desirable.

3.1.4 Metering information:
- Preferred method of metering primary or secondary.
- Rate structures, with allowances for high voltage connection, customer owned transformation.
- Special demand charges and power factor penalty.
- Acceptability of additive metering at more than one point on low voltage side of service, such as for dual or triple transformer station.
- Related additional charges, if any.

---

1 CSA C22.1-09 – Canadian electrical code (21st edition), part I, safety standard for electrical installations

3.2 In addition to the above details, the following shall be investigated:

3.2.1 The availability of alternate supply connection.

- alternate feeder same route
- alternate feeder alternate route
- alternate feeder alternate station
- Identify power supply authority charges for any other of the above arrangements which are available.
- If available, obtain historical data concerning failure rates and repair times.

3.2.2 Study economics of customer owned versus utility owned transformer and connection voltages.

3.3 Obtain approval of the following from the local Power and Inspection Authorities having jurisdiction:

- Proposed service entrance equipment,
- Switchgear,
- Duct manhole systems,
- Direct buried or overhead systems,
- Transformers and associated equipment.

4. LOAD DETERMINATION

4.1 Carry out preliminary load study, including location of major load distribution centres.

4.2 Allow for 100% lighting load plus an appropriate demand factor on the remaining load, based on operating characteristics.

5. SERVICE LOCATION AND CONFIGURATION

5.1 Underground service is preferred.

5.2 For medium, maximum and multi security level projects underground service must be considered for voltages less than 50 kV.

5.3 Underground service is to start at least 75 meters from the compound fence. Overhead service should be limited to buildings outside the compound.

5.4 For minimum security level projects, service may be underground or overhead.

- Underground service should always be considered for voltages less than 35 kV.

5.5 High voltage main service switchgear and related distribution with or without large station transformation should be configured to recognize the following criteria:

- Minimize steps of transformation as governed by economics.
- Underground distribution is preferred between buildings and service points within the project.
- Medium, maximum and multi security level projects require all power distribution between buildings to be underground.
- in minimum security level projects, where long runs to load centre connection points occur, overhead distribution at high voltage should be considered, as dictated by economic factors.

5.6 Underground services from power supply connection to service location shall be conductors in reinforced concrete encased duct banks.

- In medium, maximum and multi security level projects, an underground distribution within the compound shall consist of conductors in reinforced concrete encased duct banks.

- Conductors shall be installed in reinforced concrete encased duct banks under all hard surfaces such as asphalt or concrete.
- Where practical, for long runs in “soft” landscaped areas of medium security projects, distribution feeder conductors between buildings or service connection points may be direct buried with suitable bedding.
- Spare ducts for future growth are a mandatory requirement. Minimum size of underground ducts should be 78 mm, with pull in ropes.
- Provide one spare duct for each pair of ducts required.
- Whenever services for medium, maximum and multi security level installations are routed under security fences, such services must be minimum 2 meters below ground level.
- Drainage of ducts and pull boxes is extremely important. Pull boxes should be connected to storm sewer drainage system.
- Underground Pull Box requirements for Power and Communications distribution should be outlined. Identify sizes, concrete, galvanized steel lids suitable for vehicular traffic, padlock able lids, identification. Wherever possible locate in non-vehicular areas.

5.7 Where service tunnels are provided for other utilities they should be used for electrical distribution wherever possible.

6. LINE CONSTRUCTION

6.1 Design and specify construction of underground service and distribution facilities and overhead lines in accordance with Canadian Electrical Code Part 3 “Outside Wiring Rules” which consist of the following CSA Standards:

- CSA C22.3 No. 1-10 – Overhead Systems
- CSA C22.3 No.3-98 (R2007) – Electrical Coordination
- CSA C22.3 No. 4-1974 (R2004) – Control of Electrochemical Corrosion of Underground Metallic Structures
- CSA C22.3 No. 7-10 – Underground systems

6.2 For wood poles reference CSA Specification Series:

- CAN/CSA-O15-05 (R2009) – Wood Utility Poles and Reinforcing Stubs
- CAN/CSA-O80 Series-08 – Wood Preservation

7. ELECTRICAL EQUIPMENT VAULTS

7.1 Where vaults for electrical equipment are required, design and specify in accordance with Canadian Electrical Code Part I and to suit local requirements of the electrical Inspection Authority.

7.2 Locate vaults for ease of access and equipment maintenance. Consider special security requirement for openings doors, vents, fences, etc.

8. EXISTING CONDITIONS

8.1 Consult available documents provided by Correctional Service Canada and locate all existing buried services shown such as electrical, telephone lines, water and sewer lines, gas mains, etc.

9. CABLES FOR OUTSIDE SERVICE

9.1 For underground, References are:

- CSA C22.2 No. 1 – Overhead Systems and Underground Systems (ie)
- CSA C68.2 – Concentric Neutral Power cables
- CSA C68.3 – Power cable with Thermoset Insulation
- CSA C22.2 No. 131 – Type Teck cable
- CSA C22.2 No. 124 – Mineral Insulated copper or aluminium Sheathed cables
- CSA C22.2 No. 51 – Armoured cables (2a, 1c)
- XLPE insulation preferred.

9.2 For overhead lines consult with the local power authority as to their specific requirements and also consider copper conductor, bare and weather resistant for low voltage, A.C.S.R. for high voltage.

9.3 References:

- I.C.E.A. P 51 432 – Copper conductor, bare and weather resistant.
- CSA C49.1 – Aluminium conductor steel reinforced (ACSR)
- CSA C49.2 – Compact aluminium conductor steel reinforced (ACSR)
- CSA C22.3 No.1-10 – Overhead systems and underground systems (ie)

10. CONDUCTOR TERMINATIONS

10.1 Specify compression connectors with bolted pad for interface to bus or aerial lug.

10.2 For high voltage cable specify outdoor type porcelain body factory produced slip on terminators, complying with *IEEE Standard 48-2009*[2].

11. CONDUCTOR TESTING

11.1 Specify that the following certified reports be supplied for all type of cables rated between 5kV and 46kV.

11.1.1 Partial discharge extinction level in accordance with *CSA Standard C68.3-97 (R2006)*[3].

11.1.2 Five minute high voltage AC test to be done in the factory in accordance with *CSA Standard C68.3-97 (R2006)* and *C22.2 No. 0.3-09*[4].

11.1.3 Insulation resistance test in accordance with C68.3-97 (R2006) and C22.2 No. 0.3-09 (see footnotes 3 and 4).

11.1.4 High voltage D.C. acceptance test for fifteen minutes after installation and before the cable is placed in regular service in accordance with C68.3-97 (R2006) and C22.2 No. 0.3-09.

11.2 Apart from the above test all conductors up to 46 kV shall undergo the other tests in accordance to their respective CSA Standard.

12. HIGH VOLTAGE SERVICE EQUIPMENT

12.1 For all high voltage service equipment specify:

- Metal enclosed switchgear assemblies in a switchboard or switchboards in accordance with CSA Standard *C22.2 No. 31-04 (R2009)*[5].

---

[2] 48-2009 – IEEE Standard for Test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5 kV through 765 kV or Extruded Insulation Rated 2.5 kV through 500kV

[3] CAN/CSA-C68.3-97 (R2006) – Shielded and Concentric Neutral Power Cables Rated 5-46 kV

[4] C22.2 No. 0.3-09 – Test methods for electrical wires and cables

[5] C22.2 No.31-04 (R2009) – Switchgear assemblies

- For more detailed definitions of components and assembly types refer also to *ANSI/IEEE C37.100-1992*[6].
- *Definitions for Power Switchgear*.

12.2 For large main station type configuration specify:

- Full compartmentalization for *Metal Clad Switchgear*.
- Draw out power circuit breakers.
- Copper bus.
- Main incoming switching devices un-fused load interrupter type.
- Provisions for high voltage (primary) metering by utility if agreed.
- Customer metering to include voltmeter, ammeter. Provision for connection of portable monitoring and/or metering in the field for kW (kilowatt), kWh (kilowatt-hour), Power factor, harmonics, etc.

12.3 Ensure adequate space, ventilation cleanliness and moisture free to ensure against tracking.

NOTE: Special treatment for bus will be required where run through compartment walls, i.e.: high voltage insulated sleeves or grommets.

12.4 For voltages 15kV and lower, where specifying dry type high voltage main transformers "Unit Substation" type construction is preferred.

- Refer to "Unit Substation" definition in *ANSI/IEEE C37.100-1992* (see footnote 6) and *EEMAC Standard G13-1, 1978*[7].

12.5 For high voltage breakers, preference is for:

- solid state type relaying with low power requirements in trip actuating circuit thus permitting effective use of current transformer output as source of tripping power and avoiding station battery.
- also consider manual operation.
- 15kV and below specify air circuit breaker or minimum oil type. Above 15kV use minimum oil.

12.6 For small distributed type services, consider fused load interrupter type switchgear and;

- Indoor unit substation configuration up to 15kV.
- If outdoor specify full height full voltage class equipment and ensure flexible high voltage connection between switchgear and transformer.
- Outdoor switchgear and transformer installed on concrete pad, surrounded with crushed stone.
- High voltage fuses, specify "Power Fuses" as defined in *ANSI C37.100-1992*[8] and in accordance with *ANSI C37.46-2000*[9], also refer *ANSI/IEEE C37.40-2003*[10] and *ANSI/IEEE C37.41-2008*[11].
- Use E rated fuses.

---

[6] C37.100-1992 – IEEE Standard Definitions for Power Switchgear
[7] EEMAC G13-1, 1978 – EEMAC Standard for Unit Substations
[8] C37.100-1992 – IEEE Standard Definitions for Power Switchgear
[9] C37.46-2000 – American National Standard for High Voltage Expulsion and Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches
[10] C37.40-2003 – IEEE Standard Service Conditions and Definitions for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories
[11] C37.41-2008 – IEEE Standard Design Tests for High-Voltage (>1000 V) Fuses, Fuse and Disconnecting Cutouts, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Fuse Links and Accessories Used with These Devices

NOTE: For grounding and fencing requirements refer to *CSA C22.2 No. 0.4-04 (R2009)*[12]

12.7 For station grounding design refer to Canadian Electrical Code Part I[13] and *IEEE Standard 80-2000*[14].

12.8 For all installations provide surge arrestors to protect power cable, switchgear and transformers. Select arrestor class and rating to suit system and voltage. Consult utility. Base selection on:

- *ANSI C62.2-1987*[15].
- Specify manufacture and testing in accordance with *ANSI/IEEE C62.1-1989*[16].

12.9 Allow for future expansion by using adequate space and access for addition of future equipment.

13. HIGH VOLTAGE TRANSFORMERS

13.1 For distribution within buildings for systems 400 kVA and over, secondary voltage normally preferred is 600 volt - 3 phase grounded wye.

- Secondary system may be 4 wires or 3 wires.

(NOTE: 4th wire or neutral should always be taken to main service switchboard and grounded. Some utilities may require the neutral for metering.)

Smaller systems may be lower voltage such as 208/120V 3 phases 4 wires subject to restrictions imposed by motor loads, etc. Unless clearly impractical 3 phase systems are preferred

13.2 When applying high voltage transformers refer to and specify in accordance with the following standards.

- Power Transformers: *CAN/CSA-C60044-5:07*[17]
- Distribution Transformers *CAN/CSA-C2.1-06* and *CAN/CSA-C2.2-06*[18]
- Dry type Transformers *C9-02 (R2007)*[19]

Apply transformer types in accordance with the following table:

Configuration	H.V. (primary)	L.V. (secondary)	Indoor	Outdoor
Main Stn.	Below 15kV	600V	Dry type C9	Power type C88
Dist. Stn.	Below 15kV	600V or lower	Dry type C9	Dist. Type C2
Main Stn.	15kV to 46kV	600V	LNAN C88	ONAN C88
Dist. Stn.	15kV to 46 kV	600V or lower	LNAN C2	ONAN C2
Main Stn.	15kV to 46 kV	600V or lower	LNAN C88	ONAN C88

12 CAN/CSA-C22.2 No. 0.4-04 (R2009) – Bonding of Electrical Equipment
13 CSA C22.1-09 – Canadian electrical code, part I (21st edition), safety standard for electrical installations
14 80-2000 – IEEE Guide for Safety in AC Substation Grounding
15 C62.2-1987 – IEEE Guide for the Application of Gapped Silicon-Carbide Surge Arresters for Alternating Current Systems
16 C62.1-1989 – IEEE Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits
17 CAN/CSA-C60044-5:07 – Instrument Transformers – Part 5: Capacitor Voltage Transformers
18 CAN/CSA-C2.1-06 – Single-Phase and Three-Phase Liquid-Filled Distribution Transformers
CAN/CSA-C2.2-06 – Pole-mounted, Single-phase Distribution Transformers for Electric Utilities
19 C9-02 (R2007) – Dry-Type Transformers

13.3 Transformer winding and connection arrangement generally preferred is:

- H.V. primary – Delta
- L.V. secondary – grounded wye

However, refer to *ANSI/IEEE C57.105-1978 (R2008)*[20]. Particularly note and Review possibility of Ferro resonance for each application. Where necessary to guard against Ferro resonance use connections and winding arrangements such as:

- H.V. primary – grounded wye
- L.V. secondary – grounded wye

with common ground point for both windings.

NOTE: Requirement for additional loop in magnetic circuit to compensate for negative sequence current due to unbalanced loads and specify 4 or 5 legged core.

13.4 Select transformer size to suit load

- main service configuration
- distribution system size and configuration

For 600 volt secondary, transformer size should be selected to limit maximum let through RMS symmetrical short circuit current to 34,000 amperes which implies a maximum 2500 kVA transformer with 6.5 to 7.0% impedance.

Fan cooled rating would be 3300kVA.

Refer to details for distribution system size and configuration under Section E-2 Electrical Distribution.

13.5 Specify copper windings for high voltage and low voltage. Specify temperature rise tests on all transformers. Specify BIL tests on all dry type transformers.

13.6 Ensure transformers are installed with adequate ventilation.

Oil filled transformers should be installed in a secure enclosure constructed to protect for explosion and fire.

For liquid filled transformer installation refer to *IEEE C57.93-2007*[21] (filling the transformer *IEEE C57.91-1995*[22] and *IEEE C57.91-1995/Cor-2002*[23].

For dry type transformer installation refer to *CSA C9-02 (R2007) Appendix A* [24] .

[20] ANSI/IEEE C57.105-1978 – Guide for Application of Transformer Connections in 3-phase Distribution Systems
[21] C57.93-2007 – IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers
[22] C57.91-1995 – IEEE Guide for Loading Mineral-Oil-Immersed Transformers
[23] C57.91-1995/Cor 1-2002 – IEEE Guide for Loading Mineral-Oil-Immersed transformers Corrigendum 1
[24] C9-02 (R2007) – Dry-Type Transformers

14. COMMISSIONING

14.1 Specify preparation of a load study as part of the contract. The load study is to be reviewed and commented on by the design engineer. The study is then to be submitted to CSC.

14.2 The load study is to contain full load current readings of all feeders connected to 50 ampere circuit interrupting devices and larger. Currents are to be read at the line side of the feeders if possible.

14.3 The load study is to contain voltage readings taken at the load side of the feeders. Transformer taps shall be adjusted within 2% of rated voltage of equipment.

14.4 The load study is to identify loads i.e. are they motors, lighting or heating.

14.5 Specify balancing of loads.

14.6 Specify for contractor to demonstrate that systems operate as design intended them to operate and that contractor must be prepared to operate each device, such as switches, relays etc., to the satisfaction of CSC and PWGSC personnel involved in the acceptance procedure.

Correctional Service Canada
Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Technical Criteria for
Correctional Institutions

SECTION A - ARCHITECTURE

Canada

A-14 ARCHITECTURE – ARMOURY

A-1 ARCHITECTURE – PROJECT AND DEFINITIONS

1. SCOPE

This section outlines the key considerations for the design of correctional projects.

2. PROGRAM REQUIREMENTS

A detailed program of requirements for the functional areas contained in a correctional project will be provided by CSC. The program contains the problem statement, the objective(s) to be realized, a budget and schedule for such work. The architect shall adhere to the program requirements and the stated objectives.

3. STYLE AND MATERIALS

New buildings or additions shall be compatible in scale and modest in form. The building shall be designed with the users well being in mind and be environmentally sustainable by employing current “green” best practices.

4. COST

The solution shall fulfill all program requirements and objectives in a cost efficient manner. If at any time it is apparent that there is a discrepancy between the program requirements, objectives and the approved budget, the matter shall be referred to CSC for resolution.

5. DEFINITIONS

Inmate Areas: Areas in an institution intended for inmate circulation and activities. These areas are periodically supervised by visual or virtual means and traffic to these areas may be scheduled and controlled by group size. Examples are: Inmate cell/bedroom, ranges, and program rooms.

Inmate Controlled Access Areas: Areas in an institution intended for limited inmate circulation and movement may be under escort. This also includes areas to which access is permitted for specific groups of inmates but denied for others. Examples are: Administration office areas, and aboriginal sacred ground.

Inmate Restricted Areas: Areas in an institution where inmate presence and circulation are prohibited. Examples are: Security posts, galleries, refuge areas and utility equipment spaces.

A-2 ARCHITECTURE – BUILDING CONSTRUCTION

1. SCOPE

This section outlines envelope requirements for correctional institutions and identifies specific functions requiring secure construction.

2. RELATED SECTIONS

A–3 – Grilles, Mesh and Screens
A–4 – Glazing, Windows and Assemblies
A–5 – Doors and Frames
A–6 – Detention Hardware
A–10 – Finishes and Modesty Screens
A–13 – Security Control Posts, Galleries & Routes
A–11 – Inmate Cells

3. CONSTRUCTION GUIDELINES

3.1 Standard

Where confinement and/or protection are not critical, building shall be constructed in accordance with normal practices and the National Building Code (NBC)[1] for the appropriate use and occupancy. Offices within inmate controlled access areas may use standard office partition systems. For openings, standard commercial windows, doors and hardware are used unless otherwise specified.

3.2 Secure

Where confinement and/or protection are critical, the building envelope shall be constructed to resist penetration by physical force. The type of envelope construction is outlined below and the locations for each are identified in Table A-2-1.

Note: Where there is any question concerning the suitability of materials for a specific use, the approval of CSC issuing authority shall be obtained.

4. PERFORMANCE REQUIREMENTS FOR SECURE CONSTRUCTION

4.1 Secure construction is designed to resist-penetration and serves to frustrate attempts at breach with the use of impact and other instruments by means of either covert or overt assault. The construction type provides for a varying degree of resistance related to the risk of assault and the gravity of the outcome.

4.2 Materials used for walls, floors and ceilings shall provide equal resistance to doors and windows where these elements in combination form a secure enclosure.

4.3 Exterior wall materials of a façade of a building where security is at issue shall not facilitate climbing.

4.4 The façade design of a building where security is at issue shall not offer any opportunity for concealment from normal observation. Alcoves and recesses shall be avoided.

4.5 Joints of surface materials and the material itself shall not offer any opportunity for hiding of contraband for later retrieval.

4.6 Materials selected shall provide a relatively high level of resistance to vandalism and dismantling.

[1] National Building Code of Canada 2010, National Research Council, 2010, ISBN 0-660-19976-4
http://www.nrc-cnrc.gc.ca/eng/ibp/irc/codes/2010-national-building-code.html

4.7 Specific areas of an institution requiring secure construction are listed in Table A-2.1. The type of secure construction typically differs by institutional security level or by degree of threat risk and is identified as secure construction 1, 2, or 3 with increased performance in ascending order. Walls, floors, and ceilings are described below while matching envelope elements such as doors, windows, and hardware follow in Table A-2-2.***Secure Construction 1 – Commercial Enhanced***

For walls and partitions, higher performance is required than offered by simple gypsum board on stud construction.

4.7.1.1 Expanded metal mesh, woven wire mesh or plywood used as a substrate to gypsum board and fastened to the studs are acceptable materials. Alternately, standard concrete masonry of 150mm width may be used with hollow core and no vertical reinforcing other than what is required to meet the NBC or structural requirements.

4.7.1.2 Partitions shall extend and be secured to the structural ceiling or be capped under the joists with an equally secure ceiling.

4.7.1.3 Exterior stud wall construction using masonry cladding or pre-formed metal cladding of thickness no less than 0.635mm (24 ga) do not require added security within the stud wall.

4.7.1.4 Floors and ceilings due to structural requirements provide for acceptable protection on combustible or non-combustible construction.

4.7.2 Secure Construction 2

Walls and partitions require 200 mm hollow concrete block, vertically reinforced at 800 mm centres with all hollows concrete filled. Alternate construction may be acceptable providing equal performance and economies can be met. Floors and ceilings require reinforced cast in place slab, pre-cast concrete (e.g. hollow core slab) or a metal deck concrete filled. Where gaps in joints are exposed, these shall be caulked with epoxy grout to eliminate direct through passage.

4.7.3 Secure Construction 3

Walls and partitions are fully reinforced cast in place or pre-cast concrete of 150 mm thickness with vertical reinforcing at 300 mm on centre. Masonry construction may also be used comprising 200 mm hollow concrete block having all hollows concrete filled and vertically reinforced at 400 mm. An ‘H’ cast block offers generally a better performance to that of a standard block and shall be specified similarly reinforced if locally available. Steel blocks may be integrated with masonry construction at specific points to facilitate welding steel furniture and other appurtenances. Floors and ceilings are made of reinforced cast in place slab, pre-cast concrete (e.g. hollow core slab) or metal deck concrete filled. Any exposed gaps in joints and honeycombs in poured concrete shall be appropriately filled to eliminate direct through passage.

TABLE A-2-1 – Specific Areas of an Institution Requiring Secure Construction

On exterior and interior contiguous with inmate accessible areas NA = Not applicable

For construction security requirements of Control posts refer to Chapter A-13

DEPARTMENT / FUNCTION		INSTITUTION SECURITY CLASSIF.		
		MIN	MED	MAX
A1	Management Centre	NA	1	2
A2	Finance	NA	1	2
	– Vault	1	2	2
A3	Staff Services and Training	NA	1	2
A4	Administration & Central Registry	NA	1	2
	– Central File Storage Room	1	2	2
A5	Case and Sentence Management	NA	1	2
A6	Parole Board Hearing	NA	1	2
	– Inmate Waiting Room	NA	1	2
B1	External Control (Gatehouse)	NA	2	2
	– Perimeter Line, Vestibules & Interior Partitions	NA	2	2
	– Main Communication Control Post (MCCP)	NA	3	3
	– Search/Holding /Interview Room	1	2	2
B2	Emergency Response Team	NA	2	2
	– Security Equipment Room	1	1	1
B2	Armoury	NA	3	3
B3	Security Administration	NA	2	2
	– Interior Partitions	NA	1	1
	– Key Room	NA	2	2
B4	Admissions & Discharge	NA	2	2
	– Waiting/Holding Rooms	1	2	2
	– Inmate Effects Storage	1	1	1
C1	Social Programs & Leisure Activities	NA	NA	2
	– Multi-Purpose Rooms	NA	NA	2
	– Canteen	1	2	2
C2	Arts & Crafts	NA	NA	2
	– Workshops	NA	NA	2
	– Raw and Finished Material Storage	1	2	2
C3	Private Family Visiting	NA	NA	NA
C4	Visits & Correspondence	NA	1	2
	– Open Contact Visits	NA	1	2
	– Restricted Visits (Inmate side only)	NA	2	2
	– Office	NA	1	2
C5	Recreation	NA	NA	2
	– Interior Partitions	NA	NA	2
D1	Chaplaincy	NA	1	2
D2	Aboriginal Services	NA	NA	2
E1&E2	Small Group Accommodation and Minimum Security Units	NA	NA	NA

Department / function		Institution Security Classif.		
		Min	Med	Max
E3	Responsibility Units (medium security only)	NA	2	NA
	– Apartment Envelope	NA	2	NA
	– Apartment Interior Partitions	NA	NA	NA
	– Entry Vestibule and Circulation Core Partitions	NA	2	NA
	– Staff Office Area Envelope	NA	1	NA
E4	Direct Observation Units (medium security only)	NA	2	NA
	–Range & Central Circulation Area Envelopes	NA	2	NA
	–Cell, Shower and Entry Vestibule Partitions	NA	2	NA
	– Staff Office Area Envelope	NA	1	NA
E5	Maximum Security Units	NA	NA	3
	– Range, Common Area & Circulation Core Envelopes	NA	NA	3
	– Cell, Shower and Entry Vestibule Partitions	NA	NA	3
	– Staff Office and Program Area Envelope	NA	NA	2
	– Program Area Interior Partitions	NA	NA	1
E6	Segregation Unit	NA	3	3
	– Cell, Shower and Circulation Area Partitions	NA	3	3
	– Entry Vestibule Envelope	NA	2	2
	– Staff Office and Program Area Envelope	NA	2	2
F1	Health Care Centre	NA	2	2
	– Clinical Treatment and Staff Support Area Interior Partitions	NA	NA	2
	– In-Patient Area Interior Partitions	NA	1	2
	– Entry Vestibule	NA	1	2
	– Medication Room, Dispensary, Medical and File Storage	1	2	2
F2	Mental Health	NA	1	2
	–Interior Partitions	NA	NA	1
	–File Storage Room	1	2	2
G1	Maintenance	NA	NA	1
	–Volatile Material, Tool and Equipment Storage Rooms	1	2	2
G2	Food Services	NA	1	2
	– Food Storage Areas (Bulk, Coolers, Freezers)	1	2	2
	– Cafeterias/Dining Halls	NA	1	NA
G3&G4	Institutional Services and Material Management	NA	1	1
	–Volatile Materials and attractive items Storage Areas	1	2	2
H1	Occupational Development Programs/CORCAN	NA	NA	1
	– Raw, Finished and Volatile Material, Tool & Equip. Storage	1	2	2
J1,J2&J3	Education; Correctional Programs; and Library	NA	NA	2
	– Multi-Purpose Room Partitions	NA	NA	1
	Circulation separating restricted and inmate controlled access	NA	2	2
	Storage of volatile or other hazardous material or equipment	1	2	2
	Building service areas to be reviewed by CSC issuing authority			

TABLE A-2-2 – Envelope Elements

SECURE CONSTRUCTION	DOOR	WINDOW	HARDWARE
1	CD*	CW3**	BH
2	DD1, DD1p	DW1, DWb	DH1
3	DD2, DD2s, GL	DW2	DH2, DH2sl

* Glazing in doors upgraded from monolithic to laminated glass
**Windows where added security is required may be fitted with exterior grilles or mesh

See Chapter A-4, section 5 (A-3:5) for windows type definition.
See Chapter A-5, section 6 (A-5:6) for door type definition.
See Chapter A-6, section 3 (A-6:3) for hardware type definition.

A-3 ARCHITECTURE – GRILLES MESH AND SCREENS

1. SCOPE

This section identifies the requirements for all grilles, mesh, and screen types used in correctional institutions.

2. RELATED SECTIONS

2.1 Technical Criteria Document sections:

A–4 – Glazing, Windows and Assemblies
A–5 – Doors and Frames
A–6 – Hardware
A–11 – Inmate Cells
A–13 – Security Control Posts, Galleries and Routes

2.2 Standards

2.2.1 ANSI/BHMA – American National Standard

- A156.4-2008 – Doors Controls – Closers, Oct. 2008
- A156.14-2007 – Sliding and Folding Door Hardware, Sept. 2007

2.2.2 ASTM Standards

- A627-03 – Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities
- F2322-03 – Test Methods for Physical Assault on Vertical Fixed Barriers for Detention and Correctional Facilities

2.2.3 NAAMM DEMA – Detention Equipment

- 111900-09 – Guide Specification for Basic Detention Equipment Requirements, 11, Dec. 2009

3. DEFINITIONS

Tool Resistant Homogenous and Composite Steel: Grade 3 Homogenous or composite Tool-Resisting Steel as described in *ASTM A627-03*. Tool resistant steel is mild steel which had been subjected to having its total surface heat tempered to achieve a greater resistance to cutting by approximately 6X over that of mild steel. Inserts of tungsten carbide in mild steel surface form a composite steel which render it rod saw resistant increasing its cutting resistance by approximately 72X over that of mild steel. Both steels have equal resistance to impact and bending as the mild steel core is left unchanged. Tempering or hardening serves to render the mild steel more brittle. Once hardened steel is welded, the welded area loses its resistance to cutting.

Structural Quality Steel (mild steel): Steel rods, flats and shapes, including tubing, conforming to *CAN/CSA G40.20-04/G40.21-04 (R2009)*[1], Grade 300W or to *ASTM A36/A36M-08*[2]. A sub-group, hollow structural section (HSS) steel tubing is typically used for window bars as it provides not only structural stiffness (square HSS is efficient for multiple-axis loading) but also a hollow interior for inserting a bar of tool resistant homogenous steel or composite rod saw resistant steel as specified.

[1] CAN/CSA G40.20-04/G40.21-04 (R2009) – General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
[2] ASTM A36/A36M-08 – Standard Specification for Carbon Structural Steel

4. GRILLES AND MESH

Grilles and mesh are used for containment and protection in windows and to control traffic in corridors and other specified areas (See A-5) where unobstructed visibility is paramount.

4.1 Window Grille and Mesh

Steel grilles or mesh are mounted on the exterior wall over a conventional window to resist forced entry or egress.

4.1.1 Light weight security mesh for moderate resistance

This type of window protection provides a moderate resistance to attack but allows for clear evidence of any deliberate tampering. Mesh must be securely anchored preferably to the window opening face of the wall in solid material to better resist prying. Mesh may be of galvanized steel as in fence fabric using a woven or welded wire of 4.88mm (6 ga) typically 50mm X 50mm or of stainless steel; using finer and closer strands typically 12 X12 wires per 25mm squared and of 0.6mm wire diameter. The latter option is better suited for air conditioned areas with fixed windows since for operable windows the screen will significantly reduce air flow to 52%.

4.1.2 Structural steel grille for confinement and intrusion protection

Plates A-3-1 and A-3-2 illustrate two examples of steel grilles to be mounted on the exterior wall over a conventional window to resist attack and maintain confinement. The combination of a well anchored steel grille with a window unit satisfies Detention Level 1 (DW1) requirements (A-4:5.4.8).

Other designs with different opening shapes are possible provided that no opening is larger than 125mm in one direction and 610mm in the other direction. Another acceptable design is a square or near square clear opening of a maximum of 250mm by 250mm. No other dimension is permissible without the approval of the TCD issuing authority.

4.1.2.1 The use of this type of grille for inmate cell windows is acceptable as a replacement for similar existing grilles in older institutions where existing windows are to be retained.

4.1.2.2 For other than cells, this type of grille is suitable for windows in supervised areas where containment and intrusion protection is at issue.

4.2 Movement Control Grille Barrier

Movement Control Grille Barriers are used in corridors for separating functional zones or for limiting group size. Grille barriers may also be used for containment in specified areas listed in chapter A-5. Grille barriers are located close to Control Posts to facilitate observation of movement and for control of the barrier gate as well as to allow long views down the corridor.

4.2.1 Grille Barriers are fabricated using Structural steel either of hollow steel sections (HSS) or rods and flats welded together.

4.2.2 Grille Barriers combine fixed grilles and grille gates which slide or are hinged designed to similar configuration and quality of steel. Grilled swing gates are provided with closers while sliding grille gates have a maximum force set by the manufacturer. When moving in either direction and at any point in travel the force is 133 N (30 lbf)[3]. This indicates that the grille gate could be stopped when in motion and forced in the opposite direction.

4.3 Grilles Test

Grilles shall be resistant to deformation and fracture by screw jack or by impact. Tests shall conform to the following:

4.3.1 Screw Jack Test – Resistant to 30 mm screw jack turned by a 350 mm wrench.

4.3.2 Impact test – ASTM *A673/A673M-07*[4].

5. INSECT SCREENS AND PASS THROUGH RESTRICTORS

Insect screens shall be of commercial grade with standards regulated by the Screen Manufacturer Association (SMA) conforming to *SMA 6001-2002*[5].

5.1 All insect screens for windows are commercial grade applied over the operable portion of the window. In the case of their use in minimum housing where restrictions for egress apply but grilles or mesh are not permitted, they shall be screwed to the frame with security screws to facilitate detection of tampering.

5.2 For Detention Level 1 (DW1) windows, insect screens are commercial grade heavy duty applied over the operable part of the window. Screens are of aluminum using 18 X 16 mesh with frames secured to the window or bars to facilitate detection of deliberate tampering. A pass through restrictor to prevent 'fishing' shall not be used at the medium security level without the approval of the TCD issuing authority. It is critical that materials and components used reflect a gradation of severity consistent with the level of security.

5.3 For Detention Level 2 (DW2) windows in addition to the insect screen, the operable part of the window shall be fitted with a pass though restrictor either of perforated steel plate or of a type which pivots and forms the operable part of the window. The restrictor shall be robust enough to prevent damage by physical attack or dismantling (see chapter A-4 for cell window assemblies).

[3] ANSI/BHMA A156.10-2005 – Power Operated Pedestrian Doors
CAN/CSA-C22.2 NO. 247-92 (R2008) – Operators and Systems of Doors, Gates, Draperies and Louvres;

[4] ASTM A673/A673M-07 – Standard Specification for Sampling Procedure for Impact Testing of Structural Steel

[5] SMA 6001-2002 – Specifications for Metal Protection Screens

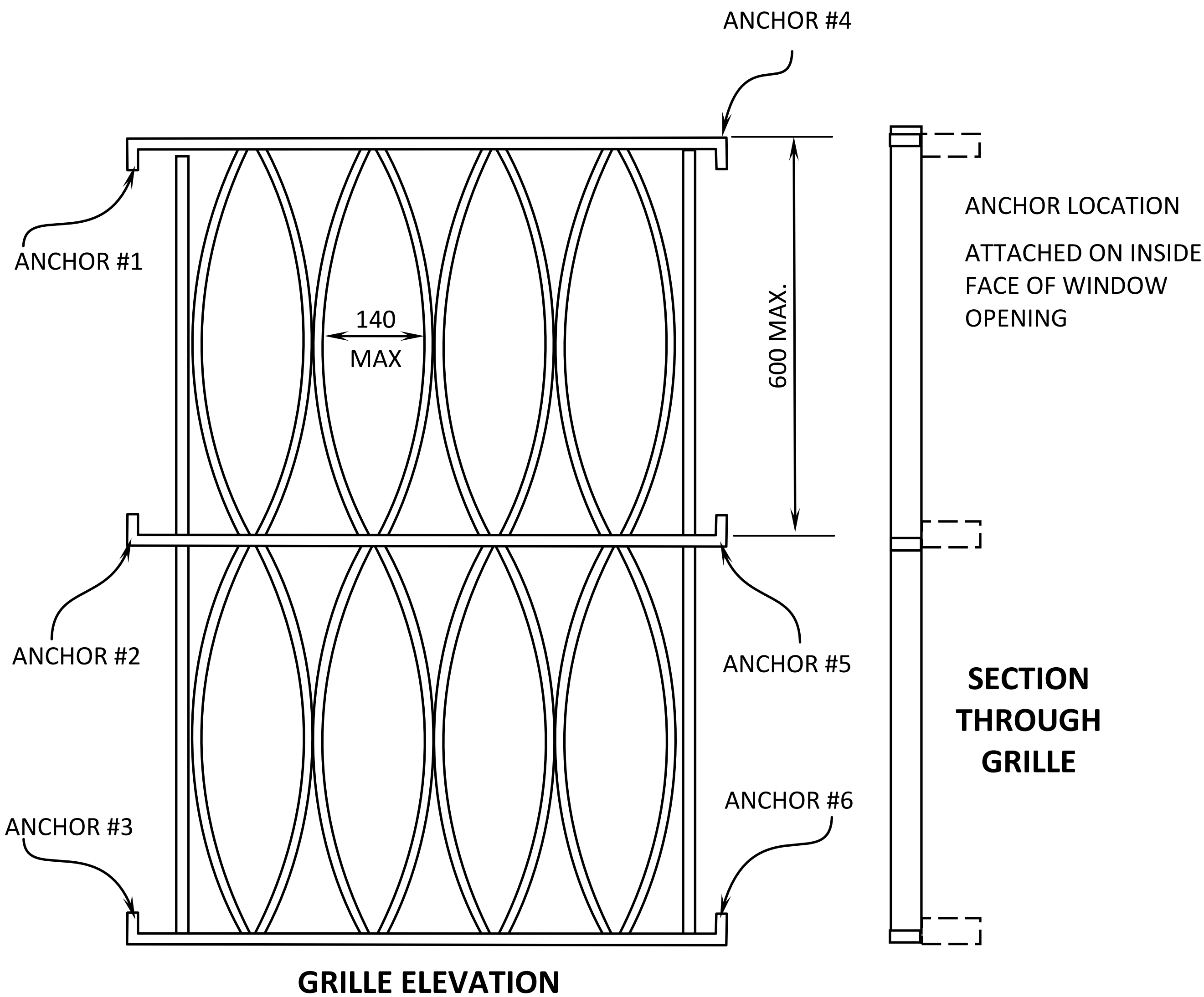


PLATE A–3–1 – GRILLE WINDOW DESIGN AND DETAILS

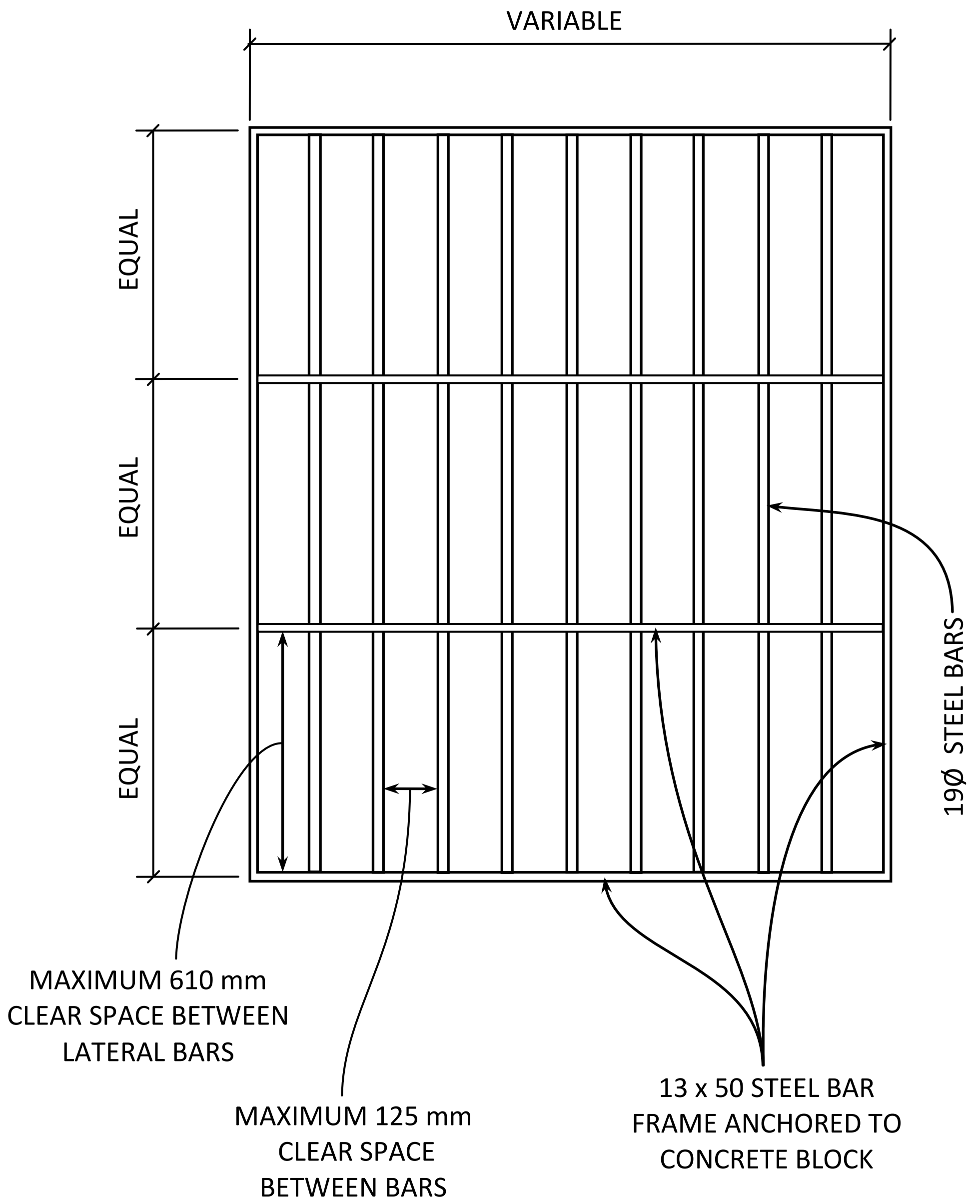
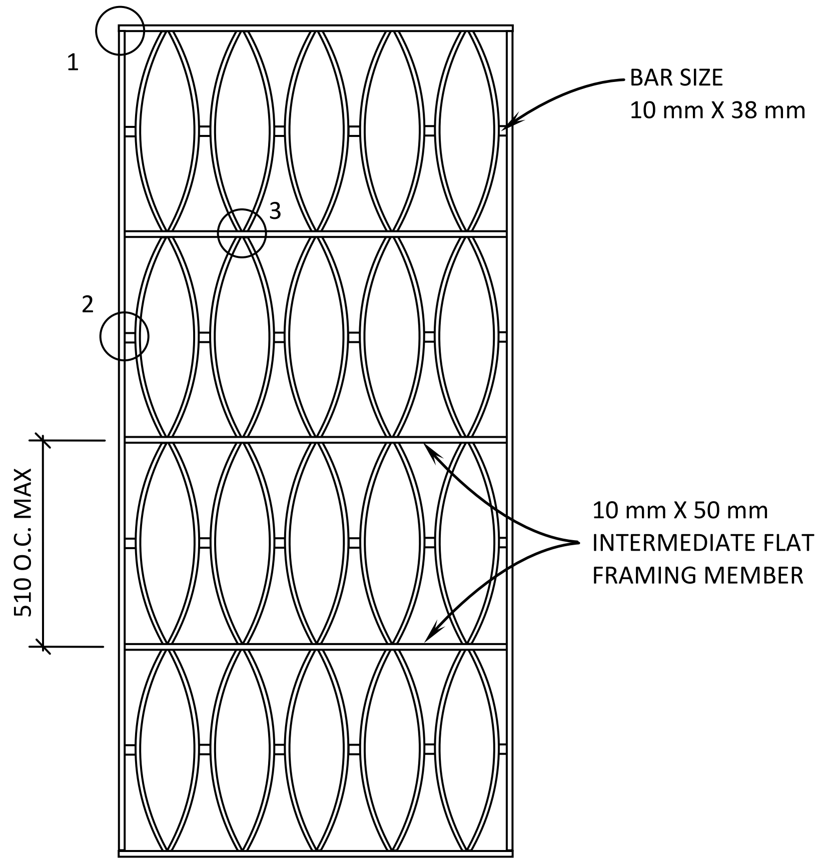
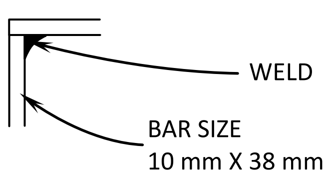


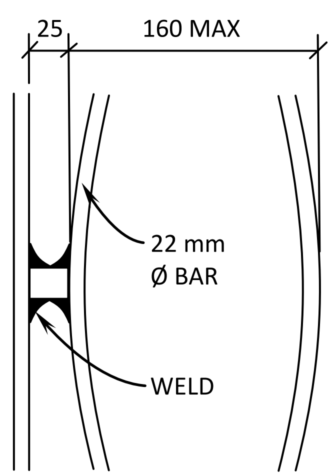
PLATE A–3–2 – GRILLE WINDOW DESIGN ALTERNATIVE



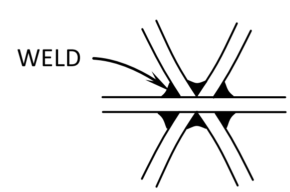
ELEVATION



DETAIL 1



DETAIL 2



DETAIL 3

PLATE A–3–3 – DOOR AND FIXED GRILLE

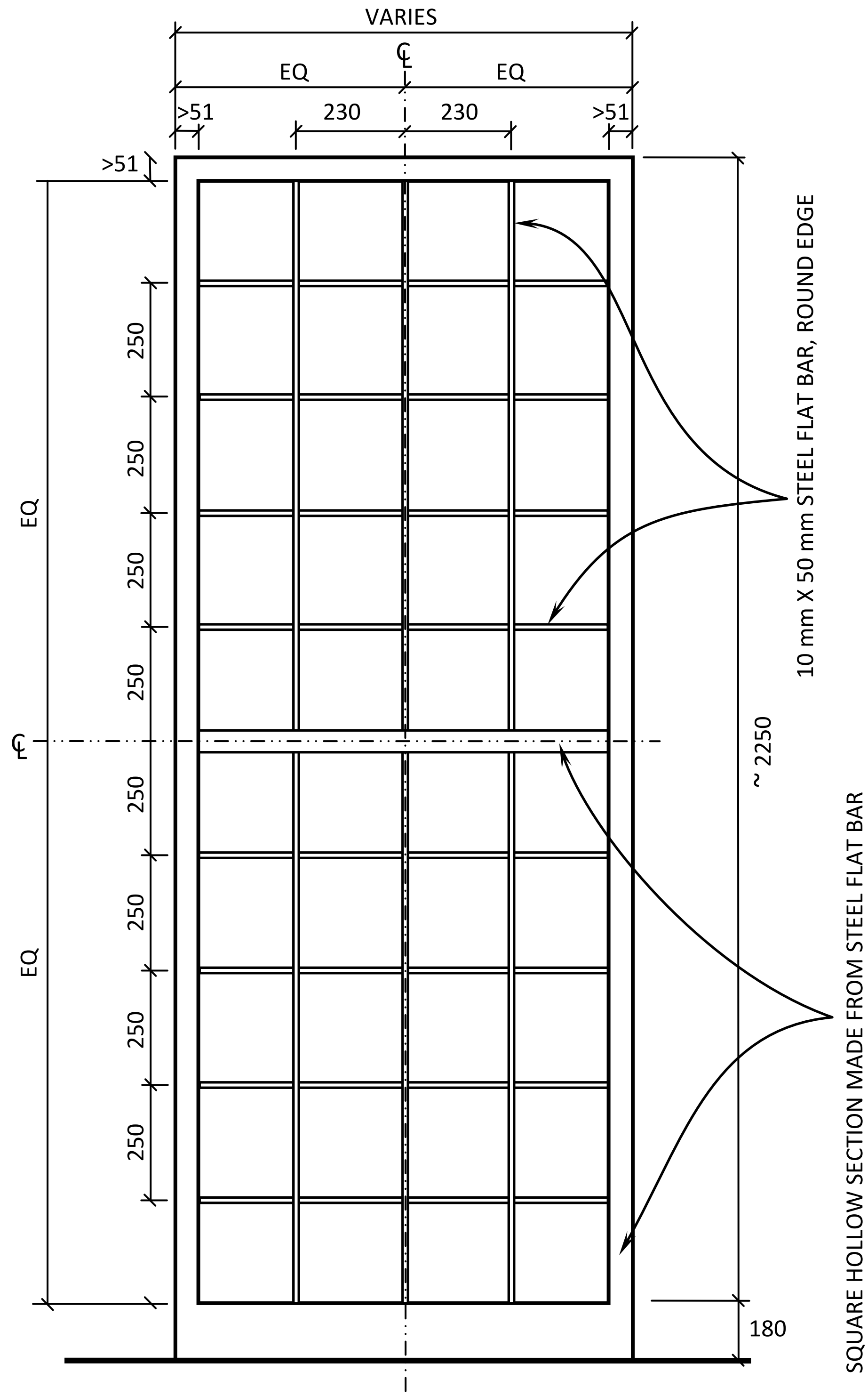


PLATE A–3–4 – DOOR AND FIXED GRILLE ALTERNATIVE

Design Shown is less than 1050 in width

A–4 ARCHITECTURE – GLAZING, WINDOWS AND ASSEMBLIES

1. SCOPE

This section defines the various types of windows for CSC institutions on the exterior and interior except for Control Posts and Weapons Dedicated Routes which are covered in section A–13. Whereas the previous section A-3 dealt with steel grilles and mesh which may be superimposed on exterior of windows, this section deals with a total window assembly designed to achieve a required level of security.

2. RELATED SECTIONS

2.1 Technical Criteria Document sections:

A–2 – Building Construction
A–3 – Grilles, Mesh and Screens
A–5 – Doors and Frames
A–11 – Inmate Cells
A–13 – Security Control Posts, Galleries and Routes
ST–1 – Guard Towers

2.2 CSC/NMS Specifications (NMS–CSC Masterformat 2010 Sections)

08 56 63 Detention windows (Prior to 2004: 08581 – Detention windows)
08 88 53 Detention and Security glazing
11 19 00 Detention equipment

2.3 Standards

2.3.1 ASTM Standards
- A627-03 – Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities
- A673/A673M-07 – Standard Specification for Sampling Procedure for Impact Testing of Structural Steel
- F1592-05 – Std. Test Methods for Detention Hollow Metal Vision Systems
- F1915-05 – Standard Test Methods for Glazing for Detention Facilities

2.3.2 NAAMM DEMA – Detention Equipment
- 111900-09 – National Association of Architectural Metal Manufacturers – NAAMM – Guide Specifications for Basic Detention Equipment Requirements
- 111950-09 – National Association of Architectural Metal Manufacturers – NAAMM – Guide Specifications for Detention Fixed Exterior Windows

2.3.3 Canadian Standards Association (CAN/CSA)
- A440-00/A440.1-00 (R2005) - CAN/CSA-A440-00, Windows
- A440.1-00, User Selection Guide to CSA Standard CAN/CSA-A440-00, Windows
- A440S1-09 – Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440
- A440.4-07 – Window, Door, and Skylight Installation
- A440.2-09/A440.3-09 – Fenestration energy performance + User guide
- AAMA/WDMA/CSA 101/I.S.2/A440-08 NAFS - North American Fenestration Standard / Specification for Windows, Doors, and Skylights

2.3.4 Canadian General Standards Board (CAN/CGSB)
- 12.1-M90 – Tempered or Laminated Safety Glass
- 12.2-M91 – Flat, Clear Sheet Glass
- 12.3-M91 – Flat, Clear Float Glass
- 12.4-M91 – Heat Absorbing Glass
- 12.8-97 – Insulating Glass Units & 12.8-97 AMEND – Insulating Glass Units
- 12.10-M76 – Glass, Light and Heat Reflecting
- 12.11-M90 – Wired Safety Glass
- 12.12-M90 – Plastic Safety Glazing Sheets

3. DEFINITIONS

Tempered glass: Glass that has been processed by controlled heat or chemical treatment to increase its strength compared to float and untreated glass. Heat tempered glass if fractured breaks into rounded grains rather than sharp shards. This glass is approximately three times more resistant to impact than untreated glass for a thickness of 6mm but less for thinner sheets. It is also more resistant to breakage than chemically tempered glass though the latter if fractured breaks up into shards. Heat tempered glass however due to its heat treatment and resulting surface tension is vulnerable to fracture when impacted by a pointed object or struck at the edge or scratched by a harder mineral such as quartz or a 'precious' stone. Heat tempered glass cannot be cut.

Safety glass: A laminate of two or more sheets of glass adhered to one another with the use of a plastic interlayer. The type of glass used in laminates can differ but if fractured it remains secured to the plastic interlayer (typically PVB or polyurethane minimally 0.78mm thick (30mil) or multiples of this thickness). Depending on the glass type, the breakage pattern will differ but sharp shards are unlikely to be obtained since by impacting the fractured area, the glass will progressively break up into smaller pieces.

Plastic Polycarbonate and Acrylic sheet: Plastic materials which are clear, tough, and shatterproof but are more affected by UV rays than glass. Polycarbonate, a thermoplastic polymer (commonly known by the trademark 'Lexan'), is the softer of the two materials, more resistant to impact but less to abrasion though it could be hard coated to improve abrasion resistance. Acrylic (commonly known by the trademark 'Plexiglass') is harder and therefore more apt to crack under impact but is more resistant to abrasion. This material, commonly used for light diffusers, is not normally found in detention application due to its inferior performance against physical attack. Sheets of polycarbonate can be laminated together using polyurethane as an interlayer to enhance their performance against physical or ballistic attack. Polycarbonate will burn when exposed to continuous flame but if the flame is withdrawn, it chars and rapidly extinguishes itself.

Composite translucent material: Glass combined with polycarbonate in multiple layers to improve performance against physical or ballistic attack while achieving enhanced resistance to chemicals, fire or abrasion. Glass is typically applied on the exposed sides but may be only on 1 side if a threat from ballistics requires that the protected side be spall free. The interlayer used in composite glazing is typically polyurethane due to the two materials having a different coefficient of expansion.

Fire resistant applications: Glass in fire separations is usually comprised of wired glass, tempered glass or glass blocks subject to area and location limitations. Ceramic glass technology is also becoming increasingly popular. Other usages of glass in fire separations consist of combinations with window sprinkler treatments and include specific framing restrictions.

4. PERFORMANCE CRITERIA

The following applies to the use of windows in correctional environments:

4.1 Glazed windows for exterior and interior locations are used in combination with other measures or components to achieve the required security. The measures may include restricted openings, attack resistant glazing or security bars / grilles / or mesh.

4.2 The extent of the exterior window clear glass opening to be provided in all bedrooms and cells shall be 5% of the net room area.

4.3 Windows in bedrooms and cells shall have an operable sash to allow for fresh air controlled by the inmate. The unobstructed ventilation area[1] of the window shall be sized minimally at 125mm in the narrow dimension.

4.4 Windows on a given project shall be of equal size to the extent possible in order to reduce manufacturing costs and to simplify the stocking of glazing materials.

4.5 Glass in windows in minimum security institutions including that which is used in interior areas does not need to be treated to prevent shards when broken except where required by the NBC. Glass in windows in medium and maximum institutions including that which is used in interior spaces shall be heat tempered or safety (laminated) type to prevent shards when broken.

4.6 Tinting films for one way viewing shall not be used on glazing except as indicated in Chapters A-13 and ST-1 for Observation galleries and Guard towers respectively.

4.7 Curtains (and blinds at minimum security institutions) may be used on exterior windows for reasons of comfort and upon request. Curtains in windows at medium and maximum may be attached using ‘Velcro’.

4.8 Skylights, where provided, shall meet the same level of performance as that required in wall openings except where they are inaccessible and located in supervised areas.

4.9 For medium and maximum security institutions bars or grilles shall be used on windows to achieve confinement or intrusion protection. The bars shall be spaced to form a clear opening between bars of 125 mm and shall be designed to minimize the effect of “tunnel vision”. Bars shall be located on the interior side of the window to be protected from exposure to weather and to assure adequate anchoring to the interior side wall material which typically is reinforced masonry or monolithic concrete. A grille fabricated from mild steel or screens of galvanized steel mesh or stainless steel generally applied on the exterior of the window, do not achieve the security performance of that of a bar.

4.10 Windows used along with bars may have varied configurations to respond to suspension point concerns. For medium security cells, the fixed window sash may span the full opening and be set away from the bars. Bars in this case must be set on the vertical and have no intermediate horizontal members in order to lower the height of potential suspension points to the window sill. For maximum security cells and for segregation and observation cells, the bars shall be in contact with the window glass or window mullions. The window mullion or glass shall be sealed or caulked to each bar to prevent feeding a line behind the bar to achieve a suspension point. As such, windows for maximums and segregation units can have bars set in either vertical or horizontal direction. It should be recognized that suspension prevention is only achieved when the glass is intact. An inmate intent on committing suicide can break the glass on each side of a bar to allow wrapping a ligature around the exposed bar. Closed and secure control posts contribute to sound attenuation preventing hearing glass breaking within a cell.

4.11 Openings for natural ventilation by means of operable sashes or pass through restrictors shall be equipped with insect screens.

4.12 Glazed partitions or wall assemblies for interiors where Security Construction 2 or 3 is required, shall use glass which does not break into shards in combination with grilles or mesh or alternately polycarbonate or composite glazing without the use of grilles or mesh. For secure construction 1, laminated glass may be used to offer a degree of

[1] National Building Code of Canada 2010, 13th Edition 2010, National Research Council, Vol. 2, Section 9.32.2.2

protection. Where fire rated construction is required, NBC compliance shall dictate the choice of materials.

4.13 Window accessories shall not be easily removable or dismantled. The use of vertical sliders in other than minimum security must not incorporate sash balances; instead, sash bolts shall be used.

4.14 Glass used in required fire separations:

4.14.1 Glass used in fire separations must be carefully selected for its use, size, location, type as well as security requirements to ensure that there are no conflicting requirements.

4.14.2 Wired glass and glass blocks shall conform to the requirements of the NBCC with respect to testing, size and area.

4.14.3 Ceramic glass products shall conform to the requirements of CAN4-S106-M "Fire Test of Window and Glass Block Assemblies" for the required rating of the assembly.

4.14.4 Where ceramic glass products are used, these shall be subject to the same area limitations of the NBCC for wired glass unless the material is also tested to limit temperature rise (exposure to radiant heat) at which point the product's listing shall govern.

4.14.5 Window sprinkler applications (protection of glazing using listed sprinklers) shall only be permitted if a specific listed assembly is selected and installed based on ULC/ORD-C263.1-99.

4.14.5.1 A window sprinkler protected glazed wall assembly shall not be installed in:

4.14.5.1.1 Fire separations requiring a fire resistance rating of more than 2 hours,

4.14.5.1.2 A firewall,

4.14.5.1.3 A high hazard industrial occupancy, or

4.14.5.1.4 Any part of an exit serving a high building, a care and detention occupancy (Group B), or a residential occupancy.

5. WINDOW TYPES

General

Window design may be subject to an examination of a mock-up and / or certification of compliance to standards for critical components by an independent laboratory.

5.1 Commercial Level 1 (CW1) – Applicable at Minimum Institutions only

Conventional window conforming to medium duty standards outlined in *CSA A440-8*[2]. This window is not intended to resist forced passage. The thermal unit glazing is medium duty float glass. All windows in housing units shall provide for detection of unauthorized egress or deliberate tampering. This is achieved by using stops on the operable sash to limit the opening to 125 mm or by affixing the screens with security screws to the window frames.

[2] AAMA/WDMA/CSA 101/I.S.2/A440-08 – NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights

5.2 Commercial Level 2 (CW2) – Applicable at Medium and Maximum Institutions

Conventional window conforming to medium duty standards outlined in *CSA A440-8*[3] but with a glazing type which does not form shards when broken. The thermal unit glazing is medium duty heat tempered glass. For secure applications, this window is used in combination with grilles, mesh or bars which provide for containment or intrusion protection.

5.3 Commercial Level 3 (CW3) – For Secure Construction 1 application

Conventional window conforming to medium duty standards outlined in *CSA A440-8* (see footnote 2) but having safety glass as one layer of the thermal unit, the other being heat tempered. This window is intended to delay and frustrate a breach attempt and to provide evidence of breach attempts (e.g. broken glass). Window comes with the outside glass of the thermal unit made of two layers of 6 mm float glass held by minimally a 0.78mm (30mil) interlayer of polyvinyl butyral (PVB).

5.3.1 For window retrofits, security films are acceptable provided they are installed on the interior glass covering the entire glass area below the bite or covering the glass and returned and anchored onto the frame.

5.3.2 This type of window may not be appropriate for non-supervised areas where heightened security is required. In this case a combined CW2 window with exterior grilles or mesh should be considered.

5.4 Detention Level 1 (DW1) – For Secure Construction 2 application

This refers to a combination CW2 window combined with bars which limit the opening between bars to a maximum, in one dimension, of 125 mm (5”) to achieve containment. Plate A-4-1 illustrates an example of a security window meeting the requirements of a Detention Level 1 (DW1) window. This window has the following characteristics:

5.4.1 Resistance to bending, jacking, impact and cutting achieved by the steel bars (as defined in *ASTM A627-03*[4]) using Hollow Structural Steel Section with an interior tool resistant steel rod. The rod may be mounted freely to enable rotation using dimples at both ends and a spacer ring to keep from leaning. See Partial Plan View of Plate A-4-1 and Plate A-4-2.

5.4.2 The bar assembly is cast into the adjacent masonry, welded to a rod or a bracket (wall anchor[5]) cast in masonry or fabricated off site with a precast concrete surround which is anchored to the masonry wall. Bars shall always be set on the interior side of the window.

5.4.3 Sashes are to be removable from the exterior side on account of the interior bars obstructing access.

5.4.4 Window assembly is not intended to prevent suspension points hence is only acceptable for medium security cells other than segregation.

5.5 Bar-less Detention Window (DWb) – For Secure Construction 2 application

A bar-less detention window (DWb) is a security window which maintains forced entry or penetration resistance achieved by a security glazing held in a secure frame assembly.

---

[3] AAMA/WDMA/CSA 101/I.S.2/A440-08 – NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights

[4] ASTM A627–03 – Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shaped for Detention and Correctional Facilities

[5] See the wall anchors as shown on figure 1b of ASTM F1592-05 – Standard Test Methods for Detention Hollow Metal Vision Systems and on figure 4 of ASTM F1450-05 – Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities

This window type is used primarily for control posts or within glazed panels such as for sidelights and doors separating areas requiring containment or intrusion protection and unobstructed vision.

5.5.1 The frame is hollow metal conforming to *ASTM F1592-05*[6] Grade 3 anchored to the wall system or a detention door.

5.5.2 The glazing type used for windows and large glazed panels in doors in supervised areas or for control posts is described in the Control post Chapter A-13. Conforming glazing is a monolithic polycarbonate of 12.7 mm thickness protected by tempered glass or Georgian wired glass.

5.5.3 For applications where inmates are only periodically supervised as for cell windows or glazing in door panels as for Observation cells, a higher performing glazing is required in order to withstand a surreptitious or sustained brute force attack as per criteria set out in Chapter A-11. Conforming glazing shall meet physical attack standards ASTM 1915 Grade 2 or HP White level II. Glazing type meeting these performance standards is a multi-layered polycarbonate glazing with a trademark name 'Lexgard MPC-500'. This glazing is protected by abrasion resistant film on the cell side and tempered glass on the corridor side. See Chapter A-12 for Observation cells.

5.5.4 For exterior windows, the security glazing set in its own steel frame shall be used in combination with a separate thermal unit type CW2 to be located on the weather side.

5.5.5 For optimal security, exterior DWb windows shall not have any openings (e.g. for ventilation) and as such they are suitable for air-conditioned environments.

5.6 Detention Level 2 (DW2) – For Secure Construction 3 application

This refers to a combination CW2 window along with bars which limit the opening between bars to a maximum, in one dimension, of 125 mm (5") to achieve containment. Plate A-4-3 illustrates an example of security window meeting the requirements of a Detention Level 2 (DW2) window.

As illustrated, the mullion locations mimic the bars and are sealed to the bars to prevent the bars from being used as a suspension point. As such these windows are prescribed only for cells at maximum and all segregation units where the threat of suicide is at the highest. Given that the glass of the thermal unit can be broken; this window cannot achieve absolute prevention of suicide.

5.6.1 Forced Entry resistance by bending, jacking, impact and cutting with homogenous tool resistant steel or composite steel (as defined in *ASTM A627-03*, see footnote 3). See 5.4.2 for a typical bar design. In addition, the ventilation opening is covered with a perforated steel plate front with a movable vent sash. A non-removable vent sash controller protrudes without offering a suspension point. See Plates A-4-3 and A-4-4.

5.6.2 The window frame is cast into the adjacent masonry or welded to a rod or a bracket (wall anchor, see footnote 4) cast in masonry.

5.6.3 Fixed sashes are to be replaceable in situ with glazing stops affixed with security screws.

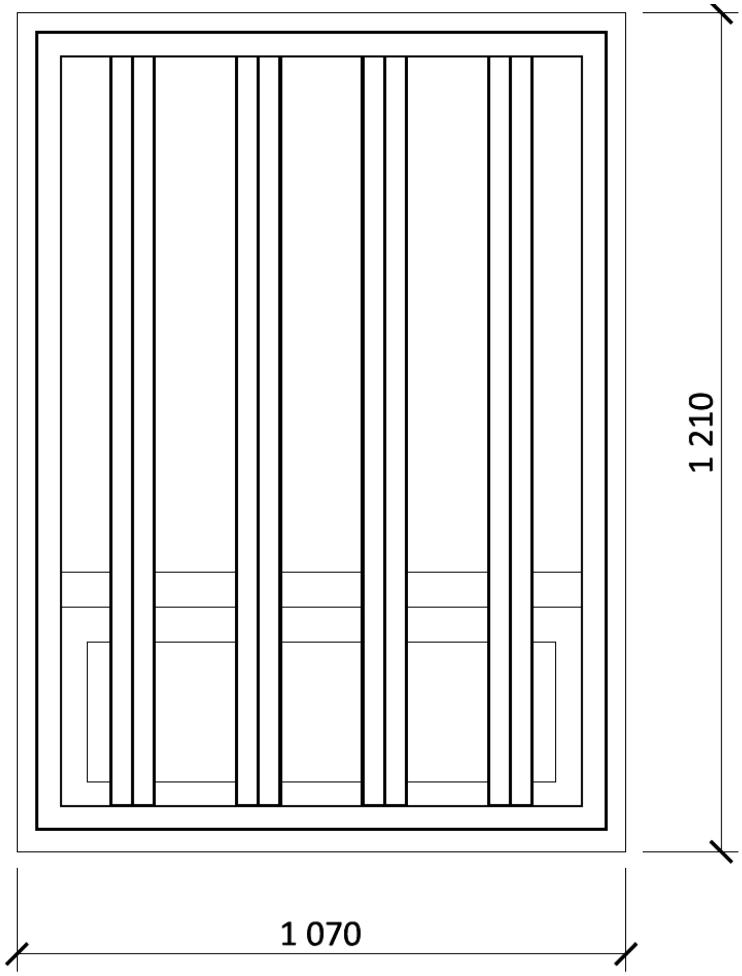
[6] ASTM F1592–05 – Standard Test Methods for Detention Hollow Metal Vision Systems

6. WINDOWS SELECTION

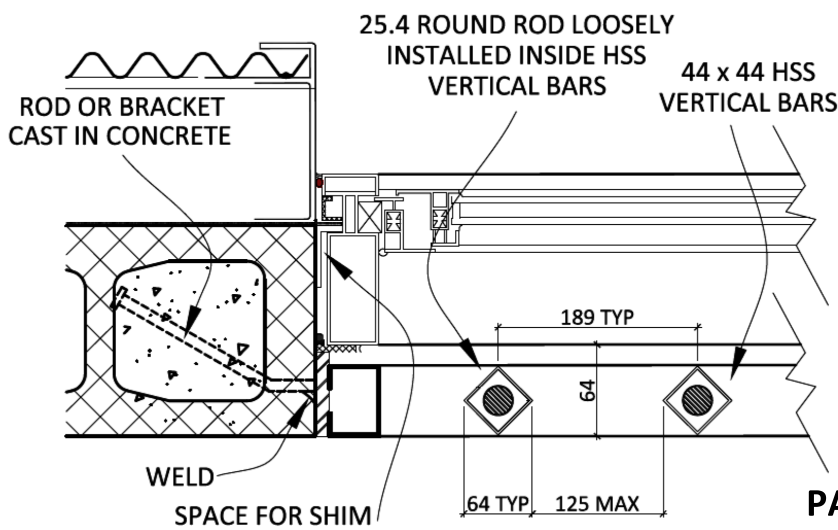
6.1 See Section A-2, Table A-2-2 for windows selection.

6.2 Multi-Level institutions

For housing units where medium and maximum classified inmates share the same housing unit but are in separate ranges, follow Table A-2-2 for the areas intended for the specific security level. For other than housing units, follow the Medium security level for the respective functions as maximum classified inmates will be more restricted in their movement and access to programs.



