ADDENDUM #6

Date: June 22, 2020

PACIFIC REGION
PORT HARDY LOGISTICS DEPOT
PORT HARDY, B.C.
Project No: 8H500

The following revisions supersede the information contained in the original drawings and specification issued for the above named project, and shall become part thereof. No consideration will be allowed for extras due to the contractor or any subcontractor not being familiar with this Addendum.

1.0 QUESTIONS

Q.1	In addendum 5, released on 2020-06-10, Question 45/Answer 45 addressed the use of a silt curtain. Can you please expand on the dimensions of silt curtain necessary, specifically the minimum length (depth) needed. There was no CEMP in the attached documents, which typically outlines silt curtain parameters.
A.1	Silt curtains should extend to approximately 0.5m from the seafloor.
Q.2	The interior painting spec. section 2.5.6.1 specifies “no finish to exposed wood columns”. Structural drawings show 2 main columns types being P3 - D. Fir (same as typical ceiling beam) and “Log” columns. Can you please confirm which columns, if any, are to receive the INT 6.1 D varnish that will applied to the glulam D. Fir beams?
A.2	No heavy timber columns or beams shall be painted or varnished.
Q.3	Drawing A-22 finish schedule shows WC-1 wall covering on the south wall at classroom 201. However, the interior elevations do not show it, is this wallcovering to be installed by the painting contractor on the south wall or is it meant to be factory finished on the operable partition wall(classroom 201 west wall)?
A.3	The finish schedule is in error. Room 201 wall South finish should be “GWB/PT1” and Room 201 wall West finish should be “WC-1”. Room 202 wall East finish should be “WC-1”. WC-1 is the finish on the movable partition wall and will be supplied as part of the wall.
Q.4	Can you please confirm that the areas with “open ceilings” note in the finish schedule are not painted.
A.4	The walls in rooms 116 and 123 shall receive a protective clear coat (to be submitted by contractor for approval by Departmental Representative prior to application) over the exposed plywood sheathing. GWB surfaces shall receive PT1.
Q.5	Can you please confirm the finishes for the boat maintenance and rack storage rooms? Will the GWB receive priming or paint? What is the clear coat product and where is it applied?
A.5	Please see A.4.
Q.6	The finish schedule shows hallway 4 and 5 to have rubber and wood base board respectively, though the rooms are directly connected. Will the base board finish be uniform between these hallways and if so which baseboard?
A.6	Finish schedule is in error. Hallway 5 shall have rubber base board (RB).
Q.7	Can you confirm whether or not there is any painting to do at the dock?
A.7	The guardrail on the abutment will require painting as outlined in Specification 05 50 00.
Q.8	Please will you confirm if it will be acceptable to use dredged marine sediment as general fill on site?
A.8	Assume not for purpose of bidding.

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Q.9	Please can you confirm if the 100mm sidewalk around the building is reinforced as per the detail on Drawing C-04?
A.9	Sidewalk shall be 150mm and reinforced as per detail on sheet C-04. See attached sketch.
Q.10	Please confirm the thickness of the 5.50 m wide concrete apron to east side of building and is it reinforced?
A.10	Sidewalk shall be 150mm and reinforced as per detail on sheet C-04. See attached sketch.
Q.11	The British Columbia Marine/Estuarine Timing Windows for the Protection of Fish and Fish Habitat for Port Hardy are as follows: Summer Window: July 1 - August 15 Seymour River Estuary: July 1 - July 15 Summer windows do not apply in any of the following estuaries: Shushartie River, Nimpkish River, and Quatse River. Winter Window: November 15 - February 15 Please confirm if the Project Site is located in the Quatse River Estuary and therefore no summer Window is available.
A.11	The site is not located in the Estuary. The summer window available is July1 to August 15, once a DFO Authorization is obtained. This project has not received Authorization yet. It is anticipated Authorization will be award end of July. Exact date TBD.
Q.12	In-Water works are generally only allowed during the Timing Windows set for a specific region. However, during the permitting process, if certain mitigation measures are proposed to be implemented, sometimes In-Water work can be performed outside the Timing Windows. Also, amendments to the permit can be made with mitigation measures proposed. Has PWGSC proposed any mitigation measures to perform In-Water work outside the Timing Windows? What time of the year is the contractor to assume In-Water works can be performed?
A.12	Our authorization application contained language for permission to work outside of the Timing Window. Confirmation of permission to work outside Window won't be known until authorization is obtained.
Q.13	Can the contractor excavate and place material in the tidal zone (but not in the water) outside the Timing Window's if mitigation measures are in place?
A.13	Tidal zone restrictions will be outlined in the pending DFO permit and can not be confirmed until it is issued.
Q.14	The rock revetments requires portions to be excavated and or dredged before material can be placed. Can you provide the amount in cubic meters (m3) of material that needs to be removed. To expand upon this further, there is not enough information in the tender drawings to estimate with reasonable accuracy the volume of material to be removed. There are only two cross-sections. This is an important item not only to account for time to remove, but also the cost to dispose which can be expensive.
A.14	The total estimated volume is approximately 820m3.
Q.15	*(Recommendation for alternate detailing of heavy timber framing)*
A.15	Please bid project as shown. Design changes may be considered after tender is awarded.

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Q.16	Item 3.6 now shows 1350 M3. 3.7 shows 3000 M3. Now in section 35 31 20 page 5, It shows porosity of filter as 30% and rip rap as 35%. I believe this then means that total volumes based on loose in place would be filter @ 1755 M3 and riprap @ 4050 M3. Am I correct on this?
A.16	This is incorrect. The volumes provided in the unit price table are total estimated volumes for the placed revetment rock.. The formula in Section 2.3.6 of Specification 35 31 20 should be used to calculate the rock weight based on these volumes and voids.
Q.17	On page 24 of the architectural drawings, there is blue colour code over multiple rooms. It appears access flooring is called for the following locations: Physical Training Space (202) Classroom (201) Quiet room (112) Meeting room (106) Reception (103) Private office (104) Are you able to confirm this is correct?
A.17	Access flooring shall be installed only in rooms 201 and 202. The blue color refers to the flooring finish (which shall be carpet for the rooms noted in the question).
Q.18	The removal of the existing steel piles is a significant risk item due to the unavailability of any pile information or installation details. Will the owner remove this demolition scope from the LS amount so it can be performed as a Provisional Sum item to normalize the risk to all General Contractors?
A.18	No. We appreciate that some bidders consider this is a high-risk item, but, especially at this stage in the tender, we prefer to keep it as part of the lump sum price. However, please note A.14 in Addendum #5.
Q.19	The mooring wells for the concrete float in the reference drawings are 1100mmx1100mm. The tender drawings show 1600mmx1600mm. Please confirm the mooring wells are 1600mmx1600mm.
A.19	Confirmed. Please see updated float drawings as provided in Addendum #2.

2 / A-22 LEVEL 2 FINISH PLAN

1 : 100 REF. DWG. A-07

1 / A-22 LEVEL 1 FINISH PLAN

1 : 100 REF. DWG. A-07

FINISH SCHEDULE

LEVEL	RM NUMBER	ROOM NAME	FLOOR FINISH	BASE FINISH	WALLS				CEILING FINISH
					WEST FINISH	NORTH FINISH	EAST FINISH	SOUTH FINISH	
LEVEL 1	101	MAIN ENTRANCE	LINO1	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	102	VESTIBULE	LINO1	WB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	103	RECEPTION	CARPET 2	WB	GWB/PT1		GWB/PT1	GWB/BB1	GWB-PT1
LEVEL 1	104	PRIVATE OFFICE	CARPET 2	WB	GLAZING	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	105	OPEN OFFICE	CARPET 1	WB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	105a	KITCHENETTE	LINO1	WB	GWB/PT1		GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	106	MEETING ROOM	CARPET 2	WB	GWB/PT1	GLAZING	GWB	GWB	
LEVEL 1	107	DOCUMENT STORAGE	LINO1	WB	GWB/PT1		GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	108	PRODUCTION AREA	LINO1	WB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	109	WR-1	TILE		GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB-PT1
LEVEL 1	110	WR-2	TILE		GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB-PT1
LEVEL 1	111	IT/SERVER ROOM	VT	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	112	QUIET ROOM	CARPET 2	RB	GWB/PT1	GWB/PT3	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	113	STORAGE	SEAL	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	114	JANITOR 1	SEAL		GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB-PT1
LEVEL 1	115	ELEC. ROOM	SEAL	RB	FPLY/PT1	FPLY/PT1	FPLY/PT1	FPLY/PT1	GWB-PT1
LEVEL 1	116	BOAT MAINTENANCE	HARD	RB	PLY/CL/GWB/PT1	PLY/CL/GWB/PT1	PLY/CL/GWB/PT1	PLY/CL/GWB/PT1	OPEN
LEVEL 1	117	E & I	LINO1	WB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	118	BATTERY CHARGER ROOM	SEAL	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	119	JANITOR 2	SEAL	RB	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP- 4	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB-PT1
LEVEL 1	120	LAUNDRY 1	SEAL	RB	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB-PT1
LEVEL 1	121	LOCKER ROOM	SEAL		CB/GWB/PT1/CT/TP-3	CB/GWB/PT1/CT/TP-3	CB/GWB/PT1/CT/TP-3	CB/GWB/PT1/CT/TP-2	GWB-PT1

FINISH SCHEDULE

LEVEL	RM NUMBER	ROOM NAME	FLOOR FINISH	BASE FINISH	WALLS				CEILING FINISH
					WEST FINISH	NORTH FINISH	EAST FINISH	SOUTH FINISH	
LEVEL 1	121a	SHOWER #121a	SEAL						
LEVEL 1	122	LOCKER ROOM	SEAL		CB/GWB/PT1/CT/TP-3	CB/GWB/PT1/CT/TP-3	CB/GWB/PT1/CT/TP-2	CB/GWB/PT1/CT/TP-3	GWB-PT1
LEVEL 1	122a	SHOWER #122a	SEAL						GWB-PT1
LEVEL 1	123	RACK STORAGE	HARD	RB	PLY/CL	PLY/CL	PLY/CL	PLY/CL	OPEN
LEVEL 1	124	FLEET STORAGE	SEAL	RB	PLY/GWB/CL	PLY/GWB/CL	PLY/GWB/CL	PLY/GWB/CL	GWB-PT1
LEVEL 1	H101	HALLWAY 1	LINO1	WB		GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	H102	HALLWAY 2	LINO1	WB	GWB/PT1		GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	H103	HALLWAY 3	LINO1	WB	GWB/PT1	GWB/PT1		GWB/PT1	GWB-PT1
LEVEL 1	ST101	STAIR 1	SEAL	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 1	ST102	STAIR 2	SEAL	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 2	201	CLASSROOM	CARPET 2	RB	WC-1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 2	202	PHYSICAL TRAINING SPACE	CARPET 2	RB	GWB/PT1	GWB/PT1	WC-1	GWB/PT1	GWB-PT1
LEVEL 2	203	GYM	MAT	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 2	204	ACCOMMODATION 3	LINO 2	WB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT3	GWB-PT1
LEVEL 2	205	ACCOMMODATION 2	LINO 2	WB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT3	GWB-PT1
LEVEL 2	206	ACCOMMODATION 1	LINO 2	WB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT3	GWB-PT1
LEVEL 2	207	LIVING/ DINING AREA	LINO 2	WB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 2	208	WR-3	TILE		GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB-PT1
LEVEL 2	209	WR-4	TILE		GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB/PT1/CT/TP-1	GWB-PT1
LEVEL 2	210	STORAGE	SEAL	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 2	212	WR-5	TILE		GWB/CT/TP-2	GWB/CT/TP-2	GWB/CT/TP-2	GWB/CT/TP-2	GWB-PT1
LEVEL 2	213	LAUNDRY 2	TILE	RB	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB/PT1/CT/TP-4	GWB-PT1
LEVEL 2	214	MEZZANINE STORAGE	SEAL	RB	PLY/GWB/CL	PLY/GWB/CL	PLY/GWB/CL	GWB/PT1	GWB-PT1
LEVEL 2	H201	HALLWAY 4	LINO1	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	
LEVEL 2	H202	HALLWAY 5	LINO1	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 2	ST201	STAIR 1	SEAL	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1
LEVEL 2	ST202	STAIR 2	SEAL	RB	GWB/PT1	GWB/PT1	GWB/PT1	GWB/PT1	GWB-PT1

ABBREVIATIONS

FLOORING:

CT	CERAMIC TILE
HARD	SEALED CONCRETE WITH HARDENER
LINO-1	LINOLEUM (# DENOTES TYPE)
LINO-2	LINOLEUM (# DENOTES TYPE)
MAT	RUBBER MAT
SEAL	SEALED CONCRETE
VT	VINYL ANTI-STATIC TILE

BASE:

RB	RUBBER BASE
WB	1" X 8" ROUGH SAWN WOOD BASE

WALLS:

BB	BULLETIN BOARD
CB	CEMENTITIOUS BOARD
GWB	GYPSUM WALL BOARD
PLY	PLYWOOD

SURFACE:

CL	CLEAR COAT
PT-1	PAINT (# DENOTES COLOUR & SHEEN)
PT-2	PAINT (# DENOTES COLOUR & SHEEN)
PT-3	PAINT (# DENOTES COLOUR & SHEEN)
PT-4	PAINT (# DENOTES COLOUR & SHEEN)
WC-1	WALLCOVERING

TRIM:

WT	1" X 4" ROUGH SAWN WOOD CASING

GENERAL NOTES

1. ALL WASHROOM/CHANGE ROOMS, SHOWER STALLS, AND JANITOR ROOMS TO BE INSTALLED WITH MOISTURE RESISTANT GYPSUM WALL BOARD.
2. TYPICAL FIELD PAINT COLOUR - PT1. ALL WALLS NOT NOTED OTHERWISE SHALL BE PAINTED PT1.
3. REFER TO SPECIFICATIONS FOR MATERIAL COLOURS.

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Region de Pacifique

CHERNOFF THOMPSON ARCHITECTS

REGISTERED ARCHITECT NAOMI F. GROSS BRITISH COLUMBIA

Revision/ Revision	Description/Description	Date/Date
0	Issued for Tender	2020-01-20

Client/client

FISHERIES AND OCEANS CANADA - CANADIAN COAST GUARD

Project title/Titre du projet

6270 Jensen Cove Rd
Port Hardy, BC
V0N 2P0

PORT HARDY LOGISTICS DEPOT

Consultant Signature Box Only
-

Designed by/Concept par
N.G

Drawn by/Dessine par
A.R.