ELEVATION



PARTIAL PLAN VIEW

PLATE A–4–1 – TYPICAL DW-1 WINDOW

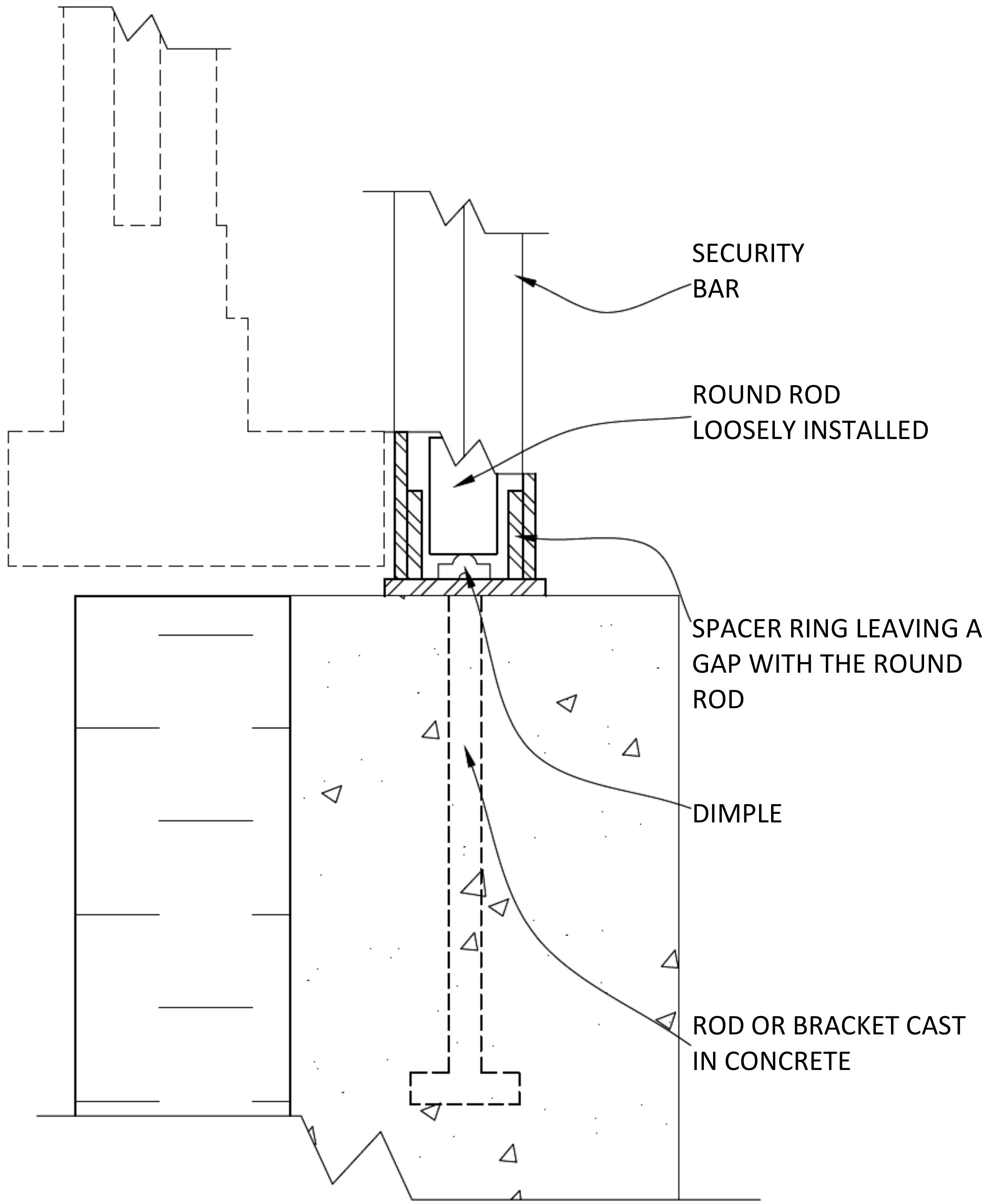


PLATE A–4–2 –INTERNAL ROD DETAIL

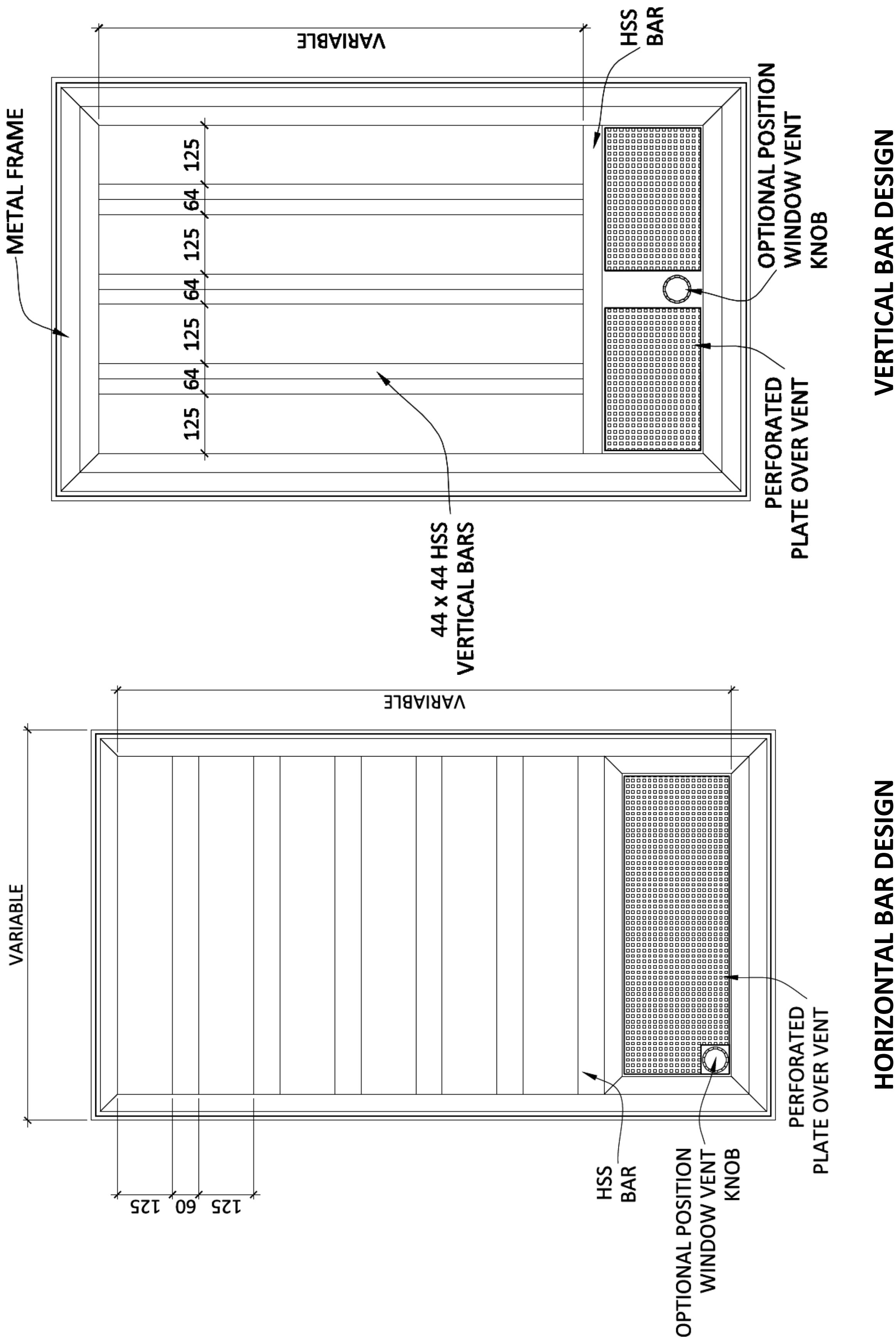


PLATE A–4–3 – DW-2 WINDOW

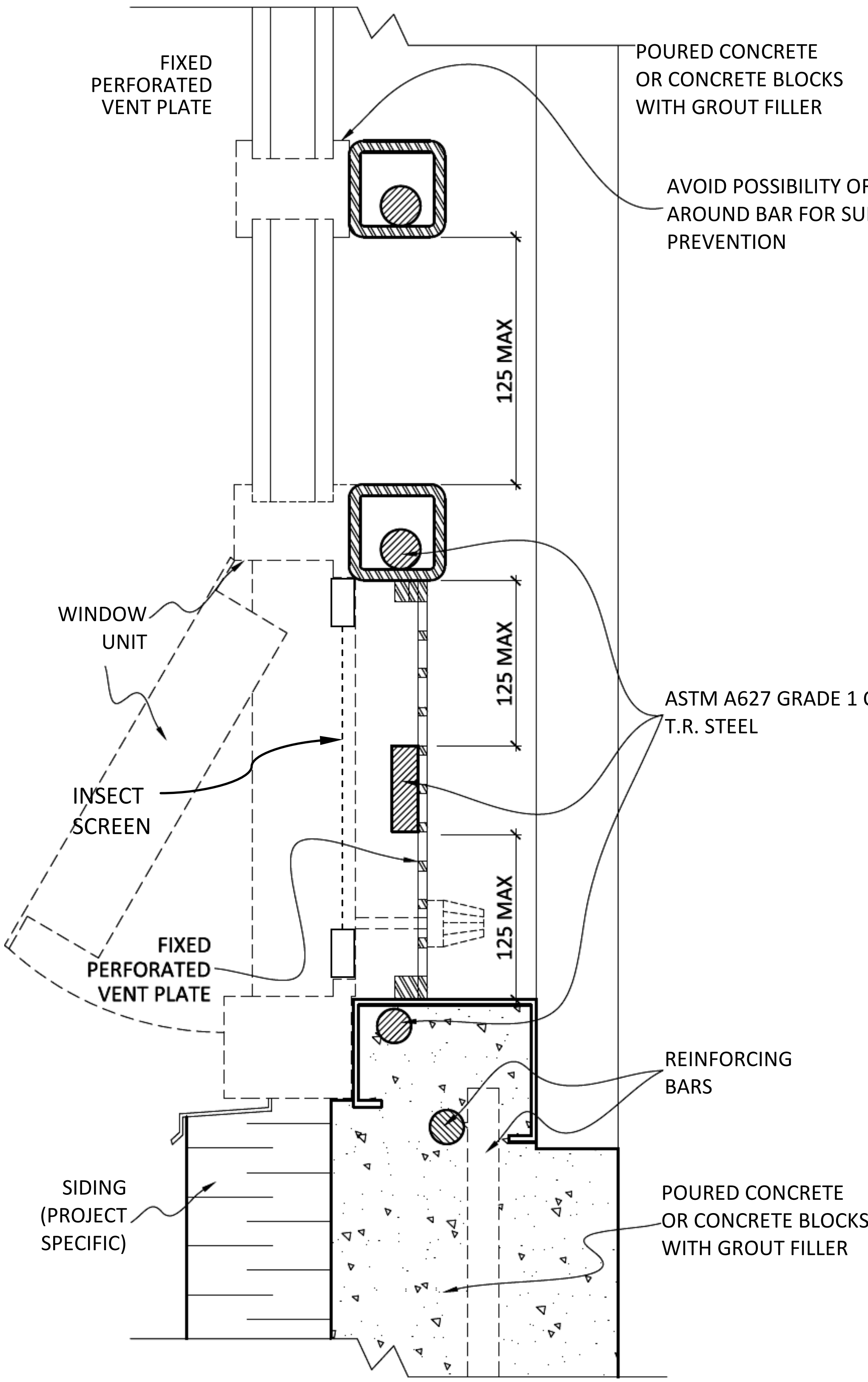


PLATE A–4–4 – DW-2 WINDOW – HORIZONTAL BAR DESIGN – DETAIL

A–5 ARCHITECTURE – DOORS & FRAMES

1. SCOPE

This section identifies the requirements for all doors and frames used in correctional institutions.

2. RELATED SECTIONS

2.1 Technical Criteria Document sections:

A-2 – Architecture – Building Construction
A–3 – Grilles, Mesh and Screens
A–4 – Glazing, Windows and Assemblies
A–6 – Hardware
A–11 – Inmate Cells
A–13 – Security Control Posts, Galleries and Routes

2.2 CSC/PWC Specifications

08 34 63 Detention hollow metal frames, doors, and door frames (11193 before 2004)
08 34 63.13 Steel Detention Doors and Frames
08 34 63.16 Steel Plate Detention Doors and Frames
08 34 63.33 Detention Door Frame Protection
08 71 63 Detention Door Hardware (11192 before 2004)
11 19 13 Detention Pass-Through Doors

2.3 Standards

2.3.1 ANSI/BHMA – American National Standard

- A156.4-2008–Doors Controls – Closers, Oct. 2008
- A156.14-2007–Sliding and Folding Door Hardware, Sept. 2007

2.3.2 NAAMM HMMA – National Association of Architectural Metal Manufacturers

- 801-05–Glossary of Terms for Hollow Metal Doors & Frames, 8d, 2005
- 802-07–Manufacturing of Hollow Metal Doors & Frames, 8d, May 2007
- 803-08–Steel Tables, 8d, December 2008
- 805-10–Recommended Selection and Usage Guide for Hollow Metal Doors & Frames, 8d
- 810-09–Hollow Metal Doors, 8d
- 820-08–Hollow Metal Frames, 8d
- 830-02–Hardware Selection for Hollow Metal Doors & Frames, 8d, Jan. 2002
- 831-97–Hardware Locations for Hollow Metal Doors & Frames, 8d, May 1997
- 841-07–Tolerances and Clearances for Commercial Hollow Metal Doors & Frames, 8d, June 12, 2007
- 850-00–Fire-Rated Hollow Metal Doors & Frames, 3rd Edition, 8d, Feb. 2000
- 861-06–Guide Specifications for Commercial Hollow Metal Doors & Frames, 6th Edition, 8d, December 5, 2006
- 862-03–Guide Specifications for Commercial Security Hollow Metal Doors & Frames, 8d, August 26, 2003
- 863-04–Guide Specifications for Detention Security Hollow Metal Doors & Frames, 8d, January 26, 2005
- 867-06–Guide Specifications for Commercial Laminated Core Hollow Metal Doors & Frames, 8d, March 27, 2006
- 890-06–Technical Summary Hollow Metal

2.3.3 ASTM Standards

- F1450-05–Test Methods for Hollow Metal Swinging Door Assemblies for Detention Facilities *(under revision - 2011)*
- F1577-05–Test Methods for Detention Locks for Swinging Doors

- F1592-05–Test Methods for Detention Hollow Metal Vision Systems
- F1643-05–Test Methods for Detention Sliding Door Locking Device Assembly
- F1758-05–Test Methods for Detention Hinges Used on Detention-Grade Swinging Doors
- F1915-05–Test Methods for Glazing for Detention Facilities

2.3.4 NAAMM DEMA – Detention Equipment

- 111900–09–Guide Specification for Basic Detention Equipment Requirements, 11, Dec. 2009

3. DOOR CLASSIFICATIONS

3.1 Commercial Doors and Frames (CD)

Commercial doors and frames are of heavy duty commercial grade and have no special detention requirements. Interior doors used in S-2 and S-3 inmate apartment suites shall be of lighter construction. Commercial doors on exterior or interior exits from a suite of spaces generally denote free egress occupancy. Interior commercial doors may however be used within an impeded egress occupancy as for offices, classrooms and other occupational or group activity areas.

3.2 Detention Doors and Frames (DD)

Detention doors and frames exceed heavy duty commercial grade construction and are used to restrict or control the movement of persons for security reasons. Detention doors are used generally on the envelope of areas requiring containment and impeded egress. There are four types of Detention Doors, namely:

3.2.1 DD1–Detention Door Medium Swing
3.2.2 DD1p–Detention Door Pivot (for special application)
3.2.3 DD2 sliding–Detention Door Maximum
3.2.4 DD2 swing–Detention Door Maximum

3.3 Grilles (GL) Swing or Sliding

Grilles are metal lattice screens used to control movement of persons while permitting visual surveillance. See Section A-3.

4. DOOR STYLE

TABLE A–5–1 – DOOR STYLES

(as illustrated on Plates A-3-3 and A-3-4 for grilles, A-5-1 and A-5-2 for doors)[1]:

Style	Name	Location examples
A	Two Half Lights	• Main Entrance • Observation cells (suicide watch)
B	Half Light	• Offices (Alternative 1) • Corridors • Control Post • Health Care
B2	Sidelight Frame Flush	• Offices (Alternative 2)
C	Narrow Light	• Inmate cells and bedrooms • Rooms requiring visual checks i.e. utility and storage rooms
D	Two Narrow Lights	• Security exterior entrances

1 Using terminology from NAAMM HMMA 810-09, 8d, Hollow Metal Doors

Style	Name	Location examples
		• Stairways
E	Flush	• Service shafts • Washrooms • Mechanical rooms • Armoury
F	Dutch Door	• Counter service[2]
G	Grille	• Security Barrier in corridors or showers in segregation and maximum security ranges.
H	Overhead	• Shipping/Receiving, shop supply, areas requiring high openings for clearance

4.1 Door Light

4.1.1 For all security levels, all offices and areas of inmate/staff contact other than locations requiring an E style door must be observable from the adjacent circulation space through either a window in a door or an adjacent sidelight. The maximum height for the bottom edge of any light is 1300 mm from the floor (not accounting for the undercut which shall be 12 +/- mm).

4.1.2 Curtains, draperies and other decorative materials including textiles and films (i.e. reflective films) are not permitted in door lights except for :

4.1.2.1 Observation Cells (A) where it may be required to cover the extent of glass in the door to allow the cell to be used for other than observation purposes. In this case, a fabric could be held in place by 'Velcro'. Other glass covering options may be considered.

4.1.2.2 Bedroom doors in Women's minimum and medium security housing units. In this case privacy curtains on the corridor side of the door that allow control of the curtain by staff during security patrols and counts, and are made of fire resistant fabric held in place by 'Velcro' are permitted due to long standing practice at Women's Institutions that is in accordance with *Creating Choices.*

5. DOOR FUNCTIONS

5.1 Movement

5.1.1 A swing (**SG**) movement is achieved with the use of hinges or pins. The swing of doors shall be in accordance with good architectural practice when security is not a consideration. Cell doors shall swing outward into the corridor with a 180° swing. For free egress bedrooms, doors swing into the bedroom.

5.1.2 A pivot (**PV**) movement allows a door to rotate on a vertical axis at the centre line of the wall width. Under routine operations, the door swings into the room with a 90° swing, but can be made to swing into the corridor with a 90° swing by removing the door movement blocker. A door with this movement is not recommended for cell use since it does not sit within a frame and as such has gaps on both jambs and head. These gaps contribute to excessive light and sound penetration and potentially allow objects or liquids to pass to the

2 Fire resistance rating of the room is to be considered in terms of latching and locking.

outside. It also poses certain problems when used with standard cell locks as the latch bolt is exposed on the cell side and any tampering is not readily visible.

5.1.3 A slide (**SL**) movement allows a door to slide to one side of its opening along the face of the wall. Sliding doors are moved by an electric motor and chain drive or by a pneumatic system.

5.1.4 Refer to *NAAMM/HMMA 801-05*[3] for further terminology.

5.2 Locking

5.2.1 A Manual Lock (**LM**) operates mechanically by key one lock at the time.

5.2.2 A Remote Controlled Lock (**LR**) operates electromechanically or pneumatically from a control post. Locks are also mechanically keyed at the door and may be equipped with a local electric unlock when activated at the control post console.

5.2.3 There is no requirement for any locks or locking devices to have a mechanical gang release.

5.3 Operation

5.3.1 Manual (**M**) operation indicates that the opening or closing of a door is manually executed by staff or inmates.

5.3.2 Motorized (**MO**) operation indicates that the opening and closing of a door is achieved by a remote electric (or pneumatic) system.

6. TECHNICAL REQUIREMENTS

6.1 Commercial Doors (CD)

6.1.1 Commercial doors shall be of aluminum, solid core wood or composite, or hollow metal. All pressed steel hollow core metal doors and frames shall be of a minimum of 1.27mm (18ga) steel.

6.1.2 Glazing on doors or sidelights shall meet NBC requirements except for doors in medium and maximum security institutions where glazing shall be 6 mm tempered glass.

6.1.3 Door frames shall be compatible with the door for which they are intended. Reference is made to the *NAAMM/HMMA 820-08*[4] – Hollow Metal Frame regarding frames for hollow metal door.

6.1.4 Commercial doors and frames shall have a minimum clear opening (door or hardware cannot interfere) of 810 mm x 2100 mm, unless specified otherwise[5].

6.2 Detention Doors – Swing (DD1)

6.2.1 DD1 doors and frames shall have a minimum clear opening (door frame element or hardware cannot interfere with the clear opening) of 810 mm x 2100 mm, unless specified otherwise[5].

6.2.2 DD1 doors shall be constructed of 2.0 mm (14ga) sheet steel both sides with total thickness of 50 mm. See standard *NAAMM/HMMA 863-04*[6], specification CSI 08 34 63.13 – Steel Detention Doors and Frames (NMS 08 34 63)[7] for additional details.

---

3 ANSI/NAAMM HMMA 801-05 – Glossary of Terms for Hollow Metal Doors and Frames

4 NAAMM/HMMA 820-08 – Hollow Metal Frame

5 Examples: Doorways in a public corridor or access to exit may be required to have a clear width 850 mm for detention or care occupancies (NBCC 3.3.3.4.(1)). Doorways through which it is necessary to move patients in bed shall have a clear width of at least 1050 mm (NBCC 3.3.3.4.(2)).

6 ANSI/NAAMM HMMA 863-04 – Guide Specifications for Detention Security Hollow Metal Doors and Frames, Fifth Edition, 8d January 2005. This standard has an Appendix with a thickness conversion table (page A-1). Measurement in the present document are all in mm, use this table for Imperial conversion.

7 Specifications 08000, 11190 & 11193 before 2004

6.2.3 DD1 doors of type C or D using narrow lights shall have 6 mm clear tempered glass. For larger glazing panels on detention doors, follow Section A-13 Control Post, Level B.

6.2.4 DD1 doors and frames are to be constructed as required in standard *NAAMM/HMMA 863-04* (see footnote 6) and specification CSI 08 34 63.13 – Steel Detention Doors and Frames (NMS 08 34 63). In addition, test reports shall be submitted from an independent testing laboratory certifying the following minimum performance of a typical Detention door, 860 x 2100 mm. Doors certified under *ASTM F1450–05*[8] are acceptable. The following tests are applicable to DD1 and DD2 doors with minor differences in deflection as noted:

6.2.4.1 ***Static Load***: Centrally apply load of 4000 kg at quarter points on door. Maximum deflection must not exceed 30 mm (15 mm for DD2). Permanent set not to exceed 10.0 mm (2 mm for DD2) after release of load (see Plate A–5–9).

6.2.4.2 ***Rack Test***: Concentrate load of 2645 kg on one unsupported corner of door. Door must not fail. Deflection must not exceed 50 mm (35 mm for DD2) (see Plate A–5–10).

6.2.4.3 ***Impact Load Test***: The door is mounted in a frame as in a normal cell setting. The door is subjected to a series of impact loads of 271 Joules following a pattern of targets from a pendulum ram (see Plate A–5–11). Impacts are delivered on the push side of the door[9]. The number of impacts for a DD-1 and DD-2 doors are:

- 200 lock or strike impacts (target 1)
- 75 hinge impacts (targets 2, 3 & 4)
- 100 corner panel impacts (target 5)

6.2.4.4 The door must remain operable after the test.

6.2.5 Plate A–5–3 illustrates typical DD1 swing door details.

6.3 Detention Doors – Pivot (DD1p) [Not recommended for cell use]

6.3.1 DD1p door size must account for pivot and 90° swing as well as the removable door stopper to achieve a minimum clear opening of 810 mm x 2100 mm.

6.3.2 DD1p doors shall be constructed of 2.0 mm (14ga) sheet steel both sides. See standard *NAAMM/HMMA 863-04*[10], specification CSI 08 34 63.13 – Steel Detention Doors and Frames (NMS 08 34 63)[11] for additional details[12].

6.3.3 DD1p doors shall be type C as illustrated on Plate A–5–1. Narrow light glazing shall be 6 mm clear tempered glass.

6.3.4 DD1p pivot hardware is a pin/rod extending at both ends of the door. Bottom receiver is inserted in the floor during the pour of the slab. Top receiver is inserted in the door sill and has a removable housing to allow the door to be removed. Assembly must ensure rigidity of door (see note 10).

---

8 ASTM F1450 – 05 Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention Facilities

9 Procedure as with section 7.2.4 of ASTM F1450-05 Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention Facilities

10 ANSI/NAAMM HMMA 863-04 – Guide Specifications for Detention Security Hollow Metal Doors and Frames, Fifth Edition, 8d January 2005. This standard has an Appendix with a thickness conversion table (page A-1). Measurement in the present document are all in mm, use this table for Imperial conversion.

11 Specifications 08000, 11190 & 11193 before 2004.

12 There is no provision relating to pivot hardware in the NAAMM/HMMA standards.

6.3.5 DD1p doors are constructed in accordance with DD1 door requirements as noted in 6.2.4

6.3.6 Plate A-5-4 illustrates typical DD1p pivot door.

6.4 Detention Doors Maximum Slide (DD2)

6.4.1 The minimum clear opening for DD2 doors is 810 mm x 2100 mm. Door frame element or hardware must not infringe on the clear opening.

6.4.2 DD2 doors shall be constructed of 2.8 mm (12ga) sheet steel both sides with total thickness of 50 mm (see standard *NAAMM/HMMA 863-04* [see footnote 9]), specification CSI 08 34 63.13 – Steel Detention Doors and Frames (NMS 08 34 63) for additional details.

6.4.3 DD2 doors type C or D as illustrated on Plates A–5–1 and A–5–2 shall have narrow lights of 9 mm clear tempered glass. For larger glazed panels refer to Sections A-4 and A-12, Special Observation Cells, for glazing requirements where sized to enable passage.

6.4.4 DD2 cell doors have Food Pass/Cuff Port installed (see Plate A–5–8 for details).

6.4.5 DD2 doors and frames are to be constructed as required in standard HMMA 863-04[13] and specification CSI 08 34 63.13 – Steel Detention Doors and Frames (NMS 08 34 63) and specification CSI 11 19 13 – Detention pass-through doors. In addition, test reports shall be submitted from an independent testing laboratory certifying the conformity to the tests outlined in section 6.2.4 for DD2 doors sized at 860 x 2130 mm. Manufacturer certified performance in accordance with ASTM F1643–05[14] is also acceptable.

6.4.6 A 50 mm notch shall be provided in the door frame of sliding doors for emergency pry bar use. See Plates A–5–5 and A–5–7. The depth of the notch shall be sufficient to expose the edge of the door to allow the insertion of a pry bar to force the door open in the case of an emergency.

6.4.7 Plates A–5–5 illustrates typical DD2 sliding door and corridor arrangement and Plates A–5–6 and A–5–7 illustrate sliding door details.

6.5 Detention Doors Maximum Swing (DD2) [not for cells]

6.5.1 Swing DD2 doors and frames shall have a minimum clear opening of 810 mm x 2100 mm unless specified otherwise[15].

6.5.2 Swing DD2 doors shall be constructed of 2.8 mm (12 ga) sheet steel both sides with total thickness of 50 mm. See standard *HMMA 863-04*[16], specification CSI 08 34 63.13 – Steel Detention Doors and Frames (NMS 08 34 63)[17] for additional details.

6.5.3 Swing DD2 doors type C or D as illustrated on Plates A–5–1 and A–5–2 shall have narrow lights of 9 mm clear tempered glass. For larger glazed panels as in doors

13 ANSI/NAAMM HMMA 863-04 – Guide Specifications for Detention Security Hollow Metal Doors and Frames, Fifth Edition, 8d January 2005. This standard has an Appendix with a thickness conversion table (page A-1). Measurement in the present document are all in mm, use this table for Imperial conversion.

14 ASTM F1643 – 05 Standard Test Methods for Detention Sliding Door Locking Device Assembly

15 Examples: Doorways in a public corridor or access to exit may be required to have a clear width 850 mm for detention or care occupancies (NBCC 3.3.3.4.(1)). Doorways through which it is necessary to move patients in bed shall have a clear width of at least 1050 mm (NBCC 3.3.3.4.(2)).

16 ANSI/NAAMM HMMA 863-04 – Guide Specifications for Detention Security Hollow Metal Doors and Frames, Fifth Edition, 8d January 2005. This standard has an Appendix with a thickness conversion table (page A-1). Measurement in the present document are all in mm, use this table for Imperial conversion.

17 Specifications 08000, 11190 & 11193 before 2004

for level ‘A’ control posts, glazing shall match that of the control post envelope as outlined in Section A-13 Security Control Posts.

6.5.4 Swing DD2s doors and frames are to be constructed as required in standard *HMMA 863-04* (see footnote 15), specification CSI 08 34 63.13 – Steel Detention Doors and Frames (NMS 08 34 63) and specification CSI 11 19 13 – Detention pass-through doors. In addition, test reports shall be submitted from an independent testing laboratory certifying the conformity to the tests outlined in section 6.2.4 for DD2 doors sized at 860 x 2130 mm. Manufacturer certified performance in accordance with ASTM F1643–05[18] is also acceptable.

6.6 Grilles (GL) Swing or Sliding

See section A-3.

6.7 Control Post Doors

See Section A-13–Security Control Posts, Galleries and Routes: Level A and B Control Post doors.

6.8 Service Chase Access Doors between cells

All access doors for service shafts between cells shall be DD1 sized at 900 mm X 2100 mm to facilitate repair and maintenance.

18 ASTM F1643 – 05 Standard Test Methods for Detention Sliding Door Locking Device Assembly

7. DOOR SELECTION

Table A-5-1 coding is defined in Legend following table.

Inmate bedroom doors in S2 and S3 housing units swing into the room. All cell doors swing out.

TABLE A–5–1 – DOOR SELECTION

LOCATION	MEDIUM	MAXIMUM
Inmate Cell (Not applicable to free egress bedrooms where doors are CD)	DD1-SG-LE-M	DD2–SL–LE[19]–MO
Apartment entry and fire exit doors	DD1-SG-LE-M	N/A
Service chase doors	DD1-SG-LM-M	DD1-SG-LM-M
Housing Unit and Segregation Entrance and fire exit doors	DD1-SG-LE-M	DD2-SG-LE-M
Housing Unit Office Suite Entry and fire exit doors	DD1-SG-LE-M	DD2-SG-LE-M
Segregation cell doors	DD2–SL–LE–MO	DD2–SL–LE–MO
Health Unit Entrance and fire exit Pharmacy / Dispensary Nursing Station Patient room doors	DD1–SG–LE–M DD1–SG–LE–M CD-SG-LM-M CD-SG-LM-M	DD1-SG-LE-M DD1-SG-LE-M DD1-SG-LE-M DD1-SG-LE-M
Partitions, Corridors	GL–SG–LM–M GL–SL–LE–MO	GL–SG–LM–M GL–SL–LE–MO
Inmate Program rooms and offices Program and Admin Area Entrance	CD–SG–LM–M DD1–SG–LE–M	CD–SG–LM–M DD1–SG–LE–M
V & C Entry	CD–SG–LM–M DD1–SG–LE–M	CD–SG–LM–M DD1–SG–LE–M
Gatehouse: Vestibule Doors on both ends. Exterior door on outside of institution may be commercial type.	DD1–SG–LE–M	DD1–SG–LE–M

LEGEND FOR TABLE A–5–1

Classification

CD – Commercial Doors

DD1 – Detention Doors Swing

DD2 – Detention Doors Maximum Sliding or Swing

GL – Grilles Sliding or Swing

Movement

SG – Swing

PV – Pivot

SL – Slide

Locking

LM – Manual Lock

LE – Electric Lock

Operation

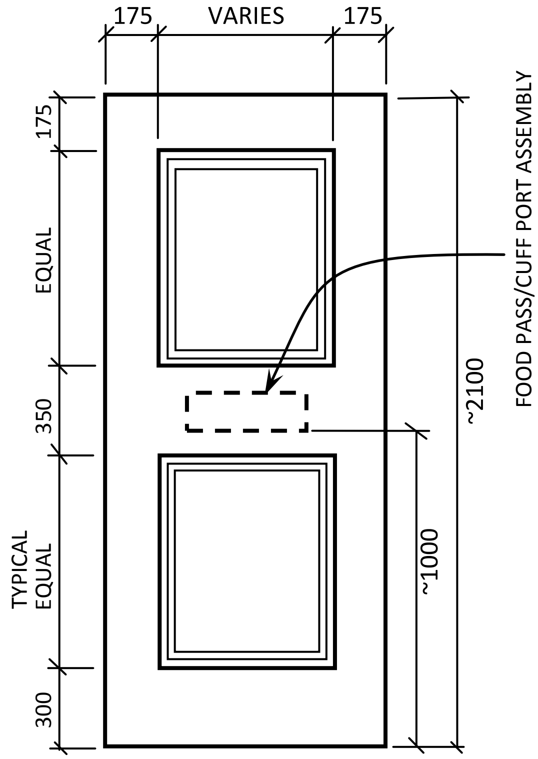
MO – Motorized

M – Manual

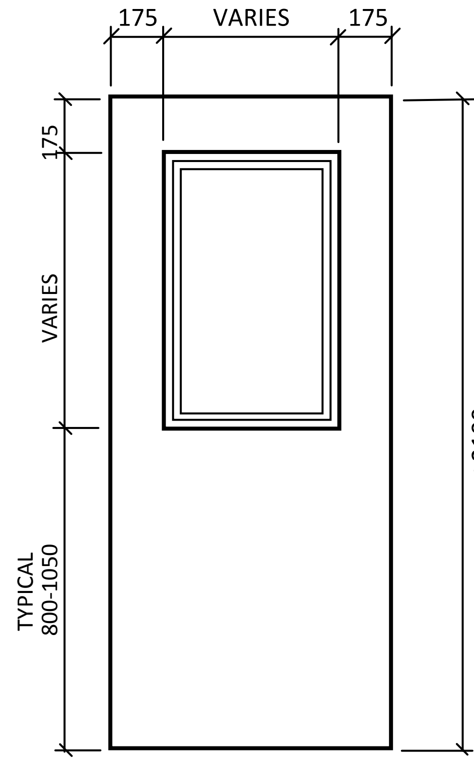
19 Doors are locked locally mechanically or by remote control of selected cell/cells. Doors lock in closed or open position

8. DOOR CONTROL

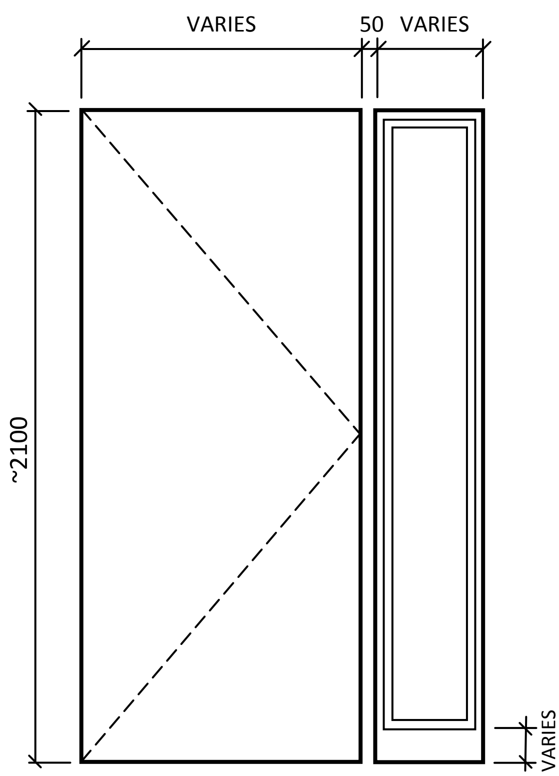
8.1 Door control for living unit doors may be integrated with other functions to be displayed graphically showing a representational floor plan on a touch screen type monitor in the control post. The design of the console /monitors and its functions is part of the security electronics specification and will be made available to the consultant as part of the Project Brief where applicable. Assistance by CSC experts will also be available during the development of these systems. Plates A–5–12 and A–5–13 are included only for illustration purposes to be tailored for a given project.



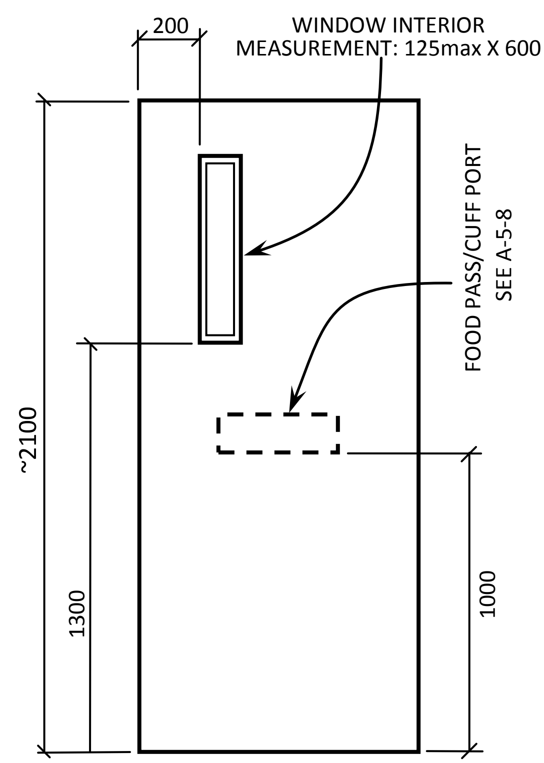
STYLE A – TWO HALF LIGHTS



STYLE B – HALF LIGHT

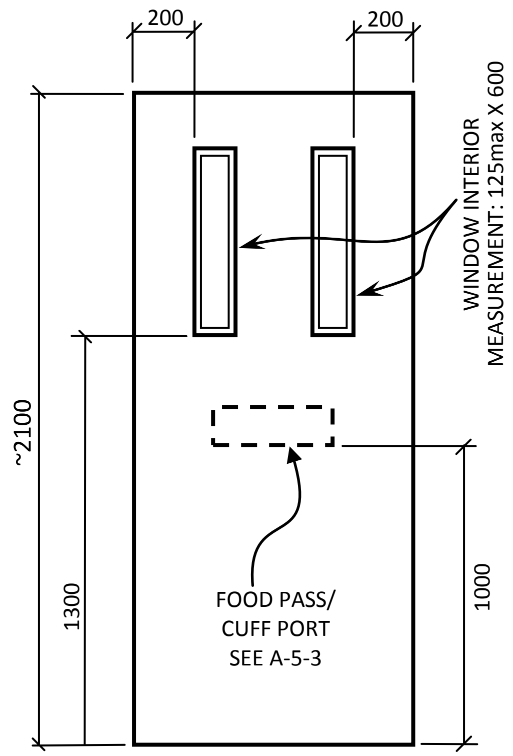


STYLE B2 – SIDELIGHT FRAME FLUSH

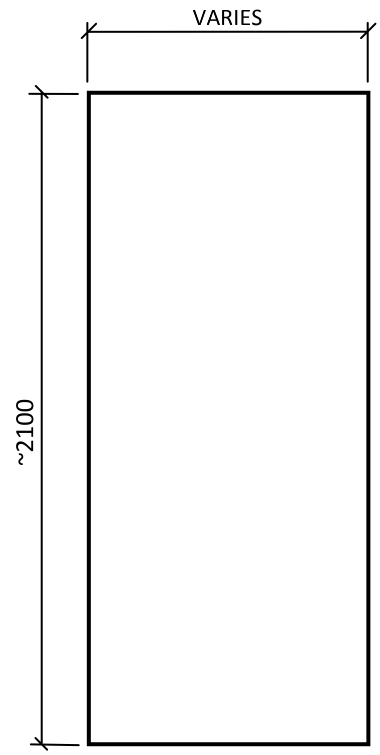


STYLE C – NARROW LIGHT

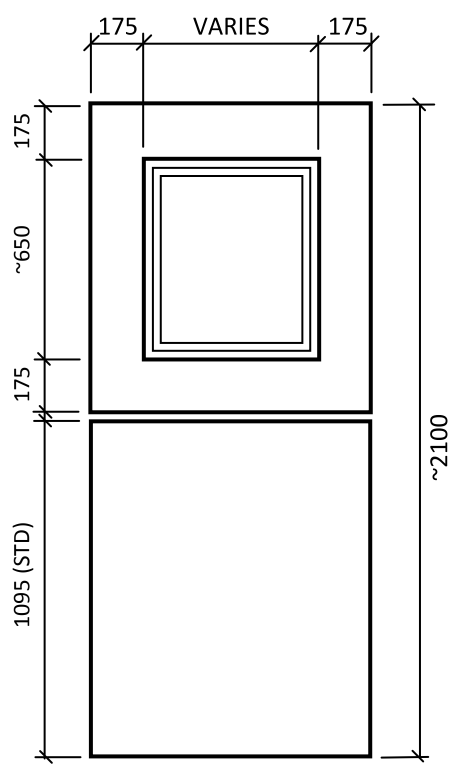
PLATE A–5–1 – DOOR STYLES – EXAMPLES OF APPLICATION PART 1



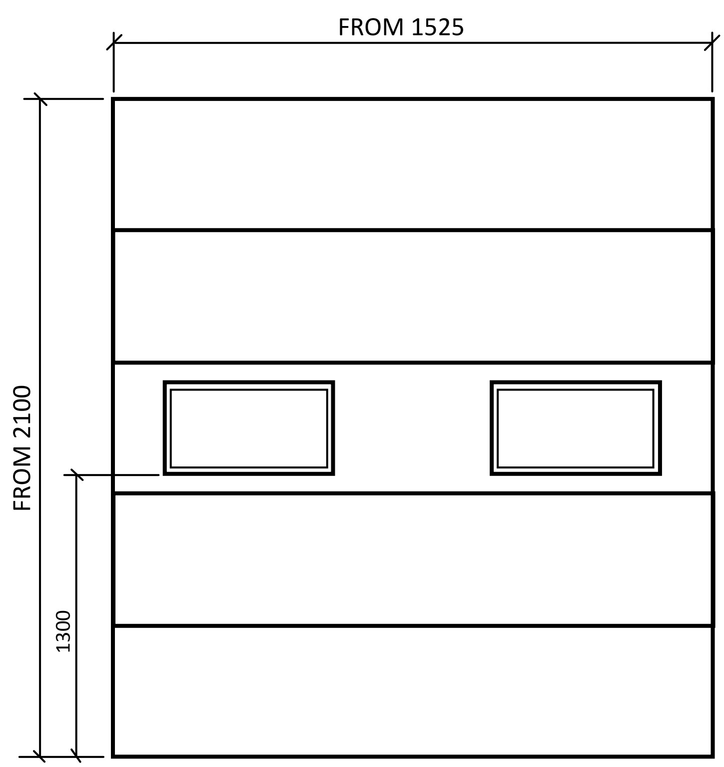
STYLE D – TWO NARROW LIGHTS



STYLE E – FLUSH

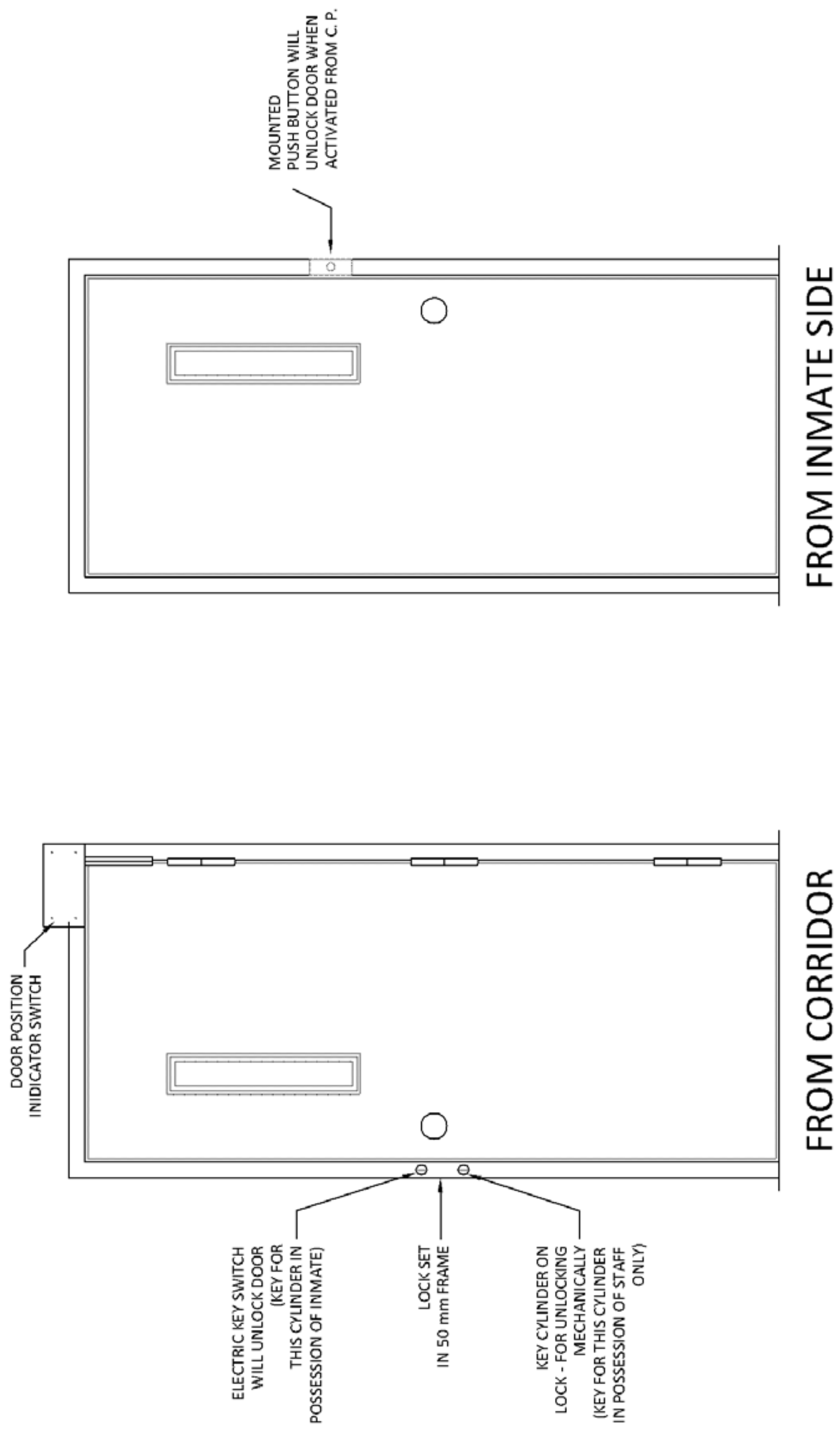


STYLE F – DUTCH DOOR

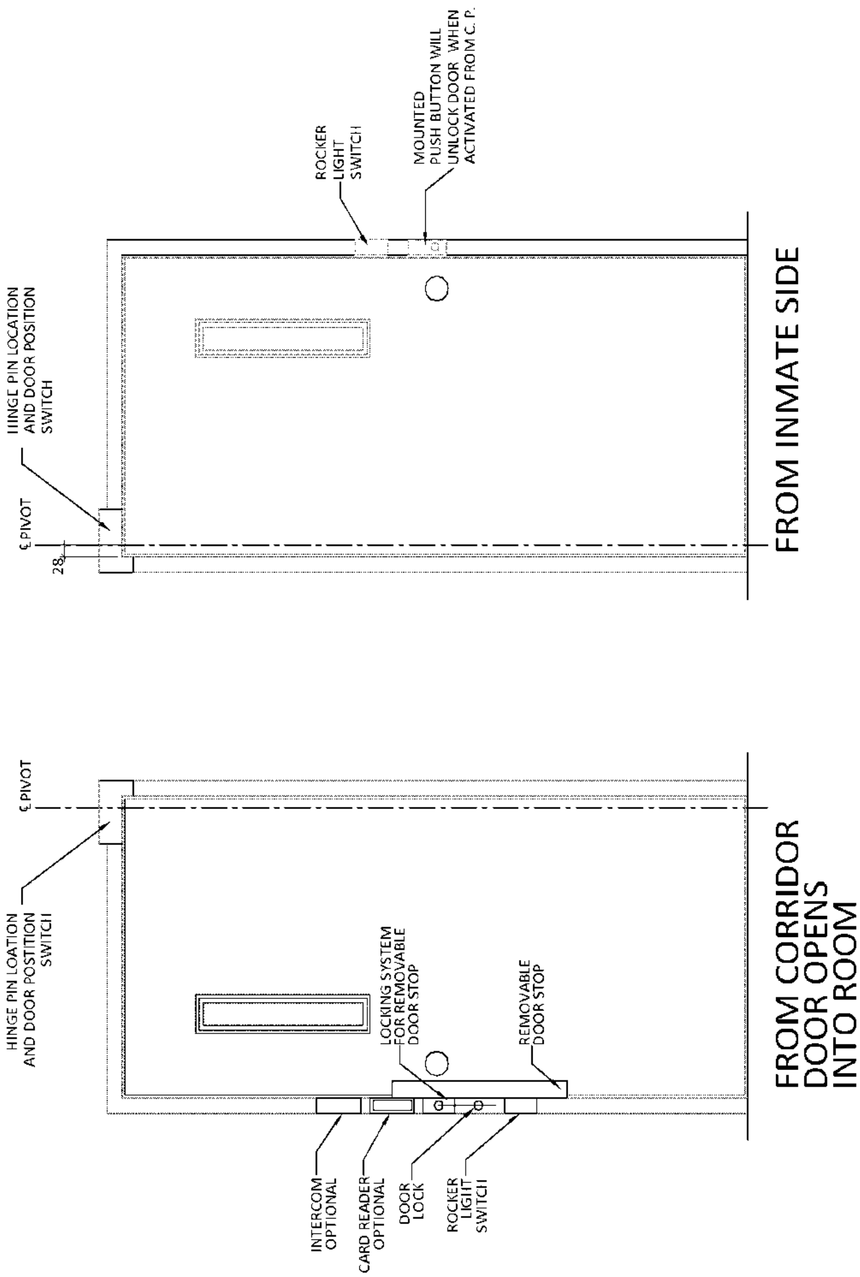


STYLE H – OVERHEAD

PLATE A–5–2 – DOOR STYLES – EXAMPLES OF APPLICATION PART 2



A–5–3 – ELEVATION OF DD1 SWING DOOR



A–5–4 – ELEVATION OF DD1p PIVOT DOOR

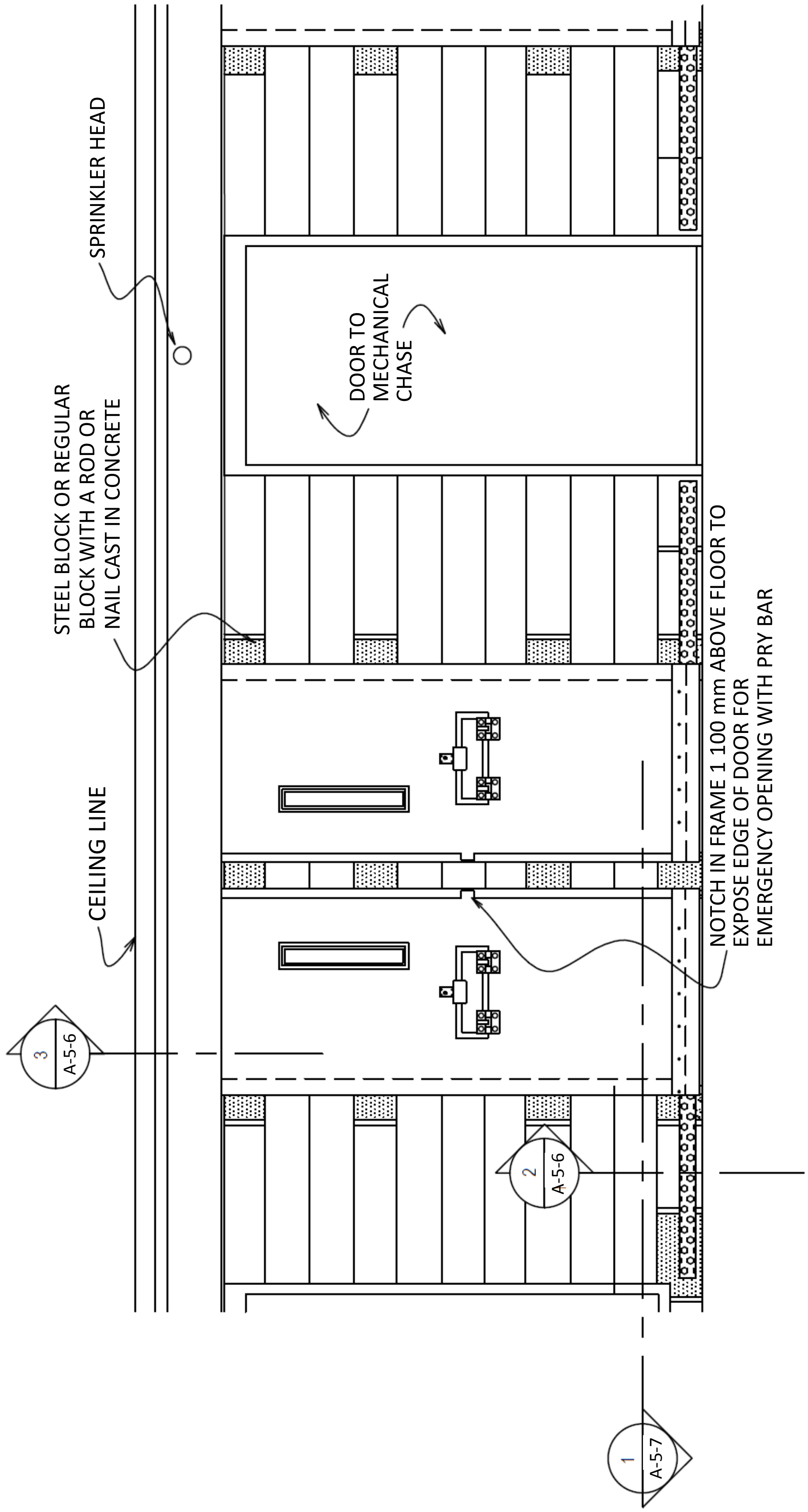
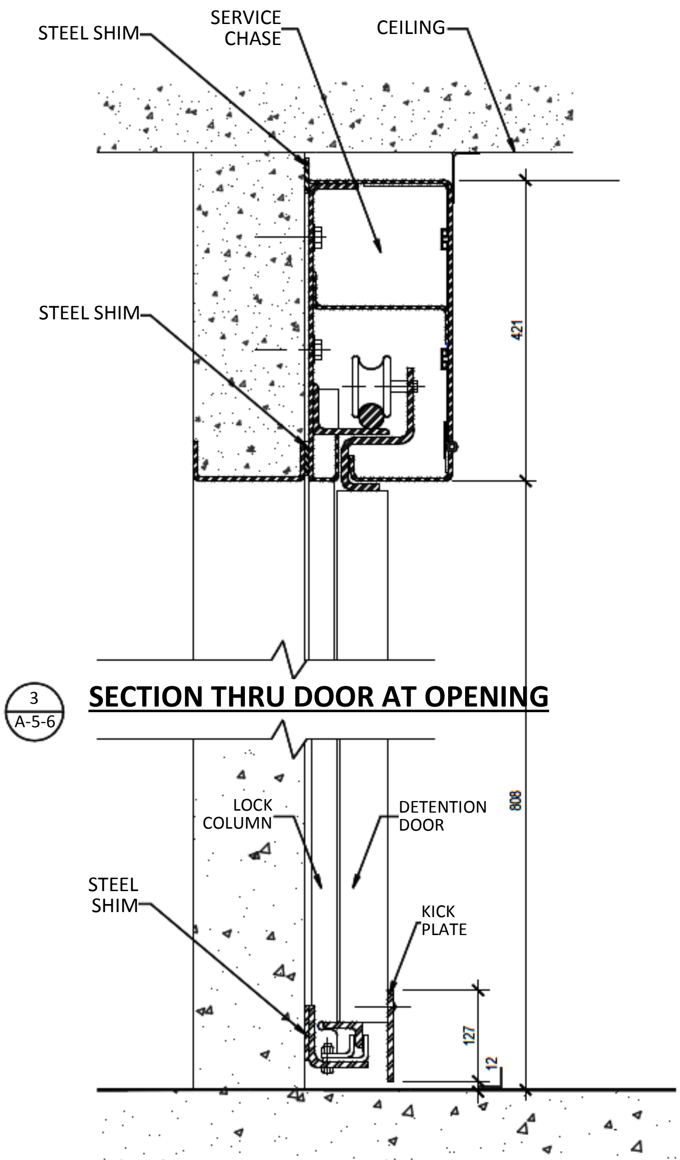
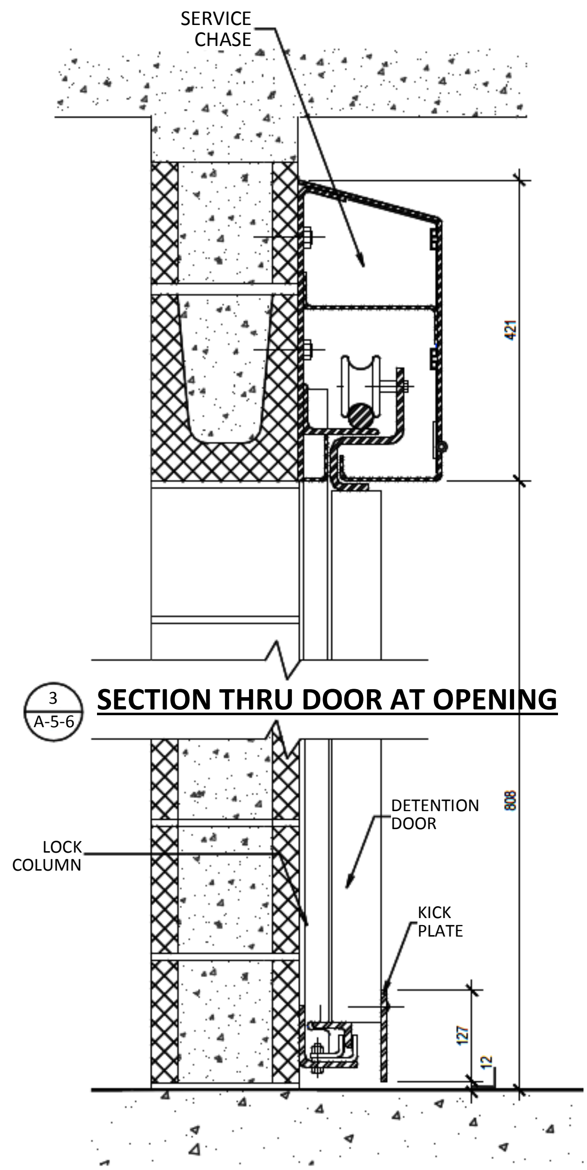


PLATE A–5–5 – CORRIDOR ELEVATION OF TYPICAL DD2 SLIDING CELL DOOR



2 A-5-6 **SECTION THRU DOOR BEYOND OPENING**

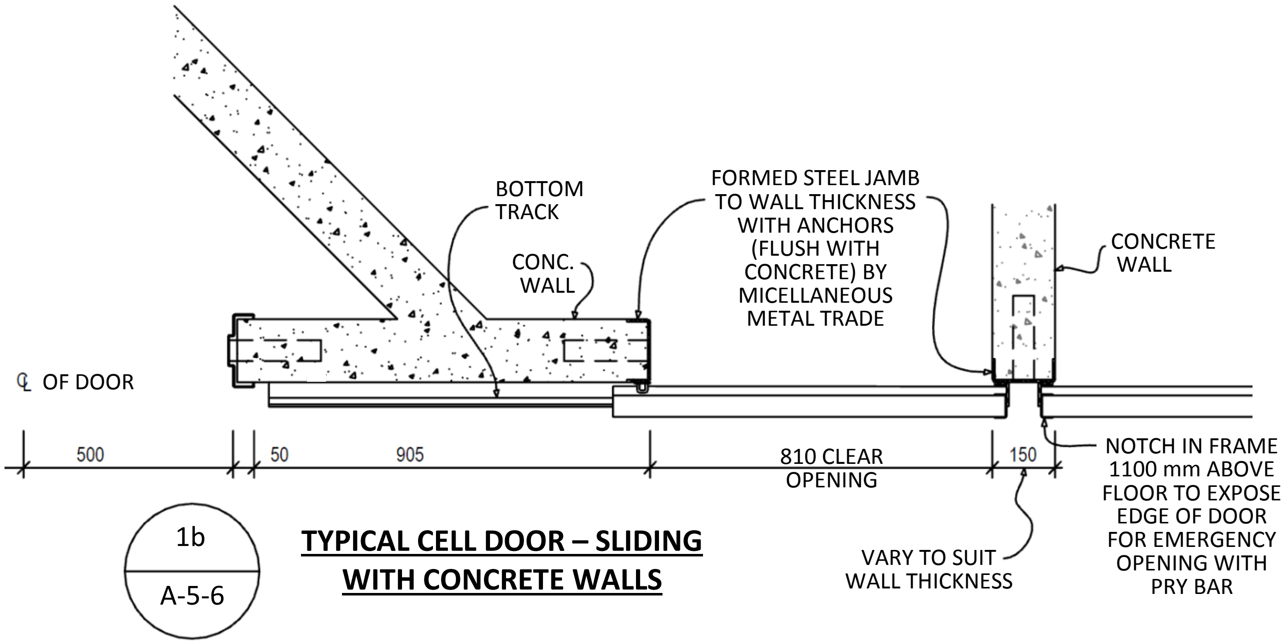
SLIDING DOOR MOUNTED ON
150mm REINFORCED CONCRETE WALL
WITH LOW CEILING CONDITION



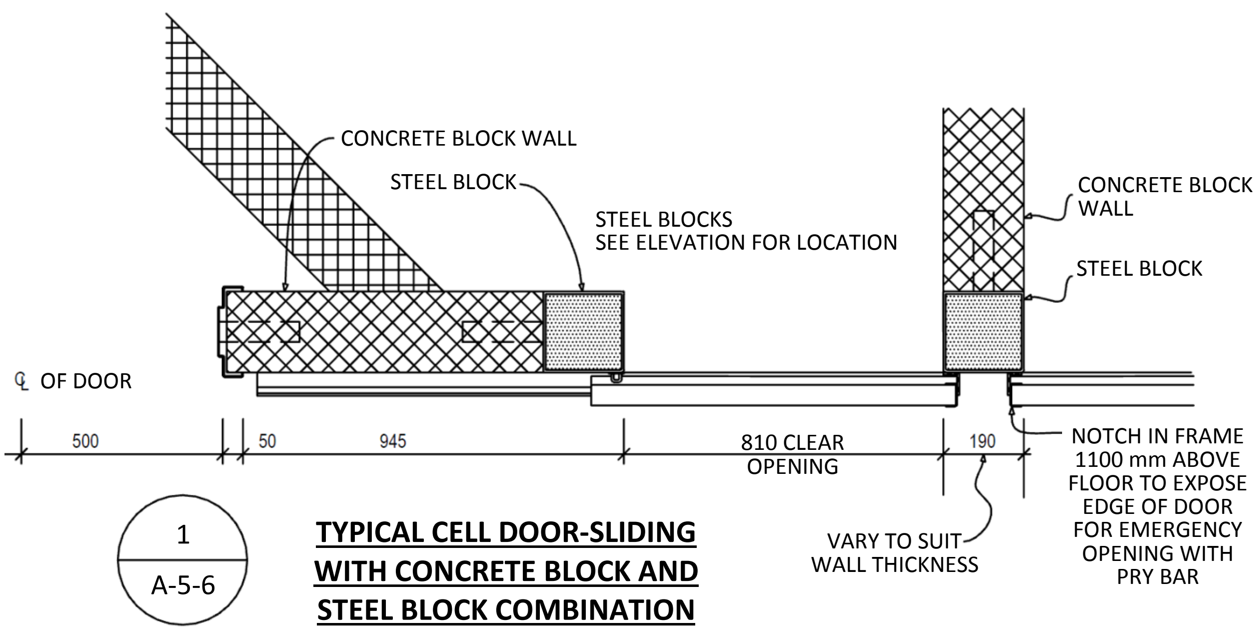
2 A-5-6 **SECTION THRU DOOR BEYOND OPENING**

SLIDING DOOR MOUNTED ON
200mm REINFORCED CONCRETE
BLOCK WITH STEEL BLOCKS @
SELECTED LOCATIONS

PLATE A–5–6 – TYPICAL DD2 SLIDING CELL DOOR – DETAILS 1

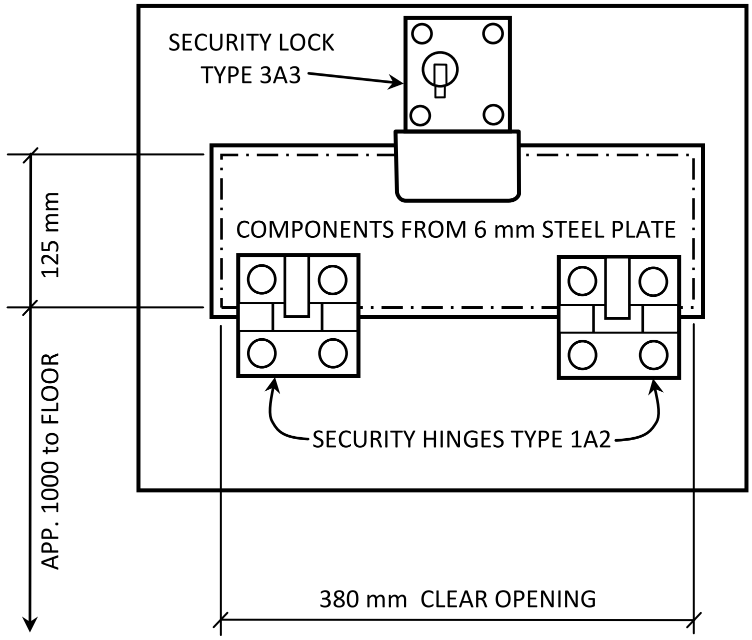


TYPICAL CELL DOOR – SLIDING WITH CONCRETE WALLS

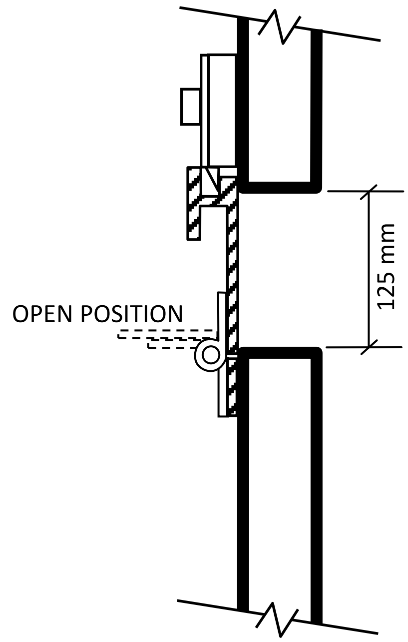


TYPICAL CELL DOOR-SLIDING WITH CONCRETE BLOCK AND STEEL BLOCK COMBINATION

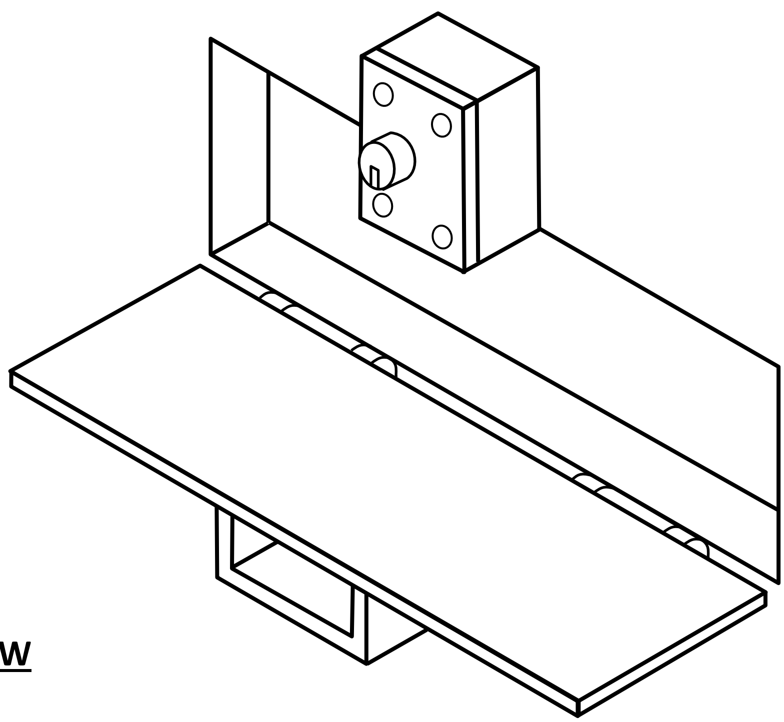
PLATE A–5–7 – TYPICAL DD2 SLIDING CELL DOOR – DETAILS 2



ELEVATION

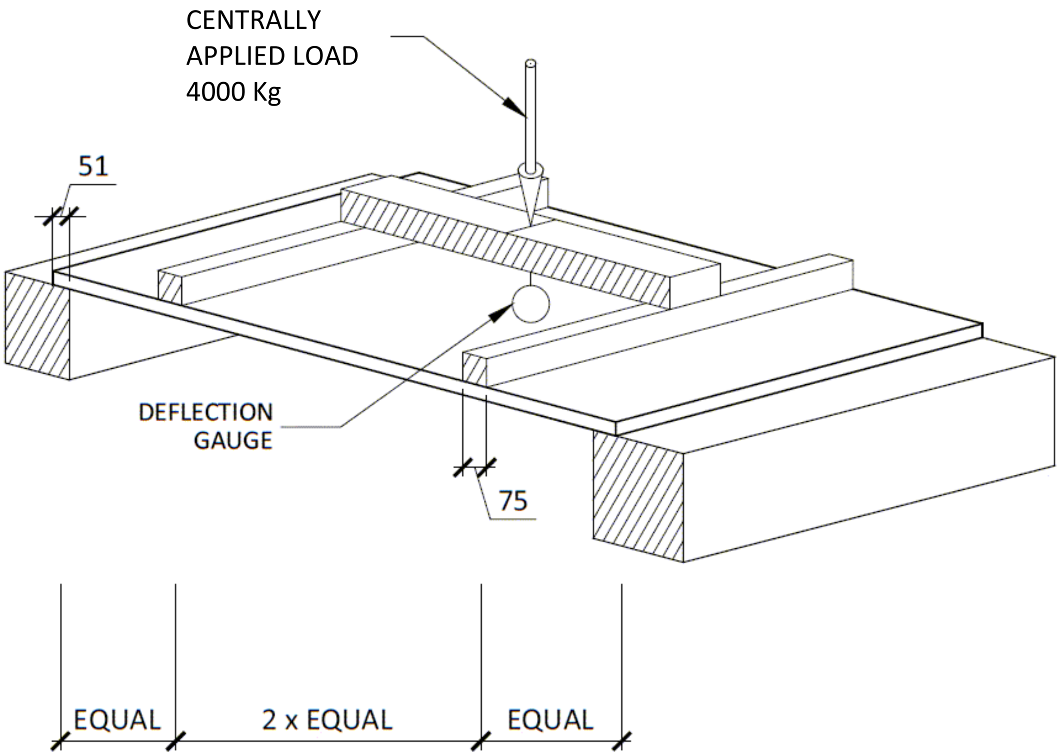


SECTION

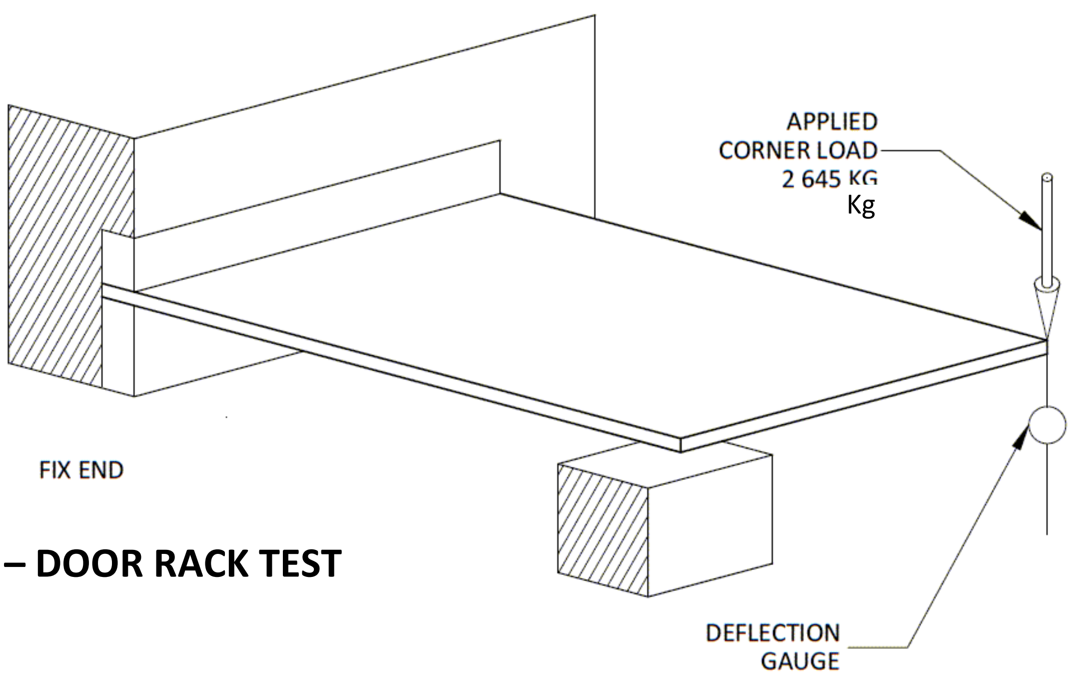


ISOMETRIC VIEW

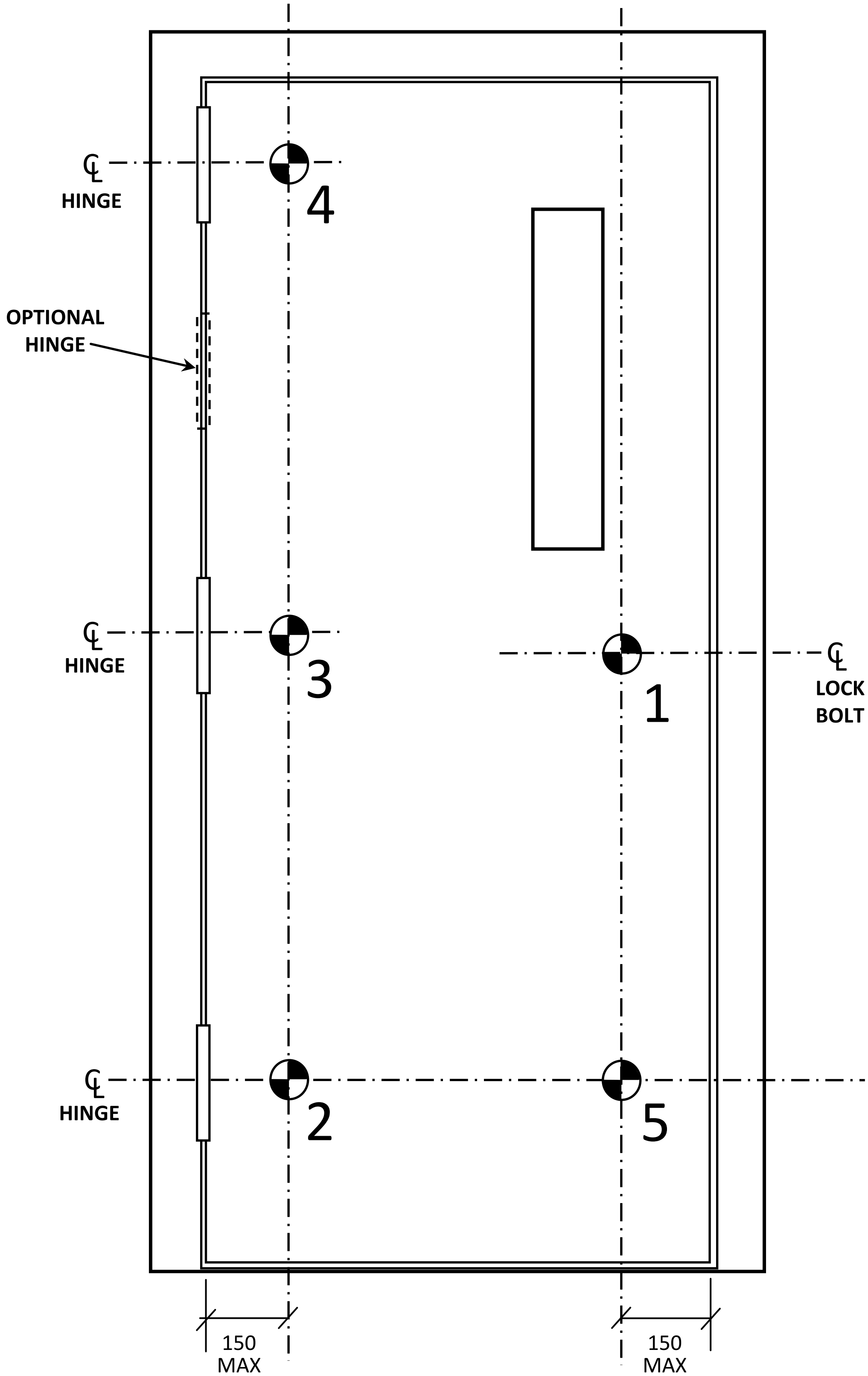
A–5–8 – FOOD PASS/CUFF PORT ASSEMBLY FOR DD2 DOOR



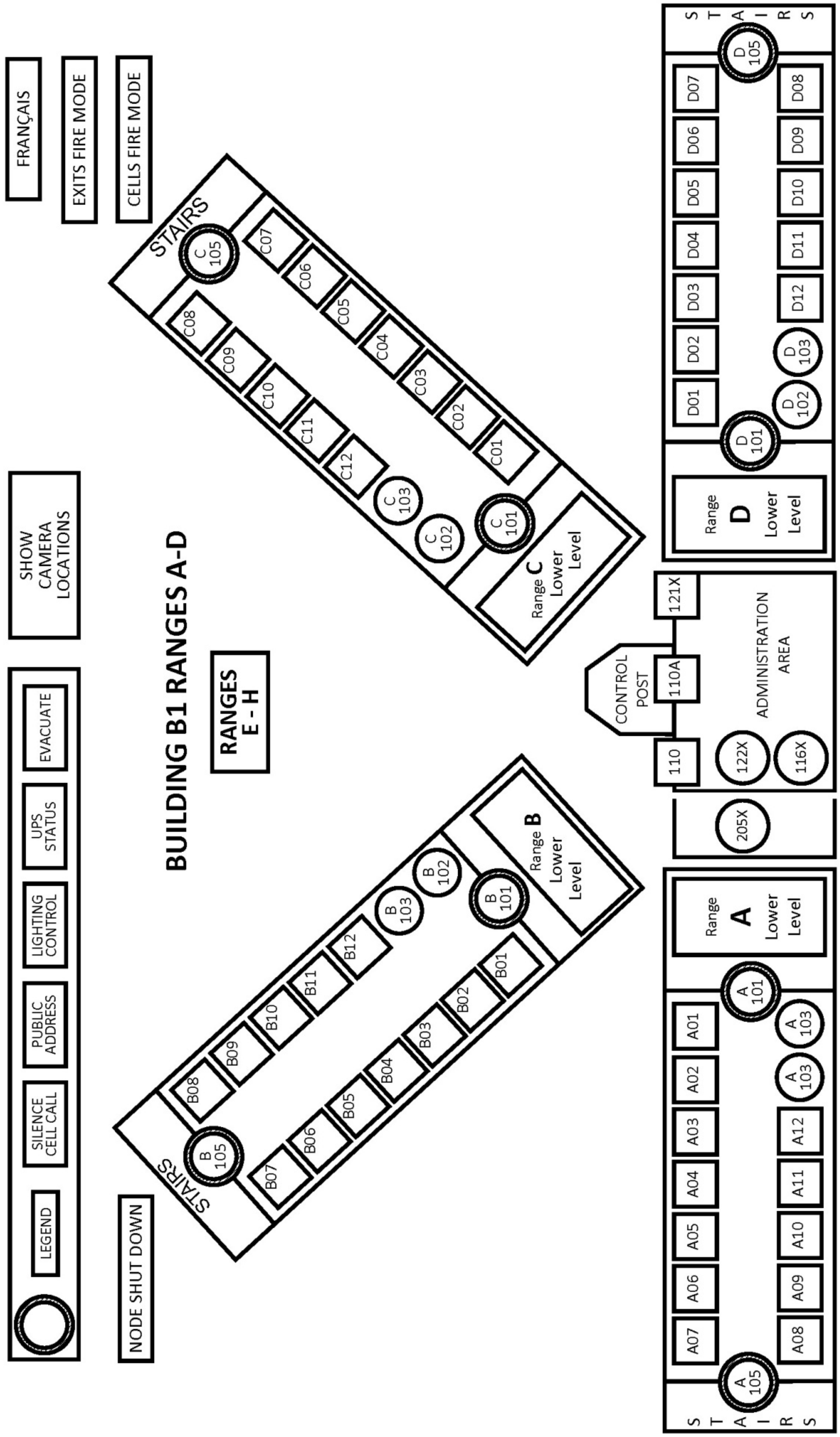
A–5–9 – DOOR STATIC LOAD TEST



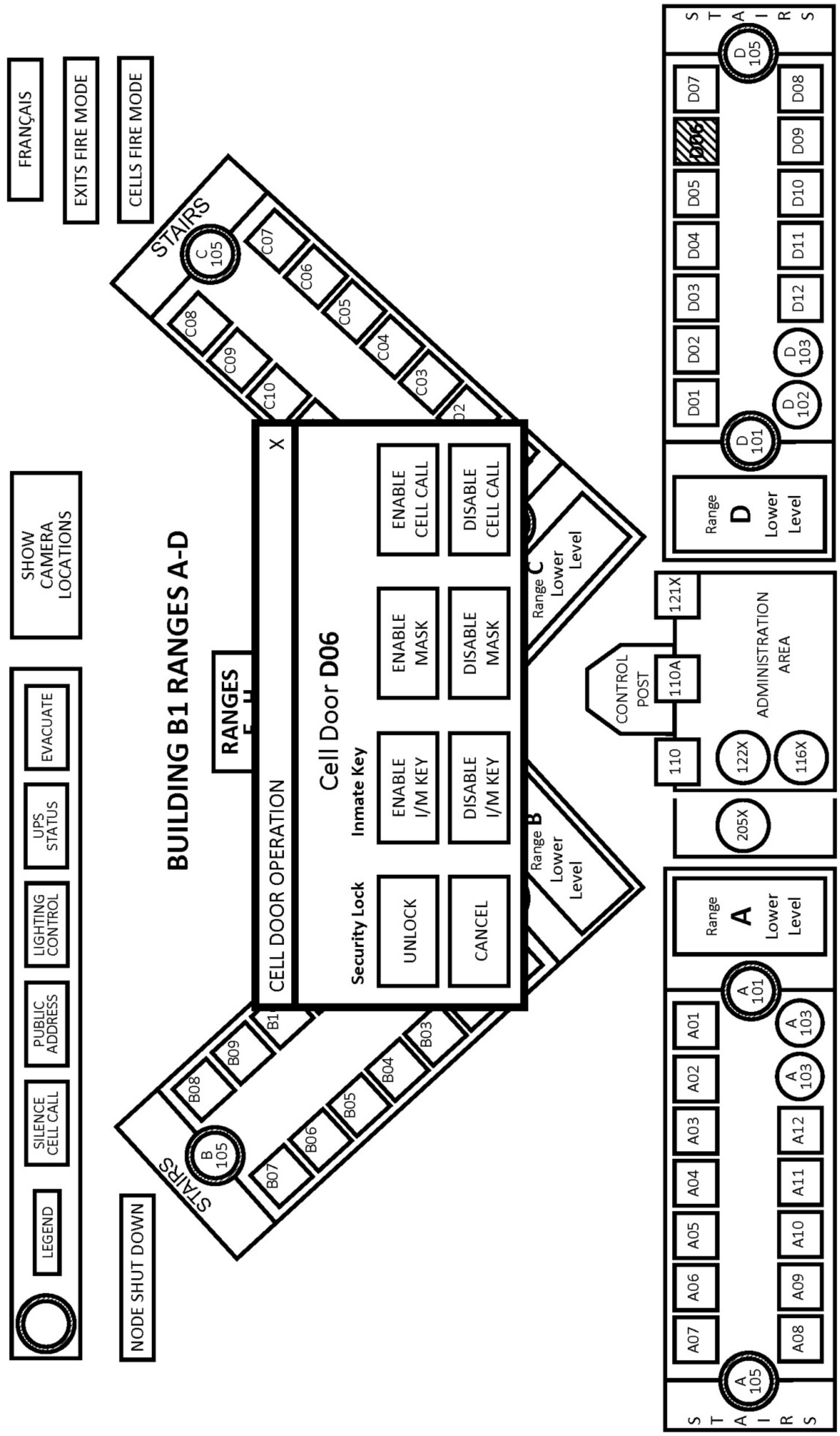
A–5–10 – DOOR RACK TEST



A–5–11 – DOOR ASSEMBLY IMPACT TEST



A–5–12 – CONSOLE – HOME



A–5–13 – CONSOLE – SINGLE DOOR CONTROL

A-6 ARCHITECTURE - HARDWARE

1. SCOPE

This section is a guide for the selection and specification of all hardware for correctional institutions.

2. RELATED SECTIONS

2.1 Technical Criteria Document

A–5 – Doors and Frames
A–13 – Security Control Posts, Galleries and Routes

2.2 CSC/PWGSC Specifications (NMS–CSC Masterformat2010 Sections)

08 34 63 – Detention hollow metal frames, doors, and door frames[1]
08 34 63.13 – Steel Detention Doors and Frames
08 34 63.16 – Steel Plate Detention Doors and Frames
08 34 63.33 – Detention Door Frame Protection
08 71 63 – Detention Door Hardware[2]

2.3 Detention Hardware Testing Standards

ASTM F1450–05 – Test Methods for Hollow Metal Swinging Door Assemblies for Detention Facilities
ASTM F1577–05 – Test Methods for Detention Locks for Swinging Doors
ASTM F1643–05 – Test Methods for Detention Sliding Door Locking Device Assembly
ASTM F1758–05 – Test Methods for Detention Hinges Used on Detention-Grade Swinging Doors

3. DEFINITIONS

3.1 ***Builder Hardware (BH)***: Heavy duty commercial Grade 1 hardware which is used to provide a degree of security and long use. It includes, but is not limited to: latch and lock sets, hinges, door pulls, door closers, door stops, silencers, kick plates etc. Hardware used for bedrooms and other rooms within free egress small group living suites do not require the same level of performance. Residential type shall be used. Lock functions for specific rooms shall comply with Builder hardware standard.

3.2 ***Detention Hardware (DH)***: Hardware used for containment and to withstand sustained and surreptitious forced intrusion at medium and maximum institutions. Such hardware is fabricated, supplied, and installed by specialty detention equipment manufacturers and contractors and meets applicable standards. Detention hardware shall be used with detention doors and grilles. Detention Hardware is categorized as:

DH1 – for swing doors at medium security institutions

DH2 – for swing doors at maximum security institutions and mediums in specific locations

DH2sl – for sliding doors or grilles at maximum security institutions and mediums in specific locations.

4. BUILDER HARDWARE

4.1 Standards

All finish hardware shall conform to the following ANSI/BHMA Standards[3]:

[1] Previous version (<2004): Section 11193 – Detention Doors, Panels and Frames
[2] Previous version (<2004): Section 11192 – Detention Hardware

- ANSI/BHMA A156.1–2006 – Standard for Butts and Hinge
- ANSI/BHMA A156.4–2000 – Standard for Door Controls – Closers
- ANSI/BHMA A156.14–2002 – Standard for Sliding and Folding Door Hardware
- ANSI/BHMA A156.13–2005 – Standard for Mortise Locks & Latches

4.2 Staff Controlled Doors

Doors equipped with locks and locksets controlled by staff shall be heavy duty cylindrical or mortise type and shall have a latch or bolt of no less than 19 mm. Power locksets used for fire exit doors shall be **fail-safe** on power outages and be linked to the fire alarm system to permit emergency egress.

4.3 Door Alarms

Exterior doors used in free egress facilities and in particular living units, are equipped with contact alarms to signal unauthorized egress. These alarms are activated during curfew hours from a 24 hour duty station. The contact alarms shall be triple bias type meeting UL-634 Level 1 and 2 high security switches.

4.4 Inmate Controlled Doors

Interior doors for free egress living units with locks controlled by both staff and inmates such as for bedrooms and main entrance doors to apartments shall be residential cylindrical type.

4.5 Keying

All builder locks shall be under a master key system. Key cylinders for use by staff shall be 7 pin type or alternates offering equivalent security. Where keying is permitted to inmates, key cylinders shall be 5 pin type. Two keys shall be provided for each lock and for each master key system.

4.6 Finish

All latch and lock sets, handles, pulls, kick plates and other door hardware shall be dull stainless steel (C32D), or dull chrome plate (C260).

5. DETENTION HARDWARE

5.1 Door Hardware

Door hardware except Finish hardware as noted above, shall be detention type selected to match the door type. As an example, hinges for DD2 doors shall be heavier duty than those for DD1 doors. Three hinges shall be used per door.

5.2 Mechanical Lock types

Detention Locks are available for hollow metal doors, grilles and flat plate in openings such as for food passes in cell doors. For hollow metal doors, locks are inset in the door as in a mortise mount. For plate openings they are surface mounted as is the bolt keeper. Locks come either with a latch which slam locks upon closure or with a deadbolt which requires to be retracted on closure and extended to lock. Slam locks are generally used in corridors, entry to program areas and for emergency egress doors often with doors equipped with closers. Deadlocks are used for storerooms, mechanical rooms and service chases where it may be desirable to leave the door ajar. These doors are not equipped with closers. Either lock requires to be opened locally by key and keys cannot be retracted until the latch or deadbolt is fully extended.

[3] The following standards have all been replaced by the ANSI/BHMA standards in the list: CGSB 69-GP-1M, CGSB 69-GP-2M, CGSB 69-GP-6M, 69-GP-9M, 69-GP-10M & 69-GP-11M, CGSB 69-GP-13M

5.3 Remote Controlled Lock Types

Remote controlled locks or locking devices are equipped with door indication switches to signal status of door. One switch is located at the head of the frame to monitor door position, the other switch is in the lock to monitor if latch bolt is extended or retracted. When door is fully closed and the latch bolt fully extended, the latch bolt is deadlocked triggering a secure status mode on the console. All locks are **fail-secure** on power outages and are not linked to the fire alarm system. The remote controlled lock types are as follows:

5.3.1 **DH1** locks used on swing doors (DD1) at medium security institutions shall be slim line which fit within a standard 50mm wide door frame. Locks are either electromechanically or pneumatically remote operated by motor or solenoid as well as mechanically and locally by key. Motorized locks are favoured for cells due to their quiet operation. Locks used for cell doors shall provide a separate keyway for use by the occupant to operate the door by electric switch when this function is activated from the housing unit control post. Key cylinders used for mechanical unlock shall be heavy duty commercial. Key cylinders used by inmates shall be light duty commercial / residential.

5.3.2 **DH2** locks used on swing doors (DD2) at maximum security institutions and (DD1) doors at specific locations as for exit doors at mediums, shall be of a higher security grade requiring a 150mm wide pocket within the frame. Locks are either electromechanically or pneumatically remote operated by motor or solenoid as well as mechanically and locally by key. Solenoid locks are effective for corridor doors as the bolt retraction clicks to alert persons to pass. Key cylinders used for mechanical unlock shall be mogul type. These locks do not normally come equipped with local electric switch unlock function.

5.3.3 **DH2sl** locking devices for sliding doors (DD2) at maximum security institutions are integrated within the sliding door assembly which incorporates tracks and guides, wheels, motorized drive and door locking mechanism and housing to protect all moving parts. Installation of sliding doors and assembly require plumb surfaces necessitating extra care during construction. Doors are chain driven moved by a motor or by a pneumatic system. They are locked at top and bottom of door either in open or closed position by remote control. Doors may be mechanically released and opened with the use of a special tool at an overhead location or by electrical switch operated by key. Mechanical gang unlock shall not be provided. Sliding door devices shall not be made to stop mid stream to allow for cuffing of inmates, instead, food/cuff passes shall be used for this purpose. A door when ajar subjects an officer to potential assault by ejected objects or liquids on all body parts.

5.4 Lock Mounting

Lock mountings shall be used for all Detention locks as recommended by the manufacturer. Key cylinders are set near flush to the lock face plate or shielded by a solid threaded ring. Where they protrude by more than 8 mm, they may be at risk of compromise enabling cylinder removal and manipulation of internal parts. Therefore in the case of excessive protrusion, key cylinders must be protected by a pipe collar attached to the lock face plate by a continuous weld.

5.5 Pneumatic Locks

Pneumatic locks and locking devices require power as well as air to secure or release the lock. Air tubing, compressors, dryers must be integrated with the installation. Compressors and dryers require secure locations and noise separation. These systems must be engineered by the lock supplier even though described within the mechanical specification and not the lock specification on project contract documents.

5.6 Keying

All locks shall be keyed individually and shall have a maximum of three keys supplied for each lock. Each key shall be stamped with a code number and date; all keys for Detention hardware locks shall be delivered in a sealed container to the designated CSC representative – typically the Security Maintenance Officer. Separate construction key cylinders shall be used by the contractor until substantial completion of the building.

5.7 Fastening Devices

Fastening devices used in inmate areas shall include security screws, security nuts, rivets, spanner screws or other equally secure devices, depending on the particular installation or level of security required.

5.8 Finish Hardware for Detention Doors

5.8.1 Detention doors equipped with Detention hardware may be supplemented by finish hardware items such as door closers, silencers, kick plates etc. All such hardware shall minimally be heavy duty commercial grade.

5.8.2 Door closers shall be installed in a manner which will prevent dismantling.

5.8.3 All double doors to have astragals and/or lock guard plates to prevent saw blades from being used on latches or deadbolts.

5.9 Key Cabinet

5.9.1 One key cabinet in each Control Post shall be provided to hold keys used in any functional area to be controlled by a security guard.

5.9.2 One key cabinet for a duplicate set of all keys shall be located with the Deputy Warden operations or designated staff member.

5.9.3 One key cabinet for a reserve duplicate set of all keys shall be located in a secure area at Security Administration.

5.9.4 Electronic key cabinets with tracking capability are used for all other staff keys to access their respective work areas. These doors are commercial grade equipped with commercial grade locks and cylinders. The key cabinet shall be located close to the main entrance of the institution and directly accessible to staff.

6. HARDWARE SCHEDULE

A proposed hardware schedule shall be submitted for review by CSC at the 66% working drawing stage.

A-7 ARCHITECTURE – FINISHES AND MODESTY SCREENS

1. SCOPE

This section provides performance criteria and guidelines for interior finishes for buildings at correctional institutions. Included in this section are modesty screens used in washrooms, cells and search areas.

2. RELATED SECTIONS

2.1 Technical Criteria Document

G–2 – Fire Authorities and Classification
A–2 – Building Construction
A–8 – Building Acoustics

2.2 Manuals and Standards

- Architectural Painting Specification Manual, Master Painter Institute, March 2006
- CAN/CGSB 85.100-93 Painting

3. PERFORMANCE CRITERIA

3.1 Interior finishes shall contribute to the need to provide safe institutions. Commensurate with the security level of the institution, interior finishes should minimize the opportunities available to the inmate to hide contraband and to transform building materials into weapons.

3.2 Interior finishes should be cost effective while being durable, easy to maintain and repair. Finishes should not exceed the level of quality used at public funded community facilities.

3.3 Although safety and cost effectiveness have priority, interior finishes shall contribute to a visually pleasing environment which may serve to influence the well-being and a harmonious interaction of inmates and staff.

4. DESIGN GUIDELINES

4.1 The choice of finish corresponds to the security requirements of a space usage, and the degree of staff supervision of that space. In general, areas of minimal staff supervision should not have finishes which allow concealment, while areas of frequent supervision allow for more latitude. Finishes used to cover overhead structural members and service lines may be avoided in supervised areas provided other relevant criteria are met.

4.2 Finishes for cells shall contribute to achieving a softer environment. Flooring for example shall be tiled as opposed to an epoxy sealed concrete even though the latter may be better from the standpoint of longevity, maintenance and security but harsher and harder than tile. The cove base at a concrete block wall however could be of epoxy for a clean non-removable finish. For coves on drywall, consider glued down wood trim and caulking.

4.3 Finishes for kitchens shall be selected based on longevity and ease of maintenance and sanitation. Although specific finishes are identified in the tables which follow, alternates such as seamless flooring which are commonly used in commercial kitchens and which are cost effective and have a proven performance shall also be considered.

4.4 Colour schemes should be such that they offer good visibility for effective security surveillance. Observation is greatly improved by providing light background colours; while this is less critical at close range, it is more important at a longer range, and becomes critical for the end walls of corridors. Colour schedules shall be approved by CSC.

4.5 Dark colours on screens and grilles enhance observation through these elements.

4.6 Spaces can be enhanced with the use of inmate wall graphics or paintings.

4.7 A suggested summary of interior finishes for various areas follows in Table A-7-2; and A-7-3. The designer may suggest alternate finishes for CSC approval. Designations FL, CL, and WL refer to finishes identified in Table A-7-1.

5 MODESTY SCREENS

5.1 Modesty screens aim to provide limited privacy to inmates during their use in areas such as toilets, showers, cells, and for strip search.

5.2 In areas other than cells, modesty screens may be standard steel toilet partitions with a clearance of 300 mm from the floor.

5.3 For cells, screens may be used to limit views of the use of toilet through the viewing port in the cell door. Space permitting, screens may be integrated with the furniture or be stand-alone. For this use, partitions may be fixed or curtain type as described below. Screens shall not obstruct views of the occupant beyond the toilet area.

5.4 Showers shall have canvas type curtains with clear vinyl tops and bottoms measured 1400 mm and 450 mm from the floor respectively. Military National Stock Number 7230 21 868 6585[1] – CURTAIN, SHOWER – gives details of such curtains.

5.5 Strip search areas shall be provided with tracks and enclosure curtains as stated for showers.

5.6 For existing institutions with grille front cells, modesty screens or curtains shall be installed at the inmate's request.

5.7 Both modesty screens and shower curtains must be made of fire resistant material. The Fire Safety Manual[2] – Section 8 – Paragraphs 54 and 55 reflect flammability requirements of the National Fire Code of Canada.

TABLE A-7-1 – LIST OF SUGGESTED FINISHES

AREA	ELEMENT
Floor/Base	FL-1 - Carpeting (glue-down nylon, low pile textured loop)
	FL-2 - Resilient tile flooring (rubber base)
	FL-3 - Painting over Concrete, gloss enamel
	FL-4 - Resilient sheet flooring (vinyl) with rubber base
	FL-5 - Concrete floor finish (shake non-metallic hardener into finish and apply acrylic cure and seal)
	FL-6 - Porcelain/quarry tile with tile base
Ceilings	CL-1 - Acoustical Panels and Tiles (suspended lay-in system)
	CL-2 - Painting of suspended gypsum board
	CL-3 - Acoustical Panels and Tiles (concealed non-accessible system)
	CL-4 - Painting on Exposed Structure, primed ferrous metal surfaces: Semi-gloss enamel. Galvanized and zinc coated metal: semi-gloss enamel; Zinc coated metal decking; flat paint
	CL-5 - No finish
	CL-6 - Painting of underside of concrete, semi-gloss enamel

1 http://7230.iso-group.com/NSNDetail/7230-21-868-6585/7230218686585.aspx

2 345 - FIRE SAFETY MANUAL, Issued under the authority of the Assistant Commissioner, 2005-12-01

AREA	ELEMENT
	CL-7 - Acoustical Panels and Tiles (glued to suspended gypsum board)
Walls	WL-1 - Gypsum or wood panel mounted on stud-type partitions
	WL-2 - Gypsum or wood panel mounted on concrete block/concrete (fire-rated and exterior walls)
	WL-3 - Painting on concrete block/concrete, semi-gloss enamel
	WL-4 - Gypsum over wood panel or expanded steel mesh on stud-type partitions
	WL-5 - Ceramic Tile (dado to 1800 mm)
	WL-6 - High build glazed coating, high gloss on concrete block/concrete
	WL-7 - Painting on concrete block/concrete gloss enamel
	WL-8 - Semi-gloss enamel with cellular wood fibre cementitious composition boards applied on upper half of wall (out of reach where possible)
Doors/Frames	DL-1 - Painting, semi-gloss enamel
Other Elements (miscellaneous metalwork, grills, etc.)	O1- Painting, high gloss enamel

TABLE A–7–2 – SUGGESTED SUMMARY OF INTERIOR FINISHES

DEPARTMENT	Floor FL	Ceiling CL	Walls WL
Group A Administration			
A1 Management Centre	FL-1/FL-2	CL-1	WL-1/WL-2
A2 Finance	FL-1/FL-2	CL-1	WL-1/WL-2
A3 Staff Services and Training	FL-1/FL-2	CL-1	WL-1/WL-2
A4 Administration & Central Registry	FL-1/FL-2	CL-1	WL-1/WL-2
A5 Case and Sentence Management	FL-1/FL-2	CL-1	WL-1/WL-2
A6 Parole Board Hearing	FL-1/FL-2	CL-1	WL-1/WL-2
Group B Security			
B1 External Security	FL-2	CL-2	WL-3
B2 Emergency Response & Armoury	FL-2	CL-2	WL-3
B3 Security Administration	FL-1/FL-2	CL-1	WL-1/WL-2
B4 Admissions & Discharge	FL-1/FL-2	CL-2	WL-3
Group C Socialization			
C1 Social Programs & Leisure Activities	FL-2	CL-3	WL-3
C2 Arts & Crafts	FL-3	CL-4	WL-3
C3 Private Family Visiting	FL-2	CL-3	WL-3
C4 Visits & Correspondence	FL-2	CL-3	WL-3
C5 Recreation	FL-2	CL-4	WL-3
Group D Spirituality			
D1 Chaplaincy	FL-2	CL-3	WL-3
D2 Aboriginal Services	FL-2	CL-3	WL-3

DEPARTMENT	Floor FL	Ceiling CL	Walls WL
Group E Housing			
E1 Small Group Accommodation	FL-2	CL-2	WL-1
E2 Minimum Security Unit	FL-2	CL-2	WL-1
E3 Responsibility Unit	FL-2	CL-2	WL-1
E3 Direct Observation Unit	FL-2	CL-4	WL-3
E5 Maximum Security Unit	FL-2	CL-4	WL-3
E6 Segregation Unit	FL-2	CL-4	WL-3
Group F Health Services			
F1 Health Care Centre	FL-2	CL-2	WL-1/WL-2
F2 Mental Health Care	FL-2	CL-2	WL-1/WL-2
Group G Technical Services			
G1 Maintenance	FL-5	CL-5	WL-4
G2 Food Services	FL-6	CL-2	WL-5/WL-6
G3 Institutional Services	FL-4	CL-6	WL-7
G4 Material Management	FL-5	CL-5	WL-4
Group H Occupational Development			
F1 Occupational Development/CORCAN	FL-5	CL-5	WL-4
Group J Education & Personal Development			
G1 Education	FL-2	CL-3	WL-3
G2 Correctional Programs	FL-2	CL-3	WL-3
G3 Library	FL-2	CL-3	WL-3
Circulation	FL-2	CL-2	WL-3

TABLE A-7-3 – SUMMARY OF INTERIOR FINISHES IN SPECIFIC SPACES

SPACE	Floor FL	Ceiling CL	Walls WL
Vault, secure storage, terminal equipment rooms, telecommunications equipment, inmate rooms, segregation cells, armoury	FL-2	CL-6	WL-3
Washrooms (staff, inmate and public), bathing laundry	FL-3	CL-6	WL-6
Entrance / Vestibules	FL-6	CL-2/CL-6	WL-2/WL-3
Storage spaces type 3, loading dock, compressor rooms, receiving/issuing, training rooms	FL-5	CL-5	WL-4
Offices, dining rooms, tailoring room	FL-2	CL-3	WL-3
Maintenance closets	FL-3	CL-5	WL-3
Music room	FL-1/FL-2	CL-7	WL-8

A-8 ARCHITECTURE – BUILDING ACOUSTICS

1. SCOPE

This section outlines acoustic considerations unique to correctional facilities.

2. RELATED SECTIONS

2.1 ***Technical Criteria Document***

A–7 – Finishes and Modesty Screens

2.2 Mechanical design requirements referring to noise and vibration control are outlined in the Mechanical sections of this Technical Criteria Document. These sections are:

M–1 – General Mechanical Requirements
M–2 – Plumbing Requirements
M–3 – Fire Protection Requirements
M–4 – Heating, Ventilating & Air Conditioning Requirements

2.3 ***Other references***

- National Building Code of Canada 2010, National Research Council, 2010, ISBN 0-660-19976-4, Division B – Section 9.11 Sound Control http://www.nrc-cnrc.gc.ca/eng/ibp/irc/codes/2010-national-building-code.html
- CSA Z107.10–06 – Guide for the use of Acoustical Standards in Canada
- CSA Z107.58–02, Noise Emission Declaration for Machinery
- ASTM E90–09 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- ASTM E336–10 Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings
- ASTM E413–10 Classification for Rating Sound Insulation
- The Acoustics Design Guide for Corrections, Advisory Council on Corrections and Acoustics, 1993

3. DEFINITIONS

The following criteria are used to define the acoustic requirements of a given space and are useful here in interpreting the ratings in table A-8-1 which follows:

3.1 The **Noise Criterion (NC) number** – indicates the recommended maximum permissible background noise level in dBA in the important 1200 – 2400 Hz frequency band.

3.2 The **Sound Transmission Class (STC) number** – determines the sound transmission loss through a construction assembly considering the frequency range audible to the human ear. This indicates the required noise insulation for a closed space.

3.3 The **Reverberation Time (RT) rate** – is a measure of the reverberation time at which the reverberant sound dies away. This is defined as the time required for the reverberant sound to diminish by 60 dB. The RT depends on the absorptive area and the volume of the space.

4. PERFORMANCE CRITERIA

4.1 Acoustical treatment shall be considered in the design of spaces as an integral element.

4.2 Building sub systems shall consider the acoustic implications on the surrounding areas.

4.3 All acoustic assemblies shall be compatible with the security requirements of the institution. Special attention should therefore be paid to finishes such as sound reflectors, suspended ceilings, etc., within inmate areas which are only periodically supervised. To control concealment, acoustical panelling shall be set high from the floor and / or allow for ease of detection if tampered with.

5. DESIGN GUIDELINES

5.1 Ceilings and walls in group areas such as a library, classrooms, chapel, common dining rooms and visits rooms may be provided with acoustical panels applied to solid structure or other monolithic finish.

5.2 For inmate areas, suspended lay-in tile acoustical ceilings are acceptable for high ceiling application or for areas under the presence of staff.

5.3 Noise reducing acoustic treatment is not required in recreational or shop occupational areas. The location of these relatively noisy areas within the correctional complex must be considered so that conflicts do not develop between noisy and quiet spaces.

5.4 The acoustical requirements of administration offices within a correctional institution will correspond to those of similar facilities located in any public office building[1].

5.5 Interview rooms and enclosed offices shall have no other treatment than standard office partitions with appropriate insulation and solid core office doors but assuring viewing capability from the corridor. Ceilings shall be either lay-in acoustical tile or drywall.

5.6 Boardrooms and classrooms shall have their partitions extend to the underside of the floor or roof above to achieve a higher sound transmission barrier.

5.7 Cells and bedrooms shall have their partitions extend to the underside of the floor or roof above.

5.8 The table below provides general guidelines with ratings assumed to be achievable using conventional construction materials and methods. Testing for results accomplished is not intended.

Table A–8–1 – General Building Acoustics (Basic Design Guide)

SPACE	NC(dB)	STC(dB)	RT(SEC)
Chapel, Library, Classrooms, and boardrooms	30	40-45	0.3-0.5
Administration Offices and interview rooms	35-40	35-40	0.3-0.5
Dining Rooms,	35-40	40-45	1.0-1.2
Parole Hearing Room + Deliberation Room	35-40	45	0.3-0.5
Inmate Cells + Bedrooms	40	35-40	0.3-0.5
Living unit common areas	35-40	35-40	1.0-1.2
Visit & Correspondence at Medium & Maximum Levels	*Provide acoustical treatment to the room to enhance monitoring of conversations with listening devices*		
Mechanical noise-generating devices	*Provide isolation and absorption in order to meet the above*		

[1] CSA–Z412–00 (R2005) – Guideline on Office Ergonomics, Section 6.3 The acoustical environment
Public Works and Government Services Canada, An Architect's Guide for Sustainable Design of Office Buildings, Section 2.9 Improving Acoustic Quality, http://www.tpsgc-pwgsc.gc.ca/biens-property/archtct/page-2-eng.html#a2
Public Works and Government Services Canada, Fit-up Standards: Technical Reference Manual http://www.tpsgc-pwgsc.gc.ca/biens-property/documents/pubs-am9-eng.pdf

A-9 ARCHITECTURE – INTERIOR SIGNAGE

1. SCOPE

This section outlines requirements for interior signage in correctional institutions other than contained in the Treasury Board of Canada (TB) procedural manual Signage: System Overview and Implementation. The TB manual provides standard requirements for government buildings, including correctional facilities.

2. GENERAL REQUIREMENTS

2.1 Signs required by an institution fall into four (4) categories:

- Outdoor Path Finding/Directional Signs required in public areas,
- Building Identification Signs,
- Room/Door Identification Signs which include the building number,
- Interior signs necessary for operational reasons.

The room and door numbering system which is required shall form part of the building construction package in order to allow the early identification of door locations at the commissioning stage.

2.2 The need for signage is limited in many areas which are not open to the public or in which access is restricted and movement is controlled; in such cases, a door numbering system is adequate. Where staff offices and work stations are located, name plates may be required; corporate identity signs shall be used to meet requirements in such cases.

3 DESIGN REQUIREMENTS

3.1 All buildings and rooms shall be supplied with alphanumeric identification in accordance with established regionally approved system.

3.2 The building shall have all signage in place before it is occupied. For this the contract documents shall have the rooms numbered as per the numbers in use at that institution.

3.3 The conventions to be followed are: the building has a number which is the next number that follows existing buildings. Rooms within the building are by floor 001, 002… for the basement; 101, 102… for the ground floor, 201, 202… for the 2nd floor, and etc. Rooms accessible from another room but not from the corridor have a letter ending ie 101A is accessible from 101 and 101B is accessible from 101A.

3.4 All signs shall be sized and labeled in accordance with the above TB manual and signs shall be surface mounted and follow the location used at that institution.

3.5 Signs shall be affixed so that they are not easily removable. For higher security institutions, security type fasteners shall be used.

4 PROCUREMENT OF SIGNAGE

Signage shall be procured from a federally approved supplier (standing offer with a signage company). Procurement shall comply with normal CSC established procedures or form part of the construction project.

A-10 ARCHITECTURE – CONTRABAND AND BANNED SUBSTANCE CONTROL

1. SCOPE

This section establishes building construction requirements for the areas whose purpose involves screening of persons for contraband and banned substances.

2. RELATED SECTIONS

2.1 Technical Criteria Document

SP–3 – Gates/Sally Ports
A–11 – Inmate Cells
A–13 – Security Control Posts, Galleries & Routes
A-14 – Special Observation Cells

3. PERFORMANCE CRITERIA

3.1 Contraband and Banned Substance Control

3.1.1 The Gatehouse provides for the control and screening of all visitors with the aid of walk-through metal scanners, ion scanners and x-ray luggage scanners. Other areas where walk-through scanners may be located are along inmate traffic areas originating from workshops. Package scanners may also be used in Admissions and discharge area for all effects purchased by inmates. For other than the Gatehouse, need and location for contraband control equipment shall be established on a project specific basis.

3.1.2 Location of equipment shall consider potential interference from:

- Electric Cables
- Electric Motors
- Moving Metal Objects: metal doors, conveyors, carts, moving signs, metal chains
- Stationary Metal Objects: heating pipes, ventilation ducts, steel beams, and metal barriers.

3.1.3 In connection with contraband control at the main entrance, small lockers are required to provide for storage of handbags and possessions which are not permitted inside the institution. The lockers shall be located such that they are accessible to visitors prior to being screened and cleared for entry. Locker location shall also consider the need to observe what is being placed in the lockers. Smaller lockers for keys or cell phones belonging to officials may be located close to screening.

3.1.4 In addition to the use of contraband control equipment, screening is supplemented by the use of a trained drug detection dogs. This procedure requires a clearly identified spot on the floor for the person to stand.

3.1.5 A search room is provided adjacent to the screening area to allow for a search to be conducted on a suspected person in accordance with directives.

3.2 Contraband and Banned Substances Recovery

3.2.1 Holding Dry Cell

This cell provides for a safe and sanitary collection of fecal specimen. An inmate is placed in the cell when suspected of harbouring drugs in his body. Inmates are placed in this cell under supervision for up to 3 days . The cell is minimally furnished comprising a bed and a dry toilet, known by its proprietary name as

"Drugloo". Similarly performing equipment when available shall be acceptable as alternate. The "Drugloo" requires an adjacent secure room for the collection of the specimen. The said suite which is limited to this specific use is typically situated in the segregation unit. The cell shall be constructed and equipped to minimize suspension points as a measure for suicide prevention.

Surveillance of the inmate, when locked in the cell, is performed by an infrared wide angle camera monitored from the Segregation Control Post or in person by staff from outside of the cell.

3.2.2 Banned Substances Recovery Room

The recovery room located adjacent to the dry cell with a dedicated access is used for the retrieval of banned substance from the "Drugloo" recovery port. A sink for hand washing is provided as well as a counter with a cabinet below for the officer to package and identify the specimen and store the specimen ready to be sent to a lab.

3.2.3 Urinalysis Room

This room is used for the collection of urine specimen from inmates who may be suspected of drug use or as part of a random testing procedure to ensure that inmates are free of drug use. This room is an oversized washroom where the inmate is given a container used over a toilet. An officer is typically present to observe the inmate and collect the container. The officer stands behind a glass panel located to enable viewing. A sink for hand washing is located convenient for both parties and a counter with a cabinet below is provided for the officer to identify the container and store the specimen ready to be sent to a lab.

4. DESIGN GUIDELINES

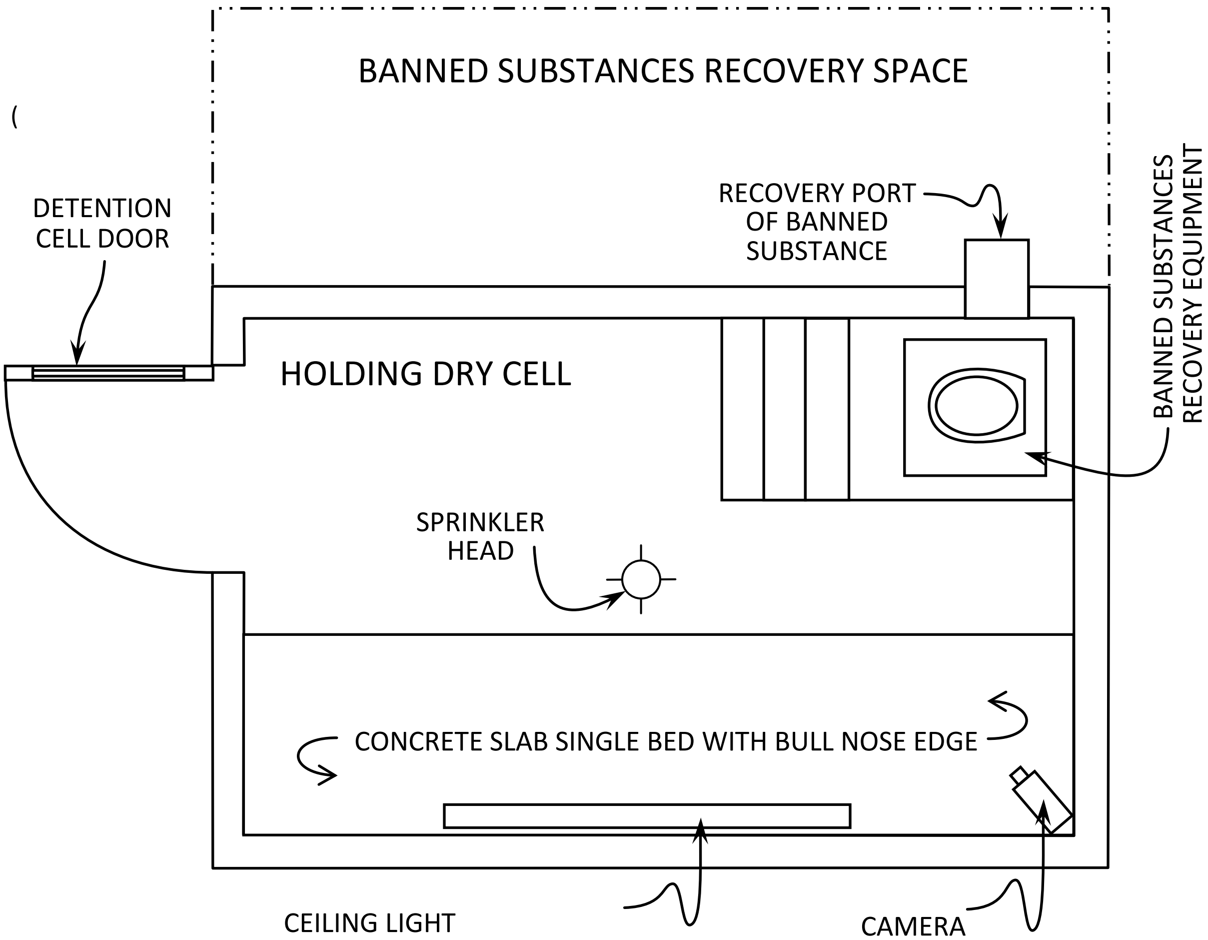
4.1 Location of Dry Cell and Recovery Room

The suite should be located close to the Segregation control post and separate from segregation inmate traffic as inmates move to showers and yards. This suite would ideally be integrated with the Special Observation cell both of which require in person surveillance with camera back-up from the exterior of the cells.

4.2 Dry Cell and Recovery Room Technical Features

Both rooms shall be designed to the same requirements as a cell: the dry cell and the recovery room each sized at $6m^2$. These, being short term use spaces, windows are not required. Both rooms shall be equipped with floor drains and the cell with a concealed water bib. Ventilation and heating shall be as per cell requirements and light switch on the corridor side. Doors shall be style A with double half lights with a food/cuff port as for the Special observation cell. Because the Drugloo is elevated by 3 steps to reach the platform with the toilet, the height from the platform to the ceiling should be a minimum of 1900 mm.

PLATE A–10–1 – DRY HOLDING CELL & BANNED SUBSTANCES RECOVERY EQUIPMENT



A-11 ARCHITECTURE – INMATE CELLS

1. SCOPE

This section outlines performance and design requirements for inmate bedrooms and cells for Minimum to Maximum Institutions, for both "Regular" and "Special" inmate populations.

2. RELATED SECTIONS

2.1 **Technical Criteria Document**

A–2 – Building Construction
A–3 – Grilles, Screens and Mesh
A–4 – Glazing, Windows and Assemblies
A–5 – Doors & Frames
A–6 – Hardware
A–14 – Special Observation Cells
All Mechanical Sections
E–4 – Interior Lighting & Cell Lighting Fixtures

3. DEFINITION OF TERMS

3.1 ***Regular Inmate Population*** refers to inmates who have general access to program areas in the institution. Within the Regular populations there are sub-classifications reflecting differences in the Custody rating scale and corresponding behavioural expectations.

3.2 ***Special Inmate Population*** refers to inmates who are isolated from the regular population for specific reasons; these include inmates in Segregation, Treatment and Care, Reception, Temporary detention and the Special Handling Unit. Generally, these populations form a smaller subgroup within a larger institution and they have limited access to program areas of the Institution.

4. SECURITY REQUIREMENTS

4.1 Inmate bedrooms in Minimum security living units (S-2) are free egress with the exception that unauthorized egress to the outdoors shall be capable of being detected. This is typically achieved by the bedroom window openings being restricted to a maximum of 125 mm or by affixing window insect screens so that they would need to be ripped or damaged to allow egress.

4.2 Inmate bedrooms within S-3 living units in Medium Institutions though free-egress are located in apartments which have impeded egress and as such the exterior envelope of bedrooms and all other spaces within the suite shall provide for confinement. This is achieved by the exterior walls being constructed of concrete block reinforced and core filled and the for the bedroom windows to have a restricted opening to a maximum of 125 mm. There is no security requirement for any of the interior walls or openings of the bedrooms; drywall shall be used.

4.3 Cells in S-4 to S-7 living units in Medium and Maximum Institutions shall be designed to provide secure and safe confinement of the inmate.

4.4 Given a ban in the use of tobacco, matches or lighters are no longer permitted other than for aboriginal ceremonial purposes and therefore the threat of cell fires are mitigated.

5. PERFORMANCE REQUIREMENTS

5.1 All inmate bedrooms and cells shall meet the following requirements:

5.1.1 Single occupancy, unless sanctioned for double bunking by the Commissioner of CSC[1] under conditions of population pressures. This is seen to be a temporary measure;
5.1.2 Natural light via an in bedroom / cell window; the size of the glazed opening shall be a minimum of 5% of the floor area of the cell;
5.1.3 Natural ventilation operated by the occupant;
5.1.4 Continuous access to a toilet and wash basin equipped with hot and cold running water; in S-2 and S-3 living units in Minimum and Medium Institutions, toilets and wash basins shall be outside of the bedrooms within the suite;
5.1.5 An artificial lighting level adequate for reading and for personal grooming;
5.1.6 A provision for electrical equipment plug in;
5.1.7 Capability for unobstructed observation by staff for the purpose of counts and safety checks;
5.1.8 Ambient room temperature appropriate to a winter comfort zone;
5.1.9 Ambient background noise levels (NC) according to Section A-8 Building Acoustics;
5.1.10 Smoke detection with annunciation in a 24/7 occupied control post and sprinkler protection within each bedroom and cell;
5.1.11 Quality of construction materials, fittings, and furnishings to be commensurate with the expectations of inmate behavior and the trust accorded to inmates. S-2 and S-3 bedrooms in living units shall be designed with the least harshness and hardness.

5.2 Cells at Medium and Maximum Institutions, for all populations, shall satisfy the general conditions in item 5.1 and shall also provide:

5.2.1 Adequate mechanical ventilation of re-circulated filtered air recognizing the provision of an in cell toilet;
5.2.2 A cell call system with annunciation in a 24/7 occupied control post;
5.2.3 Construction materials, fittings and furniture which curtail the following:
5.2.3.1 Self mutilation and suicide;
5.2.3.2 Barring of doors;
5.2.3.3 Hiding of contraband;
5.2.3.4 Passing of contraband;
5.2.3.5 Escape;
5.2.3.6 Intrusion from outside the cell;
5.2.3.7 Dismantling or smash up;
5.2.3.8 Easy voice communications between cells.

Note: The degree to which this condition is to be satisfied varies with the type of inmate classification. Typically disruptive activities for “regular” populations in Medium Institutions are moderate, they are high in Maximums and they vary for “Special” populations depending on security classification.

[1] Commissioner’s Directive (CD) 550 – Inmate Accommodation and Policy Bulletin 315 (2010-08-11)

6. DESIGN REQUIREMENTS

6.1 Spatial [2]

6.1.1 S-2 and S-3 bedrooms at Minimum and Medium Institutions are not equipped with a toilet and wash basin. Toilet and wash basin are shared in the residential unit. The net living area of the bedroom is 6.5 m^2 minimum.

6.1.2 S-4 to S-7 cells at Medium and Maximum Institution for "Regular" and "Special" populations are equipped with a toilet and wash basin. The net living area of the cell (except for Health Care and handicapped cells) is 7.0 m^2 minimum.

6.1.3 Health Care Cells at all institutions require a larger area for manoeuvrability of a hospital bed and patient care. The net living area is 10.2 m^2 minimum.

6.1.4 Barrier free cells are intended for mechanical wheel chair use and are sized at 10m^2. These cells may not be suitable for motorized chairs and hence may require a furniture refit to suit. Percentage of cells dedicated for handicapped use is a maximum of 2% per housing unit but 1% of the institutional capacity given older housing units cannot be practicably retrofitted to accommodate handicapped inmates.

6.1.5 A utility chase accessible from a cell corridor is typically shared between two cells each equipped with a toilet and wash basin. Whether a chase serves two cells or one cell, it shall have a net area of no less than 0.5 m^2.

6.1.6 Minimum floor to ceiling height for all bedrooms and cells shall be 2400 mm.

6.2 Floors and Ceilings

For detailed information refer to TCD section A-2, Building Construction.

6.3 Walls

For detailed information refer to TCD section A-2, Building Construction.

6.4 Ventilation Grilles

Ventilation Grilles must not allow suspension ("ligature resistant") and comply with the *ASTM F2542–05*[3] physical assault test. For more detail see Section M-4. This requirement is critical for S-6 and S-7 and Segregation cells.

6.5 Doors

Refer to TCD section A-5, Doors and Frames, and to TCD section A-6, Hardware.

6.6 Windows

Refer to TCD section A-4, Windows.

6.7 Mechanical

Pipes located close to the ceiling shall not be exposed but encased in a housing so as not to offer a suspension point. Refer to TCD sections related to Mechanical.

6.8 Electrical

Conduit located close to the ceiling shall not be exposed but encased in a housing so as not to offer a suspension point. Refer to TCD sections related to Electrical.

[2] Commissioner's Directive 550 – Inmate Accommodation, February, 2013,
[3] ASTM F2542–05 Test Methods for Physical Assault on Ventilation Grilles for Detention & Correctional Facilities.

6.9 Furniture

6.9.1 With the exception of hospital type beds required in Health Care Units, CORCAN is given an opportunity to manufacture and supply furniture on a first refusal basis. The first refusal depends on price competitiveness with equivalent furniture and on an acceptable delivery schedule for the project.

6.9.2 Furniture at S-4 to S-7 cells at Medium and Maximum Institutions shall be metal and secured in place with the appropriate anchoring clearly specified in the construction contract documents. Furniture in S-2 and S-3 bedrooms shall be loose and of wood.

6.9.3 Hooks in all cells shall be a type with a pin and ball in socket to rotate down with weight and to prevent snagging or catching a line.

6.9.4 Cork boards for pinning pictures are permitted but must be of light and attached to the wall with 'Velcro' to facilitate removal for checking for contraband.

6.9.5 Furniture for bedrooms and cells is outlined in the table which follows.

6.10 Curtains and Blinds

Window curtains and blinds including textiles and films that are provided or permitted in locked detention and correctional buildings shall conform to requirements of the Fire Safety Manual – Section 8 – Paragraphs 54 and 55[4].

6.11 Double Bunking

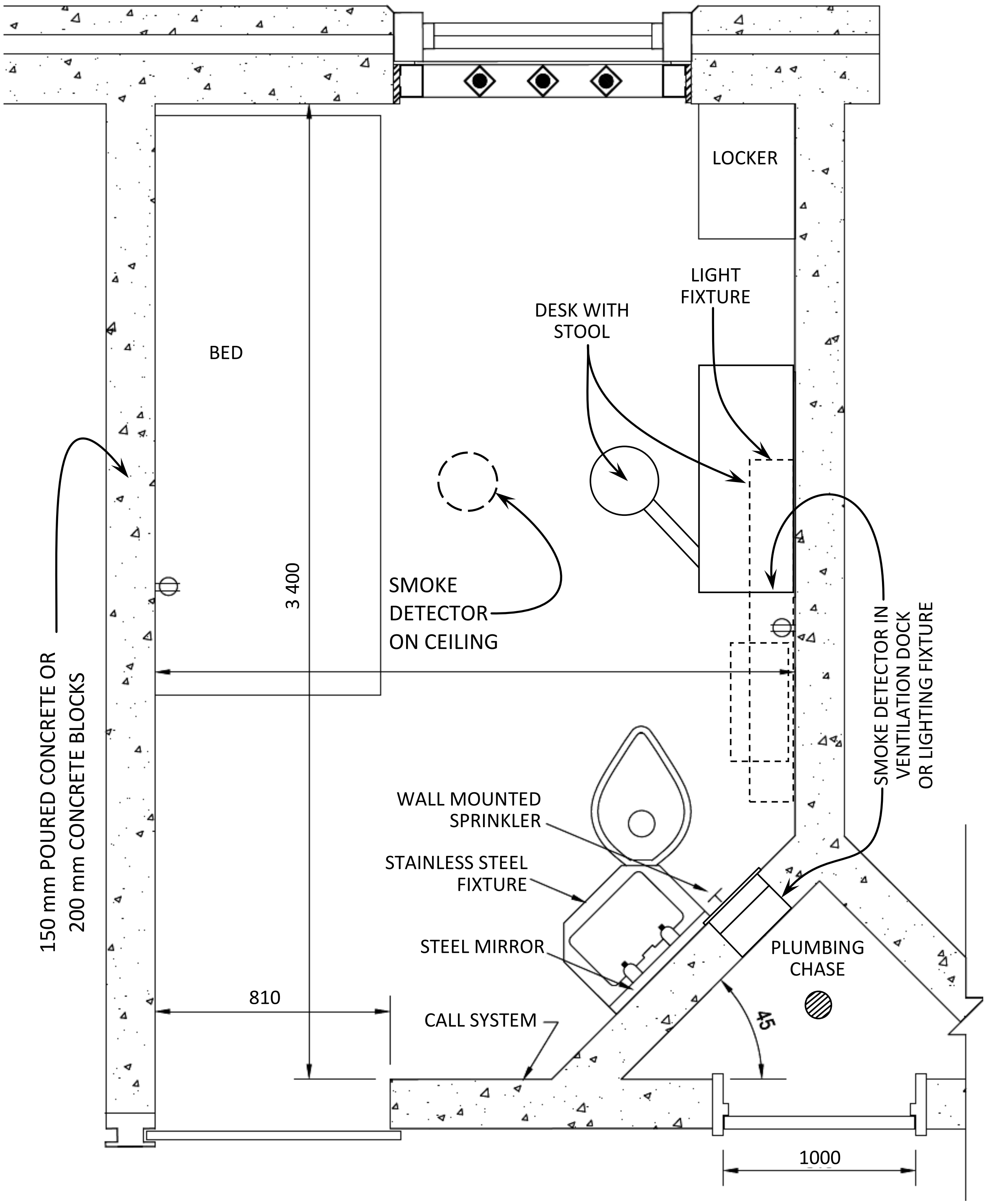
Double bunking is a temporary measure used during times of population pressures. CD 550 outlines requirements and conditions for the use of double bunking. In the design of double bunks, the height of the upper bunk shall be such that it does not impede viewing of the sleeping inmates during cell checks. To allow this, the mattress height should be approximately 1500 mm. Safety rails shall only be used at the location of the ladder or steps as a hold for safe access. The clear spacing between the two bunks shall be 900 mm. Space permitting; additional furniture and a modesty screen may be supplemented for convenience and dignity. For all installations, provision for the safe storage of personal belongings is required. Metal lockers or durable fabric bags are typically used and stored under the lower bunk.