PWGSC Project Manager/Administrateur de Projets TPSGC
Don Storry

PWGSC, Regional Manager, Architectural and Engineering Services/ Gestionnaire régionale, Services d'architectural et de génie, TPSGC
-

Drawing title/Titre du dessin

FINISH PLANS & SCHEDULE

As indicated

Project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
8H500 DATE 06/18/19	**A-22**	**0**

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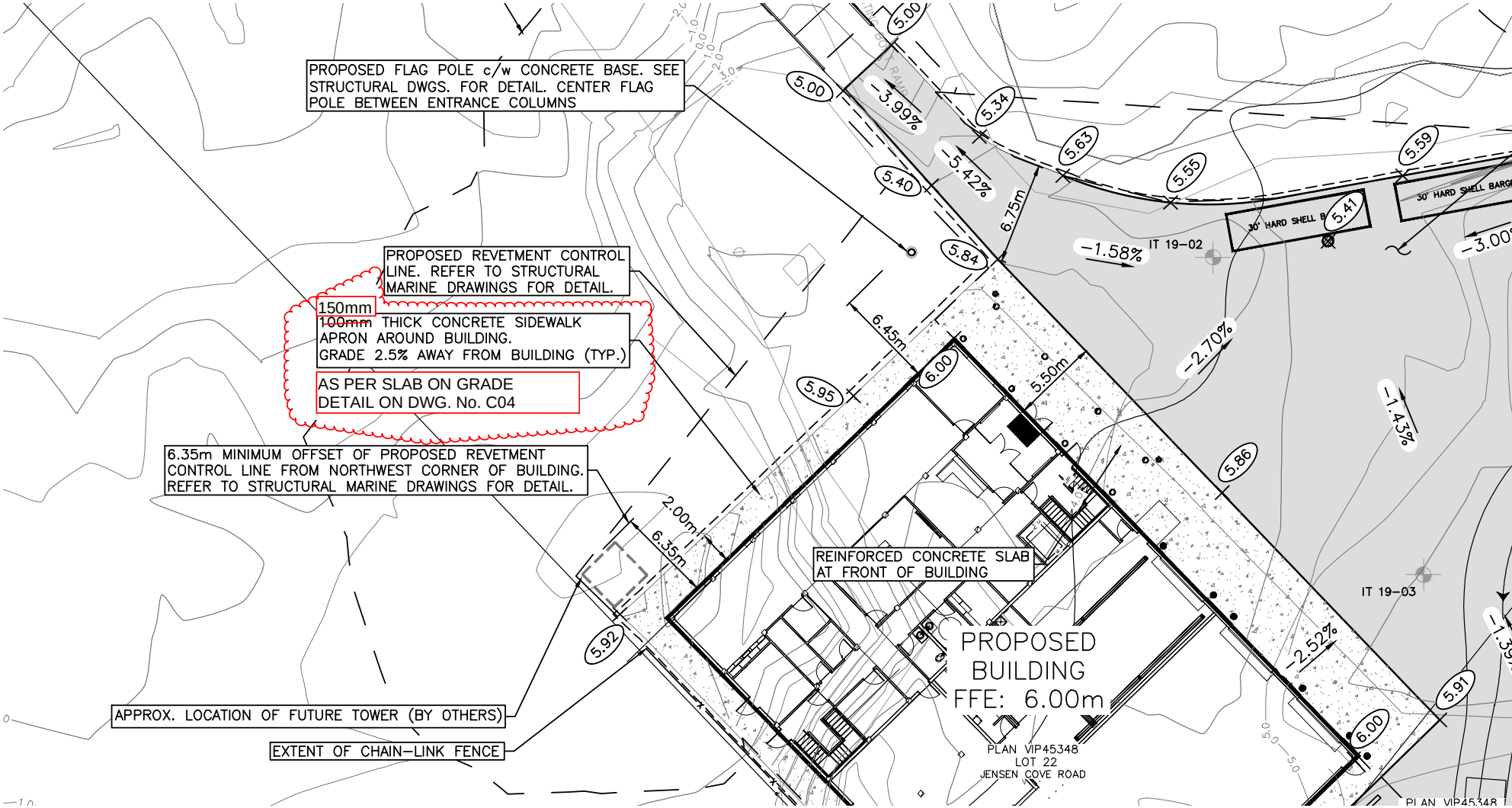
PROPOSED FLAG POLE c/w CONCRETE BASE. SEE STRUCTURAL DWGS. FOR DETAIL. CENTER FLAG POLE BETWEEN ENTRANCE COLUMNS
PROPOSED REVETMENT CONTROL LINE. REFER TO STRUCTURAL MARINE DRAWINGS FOR DETAIL.
150mm
~~100mm~~ THICK CONCRETE SIDEWALK APRON AROUND BUILDING.
GRADE 2.5% AWAY FROM BUILDING (TYP.)
AS PER SLAB ON GRADE DETAIL ON DWG. No. C04
6.35m MINIMUM OFFSET OF PROPOSED REVETMENT CONTROL LINE FROM NORTHWEST CORNER OF BUILDING. REFER TO STRUCTURAL MARINE DRAWINGS FOR DETAIL.
APPROX. LOCATION OF FUTURE TOWER (BY OTHERS)
EXTENT OF CHAIN-LINK FENCE
REINFORCED CONCRETE SLAB AT FRONT OF BUILDING
PROPOSED BUILDING
FFE: 6.00m
PLAN VIP45348
LOT 22
JENSEN COVE ROAD
IT 19-02
IT 19-03
30' HARD SHELL B
-3.99%
-5.42%
-1.58%
-2.70%
-1.43%
-2.52%
6.75m
6.45m
5.50m
2.00m
6.35m
5.00
5.34
5.63
5.55
5.59
5.41
5.40
5.84
5.95
6.00
5.86
5.92
5.91

Service | Innovation | Value

Technical Standard

TS-01

Premises Telecommunications Infrastructure Installation in Leased, Owned and Occupied Spaces Under Shared Services Canada Mandate

Shared Services Canada

Wireline Voice Infrastructure Services (WVIS)

Standard version:	1.0g
Status:	VER
Publish date:	April 25, 2017

Shared Services Canada | Services partagés Canada

Canada

Standard history

Author and collaborator

Name	Role	Organization
Hamid Vafaie, P.Eng.	Author	SSC-NEUB-Telecom-SI-A&E
Steven Richard, ing.	Co-author	SSC-NEUB-Telecom-SI-A&E
Jeffery Au	collaborator	CSEC
Ward Roberts	collaborator	CSEC
Frank Blasioli	collaborator	CSEC

History of change

Version	Date	Consulted	Author	Change information
1.0	2013/10/24	Daniel Rollin, ing. and Chantal Boudreault	Hamid Vafaie, P.Eng.	Final
1.1FINAL	2014/06/09	Daniel Rollin, ing. and Chantal Boudreault	Hamid Vafaie, P.Eng.	Transform document to SSC technical standards format, and reduced the number of ports per telecommunications outlet from two to one.
1.1a (amended) FINAL	2014/12/22	John Dullaert	Hamid Vafaie, P.Eng.	Corrected typo error in Para 5.1, per input from John Dullaert. In para 6.5.2 updated specifications for concrete encasement (from 7% to 4%-7% air-entraining based on aggregate size, and included application of sealants, and fibre reinforcement). Changes are minor and document will not require formal re-approval.
DRFT v1.2		John Dullaert Hamid Vafaie, P.Eng. Chantal Boudreault Alec Olaveson Guy Simoneau	Steven Richard, ing.	Added section within scope. Various small changes and corrections. Added note about heat dissipation associated to cable gauge. Added definitions.
DRFT v1.3	2015/03/23	Hamid Vafaie, P. Eng. Alan Armstrong	Steven Richard, ing.	Added statement to end of scope. Added clarification for visual inspection of cable within Case 4. Added Case 12. Replaced “non-partner” with “client”. Added note in 6.5.2.
VER v1.0	2015/03/31	Hamid Vafaie, P. Eng. Chantal Boudreault	Steven Richard, ing.	Incorporated final comments into heat generation of copper cables. Changed to VER for signature
VER v1.0b	2015/05/13	Cecily Wallace	Steven Richard, ing.	Proof reading and corrections made. Otherwise same document as signed v1.0.

VER v1.0d	2015/12/17	Guy Simoneau Alec Olaveson Gaby Mai Hamid Vafaie, P.Eng.	Steven Richard, ing.	Telecommunications nomenclature change to reflect TIA-569-C, and also to align with SSC documents. Last signed version is VERv1.0, however only proof reading and nomenclature changes have been made since then, so content remains the same.
VER v1.0e	2016/01/28	Steven Richard, ing.	Hamid Vafaie, P.Eng.	Updated definition for Main Equipment Room.
VER v1.0f	2017/03/27	Hamid Vafaie, P.Eng. Cal Clupp Mike Huard	Steven Richard, ing.	Change distance to RF transmitters Changed organization Incorporated comments from Cal Clupp and Mike Huard
VER v1.0g	2017/04/25	Mike Huard Hamid Vafaie, P.Eng.	Steven Richard, ing.	Modified figure 2 by recommendation of Mike Huard to make text clearer.

Table of contents

Standard approval

The signing authorities below concur with the conditions and responsibilities specified within this technical standard.

Shirley Ivan	Director General, Enterprise Architecture	Date	Signature
Pierre Nantel	Executive Director, EAS	Date	Signature
Marty Gratton	Director, EAS Telecom	2015-03-31 Date	Signature
Hamid Vafaie, P.Eng..	A/Director, ESRD	2015/03/31 Date	Signature

Previous version approval history

Version and issue date	Approving authority	Approver	Signature	Date
Ver. 1.0, issued: Nov 1, 2013	Director General Enterprise Architecture Shared Services Canada	Jirka Danek		Nov 7, 2013
Ver. 1.1, issued: June 9, 2014	Director Standards, Engineering and Research	Daniel Rollin, ing.		Aug 18, 2014
	Executive Director Enterprise Architecture and Strategies	Pierre Nantel		
	Director General Enterprise Architecture Shared Services Canada.	Shirley Ivan		

1 Introduction

This technical standard specifies the cabling fit-up requirements to support unclassified, designated and classified (up to Secret) processing and replaces the *Premise Telecommunications Cabling Fit-up Operating Standard (OS) in Leased, Owned and Occupied Spaces* under the Shared Services Canada mandate that was approved by the TBS-SSC IT Standards DG Working Group on April 2, 2012.

The **Director General, Telecom Services**, is the Telecommunications Infrastructure Design Authority for Shared Services Canada.

This technical standard has been prepared and reviewed by the following on behalf of the SSC Telecommunications Infrastructure Design Authority.

Name	Position
Steven Richard, ing.	Sr. Telecom Engineer SSC-NEUB-Telecom-SI-A&E
Hamid Vafaie, M.Eng., P.Eng.	Manager SSC-NEUB-Telecom-SI-A&E

2 Purpose

The federal government invests a significant portion of its annual budget in establishing and managing IT infrastructure to support government programs and services. Telecommunications cabling systems are a foundational component of IT infrastructure. Accordingly, each component of the telecommunications cabling system must be implemented, tested and certified for use according to codes, standards and regulations to ensure safety, performance, interoperability and reliability of networks up to each end-user device. This standard addresses the effective fit-up of the telecommunications cabling systems.

The application of this technical standard will lead to consistency in telecommunications cabling systems between sites and organizations in terms of quality, technical design, management and cost.

Shared Services Canada (SSC), created through two Orders-in-Council during 2011 (August and October), was given the mandate for the majority of GC networks and data centres.

This technical standard enables the alignment of SSC cabling practices and standards with the Canadian and North American cabling industry, and clarification of SSC and departmental roles and responsibilities pertaining to telecommunications cabling systems through the life cycle of the infrastructure.

Furthermore, this technical standard supports the *Directive on Management of Information Technology* strategic direction towards a more strategic approach to IT investments to ensure interoperability of departmental systems and increased effectiveness and efficiency in delivery of government programs and services.

Finally, this technical standard is to be read and interpreted in conjunction with the following:

- *Policy Framework for Information and Technology*;
- *Policy on Management of Information Technology*;
- *Directive on Management of Information Technology*; and
- *Policy on Government Security*.

3 Effective date

This technical standard will come into effect on the day noted in the Approval history.

4 Scope

This technical standard is applicable to the design, implementation, and fit-up of premise telecommunications cabling systems in all owned, leased, or occupied spaces that are under Shared Services Canada's mandate. This standard applies to general office space (including those located in commercial buildings, data centres, residential buildings, and industrial premises as specified within the American National Standards Institute (ANSI) and Telecommunications Industry Association (TIA) standards listed in Appendix B). Any reference in this standard to all or part of national or international codes, regulations, standards and specifications shall be construed as a reference to the most recent version of those standards or specifications, as well as any officially issued addenda.

For special purpose premises such as labs, inspection facilities, and service booths, designers must utilize their knowledge and experience to best apply this standard to meet a site's unique requirements and challenges.

This technical standard is mandatory for all new fit-ups and retrofits of existing owned, leased and occupied spaces. Appropriate elements of this standard can be applied to existing cabling infrastructure, even when no retrofit has been planned. Compliance with this technical standard is mandatory.

This technical standard must be used in conjunction with RMCP G1-026 *Guide to the Application of Physical Security Zones*, CSEC ITSG-11 *COMSEC Installation Planning - TEMPEST Guidance and Criteria*, CSEC ITSB-79 *Guidance for the Communications Security of SECRET Information*, and any other relevant CSEC guides, bulletins or advisories.

SSC's mandate is to provide and support information technology (IT) infrastructure for its 42 partners. Cabling is an integral component of the IT infrastructure. It is the building owner's responsibility to provide spaces and pathways throughout the building, in accordance with ANSI/TIA-758-B, as referenced in PWGSC's *Base Building Standard* dated January 05, 2015. Pathways from the property line to the building are not SSC's responsibility.

Finally, this technical standard does not address all aspects of securing data within a cabled network. As a result, an HTRA should still be performed to identify and address remaining risks that may not have been mitigated through physical cabling installation.