[4] 345 - FIRE SAFETY MANUAL, Issued under the authority of the Assistant Commissioner, 2005-12-01

TABLE A-11-1 – BEDROOM/CELL FURNITURE

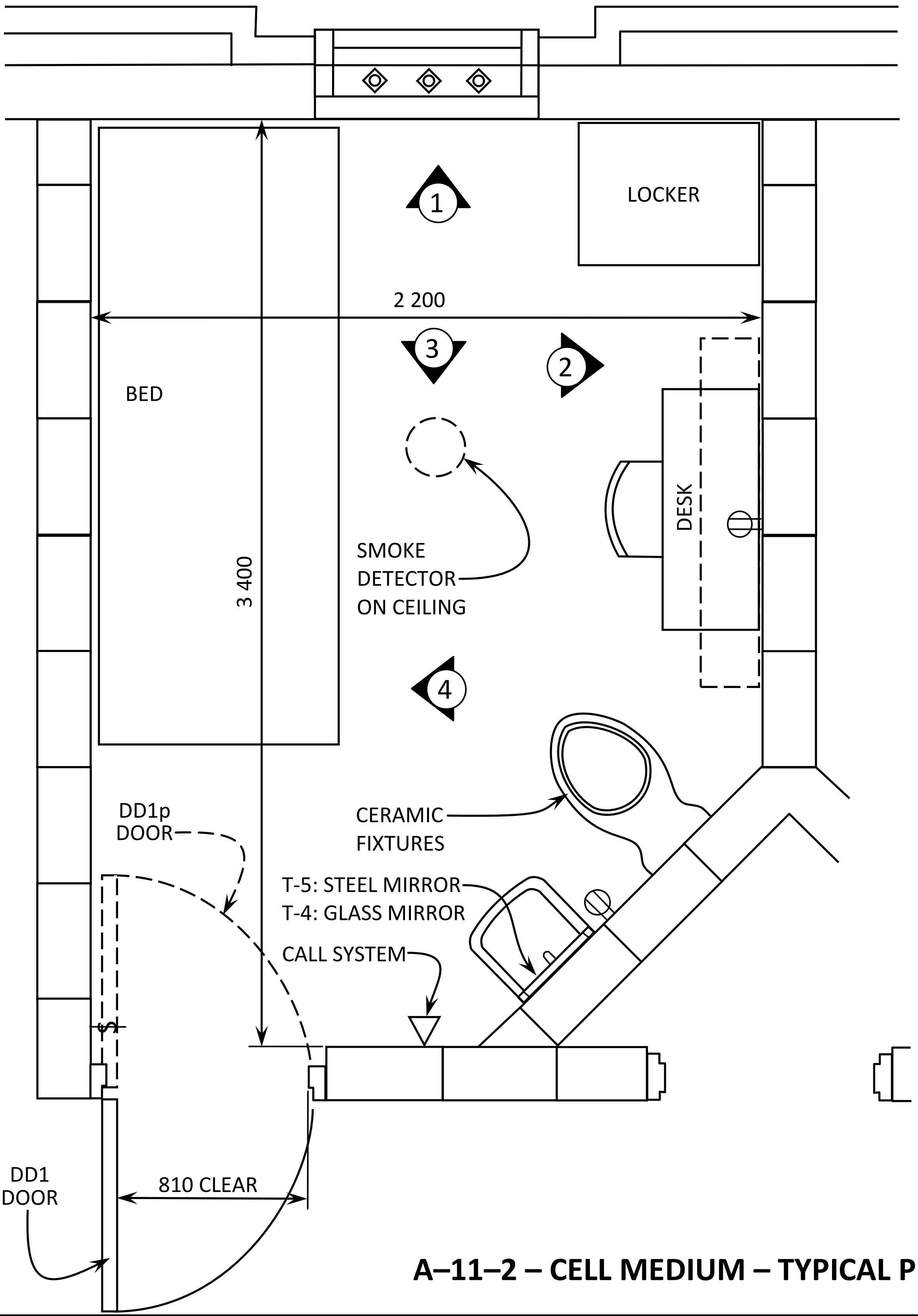
	MINIMUM BEDROOM S-2	MEDIUM BEDROOM S-3	MEDIUM CELLS S-4	MEDIUM CELLS S-5	MAXIMUM CELLS S-6 & S-7	HEALTH CARE CELLS	SEGREG. CELLS	OTHER SPECIAL CELLS
Bed, free standing	W	W						
Bed, secured			M	M				M
Bed, wall unit					M		M	
Bed, hospital						M		
Desk (free standing) + chair	W	W				M		
Desk (secured) + chair			M	M				
Tack boards (cork)	X	X	X	X	X			X
Desk-stool unit					M		M	M
Open lockers	W	W	M	M	M	M		M
Single shelf & collapsible hooks						M	M	M
Double shelf & collapsible hooks			M	M	M			
T.V. shelf	W	W	M	M	M	M		M
Window Curtain & blinds	X	X	X	X	X	X	X	X

M= Metal W= Wood X= Permitted

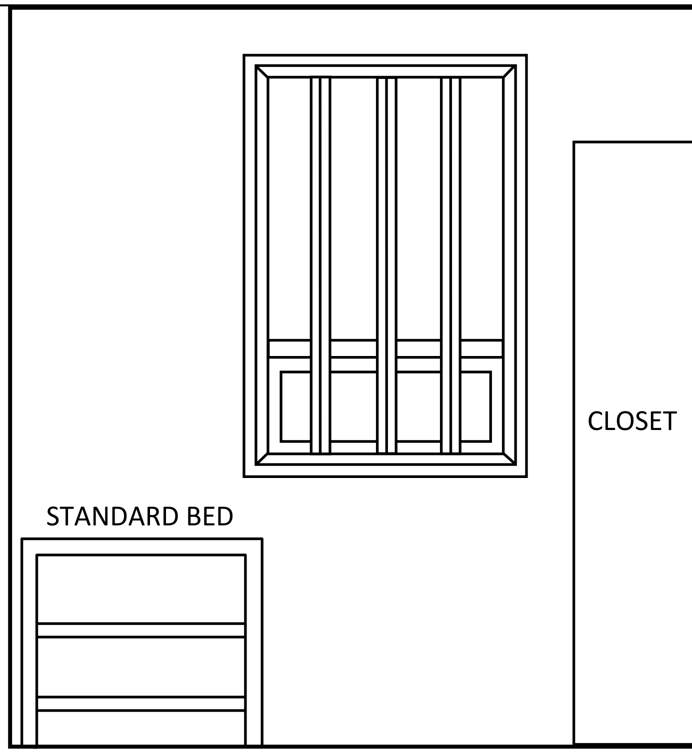


A–11–1 – CELL MAXIMUM – TYPICAL PLAN

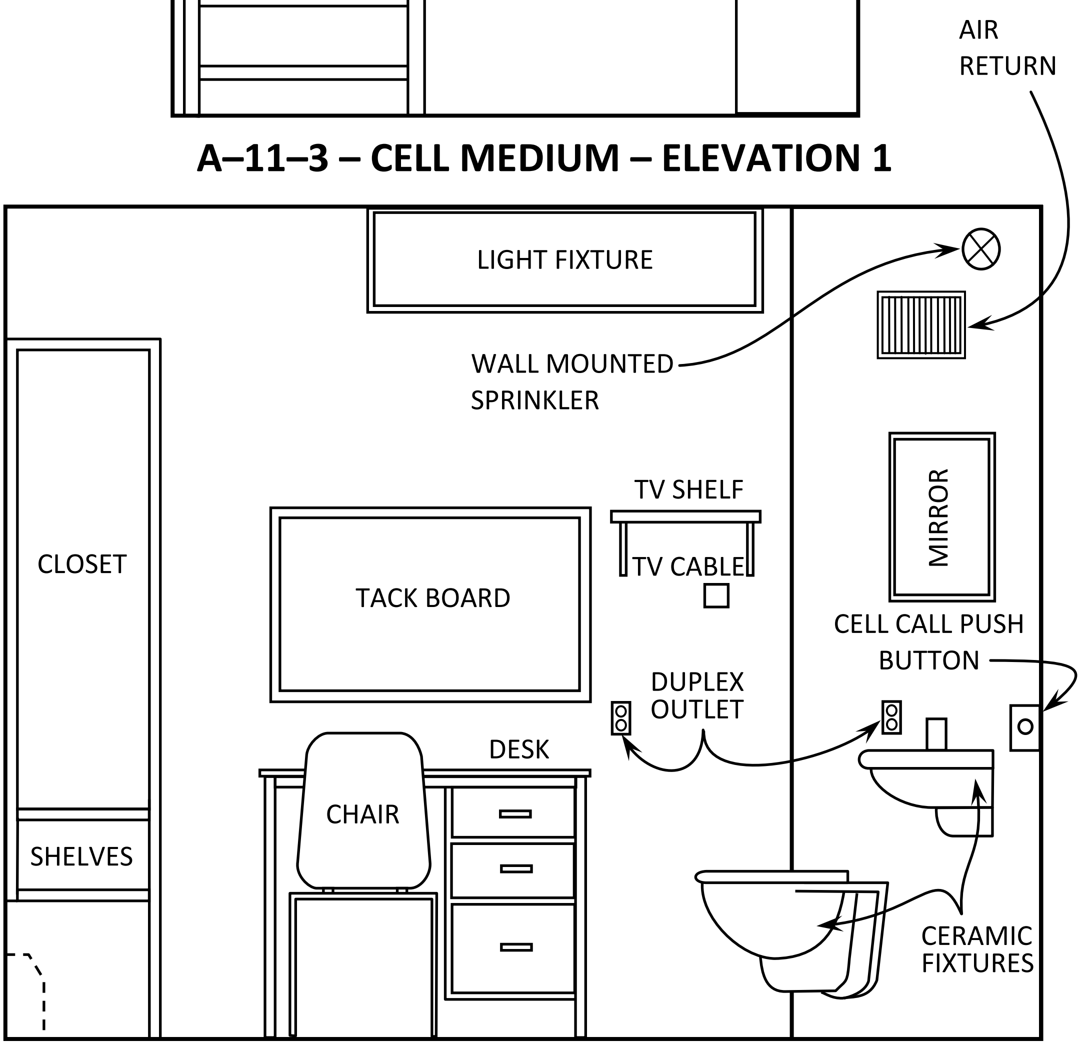
1– For window details see section A–4   2– Anchor furnishing in place
3– Weld furnishings. to plate anchors   4– Room dimensions may vary depending on building grid used



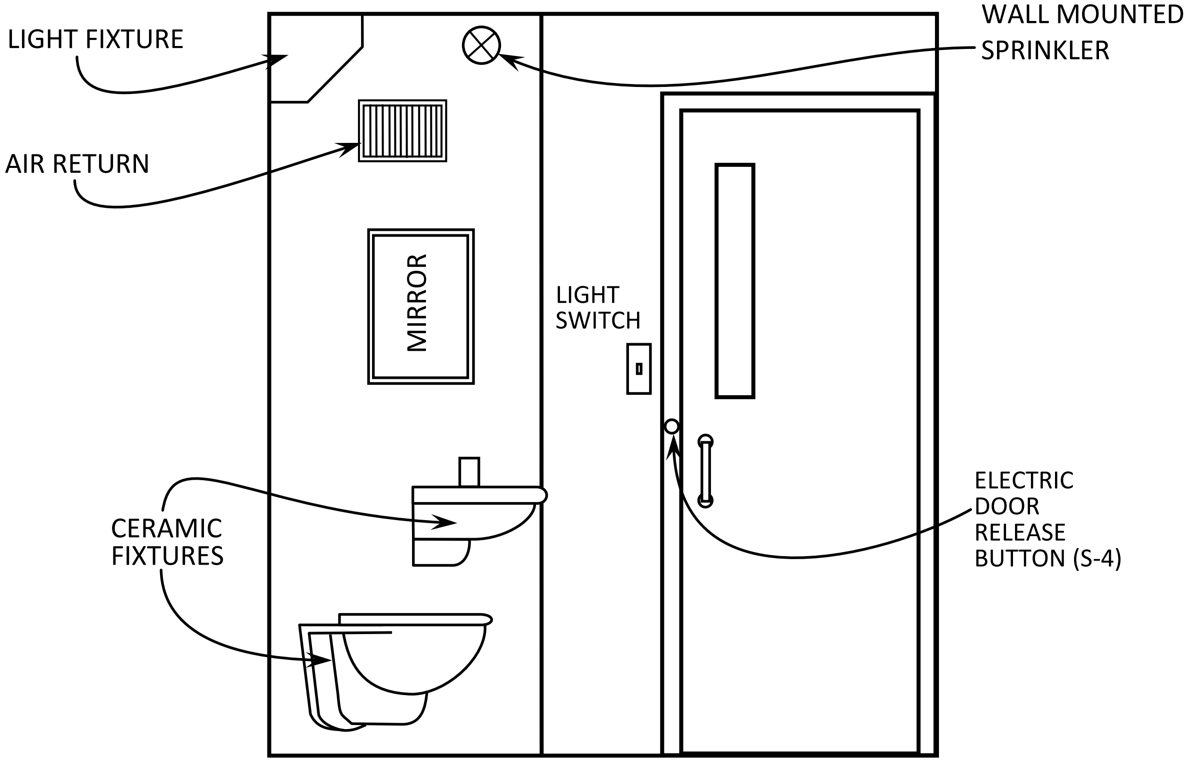
A–11–2 – CELL MEDIUM – TYPICAL PLAN



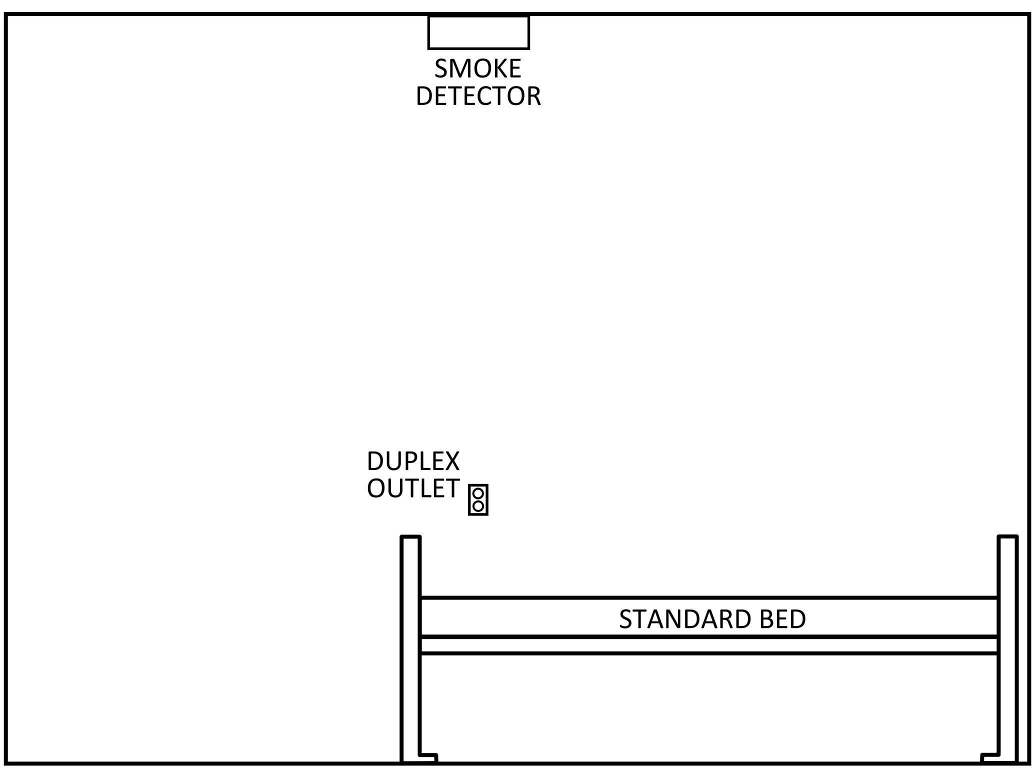
A–11–3 – CELL MEDIUM – ELEVATION 1



A–11–4 – CELL MEDIUM – ELEVATION 2



A–11–5 – CELL MEDIUM – ELEVATION 3



–11–6 – CELL MEDIUM – ELEVATION 4

A-12 ARCHITECTURE – SPECIAL OBSERVATION CELLS

1. SCOPE

This section outlines performance criteria for special observation cells for Medium, Maximum and multi-level Institutions in accordance with CD 843[1].

2. RELATED SECTIONS

2.1 This section should be read in conjunction with the following TCD sections as applicable:

A–5 – Doors and Frames
A–7 – Finishes and Modesty Screens
A–11 – Inmate Cells
M–3 – Fire Protection Requirements

3. PERFORMANCE CRITERIA

The categories for special observation cells and conditions of use are listed in Cases 1 and 2 below. Furniture, fixtures, fittings and finishes shall be based on the needs of each of the cases as follows:

Case 1 – Mental Health Monitoring

This may be met either by the use of a regular cell with standard furniture and fixtures, or, by placing an inmate in the Health Care Unit's inpatient room. In the event that an inmate has been assessed as requiring Pinel restraints, a Health care inpatient room shall be used by converting a hospital bed for this purpose. This is accomplished by anchoring the bed to the floor so that it is immoveable. The bed and floor provisions are in place to allow for a rapid conversion. Observation may be carried out by:

a) Frequent viewing through standard cell door light by an officer, **<u>or</u>**
b) Frequent viewing by a nurse in the Health care unit through a half light of a hospital door. This room will also be equipped with a CCTV monitored in the Nursing station.

Case 2 - High Watch

This is a cell equipped to reduce the risk of self-harm and located in the Segregation Unit which is staffed at all times. Observation of the cell occupant is continuous via glazed panels in the cell door. Because this cell may at times be used to house segregated inmates, the glazing must be highly resistant to prevent surreptitious or sustained physical attack. See Chapter A-4 for Bar-less Detention Window and Plate A-12-1. Technical requirements for this cell are as follows:

- Door Glazing shall be laminated polycarbonate 12.7mm thick comprising 3 layers. Conforming product is Lexguard MPC 500 or equivalent. The glazing shall have an engagement of 25mm and be affixed using 9.6mm screws starting 50mm from each corner spaced at 200 mm or less on centre.
- Special observation cells shall conform to the prescriptions stated in section A-11 Inmate Cells and furnished as per a segregation cell.
- Cell shall be capable of being also monitored by CCTV from the Segregation control post.

[1] Commissioner's Directive #843 – Prevention, Management and Response to Suicide and Self-Injuries, 2009-06-03

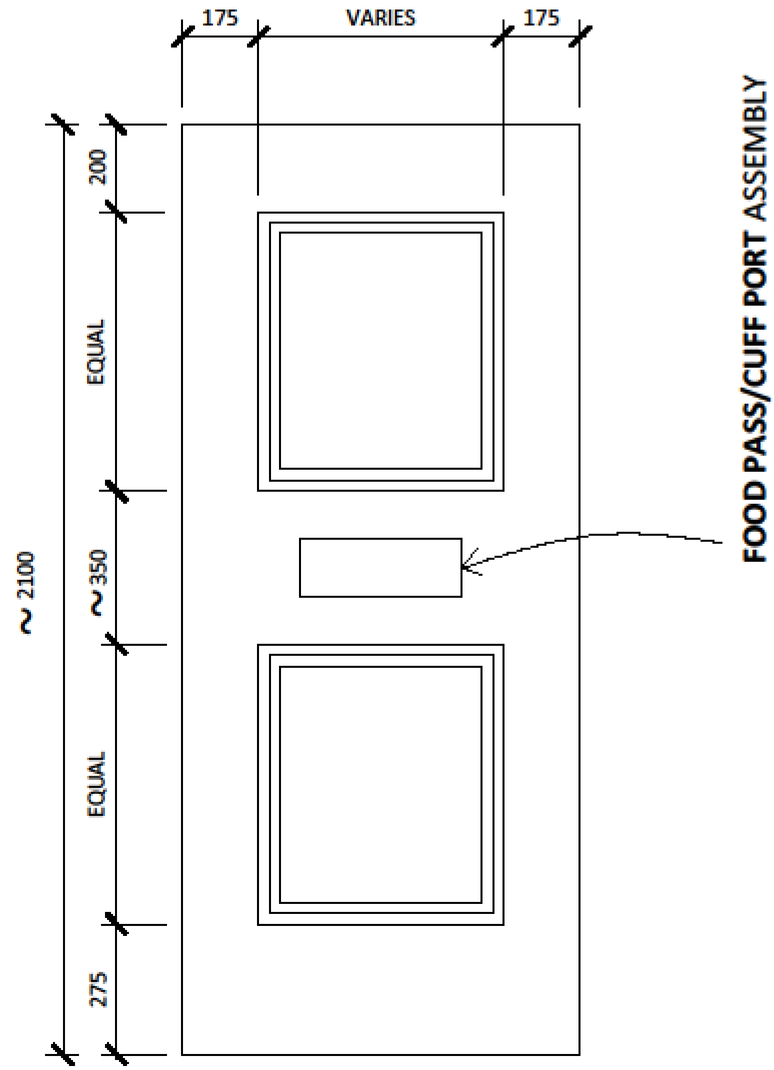


PLATE A-12-1 - OBSERVATION CELL DOOR
EXAMPLE 1 - STYLE A - TWO HALF LIGHTS

A DETENTION STYLE DOOR WITH SPECIAL OBSERVATION WINDOWS

A-13 ARCHITECTURE – SECURITY CONTROL POSTS, GALLERIES & ROUTES

1. SCOPE

This section outlines design requirements for all security control posts, observation galleries, dedicated security routes and special work stations located within inmate areas.

2. RELATED SECTIONS

2.1 This section should be read in conjunction with the following TCD sections as applicable:

A–2 – Building Construction
A–3 – Grilles, Screens and Mesh
A–4 – Glazing, Windows and Assemblies
A–5 – Doors & Frames
A–6 – Hardware
E–6 – Emergency Electrical
M–3 – Fire Protection Requirements
M–4 – Heating, Ventilating and Air Conditioning Requirements

2.2 Other CSC Documents:

CSC Electronic Security Systems (ESS)

3. DEFINITIONS

3.1 Security Control Post

A security control post is an enclosed or defined space which is staffed by designated personnel and is designed to provide for at least one of the following functions:

3.1.1 Visual surveillance,
3.1.2 Control of movement through specific doors and grilles,
3.1.3 Monitoring of: detection, surveillance, safety and communications equipment,
3.1.4 Intervention when required by means of firearm or gas.

3.2 Observation Gallery

An observation Gallery is an enclosed walkway, separated from inmate areas, where security staff:

3.2.1 Carry out surveillance of adjacent inmate areas, and
3.2.2 Warn or intervene with the use of sirens and weapons during emergency situations.

3.3 Dedicated Security Route

A Dedicated Security Route is an enclosed and secured corridor which links all Armed Security Control Posts and Observation Galleries. Its principal purpose is to provide safe movement of weapons. Observation Galleries may serve as a section of a Dedicated Security Route.

3.4 Special Work Stations

A special Work Station is an enclosed area providing one or more functions of a control post but may be staffed by other than security staff. This includes the Visits and Correspondence Office and Control (V & C office control) and the Nursing Station. Design requirements for special Work Stations follow those for control posts.

4. TYPE & LOCATION OF SECURITY CONTROL POSTS

4.1 Principal Entrance Control Post

The Principal Entrance Control Post (PECP) is an armed post serving as a sub-armoury, from where staff monitors arrivals and departures to and from an institution. It is located in the Gatehouse or in the Entrance Building where it forms part of the perimeter of the institution. Where pedestrian and vehicular movement are combined at the Gatehouse, it monitors both movements. Where a separate service entry exists, vehicular movement is monitored from a separate Control Post or Tower. Mobile patrol exchange their weapons at the PECP.

4.2 Main Communications Control Post

The Main Communications Control Post (MCCP) monitors the security systems comprising: Personal Portable Alarm, Inmate Cell Call, Perimeter Intrusion Detection, Alarm Response Log, Fire/Smoke Alarm, Fixed Point Security Alarm. This post shall be located in the Gatehouse where feasible and adjacent to/or form part of the Principal Entrance Control Post. The Central Equipment room (CER) is located adjacent to the MCCP and serves as the hub for terminal equipment in support of the MCCP as well as the Uninterrupted Power Supply batteries. Where feasible, the MCCP and the CER shall each be located in a room having a 2-hour fire resistance rating.

4.3 Main Control Post

The Main Control Post (MCP), where it exists, monitors all pedestrian movement from the Gatehouse into the body of the institutions. In closed movement institutions, it is located such that it is the last point of control for movement to the Gatehouse.

4.4 Area Control Post

The Area Control Post (ACP) monitors movement through gates which separate inmate main activity areas such as a daytime occupational zone. There are generally a limited number of Area Control posts within an institution.

4.5 Living Unit Control Post

Living Unit Control Post (UCP) provides surveillance of housing areas and for the control of remote operated doors. These posts are located in inmate housing units and in segregation or other special population units.

4.6 Observation Control Post

Observation Control Post (OCP) provides for surveillance and intervention for inmate areas where observation galleries are not present. The requirement for Observation Control Posts shall be determined on a project specific basis.

5. CLASSIFICATION OF PROTECTION LEVELS

The Rooms and Areas covered in this chapter require varying levels of protection from physical attack and/or ballistics. This protection level varies with the security classification of an institution and with the degree of risk associated with the location of the post.

Classification of protection levels and performance requirements established for areas covered in this section are listed below in order of decreasing level of security.

5.1 Level A

This level applies to armed control posts which provide for the safekeeping of weapons. The enclosure is constructed to resist ballistics of up to a 44 Magnum hand gun and physical attack with hand tools for 60 minutes. In addition, where two armed posts face one another being potentially subject to cross fire from the opposing post, each post will have specific glazing panels capable of resisting the ballistics from the approved firing weapon of a control post. All Level A posts are accessed from a network of protected routes to safeguard the movement of weapons and to provide a safe egress for staff. Access to the post from inmate areas is via a secure vestibule.

5.2 Level B

This post is not intended for the keeping of firearms. Its enclosure is constructed to resist physical attack with hand tools for 15 minutes. A safe egress route is provided for staff and access to the post from inmate areas is via a single door.

5.3 Level C

Enclosed post not intended to resist a physical attack but to provide a degree of privacy and sound control from inmate activity areas.

5.4 Level D

Non enclosed area defined by counter intended to allow sound and sight of inmate areas such as housing units. For medium and maximum institutions, a safe egress route is provided for staff and access to the post from inmate areas is via a counter height door.

5.5 Post Schedule

The S categories are applicable to the housing type located within each of the institutional classifications: minimum, medium and maximum.

TABLE A-13-1 – POST SCHEDULE

	MIN	**MEDIUM**			**MAXIMUM**	
	S-2	**S-3**	**S-4**	**S-5**	**S-6**	**S-7**
Principal Entrance	D	A	A	A	A	A
Main Communication Control Post	n/a	A	A	A	A	A
Main Control	n/a	B+B	B+B	B+B	A	A
Area Control	n/a	D	D	D	A	A
Unit Control	n/a	D+B	D+B	B+B	A	A
Segregation	n/a	B+B	B+B	B+B	A	A
Observation Control	n/a	n/a	n/a	n/a	A	A
V & C Office & Control	n/a	C	C	C	B+B	B+B
Nursing Station	n/a	C	C	C	B+B	B+B
Observation Gallery/ Dedicated Security Route	n/a	n/a	n/a	n/a	*	*

n/a - not applicable

D+B – An open post with an adjacent safe egress route leading to the exterior
B+B – Class B Post with an adjacent safe egress route leading to the exterior
* Requirements for these areas are outlined under section 7.1.

6. CONTROL POST DESIGN CRITERIA

6.1 Location and Layout Requirements

6.1.1 Control Posts are located along main corridors and entranceways where secondary corridors emanate which give access to various functional departments or program spaces.

6.1.2 For maximum security institutions, where a network of control posts exists, each post shall be located at a distance not to exceed 90 m from the next control post or posts and shall have visual contact with these posts.

6.1.3 Where control posts are equipped with consoles for control of remote barriers and doors, these barriers and doors and movement through them shall be visible from that post.

6.1.4 The control post equipment placement shall be laid out to allow for effective viewing and console control from a sitting or standing position.

6.1.5 Level A control post shall be laid out to facilitate effective intervention through gun ports.

6.1.6 Level A Control Posts shall have a dedicated toilet or direct access to one.

6.1.7 Level A, B, and D (in living units) posts require secondary means of egress to safety.

6.2 Enclosure Requirements

6.2.1 The enclosure of the control post shall have sufficient glazing to allow for effective surveillance. Mullion and structural member locations shall be designed in order to minimize obstruction to field of vision.

6.2.2 The exterior enclosure of level A & B control posts shall have a consistent level of protection throughout.

6.2.3 Glazing used in control posts shall be a type which, if broken, will not form shards or be easily dismantled to become a potential weapon.

6.2.4 Glazing which is required to be ballistic resistant shall be no spall type.

6.2.5 Where a control post envelope forms an exterior wall, appropriate thermal breaks shall be provided.

6.2.6 Glazing panels shall be to a uniform size and to manufacturer standards to the extent possible.

6.3 Glare Reduction

Visibility from within a control post is critical to the operations. Control post conditions both interior and exterior, must ensure that glare is reduced to the minimum.

6.3.1 Exterior windows exposed to sun shall have glare reducing glass. Exposure to extended direct sunlight is to be reduced by shading devices (canopies, roof overhang, etc.). Similar shading devices must be used to reduce glare from exterior overhead flood lights. Shading devices should be of dark matte colour.

6.3.2 Refer to Section E-5 Interior lighting for details of fixtures, controls and lighting levels.

6.3.3 Rooms and corridors under view from the control post should be finished with low reflectance (20% - 40%) colours.

6.3.4 Walls opposite post window should be finished one tone darker than other walls.

6.3.5 Post interior surfaces, including fixtures should have low reflectance (20% - 40%) colours achieved by use of darker colours and matte surface finish. To the extent possible, slope control panel tops and avoid use of polished metal.

6.4 Building Material Requirements by Level of Post

6.4.1 For Level A Protection:

6.4.1.1 Glazing system:

a) Level A glazing shall meet the equivalent H.P. WHITE[1] rating of Level C Ballistics and Level III Forced Entry. A glazing meeting Class/Level HG4 Ballistics (Table 1) and Class IV Forced Entry (Table 2, Sequence 31) in *ASTM F1233-08*[2] is also acceptable. 32 mm polycarbonate laminated (SP 1250) as tested and approved by HP WHITE meets this requirement.

b) This material shall be protected by a sacrificial layer of 6 mm tempered glass with an air space between it and the 32 mm laminated polycarbonate. The sacrificial layer shall be set on the attack side. Interior side of the polycarbonate shall be treated to enhance its abrasion resistance;

c) Glazing in panels which face similar control posts must be capable of withstanding multiple shots from stray bullets. As such, single layer tempered glass cannot be used as this will fracture upon the first shot. Acceptable glass type is safety glass of 2X6mm float glass with a 0.75mm (30mil) PVB interlayer. This glass will remain intact to resist multiple shots and when fractured will not mar vision from the control post;

d) Glazing assembly shall consist of 3.12 mm (0.123”) rolled steel frame where the frame is formed or it shall be of 4.0 mm thick steel flats where a built up assembly is provided;

e) Glazing stops shall be a minimum of 4.24 mm (0.167”) thick angle steel or solid bar with an engagement of 25 mm minimum. Stops shall be removable from the attack side. Removable stops shall be held by minimum 9.6 mm Ø security screws set at 150 mm on centre. End screws shall be 50 mm from each corner.

f) For exterior windows in level A posts, the thermal break required by item 6.2.5 of this section, shall be provided by a separate weather window applied over the secured frame. This weather window will also serve as the sacrificial layer.

6.4.1.2 Walls:

a) Reinforced concrete, 150 mm thick, with 15 mm bars at 150 mm on centre two ways; or,

b) Concrete block solid or core filled 150 mm thick faced with minimum 4.67 mm (0.184”) steel plate anchored to the structure; or,

---

1 H.P. White Laboratory, Inc., TEST PROCEDURE, Transparent Materials for Use in Forced Entry or Containment Barriers, HPW-TP-0500.03 (March 2003): http://www.hpwhite.com/uploads/file/500-03.pdf

2 ASTM F 1233-08, Standard Test Method for Security Glazing Materials and Systems

c) Steel structure faced with minimum 3.12 mm steel on each side, spaced a minimum of 50 mm and filled with insulation for sound deadening; or

d) Single steel sheet minimum 9.52 mm (3/8" or 0.375") thick with an interior wall board facing.

e) Welded construction is preferred. If bolts are used they shall be a minimum of 9.6 mm diameter. Any bolt work exposed to the inmate side shall be security type or welded when bolted.

f) Other configurations will be accepted provided equal performance and economies can be demonstrated.

6.4.1.3 Doors, Frames and Hardware:

a) Entry into the control post from a public or inmate areas shall be through a vestibule constructed to level A protection. Locks for doors in vestibule shall be DH2: jamb mounted maximum security electromechanical locks interlocked.

b) Entry into a dedicated security route shall be from level A protection area, excluding the vestibule referred to in a) above, and through a detention door with a mechanical lock keyed from two sides.

c) The doors are DD2 Swing type with the two doors or in combination of a wall of the vestibule providing ballistic resistance. Glazing is as per section 6.4.1.1. Doors shall swing out into the corridor for maximum resistance against ramming.

d) Door frames shall be of 2.8 mm rolled steel.

6.4.2 For Level B Protection

6.4.2.1 Glazing System:

a) Level B glazing shall meet the equivalent H.P. WHITE rating of Level I Forced Entry (see footnote 1) and need not meet any ballistic rating. A glazing meeting Class II Forced Entry (Table 2, Sequence 6) in *ASTM F1233-98 (2004)* (see footnote 2) is also acceptable. 12.7 mm monolithic polycarbonate as tested and approved by H.P. White meets this requirement.

b) This material shall be protected by a sacrificial layer of 6 mm tempered glass or polycarbonate with an air space between it and the 12.7 mm polycarbonate. The sacrificial layer shall be set on the attack side;

c) Glazing assembly shall consist of 2.36 mm (0.093") rolled steel frame;

d) Glazing stops shall be of 4.0 mm thick angle or channel steel or solid bar with an engagement of 25 mm minimum. Stops shall be removable from the attack side. Removable stops shall be held by 9.6 mm security screws set at 200 mm on centre;

e) For exterior windows follow criteria specified for level A glazing.

6.4.2.2 Walls:

a) Core filled concrete block, 150 mm thick minimum and reinforced. Horizontal reinforcing to be provided at every course. Vertical reinforcing to be 15 mm steel rods 400 mm o/c; or

b) Steel structure faced with minimum 2.36 mm (0.093”) steel on each side, spaced a minimum of 50 mm and filled with insulation for sound deadening; or

c) Single steel sheet minimum 4.24 mm (0.167”) thick with an interior wall board facing.

d) As for level A, welded construction is preferred. If bolts are used they shall be a minimum of 9.6 mm diameter;

6.4.2.3 Doors, Frames & Hardware

a) Access into a post is through a Detention Door Swing type (DD1).

b) A secondary egress into an inmate restricted area shall be provided. All doors, including hatch, if provided, are Detention Door Swing type (DD1). Minimum Hatch dimension is 914 X 914 (36” X 36”).

c) Frame for Detention Door (DD1) is made with rolled steel having the same thickness as the door panels (2.36 mm [0.093”]);

d) Lock for door into control post shall be DH2: jamb mounted maximum security electromechanical lock, keyed both ways;

e) Locks for secondary exit doors or hatch shall be detention mechanical type.

6.4.2.4 Class B refuge may incorporate:

a) 1 or 2 workstation(s) for correctional officers

b) Lockers for correctional officers

c) Radios, emergency equipment for correctional officers

d) Electrical panels/breakers for the living unit

e) “Kill switch” for the control panel / computer in the D or B post

f) Door controls computer with its printer

g) Secondary means of safe egress

h) Monitors for evidentiary cameras if provided

6.4.3 For Level C and D Protection

6.4.3.1 Glazing shall not form shards when broken.

6.4.3.2 No other special envelope features are required for Level C and D Protection posts.

6.5 Control Post Equipment and fitting

6.5.1 Some or all of the equipment and fittings below are required in a control post in the performance of duties. Preliminary design layouts of control posts shall show all equipment and fittings for design approval by C.S.C.

6.5.2 Post Equipment Schedule

TABLE A-13-2 – POST EQUIPMENT SCHEDULE

ITEM	**PROTECTION LEVEL**			
	A	**B**	**C**	**D**
Console / Computer	R	R	R	N
Key Pass	R	R	N	N
Speak Ports	R	R	N	N
Weapons Vault	R	N	N	N
Fire Extinguishers	R	R	R	R

Key Cabinets	R	R	P	P
Water Supply Valves	P	P	N	N
Gun Ports	R	N	N	N
Breathing Apparatus	R	R	P	P

R= Required N= Not Required P= Project specific basis only

6.5.3 Pertinent information with respect to each of the above items (1) through (9) follows:

6.5.3.1 Console / Computer

Console houses communication and alarm systems, door control and power switches. The design of the console and its controls shall be executed in close collaboration with CSC Electronic Security Systems (ESS) Key Pass

Key/Parcel construction shall be equal to that of the envelope performance for that post. See plate A-13-3 for acceptable design solutions.

6.5.3.2 Speak Ports

See plate A-13-4 for acceptable design solutions for speak ports and intercoms.

6.5.3.3 Weapons Vault (cabinet type) is required as the post may be used as sub-armoury. Vault shall meet detention equipment standards and be sized to meet the CSC approved arsenal for a particular post.

6.5.3.4 Fire Extinguishers

Fire extinguishers shall be provided as detailed in section M-3 Fire Protection Requirements.

6.5.3.5 Key Cabinets

Key cabinets will be sized for the keys under the control of that control post. The cabinet for the Main Control Post will be sized to hold one set of security lock keys required for the institution.

6.5.3.6 Water Supply Valves

Water supply valves for hose cabinets will control the flow to cabinets which are in sight of the respective control post.

6.5.3.7 Gun ports

a) Gun ports shall be sized to accommodate a Colt C8 and a 40 mm multi launcher and shall permit a 90 ° arc of fire. Gun port design shall not permit a weapon to be pulled through.
b) Gun ports shall be strategically placed around the Control Post enclosure to allow coverage of critical areas. Blind spots around the immediate location of the Control Post shall be tolerated.
c) Gun ports shall be located at a height suited for rifle firing while standing and shall accommodate varying officer heights. Where control posts cover two tiers of cells, gun ports shall be located to suit the site specific conditions. A compromise to the shooting position shall be tolerated.
d) Gun ports shall remain closed at all times to prevent objects from being injected except when required to intervene. Covers shall be

hinged to swing in rather than slide so that they cannot be wedged shut.

e) An acceptable solution for new or retrofit gun ports consists of a vertical slot sized 75 mm by 150 mm cut out from a 32 mm polycarbonate glazing panel sized as per a typical window light. The slot shall have bevelled vertical sides from a 6 mm perpendicular distance from the inner face of the glazing at 45° to the outer face. Protective glazing on the threat side shall be cut at the edge of the gun port frame. It should be noted that the bevelled edge of the polycarbonate has an opaque surface, therefore, impeding visibility. A hinged door of 6 mm steel shall be framed and bolted through the glazing using through bolts. Existing gun ports needing to accommodate new firearms shall be examined for acceptable retrofit in order to avoid costly replacement. Plate A-13-6 illustrates a suggested retrofit of an existing gun port.

6.5.3.8 Breathing Apparatus

Breathing apparatus and rescue equipment shall be determined on a project specific basis for each control post.

7. DESIGN CRITERIA FOR OTHER SECURITY AREAS

7.1 Observation Gallery/Dedicated Security Route

7.1.1 Location, Layout and Equipment Requirements

7.1.1.1 Location shall be efficiently planned to minimize excessive runs. Follow Accommodation Guidelines for areas where supervision is required.

7.1.1.2 Minimum unobstructed width shall be 1.5 m and unobstructed height 2.1 m.

7.1.1.3 Observation Galleries shall be combined with dedicated security routes where possible.

7.1.1.4 Entrances shall be from Level A posts and from inmate restricted areas.

7.1.1.5 Galleries are to be laid out to reduce the number of required exists.

7.1.1.6 Access to water closets shall be provided from Observation Gallery. Use of control post water closets will meet this requirement.

7.1.1.7 The design of observation openings shall use grilles to resist forced entry by inmates.

7.1.1.8 Window locations overlooking large activity areas or long corridors may be equipped with a buzzer or horn to give first warning to inmates involved in violent incidents.

7.1.2 Enclosure Requirements

7.1.2.1 Construction shall be of fire resistant materials. Polycarbonate glazing is permitted as it does not support combustion.

7.1.2.2 Walls and glazing shall be to Level B Protection.

7.1.2.3 Glazing shall permit 1 way viewing to allow security officers to observe areas without being observed themselves. Gallery lighting shall conform to 1 way glazing requirements.

7.1.3 Observation/Intervention Gallery Windows

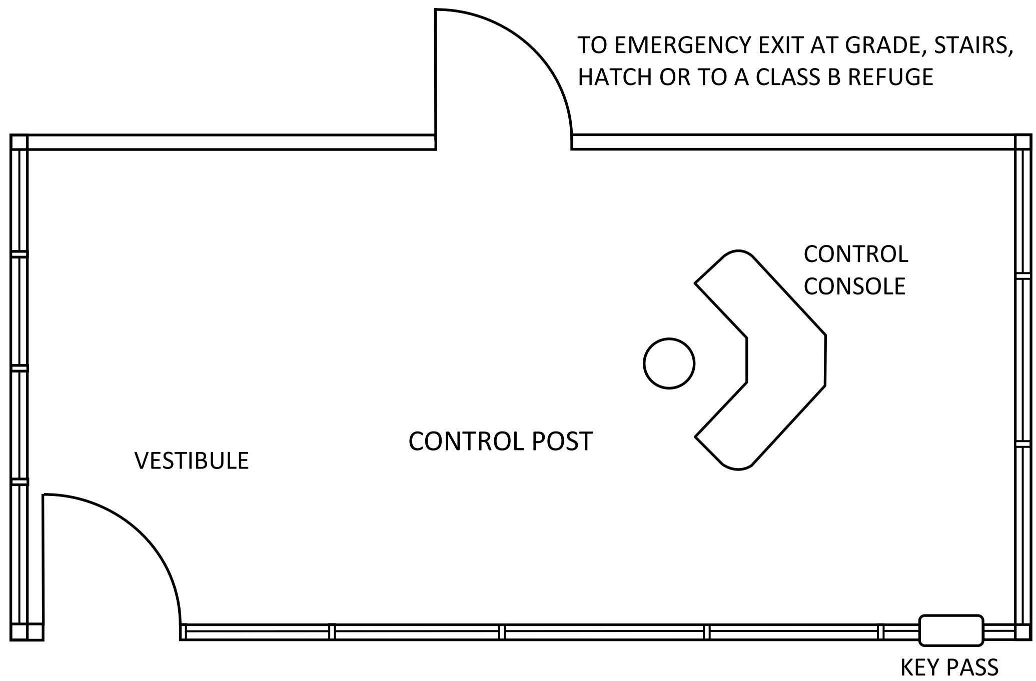
7.1.3.1 Observation/Intervention gallery windows shall allow for unobstructed field of fire. To minimize the number of windows yet provide maximum firearm coverage, openings shall be formed by a framed operable window supplemented by a grille on the threat side. Given that the use of a weapon requires it to be attached to a body security harness, the risk of its removal or it being dropped is mitigated.

7.1.3.2 To permit optimal observation and provide protection from thrown objects, the gallery window should be a horizontal slider to allow the officer to stand out of the way if required. The exterior grille should be set away from the face of the window to permit downward observation/intervention. The window glazing shall be of 12.7 mm monolithic polycarbonate set in a steel frame. Commercially applied glazing film is used to enable one-way viewing of the inmate activity area.

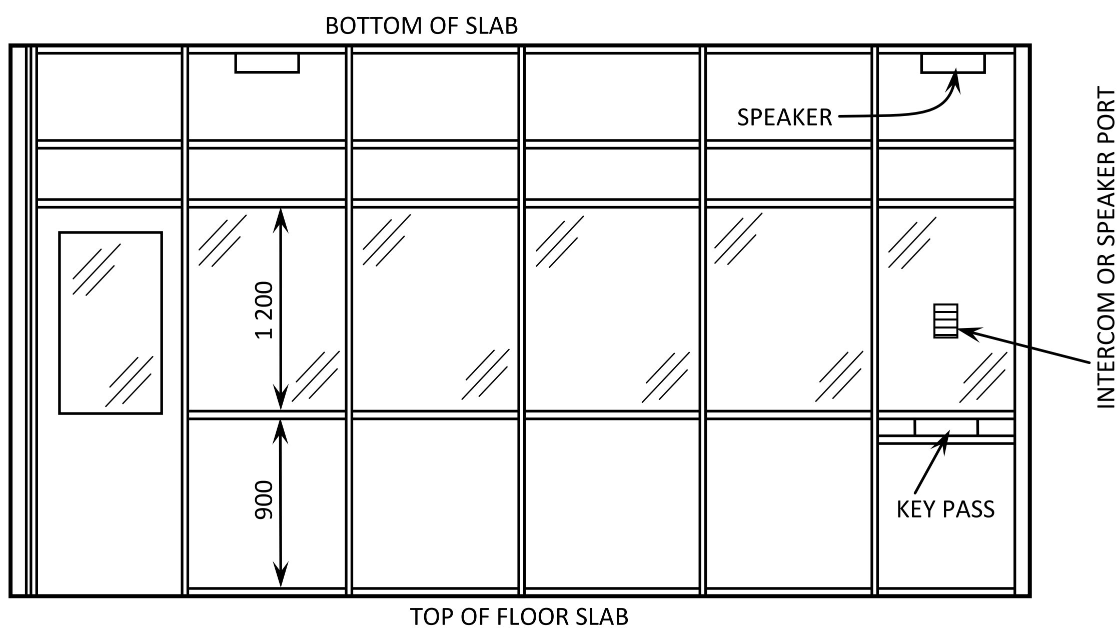
7.2 V & C Office and Control and Nursing Station

7.2.1 Follow layout and location requirements shown in the Accommodation Guidelines.

7.2.2 Follow Post Schedule 5.5 for level of Enclosure for varying classification of Institutions.



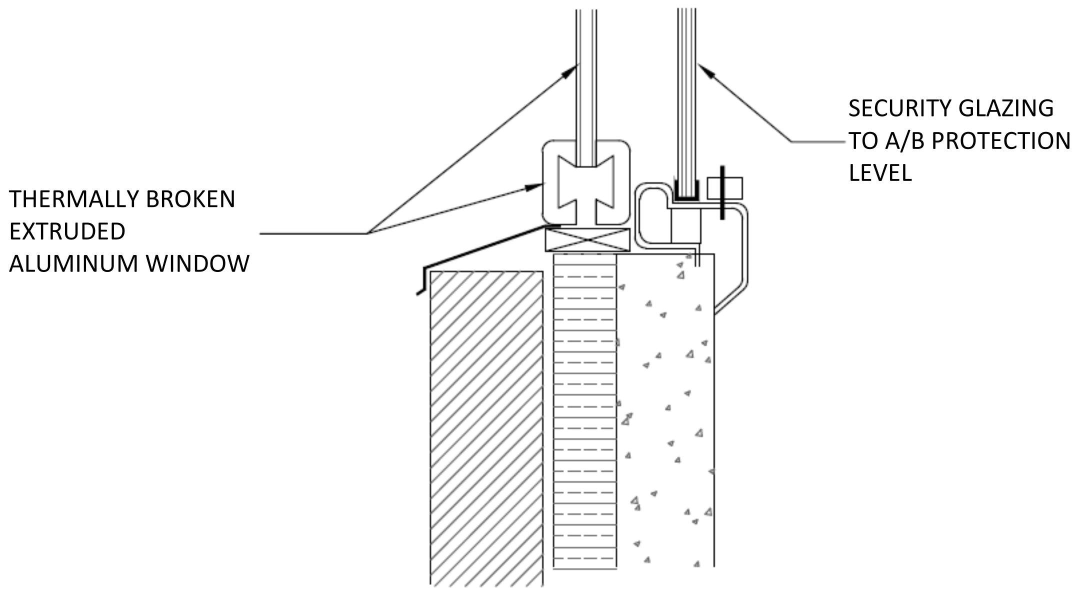
PLAN LAYOUT



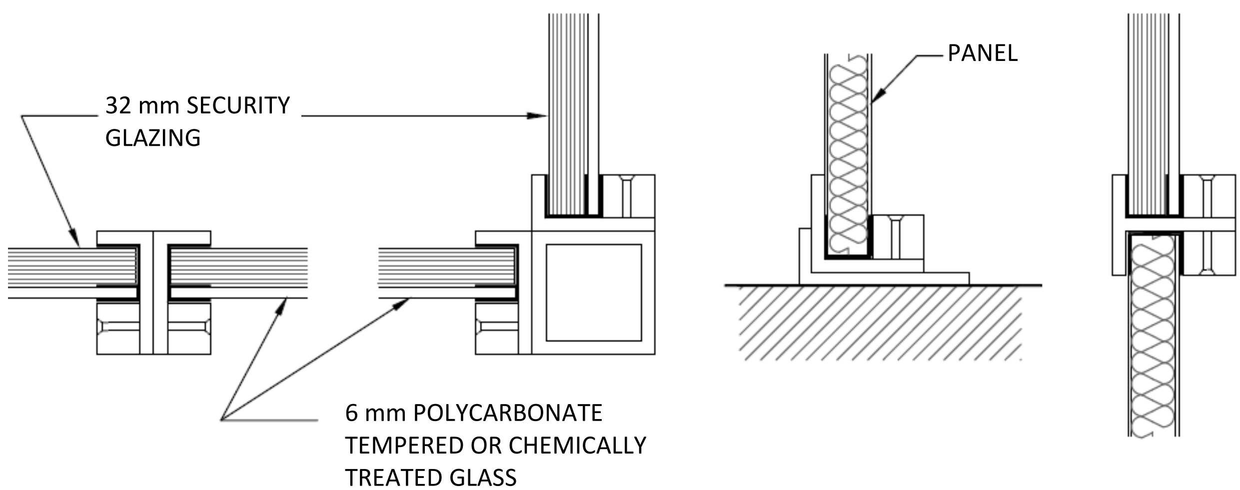
ELEVATION

PLATE A–13–2 – DIAGRAMATIC LEVEL B POST ILLUSTRATION

1- Post size and shape as required by location
2- Door control console(s) located to suit traffic viewing
3- Ports to suit location
4- Other consoles located to suit operational needs
5- Framing and panel system of strength to meet specified resistance to attack and building conditions



EXTERIOR LEVEL A/B CONSTRUCTION DETAILS



FRAMING – 10 mm STRUCTURAL SHAPES
STOPS – 25 mm SOLID BARS FIXED BY 96 mm SCREWS @ 150 mm O.C.
PANELS – 3.2 mm STEEL PANELS

INTERIOR LEVEL 'A' CONSTRUCTION DETAILS (STEEL PARTITION)

PLATE A–13–3 – CONTROL POST – DETAILS

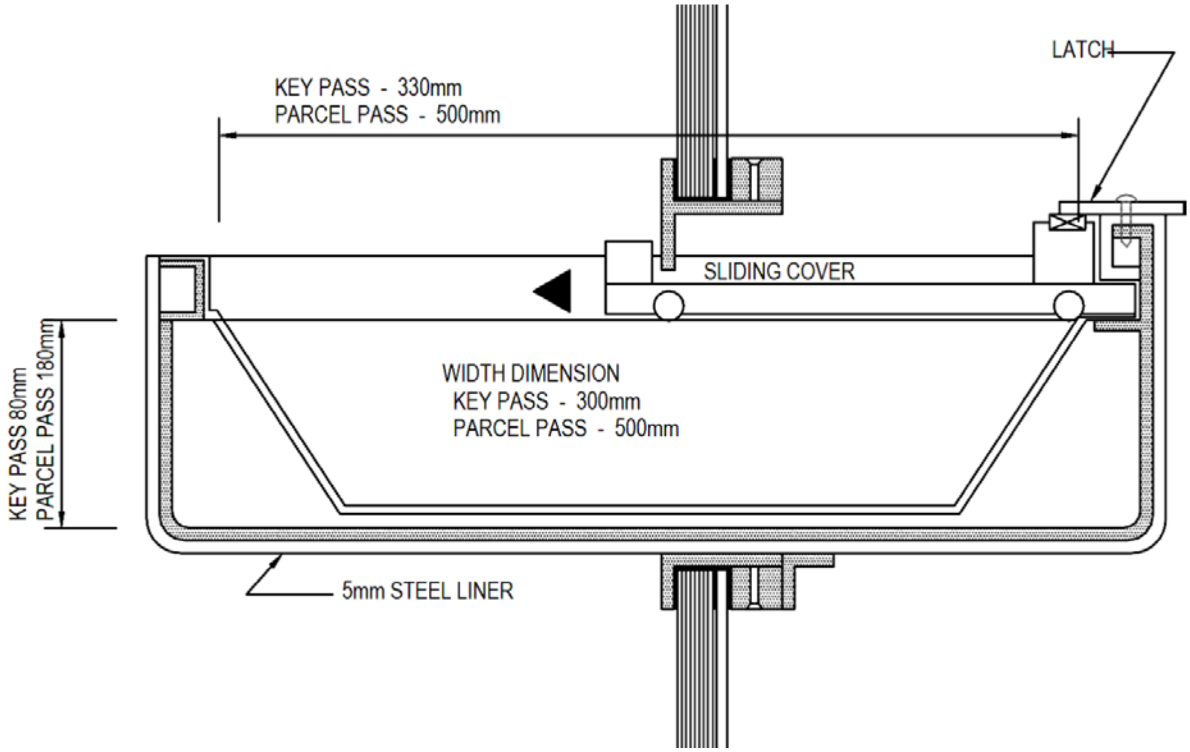


PLATE A–13–4 – KEY PASS THROUGH/PARCEL PASS

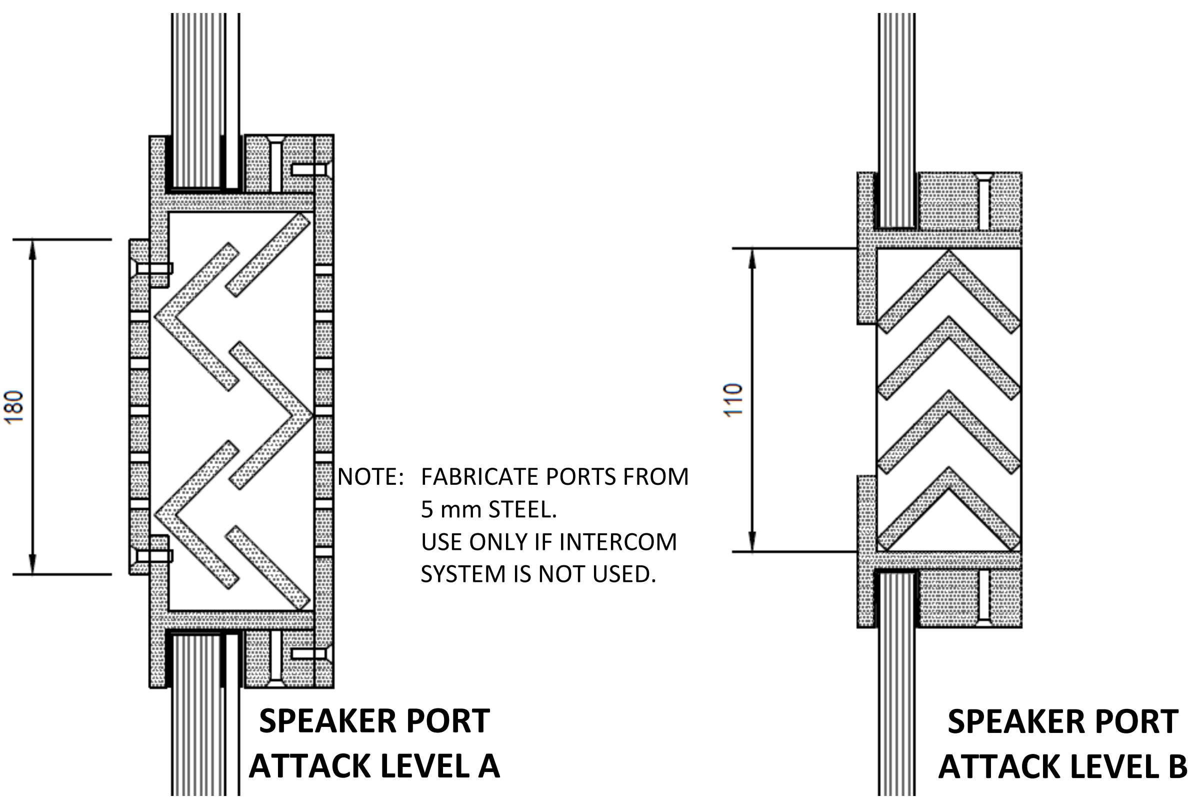
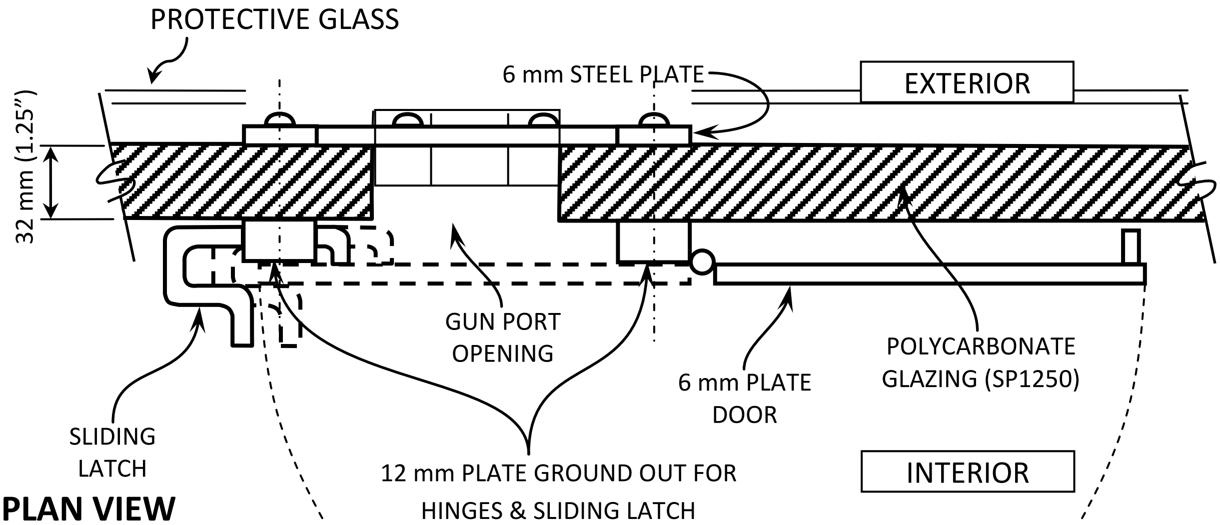
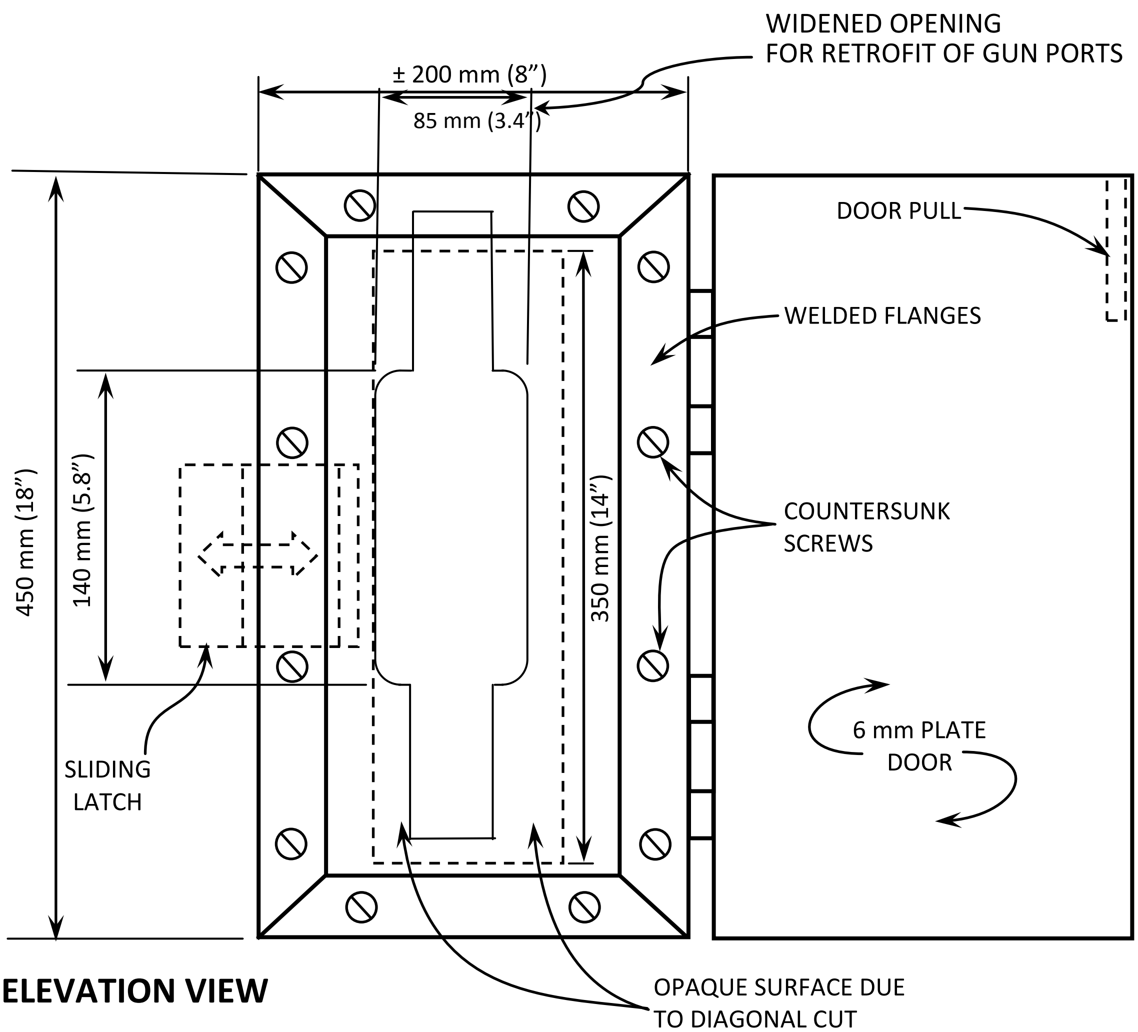


PLATE A–13–5 – SPEAKING PORT



PLAN VIEW



ELEVATION VIEW

PLATE A–13–6 – GUN PORT – VERTICAL OPENING

A-14 ARCHITECTURE – ARMOURY

1. SCOPE

This section outlines the construction and location requirements for an Armoury used in Medium and Maximum Institutions.

2. RELATED SECTIONS

2.1 This section should be read in conjunction with the following TCD sections as applicable:
A–3 – Grilles, Screens & Modesty Barriers
A–5 – Doors & Frames
A–6 – Hardware
M-3 – Fire Protection Requirements
M-4 – Heating, Ventilating, and Air Conditioning Requirements

2.2 Other CSC Documents:
Scale of Issue for Firearms and Security Equipment (CSC)

3. DEFINITIONS

3.1 Armouries are CSC institutional arsenals required to store weapons, ammunition, riot control agents and emergency and rescue equipment of an explosive or toxic nature that are on inventory as specified in the Security Equipment Manual, issued by NHQ Operations. The armoury is used for the maintenance of weapons as required. Key storage and key cutting may be combined with the Armoury.

3.2 Normal security equipment, not of an explosive or toxic nature, including riot control equipment of the Emergency Response Team does not require Armoury Storage space.

4. ARMOURY SECURITY AND DESIGN REQUIREMENTS

4.1 Location and Size

4.1.1 The Armoury shall be located in the Gatehouse since the Gatehouse is supervised 24 hours a day and is the most secure location in the institution being remote from inmate areas. The Gatehouse also provides ready access to staff reporting for duty in the event of an emergency.

4.1.2 Level ‘A’ control posts may be used as sub-armouries. In this case they will be equipped with an approved weapons vault cabinet. This requirement will be identified on a project specific basis.

4.1.3 An area of $15m^2$ will suffice for the needs of an armoury.

4.2 Design and Fit up Requirements

4.2.1 The armoury shall be designed to provide for the following:

a) Weapons racks with a pull through steel cable, chain or locking bar and a lock to prevent unauthorized removal of rifles or other weapons.
b) Lockers for hand weapons, tools and spare parts.
c) Counter with solvent fume hood above for weapon cleaning.
d) Sink for hand washing.
e) A metal munitions and gas cabinet sized to meet specific needs approved by NHQ Operations. Direct exhaust shall be provided from this cabinet to prevent gas leakage into the armoury.

4.2.2 Material and Construction

4.2.2.1 The Armoury shall be designed to be secure against forced entry and shall have a Fire Separation with a Fire Resistance Rating of two hours.

4.2.2.2 The Armoury shall be constructed of cast in place reinforced concrete or precast concrete. Walls and ceilings shall have a minimum thickness of 200 mm.

4.2.2.3 There shall be no windows. Ventilation openings where required will have tool resistant steel bars spaced to limit one dimension of the opening to a maximum of 125 mm (5”).

4.2.3 Doors

4.2.3.1 Door to armoury shall be style E, Detention Door Maximum Swing classification (DD2s) as detailed in Section A–5 – Doors and Frames.

4.2.4 Hardware

Hardware will be maximum security type with a mechanical deadbolt lock keyed both sides.

4.2.5 Security and Communications

4.2.5.1 During use of armoury, a corridor light will illuminate activated by switching on lights of the armoury.

4.2.5.2 An intercom phone will be provided connected to the Principle entrance controls post.

4.2.5.3 A door position switch shall be provided to indicate status of door at the Principle entrance control post.

4.2.6 Environmental Requirements

See section M-4:11 Armoury.

Correctional Service Canada | Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Technical Criteria for
Correctional Institutions

SECTION M – MECHANICAL

Canada

M-1 MECHANICAL – GENERAL MECHANICAL REQUIREMENTS

1. SCOPE

This section outlines the basic mechanical engineering design criteria related to the special requirements of Correctional Service Canada (CSC).

2. RELATED DOCUMENTS

2.1 Technical Criteria Document (TCD)

M–2 to M–4 inclusive
SU–1 – Storm & Sanitary Sewers
SU–2 – Wastewater (Sewage) Treatment
SU–3 – Water Utility

2.2 Correctional Service of Canada - Commissioner's Directives

318-2 - Energy Measurement and Conservation
318-4 - Management of Halocarbons

3. GENERAL REQUIREMENTS

3.1 The mechanical technical criteria provided under this section describes special Correctional Service Canada (CSC) requirements and are intended to supplement the most current version of the National Building Code, National Plumbing Code, and National Fire Code of Canada.

3.2 Health care facilities construction, renovation and design shall meet the requirements of the CSA Z317 Health Care Codes: CAN/CSA Z317.13 Infection control during construction, renovation and maintenance of health care facilities, CAN/CSA Z317.1 Special requirements for plumbing installations in health care facilities, CAN/CSA Z317.2 Special requirements for heating, ventilating and air-conditioning systems in health care facilities, and CSA Z8000 Canadian health care facilities.

3.3 Any departure from these technical criteria shall be supported by explanation and back-up data, and shall receive approval by CSC NHQ-Technical Services and all Authorities Having Jurisdiction before proceeding with the design.

4. DESIGN GUIDELINES

4.1 General

4.1.1 Design systems to minimize opportunities for system sabotage, the concealment of contraband and to facilitate the task of staff in maintaining and controlling the institution.

4.1.2 Mechanical equipment shall generally be located in specially-designated buildings or rooms for mechanical equipment. Building mechanical rooms shall be located, laid out and designed so that major equipment items such as boiler, air handlers and hot water tanks can be efficiently serviced, removed or replaced. For example, allow adequate room for filter and coil replacement. Arrange to provide suitable wall opening(s) to replace equipment. For example, a mechanical room located on a 2nd floor or higher shall be accessible from a high level exterior access door to avoid the use of interior stairwells when replacing large equipment. Layout of mechanical rooms shall be designed to allow for replacement of equipment without the need to remove other major equipment, piping or ducting.

4.1.3 Arrange location of controls, alarm accessories, indicators, valves, traps, cleanouts, etc., to prevent access by inmates.

4.1.4 Where a complex is served with connecting security walkways, tunnels or galleries, consider using these areas for running heating and plumbing pipes.

4.2 Central Control

The mechanical central control station shall be located in a room controlled by maintenance staff. Selected alarms shall be relayed to the 24 hour manned Main Communication Control Post (MCCP). The capability to change set points or programs shall not be available from the MCCP.

4.3 Service Chases

Design cell service chases for ease of maintenance and economy of space and provide large scale sectional drawings across critical points of chase. Provide a “mock up” of service chase with all services installed. The “mock up” shall be provided either by the consultant, through PWGSC, before tender, or specified to be provided by the successful contractor before commencing the installation of services. Mock-up shall demonstrate reasonable access to all components in the chase that may require adjustment, servicing or replacement. Access to chases shall be from corridor through secured doors as described in the Technical Criteria section A-5 Architecture-Doors and frames.

5. ENERGY CONSERVATION

5.1 General

5.1.1 The level of quality of systems provided in the institution is to be consistent with achieving the lowest possible energy consumption based on life cycle cost principles. New constructions of facilities and renovated portions of facilities shall be designed so that energy use will not exceed 1 400 MJ/m2/year, based on a national average of 4,700 Heating Degree-Days (HDD), or to meet the requirements of the National Energy Code for Buildings (2011), whichever is the lower.

5.1.2 Prepare an energy consumption analysis during the conceptual phase of design. All modelling shall adhere to the National Energy Code or another approved CSC method.

6. METERING

6.1 Provide permanent recording energy or steam flow meters in each major boiler plant, and oil or gas meters to measure fuel to the boilers.

6.2 Provide permanent meter to measure heating energy used in each major building.

6.3 Provide meters for CORCAN buildings or processes when energy usage is significant (paint baking ovens, laundry, etc.).

6.4 All meters shall be connected to the building automation system and provide both instantaneous and cumulative values.

6.5 Locate natural gas meters outside the secure perimeter for easier access by the utility.

7. FUELS

7.1 Natural gas and propane lines generally shall not be located in areas accessible to inmates. However gas may be installed where required, in kitchens, industrial areas, shops, etc.

7.2 Unless specifically requested by the project brief or project manager:

7.2.1 Propane and gasoline storage tanks shall not be installed within the perimeter security fence.

7.2.2 Vehicle fuelling stations shall not be installed within the perimeter security fence.

M-2 MECHANICAL – PLUMBING REQUIREMENTS

1. SCOPE

This section outlines the special requirements for plumbing systems associated with Correctional Service Canada (CSC) institutions. In general, this Section covers the following:

- Drainage systems
- Domestic water
- Plumbing fixtures and trim
- Plumbing in health care facilities must meet the requirements of the CSA Z317 health care codes. See M-1 Mechanical: General Mechanical Requirements.

2. RELATED DOCUMENTS

2.1 Technical Criteria Document (TCD)

SP–1 – Site Development
SU–1 – Storm and Sanitary Sewers
SU–2 – Waste Water (Sewage) Treatment
SU–3 – Water Utility

2.2 Correctional Service of Canada - Commissioner's Directives

318-9 - Water Measurement and Conservation

3. DRAINAGE SYSTEMS

3.1 Pumped Sewage

Sewage pumps should be considered only if gravity flow cannot be employed. Where such pumps are required, only the floors which cannot drain by gravity shall be pumped.

Provide duplex sewage pumps with an automatic transfer switch to alternate the unit operation, emergency power supply and high level alarm.

3.2 Blockages

In order to minimize the problem of drainage system blockage by inmates, either intentionally or in the attempt to dispose of unauthorized clothing by flushing down water closets:

3.2.1 The number and location of cleanouts in soil and waste runs and risers shall be selected to facilitate the easy removal of blockage material.

3.2.2 Where practical, locate cleanouts in areas inaccessible to inmates such as janitor closets, pipe chases, mechanical rooms, etc. Any cleanouts in inmate areas shall be secured with tamper-proof screws.

3.2.3 In inmate housing units, below-grade or concealed drain lines from water closets shall be a minimum of 150 mm in diameter.

3.2.4 Consideration shall be given to provide a screen or a sewage grinder to remove large objects, i.e., clothing, from sewage before it enters the sewage treatment system.

3.3 Floor Drains

3.3.1 Provide floor drains in corridors and cell runways, normally one per housing wing, located away from traffic areas.

3.3.2 Floor drains in areas occupied by inmates shall have grates secured with vandal-proof screws.

3.3.3 To reduce the possibility of inmates hiding or disposing of contraband, grate openings in inmate areas shall consist of multiple holes approximately 10 mm in diameter.

3.4 Traps

Exposed traps are not permitted in inmate areas.

3.5 Chases

Where two (2) cells share a common service chase, water closet connections to main stack in chase must be designed with a “Y” in order to prevent “fishing” of contraband from a cell to another.

4. DOMESTIC WATER QUANTITIES

Refer to Technical Criteria section SU-3 Water Utility.

General note: an electrically-operated valve must be provided to shut off domestic water supply in case of a disturbance in a unit. This valve is to be operable from the control post.

5. HOT WATER GENERATION

5.1 Temperature Requirements

5.1.1 Water shall be delivered at the following temperatures:

5.1.1.1 Lavatories and janitors service sinks: 38°C.
5.1.1.2 Clinical areas: 43°C.
5.1.1.3 Food Services; general use 60°C, with booster to 82°C where required by health regulations.
5.1.1.4 Washing machines: No hot water
5.1.1.5 Showers: 43°C for shower with hot and cold supplies
40.5°C maximum for showers with tempered supply only.

5.1.2 Temperature control and mixing valves shall not be accessible to inmates and shall be provided with temperature-adjusting knob and dial thermometer to measure discharge temperature.

6. FIXTURE AND FITTINGS

6.1 General

6.1.1 . Do not specify “pop-up” drain fitting within the institution fence including in the administration washrooms.

6.1.2 Flush valves must be provided for all fixtures. Reservoirs are not acceptable.

6.2 Health Care Centre (all levels)

6.2.1 Dispensary and dental operating – General purpose 302 stainless steel sink 1.0 mm thick nominal 530 x 530 x 175 mm self rimming, ledge back with undercoating and swing spout aerator tip supply with indexed hooded handles and basket strainer. (Aerators not to be used in Class A and B facilities.)

6.2.2 Dental laboratory; general purpose sink as above but with plaster interceptor.

6.2.3 Examination room; hospital type lavatory and general purpose sink.

6.2.4 Treatment room; scrub up sink. V.T. wall hung 559 mm x 483 mm lavatory with integral back, wall carriers, rigid gooseneck spout, aerator and 100 mm indexed blade handles, drain plug and perforated strainer. (Aerators not to be used in Class A and B facilities.)

6.2.5 Washrooms; vitreous china prison type WC complete with seat and prison type lavatory.

6.2.6 Cells; vitreous china prison type WC complete with seat and cover and prison type lavatory.

6.2.7 Bathtubs may be provided with lift assist devices in designated Health Care tub rooms.

6.2.8 Fit one (1) WC in the area, but not in a cell, with bed pan washer and lugs.

6.3 Maximum Institution at S-6 & S-7 Levels

6.3.1 Maximum Cells: stainless steel WC and lavatory with pushbutton valves.

6.3.2 Segregation cells: stainless steel WC and lavatory with pushbutton valves.

6.3.3 Inmate washrooms in dining areas, gymnasiums, visiting area, work spaces, library, etc.: stainless steel prison type fixtures with concealed water supplies, pushbutton operated concealed flush valves, and pushbutton hot and cold water supplies for lavatories. Access for maintenance shall preferably be from pipe chase, but if this is not practical, access shall be from security type access box.

6.3.4 Showers: Stainless steel shower panel with chrome plated 12 1/2° tamper-proof shower head with 9 litres/min maximum flow and pneumatically-activated pushbutton valve. Single temperature tempered water shall be supplied to showers, thermostatically-controlled from remote position in non-inmate area. Thermostatic mixing valve shall compensate for both temperature and pressure.

6.4 Medium Institution at S-3, S-4 & S-5 Levels

6.4.1 S-3 Unit Bedrooms: no plumbing; Common washrooms: commercial vitreous china type WC with seat and cover and vitreous china lavatory.

6.4.2 S-4 & S-5 Unit Cells: vitreous china institutional type WC with seat and institutional type vitreous china lavatory.

6.4.3 Segregation cells: stainless steel WC and lavatory.

6.4.4 Inmate washrooms in dining areas, gymnasiums, visiting areas, work spaces, library, etc.: vitreous china prison type fixtures. Water closet with seat. Water supplies and flush valves shall be as specified in 6.3.3.

6.4.5 S-3 Unit Showers: hot and cold water supplied to commercial type showers. Thermostatic mixing valve shall compensate for both temperature and pressure.

6.4.6 S-4 & S-5 Unit Showers: see 6.3.4.

6.5 Minimum Institution

Provide commercial grade fixtures. WC's shall be flush valve type

6.6 Drinking Fountains

6.6.1 Fully or semi-recessed type in all areas.

6.6.2 Do not provide refrigerated drinking fountains in inmate-occupied areas.

6.7 Urinals

6.7.1 Urinals in inmate areas where stainless steel W.C's are specified shall be wall hung with concealed flush valve if backing on pipe chase, or with exposed flush valve if not backing onto pipe chase.

6.7.2 Urinals in inmate areas where vitreous china W.C's are specified shall be wall hung with concealed flush valve. If a pipe space is not available in which to install the flush valve, provide security access box as specified in 6.11.

6.8 Service Sinks

6.8.1 Since floor receptor type service sinks are less subject to damage through inmate use, they shall normally be specified.

6.8.2 Where it is architecturally impractical to design floor receptors, specify standard mop or service sinks with rim guard and wall mounted fittings.

6.8.3 All mop and service sink faucets shall be provided with a built-in vacuum breaker.

6.9 Pushbutton valves (showers and lavatories)

Other than in an S-2 or S-3, pushbutton valves shall be vandal-resistant metering type valves. Duration of flow shall be adjustable from five (5) to sixty (60) seconds, by a control located in pipe chase. Metering cartridge shall be serviceable from pipe chase without disconnecting inlet supply. No inlet water shall flow through the timing mechanism.

6.10 Access box

Security type access box shall have 1.9 mm type 304 stainless steel cover secured with vandal-resistant screws.

Frame shall be 0.90 mm galvanized steel frame with back mounting flange and front reinforcing hemmed edge.

M-3 MECHANICAL – FIRE PROTECTION REQUIREMENTS

1. SCOPE

This section outlines the special requirements for fire protection associated with Correctional Service Canada (CSC) institutions.

2. RELATED DOCUMENTS

2.1 This section should be read in conjunction with the following Technical Criteria Document (TCD) sections as applicable:

G-2 – Fire Authorities and Classification
A-13 – Control Posts
E-6 – Emergency Electrical
E-9 – Fire Alarm

2.2 In addition the following standards and guidelines shall be observed as applicable:

- National Building Code of Canada
- National Fire Code of Canada
- National Fire Protection Association (NFPA) 13 – Standard for the Installation of Sprinkler Systems
- National Fire Protection Association (NFPA) 14 – Standard for the Installation of Standpipe and Hose Systems
- PWGSC Standard and Guideline MD 15500 – Fire Protection National Master Specification (NMS) Division 15.

3. GENERAL DESIGN REQUIREMENTS

3.1 Firefighting equipment in living unit and inmate circulation areas shall be designed for maximum control by staff. Design systems to minimize opportunities for vandalism, sabotage, the hiding of contraband and the use of the system or system components as weapons.

3.2 The fire standpipe system should be combined with the automatic sprinkler system in order to economize on the distribution piping. Piping and valving shall be such that the sprinklers on a range or portion can be shut off after a fire or vandalism to permit repair yet still permit operation of the fire standpipe and hose cabinets in the area.

4. SPRINKLER SYSTEM

4.1 Location

Sprinkler systems shall be installed in all Living Units; in all new buildings and in buildings receiving major renovations except:

4.1.1 Unless otherwise required by code, sprinklers may be omitted from small detached buildings having free-egress, in which there are no sleeping units and which do not constitute an exposure hazard to the principal functional areas of the institution, where such buildings are:

4.1.2.1 Not more than two storeys in height and less than 500 m^2 in area, or
4.1.2.2 One storey in height and less than 1000 m^2 in area.

4.2 Type

Sprinkler systems shall be generally of the wet type with the following exceptions:

4.2.1 Dry type system is to be used in areas subject to freezing.

4.2.2 Pre-action type as used in meeting the requirements of clause 7 for the protection of the Main Communication and Control Post (MCCP).

4.3 Zone Shut Off Valves

It is known that sprinklers located in inmate occupied areas are more likely to be activated, either because of vandalism or purposely set fires, than in a standard building. For this reason, provide electrically supervised manually operated control valves to aid in quickly shutting off the water without disrupting sprinkler protection to other areas of the building after it has been determined that sprinkler fire suppression in the immediate area is not required. These control valves shall be capable of quickly restoring water to the system if a fire is started in the affected area.

4.3.1 The zone valves shall be located in secured areas.

4.3.2 Each zone valve shall be clearly identified using a metallic tag as to what it controls. Cell numbers and/or range identification are to be clearly indicated.

4.3.3 Each zone controlled by a shut off valve shall have an alarm and flow switch.

4.3.4 Provide a minimum of one shut off valve for each cell block wing. Further subdivision of zoning to each side of the range and upper and lower floors is desirable if feasible.

4.4 Sprinkler Heads

4.4.1 Sprinkler heads in cells must be of the type which cannot be used to secure or anchor a rope like object to be used by the inmate for self destruction by hanging. If a rope or string can be secured to the head it shall not support a weight of more than 50 kg without breaking or operating the sprinkler system.

4.4.2 While not exclusive, the following list of sprinklers meets the CSC Standard of Acceptance:

- *Pendant Type*
  - Tyco Raven Quick Response Pendant Institutional Sprinkler.
  - Viking HQR-2 Institutional Quick Response Pendant.
  - Reliable - RASCO PEND ZX-SR-INST
  - Viking Horizon Model H Residential/Extended Coverage Pendant Sprinkler.
- *Side wall Type*
  - Tyco Raven Quick Response Horizontal Sidewall Institutional Sprinkler.
  - Reliable – RASCO HSW ZX-SR-INST
  - Viking - HQR-2 Institutional Quick Response Pendant

4.4.3

4.4.4 Provide protective guards on heads in MCCP, Janitor Closets and electrical and mechanical rooms to prevent the accidental impact of objects with the heads causing unwanted sprinkler operation.

4.4.5 Dry pendant type sprinklers may be used on a wet system in areas subject to cold temperatures such as walk-in refrigeration/freezer units.

5. STANDPIPE AND HOSE SYSTEM

5.1 Where Required

Standpipe and hose systems shall be installed in all locked Living Units and in all buildings of more than 3 storeys or 14 m in height and of 3 storeys or 14 m or less in height when the building area exceeds the following with no exemption to sprinklered buildings:

Height (Storeys)	Area (m^2)
1	2000
2	1500
3	1000

5.2 Non-Inmate Locations

Fire hose and cabinets, not in inmate housing units or other inmate oriented spaces, shall be unlocked standard type as required by National Building Code of Canada (NBC) except door shall be solid steel without a glazed viewing panel.

5.3 Minimum Institutions

Fire hose cabinets in housing units shall generally be standard type to meet National Building Code of Canada. However, since standard type soft hose must be fully extended before water will flow, consideration should be given to installing hard rubber hose on continuous flow reels if building configuration will not readily allow this full extension. Cabinets shall be unlocked. Hose length shall depend on the distance required to travel to meet the most remote location and shall conform to NFPA 14.

5.4 Medium and Maximum Institutions

In institution living areas, inmate circulating corridors and other inmate oriented spaces such as gymnasium, classrooms, library, vocational shops industries etc. provide standpipe and hose system as follows:

5.4.1 Fire hose cabinet shall be of steel, recessed where possible, with solid steel door without viewing window and shall be equipped with a 65 mm hose connection for fire department use and a 38 mm connection with adapter to 25 mm hose. Cabinet shall not contain a hose wrench as it may be used as a weapon.

5.4.2 The hose shall be 25 mm inside diameter rubber not exceeding 30 m in length and shall be mounted on a continuous flow hose reel. Water shall be admitted to the hose reel by a manually operated valve in the cabinet or in the line feeding the cabinet. Use of an automatically operated valve admitting water to the hose reel is not permitted as they can inadvertently shut off the water if several metres of hose is re-racked. The hard rubber hose is required because, unlike the standard soft hose, it cannot be easily slashed and if it is damaged it can be readily detected by visual inspection.

5.4.3 Fire hose nozzle shall be 25 mm size constructed of brass and shall be easily adjusted under all pressures through the complete range of; off, fog straight stream, and wash-down stream.

5.4.4 Fire hose cabinets at S-3 and S-4 Levels shall be unlocked.

5.4.5 At S-5 to S-7 Levels, to prevent inmate misuse of the hoses, the following features are required:

4.1.5.1 Provide means to shut off the water to the living unit hose cabinets from within the security control post. This is to be accomplished by either having electrically supervised manual shut off valves in the post or by ULC certified electrically controlled valves installed in a secure area, with switch in the control post.

4.1.5.2 Provide means to shut off the water to the cabinets in the inmate circulating corridor and inmate oriented spaces from a secure area, without disrupting the water supply to sprinklers or fire hose cabinets in other areas. Shut off to be either electrically supervised manual valve or ULC certified electrically controlled valve.

4.1.5.3 The cabinets shall be specially designed of heavy steel so that inmates cannot force open the door for unauthorized use. The doors shall either be secured with padlock or preferable, if cabinet can be recessed into security control post, a locking latch operable only from within the control post. If padlocks are used all doors shall be keyed alike. Padlocks and hasps are to be used on cabinet doors rather than cylinder locks or security type locks, since they can be broken off to gain access if the key slot is plugged with foreign matter or key is misplaced. The padlocks shall be provided by the owner.

5.2 Identification

Cabinet doors shall be painted red and be identified with graphic symbols or bilingual signs reading FIRE HOSE.

6. FIRE EXTINGUISHERS

5.1 General

Fire extinguishers shall be installed in accordance with National Fire Code of Canada requirements except as required in this section.

5.2 Water Type

5.2.1 Shall be pressurized type of 9 ℓ capacity.

5.2.2 For Maximum Institution and Medium Institution at S-5 Level, extinguishers required in living units, inmate circulating corridor and gymnasiums shall be in locked cabinets. Locks shall be as for fire hose cabinets and all keyed alike.

5.3 Water extinguisher

A water extinguisher shall be provided in every hose cabinet and generally shall be located so that the travel distance to an extinguisher does not exceed 23 m. However in areas requiring locked cabinets, permission may be given to increase the distance between extinguishers so that they will only be required in each fire hose cabinet. Dry Chemical Type

5.3.1 A 5 kg or equivalent multipurpose dry chemical extinguisher shall be installed in workshops or similar areas where flammable or combustible liquids are stored or handled. They shall be located so that at least 1 extinguisher is within 15 m of hazardous areas.

5.3.2 Dry chemical extinguishers must be of the stored pressure type. Cartridge operated extinguishers are not permitted as the cartridge could be used a weapon.

5.4 ***Carbon* Dioxide Type**

Carbon dioxide extinguishers of 5 kg or equivalent capacity shall be provided for the protection of electrical and electronic equipment. They shall be located so that at least 1 extinguisher is within 7.5 m of such equipment.

5.5 ***Class K Wet Chemical***

5.5.1 Class K fire extinguishers shall be provided for hazards where there is a potential for fires involving combustible cooking media (vegetable or animal oils and fats). A Class "K" wet chemical portable extinguisher of 6 L capacity shall be installed within 10 m of all commercial cooking appliances producing grease laden vapours.

5.5.2 A sign shall be posted next to the Class K extinguisher stating the "Fixed extinguishing system shall be operated prior to the use of the Class K portable extinguisher." This is required to isolate the fuel or energy source associated with the cooking appliance.

5.6 ***Clean Agent***

Listed special purpose clean agent portable extinguishers shall be provided for the protection of areas involving fine electronic equipment such as in central computer rooms in RHQ and NHQ and in MCCP/CER's. Dry chemical extinguishers shall not be used for protection of MCCP/CER's.

5.7 ***Supplier***

The location of all fire extinguishers shall be shown on the contract drawings. However, CSC shall supply and install all hand extinguishers that are not required to be located in a cabinet.

7. MAIN COMMUNICATION CONTROL POST (MCCP)

7.1 Except as otherwise noted in this Section, where the building containing the Main Communication and Control Post (MCCP) and Communication Equipment Room (CER) is required to be sprinkled, the sprinkler system in these rooms shall be of the single-interlock pre-action type, activated by heat detectors (no cross zoning) installed at ceiling level. An easily accessible, electrically supervised manual sprinkler control valve shall be located near the exit from the MCCP.

7.2 15 lb CO_2 fire extinguishers shall be provided at the exit from the MCCP and CER rooms.

7.3 Ventilation for the UPS battery units shall be provided in accordance with Canadian Electric Code C22.1[1]

7.4 In lieu of a pre-action sprinkler system, institutions may consider the use of a listed clean agent (or similar) fire suppression system. All systems so installed to comply with this sentence shall be submitted via a formal project submission to CSC Technical Services, Engineering & Maintenance at National Headquarters.

8. WATER SUPPLIES

8.1 The water supply in litres per second for correctional institutions shall be not less than two times the square root of the largest single floor area in square metres, to a maximum of 130 ℓ/s. Floor area means the space on any storey of a building between exterior walls and required firewalls.

8.2 The water supply stipulated in (.1) shall be available for a period of not less than 2 h.

8.3 Every hydrant shall be capable of flowing not less than 30 ℓ/s of water at a residual pressure of not less than 450 kPa (gauge).

8.4 Water supply capacity for buildings shall be sufficient to meet the requirements for sprinkler systems and standpipe and hose systems.

8.5 Fire protection water supply entry into buildings shall be controlled with an above ground post indicator valve (PIV).

8.6 When available, the water supply shall consist of 2 separate connections from a municipal water works system.

8.7 When a municipal water works system is not adequate to meet the requirements stipulated in the previous clause, it shall be augmented by on site water supply from tanks or reservoirs with at least 2 fire pumps. Each fire pump shall be capable of supplying the water supply requirements based upon 120 percent of its rated capacity.

9. FIRE PUMPS

9.1 Fire pumps shall be automatic in operation and arranged to remain in operation until manually shut down.

9.2 Fire pumps shall be electrically interconnected with the fire alarm system such that their operation is indicated at the central alarm and control facility.

9.3 Where adequate standby power is available the two fire pumps shall be driven by electric motors with at least one of them connected to the emergency power supply.

9.4 Where it is not feasible to provide reliable standby power, one pump shall be electrically driven and the other shall be driven by an internal combustion engine.

M-4 MECHANICAL – HEATING, VENTILATING & AIR CONDITIONING REQUIREMENTS

1 SCOPE

This section outlines the basic HVAC criteria for Correctional Institutions and provides design guidelines for these systems.

Heating, ventilating and air-conditioning in health care facilities must meet the requirements of the CSA Z317 health care codes. See M-1 Mechanical: General Mechanical Requirements.

2 RELATED DOCUMENTS

2.1 This section should be read in conjunction with the following TCD sections as applicable:

A–3 – Architecture – Grilles, Mesh and Screens
A–8 – Architecture – Building Acoustics
M–1 – Mechanical – General Mechanical Requirements, and
E–6 – Electrical – Emergency Electrical

2.2 In addition the National Master Specification (NMS) for HVAC, Division 15000 shall be observed as applicable.

3 ENVIRONMENTAL COMFORT LEVELS

Ventilation systems shall be designed as per ASHRAE guidelines and ASHRAE standards 55[1] and 62[2].

4 AIR CONDITIONING

4.1 Mechanical cooling shall be provided in the following areas:

4.1.1 Office areas
4.1.2 Security control posts, duty rooms, etc.
4.1.3 Food services supervisor and general offices
4.1.4 Computer equipment and telecommunication rooms. Computer room air conditioning systems shall be to ASHRAE latest recommended standards and to CSC “Computer Facility Guidelines”

4.2 Except as provided in 4.3, air conditioning shall not be provided in inmate-occupied areas unless special approval has been obtained from NHQ – Technical Services.

4.3 Exceptions

4.1.5 Hospitals and health care centres including related cells.
4.1.6 Industrial areas where processes performed require temperatures which cannot be maintained without mechanical cooling.

---

1 ANSI/ASHRAE Standard 55-2010 – Thermal Environmental Conditions for Human Occupancy (ANSI approved) – American Society of Heating, Refrigerating and Air-Conditioning Engineers including Errata

2 ANSI/ASHRAE Standard 62.1-2010 – Ventilation for Acceptable Indoor Air Quality (ANSI Approved) American Society of Heating, Refrigerating and Air-Conditioning Engineers Including Errata
ANSI/ASHRAE Standard 62.2-2010 – Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings (ANSI/ASHRAE Approved) American Society of Heating, Refrigerating and Air-Conditioning Engineers Including Errata

5 HEATING PLANT

5.1 Guidelines

Investigate and provide cost study of alternative heating methods, heating media and fuels, and recommend specific systems at the conceptual design stage, giving sufficient supporting data to justify recommendations, taking the following items into consideration.

5.1.1 For ease of operation and maintenance, preference is to be given to low or medium temperature hot water heating systems. Steam or high temperature hot water systems shall be avoided.

5.1.2 Plant economic design evaluation shall take into account the level of operator certification and length of time of mandatory supervision required by the Provincial boiler and pressure vessel regulations.

5.1.3 To facilitate maintenance, especially in plants not requiring 24 hour supervision and to eliminate or shorten underground distribution lines, the preferred location of the boiler plant is within the institution fence adjacent to the Works and Engineering Section of the complex.

5.1.4 In campus-style institutions, consider designing the heating system with separate boilers for individual buildings or small groups of adjacent buildings. CSC promotes the installation of geothermal systems, solar panels, direct contact heat exchangers, etc.

5.1.5 Buried underground heat distribution systems:

5.1.5.1 Consideration should be given to installing insulated heating pipes on a continuous concrete pad slightly below grade covered with inverted “U” precast concrete box, polyethylene and 300 mm of earth. Consider using summer boilers where the summer load is low compared to the winter load and avoid systems requiring long heat distribution lines to be kept energized to provide for a small summer load.

5.2 Boiler Standby

5.2.1 For Medium and Maximum institutions, boilers shall be sized so that if one boiler fails, comfort conditions in the critical spaces can be maintained and other areas of the complex can be kept above freezing under winter design conditions.

5.2.2 If separate boilers in the same boiler room are used for space heating, process heating, and domestic hot water, review the possibilities and cost of interconnecting the boilers to allow for maintenance and repairs while still providing all services.

If electrical heating is used, standby heating to satisfy conditions outlined in 6.2 shall be provided in the event of a main power failure.

5.3 Fuel

5.3.1 Investigate the availability and reliability of alternate fuels and prepare a comparison of heating costs and recommendations.

5.3.1.1 Investigation to include possibility of using combination of fuels such as oil and gas to obtain interruptible gas rates, off peak electrical use with oil or gas. etc.

5.3.1.2 Cost comparison to include total owning and operating costs including capital, maintenance, staffing, and fuel costs.

5.3.2 Where local fuel delivery is readily available provide a minimum fuel storage capacity of seven (7) days based on the period having the maximum continuous heating load. Use a fourteen (14) day period minimum where local fuel delivery may not be reliable.

6. HEATING AND VENTILATION

6.1 General

6.1.1 Ceiling Access

Keep to a minimum the installation of equipment such as mixing boxes, dampers, forced flow heaters etc., in ceiling spaces in inmate-oriented areas. If equipment must be installed in ceiling spaces of these areas:

5.1.1.1 Access panel must be secured so that special tools are required for removal.

5.1.1.2 Where possible, equipment shall be located so it can be serviced from below, with the equipment directly over the access panel, preventing access into the ceiling space.

6.1.2 Rooftop Units

Because of operating and maintenance difficulties, rooftop units without heated service spaces normally shall not be installed in locations with severe winter climate.

6.2 *Cells*

6.2.1 Comfort Condition

5.1.1.1 To ensure comfort levels are maintained in the cells: provide sufficient zoning so that cells with different exposures have separate temperature controls.

5.1.1.2 Design air supply to eliminate drafts in occupied space, taking into consideration that the cells are small, the occupant spends considerable time in the cell, is not able to rearrange the furniture to avoid a draft, and that the grilles must meet security requirements, which limits adjustability and air diffusion patterns.

5.1.1.3 Temperature control must be designed so that one occupant cannot upset the temperature of adjacent cells by opening his window, closing off his return air grille, providing heat source to a thermostat, etc.

5.1.1.4 The system shall be designed to keep the temperature in the cells between 21°C and 23°C during the heating season.

6.2.2 Ventilation in wet cells

5.1.2.1 Exhaust rates as per ASHRAE Standard 62 [3]

5.1.2.2 Cells shall be maintained at a negative pressure with respect to the corridor.

---

[3] ANSI/ASHRAE Standard 62.1-2010 – Ventilation for Acceptable Indoor Air Quality (ANSI Approved) American Society of Heating, Refrigerating and Air-Conditioning Engineers– Including Errata

5.1.2.3 Heat exchangers shall be provided in order to recover heat from exhaust air.

6.2.3 Security

In Medium and Maximum Institutions, since inmates spend much of their time in the cells unsupervised, cell heating and ventilation systems shall meet the following requirements:

6.2.3.1 Supply and exhaust grilles in Maximum Institutions must not be removable from within the cell. In Medium Institution, if it is not practical to design systems so that grilles are not removable from inside the cell, use security fasteners so that special equipment is required to remove the grilles.

6.2.3.2 For cells with combination stainless steel fixtures, consider using an integral punched grille for return, exhaust or supply air.

6.2.3.3 Installation shall minimize the possibility for occupant to anchor a string or rope to use for self-destruction by hanging. Grilles with bars or heavy screens installed in the ceiling will not be acceptable. The installation of S-vents or a similar type of grill shall be used for Segregation and Maximum cells.

6.2.3.4 Limit the opportunity for inmates to hide contraband in grilles or heating units. No access panels or cleanouts shall be installed in cells.

6.2.3.5 Valves, thermostats, air vents etc. shall be adjustable and serviceable from outside the cells.

6.2.3.6 Grilles or heating units must be ruggedly constructed to resist abuse and to minimize possibility of them being used as weapons. Grilles to have closely-spaced grid openings to discourage hiding of contraband. Check with project manager to determine whether grilles will be part of the contract or whether they will be manufactured by CSC Industries and supplied by the owner.

6.2.3.7 Ductwork to adjacent cells shall be divided so that there is a minimum of four 90° elbows between cells to impede verbal communication and the exchange of contraband. If service chase is used as return air plenum, provide stub duct from each cell with 90° elbow and minimum 400 mm length of duct.

6.2.3.8 Floor grilles shall not be specified as they can be used to aide in fermentation to produce wine or conceal and pass contraband. Floor grilles also collect dust and dirt, and will collect water if sprinkler system is activated.

6.2.4 Heating

6.2.4.1 In many of our existing institutions cell temperature control is accomplished by thermostatic sensors in the return air ducts from one or more cells, controlling zone values or mixing dampers. This has not been fully satisfactory for the following reasons:

a) An occupant may purposely change the temperature of neighbouring cells by opening his window, hanging a wet towel on his return air or adding a heat source, i.e., hair dryer, to the return air.

b) Occupants have a habit of covering their supply and exhaust grilles, upsetting the temperature control.

c) Not all occupants wish to have their cells at the same temperature and may wish changes from day to night. If one occupant opens a window to cool his cell the system will provide more heat to all cells thus causing others to overheat and open windows.

6.2.4.2 One method of overcoming these cell temperature control problems is to install a radiant floor heating system.

6.2.4.3 To minimize inmate hiding of contraband, the grilles in the convector cabinet shall have round holes not more than 6 mm in diameter.

6.2.4.4 Convector damper shall be sliding type that can be manually adjusted from fully open to complete closure to convector top openings and shall have a small knob not removable from cell side of cabinets. Design of the knob shall be such to make it impossible to secure a rope for self-destruction by hanging.

6.2.4.5 Convector cabinet shall be constructed of minimum 2.6 mm steel, and shall run wall to wall. Top shall be supported by wall strip hangers, and bottom shall be secured with security screws or pop rivets to floor mounted angle iron. The angle iron shall run the total length of the cabinet and shall be secured to the floor inside the cabinet.

6.2.4.6 No valves, air vents or any other fittings that may require maintenance shall be installed in the cell cabinets.

6.2.4.7 Cabinets must be secured in place so that they can only be removed by service personnel with special tools, drills, etc.

6.2.4.8 It is recommended that the amount of cell radiation installed be based on lower water temperatures than used for designing the rest of the building, as cleaning of fins will be very difficult, and if fins do become dirty over time, cell temperature could still be maintained.

7. CONTROLS

7.1 *Thermostats* and sensors

Since occupants will attempt to sabotage the heating system operation, thermostat and sensor type and location, in inmate oriented areas, must be carefully chosen using the following guidelines:

7.1.1 Thermostats shall not be located in cells.

7.1.2 Any type of standard guard is likely to be breeched.

7.1.3 Consider installing temperature sensors in return air ducts.

7.1.4 For forced flow units consider installing sensor within the cabinet.

7.1.5 Locating sensors above the reach of inmates may be acceptable.

7.1.6 Sensors shall not be located so that one inmate in his cell can affect the temperature of a neighbouring cell.

7.2 Building automation system (BAS)

Controls for HVAC systems shall be connected to a CSC building automation network (BAS) that is accessible to technical personnel. The BAS may be connected to CSC’s Corporate Network via a managed connection for administrative, technical and vendor access as necessary.

The controllers and command posts shall not be accessible to inmates.

The BAS specification shall require BAC net. Systems shall be sourced from established manufacturers with a track record of long-term system support.

8. SECURITY GRIDS

8.1 Location

8.1.1 Steel security grids are required in Medium and Maximum Institutions to prevent inmate movement through ducts which have a minimum dimension larger than 125 mm and a total cross sectional area greater than 54 000 mm^2 if the ducts pass from:

8.1.1.1 One major inmate department to another.
8.1.1.2 Inmate area to non-inmate area.
8.1.1.3 Inmate area to outside.
8.1.1.4 Outside to MCCP or Guard House.

8.1.2 The duct work design shall minimize the number of openings requiring security grids and there shall be no duct openings larger than 54 000 mm^2 through control post walls or ceilings.

8.2 Construction

The security grids shall be as follows:

8.2.1 Structural quality steel bars not less than 12 mm diameter on 137 mm centers (2 bars of radius 6 mm plus a 125-mm gap = 137 mm), except that where the opening is between an inmate area and a security corridor the bars shall be of Tool Resistant Homogenous Steel.

8.2.2 Maximum bar length without cross bars not to exceed 610 mm and all bars shall be welded together where they intersect.

8.2.3 Bars to be welded to a flat steel frame secured to masonry/concrete. Acceptable method: bolts set a minimum of 50 mm into expansion shields. Bolt spacing not exceeding 400 mm on centers. No less than 4 bolts per grille.

8.2.4 Refer to Technical Criteria Section A–3 – Architecture – Grilles, Mesh and Screens for steel specifications.

8.3 Mechanical Room Openings

Exterior Openings in mechanical rooms for air intake, exhaust, etc., in Maximum Institutions and Medium Institutions at S-5 Level, which are less than 3.5 m above grade or above an accessible roof, shall be protected with security grids to prevent inmate entry. Exterior openings in mechanical room in Medium Institutions at S-3 or S-4 Level, and those more than 3.5 m above grade in Maximum Institutions and Medium Institutions at S-5 Level shall have louvers securely fastened in place with fastenings removable only from the interior, but need not have security grids.

8.4 Security Corridor

Locate ducts to minimize the number of openings larger than 54 000 mm^2 required through the security corridor walls.

8.5 Grilles

8.5.1 Aluminum bars from ventilation grilles have been used by inmates to fabricate contraband knives. These aluminum knives are not detected by the metal detector.

8.5.2 To reduce the chance of this occurring, all grilles in inmate-oriented areas such as kitchens, dining areas, workshop, inmate corridors, recreation areas, library, chapel, etc., that are less than 3.4 meters above the floor shall be made of steel or iron in all Medium or higher level institutions.

9. AIR SYSTEMS CONTROL

9.1 General

Chemical agent (tear gas) may be used for riot control in inmate-occupied areas and corridors with inmate movement. The ventilation systems should be designed to minimize the spread of tear gas-laden air to non-inmate areas remote from the source.

9.2 MCCP

Special attention should be given to the design of the ventilation system in the main communication control post as this post must stay in operation at all times. Tear gas will have an adverse affect on equipment, and systems should be designed so that the MCCP will not become contaminated by gas or smoke from inmate areas. The room should have a positive pressure compared to the surrounding spaces.

9.3 Health Care Unit

The health care unit shall have a separate ventilation system to ensure that neither the cells nor the operations area will be contaminated if tear gas is used in other areas of the institution.

9.4 Control Post

Design of the Security Control Posts ventilation system in Maximum Institutions and Medium Institutions at S-5 Level shall prevent the control posts from being contaminated by smoke or tear gas from inmate-oriented areas of the Institution. Secure refuge areas behind D Level posts must also meet this standard. The control post shall be maintained with positive pressure to avoid any contamination.

9.5 Living Unit System Design

For “protecting in place” during a fire and to facilitate tear gas use and purging, Medium and Maximum living units (excluding S-3 units) shall be designed with the following features: a ventilation system for normal use (including supply and exhaust/return air fans) and one separate end-of-range emergency exhaust fan per level of the living unit. The emergency exhaust fans shall be capable of providing four (4) air changes per hour.

9.5.1 Under normal conditions, the living unit ventilation system alone shall operate.

9.5.2 If there is tear gas use or a fire occurrence, to prevent cross contamination or the need to shut down ventilation systems serving a number of ranges, the end of unit exhaust fan shall be used.

9.5.3 Consideration shall be given to provision of a separate ventilating system for each living unit wing. Submit cost and design implications of this requirement at preliminary design submission stage.

9.5.4 For each living unit ventilation system, provide two (2)-three (3) position (“OFF”-“AUTO”-“ON”) manual switches in the control post to control the ventilation system supply and return fans separately. .

9.5.4.1 In the “AUTO” position, the ventilation system shall operate normally, controlled by the building control system.

9.5.4.2 The “OFF” position shall over-ride all other controls and shut the ventilation system down.

9.5.4.3

9.5.4.4 When return fan is in “ON” position it shall exhaust 100% to outside.

9.5.4.5 When supply fan is in “ON” position it shall supply air to the living unit but shall not re-circulate air from the wing being controlled.

9.5.4.6 Red indicator light shall be on when switch is not in “AUTO” position, to indicate abnormal system status.

9.5.4.7 Since these controls are for emergency use only and will seldom be used:

a) Design the ventilation supply system to minimize possibility of coil freeze- up, but size the supply air heating coil for normal operation, not for 100% outdoor air at winter design conditions.
b) Consider re-circulating air from other areas of the building when supply fan is in “ON” position.
c) Freeze protection shall override “ON” position of supply fan to prevent coil freeze-up.

9.6 Living Unit. System Operation

During tear gas use

9.6.1 Before using tear gas, turn the living unit ventilation system supply and return fan switches to “OFF”.

9.6.2 To purge area after gas use, turn both switches to ON.

9.6.3 After the area has been purged, turn the living unit ventilation system switch to “AUTO”.

9.6.4 If quick exhaust is required, the end-of-range emergency exhaust fans may be turned ON. However these fans must be turned off before turning the ventilation system to “ON” or “AUTO”. The end-of-range fans are not provided with heated makeup air so they will cool down the range considerably in cold weather and should be used with caution to prevent possible occupant discomfort or freezing of piping or equipment.

10. SPECIAL VENTILATION

10.1 Smudging

This section provides guidelines for dedicated air exhaust in designated group rooms used for smudging in accordance with applicable CD’s[2]

10.1.1 <u>Locations where smudging may take place</u>

10.1.1.1 The following locations will be supported with a dedicated air exhaust system as described below:

a) Designated Sacred Space within the Spirituality, Chaplaincy or Aboriginal Services area of an institution.
b) Designated room in a standalone Aboriginal Cultural Centre or building.
c) Parole Hearing rooms.
d) Designated program room in a standalone program building or/and isolated wing of a building used for programs.

10.1.1.2 The following locations used for smudging as outlined in CD 259 and as directed by the Institutional Head, shall not be supported with a dedicated air exhaust system:

a) Inmate cells or bedrooms, including in segregation.
b) Private Family Visits space;
c) Any other space not noted above.

10.1.2 Requirements for ventilation related to smudging:

In the above-noted group rooms where smudging may take place shall have an exhaust system that vents directly to the exterior of the building. This is to prevent the transfer of smoke to other areas of the building.

The rooms used for smudging should, if possible, be located on the perimeter of the building.

10.1.2.1 Technical Requirements:

The minimum supplemental exhaust shall increase the normal air changes supplied by the existing ventilation system by two (2) air changes per hour. The maximum increase shall not be more than four (4) air changes per hour.

This can be achieved by:

- An insulated wall fan unit installed on the exterior of an outside wall of the room so that the unit can exhaust directly to the outdoors.
- A duct system with an internal fan that is ducted directly to the outdoors.

The following applies to either approach:

10.1.2.2 There shall be a manual switch with a sixty (60) minute timer.

10.1.2.3 There shall be a controlled damper on the return vent(s) for the room. The switch should be set up so that when the fan is turned on, the damper on the return vent(s) is closed. This will prevent the smoke from returning into the building ventilation system.

10.1.2.4 The supply vent(s) to the room will remain active. This may cause the ventilation system to be out of balance for a short time.

10.1.2.5 Care must be given to the placement of the exhaust vent so that it is not near operable windows, doors, or ventilation intakes to adjacent areas, in order to prevent the transfer of smoke back into the building.

10.1.2.6 There is no need to weatherstrip the room door.

10.2 Airborne isolation rooms within Health Care Centres

Airborne isolation rooms (negative pressure rooms) shall be designed as per *CSA Z317.2.*

10.3 Other

10.3.1 Provide special ventilation systems as required for carpenters shop, paint shop, Corcan laundry room, welding shops, automotive repair areas, hobby shop etc. Design shall be to ASHRAE standards and shall be designed taking into account that users will attempt to sabotage the systems:

10.3.1.1 Underfloor exhaust systems for carbon monoxide removal should be avoided, as they are easily plugged and made ineffective.

10.3.1.2 Providing appropriate portable equipment may be the most suitable solution for some ventilation requirements.

11. ARMOURY

11.1 Environment control

11.1.1 Temperature must be controlled in the armoury within the range of 1°C to 27°C.

11.1.2 Relative humidity shall be maintained below 50% within the armoury.

11.1.3 The armoury shall be cooled during summer.

11.1.4 Make-up air shall come from adjoining rooms by transfer grilles.

11.1.5 A slot exhauster type fume hood and ventilated cabinet (storage closet) shall be installed in the armoury. As solvents are used to clean the firearms, they shall be stored in the ventilated cabinets and used under the fume hood. Fume hood to be designed as per ACGIH standards.

11.1.6 Total evacuation airflow shall be 160 litres/second, including that of the fume hood, storage closet, and main room.

11.1.7 When beneficial, recover heat from exhaust air with heat exchanger.

Correctional Service Canada / Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Technical Criteria for Correctional Institutions

SECTION E – ELECTRICAL

Canada

E-1 ELECTRICAL – GENERAL ELECTRICAL ENGINEERING & DISTRIBUTION SYSTEM

1. SCOPE

- This section outlines the basic electrical engineering design criteria related to the special requirements of Correctional Service Canada (CSC) and the requirements for electrical distribution.
- It applies for CSC buildings that are inside and outside the fenced institutional perimeter.
- Approval from CSC must be obtained before any variations from this document are incorporated into any designs.

2. RELATED SECTIONS

E–2 to E–6 inclusive
SP–4 – Site Lighting
SU–4 – Power Supply & Electrical Power Distribution (Comply with all clauses in this section)

3. CODES AND STANDARDS

3.1 The design for the electrical work shall:

3.1.1 Be based on and conform with the updated requirements of the applicable National, Federal, Provincial and Local Municipal Codes, Standards, Rules, Regulations and all the appropriate authorities and agencies having jurisdiction.

3.1.2 Specify applicable standards for all equipment, i.e. EEMAC, CSA, NEMA, ULC, ASTM, NFPA, ANSI, IEEE, ULI.

3.1.3 Avoid specifying trade names, when it is required, provide not less than 3 trade names and/or equivalent equal.

3.2 The last edition of the “Canadian National Master Construction Specification” format shall be used when preparing specifications.

3.3 For wiring in hazardous locations follow CSA publication “A Guide for the Design, Construction and Installation of Electrical Equipment”.

4. GENERAL REQUIREMENTS

4.1 The scope of technical work shall include, but not be limited to, engineering services required for sound planning and design of all electrical work necessary for the Project including:

4.1.1 Determination of existing and site conditions.
4.1.2 Economic and feasibility studies of alternatives.
4.1.3 Services and connection to utilities.
4.1.4 Integration of design with that of other disciplines.
4.1.5 Preparation of preliminary and detailed cost estimates.
4.1.6 Preparation of Drawings and Specifications as complete Contract Documents suitable for tendering.

5. SYSTEM CONSIDERATIONS AND PRIMARY DESIGN

5.1 The guiding principles for design of electrical systems are to ensure sustainable development, reliability and LEED program.

The electrical design shall be based on the following characteristics and features:

5.1.1 Safety to personnel during operation and maintenance.

5.1.2 Flexibility of electrical services.

5.1.3 Stringent security requirements up to the level of maximum security institutions.

5.1.4 High level of vandalism and deliberate tampering with systems and equipment.

5.1.5 Availability of electrical power to critical security and life safety support systems shall exceed 99.99%; that is, less than one hour down per year. Redundancy for UPS power and air conditioning for CER and MCCP Rooms and electronics located within this room.

5.1.6 Fail safe systems and equipment of a quality consistent with anticipated building life and/or required reliability of service.

5.2 Reliability/availability studies shall be carried out for power delivery to the main communications and control post, security control posts and other areas as designated by CSC. The study shall be carried out in accordance with *IEEE Standard 493-2007*[1].

5.3 Service

5.3.1 Carry out preliminary load study and establish approximate loads at each load centre/connection point.

5.4 Voltage

5.1.1 Preferred secondary voltages and systems for internal distribution are:

- 600/347 volt wye grounded 3 phase – 4 wire
- 208/l20 volt wye grounded 3 phase – 4 wire

There may be some limited requirement to serve special loads at 120/240 volt 3 wire on 240 volt, 2 wire single phase.

5.1.2 Review voltage considerations as presented in

- *IEEE Standard 241-1990*[2] – Section 3 and
- *IEEE Standard 141-1990*[3]
- Voltage profile limits to be as presented in Figure 6 of Reference *ANSI Standard C84.1-2006*[4] – Range “A”.

5.5 Metering Requirements

5.5.1 Arrange and provide revenue metering to suit utility requirements in conjunction with configuration for service/distribution.

5.5.2 Distribution configuration to provide internal energy metering upon request of the institution. Metering equipment shall be similar to that provided by the utility and shall be in accordance with *CSA Standard C17-M84 (R2008)*[5].

5.5.3 Instrument transformers for metering to be in accordance with *CAN3-C13-M83 (R2004)*[6]. Specify instantaneous indicating voltmeters and ammeters at each distribution switchboard.

---

1 493-2007 – IEEE Recommended Practice for the Design of Reliable Industrial & Commercial Power Systems
2 241-1990 – IEEE Recommended Practice for Electric Power Systems in Commercial Buildings
3 141-1993 – IEEE Recommended Practice for Electric Power Distribution for Industrial Plants
4 C84.1-2006 – American National Standard for Electric Power Systems & Equipment – Voltage Ratings (60 Hz)
5 CAN3-C17-M84 (R2008) – Alternating-Current Electricity Metering
6 CAN3-C13-M83 (R2004) – Instrument Transformers

5.6 Service/Distribution System (Transformer) Configuration

5.6.1 Reliability considerations dictate that some redundant transformation is provided for large customer owned 3 phase stations since a suitable temporary spare is usually unavailable.

For smaller stations single non redundant configurations should be considered. A source for replacement spare must be established. This could mean on a project with a number of single transformer stations that a suitable spare be provided and held on the premises.

The stations must be standardized at least to the extent that the single spare may be installed at each location. Consideration should be given to installing and connecting the spare at one station in a redundant or "double ended" configuration.

Design size and configuration of systems to recognize limitations of components:

- Full load rating, interrupting capacity and withstand capability of switching, protection and control equipment.
- Short circuit capability and thermal capacity of system conductors.

5.6.2 Generally the following guidelines should be considered.

- 600 volt systems - maximum transformer size - 2500 kVA with 6.5 to 7.0% impedance to limit maximum 3 phase bolted secondary through faults to 35,000 RMS (without considering internal system sources). (3300 kVA with single stage of fan cooling on a power transformer).
- 208/120V systems - maximum transformer size - 400 kVA with 5.0 to 5.5% impedance to limit maximum 3 phase bolted secondary through faults to 20,000A RMS.
- 4160 volt systems - maximum transformer size - 4000/5333 kVA with single stage of fan cooling.

5.7 Preliminary Design Study

5.7.1 Carry out an economic study to establish optimum system configuration, voltage levels and size. Establish at least 2 and preferably 3 alternative system configurations which reasonably represent the options to consider.

- Prepare capital cost estimates for each system.
- Evaluate complete owning and operating cost estimates including
  - utility energy charges
  - losses
  - depreciation
  - cost of money
- Also carry out a quantitative analysis of the reliability of each option. Methods for this study to be set out in *IEEE Standard 493-2007*[7].
- The study to be presented in report form and should include qualitative analysis and comparisons, recognizing factors which fall outside quantitative economic reliability analysis.

[7] 493-2007 – IEEE Recommended Practice for the Design of Reliable Industrial & Commercial Power Systems

The reliability analysis should consider the system through to typical points of utilization one of which must be the critical "Emergency" power connection to the "Control Centre".

5.7.2 Based on preliminary load calculations transformer sizes and main secondary system equipment must be sized to permit 50% future expansion.

5.8 Co-ordination Study

5.8.1 Carry out preliminary co ordination study during system development.

5.8.2 Use manufacturer's typical time overcurrent characteristics for relays, fuses and circuit breaker tripping elements.

5.8.3 Specify preparation of a complete co-ordination study as part of the contract. Contractor to employ recognized independent company. Co ordination study to be submitted over stamp of a Professional Engineer, licensed to practice in a Province of Canada.

5.8.4 Co-ordination study to be submitted for approval as shop drawings.

5.8.5 Final corrected copies to be included with maintenance manuals.

5.8.6 Co-ordination studies to be carried out and presented in accordance with *IEEE Standard 242-2001*[8].

5.9 Commissioning

5.9.1 Specify preparation of a load study as part of the contract. Load study is to be reviewed and commented on by the design engineer. Study is then to be submitted to CSC.

5.9.2 Load study is to contain full load current readings of all feeders connected to 50 A circuit interrupting devices and larger. Currents are to be read at the line side of the feeders if possible.

5.9.3 Load study is to contain voltage readings taken at the load side of the feeders. Adjust transformer taps to within 2% of rated voltage of equipment.

5.9.4 Load study is to identify loads i.e. are they motors, lighting or heating.

5.9.5 Specify equipment and wiring identification as covered in Canadian National Master Construction Specification Section 26 05 00.

5.9.6 Specify balancing of loads.

5.9.7 Specify for contractor to demonstrate that systems operate as design intended them to operate and that contractors must be prepared to operate each device, such as switches, relays etc, to the satisfaction of CSC and PWC personnel involved in the acceptance procedure.

6. DISTRIBUTION EQUIPMENT

6.1 General Requirements

6.7.6 Copper bus bars for all distribution equipment.

6.7.7 Main electrical and telecom rooms should be built above 200-year flood plains.

6.7.8 Apply ground fault protection as per Canadian Electrical Code.

[8] 242-2001 – IEEE Recommended Practice for Protection and Commercial Power Systems

6.2 Switchgear Assemblies

Refer to and specify in accordance with *CSA Standard C22.2 No. 31-04 (R2009)*[9]. Also refer to and specify as "*Metal Enclosed Low Voltage Power Circuit Breaker Switchgear*" in accordance with *EEMAC G8-2, 1972*[10] (section from page 48 to page 55).

6.3 Distribution Switchboards

Refer to and specify in accordance with *CSA Standard C22.2 No. 31-04 (R2009)*[11]. Also refer to *ANSI/IEEE Standard 241-1990*[12] under "*Metal Enclosed Distribution Switchboards*" and to *NEMA PB 2-2006*[13].

6.4 Unit Substations

Refer and specify in accordance with:

- *EEMAC G13.1, 1978*[14]
- *ANSI/IEEE C37.121-1989*[15]
- Refer to Section SU-5.

6.5 Feeder Switch Units (Fusible)

Refer to and specify heavy duty classified switch units in accordance with:

- *NEMA KS 1-2001 (R2006)*[16], and
- *CAN/CSA-C22.2 No. 4-04 (R2009)*[17]

Units shall be horsepower rated for overload current interrupting capability.

6.6 Fuses for Feeder Switch Units

Select and specify a suitable time delay J type fuse (not covered under referenced standard) and apply for transformer primary protection where required.

6.7 Moulded Case Circuit Breakers

6.7.1 *CSA Standard C22.2 No. 5-09*[18].

6.7.2 The use of solid state trip units for moulded case breakers at the distribution level is encouraged to allow for best protection coordination

6.8 Panel boards

6.8.1 Refer to and specify in accordance with *CSA C22.2 No. 29-M1989 (R2009)*[19].
A considerable number of spare breakers and spaces are required.

6.8.2 For panel boards supplying appliance loads to cells, specify contactor, electrically held in mains with 120V 600Hz coil for remote control (3 wire) from central control station.

6.8.3 Panels with GFP to be installed as close as practical to the outlets served.
NOTE: All appliance receptacle circuits to cells supplied from GFP breakers.

---

9 C22.2 No.31-04 (R2009) – Switchgear assemblies
10 EEMAC G8-2, 1972 – EEMAC Standard for Switchgear Assemblies
11 C22.2 No.31-04 (R2009) – Switchgear assemblies
12 241-1990 – IEEE Recommended Practice for Electric Power Systems in Commercial Buildings
13 NEMA PB 2-2006 – Deadfront Distribution Switchboards
14 EEMAC G13-1, 1978 – EEMAC Standard for Unit Substations
15 ANSI/IEEE C37.121-1989 – American National Standard for Switchgear – Unit Substations – Requirements (NEMA 210.1970(R1976) – Secondary Unit Substations has been withdrawn no direct replacement.)
16 NEMA KS 1-2001 (R2006) – Enclosed and Miscellaneous Distribution Equipment Switches (600 V max.)
17 CAN/CSA-C22.2 No. 4-04 (R2009) – Enclosed and Dead-Front Switches
18 C22.2 No. 5-09 – Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
19 C22.2 No. 29-M1989 (R2009) – Panelboards and Enclosed Panelboards

6.9 Busways

6.9.1 Refer to and specify in accordance with *CSA C22.2 No. 27-09*[20].

6.9.2 Where practical specify for feeders 1000A and larger, and where run between switchboards within equipment rooms and in service corridors:

- for feeder specify low impedance type, open ventilated with insulated bus bars and joints.
- specify copper bus bars.
- specify bracing for available fault current.
- specify neutral if required.

6.9.3 Where feasible - in manufacturing areas, in accordance with accepted industrial practice, specify plug in bus duct, totally enclosed type.
Plug in units with circuit breaker for branch power circuit protection.
Size Ranges: 100A and 225A.

6.9.4 3 phase 4 wire bus duct to have full size neutral.

6.10 Step down Transformers

Refer to and specify dry type transformers in accordance with *CSA C9-02 (R2007)*[21].

6.11 Grounding Systems

6.11.1 When designing grounding systems for Electrical Distribution refer to and comply with the following standards:

- *CSA Standard C22.1-09*[22]
- *ANSI/IEEE Standard 142-2007*[23]

6.11.2 Design is to ensure that grounding system ground resistance suits the needs of the most sensitive equipment even if this exceeds by far the CSA Standard (50 ohms).

7. WIRING

7.1 Methods

7.1.1 For feeders, 1000A and larger which run in

- main electrical rooms
- main power plant

Specify - bus duct.

7.1.2 For feeders 1000A and less, emergency feeders, branch circuits, control circuits, alarm circuits and any other kind of feeders and/or circuits; Specify copper conductors and shall conform with the applicable Codes, Standards, Rules, Regulations and all the appropriate authorities having jurisdiction.

7.1.3 Specify flexible steel conduit for final connections to motors of all equipment subject to vibration.

7.1.4 Specify liquid tight flexible steel conduit where conditions of installation, operation or maintenance require flexibility and protection from liquids, vapours or solids.

---

20 CSA C22.2 No. 27-09 – Busways
21 CSA C9-02 (R2007) – Dry-Type Transformers
22 C22.1-09 – Canadian electrical code, part I (21st ed.), safety standard for electrical installations
23 142-2007 – IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems

7.1.5 Specify minimum conduit size for light and power branch circuits to be 20 mm.

7.1.6 In armouries and wherever solvents are used, specify explosion proof installations. (Refer to Section A-13 Armoury)

7.2 Conduit Raceway

7.2.1 Specify conduit raceway in accordance with applicable CSA Standard.

- *C22.2 No. 45.2-08*[24]
- *C22.2 No. 56-04 (R2009)*[25]
- *C22.2 No. 83.1-07*[26]
- *C22.2 No. 211.2-06*[27]

7.2.2 The electrical designer is to request in writing to the Project Manager that he, the designer, is given in time all the necessary information on all the empty conduit and raceway systems required for other systems such as alarms and telephones etc. so that these conduits can be included in the electrical design before the electrical tender call.

7.3 Conductors

7.3.1 Specify all conductors to be of copper.

7.3.2 Insulation is to be of the thermosetting type XLPE, Rated RW90.
Conductors are to be manufactured and tested in accordance with *CSA C22.2 No. 38-05*[28]. Specify RWU90 type if in conduit raceway in or below slab or in perimeter wall when in contact with earth or backfill materials.

7.3.3 Minimum conductor sizes for lighting and appliance circuits to be copper AWG #12.

7.3.4 For feeders specify compression lugs wherever possible.

7.3.5 For feeders and branch wiring specify colour coding of conductors for phases, neutral and ground.

7.4 Wiring Design

7.4.1 Design interior distribution system so that branch circuits are concentrated at the panelboards and the circuits so connected that the loads on each side of the system will balance within three percent with all the lamps burning.

7.4.2 Specify that Contractor, in providing this installation balances all loads as evenly as possible on all phases at each panel.

7.4.3 Special requirements - for cells:

- Separate lighting circuits for cells.
- Institutions for men; separate receptacle circuit (120V) for each cell. Receptacle circuits in cells supplied with 15 Amp breakers ground fault circuit interrupter type GFCI at panel, separate neutral required.

---

[24] C22.2 No. 45.2-08 – Electrical rigid metal conduit – Aluminium, red brass, and stainless steel
[25] C22.2 No. 56-04 (R2009) – Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit
[26] C22.2 No. 83.1-07 – Electrical Metallic Tubing – Steel
[27] C22.2 No. 211.2-06 – Rigid PVC (Unplasticized) Conduit
[28] CAN/CSA-C22.2 No. 38-05 – Thermoset-Insulated Wires and Cables

- Institutions for women; separate receptacle circuit (120V) for each cell. Receptacle circuits in cells supplied with 20 Amp breakers ground fault circuit interrupter type GFCI at panel, separate neutral required.
- Arc Fault Circuit Interrupter AFCI is considered a non code requirement for cells.

7.5 Underfloor Duct System

Base design of an underfloor distribution system, specify in accordance with *CSA C22.2 No.80-1978 (R2008)*[29] and *CEMA F 4-1, 1970*[30].

8. ELECTRIC HEATING

8.1 General

8.1.1 In areas where hot water heating is not feasible or such heating is unavailable, electric heaters should be considered.

8.1.2 Specify heaters to be controlled by either remote wall mounted room thermostats or built in thermostats. Thermostats should be used singly or in combination to control several heaters up to the permissible thermostat ampere rating. Where required, appropriate contactors should be specified.

8.1.3 All thermostats should be programmable line voltage with modulating output.

8.2 Electric Heaters for Pipe Tracing

Where electric heater cables are to be used for protecting piping from freezing, only heaters of the required length of cable and capacity should be specified.

8.3 Heater Units

Specify heater units consisting of a heating section of specified length, joined to a cold section of required length to connect to junction boxes located to suit the particular conditions.

8.4 Heating Sections

Specify heating sections to be of two or three conductor copper alloy resistance wire, insulated with compressed magnesium oxide, and covered by an annealed seamless copper sheath. Cold section should consist of two or three conductor mineral insulated copper sheathed power cable with a current carrying capacity in accordance with the Canadian Electrical Code.

8.5 Thermostats

Specify that heater circuits be controlled by thermostat(s) with temperature range of 0°C to 40°C housed in NEMA 4 cast aluminium enclosure.

---

[29] CSA C22.2 No.80-1978 (R2008) – Underfloor Raceways and Fittings

[30] F4-1, 1970 – CEMA Standard For Underfloor Distribution System

E-2 ELECTRICAL – WIRING DEVICE

1. SCOPE

This section outlines the requirements and characteristics of wiring devices.

2. RELATED SECTIONS

SP–4 – Site Lighting
E–1 and E-3 to E–6 inclusive

3. LOCAL SWITCHES

3.1 Local switches are to be rated 15 A at 125 V with fully enclosed composition cases, and rated 20 Amperes at 250 V for control of fluorescent lighting loads exceeding 500 W. Specify mounting 1370 mm centre from finished floor.

3.2 Specify three tamper resistant receptacles in living unit cells and administrative segregation cells.

3.3 Switching of Cell Lights and receptacles can be combined onto a single touch screen that is combined with door control, P/A, and Cell Call Systems.

3.4 Specify a master control to cut power to all cell receptacles in each living unit etc. This could be achieved by use of main breaker in cell receptacle panel.

4. CONVENIENCE RECEPTACLES

Duplex receptacles *NEMA Standard 5-20R*[1] U ground - rated 20 A at 125 V with double wiping contacts. Specification grade. Specify mounting at 300 mm centre from finished floor, unless otherwise directed by User. Cell and segregation receptacles to be tamper resistant.

5. POWER AND SPECIAL PURPOSE RECEPTACLES

5.1 Specify all receptacle in accordance with *CSA C22.2 No. 42-99 (R2009)*[2] and related NEMA *Standards WD 1-1999 (R2005)*[3], and *WD 6-2002 (R2008)*[4].

5.2 Power and special purpose receptacles of ratings and configurations compatible with usage in shops, laboratories, etc. Specify a minimum of one receptacle 30A, voltages that are available on site (208, 240 or 347V) per laboratory.

6. G.F.C.I.

Provide G.F.C.I. breaker on all circuits supplying receptacles in cells and any other locations required by code.

[1] Receptacles design: ANSI/NEMA WD 6-2002 (R2008) – Wiring Devices—Dimensional Specifications
[2] C22.2 No. 42-99 (R2009) – General Use Receptacles, Attachment Plugs, and Similar Wiring Devices
[3] NEMA WD 1-1999 (R2005) – General Color Requirements for Wiring Devices
[4] ANSI/NEMA WD 6-2002 (R2008) – Wiring Devices-Dimensional Specifications, WD 5-1977 has been withdrawn with no clear replacement

7. COVER PLATES

7.1 Specify device plates for switches and receptacles for single and multigang application. Stainless steel, satin finish on flush mounted outlet boxes, and galvanized pressed steel surface covers on surface mounted outlet boxes. Plates for weatherproof receptacles gasketed with spring loaded lift covers. Corrosive resistant where corrosive materials may be used. Bushed openings where required in laboratories. Specify that finishes on electrical equipment, cover plates and surface mounted outlet boxes match the finishes on mechanical fittings. Specify all receptacle cover plates be identified to the panel and breaker for that circuit.

7.2 For devices in cells, specify cover plates with "Security Screws" or have special boxes and cover plates fabricated. Refer to detail included herewith.

8. OUTLET BOXES

Galvanized steel outlet boxes, 4 inch square minimum and oversized where number of conductors exceed standard size. Open back concrete type where cast in slab. Cast iron fittings where exposed and appropriate supports for secure fastening.

9. MULTIOUTLET SYSTEMS

In laboratories and certain shops consider the use of multi-outlet systems of the following types and characteristics:

9.1 Surface mounted all steel raceways for use with number and type of wiring devices required.

9.2 System of raceway with snap on cover containing brackets for mounting of grounding type wiring devices located and rated as required and having the capability of being installed wherever desired within the raceway.

9.3 Alternate system of raceway with snap on cover containing prewired coils with 15A, 125V grounding type receptacles spaced in groups of two(2), on 1500 mm centers, or as directed by User (providing a duplex receptacle at each location).

9.4 Device plates finished to match that of multi-outlet system raceway. Each receptacle cover indent stamped with the voltage and ampere rating of that receptacle. Receptacles fed from an emergency source should be of the illuminated face type with integral neon glow lamp.

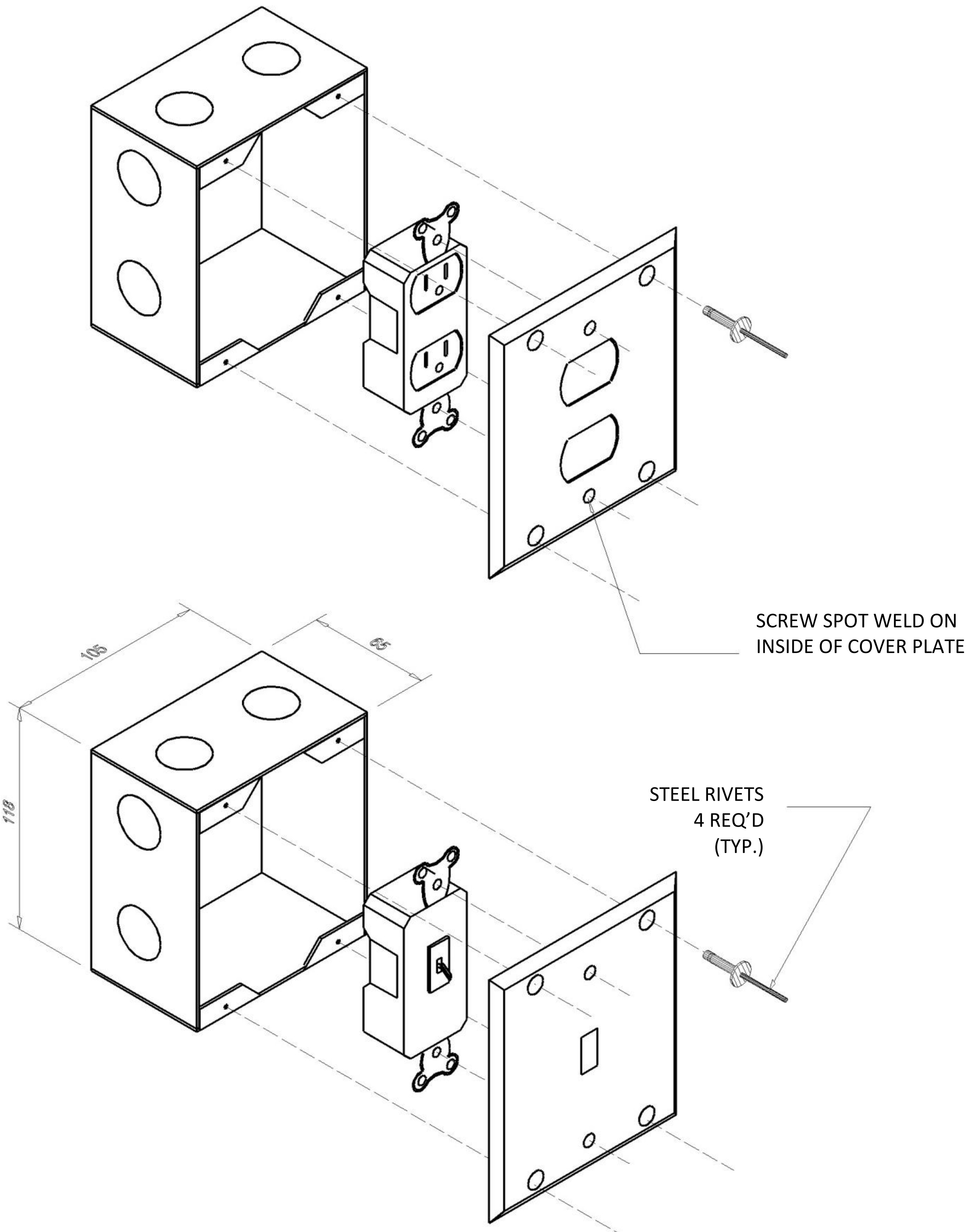


PLATE E–2–1 – FASTENING OF CELL WIRING DEVICES USING POP RIVETS

E-3 ELECTRICAL – MOTOR CONTROLS

1. SCOPE

This section outlines the characteristics and features of motor controls and auxiliary control components and provides design guidelines for these components.

2. RELATED SECTIONS

E–1 – General Electrical Engineering
E–2 – Wiring Devices

3. MOTOR CONTROLS

3.1 General

Consider and specify the following characteristics and features for motor controls and auxiliary control components to obtain the performance intended.

3.1.1 Motor controls to conform to UL Standard 508[1].

3.1.2 Sequential starting of large motors connected to emergency generator.

3.1.3 Provide for an overload heater in every phase.

3.1.4 Draw to the attention of the mechanical designer to call for factory installed thermistors, one in each phase, wired to identify terminals in the motor terminal box. This thermal protection shall be provided for all motors above 25 HP. The motor starters must also be specified to include the required controls.

3.2 Magnetic Starters

3.2.1 Combination magnetic motor starters shall be provided for all 3 phase motors.

3.2.2 Combination magnetic starters requiring motor circuit protection shall be equipped with circuit breaker type or "Motor Circuit Protector" with integral current limiting fuses where required for available short circuit: Multipole opening on blown fuses.

3.2.3 Combination magnetic starters not requiring motor circuit protection shall be equipped with horsepower rated unfused switch. Switch to comply with applicable sections of *CSA C22.2 No. 4-04 (R2009)*[2].

3.2.4 Combination magnetic starters shall have low voltage protection type control circuit, with momentary contact type manual control. Where auto restart is required provide timing relay adjustable pickup to ensure stable voltage on application (return) of power. Applicable for motor sizes 5 HP and larger.