5 Definitions

Figure 1 below, provides a conceptual view of an environment where both BLACK (unclassified, designated Protected A/B, or encrypted Confidential/Protected C/Secret) and RED (clear text Confidential/Protected C/Secret) information processing are present (see Appendix A for the definition of RED/BLACK concept).

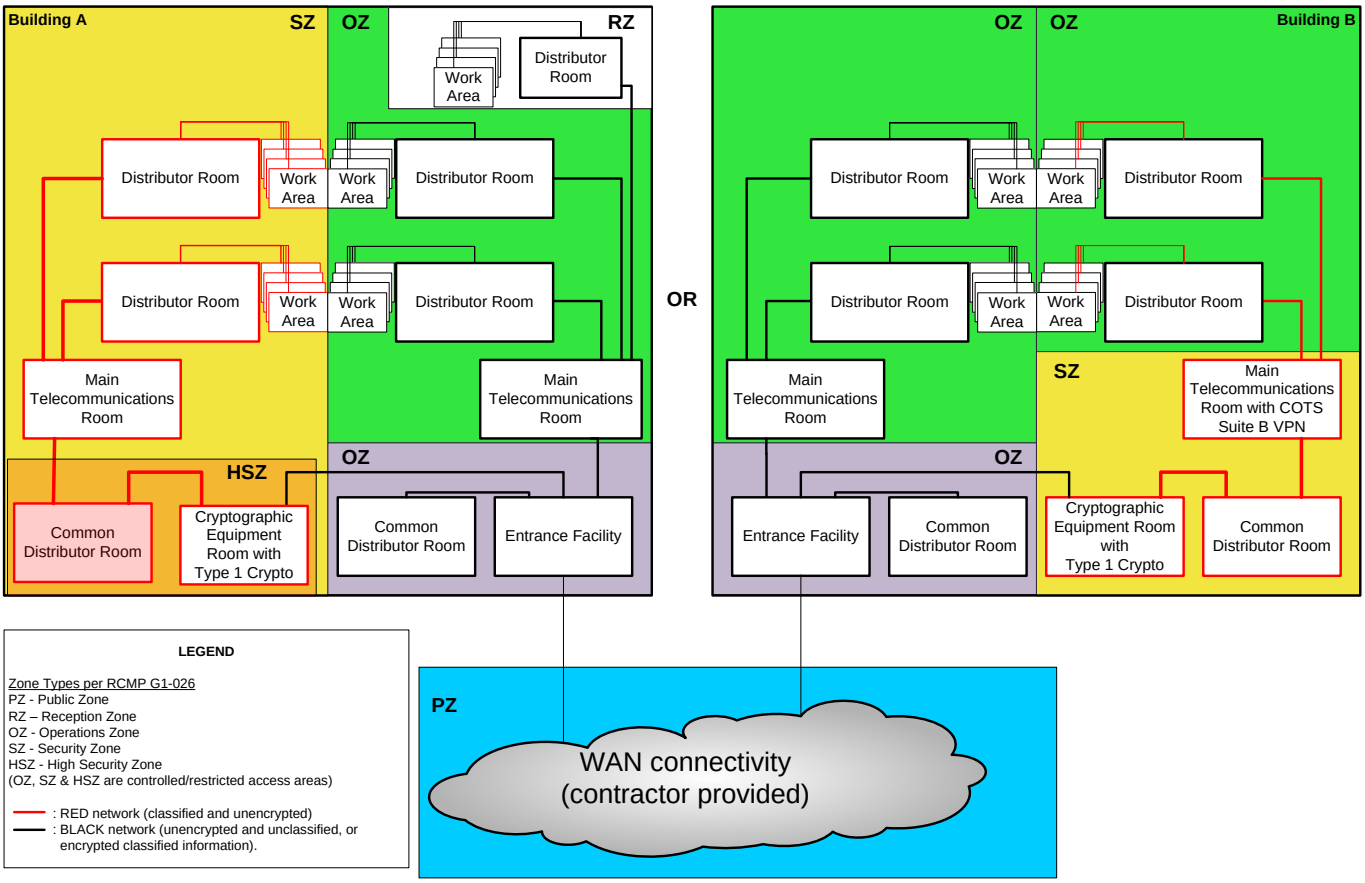

Figure 1: Premise telecommunications infrastructure is defined as the equipment and physical locations which permit telecommunications between and among defined network termination points. The **RED and BLACK network concept** refers to the segregation in cryptographic systems of **RED signals** (signals that contain extremely sensitive or classified plain text information) from **BLACK signals** (those that carry unclassified, low/particularly sensitive designated, or RED information that has been encrypted with CSEC approved cryptography). Note that Figure 1 has been simplified to demonstrate cabling topologies.

The physical isolation of RED, Controlled BLACK, and BLACK components is depicted in **Figure 2**.

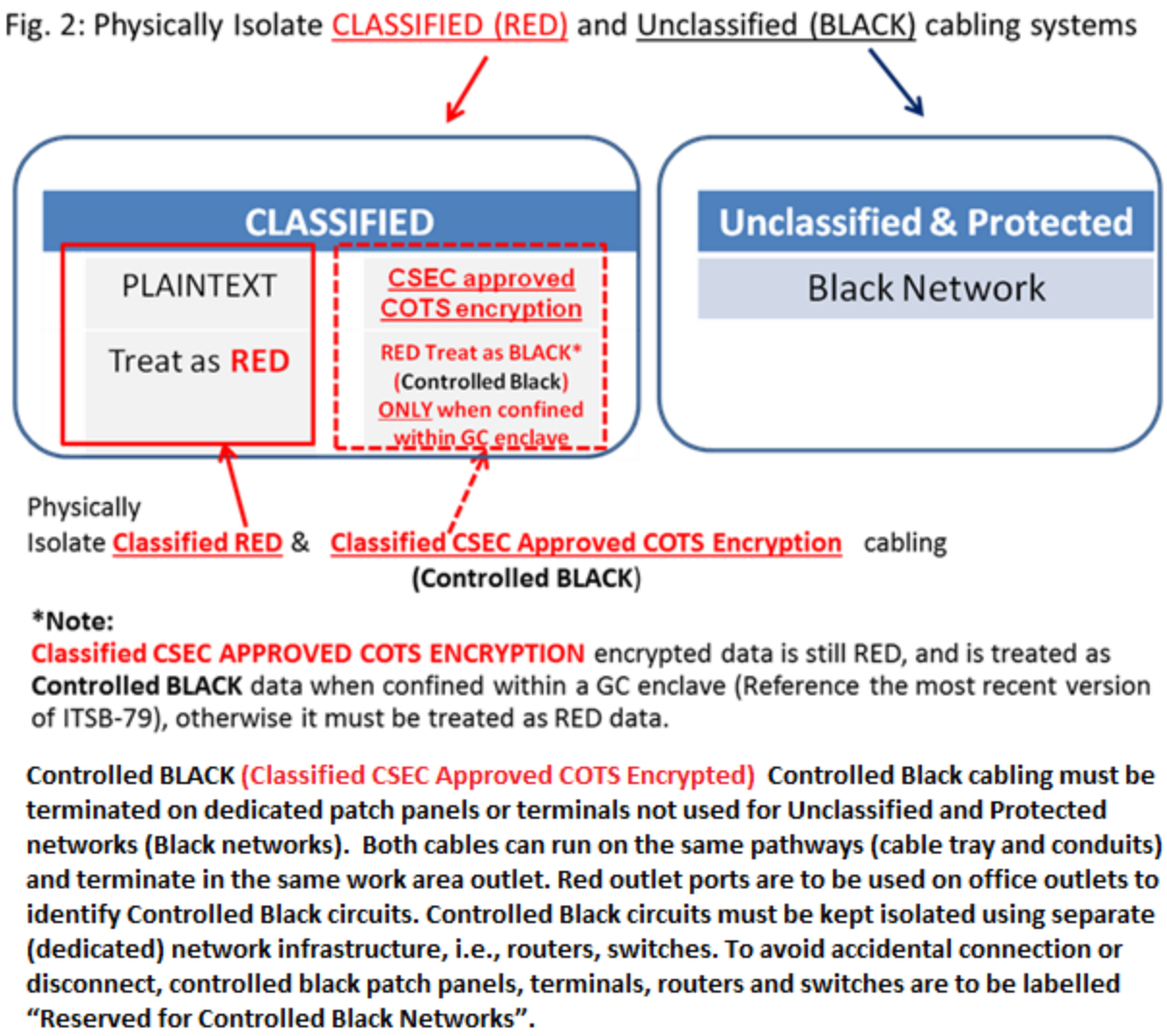

Figure 2: Depiction of physically isolated Classified (RED) and Unclassified (BLACK) components.

Examples of components that are considered part of the premise telecommunications cabling infrastructure include:

- Physical locations housing telecommunications equipment such as entrance facilities (EF), Main Equipment Room (MER), common distributor room (CDR), cryptographic rooms (CR), distributor rooms (DR), server rooms and data centres;
- Data transport control devices such as hubs, routers, switches, bridges, gateways, and repeaters;

- All low voltage structured cabling material and equipment from the demarcation point with external service providers through to the connecting port (network interface) of a network termination point. It includes all backbone/vertical cabling (intra/inter building), horizontal cabling, patch panels and patch cables; and
- All telecommunications ancillary supporting infrastructure including cable trays, racks, enclosures and conduit.

Examples of components that are not considered part of the premise telecommunications cabling infrastructure are:

- End-user devices: workstations, printers, scanners;
- Computing infrastructure: server hardware (individual or host-based);
- Storage infrastructure: SAN or NAS;
- Electrical power infrastructure; and
- HVAC infrastructure.

A list of terms and definitions to be used in the interpretation of this standard can be found in Appendix A.

Furthermore,

- All CM, CMG, CMX, CMR or CMP rated cables must be compliant with TIA 568C.2 specifications (Section 5.3) which requires solid conductors and shall consist of commercially pure, annealed, bare copper, and comply with ANSI/ICEA S-90-661-2006 and ANSI/ICEA S-102-732.
- UL 444, *Standard for Communications Cable* (Section 5.1.1) states that “The conductors shall be solid or stranded, annealed, bare or metal-coated copper.”

6 Standard statement

6.1 Objective

The objective of this technical standard is to:

- Achieve efficient and effective implementation and management of structured telecommunications cabling systems in order to support government priorities and program delivery; and
- Implement a unified fit-up standard in the spaces under Shared Services Canada’s mandate.

6.2 Recommended process

When designing a premise telecommunications infrastructure, it is recommended that the following activities be incorporated into the process:

a) Documenting user requirements with details of:

- number and type of networks required;
- number of workstations required; and
- wireless network requirements.

b) Conduct of a complete physical site survey to identify the physical security requirements (RCMP G1-005, G1-024, G1-025, G1-026, G1-029 and G1-031) and EMSEC zone requirements (CSEC ITSG 11).

6.3 Premise cabling fit-up for BLACK systems

This section outlines the requirements for cabling in premises where unclassified, designated protected A/B, or encrypted Confidential/Protected C/Secret (encrypted with appropriate CSEC approved encryption) information is transmitted.

6.3.1 Insulation-Displacement Connector (IDC) in a cross-connect configuration will be used for all new cabling terminations within common distributor rooms, and distributor rooms.

6.3.2 In locations where trained support staff may not be readily available or when there is a compelling operational requirement, SSC will have the discretion of using patch panels in lieu of IDC.

6.3.3 In locations where a cabled connection is required, a minimum of on equipment outlet will be provided (e.g., each workstation, printer, facsimile, etc.) Each equipment outlet will have one outlet port, unless operational requirements justify additional outlet ports. It must be noted that implementation of the SSC Wireless LAN service will reduce the number of cabled equipment outlets required.

6.3.4 One Category 6 (Cat 6) unshielded twisted pair (UTP) cable will be provided to each outlet port.

6.3.5 Two Cat 6 UTP cables will be provided to each wireless access point (one for the LAN traffic, and one for management console).

6.3.6 The heat generated in copper cabling for PoE and PoE+ applications, especially in large cable bundles (200 or more cables) must be considered. Additional cooling capacity or higher gauge copper cabling (i.e., Cat 6A) are options that can be considered to mitigate this situation.

Note 1:

While TIA does not specify a maximum number of cables in a bundle (in effect deferring any limit to cable manufacturers), the following factors must be considered:

- The temperature rise for cables in the middle of a large cable bundle will be significantly higher, and this will result in deterioration of performance of the cable;

- The fire and electrical codes do not sufficiently address the temperature rise of large bundles of PoE and PoE+ communications cables;
- The weight of large bundles will result in excessive pulling tension on the wires and could cause defects in the cable, which requires the supporting structures and pathways to be designed by engineers.

Therefore, cable designers must understand that heat generated by copper wires can be significant, particularly in areas where large bundles are present such as distributor rooms, and especially in computer rooms and data centres. When designing a cable plant, the designer must consider the impact of heat build-up on the life span of the cable plant and the total cost of ownership (savings in electrical and cooling costs versus the one-time capital investments for purchasing a larger conductor cable with possibly better thermal characteristics), in addition to the additional insertion loss created by the increased temperature. It must also be noted that not all cables of the same category have the same characteristics, and certified Cat 6 cable wire gauge can range from 22AWG to 24AWG (with 23AWG being the typical gauge).

For example, when using Cat 6 cable to deliver PoE (350 mA):

- R = Electrical resistance of uniform specimen of material (in ohms, Ω)
- ρ = Coefficient of resistivity (in ohm*metres, Ω*m) = $1.68*10^{-8}$ Ω*m for annealed copper @ 20^{o}C
- L = Length of the piece of material (in metres, m)
- P = Power (in watts, W)
- I = Current (in Amps, A)
- A = Cross-sectional area of the specimen (in square metres, m^2)
    - Cat 6 cable is comprised of 8 * 23 gauge conductors (0.573 mm diameter (d))
    - $A = (0.000573/2)^2 * \pi = 2.5787*10^{-7}$ m^2

- $R = \rho*L/A$ = 0.0651 Ω for each metre of Cat 6 cable
- $P = I^2*R = (0.35\ A)^2 * 0.0651\ \Omega$ = 0.007975 W (per metre of conductor)

- 1 watt ≈ 3.41 BTU/hour

- *Generated heat = 0.0272 BTU/hour per metre of cable (this is for each conductor of the cable that is being used)*

Note 2:

It is important to consider length de-rating of cabling that can be significant at higher than ambient (i.e. >20^{o}C) conductor temperatures. Manufacturers' specs should be consulted for all cable runs. Options available to the cable designer to compensate for increased operating temperatures (especially when PoE is used) are:

- Reducing the max length if standard Cat 6 is used (reduce max cable lengths from 90m to about 80 to 83 metres @ 40^{o}C, and as low as 75m @ 60^{o}C, based on de-rating specs of manufacturers); or

- Use of low insertion loss Cat 6 cables is specified. If this is not done, the cables will not perform as Cat 6 cables, and will not pass the Cat 6 tests.