3.2.5 Manual automatic control with HOA selector switch, LED pilot light and low voltage release shall be provided for motors below 5 HP. Positive indication using LED pilot lights shall be provided for motors with local disconnect switches.

3.2.6 Black sandwich type laminated plastic nameplates with white letters indicating function and association shall be provided for all magnetic starters.

3.3 Manual Type Motor Starters

For manual type motor starters specify toggle switches with thermal overload protection and LED pilot light.

---

1 UL 508 -- Industrial Control Equipment, Edition: 17th, Underwriters Laboratories / 28-Jan-1999 / 208 pages
2 CAN/CSA-C22.2 No. 4-04 (R2009) -- Enclosed and Dead-Front Switches

3.4 Reduced Voltage Starters

3.4.1 Verify whether the voltage drop due to motor starting is within limits acceptable to the local Power Authority. Also consider motor starting transient voltage effect on other building systems, motor circuit, distribution system protection device and sensitive electronic equipment.

3.4.2 Determine, according to application, the most appropriate method of limiting the starting inrush current and specify the type of reduced voltage starter to satisfy the starting requirements of the load. Consider star delta, auto transformer, part winding and primary resistor starter types depending on the specific application requirements. All starting sequences shall be of the closed transition type.

3.4.3 Specify motor starter with soft start on motor > 5 HP or where reduced starting torque will reduce maintenance and energy requirement significantly.

4. MOTOR CONTROL CENTRES

Motor control centres shall include:

4.1 Multiple vertical sections with main horizontal and vertical copper buses.

4.2 Ground bus copper, minimum 25% of main bus.

4.3 Main disconnect device, heavy duty load break, or non auto air circuit breaker.

4.4 Individual combination (fuses, unfused or circuit breaker) controllers of required NEMA size, mechanically interlocked to prevent opening door when in ON position except through release mechanism, and suitable for padlocking. Equipped with appropriate push buttons, selector switches, pilot lights, reset buttons. Other applicable features as described for individually mounted motor starters, manual and magnetic types.

4.5 Auxiliary relays for automatic operation.

4.6 Wiring compartments for copper conductors, power and control wiring.

4.7 Black sandwich type laminated plastic nameplates with white letters identifying each circuit.

4.8 Use Class II C for motor control requiring interlocks or extensive automatic sequenced pilot control for industrial process or building systems.
Use Class 1B for stand alone or single automatic pilot control.

4.9 Specify primary and secondary fuses for all control transformers in motor control centres.

4.10 Bus supports: With high dielectric strength, low moisture absorption, high impact material and long creepage surface signed to discourage collection of dust.

4.11 Refer also to *EEMAC Standard E14-2, 1983*[3].

5. CONTROL SEQUENCES

Specify that Contractor co ordinate all work with respect to motors controlled by individual starters or/and from motor control centers and all control sequences.

[3] EEMAC E14-2, 1983 -- EEMAC Standard for Industrial Control and Systems

6. DISCONNECT SWITCHES

6.1 Specify horsepower rated disconnect switches, fused or unfused, mounted adjacent to all motors regardless of their location with respect to the motor circuit branch circuit breaker.

6.2 Disconnect switches shall comply with *CSA C22.2 No. 4-04 (R2009)*[4].

7. WIRING

7.1 Power wiring shall be in accordance with Section E-1 Electrical Distribution.

7.2 Specify stranded tinned copper for control wiring. All terminations shall be on terminals or terminal blocks. All control wiring shall be colour coded.
Wherever practical specify multi conductor cable assemblies; conductors with 600 V insulation; minimum size 2 mm^2 overall PVC jacket.

7.3 Control wiring shall be terminated with compression type terminals.

7.4 Control wiring method shall generally be conductors (cable assembly) in electric metallic tubing.

[4] CAN/CSA-C22.2 No. 4-04 (R2009) Enclosed and Dead-Front Switches

E-4 ELECTRICAL – INTERIOR LIGHTING & CELL LIGHTING FIXTURES

1. SCOPE

This section outlines the requirements for interior lighting and provides design criteria for the following:

1.1 Quality and quantity of illumination for specific visual tasks, movements and exits.

1.2 Interior lighting fixtures.

1.3 Cell lighting fixtures.

2. RELATED SECTIONS

E–1 – General Electrical Engineering
E–2 – Wiring Devices
E–6 – Emergency Electrical

3. CODES AND STANDARDS

Design the interior lighting in accordance with the following Codes and Standards and applicable local regulations:

4.1 ***National Building Code -- Latest Edition***

The requirements of the National Building Code have been included in this Document. Wherever local regulations differ from the Code and this Document, the most stringent conditions shall apply.

4.2 ***ANSI/IESNA RP-1-04[1].***

I.E.S. Handbook10th Edition

The latest edition of the Illuminating Engineering Society Handbook[2] contains detailed information on light sources and lighting for all types of applications.

4.3 ***CSA-C22.2 No. 250.13-12 – Light emitting diode (LED) equipment for lighting applications***

4. ELEMENTS OF ILLUMINATION

4.1 General requirement

Design the lighting system to provide the levels of illumination in accordance with Latest Edition of IESNA. Consideration should be given to environment, green initiative and rapid changes due to new technology. Select lighting fixtures of the quality and characteristics to achieve and maintain the following criteria.

4.2 Glare Control

Keep direct glare and reflected glare to a minimum.

4.3 Brightness Pattern of Environment

Design lighting system to conform to the following visual criteria:

4.3.1 Ensure that the task is visible by being brighter than its immediate background

---

1 ANSI/IESNA RP-1-04 -- American National Standard Practice for Office Lighting (CSA C92.4-1977 has been withdrawn, CSA has adopted the ANSI equivalent)

2 IESNA -- Lighting Handbook on CD-ROM, 9th edition, 10th edition → late 2010

4.3.2 Control other brightness within the office environment and reflectance of interior finish.

4.4 Colour

The colour of the illuminant (light) is an important facet of the lighting quality and has a direct effect on the people and furnishings within an office environment. Therefore, the following aspects shall be considered in selecting light sources (lamps):

4.4.1 In offices, administrative areas, maintenance and service areas specify 32W, rapid start (RS) fluorescent cool white lamps which offer a more efficient, moderately cool source of illumination. For LED lighting, specify a colour temperature of 4000k.

4.4.2 In areas where people congregate for discussion, e.g., conference rooms, cafeterias, etc. specify good colour rendering 32W rapid start, deluxe cool white fluorescent lamps which offer a warmer atmosphere.

4.4.3 LED and induction lamps and luminaires with high colour rendering may also be specified as necessary to achieve the desired illumination levels and effects. A 3500K color temperature shall be specified to achieve a warmer ambiance.

4.4.4 Confer with Architect and draw to his attention the following considerations affecting general visual comfort:

4.4.4.1 Light colours are preferred for interior furnishings and dark colours should only be used in small areas as contrasts to the colours of the major areas.

4.4.4.2 Selection of colours of walls, floors, furniture and furnishings should be made in accordance with the Technical Criteria Section A-7 “Finishes”.

4.5 Office Lighting Layout

In laying out the office lighting systems, consider the fact that most office spaces undergo rearrangement. This need for rearrangement requires that the lighting system be flexible and suitable for partitions to be erected between rows of luminaires and individual units. Modular co-ordinated systems are suited to the solution of this problem and should be studied for possible incorporation into the design.

4.6 Supplementary Lighting

4.6.1 Design supplementary or local (task) lighting in the form of units attached to the ceiling or building structure for limited areas that require higher levels of illumination.

4.6.2 Design lighting so as to avoid and discourage the use of portable desk lights, table lamps, swag lamps, etc.

4.7 Video Display Units

4.7.1 Consider indirect lighting systems.

4.7.2 Arrange lighting fixtures to eliminate source brightness contrast on video screens. Employ low brightness louvers with minimum 45° shielding angle.

4.7.3 Consider reduced task lighting levels in order to eliminate brightness contrast.

4.7.4 Provide 500 lx on task surface where source documents must be read.

4.8 Control Posts and Ranges

In ranges and related control post areas, design corridor lighting to eliminate glare and source brightness in field of view from control post. Take note of glass/plastic and other highly reflective surfaces and ensure against mirrored light source images within control post field of view. Refer to Technical Criteria Section A-13 regarding glare control in control posts. Include dimmer controls for general lighting in control posts. Make provision for Task Lighting.

5. LIGHTING FOR MOVEMENTS AND EXITS

In designing lighting systems for areas of circulation, means of egress and means of vertical transportation, consider the following factors:

5.1 Public Entrance Lobbies

5.1.1 Design lighting to facilitate movement throughout the area without being garish or creating glare and discomfort.

5.1.2 Where canopies extend outside the entrances, specify lighting which is not subject to fluctuation on light output due to high winds or low temperatures.

5.1.3 Specify low temperature ballasts (-40°C) in all fixtures located outdoors.

5.1.4 Totally enclosed and gasketed fixtures should be specified for outdoor applications only.

5.1 Corridors and Hallways

5.1.1 The spacing of lighting equipment from centre to centre should not exceed 1½ times the mounting height.

5.1.2 The level of illumination shall be between 20% and 30% of adjacent areas but not less than 215 lx minimum. Where security viewing is involved the minimum shall be 325 lx.

5.1.3 Reflectance for ceilings, walls and floors shall equal or exceed those recommended for the offices. Draw to the Architect's attention the fact that if, for maintenance reasons, dark finishes must be used, they should be limited to the baseboard.

5.1.4 Changes in elevation in corridors where one or two steps are necessary shall have attention drawn to the change by locating small shielded lighting units recessed into the walls at the steps or by painting the edges of the steps in a distinctive colour.

5.2 Stairways

5.2.1 Locate and shield lighting equipment so that persons neither cast shadows on the stairs nor encounter glare at eye level.

5.2.2 Locate units at least on every landing and closer if necessary.

5.2.3 Specify battery operated Lighting Units in all stairways and exit corridors as emergency lighting backup.

5.3 Elevators

5.3.1 Design adequate lighting at the threshold to call attention to any difference in level between the landing and the car.

5.3.2 Draw the Architect's attention to the fact that the interior finish off the car should be as light as possible, consistent with reasonable ease of maintenance.

5.4 Exits

5.4.1 All exit doors and passageways other than the exits serving as the main entrance to a room or building shall have exit signs placed over them as described in paragraphs 5.4.3, 5.4.4 and 5.4.5, and as required by the National Building Code, Subsection 3.4.5[3]. These signs shall be LED lighting and illuminated continuously while the building is occupied and be connected to a separate emergency lighting circuit.

5.4.2 Exits and paths of exit travel are to be indicated by electrically illuminated bilingual exit signs. Size of lettering to meet the National Building Code and the requirements of the local Fire Department.

5.4.3 Illuminated exit signs are to be provided in stairwells at points of egress to outdoors and/or to corridors leading to exits.

5.4.4 Specify additional sockets and lamps in each EXIT sign fixture to be connected to a battery system. If there is no provision for a standby generator, specify self contained battery powered exit lights.

5.4.5 All exit doors leading to the outside of buildings shall have lighting fixtures above the exits, on the outside of the building.

6. LIGHTING FIXTURES

6.1 General Requirements

In specifying lighting fixtures follow the following general criteria:

6.1.1 Fluorescent fixtures utilizing low brightness pure virgin acrylic lenses and LED luminaires are preferred.

6.1.2 Minimize the use of incandescent fixtures and maximise the use of LED.

6.1.3 Where more than 100 fixtures are used, specify that the Contractor submit a sample fixture for approval, if requested by the Engineer. Select the sample at random from those delivered on site for approval of all fixtures for installation.

6.1.4 Specify that the Contractor submit complete photometric data, based on the actual fixtures proposed to be furnished for the Project.

6.2 Fixture Construction

The following features should be considered:

6.2.1 Free of light leaks

6.2.2 Ventilation for lamps and ballasts

6.2.3 No crossbars over light shields.

6.2.4 Weatherproof enamel finish, including hangers for weatherproof and vapour tight fixtures.

6.2.5 Fluorescent fixtures to be suitable for operating with specified ballasts without tripping under conditions of maximum 10% voltage above and below nominal.

6.2.6 Maximum 38°C ceiling cavity ambient for recess mounted units.

6.2.7 Maximum 38°C surrounding air ambient for pendant mounted units.

6.2.8 Maximum 27°C surrounding air ambient for surface mounted units.

6.2.9 Aluminium to concrete contact surfaces with coating of polyurethane base paint.

6.2.10 Minimum 20 gauge sheet steel for fluorescent fixture housings.

---

[3] National Building Code of Canada, Volume 2, Thirteenth Edition, 2010, National Research Council Canada

6.2.11 Interior reflecting surfaces of fluorescent fixtures finished with polymerized baked white coating to achieve a reflectance of at least 85%.

6.2.12 Exterior surfaces of fluorescent fixtures finished with basked white enamel.

6.2.13 Bonderized and painted after fabrication.

6.3 Ballasts

6.3.1 For fluorescent fixtures specify ballast of the following characteristics, meeting *ANSI C82.1-2004*[4] and *CSA C22.2 No. 74-96 (R2005)*[5]:

6.3.1.1 Instant start, electronic ballasts with 20% THD or less are preferred.

6.3.1.2 Internal non resetting thermal protector for core and coil and non-resetting, end of life protector for capacitor.

6.3.1.3 Low NEMA rated noise level.

6.3.1.4 Energy efficient, high power factor, having long life and low operating temperature.

6.3.2 HID's ballasts to meet or exceed the performance requirements to *ANSI C82.4-2002*[6]. Ballast to be of constant wattage and have isolated secondary.

6.4 Lamps

6.4.1 Fluorescent: Energy efficient type; 32 Watt, T8 lamp, 5000 K, high CRI.

6.4.2 LED lamps, Induction lamps, HPS and LPS lamps.

6.5 LED Luminaires

6.5.1 Luminaires must comply with the following standards:

6.5.1.1 *CSA-C22.2 No. 250.13-12*

6.5.1.2 IESNA LM-79-08

6.5.1.3 IESNA LM-80-08

6.5.2 LED Luminaires to meet or exceed the following characteristics:

6.5.2.1 50 000 hours rated but higher would be preferred.

6.5.2.2 80 CRI colour rendering.

6.5.2.3 20% THD or less is preferred.

6.5.2.4 0.9 power factor or higher is preferred.

6.5.2.5 Valid IES photometric data file.

6.5.2.6 cULus listed.

6.5.2.7 All of the luminaires parts warrantied for at least five years.

7. CELL LIGHTING FIXTURES

7.1 Fixture Type

Cell light fixtures may be supplied by CSC at a cost per unit to the Contractor. The fixture will be manufactured for CSC. Specify storing, installing etc. by Contractor, unless instructed by CSC otherwise.

[4] C82.1-2004 – American National Standard for Lamp Ballasts—Line Frequency Fluorescent Lamp Ballasts

[5] CAN/CSA-C22.2 No. 74-96 (R2005) – Equipment for Use with Electric Discharge Lamps

[6] C82.4-2002 – American National Standard for Ballasts for High-Intensity Discharge and Low-Pressure Sodium (LPS) Lamps (Multiple-Supply Type)

7.2 Power Requirement

The fixture shall include a 2/32 W fluorescent lamp rapid start ballast. It shall operate on 120 VAC 60Hz on a separate circuit than receptacles. It will also have a small lamp as night light. LED strip lighting may be used instead of fluorescent.

7.3 Installation

Specify installation of fixture to suit the dimensions given in “Plate E-4-1” at end of this section.

7.4 Use

Specify use of this fixture for all medium, maximum, and multi security institutions. The fixture is to be used in all cells and similar inmate secure areas.

8. LEVELS OF ILLUMINATION

8.1 General

8.1.1 Lighting levels should be in accordance with Illuminating Engineering Society Handbook, Latest Edition – IESNA. Submit to CSC detail calculations of light intensities to support the design.

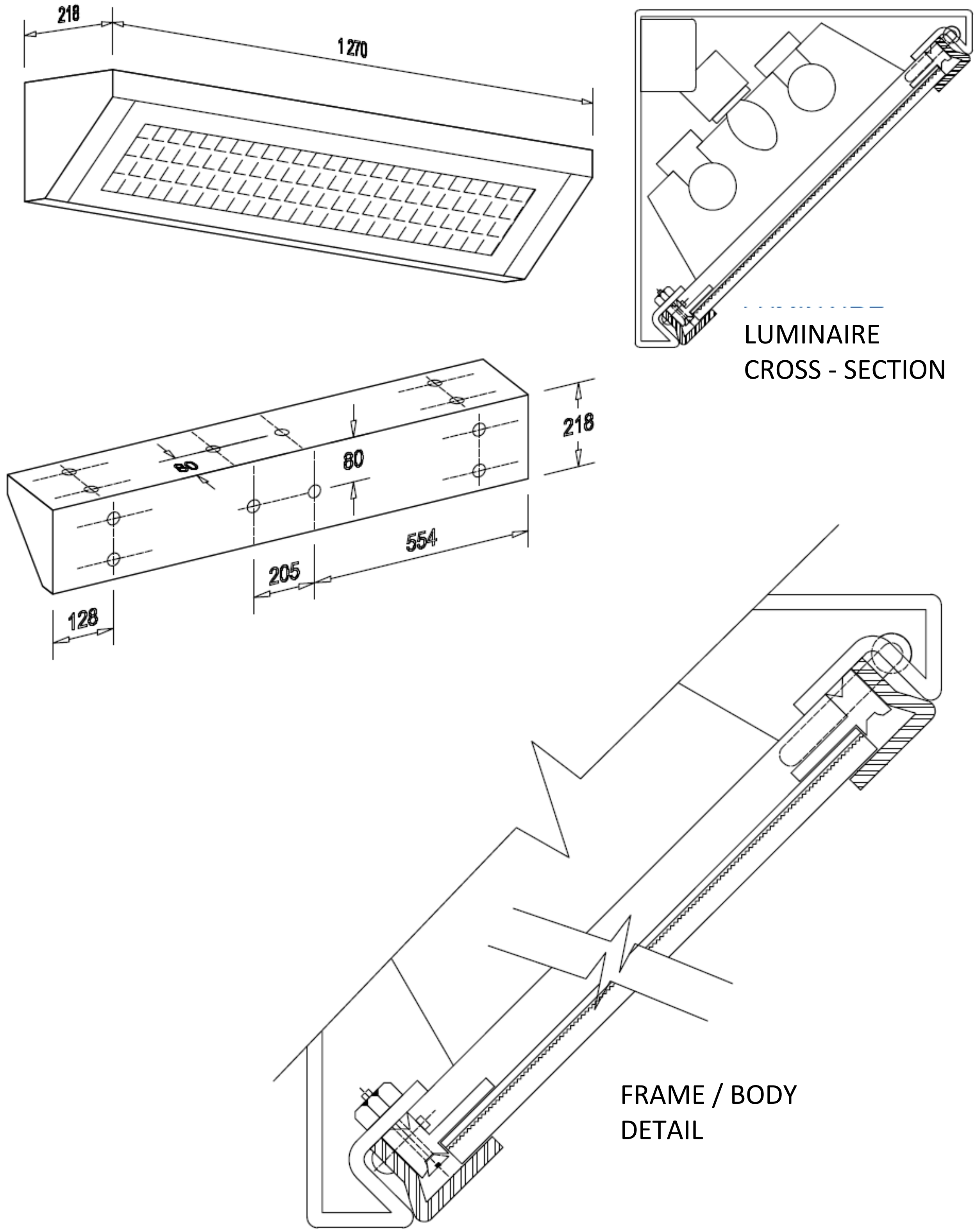


PLATE E–4–1 – CELL LIGHTING FIXTURES

E-5 ELECTRICAL – LIGHTNING PROTECTION

1. SCOPE

This section outlines guidelines for determining the need for lightning protection and for the design and specification of an appropriate system.

2. RELATED SECTIONS

SU–4 – Power Supply and Electrical Power Distribution
E–1 – General Electrical Engineering & Electrical Distribution

3. CODES AND STANDARDS

3.1 The standard for design of the protection system described herein is *CSA B72-M87 (R2008)*[1].

3.2 Approval, inspections and testing by Authorities having jurisdiction must be obtained.

3.3 Other applicable codes and standards:

- *Canadian Electrical Code, Part I CSA C22.1-09*[2].
- Canadian Labour Code, Part IV.

4. GROUNDING

4.1 Special attention must be paid to obtain good grounds. The Installation Code calls for a ground resistance of 50 ohms or less. This may suffice for general building structures, for protection of communication and alarm systems the ground resistance may have to be much lower.

4.2 For information refer to *ANSI/IEEE 142-2007*[3] and *IEEE 487-2007*[4].

---

[1] CAN/CSA-B72-M87 (R2008) – Installation Code for Lightning Protection Systems
[2] C22.1-09 – Canadian electrical code, part I (21st ed.), safety standard for electrical installations
[3] 142-2007 – IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
[4] 487-2007 – IEEE Recommended Practice for the Protection of Wire-Line Communication Facilities Serving Electric Supply Locations

E-6 ELECTRICAL - EMERGENCY ELECTRICAL

1. SCOPE

This section outlines the emergency power requirements with regard to light and power provisions and essential generating equipment.

2. RELATED SECTIONS

SU–4 – Power Supply and Electrical Power Distribution
E–1 to E–6 inclusive

3. ADDITIONAL REFERENCES

3.1 The following standards (including latest revisions) and texts should be referenced when designing emergency electrical installations:

3.1.1 *CSA Standard C282-09*[1]
3.1.2 *CSA Standard Z32-09*[2]
3.1.3 *EEMAC Standard M1-6, 1986*[3] (See related Standard Ref. 5)
3.1.4 *NEMA Standard MG 1-2009*[4]
3.1.5 Beeman D – McGraw Hill Systems Publications – Industrial Power Handbook
3.1.6 *IEEE Standard 446-1995*[5]
3.1.7 *CSA Standard C22.2 No. 178.1-07*[6]
3.1.8 *CSA Standard C22.2 No. 178.2-04 (R2009)*[7]
3.1.9 Fire Commissioner of Canada - FCC No. 501 Standard for Emergency Lighting Services

4. REQUIREMENTS FOR MINIMUM SECURITY LEVEL INSTITUTIONS

4.1 Standby power is not required for minimum security level Institutions as there is more flexibility in allowing temporary refuge.

4.2 Consider battery powered backup for use in critical areas.

5. REQUIREMENTS FOR MEDIUM SECURITY LEVEL INSTITUTIONS

5.1 General Requirements

Standby power is a requirement for medium security level institutions. Requirements can be broken down into three categories as follows:

5.1.1 Total Standby power is required as follows:

5.1.1.1 Cells and Living units all lighting and receptacles. For S-3 units, consider the use of battery back-up.
5.1.1.2 Kitchen and dining areas; Kitchen equipment, lighting, refrigerators, freezers and walk in coolers
5.1.1.3 Medical Centre and maintenance building
5.1.1.4 Segregation

[1] CSA Standard C282-09 – Emergency electrical power supply for buildings.
[2] CSA Standard Z32-09 – Electrical safety and essential electrical systems in health care facilities.
[3] EEMAC M1-6, 1986 – EEMAC Standard for Motors and Generators
[4] NEMA Standard MG 1-2009 – Motors and Generators
[5] IEEE Standard 446-1995 – IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications
[6] CSA Standard C22.2 No. 178.1-07 – Requirements for Transfer Switches
[7] CSA Standard C22.2 No. 178.2-04 (R2009) – Requirements for Manually Operated Generator Transfer Panels

5.1.1.5 Control Posts and UPS equipment.
5.1.1.6 All systems and devices such as: telephone, intercommunication, fire alarm, riot alarm, door control and alarm, P.A. etc.
5.1.1.7 Outdoor security lighting
5.1.1.8 Equipment and alarms associated with the site water supply
5.1.1.9 Sump pumps, fire pumps, chillers and associated alarms
5.1.1.10 All night lights and battery operated lights
5.1.1.11 Several convenience outlets throughout complex
5.1.1.12 Power to provide full heating and ventilation for control posts, medical centre, kitchen and dining rooms and to provide partial heating to prevent freezing in other areas.

5.1.2 No Standby power (except for night lights) for:
5.1.2.1 Industrial shops
5.1.2.2 Vocational shops
5.1.2.3 Meeting rooms
5.1.2.4 Academic rooms
5.1.2.5 Library
5.1.2.6 Chapel
5.1.2.7 Outdoor recreation areas.

5.1.3 Partial standby power for:
5.1.3.1 Administration offices (25% lighting)
5.1.3.2 Indoor recreation areas (50% lighting).

5.2 Battery Backup

Refer to Article 7. Battery Backup this section.

5.3 Emergency Lighting

Refer to Article 8. Emergency Lighting this section.

6. REQUIREMENTS FOR MAXIMUM AND MULTI SECURITY LEVEL INSTITUTIONS

6.1 General Requirements

Requirements apply also to Regional Reception Centres, Regional Mental, Psychiatric Centres and Special Handling Units.
Standby power is required for the entire complex of maximum and multi Security level Institutions with the following exceptions:

6.1.1 No standby power for:
6.1.1.1 Outdoor recreation areas
6.1.1.2 Industrial shops equipment

6.1.2 Partial standby power for 50% reduced lighting in the following areas:
6.1.2.1 Industrial shops
6.1.2.2 Vocational shops
6.1.2.3 Meeting rooms
6.1.2.4 Schools
6.1.2.5 Libraries
6.1.2.6 Chapels
6.1.2.7 Administration Offices

6.2 Battery Backup

Refer to Article 7. Battery Backup this section.

6.3 Percentage of Emergency Lighting

Refer to Article 8. Emergency Lighting Systems this section.

7. BATTERY BACKUP FOR MEDIUM, MAXIMUM, AND MULTI-LEVEL INSTITUTIONS

7.1 Need for Battery or UPS System Back up

7.1.1 Design to include battery back-up or UPS system for the areas or systems as listed. All systems indicated below are tied to institutional Emergency Power to ensure uninterrupted operation.

7.1.2 Control Posts and MCCP

- For ease of maintenance battery units may be located remotely.
- Capacity 1 hour full load continuous operation.

7.1.3 Critical Security and Life Safety Signal Systems

- For security and ease of maintenance battery units may be located remotely.
- Capacity 1 hour continuous operation.

7.1.4 Equipment Rooms

- Emergency generator room.
- Main electrical rooms
- Main security, life safety signal system control equipment rooms
- Main fire protection pump and heater rooms.
- Capacity 1 hour.

7.2 Requirements

7.2.1 When a battery powered system is required for secondary emergency backup for use in extra critical areas use the following type of unit.

7.2.2 Type of Battery backup:

- Unit emergency lighting equipment integral and remote heads. Voltage (6 volt, 12 volt, 24 volt) and capacity to suit the application. Automatic charging, automatic switching in event of power failure. Unit to meet *CSA Standard C22.2 No. 141-02 (2007)*[8] as a minimum.
- Unit plugs into circuit connected to the room lighting circuit that is fed from the emergency power distribution system. Plugs to be secured to receptacles.
- Do not consider use of central battery banks for emergency lighting. A central battery bank, for example, would not provide lighting in critical areas where individual circuits only have failed while there is no general power failure.

8. EMERGENCY LIGHTING SYSTEMS

8.1 Specify that the emergency lighting system operates automatically in the event of an interruption of the power supply to the normal lighting.

---

[8] C22.2 No. 141-02 (R2007) -- Unit Equipment for Emergency Lighting

8.2 Design lighting system to provide adequate levels of illumination at all means of egress from a building such as doorways, corridors, lobbies, stairways, ramps or other facilities provided for the speedy evacuation of persons from a building or room to a public thoroughfare or other approved open space in case of emergency.

8.3 Battery powered backup units for secondary emergency backup is provided for lighting in extra critical areas.

9. EMERGENCY STANDBY SYSTEM

Emergency standby power set may be installed indoor inside a building or outdoor in a well equipped trailer. The building or the trailer may be located inside or outside the institution security fence.

9.1 General Requirements

9.1.1 Design an emergency standby based on the use of an emergency generator designed to serve the Institution's critical loads via automatic transfer switches and distributed throughout the premises in a separate wiring system.

9.1.2 Base emergency system design on the use of a diesel generator set, of capacity sufficient to supply the Institution's emergency loads and capable of generating on a standby basis the required kW rating at 0.8 power factor continuous.

9.1.3 Design total diesel generator capacity to be able to carry the total connected load, including definitely known “future loads” plus 25% spare capacity.

9.1.4 Specify security grill barriers for air intake Louvers as covered in this Technical Criteria Section M-4.

9.1.5 Optional depending on institution’s acceptance and site conditions; the emergency generator may supplied by an off-site utility natural gas supply, conditions of *CSA Standard C282-09*[9] shall be met as a minimum.

9.1.6 Specify engine capable of operating at light loads for extended periods of time providing for pre-combustion of the fuel or a similar means for the prevention of carbonization.

9.1.7 To maintain environmental quality, engine is to be provided with a pre-combustion chamber fuel system or have suitable emission control equipment to ensure that gaseous exhaust emissions do not exceed the established maximum levels.

9.1.8 Generator set must be able to carry the institutional load within ten (10) seconds after failure of normal power. (Note: this exceeds *CSA Standard C282-09*, see footnote 9).

9.2 Engine (Diesel)

In specifying the engine, consider the following features and characteristics:

9.2.1 Reciprocating Engine: 2 or 4 cycle.

9.2.2 Minimum net brake power designed for continuous operation.
At altitudes above 500 meters and air intake temperatures above 32°C engines must be down rated for the elevation and temperature of the site of installation.

9.2.3 RPM - 1800.

[9] CSA C282-09 -- Emergency electrical power supply for buildings

9.2.4 Radiator and cooling 405 fan sized for continuous operation based on 40°C ambient air and 12.7 mm (½ inch) water gauge external static pressure.

9.2.5 Fuel transfer system, fuel injection system, lube oil system and associated pumps, filters, etc.

9.2.6 Jacket water heating system designed to maintain minimum 37.8°C water temperature based on 10°C ambient and associated pump, heaters, etc.

9.2.7 Engine freeze up protection to -29°C ambient.

9.2.8 Starting Motor.

9.2.9 Governor electronic with hydraulic activator and load sensing, provision for paralleling, designed to ensure generator voltage, frequency and performance, and to provide backup protection to prevent engine runaway.

9.2.10 Heavy duty type air cleaners.

9.2.11 To be able to run on No. 2 Heating and Diesel oil.

9.3 Fuel Supply System

9.3.1 Main aboveground storage tank as per SOR/2008- 197 “Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations” and “Federal Regulations and Canadian Council of Ministers of Environment CCME Code of Practice 2003”. Size of tank to be at least 2 days continuous operation at full load ultimate system.

9.3.2 Day tank: 1000 ℓ.

9.3.3 Automatic fuel transfer pumping system as well as manual pumping capability.

9.3.4 For fuel supply and return for engine consider need to return unused fuel from engine to main tank (not day tank). This may be required to prevent fuel in day tank from overheating.

9.3.5 Where the emergency generator is supplied by an off-site utility natural gas, the conditions of CSA C282-09 (see footnote 9) shall be met.

9.4 Engine Instrument Panel

9.4.1 Engine instrument panel containing:

- 9.4.1.1 All the necessary pressure, temperature and time gauges and indicators.
- 9.4.1.2 All the required high and low pressure and temperature alarm actuators for water, oil and over speed.
- 9.4.1.3 Terminal cabinet to accommodate internal and remote wiring.
- 9.4.1.4 Note engine instrument panel to be mounted independently from engine/generator set either mounted on pipe stand from floor or where practical in main control panel.

9.4.2 Required Controls and Instrumentation

- 9.4.2.1 Automatic and manual starting.
- 9.4.2.2 Manual remote emergency stop.

9.4.3 Automatic shut down and alarms on:

- 9.4.3.1 Overcranking
- 9.4.3.2 Over speed; out of frequency range.
- 9.4.3.3 High engine temperature
- 9.4.3.4 Low lube oil pressure
- 9.4.3.5 Short circuit
- 9.4.3.6 Alternator over and undervoltage
- 9.4.3.7 Lube oil high temperature.

9.4.4 Alarms only (below shutdown levels) on:
- 9.4.4.1 High engine temperature
- 9.4.4.2 Low lube oil pressure
- 9.4.4.3 Lube oil high temperature
- 9.4.4.4 Low fuel
- 9.4.4.5 Low battery
- 9.4.4.6 Low engine temperature

9.5 Generator

9.5.1 Heavy duty, single bearing, revolving field, brushless.

9.5.2 0.8 PF, 60 Hz.

9.5.3 Drip proof.

9.5.4 Alternator windings.

9.5.5 Dynamically balanced rotor permanently aligned to engine by SAE flexible disc coupling.

9.5.6 Exciter: rotating brushless or static with permanent magnet or series boost option.

9.5.7 EEMAC Class F insulation on rotor.

9.5.8 Alternator winding temperature rise not to exceed 80°C as measured by resistance at an ambient temperature of 40°C.

9.5.9 Voltage regulator to be solid state, silicon controlled rectifiers with phase controlled sensing circuit, regulation +1% no load to full load. Provide auto manual control module, hand trimmer adjustment and located inside control cubicle, suitable for parallel operation.

9.5.10 Voltage stability: plus or minus 0.5% maximum deviation about rated generator terminal voltage at any constant load, from no load to full load.

9.5.11 Voltage transient: 20% maximum deviation from rated generator terminal voltage on one step application or removal of full load.

9.5.12 Frequency stability: ¼% maximum deviation from rated generator terminal frequency at any constant load from no load to full load.

9.5.13 Frequency transient: 7% maximum deviation from rated generator terminal frequency one step application or removal of full load.

9.5.14 Voltage and frequency transient recovery time: 4 seconds maximum between one step application or removal of full load and the time generator terminal voltage and frequency recovers and remains within respective stability limits.

9.5.15 Terminal cabinet to accommodate internal and outgoing wiring with grounding provisions.

9.5.16 Identify alternator windings with metal tags. Bring windings to insulated terminals in a metal junction box mounted on the alternator. Size junction box to permit mounting of engine and alternator low voltage controls and wiring terminal blocks. Provide barrier in junction box to separate low and high voltage wiring.

9.5.17 Design generator set to minimize radio frequency interference (RFI) under all operating conditions. Balanced Telephone Influence Factor (TIF) to meet or better requirements of *EEMAC Standard M1-6, 1986*[10].

---

[10] EEMAC Standard M1-6, 1986 -- EEMAC Standard for Motors and Generators

9.5.18 The alternator shall be capable of sustaining 300% rated current for a period not less than 10 seconds which would allow for selective tripping of down line protective devices when a short circuit occurs. Alternator protection breaker trip curves to be matched against alternator damaged and decrement curves such that breaker trips before over-current situation damages alternator.

9.6 Motor Starting

9.6.1 Specify motor starting capability
- integrated system requirement including:
  - engine and governor
  - alternator and voltage regulator

9.6.2 Motor starting capability required in parallel and independent mode.

9.6.3 Indicate maximum motor horsepower __________________.
or maximum motor starting KVA __________________.
with system preloaded at __________kW and ___________kVA.

9.6.4 Maximum voltage and frequency transient and recovery to be as indicated under 9.5 for full load step.
Note: In case of large high inertia motors it may be necessary (to avoid oversizing) to indicate that full recovery time to be calculated from instant motor reaches breakaway speed.

9.7 Standby Plant Control Panel

9.7.1 Specify enclosure of the following construction:

9.7.1.1 Dead front type, free standing, moisture proof, metal enclosed structure, bolted or welded steel framing of sufficient strength to maintain alignment and withstand maximum interrupting capacity.

9.7.1.2 Louvered, No. 12 gauge steel panels with locked hinged access covers.

9.7.2 Specify control panel to consist of 2 full height sections
- Section one for AC power, main breaker and terminations specify auxiliary transformer breakers and interlocks for control of ventilation
- Section two for engine start, control, alarm system.

9.7.3 As a minimum specify all alarms and controls to *CSA C282-09*[11].

9.7.4 Specify cranking cycle as follow:
Three automatic starting attempts shall be made. Each attempt shall be for 15 seconds with 15 second rest periods between cranking periods. At the end of the third unsuccessful starting attempt the overcrank alarm shall come on and enough battery capacity shall be remaining to conduct four more manual starting attempts.

9.7.5 Control Section to contain completely electronic, solid state control and alarm components for concept refer to PWGSC Standard (see Reference No. 1.3).

9.8 Main Circuit Breaker

Specify main protective device of rating compatible with generator output characteristics. Provide state protective relaying with adjustable long time and intermediate adjustable ranges.

[11] CSA C282-09 -- Emergency electrical power supply for buildings

9.9 Battery Charger

Specify automatic dual rate battery charger of the following characteristics and features:

9.9.1 Solid state, dual rate
9.9.2 AC line compensated
9.9.3 Stabilized output voltage with low voltage alarm, and limited output current.
9.9.4 Ampere rating, approximately 10 percent of 8 hour ampere/hour rating of battery.
9.9.5 With ammeter and voltmeter in front panel.
9.9.6 Housed in separate wall mounted enclosure adjacent to control panel, or mounted in control panel cover.
9.9.7 Low battery or malfunction alarm for connection to control room.

9.10 Batteries

Specify engine starting batteries to the following characteristics:

9.10.1 Lead calcium in transparent flame retardant jars and covers providing the required starting voltage.
9.10.2 Ampere/hour capacity sufficient to crank engine at constant firing speed in minimum room ambient of 21°C for a minimum of seven 15 second cranking cycles with 15 seconds of rests between attempts.

9.11 Silencer

Specify heavy duty, residential type exhaust silencer with companion flanges and piping, expansion joints, drain plug, finished in high temperature resistant paint.

9.12 Vibration Isolators

Specify vibration isolators of the following characteristics and features:
9.12.1 Spring type with neoprene acoustical pads, levelling devices and vertical limit stops.
9.12.2 25 mm minimum static deflection.

10. EMERGENCY POWER DISTRIBUTION

10.1 General Requirements

10.1.1 Arrange electrical distribution system so that no power interruption takes place on the non essential side of the distribution system while the generator is being exercised carrying all of its connected loads.
10.1.2 Arrange electrical distribution system so that sufficient capacity mobile generator can be connected to a box located on outside of the building. This box shall be protected against sabotaged etc. Connection of mobile generator should be possible without disconnecting any electrical cabling of distribution system.
10.1.3 Connection point for load bank should be provided for annual maintenance of generator. Connection should be possible without disconnecting any electrical cabling of distribution system.
10.1.4 Study ground fault protection considerations in systems with multiple neutral to ground connections. Neutral switching with overlapping contacts as part of the transfer switches may be one possible solution.

10.2 Automatic Transfer Switches

10.2.1 Specify the following accessories:

10.2.1.1 All engine controls to be part of the main engine generator control panel.

e.g.
- time delay – auto start (signal received instantly from transfer switch(es)
- engine cool down – timing after normal power restored and all transfer switches returned to normal.

10.2.2 Each transfer switch equipped with:
- Voltage sensing, normal and emergency
- Instantaneous signal to control of normal power failure and return.
- Time delay on transfer to emergency (adjustable 0-60 sec.).
- Time delay on retransfer to normal after power returned (adjustable 0-300 sec.)
- Closed auxiliary contacts 2 on normal and 2 on emergency.
- Green pilot light to indicate "Normal" position amber pilot light to indicate "Emergency" position push-to-test emergency indicating pilot light with long life lamps and fuses.
- Test circuit for connection to central control (remote)
- Solid state type phase monitor with advance angle initiation, inhibiting transfer between two live sources until their phase angle difference is within plus or minus 5 electrical degrees.

10.2.3 Specify automatic transfer switches in accordance with *CSA C22.2 No. 178.1-07*[12] and relevant sections of *CSA C282-09*[13].

10.2.4 Specify contactor type transfer devices with single solenoid actuator. Maximum transfer time from signal initiation 3 cycles. Standard of Acceptance "ASCO".

10.2.5 Consider available short circuit and transfer switch withstand capacity.
Short circuit operation - minimum 6 times rating (Standard)
Short circuit withstand - minimum 20 times loading rating (Standard)
Consider increasing switch size to attain withstand requirement.

10.2.6 If necessary to use current limiting fuses (in breakers), ensure fully co-ordinated throughout system.

10.2.7 Specify neutral only if required in which case specifies overlapping switched neutral.

10.2.8 Enclosing cabinet with flush mounted tumbler lock or switchboard mounted as indicated.

11. ENGINE/GENERATOR SWITCHBOARD

11.1 Switchboard for protection and control of engine/generator.

11.2 If suitable, subject to space layout and configuration specify engine/generator control panel to be included as part of the switchboard.

---

[12] CSA C22.2 No. 178.1-07 – Requirements for Transfer Switches

[13] CSA C282-09 – Emergency electrical power supply for buildings

11.3 Switchboard to be equipped with output breaker for the generator. Circuit breaker shall be electrically operated ACB Type.

12. REMOTE MONITORING SYSTEM

Emergency power system shall have remote monitoring capability located at the maintenance building to follow up the emergency power status from the chief of maintenance office.

13. OTHER DESIGN CONSIDERATIONS

13.1 Ensure adequate air supply for cooling and combustion system to consist of modulating damper arrangement discharge, intake, circulates to room, powered from emergency supply and arranged to open intake louver immediately on engine start.

13.3 Consider separate exhaust fan and heater to maintain acceptable temperatures in engine generator room throughout the year.

13.3 Specify installation of safety signs near generating plants. Signs to be 250 x 500 mm in size and to read as follows:

THIS UNIT OPERATES AUTOMATICALLY AND MAY START AT ANY MOMENT

DANGER

CET APPAREIL AUTOMATIQUE PEUT DEMARRER SUBITEMENT

14. TESTING

14.1 Specify factory testing and submission of results comprising 23 hrs at 100% load and one hr at 110% load. Readings of load tests to be taken at 30 minute intervals.

14.2 Specify on site testing, commissioning by manufacturer/ suppliers diesel/electric technician and submission of results.
Include - 8 hour full load test including 1 hour with 10% overload. Full function tests - all instruments, alarms and operation Vibration analysis.
All transfer switches and complete sequence testing.

14.3 Specify submission of forms for PWGSC/CSC approval 10 days before commencement of tests.

15. COMPUTER POWER SUPPLIES

15.1 Specify "Uninterruptible Power Supply" (UPS) systems for computers where short interruptions of power, such as between the loss of normal power and the start up of an emergency generator could result in loss of computer memory or information. Where computers are relatively close, a single UPS system may be used to serve several pieces of equipment.

15.2 UPS systems are required for Data Centers, LAN rooms, T&E rooms, CER, etc. Coordinate exact requirements for data network equipment with IMS infrastructure standards.

16. COMMISSIONING

16.1 Specify preparation of a load study as part of contract. Load study is to be reviewed and commented on design by the design engineer. Study is then to be submitted to CSC.

16.2 Load study is to contain full load current readings at the feeders connected to 50 ampere circuit interrupting devices and larger. Currents are to be read at the line side of the feeders if possible.

16.3 Load study is to contain voltage readings taken at the load side of the feeders. Adjust transformer taps to within 2% of rated voltage of equipment.

16.4 Load study is to identify loads ie. are they motors, lighting or heating.

16.5 Specify balancing of loads.

16.6 Specify for contractor to demonstrate that systems operate as design intended them to operate and that contractor must be prepared to operate each device, such as switches, relays etc., to the satisfaction of CSC and PWGSC involved in the acceptance procedure.

E-7 ELECTRICAL – FIRE ALARM SYSTEMS

1. SCOPE

1.1 This section outlines specific requirements for a fire alarm system in federal institutions. Refer to the National Building Code of Canada (NBCC) and other documents listed below for all other requirements not covered in this section. Additional requirements or modifications may be specified by CSC for a particular project or installation.

1.2 Unless specified herein, this section is not intended to apply to existing installations nor to require retro-active modifications unless these are undergoing a significant renovation (See Sentence 1.1.3).

1.3 “Significant renovations” include (but are not limited to):

- Projects identified as “Fire Alarm Upgrade”,
- Replacement of a fire alarm panel,
- Replacement of more than 50% of the fire alarm devices on an existing fire alarm system,
- Addition of fire alarm devices to a fire alarm system increasing the number of devices to greater than that which is calculated using Sentence 2.2.15.

1.4 This section describes the overall institutional networking of fire alarm systems and the monitoring of this network.

1.5 This section describes the requirements for the design, construction and installation of fire alarm systems in

- New buildings;
- Major alteration and reconstruction of existing buildings; and
- Upgrading of a fire alarm system to remove an unacceptable fire hazard.

2. RELATED SECTIONS

2.1 Technical Criteria Document sections:

G-2 - Fire Authorities and Classification
A-13 - Control Posts
M-3 - Fire Protection Requirements
M-4 - Heating, Ventilating and Air Conditioning Requirements
E-6 - Emergency Electrical

2.2 CSC Standards:

ES/SPEC-0102 - Electronics Engineering Specifications for Data Logger in Federal Correctional Institutions

2.3 Standards:

2.3.1 If not specified herein, the applicable version/edition of a referenced standard or document is as referenced in the currently applicable edition of the National Building Code of Canada or, if not referenced by the National Building Code, the latest published edition.

In cases of discrepancies between this section and applicable codes and standards, the codes and standards will prevail unless specifically stated otherwise.

2.3.2 The following ULC Standards are to be referenced:

- CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems.
- CAN/ULC-S527, Control Units for Fire Alarm Systems
- CAN/ULC-S536, Standard for the Inspection & Testing of Fire Alarm Systems.
- CAN/ULC-S537, Verification of Fire Alarm Systems.
- CAN/ULC-S561, Standard for Installation and Services for Fire Signal Receiving Centres and Systems

Note: Treasury Board Chapter 3-4 "*Standard for Fire Alarm Systems*" and Treasury Board Chapter 3-6 "*Fire Protection Standard for Correctional Institutions*" have been rescinded by Treasury Board effective April 1, 2014. Relevant portions of those documents have been moved to this document.

3. DEFINITIONS

3.1 Terminology used in this section is first to be defined per the definitions found within the National Building Code of Canada. If the term is not defined therein, the dictionary definition is to be used.

3.2 Buildings in this section are mostly distinguished according to type of living unit or by the type of restrictions which are imposed to egress and exiting conditions. The following clarifications are to be understood:

3.2.1 Free Egress buildings are buildings which can freely be exited at all times without the need of keys, special devices or specialized knowledge. Minimum security buildings should typically meet this definition.(Free Egress buildings may be located within a medium or maximum security facility.)

3.2.2 Impeded Egress buildings are to mean buildings in which egress is restricted. This includes buildings with impeded egress zones and contained use areas. (Medium and Maximum security living units are typically of this configuration.)

3.2.3 Health Care facilities and administrative buildings are to be addressed in keeping with the egress conditions of the building and may fall as "minimum", "medium", or "maximum" security buildings.

3.3 Where a Duty Office is used in lieu of an MCCP, references to "MCCP" in this document shall apply to the Duty Office.

4. FIRE ALARM SYSTEM

4.1 System Overview

4.1.1 A fire alarm system shall have the following characteristics:

4.1.1.1 In medium and maximum security buildings, all exposed components shall be resistant to vandalism and sabotage.

4.1.1.2 Fire alarm systems shall be designed to provide audible and visible signals per CAN/ULC-S524.

4.1.1.3 A fire alarm signal shall be of a distinctive sound to other sounds or institutional alarm signals.

4.1.1.4 The trouble signal at panels and annunciators shall be distinct in sound from that of the fire alarm signal.

4.1.1.5 A fire alarm system shall be capable of providing signaling to selected areas and zones as well as selected inmate population and staff.

4.1.1.6 A fire alarm system shall be highly resistant to nuisance alarms such as those caused by environmental conditions, interference and similar. The design of the fire detectors shall incorporate features which can discriminate between products of a fire and other possible products in the air not related to fire.

4.2 System Description

4.2.1 A fire alarm system shall be installed in each building as required by the National Building Code of Canada's determination of requirement for a fire alarm system.

4.2.2 A fire alarm system shall be installed in each building provided with sleeping accommodation.

4.2.3 A fire alarm system shall be designed and installed in accordance with CSA C22.1, Canadian Electrical Code, Part I, and CAN/ULC-S524, "Standard for the Installation of Fire Alarm Systems" and the National Building Code of Canada.

4.2.4 Each building is to be provided with its own independent fire alarm system which shall be monitored from the Main Communication and Control Post (MCCP).

4.2.5 Each building's fire alarm system is to be networked to the institution's MCCP which is to be designed as a campus-style network. Each system is to be connected to the MCCP in peer to peer topology.

4.2.6 Where multiple buildings abut to one another and operate in a similar operational manner (complexes), it may be permissible to install one fire alarm system, providing for selective activation of alarm signals by zones or groups of zones provided that the building incorporates such features of design and construction that partial or phased evacuation procedures may be safely used.

4.2.7 Along with the provisions of Sentence .8, the MCCP is to receive all alarm and trouble signals from all fire alarm systems within the institution.

4.2.8 Provisions are to be made for direct monitoring to the Local Municipal Fire Department or other approved fire alarm receiving centre. This capability shall be channeled through the MCCP.

4.2.9 Each fire alarm system shall have the capability of operating interchangeably as either a 2-stage or as a single-stage fire alarm system. See Section 4. of this document for specific operational requirements.

4.2.10 Each fire alarm system shall be fully addressable.

4.2.11 New systems shall be microprocessor based using latest technology and must be capable of fully integrating into the existing fire alarm network.

Note: The requirement to use latest technologies must not be construed as a requirement to upgrade existing components of a fire alarm system or network.

4.2.12 Each building's fire alarm shall be designed to operate independently in case of failure of the communication link between the fire alarm panel and the MCCP. Loss of communication with the MCCP shall cause a trouble signal at the MCCP.

4.2.13 Fire alarm systems shall monitor each device and each zone of grouped devices for alarm and trouble and shall display each zone individually. See Section 3.4 for annunciation requirements.

4.2.14 The time required to complete a single monitoring sequence for all zones and devices shall not exceed 5 seconds.

4.2.15 The capacity of each fire alarm system shall be such that it can accommodate, at minimum, all present and known future requirements plus 50%.

4.2.16 The Fire Alarm System shall be independent of all other Security, Communication and Monitoring systems. It shall have independent hardware and software, but with the capability of ready integration with the Facility Alarm Annunciation System (FAAS).

4.3 Fire Alarm Zoning

4.3.1 The buildings and areas shall be divided into zones.

4.3.2 Alarm signaling zones shall be logical subdivisions generally related to Control Posts (CP's).

4.3.3 Signaling devices shall correspond to initiating zones. Further subdivision of alarm signaling zones within an SCP area shall be based on:

- Fire separations
- Sprinkler zone
- Floor levels
- Each cell as one address
- Fire suppression systems (Kitchen Extinguishing System)

5. EQUIPMENT

5.1 Installation of Equipment

All fire alarm equipment and associated components are to be ULC/cUL listed and installed per its specified listing.

5.2 Protection of Equipment

Protection of fire alarm components is required in order to prevent tampering, vandalism, hiding of contraband and eliminating potential suspension points.

5.2.1 In inmate-occupied areas, rigid steel conduits for fire alarm wiring, if exposed, as well as all fire alarm devices shall be securely anchored to the wall in such a manner as to prevent the forceful removal of the conduit. Security fasteners shall be used.

5.2.2 Audible/visible fire alarm devices shall not be hidden. If protective guards are to be installed, these must not impede the visibility or the audibility of the device.

5.2.3 A spot-type heat detector or smoke detector, when installed in inmate areas, shall lock onto its base using a feature that prevents removal of the detector without the use of a tool.

5.3 Initiating Devices

Fire alarm initiating devices are to be installed in locations specified by the National Building Code of Canada as well as in additional locations specified in this section or as modified herein.

5.3.1 Manual Pull Stations:

- 5.3.1.1 In a 2-stage fire alarm system, manual pull stations shall be 2-stage type utilizing a key to operate the 2nd stage.
- 5.3.1.2 Pull stations shall be robust and of metal construction and must not incorporate glass rods or other removable parts.
- 5.3.1.3 Manual pull stations shall be addressable.
- 5.3.1.4 Wall-mounted manual pull stations shall be mounted not less than 1200 mm nor more than 1400 mm above the floor.
- 5.3.1.5 A two-stage manual pull station shall be installed in a readily visible and accessible location on the security console at every Control Post.
- 5.3.1.6 In administrative and non-inmate areas, single-stage manual pull stations are to be wall-mounted within a horizontal distance of 1500 mm of every exit door, preferably on the latch side of the door if possible.
- 5.3.1.7 In inmate-occupied work areas (kitchen, industrial shops, heating plant, etc), two-stage (keyed) manual pull stations are to be wall-mounted outside the instructor/supervisor office within a horizontal distance of not more than 1500 mm from the door opening.
- 5.3.1.8 In free egress buildings, single-stage manual pull stations shall be installed in all locations required by the National Building Code of Canada
- 5.3.1.9 Except as noted in the following sentence, exit doors leading from areas with impeded egress or from contained use areas shall be provided with two-stage pull stations having a keyed second stage.

5.3.1.10 Where the exit door noted in the previous sentence is within a direct line of site of a continuously staffed Control Post (ex: S4-S6 living units), the pull station at the exit door may be omitted in favour of the pull station discussed in Sentence 5.3.1.5 of this Section (in accordance with NFPA 101).

5.3.2 Heat Detectors (not including sprinklers)

5.3.2.1 In addition to the locations specified by the National Building Code of Canada, in non-sprinklered buildings, heat detectors are to be located in workshops (ex: machine shops, electrical shops, carpenter shops, paint shops, maintenance shops), storage areas, garbage rooms, tunnels, and perimeter observation towers.

5.3.2.2 Heat detectors shall be suitable for the specific installation environment.

5.3.3 Smoke Detection

5.3.3.1 Smoke detection is required by the National Building Code of Canada in each room and corridor in a contained use area.

5.3.3.2 Institution grade multi-tube addressable Aspirating Smoke Detection (ASD) is to be installed in sleeping rooms in medium and maximum security facilities (except for S-3) as well as cells in segregation, health care and psychiatric locations. ASD sample points are to be directly within the cell and not within a duct. (See Sentence 5.3.3.7)

5.3.3.3 Aspirating Smoke Detection systems shall be capable of pinpointing the cell where the smoke originated (single point detection).

5.3.3.4 Aspirating Smoke Detection systems shall be capable of pinpointing blocked sample points and display blocked points as a Trouble condition on the fire alarm system.

5.3.3.5 Aspirating Smoke Detection sample points shall consist of metallic, flush-mounted points and shall be installed using security fasteners.

5.3.3.6 In open common areas such as range corridors, either multi-hole ASD systems or spot type detectors may be installed.

5.3.3.7 In S-3 Living Units, the institution may choose to use addressable ASD or addressable spot-type smoke detection within sleeping facilities

5.3.3.8 Spot-type smoke detectors are required (in addition to typical code-required locations) within record storage rooms/vaults, the MCCP/CER, enclosed Security Command Posts and LAN rooms.

5.3.3.9 Spot-type smoke detectors shall be highly stable, photo-electric type.

5.3.3.10 Spot-type smoke detectors shall be equipped with self-compensating circuitry to provide maximum stability against effects of aging, dust and film accumulation. The detector sensitivity shall be adjustable.

5.3.3.11 Duct-type smoke detectors in air handling systems shall be listed for air-duct installation consisting of a highly stable, addressable, photo-electric type detector in an enclosure mounted to the duct wall with connected sampling tubes installed across the duct interior.

5.3.3.12 When duct-type detectors are required by the NBCC, duct-type smoke detectors shall be installed at a location in the main supply air duct on the downstream side of the filter units; and at a location in the return air duct prior to exhausting from the building or prior to being diluted by outside fresh air.

5.3.4 Other Initiating Devices

A number of other initiating devices may be provided in a building. Such devices must also initiate the fire alarm signal. These devices may include:

- Kitchen fire suppression systems,
- Automatic sprinkler system alarm and flow valves,
- Fire pump flow valves.

5.4 Supervisory Devices

Fire alarm supervisory devices are to be installed in locations specified by the National Building Code of Canada and its associated documents and standards. Examples of supervisory devices include (but are not limited to):

5.4.1 Sprinkler tamper and pressure monitoring switches (as per NFPA 13 “Standard for the Installation of Sprinkler Systems”).

5.4.2 Fire pump monitoring devices (as per NFPA 20 “Standard for the Installation of Stationary Pumps for Fire Protection”).

5.4.3 Fire protection water supply monitoring devices for municipal supply valves, Post Indicator Valves (PIV), water tower level and temperature, and reservoir levels as applicable.

5.5 Audible and Other Signaling Devices

5.5.1 Audible signal devices shall only be used for fire emergency purposes associated to the fire alarm system.

5.5.2 Audible signal devices shall continue to operate until the system has been restored to normal or until silenced from the control panel (See Silencing Procedures in Sentence 4.3).

5.5.3 Audible signal devices shall be located in common areas (not within cells) and should ideally be located where they are under continual surveillance such as outside the Control Posts or in easily recognized secure enclosures designed to not impede the audibility of the device.

5.5.4 Audible signal devices shall consist of addressable combination Audible/Visible devices being red coloured, wall-mounted combination horn/strobe units.

5.5.5 The sound pattern of an alarm signal shall conform to the temporal pattern per the requirements of the NBCC.

5.5.6 Sound and light output capability shall be suitable for the environment.

5.5.7 Devices shall have the capability of multiple audible and multiple candela settings.

5.5.8 Synchronized strobes are required only when more than one strobe is visible at any one time.

5.5.9 Audible and visual combination devices shall not share a common output circuit unless devices can be programmed for independent operation of the horn and the strobe.

5.5.10 Fire alarm audibility and visibility shall be suitable to the nature of the individuals using the building, subject also to security oversight. For example:

- Hearing and Visual impairments: Institutions shall ensure that means are provided to ensure that persons with sensory impairments are capable of being notified of a fire alarm within their usual living unit. This may include additional devices within a cell, devices not otherwise covered in this standard or administrative provisions to varying combinations.

Note: *CSC's Fire Safety Manual 345 may be used for additional guidance on this matter.*

5.6 Fire Alarm Annunciators

5.6.1 The activation of a fire alarm or supervisory alert in a building shall be annunciated at the following locations:

- MCCP,
- Control Posts in the building,
- At the primary entrance to the building, and
- In the Chief of Works office where applicable.

There may be additional annunciators in staffed locations in shops or other inmate areas depending on operational requirements of the institution.

5.6.2 Bulk annunciation shall be provided indicating building and functional area as well as detailed annunciation by device and location. Annunciation shall display over multiple lines. It shall be possible to scroll through the various events.

5.6.3 At the MCCP, annunciation shall be provided by an LCD screen (or similar) at the video terminal connected to a data logger capable of providing a readout of multiple events per the requirement of CAN/ULC-S524. All institutional fire alarm related events shall annunciate at the MCCP.

5.6.4 At the primary entrance to each building having a fire alarm system, annunciation shall be provided. All fire alarm events related to the building shall annunciate at the building annunciator.

5.6.5 At Command Posts (CP), the annunciator shall receive and display alarm and alert signals which originate in areas within the CP's operational control. Alert signals (stage 1) originating in other parts of the building need not annunciate at the CP. Alarm signals (stage 2) originating in other parts of the building shall annunciate.

6. OPERATION

6.1 Sequence of Activation

The system shall operate so that the activation of any heat/smoke detector, fire suppression system or manual fire alarm station operates the fire alarm system in the following ways:

6.1.1 Minimum institution (general):

- The fire alarm system shall be a single-stage fire alarm system.

6.1.2 Minimum institution with sleeping accommodations:

- The fire alarm system shall be a single-stage fire alarm system.
- Smoke detectors shall be installed in lieu of smoke alarms per NBCC 3.2.4.21.(8) sounding a localized alarm only within the individual suite of detection. This shall result in a trouble condition on all required annunciators. The local alarm shall clear once the detector no longer detects smoke.

Note: this is only applicable to smoke detectors which are used in lieu of required smoke alarms. All other smoke detectors and fire alarm devices are to operate per standard fire alarm requirements (CAN/ULC-S524).

6.1.3 Medium and Maximum security with sleeping accommodations (including common areas):

- The fire alarm system shall be a two-stage fire alarm system.
- First-stage (alert) shall sound a local piezo-electric alarm at the SCP responsible for the area containing the activated device. (Common areas and mechanical rooms shall annunciate at all SCPs in the building.)
- First-stage (alert) shall also initiate visible strobes throughout the operational area of detection.
- Provided that the first stage alarm has not been attended to and corrected, upon a delay of 5 minutes, a 2nd -stage audible alarm shall take place in the building or area affected for general evacuation purposes.
- Manual 2nd stage may be initiated by key at any manual station.

6.1.4 Medium and Maximum security – Operational (ex: Corcan, Kitchens, etc):

- The fire alarm system shall be a two-stage fire alarm system.
- Detection devices shall initiate 2nd stage alarm (general evacuation).
- Manual fire alarm pull stations shall be located at all exit doors and shall consist of two-stage pull stations. Normal operation of the pull station shall result in a first stage alert. Key-operation of a pull station shall result in 2nd stage alarm.

6.2 Controls

In addition to the required controls for a fire alarm panel, each annunciator panel shall be provided with the following controls:

6.2.1 Alert/Alarm Status

6.2.1.1 Each control unit shall have a reset switch with visual indicators.

6.2.1.2 Control Posts not associated with the zone of alarm origin shall not be able to reset/clear a fire alarm condition originating elsewhere in the building.

6.2.1.3 The MCCP shall not be able to reset/clear a fire alarm condition resulting in a separate building.

6.2.2 Silencing of alarm/alert signal

6.2.2.1 Each control unit shall have signal silence and trouble silence switches with visual indicators.

6.2.2.2 Control Posts shall be capable of only silencing the alert/alarm bells and buzzers located within their own area of operational control.

6.2.2.3 The MCCP shall not be capable of silencing the alarm in a building other than the building in which it is located.

6.2.2.4 Silencing of an alarm condition at the local alarm panel (or Control Post) shall not be possible during the first

- - 20-seconds of that condition in a two-stage fire alarm system.
- - 1-minute of that condition in a single-stage fire alarm system.

6.2.2.5 A silenced alarm signal shall re-initiate after 10-minutes of silence if the condition remains unchanged.

6.2.2.6 A silenced alert signal shall initiate an audible alarm signal 5-minutes after initiation of the alert signal regardless of when it was silenced.

6.2.2.7 Means shall be provided to manually re-initiate the audible signal from a “silence” condition.

6.3 Trouble/Supervisory

Troubles and Supervisory monitoring shall occur in accordance with CAN/ULC standards.

6.4 Door Controls

6.4.1 In impeded egress facilities, fire exit doors provided with remote electric release features shall **not** be connected to the fire alarm system. Independent door release devices shall be installed in Control Posts.

6.4.2 Automatic door openers (ex: barrier-free operators) installed on doors located in a fire separation shall be connected to the fire alarm system so as to disconnect the automatic opening feature of the power door operator.

7. AIR HANDLING SYSTEMS

7.1 Smoke detectors as stipulated in NBCC are to be installed in re-circulating heating, ventilating and air conditioning (HVAC) air handling systems.

7.2 Air handling system in buildings which do not need detectors in air handling systems are to be shut off automatically by tripping the power supply should a local zone alarm be activated. These may be restarted manually once the alarm is cleared.

7.3 Unless provided with an engineered smoke control system, the operation of smoke detectors installed in air handling systems shall:

7.3.1 Cause an alarm signal at the local building, Control Post and MCCP;
7.3.2 Indicate the origin of the alarm signal at the annunciator(s);
7.3.3 Shut down all HVAC fans. Commercial kitchen hoods and associated make-up air units are an exception to this configuration.

8. INCIDENT RECORDING

All panels shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall also be provided.

8.1 Printer/keyboard

8.1.1 A printer/keyboard shall be provided within the MCCP and/or the CER in order to record all alarm, supervisory, and trouble events.
8.1.2 A printer/keyboard shall also be provided in the Chief Facilities Maintenance (CFM) office where applicable.
8.1.3 The printer/keyboard shall be ULC listed and compatible with the fire alarm system.
8.1.4 The printer shall be capable of listing:
- 8.1.4.1 Fire alarm with time, date and location.
- 8.1.4.2 Trouble alarms with time, date and location.
- 8.1.4.3 Status of output functions, "on" or "off".
- 8.1.4.4 Sensitivity of addressable smoke detectors if used.
- 8.1.4.5 Detection device type and location.
- 8.1.4.6 Status of remote relays, "on" or "off".
- 8.1.4.7 Acknowledgement time and date.
- 8.1.4.8 Signal silence time and date.
- 8.1.4.9 Reset time and date.

8.1.5 The printout is required to differentiate alarm signals from all other printed indications (ex: different font).
8.1.6 Printer paper shall be 8.5 inch wide, fan fold, tractor feed.

8.2 MCCP Data Logger Interface

8.2.1 A data logger (also known as FAAS) shall be provided to record the occurrence of all fire alarms, listing the time and zone location of each alarm, time of occurrence, acknowledgement, cancel and alarm disable/enable. This system is independent from the fire alarm system.

8.2.2 A fire alarm system shall include an output for an external data logger connection.
- Display unit to be equipped with 3 LED's: Alarm; Trouble; Power;
- System to be suitable for serially connecting or multiplexing to a main "Host" Building Security/ Management Central Processor System to duplicate display on a terminal screen.

9. INSTALLATION AND WIRING

9.1 Power Supply Sources

9.1.1 Fire Alarm systems shall be supplied by essential power source.

9.1.2 Fire alarm systems shall be arranged so that in the event of failure of the main power supply, the system shall switch automatically to the stand-by or auxiliary supply.

9.1.3 The fire alarm system shall monitor and record on its printer the loss and return of the AC supply and the return of its DC supply and provide annunciation at the central control panel and MCCP.

9.1.4 Fire alarm systems shall be provided with a 24V DC power supply consisting of gel cell type rechargeable batteries with charging means so arranged as to automatically maintain the batteries in a fully charged condition.

9.1.5 In all buildings having a fire alarm system, the battery power source shall be capable after having supervised the system for 24 hours, of operating the alarm and fire alarm system under general alarm conditions for an additional period per that which is required by the NBCC. Following this general alarm condition, the batteries must still have 85% of their rated voltage. The source shall be capable of full recovery within 24 hours.

9.2 Power Supply Circuit

9.2.1 Power supply circuit conductors for building fire alarm systems shall be stranded copper of adequate size to handle the current required to supply the maximum capacity of the system in accordance with the manufacturer’s recommendations plus 50% for future expansion of the building.

9.2.2 The power supply circuit shall be dedicated for the fire alarm system, and connected to the terminals of the automatic transfer switch (ATS) or the transformer terminals where transformation is required.

9.3 Wiring Methods

9.3.1 Wiring methods for all input (initiating) and output (signaling) circuits shall be 2 conductor in accordance with manufacturers recommendations.

9.3.2 Conductor Sizes - minimum No. 16 AWG. Refer to manufacturer recommendations for line drop and use larger conductors where required. Particularly note capacitance limits for each multiplex circuit.

9.3.3 The main fire alarm panel and the panels in the Control Posts (CP) and the Main Communications Control Post (MCCP) shall be interconnected via supervised class "A" wiring. Panel-to-panel wiring shall be protected in a non-combustible conduit where feasible (except where buried).

9.3.4 In a building, circuits for initiating and signaling to be class A loop. Tee taps are not permitted.

9.3.5 Class "B" Loop circuits may be used with smaller Fire Alarm Systems such as those in single-storey PFV's, 8-bed units, etc.

9.3.6 The wiring installation shall be carried out in a manner which physically separates the outgoing and return portion of each loop in order to ensure circuit integrity.

9.3.7 Wiring to each major signaling zone shall enter through a main remote terminal cabinet. Returning portion shall also connect through a remote terminal cabinet.

9.3.8 Remote terminal cabinet shall be factory assembled and pre-wired with all devices and terminals by the fire alarm system manufacturer/supplier.

9.3.9 All conductor terminations shall be on device terminals, or numbered terminal blocks in terminal cabinets.

9.3.10 Both ends of each conductor to be identified using numbered markers. The numbering is to be shown on shop drawings and to be subject to approval.

9.3.11 All fire alarm wiring in areas exposed to inmates shall be concealed or in rigid conduits.

10. VERIFICATION AND CERTIFICATION

10.1 Verification and Certification shall be in accordance with CAN/ULC-S537 "Standard for the Verification of Fire Alarm Systems".

10.2 In addition, final system check out shall be by representatives of the Crown with presence of qualified representatives of manufacturer and contractor.

11. INSPECTION AND TESTING

11.1 Ongoing Inspection and Testing shall be in accordance with CAN/ULC-S536 "Standard for the Inspection and Testing of Fire Alarm Systems".

12. WARRANTY

12.1 Guarantees in writing against defective material and workmanship shall be provided for a period of 2 years, from the date the building or system (or portion thereof) is granted occupancy by CSC Fire Protection Engineering, Technical Services.

13. TRAINING AND INSTRUCTION

13.1 Subject to the scope and scale of the work, training and documentation shall be provided. Subject to negotiation with the end users, provide training and documentation by the contractor and Fire Alarm Manufacturer - minimum of 3 days.

13.2 Training to take place after completion and verification but prior to final acceptance.

13.3 The manufacturer of the fire alarm equipment and the contractor installing the system shall conduct lectures and demonstrations, as necessary, on site, to train personnel in the use and maintenance of the systems.

13.4 The contractor shall develop and deliver a thorough training plan to CSC for comments and final approval. This plan must be submitted to CSC at least 60 days in advance of provision of the training, allowing at least 30 days for CSC review. As a minimum the training material shall contain:

13.4.1 Training Plans - one each, for contractors, instructors and two CSC supervisors.
13.4.2 Manuals - one for each student (up to six copies) to add notes.
13.4.3 Training Aids, consisting of a portable panel upon which system components are mounted and interconnected to enable "Hands-On" operations of pull stations, detectors, sprinkler flow and tamper switches, bells etc.
13.4.4 Student materials, including manuals.

It is anticipated that at least two submissions will be required to obtain final approval. This material shall be produced in English. Sufficient copies of all student materials shall be provided by the Contractor at the beginning of a training course to assure one copy for each student. The contractor must discuss this with CSC and his proposal should confirm that he will train the number called for. Upon final approval by the CSC project officer, six (6) sets plus one (1) set of reproducible copies of all materials shall be delivered to the CSC Design Authority.

13.4.5 Language of instructions, student materials and manuals shall be available in English and French. Actual language of training manuals and materials supplied, to be determined by CSC.

14. MAINTENANCE MANUALS

14.1 The Contractor shall submit at least two draft copies of maintenance manuals for CSC approval 30 days prior to submission of training material.

14.2 The Contractor shall provide, prior to the start of training, at least six copies of CSC approved manuals to support ongoing maintenance of system(s). The manuals shall be prepared to best commercial standards, and shall be consistent in format, quality and content, with sample manuals submitted with the proposal for approval by CSC. The final maintenance manuals shall meet the following minimum requirements:

- A title page
- A warranty page - explaining the warranty and expiry date
- A revision notice page, lined, with columns for revision numbers, dates and initials.
- Table of contents
- Introduction - general information including a full description of equipment for system(s), technical summary/specifications and detailed block diagram.
- Theory of operation, including an in-depth explanation of all circuits and parts
- Alignment and test procedures
- Repair procedures, including step-by-step fault finding or fault localizing
- Block and riser diagrams
- Circuit schematics (clear, easy to read, fold-out type)

- Complete parts lists
- Mechanical drawings, chassis layout illustrations where applicable, and wiring data lists
- Drawings, including as-built and as installed drawings.

14.3 The Contractor shall provide before the date of the interim certificate, five additional sets of updated final maintenance manuals. The Contractor shall update the approved manuals through the warranty period, and provide revision bulletins when the need arises to record manufacturer -recommended modifications, etc. to be made during the life of the equipment. Within thirty (30) days prior to expiry of the warranty, the Contractor shall submit for CSC approval one set of final, updated revision bulletins.

15. MAINTENANCE AND SPARES

The Contractor shall develop maintenance and spare support plans for CSC approval.

Correctional Service Canada   Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Technical Criteria for Correctional Institutions

SECTION ST – SPECIAL STRUCTURES

Canada

ST-1 SPECIAL STRUCTURE – GUARD TOWERS

1. SCOPE

This section outlines design and location requirements for guard towers.

2. RELATED SECTIONS

SP–1 – Site Development
SP–2 – Fences
SP–3 – Gates and Sally Ports
SP–4 – Lighting
SP–5 – Traffic Circulation and Parking
A–5 – Doors, Frames, Grilles and Modesty Screens
A–6 – Hardware
Electronic Security Systems Standards for Perimeter Intrusion Detection System (PIDS)

3. PURPOSE FOR TOWERS

3.1 Guard Tower Primary Use

Guard towers are not intended to supplement the perimeter surveillance function accomplished by perimeter mobile patrol and the fence system combined with PIDS. Historically, subsequent to the introduction of PIDS, guard towers have provided surveillance of large playfields at medium and maximum institutions. The current approach for Maximums however is to integrate small yards with the living units thus requiring multiple guard towers which is just not feasible. As for Mediums, playfields are often located centrally away from the perimeter, which also renders towers non-effective. Therefore the need for new and retrofit of existing towers is not a given and shall require the approval of the issuing authority.

3.2 Other uses for Towers

Towers cannot be viewed as being capable or helpful in providing banned substance interdiction as multiple towers would have to be used and continually deployed which is just not feasible. Towers are currently used to provide control of gates either used for vehicles or persons and to provide protection for staff performing vehicle inspections. Their extended use for these functions must be weighed against more commonly used movement control through the perimeter.

4. TOWER LOCATION

4.1 Recreation Towers

Where existing towers can be justified for continued use to provide surveillance of yards and to warn other staff of suspicious activity, a single tower shall be considered located on the outside of the perimeter closest to the yard. The tower of choice, if several exist, is the one which is closest to vulnerable areas such as Health Care and 'Special' population housing units. New towers which meet the above considerations shall conform to the following requirements.

5. DESIGN REQUIREMENTS

5.1 Tower Shaft

5.1.1 The height of the tower shall ensure that it does not interfere with the perimeter fence lighting system and cause impediments to viewing by eye or cameras.

5.1.2 The access door at the ground level of the tower shall be a swing security detention type located on the side of the tower facing the perimeter road.

5.1.3 The tower shaft shall be unheated.

5.1.4 Door locking hardware shall be maximum security type with a mechanical deadbolt lock keyed both sides.

5.1.5 Spiral steel stairs with a handrail shall be located inside the tower shaft; the stair radius shall not be less than 900 mm.

5.1.6 No flammable material shall be used in the construction of the tower shaft.

5.2 Cupola

5.2.1 The cupola shall be insulated for staff comfort and for energy conservation. A roof overhang is required with matte black soffit finish to limit reflection and to improve visibility.

5.2.2 The cupola shall be enclosed by glazing on all sides. Each glazing panel shall be as per Plate ST-1-1: double glazed with a safety glass interior pane and an exterior pane of 6 mm polycarbonate or of safety glass: 2 layers of float glass laminated together. The inner face of the glazing shall be clad with mirror membrane to reduce viewing from the exterior. All glazing shall be angled inward 10° at the panel bottom to permit downward vision. Sash track rollers to ease sliding action for one sliding section shall be provided on each side of the cupola; sliding insect screens shall also be provided as windows may remain open to allow for natural ventilation.

5.2.3 Shelving shall be installed under the window sill on one side of the cupola.

5.2.4 Lightning protection shall be provided.

5.2.5 Minimum clear height within the cupola shall be 2100 mm.

Ballistic Protection of glazed areas of towers shall not be provided in order to match the conditions available to the mobile patrols. The glazing film does however obscure the tower officer from view when lights are down. Floor and wall sections on the other hand shall have 6 mm (0.23”) steel or equivalent protection.

5.3 Mechanical

5.3.1 Heating

The heating system shall be capable of maintaining a temperature of 20°C (68°F). Air circulation shall be provided at windows in order to prevent condensation.

5.3.2 Plumbing Fixtures

Cupolas shall be provided with a water closet and hand wash basin which are to be located on the side of the cupola away from the activity area. The water closet shall be located so that observation functions by the staff are not interrupted. Cold water service only is required.

5.3.3 Sewage Disposal

Sewage lines shall be connected to the institution system, except where individual septic tanks prove to be more economical.

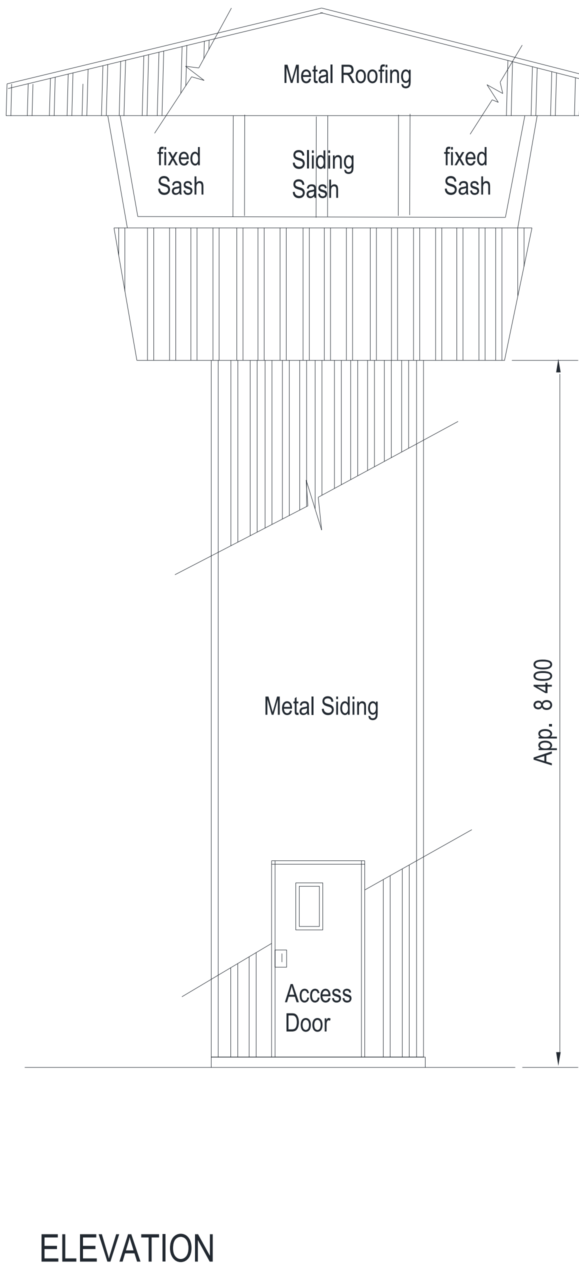
All drainage and supply lines located within the guard tower and shaft shall be protected against freezing by the use of insulation and electric heating cables.

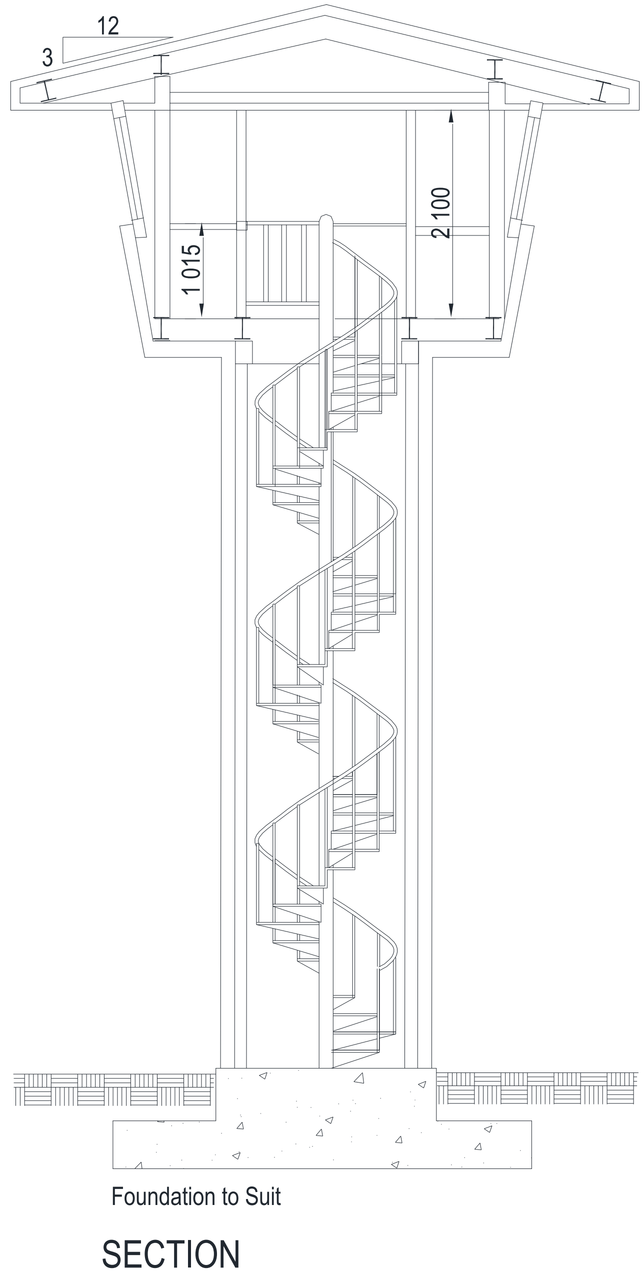
5.4 Electrical

In order to avoid loss of vision at night, lights within the cupola shall be provided with a dimmer control. A shelf with duplex receptacle and shaded task light shall be provided, as well as electric outlets for each side of the cupola. Lighting fixtures which illuminate the tower shaft and the ground below shall be provided beneath the cupola and controlled from the cupola.

5.5 Communications

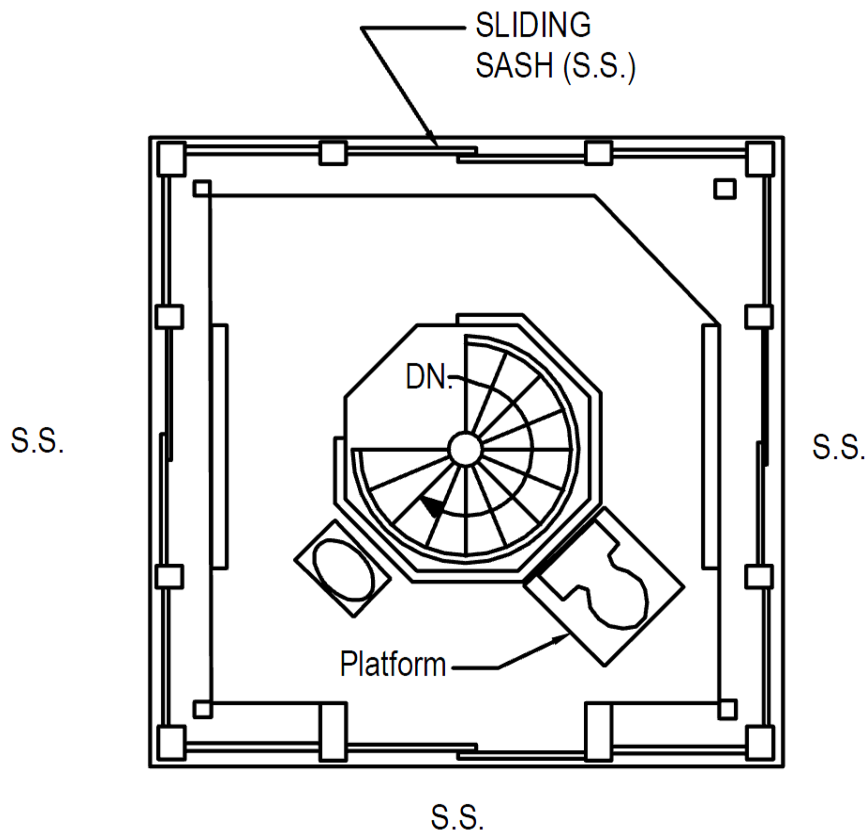
An intra mural telephone shall be installed in the cupola to provide communication with the MCCP. The officer in the tower is also equipped with a portable two way radio.



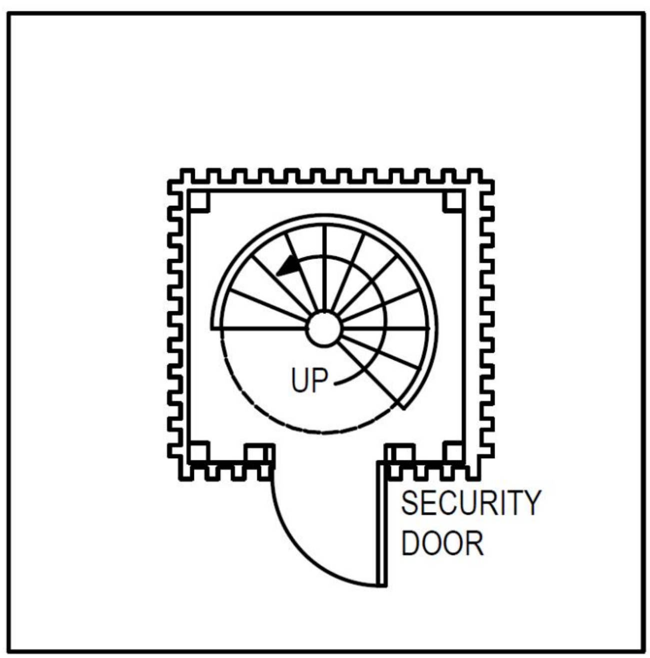


ELEVATION **SECTION**

PLATE ST–1–1 – TOWER ELEVATION/SECTION



PLAN – CUPOLA



PLAN - SHAFT

PLATE ST–1–2 – TOWER PLANS

ST-2 SPECIAL STRUCTURE – SHOOTING RANGES

1 SCOPE

This document outlines the requirements for partially weather protected outdoor shooting range for use by Correctional Service Canada.

2 PURPOSE

A shooting range forms part of Correctional officer training and provides for the upkeep of skills in the use of rifles, revolvers and other approved firearms. Each Region has shooting ranges located on institutional reserves; the number of which would be dictated by the number of staff having access to it within a maximum of 50 kilometer travel distance. Remote institutional sites require dedicated ranges. Use of a range is scheduled to ensure equitability.

3 PERFORMANCE CRITERIA

- Safety of personnel
- Effective ventilation – particularly of harmful lead dust and gaseous combustion products
- Effective backstop
- Effective natural lighting – no direct sunlight facing shooter
- Year round usage
- Safety of public outside of the shooting range
- Low cost to operate and maintain
- Minimal area footprint
- Environmental stewardship: ensures minimal impact on wildlife and natural habitat.

4. DESIGN REQUIREMENTS

4.1 Design shall meet the requirements set out in the RCMP Canadian Firearms Centre Range Design and Construction Guidelines, 2007 for an open structure ‘zero blue sky’ range.

4.2 The range shall be located on the Correctional reserve and accessible by an existing maintained road which may as an example provide access to a utility plant. It should be remote from the institution, property permitting, and be out of sight where possible.

4.3 The range shall be designed to fully contain bullets and projectiles from the CSC approved weapons including:

4.3.1° C-8 .223 calibre rifle

4.3.2 9mm pistol

4.3.3 40mm multi-launcher

4.4 Range shall be confined on all sides by concrete walls 2.7 m high with the target end configured and fitted to catch bullets and projectiles.

4.5 The number of firing lanes shall be based on use frequency and number of users. Centralized firing ranges shall have more lanes than those at single institutions in remote locations. Typically, 6 to 12 lanes are provided. Each firing lane shall be 1 m wide. In addition, a 1 m aisle shall be located on the side with the exit / service door.

There shall be no equipment kept in this aisle. Maintenance equipment such as a snow blower or lawn mower will be brought in from the main institution as required.

4.6 The distance from the firing line to the end target shall be 50 m.

4.7 Firing points shall accommodate standing, kneeling and prone firing positions and shall be covered and protected from weather. Included in this protected area shall be a lockable cabinet which provides for items such as rubber floor rolled mats, eye and ear protectors, and an emergency first aid kit. There shall be no provision for cleaning of weapons in the Range. Cleaning shall be done off-site.

4.8 The floor accommodating the firing points and the cabinet area shall be sized to be the width of the lane X the number of lanes plus the side aisle by 3.5 m deep and shall be of concrete.

4.9 There shall be 2 doors for access to the firing range. Each door type and hardware shall be of commercial grade. One door shall be the main access person door behind the firing points. The rear door located in line with the targets shall be a double door with the second leaf used for maintenance equipment. This door shall be the secondary exit door and may also be used for target setting. A strobe light shall be located above the door activated by contacts when door is being opened. Audible alarms are less effective as shooters wear ear protectors.

4.10 Targets shall be located under weather covered backstop. Targets shall be supported on wooden racks which will be changed as required. Racks shall be moveable to allow for a closer target for pistol training.

4.11 Bullet trap and lead collection system shall meet Canadian Firearms center Range Design and Construction Guidelines and applicable regulations.

4.12 The ground cover of the range exposed to the weather shall be of grass. To assure good drainage and based on local conditions, a drain tile connected to an outside tile and sloped to a retention pond or to a lower elevation on the outside may be required. At minimum, the sub-base shall be of sand topped with Geo-textile fabric, topsoil and sod. The area will not be used until the sod has taken root. The lane alongside the wall with the door and the target protected end will be of compacted stone and stone dust separated from the sod by a lawn edging.

4.13 The roof is designed to allow the weather in but to block views of the sky from the firing point at any position – standing to prone. To achieve this, the roof shall have baffles free spanning across the width of the range. The bottom of the baffles shall be set above the 2.7 m concrete wall height. Baffles closest to the shooter will have closer spacing. As the angle from the eye of the shooter to the bottom of the baffle is reduced, the spacing of the baffles down range can progressively widen. A cross section of the 50 m length will determine the appropriate baffle spacing.

4.14 The construction of each baffle shall be a covered truss set at a steep angle so that it sheds water and snow and prevents dripping. As well, the baffles block views of the sky from the firing position but allow daylight to reach the floor of the range. The wall supporting the baffles should be as high as the top of the baffle and equally opaque. The combined side wall and the baffles shall be solid to withstand lateral forces. Shadow lines, apparent but somewhat muted, do not hinder shooting. The objective is to prevent direct sunlight facing the shooter.

4.15 The baffle shall be designed and constructed to prevent a stray bullet from an approved weapon to penetrate the baffle and potentially endanger anyone outside of the range. This may mean that the baffles closest to the shooter require to be reinforced with bullet proof material. Alternately, a single wider baffle located at some juncture along the cross section may address this requirement. This provision should compare to the height of an earth berm of an outdoor range and the degree to which it offers the required protection.

4.16 Electrical service in the form of lighting are required for the weather protected front area and for the rear area at the target. In between areas shall not be lit which may limit the use of pistols needing a closer target to daytime use. The lighting closest to the target location shall be outdoor type and set behind the end baffle for its protection and to prevent direct light from obstructing the shooter. The lights shall be wired to two separate dimmer switches. The strobe and contact on the rear door will also be connected to the service. Bringing a power line to the range location should be weighed against the use of photo voltaic solar collectors with a battery pack.

4.17 Parking will be provided for as many vehicles as there are firing lanes plus 2 spare spaces for overflow at times of user changes. Parking lot shall be lit to 10 lx level.

4.18 Several ‘zero blue sky’ shooting ranges have been constructed at CSC and plans and specifications are available for review as are assessments by users.

Correctional Service Canada
Service correctionnel Canada

Safety, Respect and Dignity for All

La sécurité, la dignité et le respect pour tous

Technical Criteria for Correctional Institutions

APPENDIX – WOMEN'S TECHNICAL REFERENCE GUIDELINE

Canada

APPENDIX – WOMEN'S TECHNICAL REFERENCE GUIDELINE

SECTION WG – GENERAL

SECTION WSP – SITE

Correctional Service Canada
Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Women's Technical Reference Guideline

SECTION WG - GENERAL

Canada

WG-1 GENERAL - INTRODUCTION

1. PURPOSE

1.1 The Purpose of this document is to prescribe proven technical requirements for site and perimeter design for Women's institutions as tested in use or in accordance with recognized standards authorities. Requirements are described by performance and specification and cover the needs unique to women's correctional facilities. Other governing construction codes and authorities supplement this document.

1.2 This document is to be used for the development of all CSC Women's institutional design and construction projects in conjunction with the Technical Criteria Document (TCD) which details all technical requirements not described in this document.

1.3 The prescriptions in this document are cross referenced in the CSC "Accommodation Guidelines" which is a separate document used in the planning and design of CSC correctional facilities.

2. APPLICATION

2.1 For new construction, adherence to the documented solutions is considered important. Deviations, however, will be considered providing equal performance can be demonstrated. In such cases, requests shall be submitted to the issuing authority, the Director Facility Planning and Standards.

2.2 For renovations, alterations and expansions of existing buildings and systems, conformity to this document may not always be practicable or cost effective due to existing physical features and the age of the facility. In such cases, information contained in this document should be used as guidelines and alternate solutions, with appropriate justification, shall be submitted to the issuing authority.

2.3 This document is not meant to apply retroactively to existing facilities. Any variance between the guidelines in this document and existing facilities will be corrected as part of future construction projects, if and when planned as part of the Capital Program / Plan.

3. UPDATING

In order to keep the document current, Technical Reference Guideline and TCD sections are systematically amended as new information or lessons learned are raised to the issuing authority. The Technical Criteria Document is also periodically reviewed to determine the need for revisions.

4. DOCUMENT DISTRIBUTION

4.1 The document in its final revised version is distributed in a loose-leaf format to allow replacement of amended pages between final revised versions.

4.2 Distribution of the Women's Technical Reference Guideline and amendments will be made to listed recipients. Recipients are responsible for broader distribution and for subsequent updating.

4.3 The office of Director Facility Planning and Standards at NHQ is responsible for issuing the Women's Technical Reference Guideline in both official languages.

5. SECURITY REQUIREMENTS FOR CONSTRUCTION

Security requirements, which are critical for construction within occupied institutions, have been established to satisfy the special needs of CSC. Contractors performing construction in operating institutions must conform to the provisions contained in the "Security Requirements" issued by the office of Director Facility Planning and Standards. This document will form part of the specification of the contract documents for works to be undertaken.

6. SECURITY CLASSIFICATION AND HOUSING

While CSC uses the minimum, medium, maximum and multi-level designations to classify their institutions[1], there exists another designation (S-X) which describes the types of housing units found at CSC. Because institutions and expansions have been built over time and since the influencing factors may have differed from time to time, there exists an array of unit types. CSC has classed these housing units by an S category ranging from S-2 to S-7, with higher security in ascending order. Further description of this rating system can be found in the Technical Criteria Document Section G.

All Women's correctional institutions are classified as Multi-Level institutions. While they fall under the same general classification of a Multi-Level institution as described in the Technical Criteria Document, there are some distinct differences between women's and men's multi-level sites. Both are institutions where different security levels are co-located on one site; however, within the perimeter of a Women's Facility Minimum and Medium security populations are not physically separated within the perimeter.

There are four distinct offender populations within Women's Facilities each housed in a distinct housing type:

6.1 Minimum Security Unit

This type of unit accommodates Minimum security offenders who can live in a residential type of environment located outside the secure perimeter of the institution. These units are self-contained integrating housing, program areas, staff support and outdoor activity space, reducing the frequency for offenders in these units to enter the main institution except for special services.

1 Following Commissioner's Directive #706 of March 15, 2010

Outdoor activity areas are accessible from the Unit and will be designed for use as outdoor visiting and socialization space. These area's are not fenced and access/egress to and from the unit is controlled operationally.

Control and supervision is managed through operational means. This type of unit does not provide any level of containment.

These units fall under the S-2 category.

6.2 Residential Housing Units

This type of unit accommodates Minimum and Medium security offenders in an environment which incorporates a more residential institutional design in order to encourage inmate responsibility for behaviour and daily living activities located within the secure perimeter of the institution. There are no physical separations between Minimum and Medium security offenders in these units. These units are either standalone or row house type residential units with no integrated program or staff space. The offender population housed in these units utilize the main institution for Socialization, Spirituality, Program and Recreation facilities in a fully integrated manner.

Control and supervision is managed through operational means and dynamic security. This type of unit does not provide any level of containment.

These units fall under the S-2 category.

6.3 Structured Living Environment (SLE)

This type of unit accommodates Minimum and Medium security female offenders with significant cognitive limitations or mental health concerns in a small group living environment. The SLE provides a house-like appearance that mirrors community standards, while ensuring safety and security in instances of acting out behavior. Offenders housed in this unit may have controlled access to the institution at large and have restricted movement as a part of their correctional plan. The SLE units are self-contained integrating Program and Staff areas; but offenders will have access to Socialization, Spirituality, Health Care, Education and Personal Development and other support areas of the institution.

Control and supervision is managed through both physical and operational means. This type of unit can provide for short term containment at the bedroom level but does not secure inmates within the unit.

These units fall under the S-3 category.

6.4 Secure Units

This unit accommodates Maximum security offenders who require intensive program intervention in a secure environment. Offenders housed in the Secure Unit remains largely in the unit, and do not mix with the general population which has normal movement to Socialization, Spirituality, Program and Recreation facilities. The specialized Secure Unit is fully self-contained and includes Program, Staff and exercise spaces. The exercise spaces in this unit are fenced and topped with Barbed Tape Concertina (BTC), and the complete unit is physically separated from the rest of the institution through secure construction and controlled access/egress to and from the unit

Control and supervision is managed primarily through the physical infrastructure and operational security practices. This type of unit can provide containment at the cell, pod, and unit level.

These units fall under the S-5 category.

6.5 Segregation Units

This unit accommodates offenders who require segregation from the general offender population. The segregation of an offender, which may be voluntary or involuntary, is provided to increase the safety and security of all individuals within the institution. Segregation should only be used for the shortest period of time necessary, when there are no reasonable alternatives and in accordance with a fair, reasonable and transparent decision making process based on a review of all relevant information.

The Segregation Unit at Women's Institutions is within the Secure Unit as an isolated pod of specialized cells. Offenders housed in the Segregation Unit remains in the unit, and do not mix with the general population, they receive services on unit or under escort to specialized services such as Health Care. The specialized Segregation Unit is fully self-contained with a dedicated exercise space. The exercise space of this unit is fenced and topped with BTC, and the complete unit is physically separated from the rest of the institution through secure construction and controlled access/egress to and from the unit

Control and supervision is managed primarily through the physical infrastructure and operational security practices. This type of unit can provide containment at the cell, pod, and unit level.

These units fall under the S-5 category.

7. PERIMETER AND SITE

Women's institutions have distinct Perimeter and Site requirements from men's institutions. The primary difference in the secure perimeter being that women's facilities have a single fence perimeter equipped with only with a Fence Detection System (FDS); pole mounted perimeter lighting system; and perimeter cameras are primarily 'eye in the sky'. Women's institutions are sited on a reserve of land which is relatively small as compared to the institutional fenced compound and its related amenities. Full technical details for site planning and development, fences, gates and sallyports, exterior lighting, traffic circulation and parking and temporary construction fences can be found in Section WSP – Site of this document.

8. INTERNAL CONTROL AND POSTS

The purpose of an institution's Internal Control is to provide static controls, compatible with security operations, which create secure working and living environments for staff, visitors and inmates. It is comprised of different types of Control Posts, Terminal Equipment Rooms, Security Observation Galleries, and Dedicated Security Routes and are applicable only to institutions with a Secure Perimeter (i.e. not applicable to minimum-security institutions).

While Women's Facilities do have a Perimeter Security Fence, they have distinct Internal Control requirements from Men's institutions. There are no firearms held at Women's Facilities, and therefore there is no requirement for Security Observation Galleries, Dedicated Security Routes, or Armouries.

Additionally, there are fewer Control Posts at Women's Facilities and they are primarily Level D open posts. The only enclosed Control Posts at a Women's Facility are the Visits and Correspondence Control Post which is a Level C closed post; the Unit Control Post in the Secure Unit which is a Level B closed post and the Main Communication Control Post (MCCP) which is a Level B closed post.

9. PLANNING FOR EXPANSION IN CAPACITY

The infrastructure of every institution (service and program areas and all utilities: water, sewage, heating electrical, etc.) is designed to meet the needs of the designated rated capacity of an institution and for an expansion of housing accommodation by 25% without significant strain on the original infrastructure. All expansions should nonetheless undergo a review to assure that all current needs can be satisfied by the existing infrastructure.

Correctional Service Canada / Service correctionnel Canada

SAFETY, RESPECT AND DIGNITY FOR ALL

LA SÉCURITÉ, LA DIGNITÉ ET LE RESPECT POUR TOUS

Women's Technical Reference Guideline

SECTION WSP - SITE

Canada

WSP-1 SITE – PLANNING AND DEVELOPMENT

1. SCOPE

This section outlines planning and development principles and specific definitions of terms related to Women's detention institutions.

2. RELATED SECTIONS

WSP–2 – Fence
WSP–3 – Gates / Sally Port
WSP–4 – Exterior Lighting
WSP–5 – Traffic Circulation and Parking

3. INSTITUTIONAL PROPERTY

3.1 Women institutions are typically situated within or at the edge of urban centres except for Healing lodges which are on remote and rural sites. As such, Women's institutions are sited on a reserve of land which is relatively small as compared to the institutional fenced compound and its related amenities. In the case of a Healing lodge, the land reserve is significantly larger as compared to the open institution. For both cases, there is no specific requirement for demarcation or fencing at the CSC owned property line. Signage at the property line is recommended and shall follow the Federal Identity Program[1].

3.2 Existing property features such as topographical conditions and existing trees and bushes shall be used where possible to screen the CSC institution from adjoining properties and uses. The main access and approach to the institution shall be landscaped to be visually appealing.

3.3 Where a Women's institution on a single reserve comprises a fenced compound and an adjacent Minimum (open) Security Unit, the adjacent Unit shall be located furthest from that part of a closed institution where inmate circulation and activities take place.

4. BUFFER ZONE

4.1 A 4-meter buffer zone parallel to the interior side of the perimeter fence shall be free of all structures, trees, and shrubs.

4.2 Where adjacent to ceremonial grounds and gardens, this zone shall be marked by signage informing inmates not to trespass. Fencing shall <u>not</u> be used to demarcate this zone as it only serves to obstruct views. In addition, any low and scalable fence may invite trespassing resulting in enforcement and imposition of charges.

4.3 The buffer zone shall be covered by CCTV located on poles or buildings on the interior side of the institution.

[1] 4.3 – Common-use and operational signs, Federal Identity Program Manual, March 1990
http://www.tbs-sct.gc.ca/fip-pcim/man_4_3-eng.asp

5. NO BUILDING ZONE

5.1 With the exception of the Principle Entrance Building, no building shall be closer than 5m to the perimeter fence.

6. NO INMATE ZONE

6.1 This is the area along the perimeter fence which is close to the Principle entrance and functions serviced by vehicles. Offender access to this area is controlled. There is no specific distance to delimit this zone as it varies depending on the site layout.

6.2 Functions having controlled access to offenders within this zone include Visits and Private family visits, both shared with outside visitors. Additional functions include food services, material management and works.

7. SITE PLANNING AND DEVELOPMENT OF AN INSTITUTION

7.1 Planning of facilities and amenities shall be dictated by time of use and user type. Institutional buildings closest to the Principle entrance shall accommodate functions which are either restricted to offenders or where access is supervised. Those functions requiring vehicle access for servicing and supplies shall be relatively close to the Principle entrance and remote from offender circulation and activity areas. Evening use functions; housing, outdoor recreation areas and yards, gardens, and ceremonial grounds shall be located furthest from the entrance.

7.2 See sub-sections 9 for Landscaping and limited access grounds and 10 for Outdoor Recreation areas and yards. Also see Plate SP-1-1 for idealized site plan which illustrates building relationships.

8. SIGNAGE

8.1 All exterior and interior building signage shall conform to the Federal Identity Program (FIP). The FIP Manual is fully available at:

http://www.tbs-sct.gc.ca/fip-pcim/

8.2 The CSC “Search Sign” shall be located at each public entry leading to an institution. The “Search Sign” is a warning sign as prescribed in the Federal Identity Program Manual[2] (Caution!, Attention! under Type 3). The standard is yellow background with black letters. For the purpose of a reading distance of 30 m and a vehicular speed of 30 km/h, “x” is defined as 50 mm. Therefore, the text letters size is 50 mm (x) and the header letters size is 150 mm (3x). The layout is provided in Table 5 – Standard spaces, 50 mm to 200 mm x-height of section 4.3 of the FIP Manual (see footnote 8). The bilingual text is side by side, the official language on the left side being according to the regional practice. As the font and design follows the Federal Government standards the use of the Department signature or CSC crest is optional.

[2] Federal Identity Program Manual – 4.3 Common-use and operational signs, Treasury Board of Canada, Secretariat, March 1990; http://www.tbs-sct.gc.ca/fip-pcim/documents/man_4_3__p1.pdf and http://www.tbs-sct.gc.ca/fip-pcim/documents/man_4_3__p2.pdf
Federal Identity Program Manual – 4.5 Signage typeface, Treasury Board of Canada, January 1988; http://www.tbs-sct.gc.ca/fip-pcim/documents/man_4_5.pdf

Attention! You are now entering a Correctional Service Canada reserve and all vehicles and persons on this reserve are subject to search.	**Attention!** Vous pénétrez présentement sur une réserve du Service Correctionnel Canada et tout véhicule et personne sur cette réserve sont sujets à être fouillés.

OR

Attention! Vous pénétrez présentement sur une réserve du Service Correctionnel Canada et tout véhicule et personne sur cette réserve sont sujets à être fouillés.	**Attention!** You are now entering a Correctional Service Canada reserve and all vehicles and persons on this reserve are subject to search.

Refer to *CAN/CGSB-109.1M-1989*[3] for the sign structure and characteristics.

8.3 All areas restricted only to authorized personnel shall be clearly and boldly identified according to the common-use and operational signs as described in the Federal Identity Program Manual[4]. Refer to section A-9 Interior Signage for interior signage requirements.

9. LANDSCAPING AND LIMITED ACCESS GROUNDS

9.1 Only indigenous plants and locally available materials shall be used.

9.2 All layouts and landscape material shall take into account snow removal, grass cutting, watering and tree and shrub trimming to ensure minimum watering.

9.3 Soft landscaping is encouraged but plant type should be selected so as not to obstruct views. Gentle contouring is also acceptable as are earth berms and timber retaining walls provided they do not facilitate hiding.

9.4 Colour and visual relief can be achieved by the use of flowers beds, which shall be planted and maintained by inmates.

9.5 At closed institutions, all site furniture shall be secured in place. All walking surfaces shall be of monolithic material or compacted stone dust. Small and light paving materials (brick, concrete pavers, or gravel) shall not be used.

9.6 Positive drainage for the entire site shall be provided with the use of ditches, swales and flumes. All drainage areas shall be designed to be as shallow as possible to allow for ease of maintenance and so not to obstruct visibility.

3 CAN/CGSB-109.1M-1989 – Signage System, Extruded Aluminum, Federal Identity Program

4 Page 11 – Federal Identity Program Manual – 4.3 Common-use and operational signs, Treasury Board of Canada, Secretariat, March 1990; http://www.tbs-sct.gc.ca/fip-pcim/documents/man_4_3__p1.pdf

9.7 The minimum grade slope shall be 3% or gradual slope where natural grade changes exist for grass and landscaped areas.

9.8 Vegetable gardens where provided shall be located in designated areas away from general offender traffic and yards. Authorized offenders are permitted access to gardens.

9.9 Fruit trees are not permitted on institutional grounds.

9.10 Sacred Grounds for sweat lodge and ceremonies shall be located in designated areas away from general inmate traffic and yards. Only authorized offenders are given access to sacred grounds. Firewood used in ceremonies shall be stored under cover and be protected.

9.11 Snow storage areas shall be located in a manner that does not restrict drainage and visibility. A space wide enough to accommodate tractor power mowers shall be provided between trees and planting beds. Hose bibs shall be provided throughout the site as required on a project specific basis. Underground watering pipes or hoses shall not be used.

10. OUTDOOR RECREATION AREAS

10.1 Outdoor recreation areas, which may have a higher concentration of offenders, shall be located remote from the perimeter fence, Principal Entrance, and the Secure Unit in order to minimize opportunity for transfer of contraband.

10.2 Outdoor recreation areas shall be grassed except where an activity calls for a hard surface. Compacted fine gravel or stone dust or, a monolithic hard surface such as asphalt is acceptable.

10.3 Fenced outdoor areas associated with the Secure Unit are provided with an engineered asphalt surface to allow use in all weather, to prevent hiding of contraband, and to facilitate maintenance. The asphalt surface shall extend beyond the containment fence by 900 mm for anti-tunnelling protection and to prevent edge fracture and removal. Poured in place concrete surface may be used on account of seasonal or installation constraints. Use of concrete may be favoured for ease of construction and maintenance where an area is enclosed by buildings or walls where a wall is intended for screening.

11. FLAG AND FLAGPOST

Rules and protocol for “flying the flag” are fully available at:
http://www.pch.gc.ca/pgm/ceem-cced/etiqtt/101-eng.cfm
Refer to *CAN/CGSB-98.1-2003*[5] for the outdoor use of the National Flag of Canada.

5 CAN/CGSB-98.1-20011 – National Flag of Canada (Outdoor Use) ICS 99.020.10

PLATE WSP–1–1

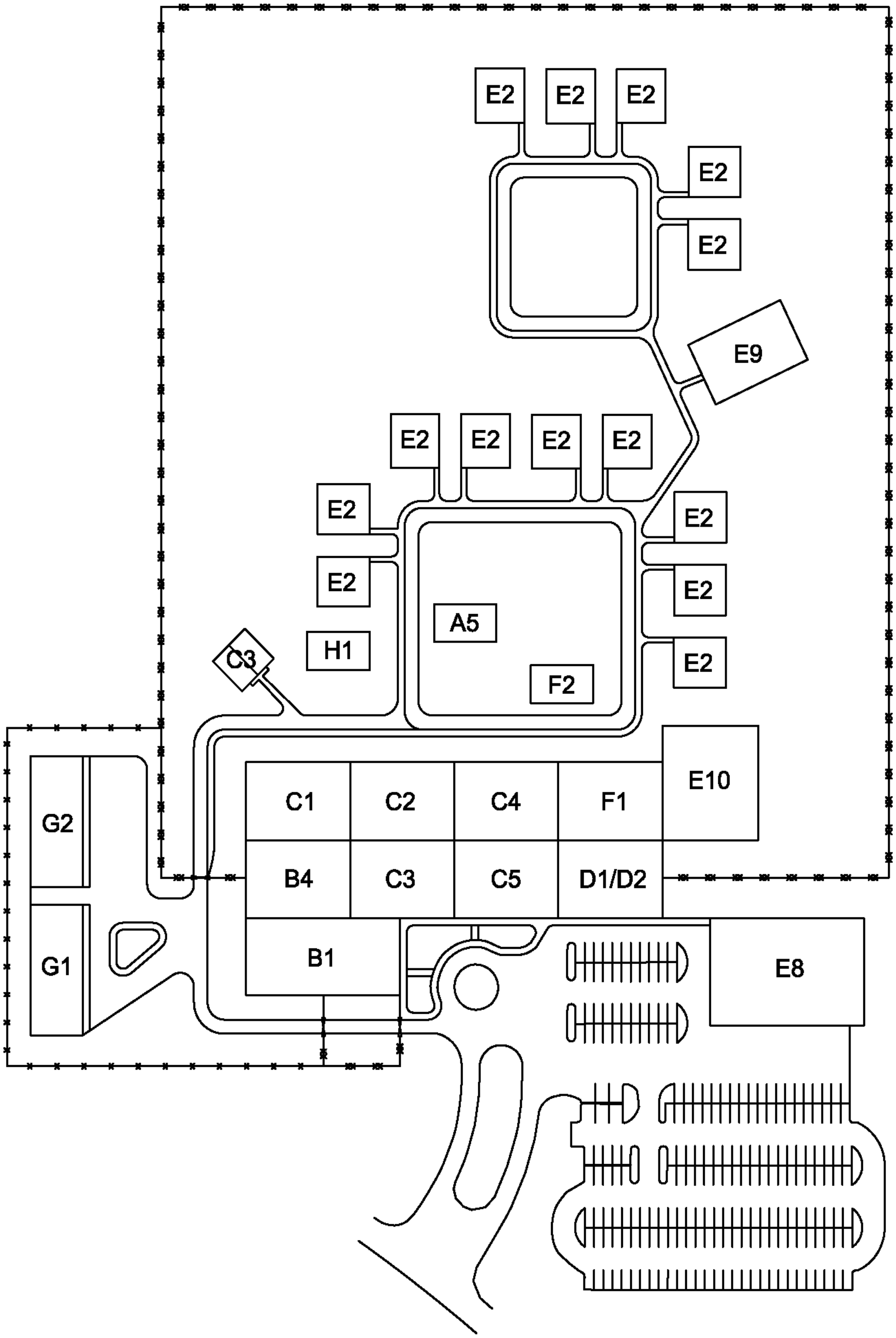

E2
E2
E2
E2
E2
E9
E2
E2
E2
E2
E2
E2
E2
E2
E2
A5
H1
C3
F2
E10
C1
C2
C4
F1
G2
B4
C3
C5
D1/D2
G1
B1
E8

TABLE A–1–1 – ORGANIZATION OF DEPARTMENTS

GROUP A – ADMINISTRATION
A1 MANAGEMENT CENTRE
A2 FINANCE
A3 STAFF SERVICES AND TRAINING
A4 ADMINISTRATION AND PERSONNEL
A5 CASE AND SENTENCE ADMINISTRATION
A6 NATIONAL PAROLE BOARD HEARING

GROUP B – SECURITY
B1 EXTERNAL CONTROL (GATEHOUSE)
B2 EMERGENCY RESPONSE AND ARMOURY
B3 SECURITY ADMINISTRATION
B4 ADMISSIONS AND DISCHARGE

GROUP C – SOCIALIZATION
C1 SOCIAL AND CULTURAL DEVELOPMENT
C2 ARTS AND CRAFTS
C3 PRIVATE FAMILY VISITING
C4 VISITS AND CORRESPONDENCE
C5 RECREATION

GROUP D – SPIRITUALITY
D1 CHAPLAINCY
D2 ABORIGINAL SERVICES

GROUP E – HOUSING
E1 SMALL GROUP ACCOMMODATION
E2 RESPONSIBILITY UNITS
E3 STRUCTURED SECURITY UNIT – OPEN POST/RANGE
E4 STRUCTURED SECURITY UNIT – CLOSED POST/RANGE
E5 CLOSED CONTROL UNITS
E6 SEGREGATION UNITS
E7 SPECIAL HANDLING UNITS
E8 MINIMUM SECURITY UNITS
E9 STRUCTURED LIVING ENVIRONMENT (SLE)
E10 WOMEN’S SECURE UNIT

GROUP F – HEALTH CARE
F1 HEALTH CARE CENTRE
F2 MENTAL HEALTH CARE

GROUP G – TECHNICAL SERVICES

G1 MAINTENANCE

G2 FOOD SERVICES

G3 MATERIAL MANAGEMENT

G4 INSTITUTIONAL SERVICES

GROUP H – OCCUPATIONAL DEVELOPMENT PROGRAMS

H1 OCCUPATIONAL DEVELOPMENT PROGRAMS (ODP)

H2 CORCAN

GROUP J – EDUCATION AND PERSONAL DEVELOPMENT

J1 EDCUCATION

J2 CORRECTIONAL PROGRAMS

J3 LIBRARY

WSP-2 SITE - FENCES

1. SCOPE

This section provides performance criteria and conforming specifications for all fences related to Women's institutions with a secure perimeter. This section does not apply to an open Healing Lodge.

2. RELATED SECTIONS

2.1 Women's Technical Reference Guideline sections:

WSP–1 – Site Planning and Development
WSP–3 – Gates/Sallyport
WSP-4 - Exterior Lighting
WSP–5 – Traffic Circulation and Parking
& any sub-section referring to the Perimeter Intrusion Detection System (P.I.D.S.)

2.2 National Master Specification Section

01 35 13.16 – Special Project Procedures for Detention Facilities
28 01 10 – Operation & Maintenance of Electronic Access Control & Intrusion Detection
28 16 00 (13705) – Intrusion Detection
32 31 13 – Chain Link Fences and Gates
32 31 13.53 – High-Security Chain Link Fences and Gates

3. EXTERNAL BOUNDARY FENCE

External boundary (property) lines shall not be fenced unless specific site conditions warrant it. The type of fence in such locations will be project specific.

4. PERIMETER SECURITY FENCE

4.1 Performance Criteria

4.1.1 The institution will be enclosed by a single chain link fence perimeter supported by a fence detection system and CCTV which shall be located on the interior of the institution mounted high enough to optimize viewing of the fence line. The perimeter fence forms the last physical obstacle to escape from the institution. The design of the fence system shall deter inmates from attempting to breach the perimeter.

4.1.2 The fence shall be erected in a straight line to the extent possible from corner to corner to allow for direct long views. The corners of the perimeter may be truncated or be at right angle contingent on the property lines and the proximity to that line.

4.1.3 To render climbing more difficult, the fence fabric shall be installed on the institution side of the fence posts.

4.1.4 The fence shall be equipped with a Fence Detection System (FDS) and its fabric tensioned to ensure vibration travel across posts while not causing excessive false alarms. Fabric vibration terminates at strain post locations where the fence fabric ends thus allowing zone separations for the PIDS.

4.1.5 Special attention shall be paid to sloped sites to ensure that gaps do not develop between the ground surface and the lower fence rail. Where necessary, due to severe ground slope longitudinally, fencing may be stepped, but the minimum height of the fence shall be maintained at all times. Ground slope across the fence line shall be minimized to prevent erosion under the perimeter fence.

4.1.6 Barbed tape concertina (BTC) coils shall be installed on top of the fence in such a manner that it prevents the passage of a person across the barbed coils. (See plate WSP-2-2).

4.1.7 Where interior fences intersect the perimeter fence, the interior fence shall be designed to prevent it from being used to aid in crossing the perimeter fence. To achieve this, the interior fence shall be equipped with:

- a Fence detection system (FDS) for a length of 2.5 meters. The fence fabric shall extend for that length and be connected to a strain post so that the vibration does not travel beyond.
- and BTC on both sides on the fence No gap between posts or fabric shall exceed 125 mm.

4.1.8 To inhibit tunnelling under the Perimeter Fence, a ground barrier shall consist of a footpath on the interior side. This could be of concrete or asphalt and shall be engineered to prevent heaving. (See Plate WSP-2-1). Roadways crossing the perimeter fence line shall be topped with asphalt which also serves as a ground barrier.

4.1.9 The fence system comprising foundation, line, strain, corner and gate posts shall meet local environmental conditions. Fence systems shall be engineered to resist local wind and snow conditions.

4.1.10 Where a building or other structure interrupts the perimeter fence run, the design to ensure perimeter integrity shall be approved by the issuing authority.

4.1.11 Where a perimeter comprises or integrates a wall, the design to ensure perimeter integrity shall be approved by the issuing authority.

4.2 Conforming Specifications

4.2.1 The perimeter fence shall be 2.4 m to the top of the chain link fabric with an overhang arm to support the BTC above.

4.2.2 No structure, with the exception of the Principle entrance building, shall be closer than 5 m to the Perimeter fence.

4.2.3 All chain link fencing shall be installed in accordance with the *National Master Specification (NMS) 32 31 13* [6] and *CAN/CGSB-138.3-96* standard[7]. Where there is a conflict between the NMS and this criterion, the TCD shall prevail.

4.2.4 Chain link fence fabric shall conform to the following specifications[8]:

---

[6] National Master Specification 32 31 13 – Chain Link Fences and Gates (2004/12/31), there is also specifically Master format reference number 32 31 13.53 for High-Security Chain Link Fences And Gates

[7] CAN/CGSB-138.3-96 – Installation of Chain Link Fence

[8] Refer also to: CAN/CGSB-138.1-96 – Fabric for Chain Link Fence

4.2.4.1 Wire Size: 4.8 mm (min) (6 Gauge)

4.2.4.2 Size of mesh: 50.8 mm

4.2.4.3 Height of fence fabric: 2400 mm

4.2.4.4 Barbed edges top and bottom

4.2.4.5 Average mass of zinc coating to be not less than 610 g/m^2 of uncoated wire

4.2.4.6 Breaking tensile strength to be 10,000 N•min.

4.2.5 Wire mesh shall be continuous from top to bottom and shall be applied on the institutional compound side of the posts.

4.2.6 Fence fabric shall be pulled taut before fixing in place. Tautness, when fixed in place, is to be established by pull tests. The application of a 12 kg perpendicular pull at the midpoint of the mesh panel (midpoint of posts/rails) shall show a displacement of no more than 30 mm from the fence at rest plane.

4.2.7 Posts, (corner, gate, strain, line) shall conform to *CAN/CGSB-138.2-96* [9], galvanized steel pipe.

4.2.7.1 Posts shall be spaced a maximum of 2.5 m apart.

4.2.7.2 Line post minimal size shall be 73 mm O.D. 8.6 kg/m.

4.2.7.3 Strain post minimum size shall be 114.3 mm O.D. 15.92 kg/m. Strain posts shall be spaced not more than 60 m apart.

4.2.7.4 Corner and gate post minimum size shall be 143.3 mm O.D. 21.0 kg/m.

4.2.8 Galvanized steel arms shall be provided on all posts where barbed concertina is to be installed, as shown on Plate SP-2-2.

4.2.9 Bottom and top rails shall be 42.2 mm O.D. minimum, 3.4 kg/m.

4.2.10 Tie wires shall be 3.7 mm diameter (9 gauge) galvanized steel wire to secure chain link fabric to bottom rail, top rail and line posts at 300 mm spacing.

4.2.11 Intermediate rails shall not be used.

4.2.12 Tension bars used for holding the ends of the fence fabric at the location of strain posts and corner posts shall be 5 mm x 20 mm minimum x 2400 mm galvanized steel.

4.2.13 Tension bar bands shall be 3 mm x 20 mm minimum galvanized steel and spaced vertically at 300 mm o.c.

4.2.14 Where nuts and bolts are required for fastening, nuts shall face compound exterior and be torqued tight.

4.2.15 Where tension cables are used at corner, end, gate, strain posts, and fittings shall be of galvanized steel.

4.2.16 Barbed tape concertina (B.T.C.) shall be galvanized tape 20 x 0.5 mm clenched around a 2.5 mm diameter spring steel galvanized core wire to form a concertina coil with a nominal exterior coil diameter of 710 mm. The coil, when

[9] CAN/CGSB-138.2-96 -- Steel Framework for Chain Link Fence

installed, shall have a minimum diameter of 635 mm. The barbed concertina shall have 20 mm long blade type barbs measured from tip to tip of the blade, and barb clusters shall be spaced approximately 45 mm on centre (see Plate SP-2-3). The concertina shall be formed by clipping adjacent loops of single helical coils together at a minimum of three (3) points on the circumference. Clips shall be galvanized. The resulting coil, when stretched, shall form a cylindrical pattern. The loop spacing shall not exceed 230 mm.

4.2.17 For concertina coil support at fence top, two barbed wires stretched and fixed to post arms shall be provided. Barbed wire shall consist of two strands of 12 gauge wire with 4 point barbs at 130 mm spacing, all galvanized.

4.2.18 Concertina coils are to be turned onto an internal intersecting fence for a distance of 2.5 m (See plate SP-2-6). Where the threat of breach exists from either side of the intersecting fence, concertina coil shall be installed on each side.

4.2.19 The Concertina coils shall be supported and tied at 230 mm spacing onto each of the two barbed wires.

5. INTERIOR FENCES

5.1 Area Fences

5.1.1 Performance Criteria

5.1.1.1 Interior fences separating vehicle service functions from the main institution and those enclosing yards of the Secure Unit shall be a maximum of 2.4 m in height topped with steel arms, barbed wire, and BTC. Any other fenced area shall <u>not</u> be topped with BTC.

5.1.1.2 Where interior fences intersect the Perimeter Fence, refer to item 4.1.18 above and plate WSP-2-6.

5.1.1.3 Tunnelling barriers are not required on interior fences except where they are topped with BTC. Barrier type shall be compacted gravel to 300 mm in depth and extending 600 mm on either side.

5.1.1.4 See chapter WSP-1 Site Planning and Development, item 10.3 for yard ground surface and anti-tunnelling protection.

5.1.1.5 Fences shall not be used to demarcate the buffer zone.

5.1.2 Conforming Specifications

5.1.2.1 Materials shall be similar to those specified for the perimeter fences (see item 4.2).

5.1.2.2 For fences where post steel arms are not provided, posts shall have galvanized post caps.

5.1.2.3 For secure unit yards where visibility and contact is at issue, fencing shall be provided with appropriate masking. A flat solid wall may be integrated with the yard fence given approval by the issuing authority.

6. EXTERIOR SERVICE COMPOUND FENCE

6.1 Performance Criteria

Where bulk fuel storage (propane and gasoline) is provided, the storage area shall be fenced (see section WSP-5, Traffic Circulation and Parking).

6.2 Conforming Specifications

7.2.1 Materials will be similar to those specified for the perimeter fences (item 4).

7.2.2 Fence height shall be 2.4 m.

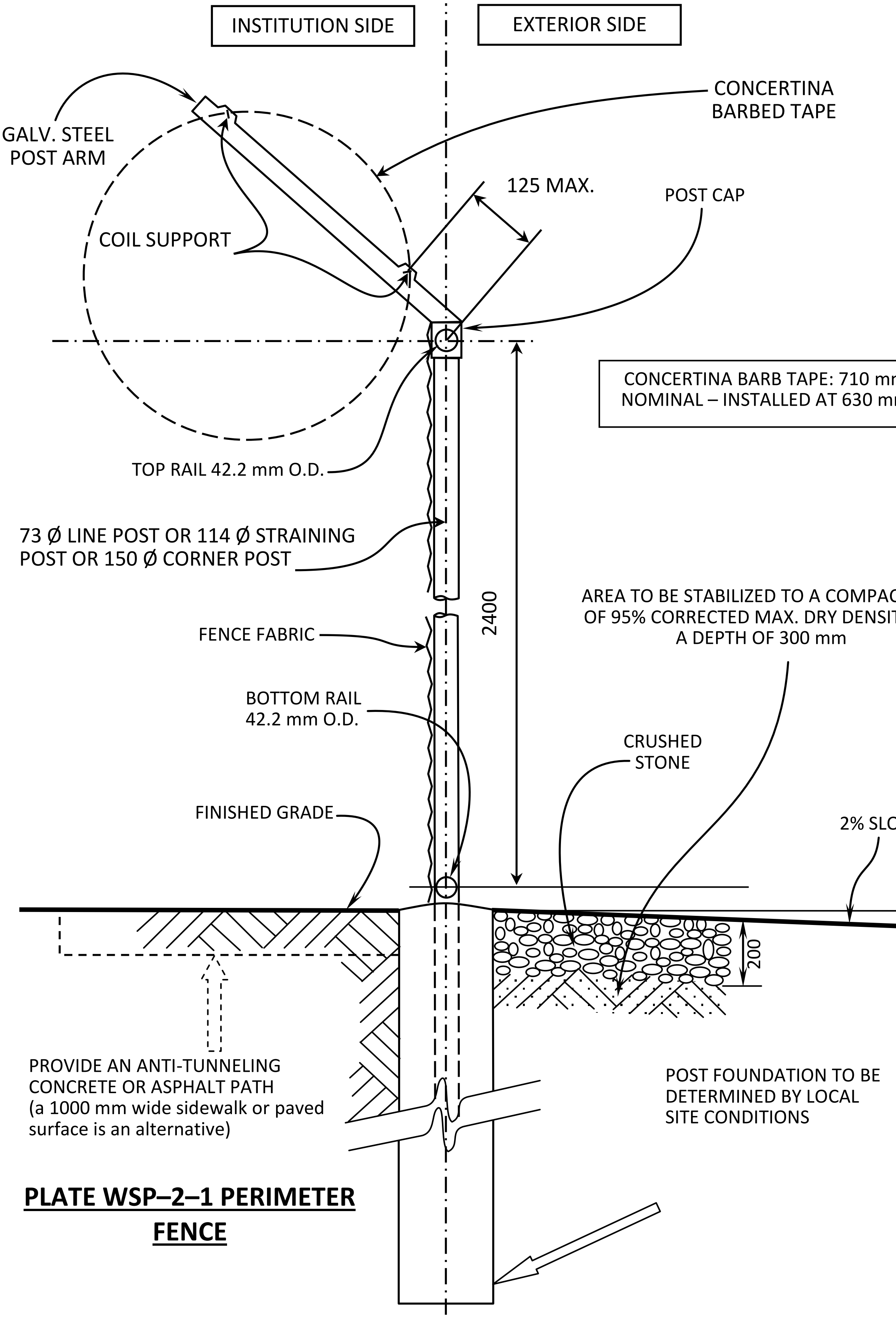


PLATE WSP–2–1 PERIMETER FENCE

WSP-3 SITE – GATES/SALLY PORT

1. SCOPE

This section outlines requirements for vehicle and pedestrian access and egress control for Women's institutions with a secure perimeter.

Access and egress control for open minimum security units outside the perimeter fence involves signage and reporting to a 24 hr open control post but does not include fencing and gates. Refer to type 'D' control post under chapter A-12 Control posts for functional requirements as well as the CSC Accommodation Guidelines.

2. RELATED SECTIONS

2.1 Technical Criteria Document sections:

WSP–1 – Site Development
WSP–2 – Fences
TCD A–6 – Hardware
TCD A–10 – Contraband Control Systems
TCD A–12 – Control Posts and Dedicated Security Routes

2.2 National Master Specification Section

01 35 13.16 – Special Project Procedures for Detention Facilities
08 34 56 – Security Gates
32 31 13 – Chain Link Fences and Gates
32 31 13.53 – High-Security Chain Link Fences and Gates
34 1 13 – Vehicle Barriers

3. ACCESS CONTROL SECURITY REQUIREMENTS

3.1 Women's institutions shall have a co-located entrance point for pedestrian and vehicle traffic. Where impractical, a vehicle dedicated access shall be located in close proximity to the Principle entrance. The 24 hour Principle Entrance Control Post (PECP), supervises all traffic by eye or assisted by CCTV and controls all pedestrian and vehicle gates.

3.2 Because the Principle entrance may malfunction or be inoperable, one Emergency Vehicle Entrance shall be provided, to be located at a point convenient for vehicle access. This Emergency Vehicle Entrance shall be manually operated and be either a Sliding Gate (Section 5.1) or a Swing Gate (Section 5.2).

3.3 Vehicles shall access a fenced sally port with a gate at each end. The sally port is where in-coming and out-going vehicles will be inspected by a dispatched officer.

4. MAIN ENTRANCE

4.1 Definition

The Principle Entrance controls all traffic into and out of the institution. This involves the screening and recording of all movement and the control of all gates and doors through the secure perimeter. The PECP performs all entrance functions from an open reception station and is supported by a closed security office for the Shift Supervisor. Traffic in and out of the institution shall meet the following criteria:

4.1.1 A vehicle sally port, which gives access into a vehicle fenced compound accommodating multiple functions shall be equipped with sliding gates. The sliding gates shall be remote controlled from the PECP and be interlocked to prevent simultaneous unlocking. The sliding gates control must provide for the opening of one gate at a time and only when the other gate is in its latched position. Both gates shall be also capable of manual unlocking and opening.

4.1.2 A vehicle sally port shall be sized to include an inspection area to facilitate a thorough inspection of vehicles. It shall be capable of holding two van type trucks astride (8.5 m min.) and hold one semi trailer truck in length (23 m min). There shall be no sentry station in the sally port as an officer is called to perform inspections as required. As such, a pedestrian gate is also required for access from the interior side of the compound.

4.1.3 In order to prevent forced drive through of vehicles, the exterior gate of the vehicle sally port shall be equipped with a crash barrier (see section 4.4 and Plates WSP-3-6 to WSP-3-8). The width of the sally port shall be sized to accommodate the crash barrier in the open position.

4.1.4 The vehicle compound with buildings, situated on the edge of the perimeter, shall also be equipped with a vehicle and pedestrian gates for access into the main institution for servicing needs. The vehicle gate shall be sliding and of similar type to the sally port gates. The pedestrian gate shall be swing type. Both gates shall be remote controlled with the aid of CCTV from the PECP.

4.1.5 All Principal Entrance pedestrian traffic shall be physically separated from vehicular traffic.

4.1.6 All pedestrian traffic shall enter directly into an Principle entrance building reception area for processing / screening by the PECP. This building may accommodate other functions and be integrated with the Fenced perimeter. The initial point of access shall be through a vestibule with both doors remote controlled.

4.1.7 See Plate WSP-3-1 for a typical Principal Entrance layout.

4.2 Crash Barriers

4.2.1 A crash barrier for the sally port shall be connected to the interior side of the exterior gate or the rack and pinion rail depending on the gate operator type and shall be operated simultaneously with the remote operation of the gate**.**

4.2.2 In order to resist vehicle impact, crash barriers shall be made of a steel I-beam or rectangular tubing supported on anti friction rollers on heavy uprights. In a test equivalent to the US Department of State K4 certification[10] (6 804 kg @ 48.3 km/hr or 15,000 lbs @ 30 mph) the vehicle must be inoperable after hitting the crash bar; disabling the vehicle being the main purpose.

4.2.3 Three heavy engineered uprights support the crash barrier and as well serve as bollards protecting the adjacent fence and gate posts. In either open or closed gate position, the crash barrier is supported by 2 uprights.

4.2.4 If crash barriers are used for emergency gates on the perimeter, they shall be made of a simple beam or rectangular tubing with a counter weight mechanically lifted and lockable in closed position with the use of a security padlock.

4.2.5 Gates having integrated crash bar or crash cables system are acceptable if they meet M30 designation of *ASTM F2656-07*[11], K4 certification of the US Department of State (see footnote 1) or the European equivalent.

4.2.6 See Plates WSP-3-3 to WSP-3-5 for typical sally port crash barriers.

5. FENCE GATES

5.1 Vehicle Sliding Gates

5.1.1 The size of each gate shall provide for a 4 m wide x 2.4 m high clear opening.

5.1.2 Sliding gates which match the fixed fence shall be topped with 600 mm upright stands with three strands of barbed wire. The fixed fence along the travel of the gate shall be similarly topped. (See section SP-2, Fences).

5.1.3 Gate framing members shall be 73 mm O.D. pipe weighing 8.6 kg/m welded and drained.

5.1.4 Motorized gates shall be capable of moving at a speed of 150 mm/s.

5.1.5 Gate shall have three point locking (top, bottom and middle) or be locked by way of rack and pinion mechanism and a vertical channel to clasp the gate.

5.1.6 Locking column shall be equipped with an emergency manual control mechanism located for easy access.

5.1.7 Operator and track shall be protected and electrically heated to ensure all weather operation. In rack and pinion system (or “drive rail” operator) the teeth of the rack can be unprotected provided that they are on the lower side of the rack and visible to the operator.

5.1.8 Outer perimeter gates with connected crash beams shall be designed to take the additional weight into account.

5.1.9 For gates operated by an overhead chain drive system, a guide shall be provided at the bottom of the gate running in a channel.