Finally, it is also important to allow cables rated for PoE/PoE+ to be tested under load and allowed time to heat to their steady-state operating temperatures before certification of the cable plant.

6.3.7 When performing modifications, changes or additions, existing cabling facilities will be supplemented with the same category of cable in use, provided that at least a Category 5e cable is used for any new cabling.

6.3.8 For facilities under short-term lease, Category 5e cable can be used when extra performance of Category 6 cable is not required.

6.3.9 The number and type of fibre optic cables used for backbone cabling between the ER and each DR will depend on site specific requirements. A minimum of 12 strands (6 pairs) of at least OM-3 (i.e., OM-3 or OM-4) multi-mode fibre will be installed. Alternatively, 6 strands (3 pairs) of OS-1 single-mode fibre may be used depending on the premise requirements. For small buildings with limited number of users, Cat 6 UTP can be considered for backbones.

6.3.10 All backbone cabling using optical fibre will be terminated with Duplex LC connectors.

6.3.11 For safety purposes, when communication cables are distributed in conduits, they must be distributed in conduits separate from the AC and DC power lines.

6.3.12 The fire ratings of any installed cable must meet the fire code ratings (i.e., CMR, CMP, etc.) of the authority having jurisdiction.

6.3.13 Backbone and horizontal cabling, and cabling support systems installation and labelling will be in accordance with ANSI/TIA-569C and ANSI/TIA-606-B.

6.3.14 All grounding must be in accordance with TIA-J-STD-607-B, and in compliance with the National or Local electrical codes having jurisdiction.

6.3.15 All fibre and copper cabling must be installed in a dedicated support system (i.e., EMT, ladder racks, etc.

6.3.16 All fibre optic jumper jackets must be colour coded in accordance to ANSI/TIA-598-C Optical Fiber Cable Colour Coding to allow visual identification of single-mode and multi-mode fibre: Yellow to denote single-mode, and orange or aqua to denote the appropriate type of multi-mode fibre cable.

6.3.17 All backbone and horizontal cabling must have identifiers and tags in compliance with ANSI/TIA-606-B.

6.3.18 All pinouts will be in accordance with ANSI/TIA 568-A.

6.3.19 The discretion to adopt some of the measures specified for cabling RED systems will be considered based on site specific requirements, anticipation of change in use (i.e. potential conversion from BLACK to RED), or justification by a business case study.

6.4 Premise cabling fit-up for RED systems

This section outlines the requirements for cabling in environments where clear text Confidential, Protected C and/or Secret information is transmitted.

6.4.1 All requirements outlined in the section entitled “Premise cabling fit-up for BLACK systems” are also applicable to RED systems with the exceptions noted below.

6.4.2 Telecommunications spaces

a) RED telecommunications network cabling infrastructures may be distributed from a physically separate Cryptographic Equipment Room (CR). In very rare instances, it is also possible for RED telecommunications cabling to enter a building at an Entrance Facility (EF) or a Distributor Room (DR) or a combined EF/DR, and then be distributed (see section 14).

b) Based on the location’s security posture and the intended concept of support, it may be possible for BLACK and RED telecommunications infrastructure to share the same spaces (e.g. ER and TR). Alternatively, it may be more feasible for the RED systems to use physically separate spaces.

c) Access to all RED telecommunications infrastructure must be limited to personnel cleared to the appropriate security level and having a valid “need-to-know”.

6.4.3 Physical separation

a) In order to reduce the likelihood of inadvertent compromising emissions coupling from RED components to BLACK components, physical and electrical separation of RED and BLACK components of co-located IT systems within a facility will be used as part of the overall Emissions Security (EMSEC) controls.

b) RED and BLACK systems will have:
- Physically separate components (routers, switches, cabling, equipment outlets, patch panels, etc.);
- Physical separation between RED and BLACK components as specified in ITSG-11;
- at all times, including when run in parallel, copper cables used for BLACK and RED systems must have a minimum separation of at least 15 cm (note: this requirement is more stringent than ITSG-11 that specifies a 5 cm separation for runs of less than 30 metres);
- when crossing each other, copper cables must cross perpendicular at 90-degrees, and have a minimum separation of 5 cm;
- RED network components must have a minimum of 200 cm separation from RF Devices (any transmitter, receiver or transceiver such as Wireless Access Points and cellular phones);

- The same multi-conductor cable or multi-strand fibre must not be used for carrying both RED and BLACK system signals;
- Provided that the recommended physical separation specified in ITSG-11 (e.g. 15 cm for copper cables) is enforced, it is possible to run the RED and BLACK cables in the same telecommunications pathways.

6.4.4 Horizontal cabling and drops

a) The recommended number of cables provided to each equipment outlet of a RED system is two Category 6 shielded twisted pair (Cat 6 STP) cables. Based on operational requirements and site security posture, other types of cables such as OM-3 fibre or Cat 6 unshielded twisted pair (UTP) may be used.

6.5 Measures for hardening the cabling for RED telecommunications infrastructure

When designing or implementing the cabling infrastructure for any location that will be processing RED information, the site's security posture and operational requirements must be considered. The overall level of security that is achieved is the result of a layered approach comprised of various measures that include access controls, physical security, location, encryption, and hardened infrastructure, of which, cabling is only one component. Based on the site's security posture, required level of confidentiality, integrity and availability, consideration of initial cost and the total cost of ownership (TCO), the following additional measures can be taken into consideration to harden the cabling for RED telecommunications infrastructure.

6.5.1 Cable support system (conduit)

a) Placing the cabling in an appropriate type and size conduit may be considered to reduce the possibility of accidental and/or intentional physical damage, unauthorized modification and access.

b) Conduits may be electrical metallic tubing (EMT), flexible non-metallic tubing, or other appropriate type of conduit deemed necessary to address site specific requirements.

c) All conduits must meet applicable federal, provincial and local electrical, building, and fire codes.

d) There should not be a need to secure RED cabling within a conduit in physical Security Zones and High Security Zones, unless there is a need to further reduce the risk of damage (accidental, unauthorized access, etc.).

e) When conduits are used for horizontal cabling, they must be installed from the horizontal cross-connect, whether in cable tray or as inner-duct, to each equipment outlet.

f) Only cabling intended for carrying RED information can be placed in the conduits designated for RED cabling.

g) Conduits must be standard sized (1”, 2”, 3”, 4”, etc.) and securely attached to hangers or solid surface.

h) Only metallic connectors and couplings will be used with EMT.

i) All conduits must have a pull string and bushings at each end.

j) All conduits used for RED cabling must be marked with RED paint in the physical restricted zones (Operations Zone, Security Zone or High Security Zone). The paint must be a strip of 5cm paint applied at least 15 cm from each end of the conduit, and at least every 5 metre along the length of the conduit.

k) Colour marking of RED conduits in physical Reception Zones will depend on the site security posture and operational requirements (recommended but not mandatory).

l) Colour marking of RED conduits in public areas is not recommended.

6.5.2 Protected distribution systems

a) When cables carrying unencrypted RED data traverse an area within the Government of Canada enclave that is of a lower level of security classification or control, or traverse an area outside of the controlled space, additional security measures must be considered. These measures will be site dependant, and may include any combination of:
   - using a protected distribution system (PDS);
   - placing cables in an appropriate sized and type of conduit;
   - use of armoured cables; and
   - use of alarmed carriers.

b) The design of the PDS is based on the site security posture relative to the location of the PDS which will identify appropriate physical security measures needed.

c) Four areas of consideration for the PDS are as follows:
   - Installation;
   - EMSEC;
   - Maintenance and monitoring; and
   - Physical security.

d) Installation, monitoring and maintenance

- PDS must be accessible and visible for continuous surveillance and periodic and random inspection by qualified and trained personnel (i.e., PDS should not be concealed behind walls or above ceilings or under raised floors);
- The PDS must have continuous monitoring and maintenance;
- The PDS must undergo periodic and random inspections (the frequency of inspections will be specified in the SSC operating standard);
- Only appropriately security-cleared personnel will have access to, or perform inspection, maintenance and monitoring of the PDS;
- Contractors and personnel without appropriate security clearance working on the PDS will be under direct supervision of security-cleared personnel;
- Records of all PDS inspections, events and alarms must be kept;
- All PDS alarms and events must be investigated and reported;
- All PDS alarms must be tested regularly;
- Personnel must be able to respond to PDS alarms within 15 minutes;
- All PDS pull boxes must be locked with an RCMP approved padlock; and
- When cost justifies the need to have visually esthetic installations, alarmed fibre carriers may be considered.

e) Emission Security (EMSEC)
   - The PDS must comply with the EMSEC requirements specified in ITSG-11.

f) Hardened and simple PDS
   - There are two types of PDS; hardened and simple.
   - A simple distribution system (SDS) provides a basic level of physical security by employing the following measure:
     - Placing the cables inside a conduit. The conduit may be EMT or of any other material that meets the local fire codes.

   - Hardened distribution systems (HDS) provide a higher level of physical security than the SDS.
     - HDS uses EMT (or other ferrous metallic conduits) and elbows, couplings, and connectors of the same material.
     - All connectors and joints are permanently sealed with epoxy or welds.
     - Pull boxes must not have removable hinge pins, and must be locked with RCMP approved padlocks.
     - If the PDS conduits are buried underground, one or more of the following measures can be considered:
       - be buried at least 1 metre underground, or below the frost line, whichever is deeper;
       - be encased in at least 20cm of concrete. The concrete must have a minimum 20 MPa compressive strength and 4% to 7% air-entraining (the engineer designing the

concrete may specify a higher compressive strength, percent air-entraining based on aggregate size, fibre reinforcement, or application of sealants based on site specific requirements);
- use of alarmed carriers.
- If PDS conduits are run above grade in a physical Public Zone, then they should be at least 5 metres above ground, continuously monitored, and alarmed.

g) The RED cabling within the physical Security Zone (both plain text RED and CSEC approved COTS encryption) should:
   - not be concealed in plenum areas, or behind walls; and
   - be visible and accessible for visual inspections.

Note: If, for any reason, a PDS cannot be visually inspected over its entirety, then additional security measures may need to be taken into consideration. This, however, is beyond the scope of this cabling standard and should be identified and addressed in a HTRA.

6.5.3 Cable management (identification)

a) All RED cabling (both copper and fibre) must be colour coded to allow for visual identification of the RED cables.
b) The colour marking of RED network cabling must be uniform in all SSC buildings. The colour markings must be a 2 cm wide RED electric tape, applied 7.5 cm from each end of the cable, and on the section in the pull boxes.
c) Based on site specific security posture and operational requirements, colour markings may also be applied every 1.5 metres along parts or the length of the RED cables.

6.5.4 Cabled equipment outlets

a) Appropriate size and type of conduits will be used when conduits are required to protect the cables that run to the equipment outlets.
b) All RED equipment outlets must have a RED faceplate.
c) All RED equipment outlets must have a sticker identifying them with the appropriate information security designation/classification of the network, i.e., “protected C” or “Secret”.
d) Keyed connectors must be used on all RED equipment outlet ports to provide positive separation from BLACK equipment outlet ports.
e) When deciding on location of equipment outlets, RED/BLACK physical separation requirements must be considered.

6.5.5 Cabling

a) Based on site specific security posture, security and operational requirements, type of encryption and type of end terminals used, type of conduits specified for the site, justification of costs supported by a business case study, additional hardening measures may be taken for the cabling as specified below.
   - Cat 6 STP cabling can be used for horizontals. In this case, the copper cabling must be terminated with metallic jacketed connectors.
   - In lieu of Cat 6 STP, fibre optics (OM3 or OM4), can be considered when operational and security requirements justify the cost.
   - When fibre is used for horizontal cabling, the fibre must either be terminated on fibre to copper media converters, or end-user devices with fibre network cards are to be considered. Alternate arrangements are required to provide users with PoE.

6.5.6 Controlled BLACK systems

a) Controlled BLACK data is RED data that has been encrypted with CSEC approved COTS encryption. Controlled BLACK is still RED, and can only be treated as controlled BLACK within the GC enclave. Therefore, measures specified for RED systems should also be applied to Controlled BLACK systems when outside the GC enclave.

6.5.7 Other measures

a) Additional site specific measures that are not listed here may be considered to address site specific security and operational requirements on a case by case basis.

6.6 Demarcation point

6.6.1 To the extent possible, SSC will use existing MERs or Entrance facilities to establish and/or maintain demarcation points in office buildings. Service Providers must terminate their fibre and/or copper cables at the demarcation point and SSC will use its backbone cables to bring the services to the appropriate DRs throughout the building.

6.7 Expected results

- Alignment of SSC's premise telecommunications cabling infrastructure with the Canadian and North American Cabling Industry;
- Alignment of fit-up standards within spaces under SSC's mandate with respect to telecommunications cabling systems;
- Increased standardization, consistency, quality, and reliability of specifications and telecommunications cabling systems to support improved decision making and stewardship;

- Reduced costs through implementation of common telecommunication cabling fit-up standards.

7 Implementation and monitoring

SSC TTP (Telecommunications Transformation Program) will develop an operating standard based on this technical standard. The operating standard will be updated when the technical standard is updated.

7.1 Consequences of non-compliance

Consequences of non-compliance can include: informal follow-ups and requests from SSC-TBS IT Standards Committee, external audits, and formal direction on corrective measures.

7.2 Roles and responsibilities

Final responsibility and accountability for IT infrastructure pertaining to telecommunications cabling systems decision making, relating to this standard, rests with SSC for the 43 partner departments. For SSC clients, the departments that are conducting business from the premise and utilizing the infrastructure are responsible and accountable for the IT infrastructure.

To the maximum extent possible, within their decision making authority, SSC and partner departments will jointly leverage existing infrastructure, common and shared infrastructure, common technical solutions, and common management practices to advance overall government telecommunications cabling efficiencies and services.

7.3 Reviews and updates

This technical standard must be reviewed at least once each fiscal year and updated as required to reflect changes in SSC requirements and industry standards.

Since this standard involves applications of engineering principles and practices, any change or modification to this technical standard must be reviewed and approved by a professional engineer.

8 Reference

8.1 Relevant legislation

- *Financial Administration Act* (FAA)

8.2 Related policy instruments and publications

- Treasury Board – mandatory policy instruments
  - *Management Accountability Framework (MAF)*
  - *Policy Framework for Information and Technology*
  - *Policy on Management of Information Technology*
  - *Directive on Management of Information Technology*
  - *Policy on Information Management*
  - *Common Services Policy*
  - *Policy on Government Security*
    - *Management of Information Technology Security* (MITS)
    - *Operational Security Standard on Physical Security*
    - *Personnel Security Standard*
    - *Security Organization and Administration Standard*

8.3 Lead agency non-mandatory guidance instruments:

- RCMP G1-005 *Preparation of Physical Security Briefs*
- RCMP G1-024 *Control of Access*
- RMCP G1-026 *Guide to the Application of Physical Security Zones*
- RCMP G1-029 *Secure Rooms*
- RCMP G1-031 *Physical Protection of Computer Servers*
- *Physical Protection of Computer Servers* (RCMP G1-031)
- *COMSEC Installation Planning - TEMPEST Guidance and Criteria* (CSEC ITSG-11[1])
- *Guidance for the Communications Security of SECRET Information* (CSEC ITSB-79)
- *CSEC Approved Cryptographic Algorithms for the Protection of Sensitive Information and for Electronic Authentication and Authorization Applications within the Government of Canada* (ITSA-11E)
- *Government of Canada Policy for the Protection of Classified Information Using Suite B* Algorithms (ITSB-40A)
- *Directives for the Application of Communications Security in the Government of Canada* (ITSD-01)
- *Directive for the Control of COMSEC Material in the Government of Canada* (ITSD-03)

8.4 Technical standards and specifications

- See Appendix B

[1] CSEC ITSG-11 applies to systems processing Protected C or Classified information

9 Enquiries

Please direct enquiries about this technical standard to your departmental headquarters' functional authority.

For interpretation of this standard, contact the departmental headquarters' functional authority:

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Email: hamid.vafaie@canada.ca

10 Appendix A: Glossary

Backbone: A facility (e.g., pathway, cable, or conductors) between any of the following spaces: distributor room, floor-serving terminals, entrance facilities, and common distributor rooms.

Backbone pathways: The backbone pathways carry cables from the Entrance Room to the Main Equipment Room. Backbone pathways also carry cables from the Main Equipment Room to the various distributor rooms located on each floor and may link multiple distributor rooms on each floor.

BLACK area: The space which contains only BLACK equipment and BLACK lines. (Source: CSEC ITSG 11)

BLACK data: Information whose disclosure will not cause injury to the national interest or is not extremely sensitive (i.e., unclassified and protected A or B information). BLACK data is also defined as RED data that has been encrypted using a CSEC approved cryptographic device. (Source: CSEC ITSG 11)

BLACK equipment: IT equipment which only intentionally generates or processes BLACK data. (Source: CSEC ITSG 11)

BLACK lines: Signal lines which only intentionally carry BLACK data. BLACK lines include power lines, control lines, the encrypted output of a cryptographic device, or any other signal line not intended to carry RED data. (Source: CSEC ITSG 11).

Client: The intended recipient of a service. Clients may be external (citizens, businesses, non-Canadians, or organizations, e.g., non-profit) or internal to government (departments). (Source: TBS *Policy on Management of Information Technology*, July 1, 2007).

Common Distributor Room (CDR): A distributor room that services tenants in a multi-tenant building.

Common service: A service that is provided by a common service organization. (Source: TBS *Policy on Management of Information Technology*, July 1, 2007).

Common service organization: A department or organization that is designated as a central supplier of particular services to support the requirements of departments. Common service organizations are listed in Appendix B of the *Common Services Policy*. (Source: TBS *Policy on Management of Information Technology*, July 1, 2007)

Controlled BLACK data: RED data that has been encrypted with CSEC approved COTS encryption, and is confined within a GC enclave. “Controlled BLACK” data is still RED and must be physically separate from both BLACK data, and RED data.

COTS: Commercial off the shelf.

Cryptographic (Equipment) Room (CR): A physically secure room hosting cryptographic equipment.

CSEC: Communications Security Establishment Canada.

Demarcation point: A point where the operational control or ownership changes

Department: A federal entity as defined in section 2 of the *Financial Administration Act* unless excluded by specific acts, regulations, or Orders in Council. (Source: TBS *Policy Framework for Information and Technology*, July 1, 2007)

Distributor Room: The distributor room is a common access point for cabling subsystems and building pathways. The distributor room shall be able to contain telecommunications equipment, cable terminations, and associated cross-connect cabling. The distributor room may also contain information technology and building automation systems (BAS) equipment and cabling.

EMSEC: Emission (or Emanations) Security

EMSEC zoning: Determines the extent (distance) to which compromising emanations (CE) propagate from RED IT systems. Zones are based on combined amount of free space attenuation (FSA) and the attenuation provided by the building materials used in the facility's construction. There are three EMSEC zones (1, 2, and 3). Ref. ITSG-11 section titled *Facility EMSEC Zoning Table 5 – EMSEC Zones*.

Enterprise data centre: SSC's purpose built data centres with dedicated power and cooling.

Entrance Room (ER) (also referred to as Entrance Facility (EF)): The Entrance Room is the first termination point inside the building from the street level/exterior. Cables of the various public and private network services providers are routed to the Entrance Room. This room usually houses electronic equipment owned by the network services providers to deliver services to the occupants. The point of demarcation between the facilities owned by the network services providers and those owned by SSC or the occupants is usually located in the Entrance room. This room is typically located in the basement or at ground level. Although this room is not within the Government of Canada leased space, the RCMP'S *Guide on application of physical security zones* (G-0126) requires this room to be within the physical Operations Zone (OZ) where access is limited to personnel who work there and to properly escorted visitors.

Horizontal pathways: Horizontal pathways typically carry cables from each distributor room to the vicinity of the work area (workstations and enclosed spaces) being served.

Information management: A discipline that directs and supports effective and efficient management of information in an organization, from planning and systems development to disposal or long-term preservation. (Source: TBS *Policy Framework for Information and Technology*, July 1, 2007).

Information technology: Includes any equipment or system that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. It includes all matters concerned with the design, development, installation, and implementation of information systems and applications to meet business requirements. (Source: TBS *Policy Framework for Information and Technology*, July 1, 2007).

Insulation displacement connector: Also known as insulation-piercing connector. Refers to an electrical connector designed to be connected to the conductors of an insulated cable by a connection process which forces a sharpened blade through the insulation of the cable.

IT decision making: Refers to the process and actions involved in making decisions on IT management. (Source: TBS *Directive on Management of Information Technology*, April 1, 2009)

ITSA, ITSB, ITSD and ITSG: CSEC's IT Security Alert, Bulletin, Directive and Guidance.

LAN switches: LAN switches connect users to the LAN and direct the telecommunications traffic that flows through them. Aggregation (core) and distribution switches are typically located in the Main Equipment Room and access switches are typically located in the Distributor Rooms.

LC connector: LC (also known as little connector) is a small form factor connector that uses a 1.25 mm standard ceramic ferrule connector that is easily terminated with any adhesive, provides good performance, and is highly favoured over the SC connector for single-mode fibre.

Main Equipment Room (MER) (also referred to as Common Distributor Room (DR) see 569-C figures 9 & 18**):** The Main Equipment Room is the central point for the distribution of telecommunications services within the building. This is a special purpose space housing backbone interconnections, routers, local survivability gateways (and servers), IT equipment shared by the occupants and supporting infrastructure. It generally requires additional air conditioning and electrical requirements, and may have a raised floor. *N.B.:* With a few exceptions, including building security systems servers, wireless access controllers and VoIP local survivability gateways, there should be no SSC-owned or SSC partner-owned servers in office buildings occupied by SSC partners, since SSC is consolidating its partners' data centres into enterprise data centres. The MER must be located outside of partners' or clients' areas, unless no alternative location is available.

Management of information technology: Includes planning, building (or procuring), operating and measuring performance. (Source: TBS *Policy on Management of Information Technology*, July 1, 2007)

Physical security zone types: RCMP G1-026 identifies five fundamental zone types as well as the baseline security requirements for each, as follows:

- Public Zone (PZ) where the public has unimpeded access and generally surrounds or forms part of a government facility.
- Reception Zone (RZ) where the transition from a public zone to a restricted-access area is demarcated and controlled.
- Operations Zone (OZ) where access is limited to personnel who work there and to properly escorted visitors.
- Security Zone (SZ) where access is limited to authorized personnel and to authorized and properly escorted visitors.
- High Security Zone (HSZ) where access is limited to authorized, appropriately screened personnel and authorized and properly escorted visitors.

Power over Ethernet / Power over Ethernet plus (PoE and PoE+): IEEE standard that allows delivery of electrical power to wired devices over the Ethernet cabling. PoE delivers 15.4 W of DC power (minimum 44 V DC and 350 mA) to each device, while PoE+ delivers 25.5 W of power and 600mA.

Protected distribution system (PDS): Refers to copper and/or optical cables that are protected from unauthorized physical or electronic access when transmitting unencrypted data through an area of lesser classification or control.

RED area: The space in which any RED equipment, RED lines or RED systems is located. (Source: CSEC ITSG 11)

RED data: Classified information and/or information that is extremely sensitive (Protected C). (Source: CSEC ITSG 11)

RED equipment: IT equipment which generates or processes RED data. (Source: CSEC ITSG 11)

RED lines: Signal lines carrying RED data, originating, or terminating on RED equipment. (Source: CSEC ITSG 11)

RED system: Combination of RED equipment and RED lines. (Source: CSEC ITSG 11).

Retrofitting: To modify systems that are already in service using parts made available after the time of original installation. (Source: BICSI TDMM 12th edition)

Servers: Servers are computers that host applications and store and process client specific information. They are typically located in the Main Equipment Room. Servers must be located in distributor rooms that meet the appropriate level of physical security zone requirements. A separate server room may not be required in situations where the building contains a main equipment room of adequate size and appropriate level of physical security zone type*. N.B.:* With a few exceptions, including building security systems servers, Wireless Access Controllers and VoIP Local Survivability Gateways, there should be no SSC-owned or SSC partner-owned servers in office buildings occupied by SSC partners, since SSC is consolidating its partners' data centres into enterprise data centres.

Service: A means, administered by a program, of producing a final valued output (i.e. service output) to address one or more target group needs. (Source: TBS *Policy on Management of Information Technology*, July 1, 2007).

Shared service: A service that is shared by more than one client (Source: TBS *Policy on Management of Information Technology*, July 1, 2007).

Shielded twisted pair: A cable with an overall shield composed of at least 65% tinned copper braid coverage. Both ends of the cable shields must have 360-degree termination to the cable connectors, and the cable connectors should then be connected to the equipment chassis, which then provides ground plane for the shield.

Suite A Cryptography (type 1): Type 1 cryptographic equipment includes CSEC-approved secure equipment and systems designed to protect classified information.

Suite B cryptography (COTS): Suite B: A specific set of cryptographic algorithms suitable for protecting classified information throughout the Canadian government to support interoperability with allies and coalition partners. All Suite B algorithms are described in *Federal Information Processing Standards* (FIPS), *National Institute of Standards and Technology* (NIST) *Special Publication* (SP) and Internet Engineering Task Force (IETF) standards.

Telecommunications cabling systems: Encompasses the specifications, design, configuration, implementation and management of telecommunications pathways, spaces and cabling infrastructure within and between buildings. Examples of spaces include telecommunications entrance facilities, distributor rooms, and distributor rooms. Pathways, such as conduit and cable tray, provide the support for cabling infrastructure between spaces.

Telecommunications infrastructure: The telecommunications infrastructure includes the Entrance Room, the Main Equipment Room, the Distributor rooms, the backbone pathways and cabling, and the horizontal pathways and cabling. It follows a “holistic” approach by looking at the building as a single entity, regardless of how many departments it houses, similarly to other utility spaces such as mechanical rooms and electrical rooms. The telecommunications infrastructure is to be shared by all federal occupants. The Government of Canada is considered a single tenant.

Telecommunications pathways: Cable trays and conduits that transport the cables.

Telecommunications spaces: Any spaces (e.g., rooms) that house telecommunications equipment and terminations of telecommunications cables. These include Entrance Facilities (EF), Distributor Rooms (DR), combined EF/DR, MER.

11 Appendix B: Codes, regulations and industry standards

The codes, regulations and standards listed in this section provide: for inter-operability between components, defined performance levels, and safety. Compliance with the following codes, regulations, and industry standards is mandatory.

11.1 Canadian codes

- *Canadian Electrical Code (CEC)*
- *National Building Code (NBC)*
- *National Fire Code (NFC)*

11.2 Canadian Radio-television and Telecommunications Commission (CRTC)

- *Decisions, Notices and Orders, Telecommunications Sector* http://www.crtc.gc.ca/

Parliament has given the CRTC the responsibility of regulating and supervising the broadcasting and telecommunications systems in Canada. The CRTC reports to Parliament through the Minister of Canadian Heritage.

11.3 North American telecommunications industry standards

The Telecommunications Industry Association (TIA) develops standards for the passive telecommunications cabling systems in North America. Compliance with the standards listed below is mandatory.

Within the ANSI/TIA standards, two categories of criteria are specified: mandatory and advisory. The mandatory requirements are designated by the word “shall”; advisory requirements are designated by the words “should”, “may” or “desirable”, which are used interchangeably in these standards.

Mandatory criteria must be met. Advisory requirements allow designers some reasonable and limited latitude as to how they will meet the intent of such requirements.

The American National Standards Institute (ANSI) and the Telecommunications Industry Association (TIA) develop standards for the North American Cabling Industry. The telecommunications industry is dynamic. As such, new versions of the ANSI/TIA standards are released approximately every three years. Updates are not performed in synchronization and changes in one standard will often cascade into another. Between the releases of new standard versions, the various standards committees often release addenda.

ANSI/TIA standards are published by IHS; therefore, the IHS website is an appropriate source to determine the latest published version of these standards. Visit the IHS website http://www.global.ihs.com/ and view the standards under the Telecommunications heading.