5.1.10 Motors shall be located low to the ground to facilitate maintenance

5.1.11 All gate components shall be galvanized.

---

[10] US Department of State SD–STD–02.01, Revision A , March 2003, Test Method for Vehicle Crash Gate Testing of Perimeter Barriers and Gates

[11] ASTM F2656–07, Standard Test Method for Vehicle Crash Testing of Perimeter Barriers, M30 Designation: Medium-duty truck (M) 6800 kg @ 50 km/h

5.1.12 All security hardware shall be in accordance with chapter A-6, Hardware of the present document. All other components shall be in accordance with the Fences section of this criterion.

5.1.13 See Plates WSP-3-2 and WSP-3-3 for a typical gate installation.

5.2 Vehicle Swing Gates (Perimeter and Internal Fences)

5.2.1 Gates shall consist of a pair of 2 m wide by 2.4 m high sections, for an opening of 4 m wide X 2.4 m high, except where municipal by law or sufficient height and width for local emergency vehicles (fire trucks) dictate otherwise[12].

5.2.2 The swing direction of gates shall be based on road access design and snow removal constraints.

5.2.3 Any gap between the bottom rail of a gate and the ground shall not exceed 125 mm. Where gates are located on a fence equipped with a ground barrier, this barrier shall be continuous.

5.2.4 The chain link fabric for gates shall match that of the fence (see section SP-2, Fences).

5.2.5 Gate framing shall be as per item 5.1.3 above.

5.2.6 There shall be three gate hinges and they shall be of standard quality. Foot, mid height, and top locking shall be accomplished with Southern Folger detention grade locks or equivalent.

5.2.7 Plate SP-3-7 illustrates a typical design for vehicle swing gate.

5.3 Pedestrian Gates (Perimeter and Internal Fences)

5.3.1 The size of each swing gate shall provide for a 1.2 m wide x 2.1 m high clear opening.

5.3.2 Items 5.2.2, 5.2.3 and 5.2.4 noted above for vehicle swing gates shall apply.

5.3.3 Swing gate framing members shall be 43 mm O.D. pipe weighing 3.4 kg/m.

5.3.4 Swing gates shall be manually operated with security key locks when gates are used daily. Infrequently used gates shall be security padlocked.

---

12 For example, in Ontario the *Highway Traffic Act* Section 109 stipulate a maximum height of 4.15 m by a width of 2.6 m, which is similar to the 13’-6” (4.12 m) by 8 (2.43 m) in USA.

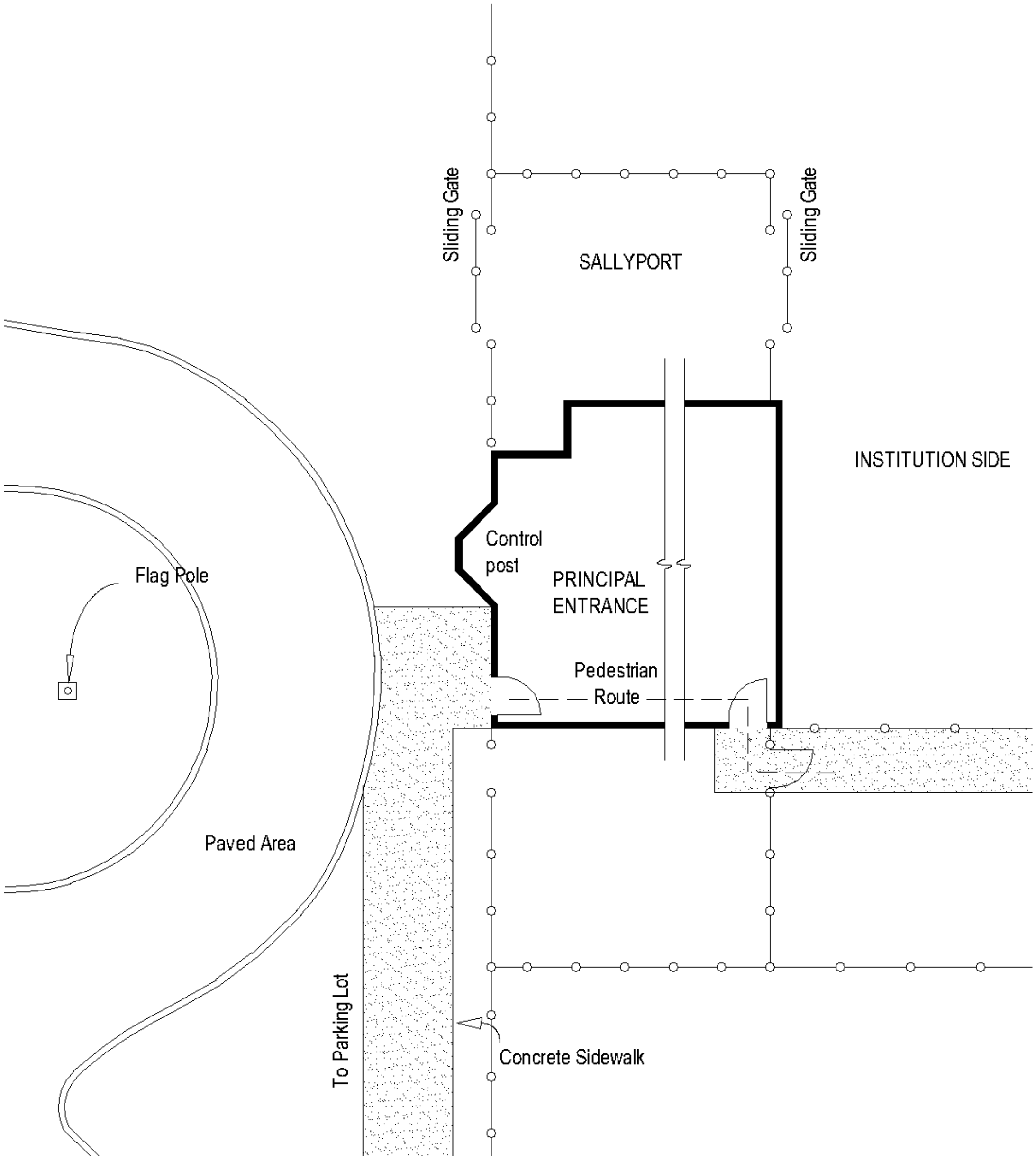
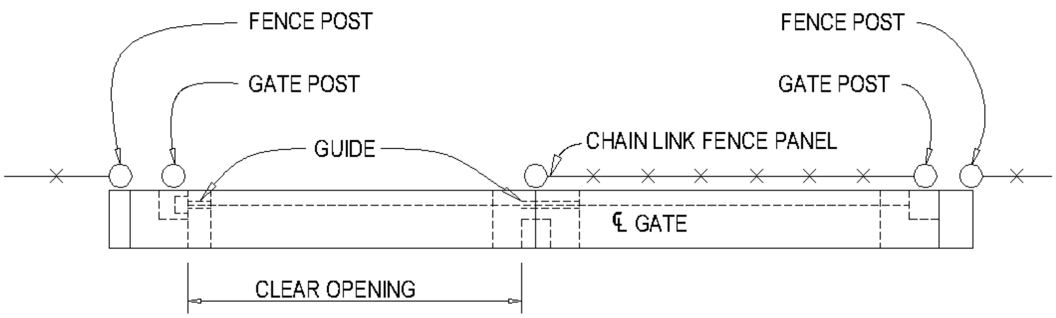
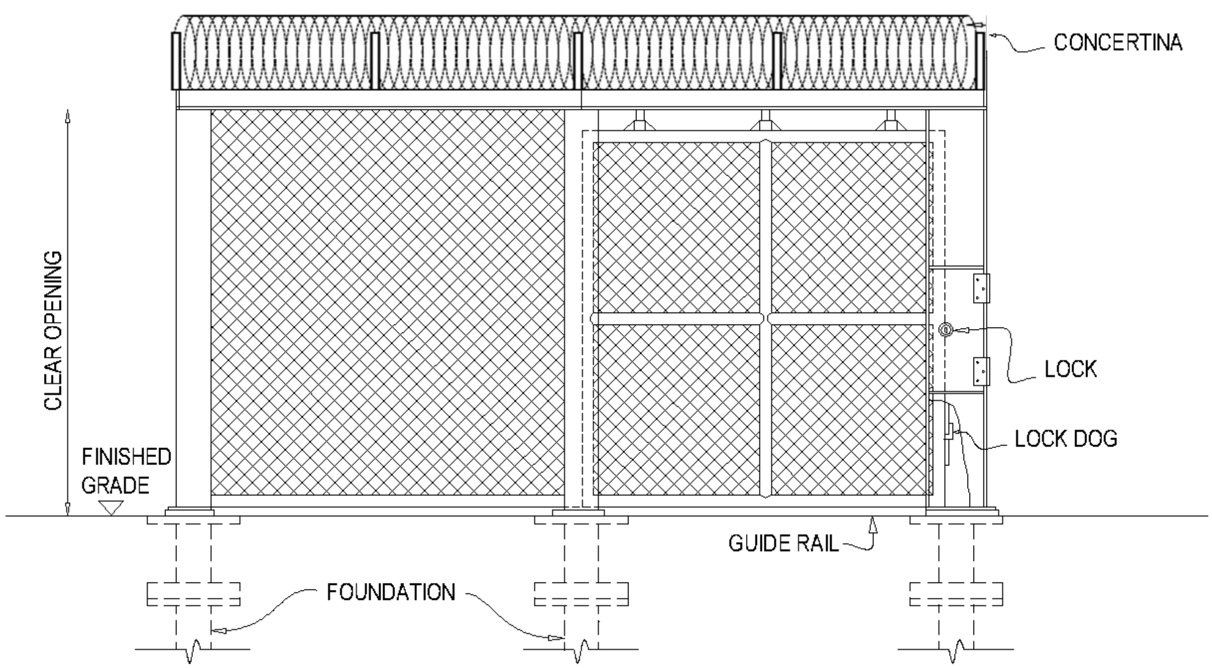


PLATE WSP–3–1 – TYPICAL SALLY PORT ARRANGEMENT

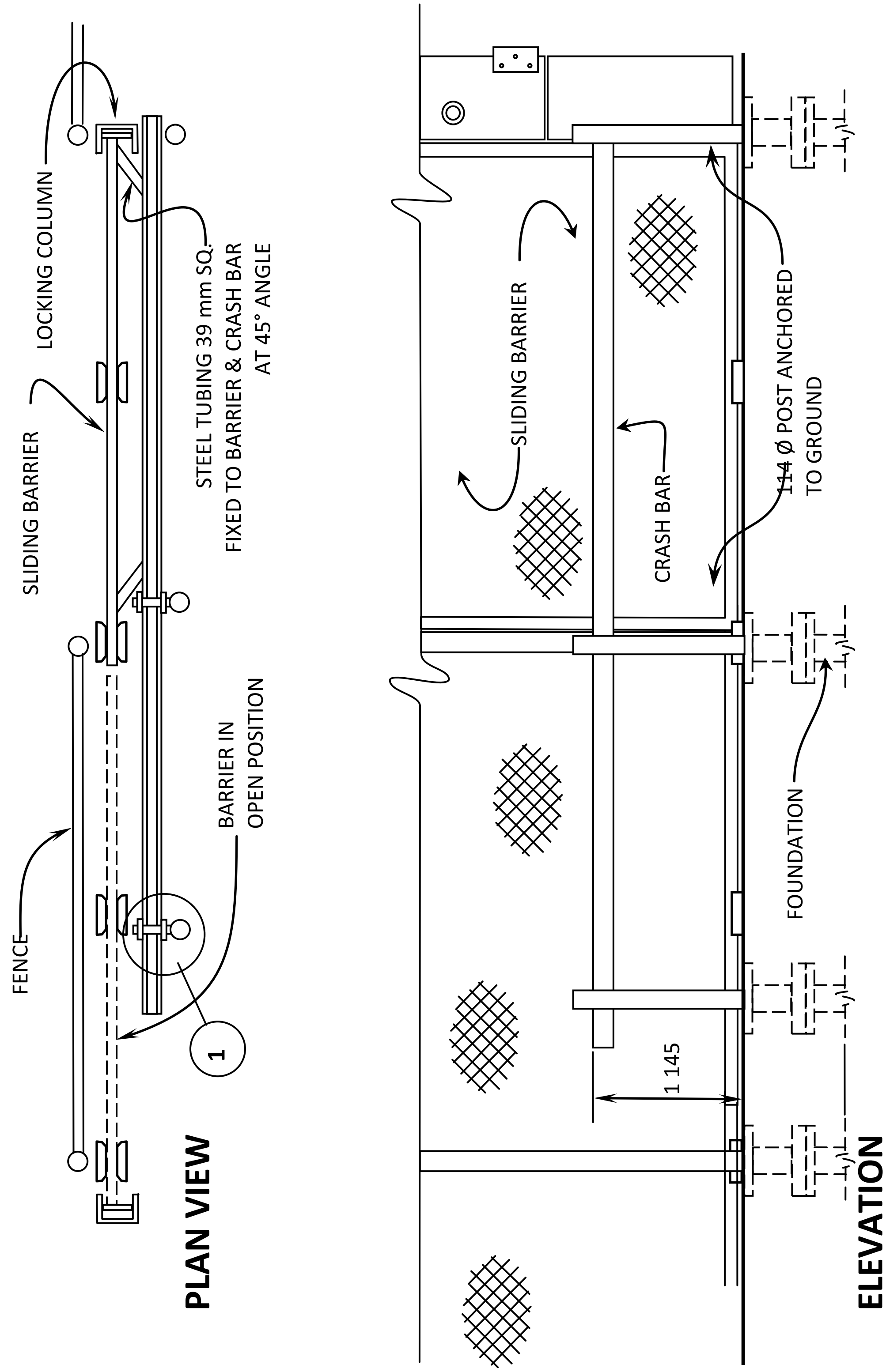


TOP VIEW



FRONT VIEW

PLATE WSP–3–2 – FENCE GATE WITH OVERHEAD CHAIN DRIVE PERIMETER FENCE



WSP–3–3 – FENCE GATE WITH OVERHEAD CHAIN DRIVE PERIMETER FENCE

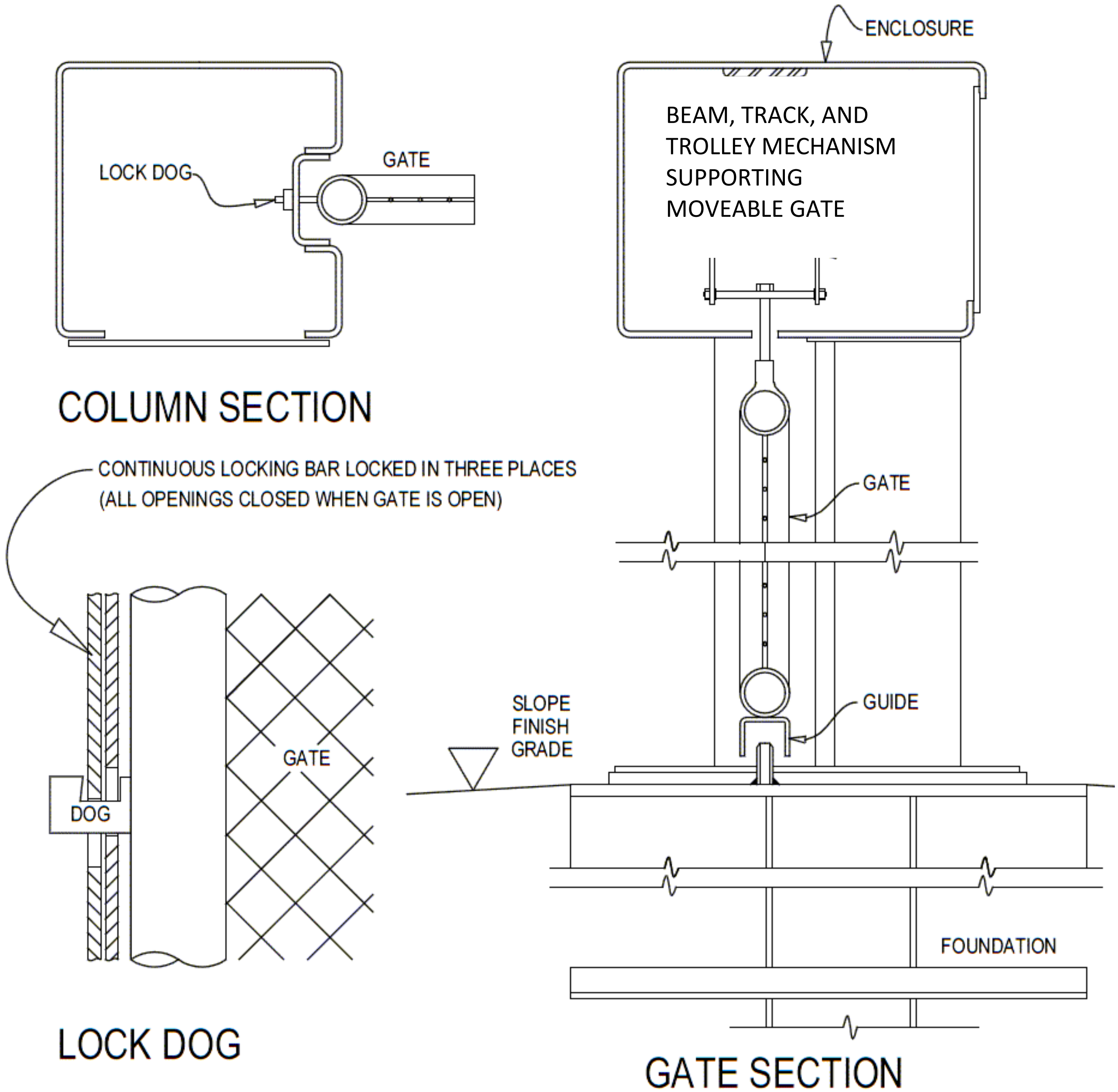


PLATE WSP–3–4 – FENCE GATE WITH OVERHEAD CHAIN DRIVE – DETAILS

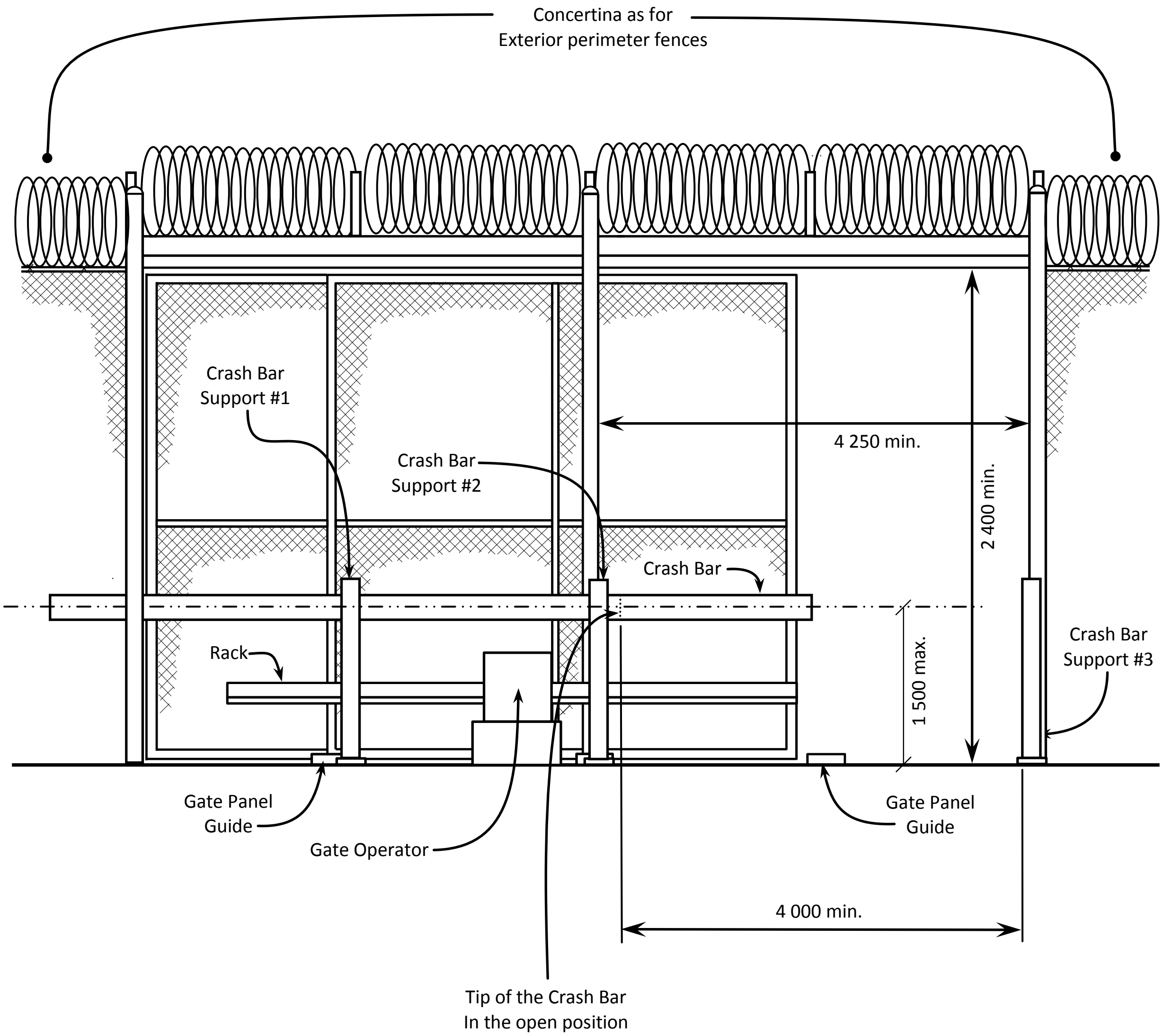
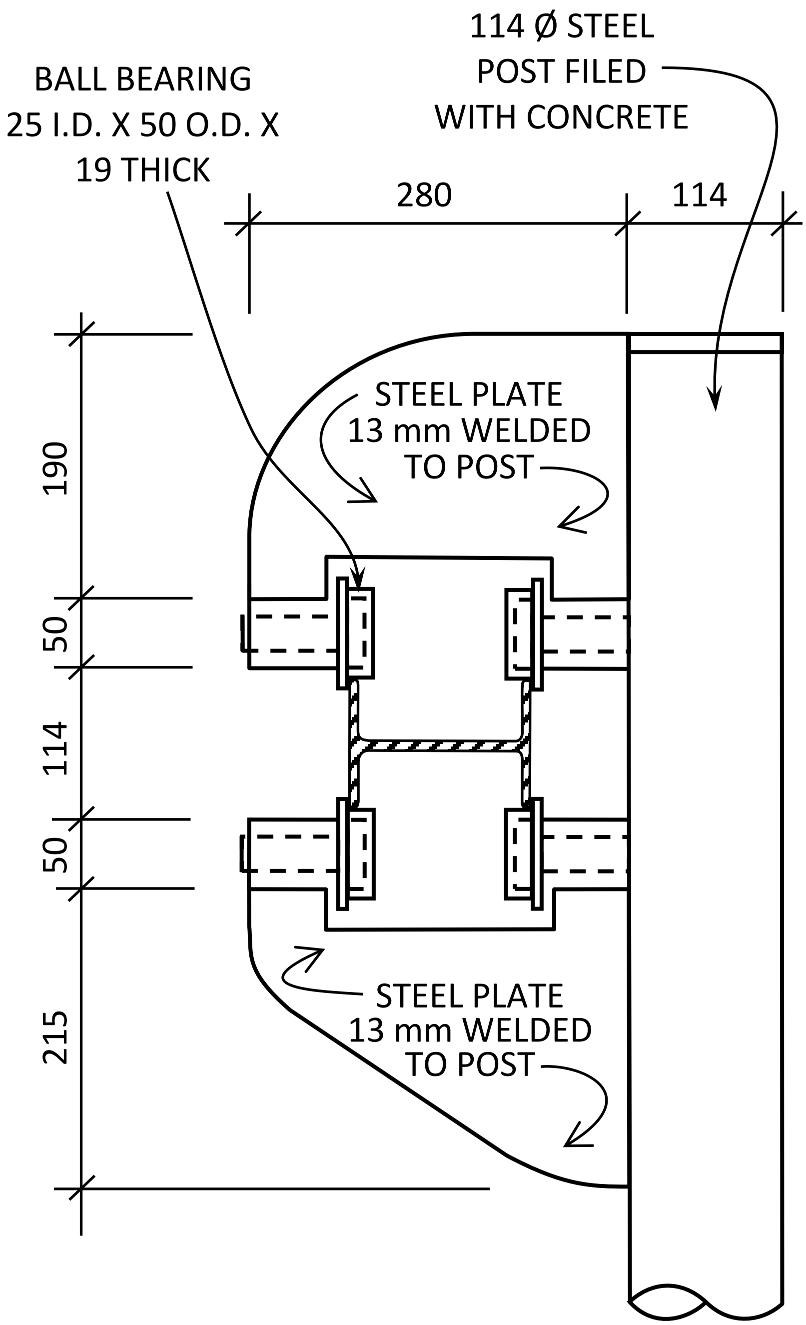
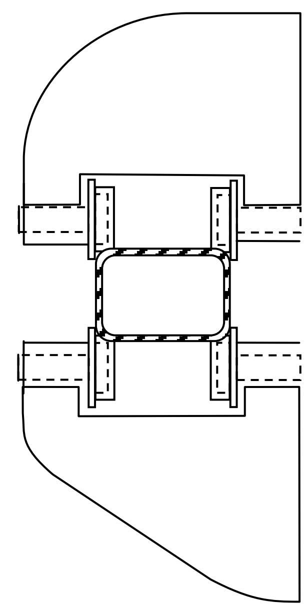


PLATE WSP–3–5 – FENCE GATE WITH RACK & PINION – INSIDE ELEVATION PERIMETER FENCE





RECTANGULAR STEEL TUBE ALTERNATIVE

PLATE SP–3–6 – CRASH BAR DETAILS

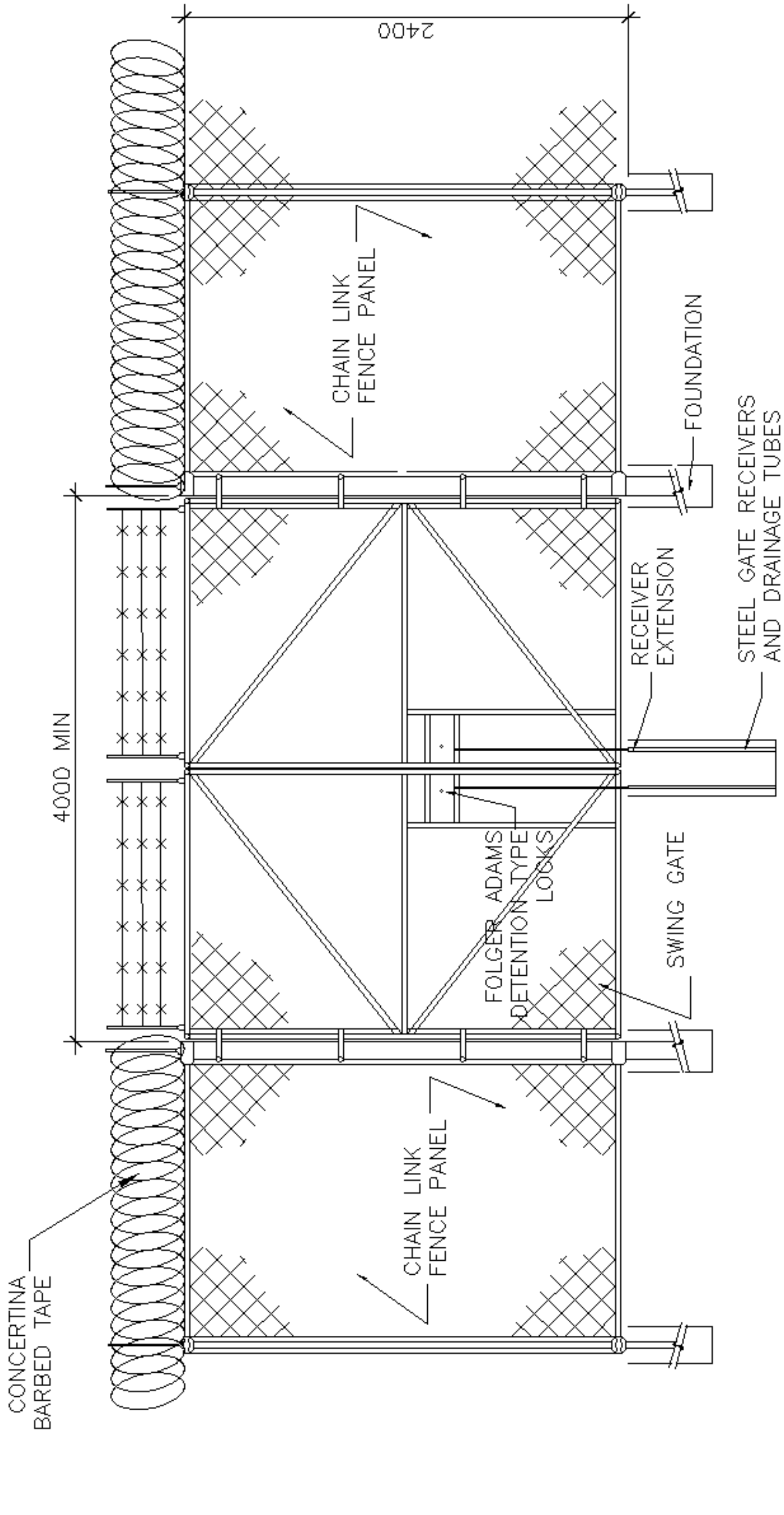


PLATE WSP–3–7 – VEHICLE SWING GATE (EMERGENCY GATE)

WSP-4 SITE – EXTERIOR LIGHTING

1. SCOPE

This section outlines the requirements for site lighting for Women's institutions including perimeter fence lighting and provides design guidelines for the following:

- Type of lighting systems and standards.
- Recommendations for lighting levels.
- Quality of illumination.
- Recommendations for control of glare.
- Recommendations for uniformity and brightness control of the environment.
- Recommendations for maintenance of the lighting system.

2. RELATED SECTIONS

WSP–2 – Fences
WSP–5 – Traffic Circulation
TCD E–1 – General Electrical Engineering and Electrical Distribution
TCD E–7 – Emergency Electrical

3. GENERAL REQUIREMENTS

3.1 Exterior lighting is provided for safety and security within institutional grounds; to assist in the visual detection of escape attempts, and to permit the use of outdoor amenities after daylight.

3.2 Exterior lighting shall be situated to minimize light entering sleeping areas.

3.3 Exterior lighting systems shall be designed to caste a practicably uniform level of lighting, free of shadows or dark spots and with minimal glare.

3.4 Energy saving features and systems shall be used in accordance with government policy.

3.5 Levels of illumination herein presented refer to average and avg./min. ratio values for either horizontal, ground level, or vertical illumination, unless otherwise stated. Local conditions may make it necessary to adjust values.

3.6 Lighting is provided to assist CCTV monitoring.

3.7 Systems shall be designed to withstand a wind velocity of 160 km/h and ice loading characteristic of the area in which the institution is located.

3.8 All security lighting systems shall be equipped with automatic control and manual override. The manual override shall reset itself to the automatic mode after it has been left in the manual mode for 24 hours. Recreation area lighting controls shall be manual only.

4. APPLICATIONS

4.1 Exterior lighting is designed to provide illumination of the following:

- Signage
- Entranceways and exits, including exterior stairways and ramps
- Pedestrian walks
- Institutional Grounds
- Parking lots and roadways
- Outdoor amenity areas
- Secure perimeter

5. PERFORMANCE REQUIREMENTS

5.1 Security Lighting

5.1.1 Lighting requiring Emergency Power Source

5.1.1.1 Perimeter Fence Lighting System - Special requirements for the perimeter system are covered in item 5.2.

5.1.1.2 Institutional Compound – the entire area within the perimeter fence illuminated to 10 ℓx average to allow silhouetting surveillance.

5.1.2 Illumination

5.1.1.3 Entrances and Sally ports shall be illuminated to allow recognition of persons entering the institution after daylight hours. Fixture placement shall achieve optimal visibility. The Entrance and Sally ports shall generally have an illumination level matching that of the perimeter fence.

5.1.1.4 Glare Control - Lighting system shall be engineered to ensure that spill light will not produce a glare problem without affecting the minimum illumination levels.

5.1.1.5 Uniformity – The placement of the luminaires should be arranged so as to ensure good uniformity of illumination over the area illuminated. Uniformity is expressed as the ratio of average illumination to minimum. In the area between perimeter fences the ratio should not exceed 3:1.

5.1.1.6 Luminaires – perimeter security lighting fixtures shall be based on the following requirements:

a) Shatterproof lenses and vandal resistant housings
b) Non yellowing lenses
c) Pole, luminaires and brackets capable of withstanding the force of 160 km/h wind
d) Lighting fixtures location to facilitate replacement of components.

5.1.1.7 Electrical System – The electrical system must meet the following minimum requirements.

a) The security lighting system including the perimeter fence lighting shall be connected to the standby power system for continuity of service.

b) Grounding methods shall meet the requirements of the Canadian Electrical Code, *CSA C22.1-09*[13].

c) Protect each phase with dedicated single phase circuit breaker. This will prevent the possibility of a fault on one phase affecting the other two.

5.1.1.8 Codes and Standards – Installation shall comply with the latest edition of the Canadian Electrical Code, Part 1, *CSA C22.1-09* (see footnote 2) and any applicable local or provincial regulation. Requirements outlined herein however, shall take precedence.

5.2 Perimeter Fence Lighting

5.2.1 General

5.2.1.1 Security Lighting for the Perimeter fence shall:

a) Discourage or deter escape attempts.
b) Make detection certain should an escape be attempted at scaling the perimeter fence.
c) Avoid glare that can impact good visibility while not adversely affecting surrounding area.
d) Ensure high system reliability.
e) Meet levels of illumination indicated in Plates SP-4-2 and SP-4-6.
f) Have automatic control.
g) Consist of poles, lighting equipment and components located inside the perimeter fence and be made vandal or sabotage proof.
h) Be connected to the standby power system for continuity of service.
i) Provide a monochromatic light source.
j) Provide minimum illumination level of 10 ℓx at the fence line.

5.2.2 Design

Perimeter Fence Lighting System shall be designed to achieve and maintain lighting quality based on the following factors and considerations:

5.2.2.1 Where a Women's institution is located in an area with little light from off property, the lighting system shall independently enable clear viewing within the illuminated area of the fence line.

5.2.2.2 Where an institution is located in close proximity to the community and more specifically housing, the lighting system shall reduce the impact of light spill beyond the institutional reserve.

5.2.2.3 A maintenance factor shall be applied in the design calculation to make allowance for luminaire dirt and any depreciation. Also consider weather conditions which will adversely affect visibility.

5.2.3 Luminaires

5.2.3.1 Luminaire type – The current choice for lighting is Light Emitting Diode (LED) or Induction lighting. These will normally be fully operable between -40°C (or less) and + 50°C (or more) and emit a white and bright light quality which enhances vision. LED systems can also be integrated with PIDS to allow the lighting to run at two illumination settings: low and high. Lighting could normally run at the low setting but

---

[13] CSA C22.1-09 -- Canadian electrical code, part I (21st edition), safety standard for electrical installations.

should the perimeter fence be disturbed as detected by the FDS, the lighting for that zone only could increase to the high setting. This will signal to the escapee that his attempt has been detected and as well highlight the disturbed zone to the any officer on ground. The lighting therefore operates at 50% power increasing to 100% for the disturbed zone reducing the power output even beyond its already highly efficient performance. See Plate SP-4-6 for LED layout.

5.2.3.2 LED lamps are specified by manufacturers and must be selected based on engineer's recommendation for CSC application.

5.2.4 Poles are specified as follows:

5.2.4.1 Octagonal tapered of steel complete with transformer bases, eye bolts and gasketed electrical outlet boxes.

5.2.4.2 Hot dipped galvanized on interior and exterior surfaces as per *ASTM A123–09 and* hot dipped galvanized anchor bolts and hardware accessories where possible.

5.2.4.3 Height and luminaire spacing to match type of lighting system as shown on Plates SP-4-3 & SP-4-6.

5.2.4.4 Hardwood plywood template for retaining anchor bolts when grouting them in place in the concrete base.

5.2.4.5 With non-shrink grout.

5.2.4.6 Transformer base plates drilled in the manufacturer's plant to match the anchor bolt configuration set in the bases.

5.2.4.7 Access doors in the transformer bases are c/w gasket and use tamperproof hardware for securing doors in place.

5.2.4.8 Transformer base oriented so that their access doors are parallel to but facing away from the fence.

5.2.4.9 For grounding requirement specify:

a) 10 mm threaded copper grounding stud welded to the inside of each transformer base at the back and above the bottom of the door opening. Ground studs are supplied complete with two nuts, one lock washer and one copper clamp type lug for minimum 13 mm^2 stranded bare copper wire.
b) Ground studs welded to the transformer bases in such a manner as to present a smooth surface on the exterior of the bases.

5.2.4.10 Aluminium nameplate located one foot above its base to include the manufacturer's name or identification mark, year of manufacture, pole length and ordering reference number.

5.2.4.11 Shims for levelling consisting of one 1.5 mm and two "U" shaped 3 mm.

5.2.5 Pole Mounted Luminaires and Lamps

5.2.5.1 Distance between luminaires shall be based on Light diffusion modelling using approved lighting, their manufacturers and fixtures. Plate SP-4-6 illustrates existing installation characteristics for pole mounted luminaires.

5.2.6 Controls

Perimeter fence lighting shall be controlled by a photo cell and meet the following requirements:

5.2.7.1 A photo control unit shall automatically turn on the security fence lighting system.

5.2.7.2 The weatherproof unit capable of operating over a range of -60°C to +55°C shall be mounted on a fence lighting pole located closest to the Main entrance.

5.2.7.3 The control shall energize the lamps on a preset (adjustable) value.

5.2.7.4 A manual control override turns the lights on and off as required.

5.2.7.5 The system shall operate on stand-by power and “be fail-secure”.

5.2.7.6 Controls shall be connected in parallel with the “ON” contacts of the “ON OFF” selector switch located as specified.

5.2.7.7 The photo control shall have a standard NEMA twist lock plug.

5.2.7.8 The photocell shall be temperature stabilized pre-aged and hermetically sealed.

5.2.7.9 The Installation Contractor shall adjust the photo control unit to switch on at not less than 40 ℓx. The unit shall be rated 1000 W incandescent, 120 volts, 60 HZ and CSA approved.

5.3 Other Exterior Lighting

5.3.1 Luminaire type

Lighting type shall be selected based on energy efficiency, economy and accepted practices for Recreation Areas, Parking Lots, Signage, Roads and sidewalks, Building entranceways and exits, and Institutional grounds. Luminaires must be fully operable between -40°C (or less) and + 50°C (or more).

5.3.2 Recreation Areas and Yards

5.3.2.1 The recreation area illumination system shall be installed on a project specific basis so as to form an integral system as part of the exterior lighting system. Illumination levels for dedicated yards connected to living areas -70 lx.

5.3.3 Parking Lots, Institutional Grounds. Roads and sidewalks

5.3.3.1 Average Illumination Levels – 10 lx.

5.3.3.2 Illumination Uniformity – Maintain a maximum ratio of average lux to minimum lux of 3:1.

5.3.3.3 Illumination Quality – To minimize shadows especially between parked cars illuminate each point from at least two luminaire locations.

5.3.4 Signage, Building entranceways and exits

5.3.4.1 Direct lighting with similar luminaires to that for sidewalks and roads will serve to illuminate the target door or sign to a higher level.

5.3.5 Controls

5.3.5.1 The recreation area lighting controls shall be manually switched on and off as required from a specified location.

5.3.5.2 All other exterior lighting shall be controlled by photocell or astronomical dial time clock with manual bypass from a specified location. Lighting controls shall be separated for each use.

5.3.6 Poles

5.3.6.1 Specify that all poles used as light standards shall be fabricated from steel conforming to *CSA Standard G40.21-04 (R2009)*[14] Type T, grade 60T, Low silicon, 60,000 psi yield strength. Do not use concrete poles.

5.3.6.2 Avoid having steps on poles.

5.3.6.3 Minimum height of post for pedestrian walks 3.05 m, for parking lots 6.1 m.

5.3.6.4 The lighting system should incorporate a method by which luminaires on poles may be easily and economically maintained.

5.3.6.5 High Standards (30 m poles) are shall not be used for Women's institutions. Maximum height shall not exceed 13 m.

[14] CSA G40.20-04/G40.21-04 (R2009) – General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

WSP-5 SITE – TRAFFIC CIRCULATION AND PARKING

1. SCOPE

This section outlines requirements for vehicle and pedestrian circulation and for vehicle parking inside and outside Women's institutions.

2. RELATED SECTIONS

WSP–1 – Site Development

WSP–2 – Security Fences

WSP–3 – Gates/Sally Port

WSP–4 – Lighting

3. CIRCULATION SECURITY REQUIREMENTS

3.1 Outside the Institutional Perimeter

3.1.1 For ease of control, there shall be only one roadway providing access to the institution from a public thoroughfare.

3.1.2 All parking, including that of staff, visitor and CSC owned vehicles, shall be located on the exterior of the institution and in proximity to the Principle Entrance.

3.1.3 Pedestrian walks shall only be provided from the parking area to the Principle Entrance.

3.2 Inside the Institutional Perimeter

3.2.1 A pedestrian outdoor circulation network shall connect all buildings. Enclosed circulation networks shall not be provided except where buildings are connected.

3.2.2 Fire vehicle access shall be in accordance with applicable authorities. Two different access routes, one via the Principle Entrance, one via the Emergency Vehicle Entrance shall be provided with clear signage (see SP-3:3.2).

3.2.3 Vehicle roadways are required for service functions and shops. Vehicle movement shall be separated from offender circulation and located away from outdoor offender activity areas.

3.2.4 Vehicle loading and unloading zones shall be centralized where possible, or located in proximity to one another to facilitate their control. Loading zones shall be located away from inmate movement and exterior activity areas, and shall be close to the Principle Entrance.

4. DESIGN REQUIREMENTS

4.1 Roadways

4.1.1 The access road shall be integrated into the public road system; it shall not provide hazardous crossings nor cause undue congestion during peak hour movements.

4.1.2 All roads shall be asphalt paved unless local conditions dictate otherwise.

4.1.3 The minimum widths of paved surfaces shall be as follows:

- One way single lane: 3.5 m
- Infrequently used access ways: 4.8 m
- Two way double lane: 7.0 m

4.1.4 Roadway curbs shall not be used.

4.1.5 Drainage, turning radii, prepared shoulders and intersections shall conform to local municipal standards.

4.1.6 Pedestrians and vehicles shall share the same traffic surfaces except as provided for above.

4.1.7 Roadways shall be illuminated as per section WSP-4 Exterior Lighting.

4.2 Perimeter Walkway

4.2.1 A paved walkway for fence inspections shall be provided along the interior side of the perimeter fence. The Walkway shall be 900 mm wide and engineered for local conditions.

4.2.2 Illumination of the walkway shall be satisfied by perimeter fence lighting as per Section WSP-4 Exterior Lighting.

4.3 Pedestrian Walkways

4.3.1 Walkways shall be of monolithic material such as asphalt, concrete, or compacted stone dust. Small or thin pavers which can be lifted or broken shall not be used.

4.3.2 Walkway design shall allow for movement of handicapped persons and snow removal equipment s well as projected traffic volume.

4.4 Parking (Other than for CSC Vehicles)

4.4.1 Offender visitor parking and staff parking shall be separately demarcated. Offender visitor parking stalls shall be provided at a ratio of 50% of the maximum number of offenders allowed in the visits area at one time (visit capacity); such visit capacity shall be identified on a project specific basis. For optimal time of use distribution, the visitor parking lot shall also accommodate official visitor cars.

4.4.2 The number of staff parking stalls shall be provided at the rate of 1.2 multiplied by the peak weekday shift. Staff complement shall be identified on a project specific basis.

4.4.3 Barrier-free parking shall be located close to the gatehouse and be combined for use by staff and visitors. The number of stalls shall be based on established need ranging from a minimum of 2 to a maximum of 4.

4.4.4 Parking areas shall be asphalt paved unless local conditions dictate otherwise.

4.4.5 Curbs shall not be used, although pre-cast wheel stops are permitted.

4.4.6 Landscape islands and trees are permitted but dense planting shall be avoided.

4.4.7 Parking stall dimensions (including barrier-free) and drainage provisions shall conform to governing standards.

4.4.8 Parking areas shall be illuminated as per section WSP-4 Exterior Lighting.

4.5 Parking for CSC Vehicles

4.5.1 A CSC vehicle parking compound shall be provided, located on the outside of the perimeter fence; size shall be defined on a project specific basis.

4.5.2 The parking compound shall be located in proximity to the Main entrance.

4.5.3 Fuel shall not be stored on site except for light vehicles and for the emergency generator. Fuel shall be stored in registered tanks in accordance with the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations[2].

4.5.4 The parking compound shall be illuminated as per section WSP-4 Exterior Lighting.

4.6 Electrical Outlets for Engine Blocks

Where an institution is located in an isolated area in climate zones having sustained low temperatures of -20°C or less, electrical outlets for engine blocks shall be provided based on the following:

4.6.1 CSC Vehicles

The intent being that institutions have ready to run CSC vehicles for everyday operations including escort or transfer of inmates. Consequently, electrical outlets for block heaters are mandatory.

4.6.2 Staff Vehicles
The provision of outlets must be consistent with local practices. For this, a survey of other Government buildings and local area business and plants will determine the need to provide electrical outlets for block heaters.

4.6.3 Other Vehicles
Electrical outlets for block heater shall not be provided for visitor parking or for other short term parked vehicles.

4.6.4 Parking Electrical Outlets General Requirements

Where provided, electrical outlets may be controlled by timer or by a programmable controller.

WSP-6 SITE – TEMPORARY CONSTRUCTION FENCES

1. SCOPE AND DEFINITIONS

This section provides performance criteria and relevant specifications for all temporary construction fences for Women's institutions.

Several options for temporary fences are available. Their selection must weigh the following factors: location of construction, the risk of breach, and the duration of construction. Type of fence and conditions of use:

Type 1 Fence for open facilities without fenced perimeter provides a physical barrier to prevent unauthorized persons access to the site for reasons of safety and to protect the contractor's assets. This fence is no different from that used in the community.

Type 2 Fence in restricted or controlled offender areas such as where routine vehicle movement takes place within the service compound and therefore where breach concerns should not be elevated. This fence serves to prevent unauthorized access for similar reasons as above and as such the fence type is also as above. Construction truck traffic is via the Principle entrance vehicle sally port where it is inspected for contraband. Type 2 Fence shall also be used where construction duration is short term as for a repair or replacement of existing systems or where the work site shifts by phase from building to building. The institution in this case will schedule offender movement and activities so as to mitigate risk of breach. Truck traffic to the site will be escorted from the Principle entrance.

Type 3 Fence used in offender movement and activity areas within the main perimeter and where breach is possible. Construction truck traffic is via the main entrance vehicle sally port where it is inspected for contraband. Trucks are escorted to the construction site. This fence is used for long term projects which have a substantial scope and cost. Fences here must assure appropriate security based on assessed risk. . Type 2 fence may be used here complemented by being topped with BTC to assure adequate security against scaling.

Type 4 Fence used for long term projects in proximity to the perimeter fence. This fence forms a secure compound which is integrated with the perimeter fence. Type 3 fence is used except that it is fitted with a Fence detection system and covered by camera and lighting integrated with the PIDS. A dedicated access will be constructed on the perimeter fence line for construction truck traffic to be controlled by contracted commissionaires.

2. RELATED SECTIONS

2.1 Technical Criteria Document sections:

WSP-1 - Site Development
WSP-2 - Fences
WSP-3 - Gates/Sally Ports
WSP-4 - Exterior Lighting
WSP-5 - Traffic Circulation and Parking

2.2 Other CSC document

Statement of Technical Requirements – Temporary Construction Fences at Medium and Maximum Security Institutions, Correctional Service Canada, Technical Services Branch – Electronic Systems, Issue 5, April 8, 2011.

2.3 National Master Specification section:

01 35 13 – Security Requirements (prior to 2004: 01003 – Security Requirements)
01 56 26 – Temporary Fencing
01 56 36 – Temporary Security Enclosures

3. PERFORMANCE CRITERIA

3.1 Type 1 Fence

This fence type shall be a self supporting welded mesh sectional fence typically available by rental ('Modu-loc' or similar). The height of the fence shall be no less than 1800 mm high but may be higher depending on local availability. The fence must be stable and self supporting. Welded wire mesh is considered to be non-climbable due to its mesh size which inhibits the insertion of a foot to aid climbing. The top of the fence also has its vertical wire projecting over the top rail to discourage breach. Matching vehicle gates are padlocked after work hours. The temporary construction fence shall be removed from the institution by the contractor after construction is completed.

3.2 Type 2 Fence

This fence type shall be similar to the above but with a height of 2.4 m. This fence must not come in contact with the perimeter fence nor be closer than 5 m to the perimeter fence so as not to interfere with PIDS camera viewing on the interior side of the institution. The temporary construction fence shall be removed from the institution by the contractor after construction is completed.

3.3 Type 3 Fence

This fence shall be similar to the Type 2 fence except that it shall be topped with BTC, with a base securely pinned in the ground from each side and with the ground compacted to prevent tunneling. Matching swing type vehicle gates shall be padlocked after hours. As for type 2 fence, this fence must not come in contact with the perimeter fence nor be closer than 5 m. Truck access to this compound shall be via the Main entrance with all vehicles escorted. The temporary construction fence shall be dismantled and removed by the contractor after construction is completed.

3.4 Type 4 Fence

This type of fence forms part of the perimeter. It shall be a Type 3 fence with BTC and equipped with a fence detection sensor connected to the MCCP. Cameras are also required to monitor the fence line connected to the MCCP as well as lighting to enhance viewing. Access is through a single gate similar to the emergency gate and is secured with padlocks and keys under the control of a Commissionaire. A commissionaire's temporary hut is required within the construction site. The fence and systems must be dismantled and removed by the contractor.

4 RELEVANT SPECIFICATIONS

4.1 Type 1 Fence

Rental construction protection fence comes with welded wire mesh and components conforming to ASTM F2919 Welded Mesh Fence specification. Mesh is galvanized steel no larger than 50X150mm (vertically long rectangle) with vertical wire projecting and exposed at top. Fence must be at least 1800mm high and secured with pins inserted in the ground through the 'T' base support. Sections of fence must be securely clamped together to ensure that the each fence run acts as a continuous barrier which will resist lateral forces and separation. Sloped runs must be protected by mesh panels to ensure continuity of barrier from ground up.

4.2 Type 2, 3, and 4 Fence

This fence is similar to Type 1 above but shall be 2400mm high. Ground along the fence run shall be surfaced with compacted gravel. ‘Barbed tape concertina’ (BTC) where required shall be as per SP-2-4.2 except that it could be directly attached with galvanized twist ties or clips to the top rail or wire resting against the mesh on the threat side. Use of steel arms fastened to the posts may also be considered for the support of 2 barbed wires and BTC.

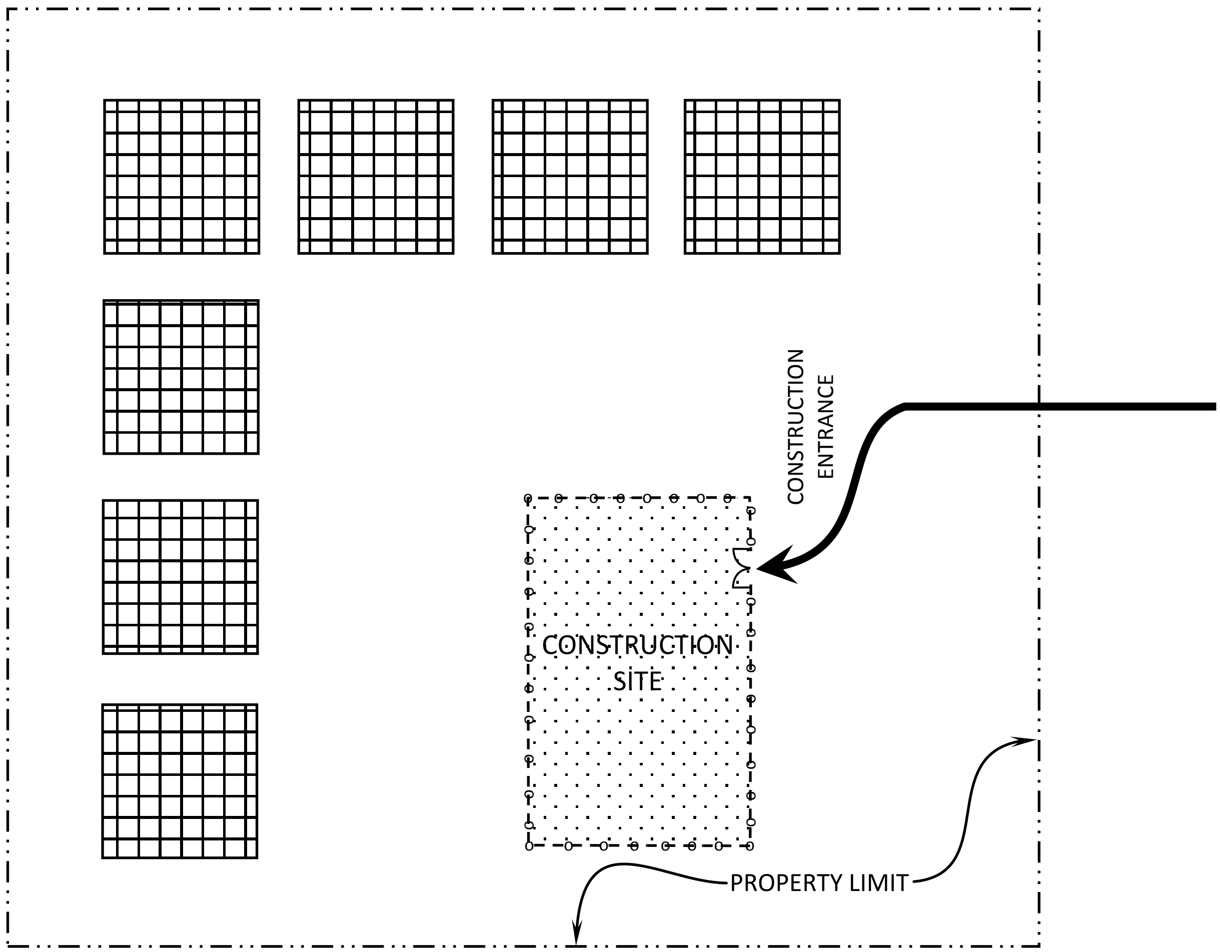


PLATE WSP–6–1 – TYPE 1 FENCE

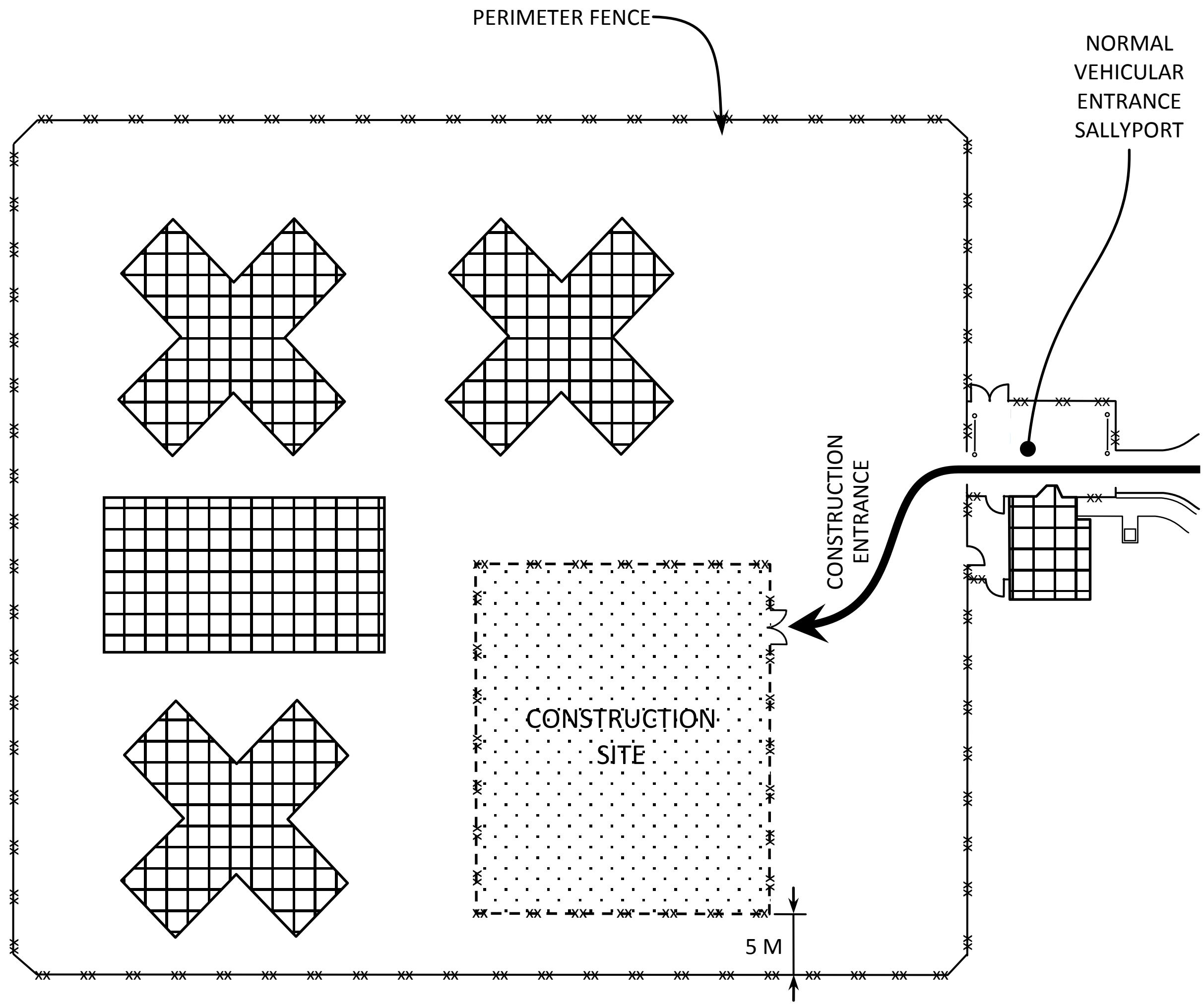
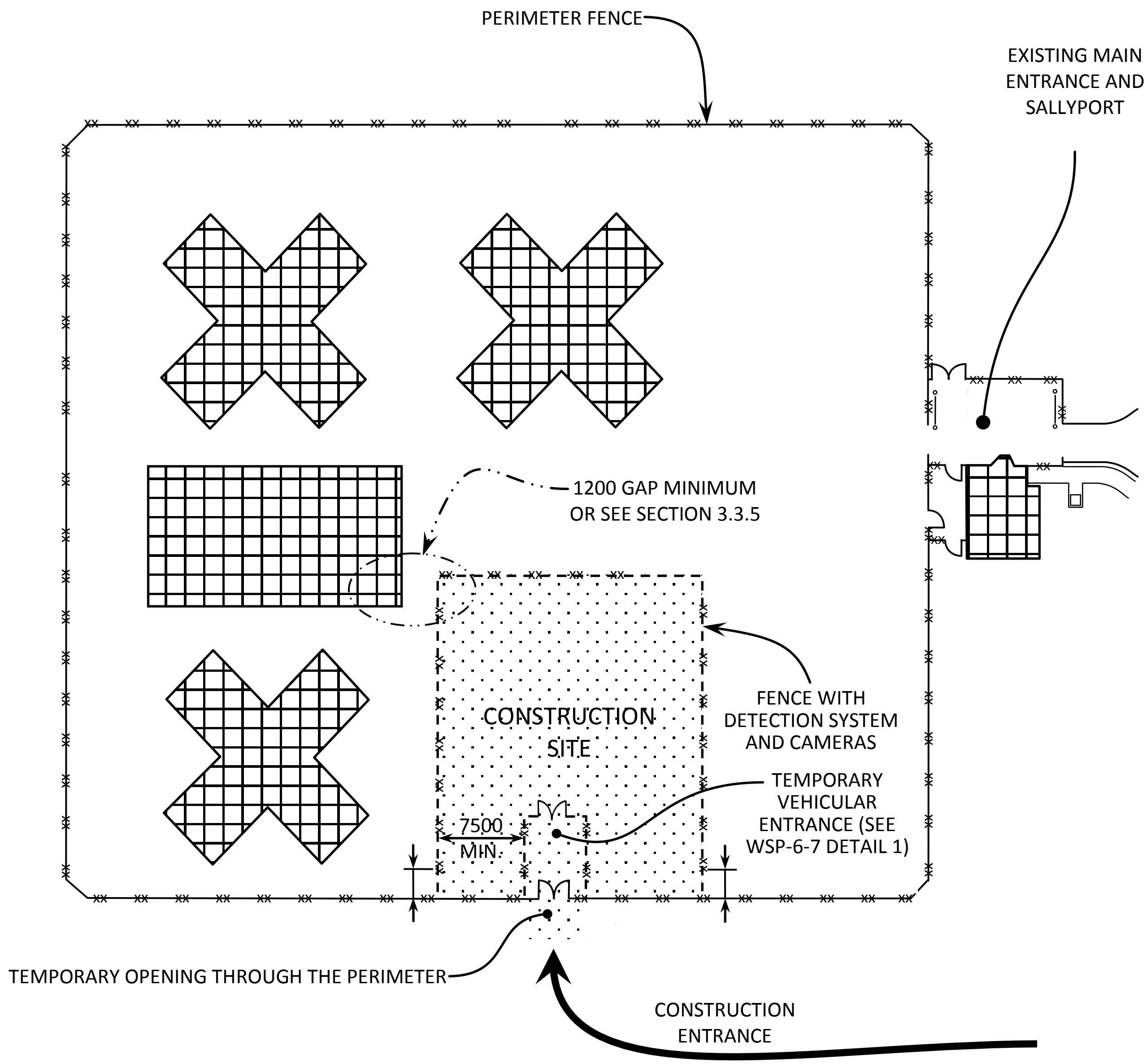
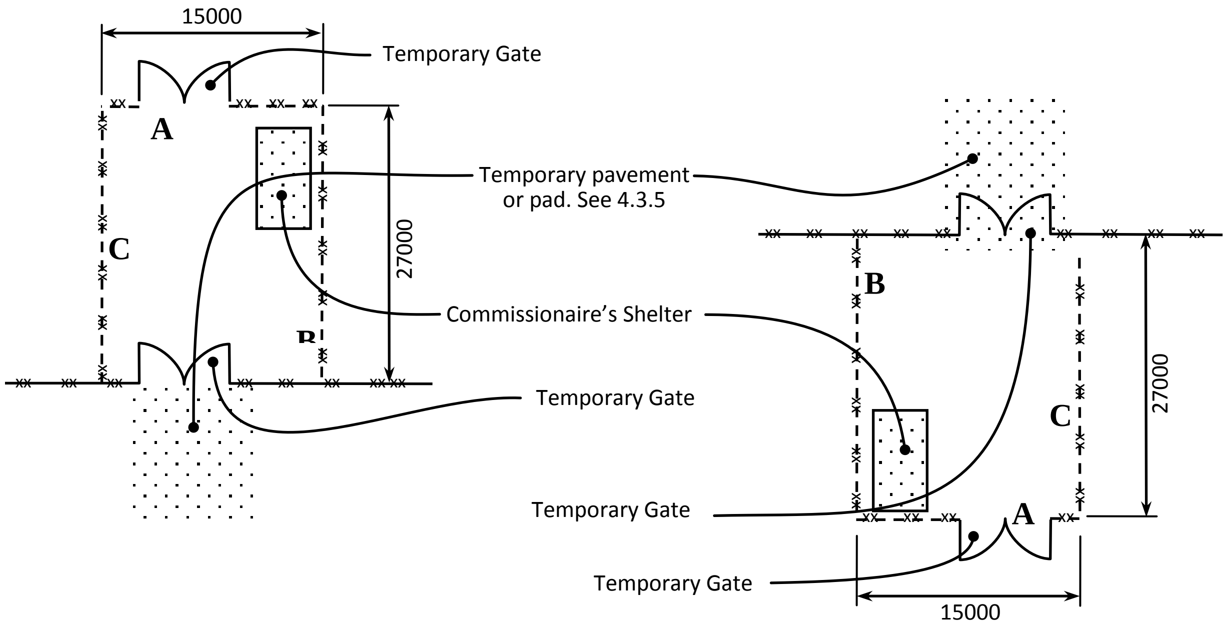


PLATE WSP–6–2 – TYPE 2 AND 3 FENCE

PLATE WSP–6–3 – TYPE 4 FENCE

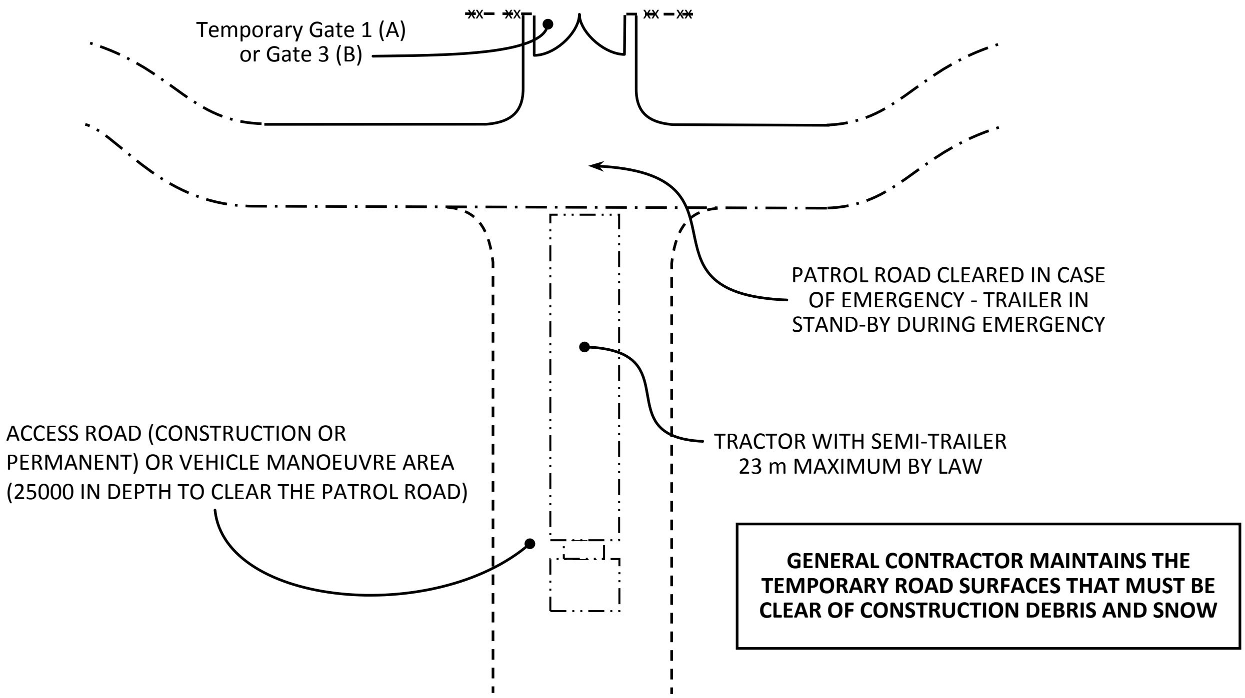




A – INSIDE THE INSTITUTION

B – OUTSIDE THE INSTITUTION

WSP–6–4 – TYPE 4 FENCE –
ENTRANCE OPTIONS



WSP–6–5 – TYPE 4 FENCES –
VEHICLE ACCESS DETAIL