Common standards	Premises standards	Component standards
ANSI/TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises	ANSI/TIA-568-C.1 Commercial Building Telecommunications Cabling Standard	ANSI/TIA-568-C.2 Balanced Twisted Pair Telecommunications Cabling and Components Standard
TIA-569-C Commercial Building Standard for Telecommunications Pathways and Spaces	ANSI/TIA-570-C Residential Telecommunications Infrastructure Standard	ANSI/TIA-568-C.3 Optical Fiber Cabling Components Standard
ANSI/TIA-606-B Administration Standard for Commercial Telecommunications Infrastructure	ANSI/TIA-942-A Telecommunications Infrastructure Standard for Data Centers	ANSI/TIA-598-C Optical Fiber Cable Color Coding
TIA-J-STD-607-B Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications	ANSI/TIA-1005-A Telecommunications Infrastructure Standard for Industrial Premises	
ANSI/TIA-758-A Customer-owned Outside Plant Telecommunications Infrastructure Standard		
ANSI/TIA-862-A Building Automation Systems Cabling Standard for Commercial Buildings		

It must be noted that TIA-569-C introduced a number of new nomenclature for telecommunications spaces as indicated below. The original terms used in TIA-569-B are still commonly used in the industry but have been updated in this document.

TIA-569-B terms	New terms in TIA-569-C
Telecommunications Room or Equipment Room	Distributor Room
Telecommunications enclosure	Distributor enclosure
Common Telecommunication Room or Common Equipment Room	Common Distributor Room
Telecommunications outlet	Equipment outlet

11.4 Provincial and municipal codes and regulations

Where provincial and municipal codes, standards and regulations are more stringent than national codes, standards and regulations, the implementation must comply with the most stringent requirements.

12 Appendix C: Recommended cabling, types and applications

The following table outlines the types of recommended cabling and their recommended applications.

Cable type[2]	Specifications	Applications
Category 6	Unshielded twisted pair or shielded twisted pair	- Horizontal cabling. - Unclassified communications (data, voice, telepresence/video). - Classified communications with appropriate CSEC approved encryption.
Multi-Mode OM3 or OM4	Laser optimized 50µm/125µm	- Horizontal cabling. - Backbone cabling. - Unclassified communications (data, voice, telepresence/video) - Classified communications when appropriate CSEC approved encryption employed. - Classified communications in physically secure enclaves.
Single-Mode OS1	8.2µm/125µm	- Backbone. - Unclassified communications (data, voice, telepresence/video). - Classified communications when appropriate CSEC approved encryption employed. - Classified communications in physically secure enclaves.

[2] Appropriate plenum and riser rated cables as required.

13 Appendix D: Zone selection

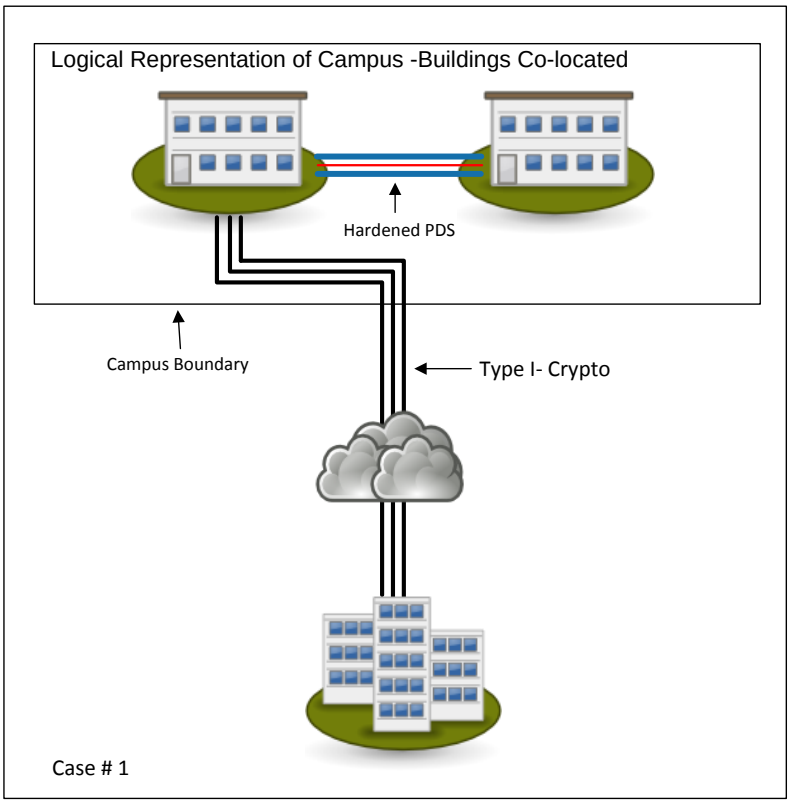
G1-026 Guide to the Application of Physical Security Zones recommends that for determining the appropriate zone(s) for the processing, storage or destruction of sensitive assets, it is first necessary to establish the minimum baseline requirements. The *Operational Security Standard on Physical Security* assigns zones based solely on the confidentiality of the asset and corresponding injury that would result from its unauthorized disclosure, destruction, removal, modification, interruption or use. The zone selection made at this point is the baseline minimum requirement.

14 Appendix E: Secret cabling use case examples

The use cases in this section have been simplified as they are intended for the purpose of providing examples for cabling, thus not all details related to encryption haven been shown.

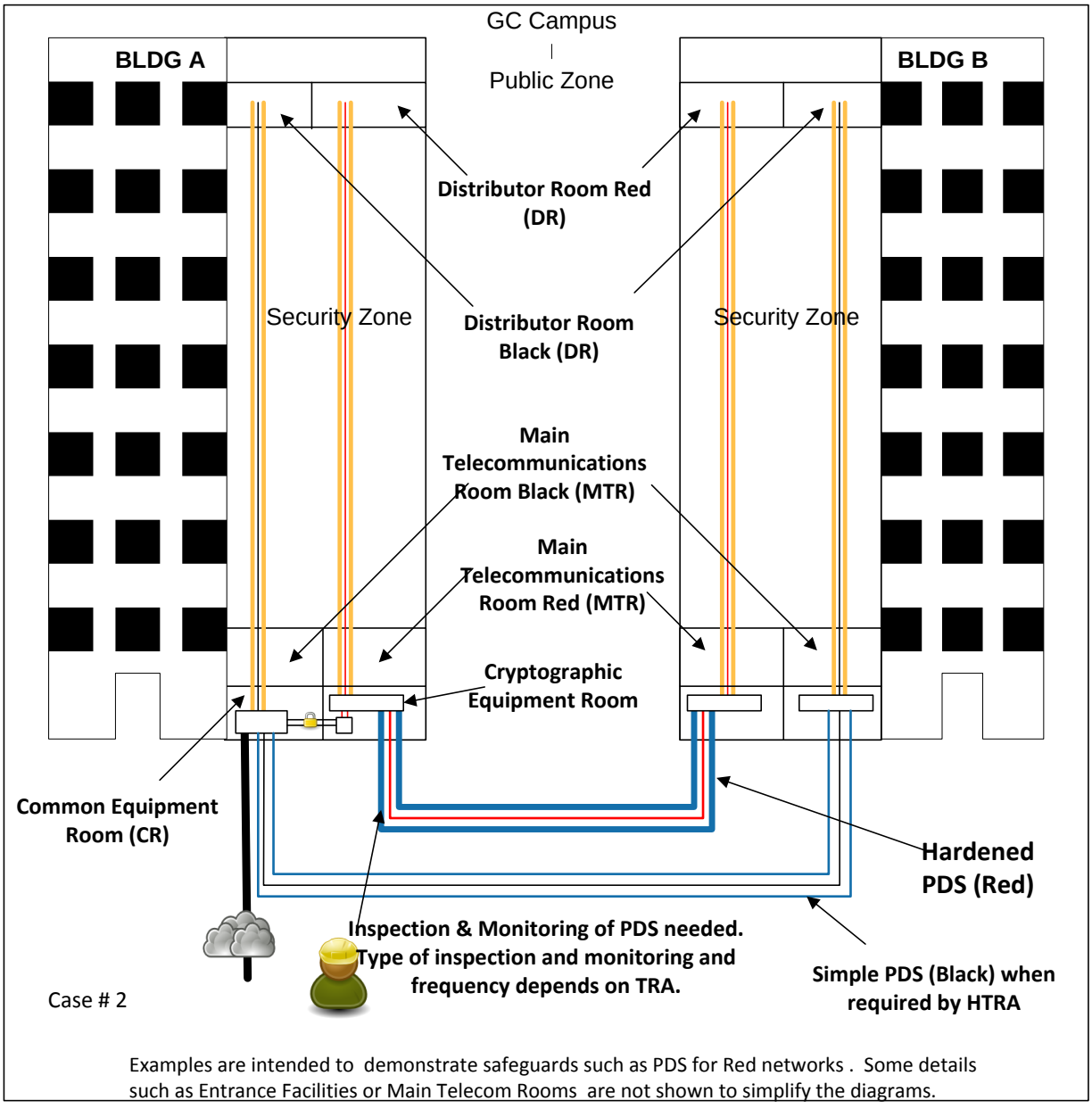
14.1 CASE 1: Co-located buildings cabling

This case is a logical (not physical) representation of buildings co-located within a campus of the Government of Canada. A hardened PDS is required when RED cable (copper or fibre) is run between buildings within the same campus where the space between buildings is not within a physical security restricted zone. The best option in this case is to use type 1 cryptographic devices between the buildings to reduce the cabling cost.



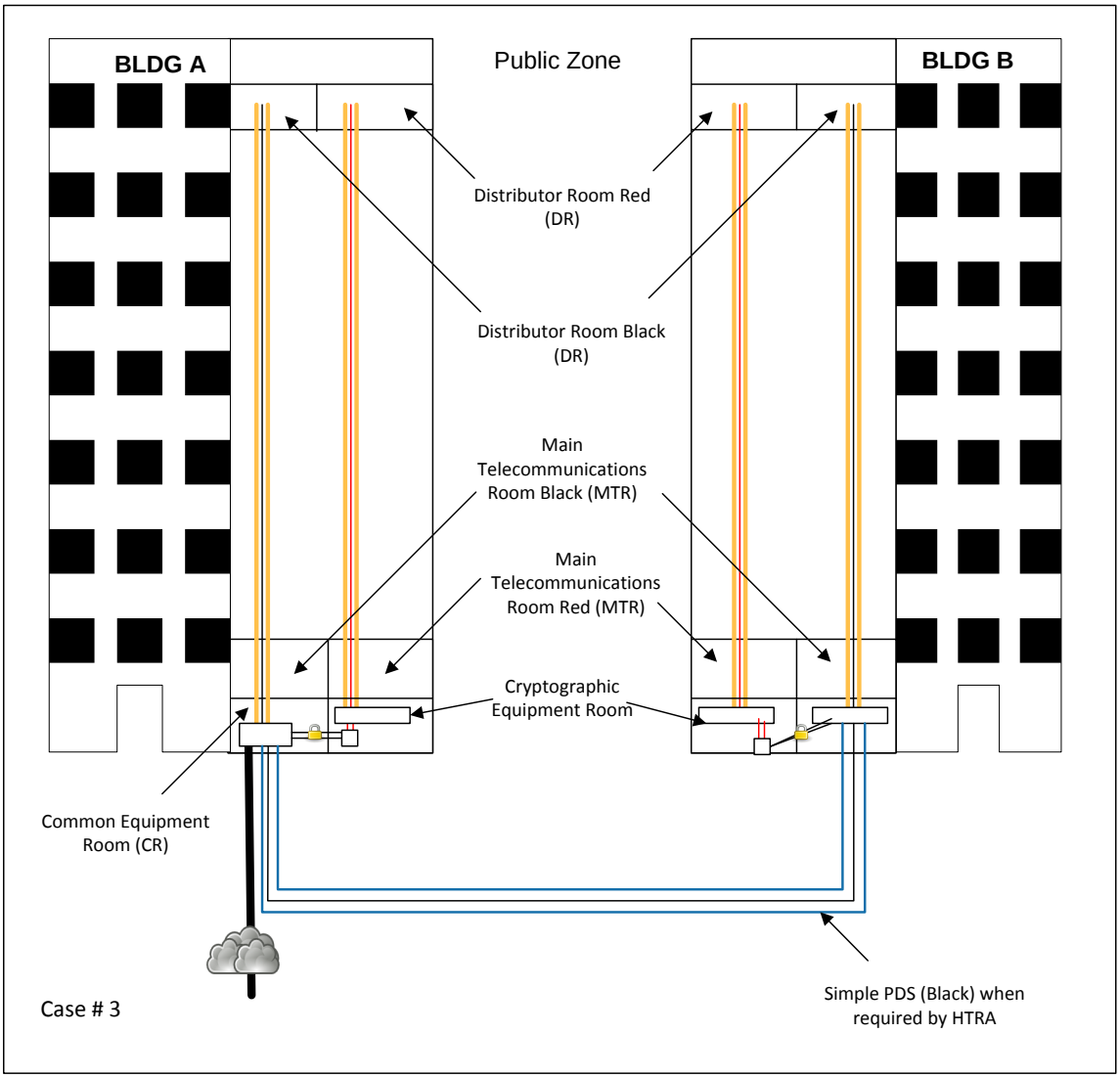
14.2 CASE 2: Co-located vertical cabling and inter-building cabling

In this case there is a CER in BLDG A, and the RED network from BLDG A is extended to BLDG B using a hardened PDS.



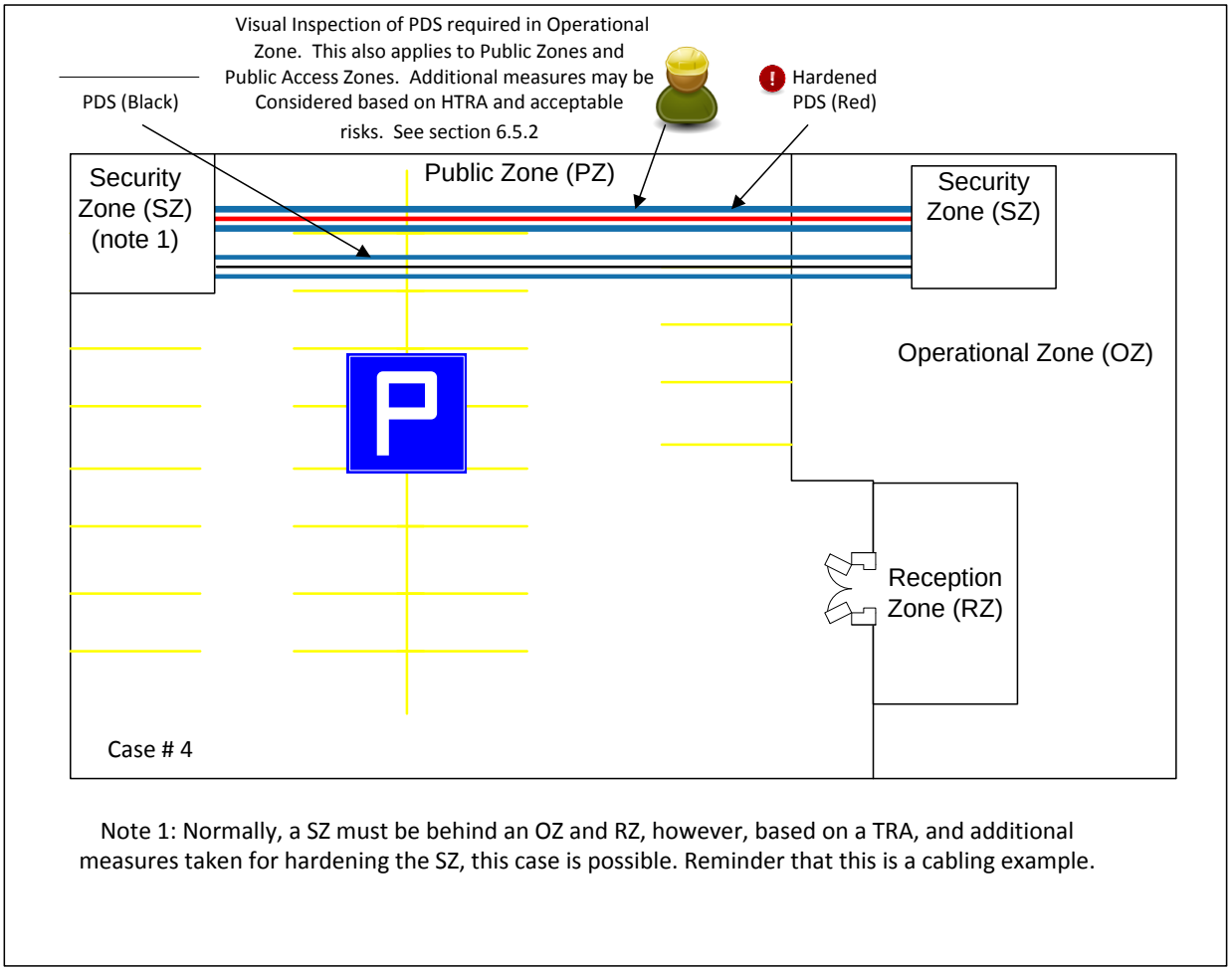
14.3 CASE 3: Co-located vertical cabling and inter-building cabling

In this case, the RED systems of buildings A and B are distinct and separate; this means there is no need to install a PDS between buildings A and B.



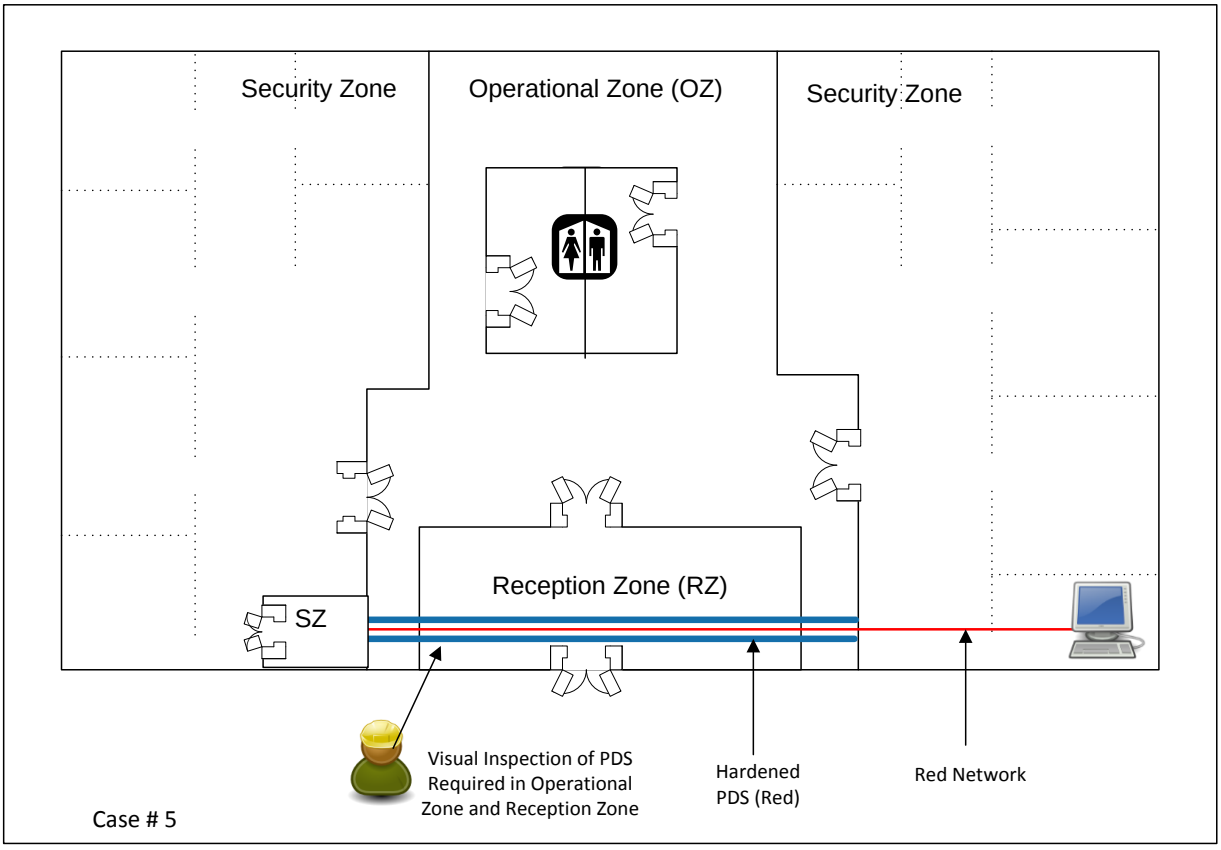
14.4 CASE 4: Cabled horizontal connection from Security Zone to Security Zone traversing Public Zone

In this case the RED networks must be in a hardened PDS at a significant additional cost, while the BLACK network will only require a simple PDS.

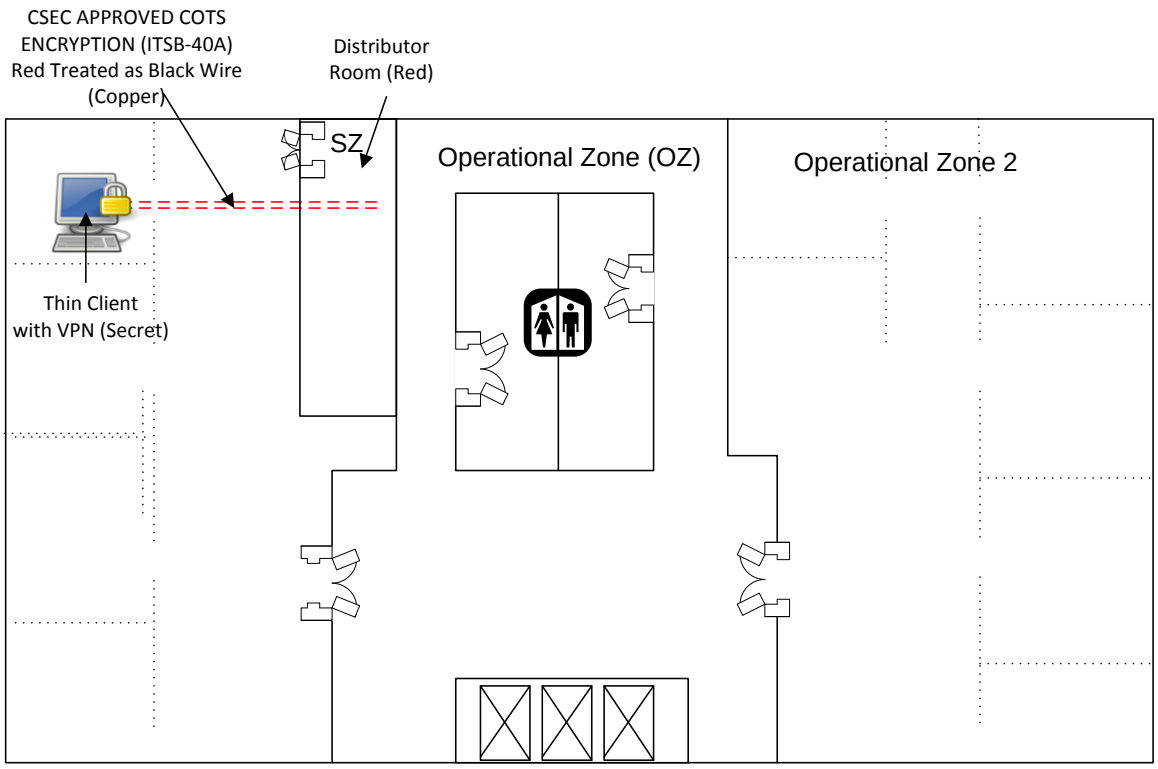


Note 1: Normally, a SZ must be behind an OZ and RZ, however, based on a TRA, and additional measures taken for hardening the SZ, this case is possible. Reminder that this is a cabling example.

14.5 CASE 5: Cabled horizontal connection from Security Zone to Security Zone traversing Reception Zone



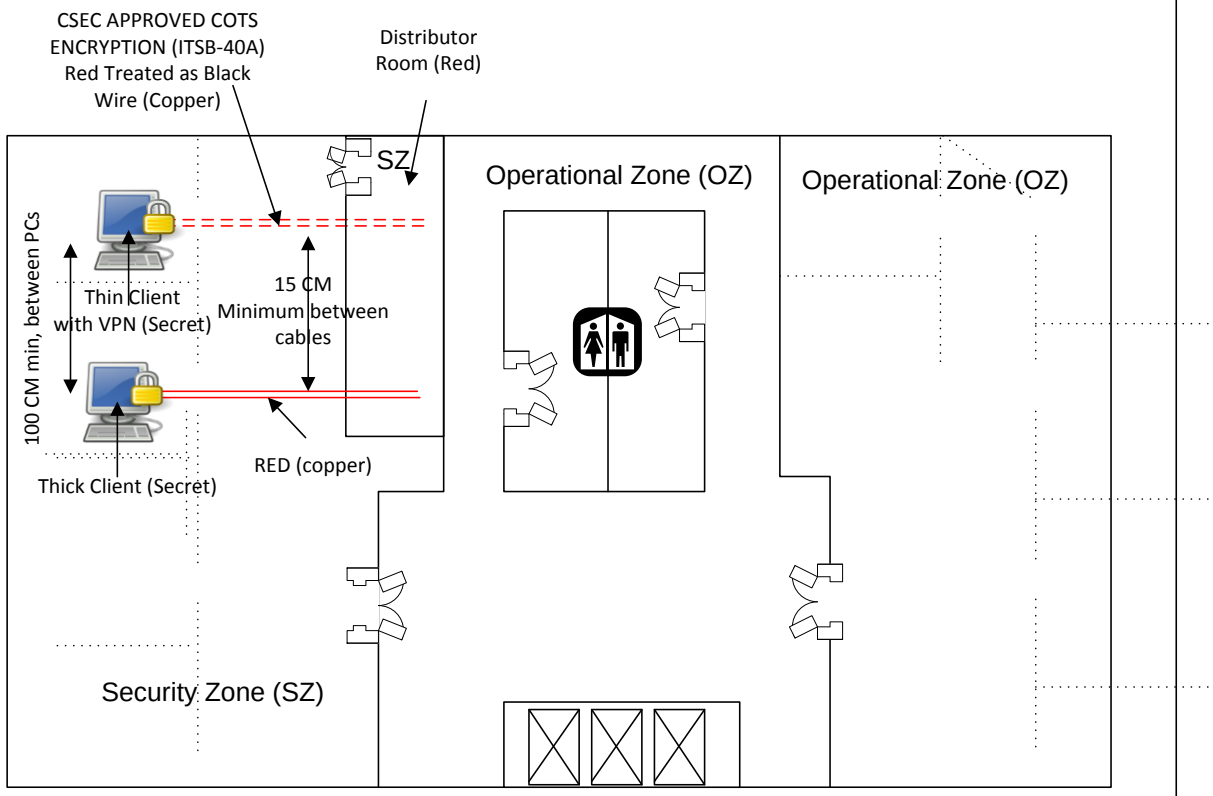
14.6 CASE 6: Thin client wire (horizontal) connection from Operational Zone to Security Zone



Case # 6: In this case the Thin Client is located in an Operational Zone adjacent to the SZ, and with the appropriate CSEC Approved COTS Encryption (ITSB-40), the cable can be treated as "Black Wire". Operational Security consideration should be taken (i.e. computer screens should not be visible from the door, access control is critical to ensure uncleared personnel don't have access to the system.

= = = = : RED treated as Black

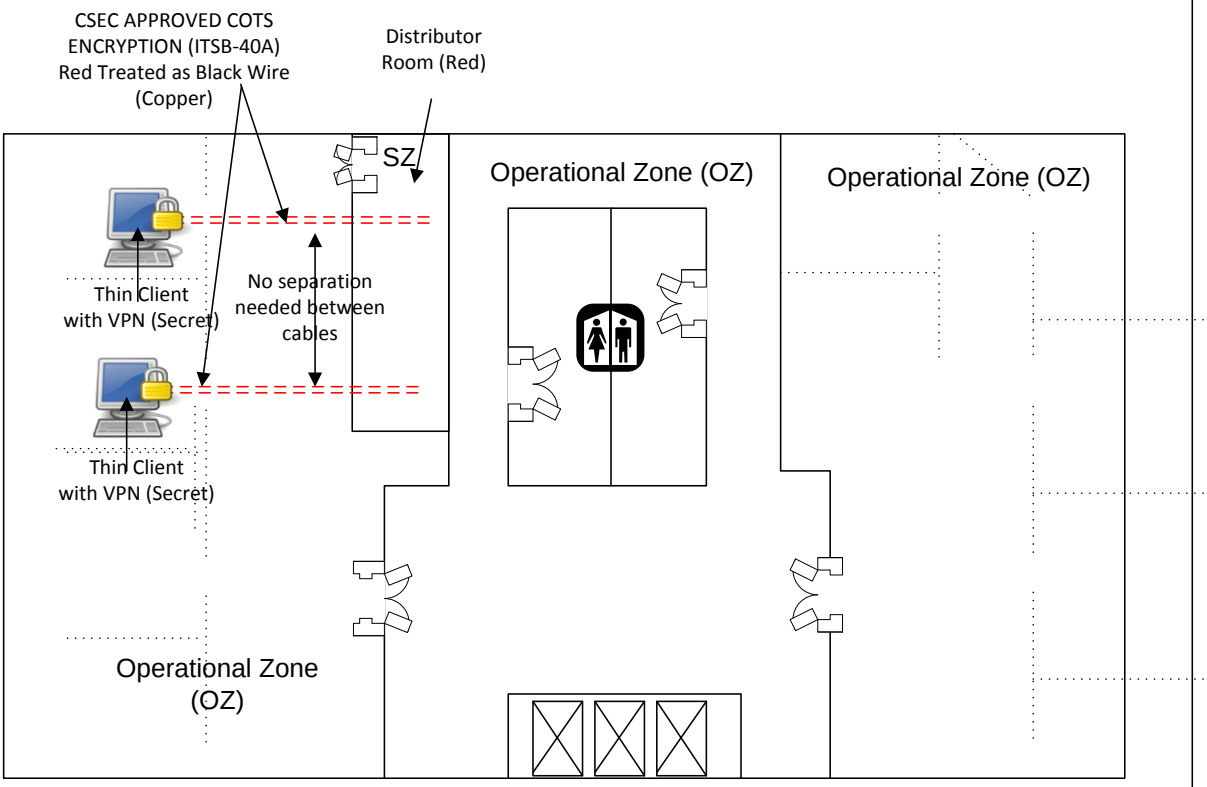
14.7 CASE 7: Variation of case 6



Case # 7: In this case a Thin Client and a Thick Client are located in a Security Zone (SZ). The Thin Clients is running CSEC APPROVED COTS ENCRYPTION (ITSB-40). The Copper cable to the Thin Client (Secret) would be treated as “Black Wire”, and the copper cable to the Thick Client (Secret) would be treated as “Red Wire”.

= = = = : RED treated as Black

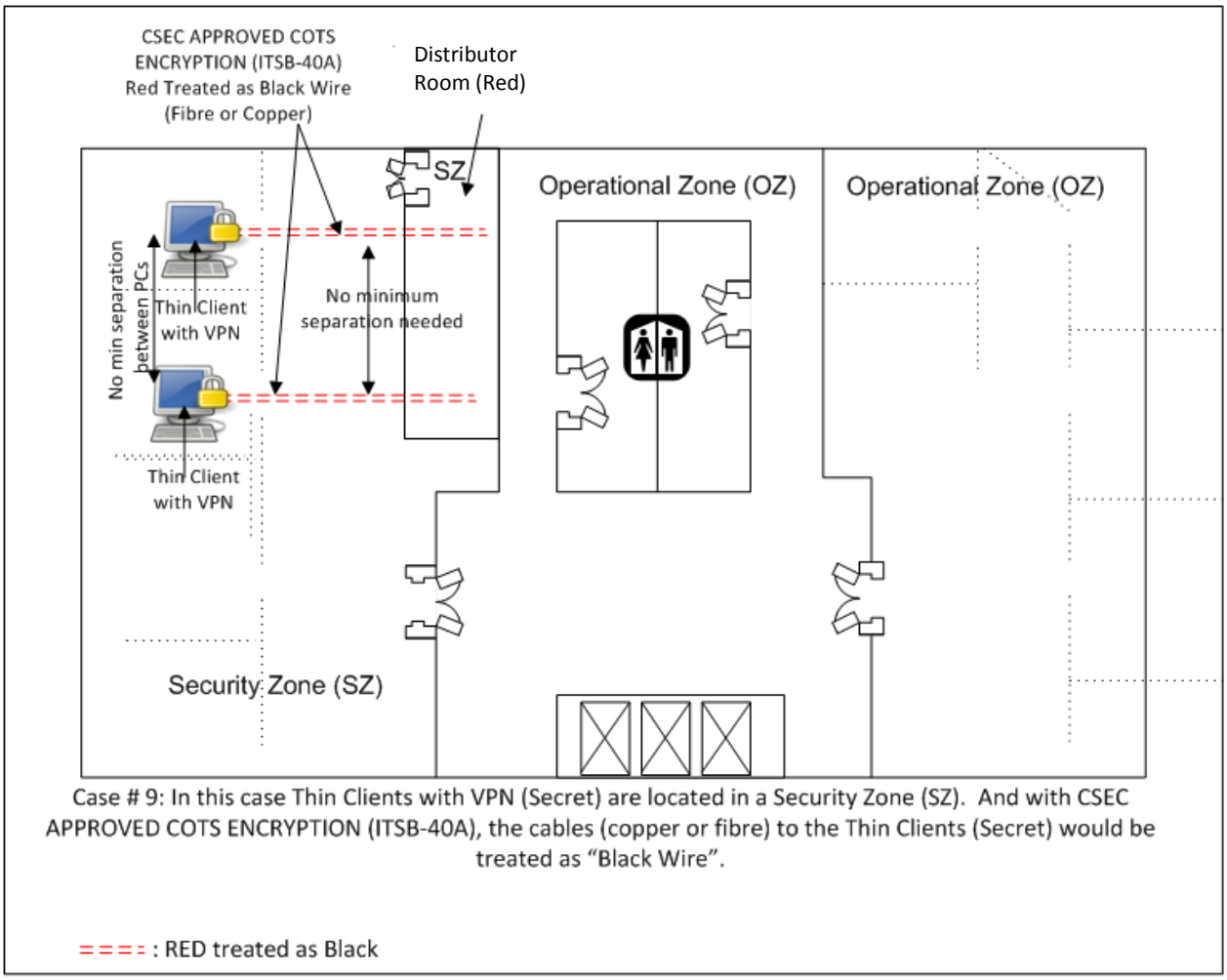
14.8 CASE 8: Variation of case 6



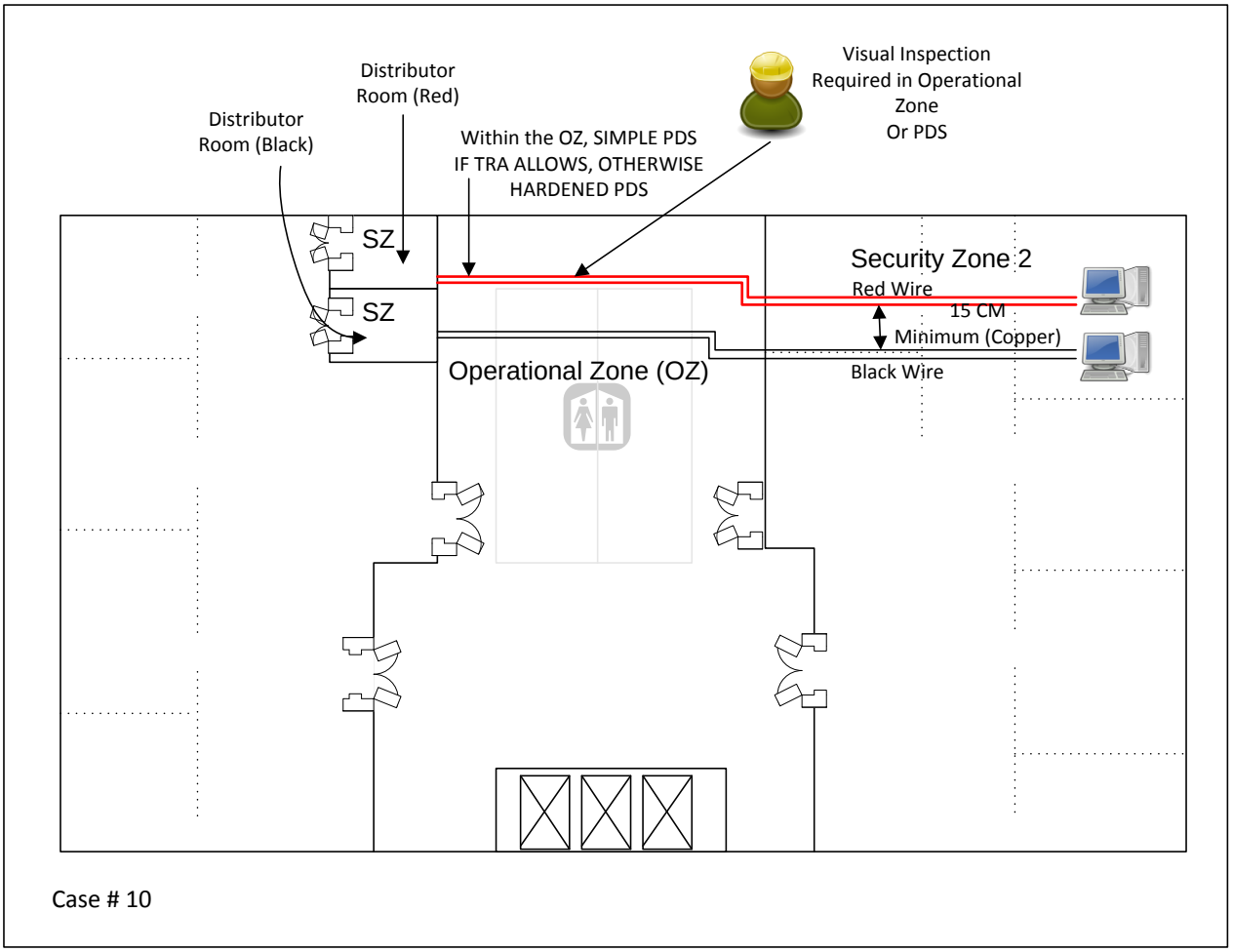
Case # 8: In this case two Thin Clients with VPN (Secret) are located in an Operational Zone adjacent to the SZ, and with the CSEC APPROVED COTS ENCRYPTION (ITSB-40), both copper cables can be treated as "Black Wire". Operational Security consideration should be taken (i.e. computer screens should not be visible from the door or windows. Access control is critical to ensure uncleared personnel don't have access to the system.

= = = = : RED treated as Black

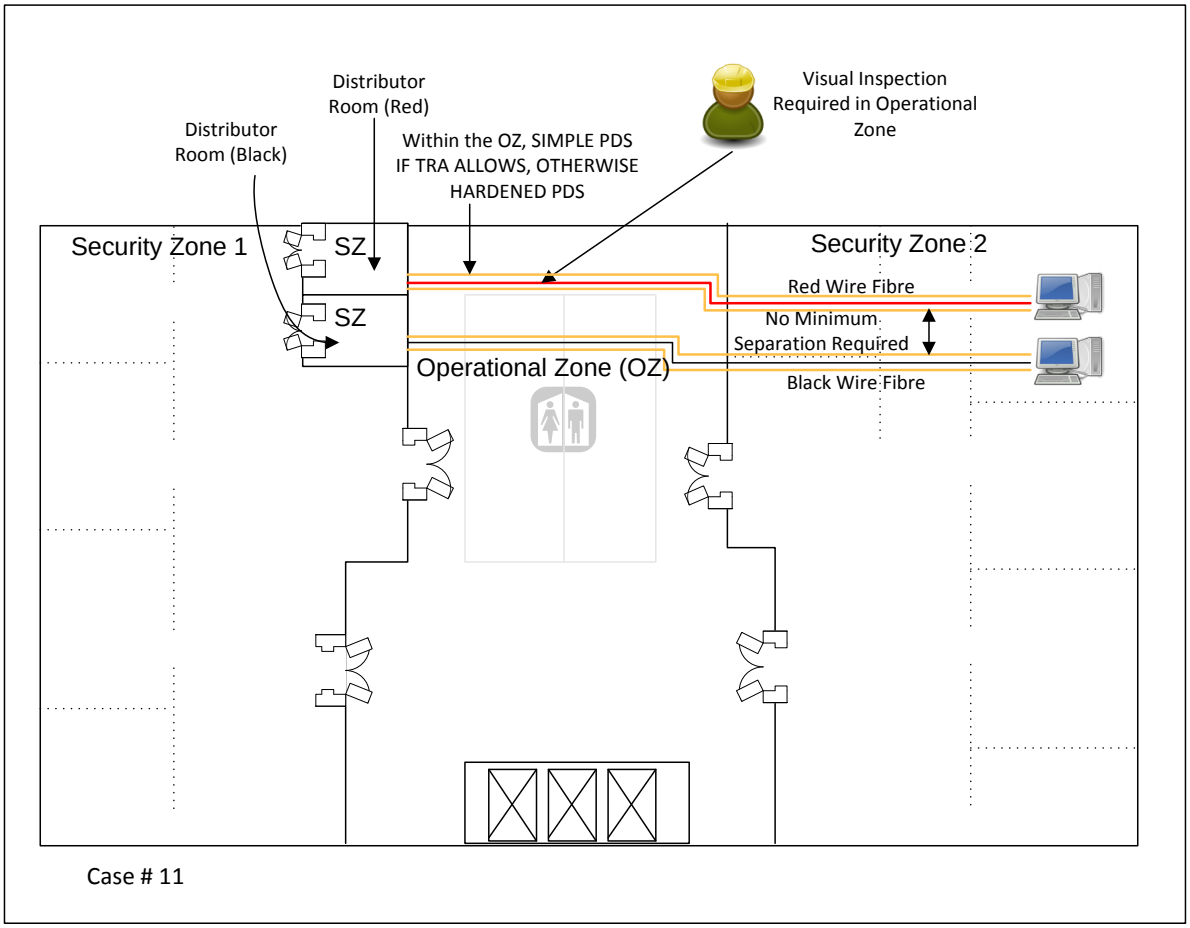
14.9 CASE 9: Variation of case 6



14.10 CASE 10: Cabled connection horizontal (BLACK and RED) between two Security Zones that traverse an Operational Zone

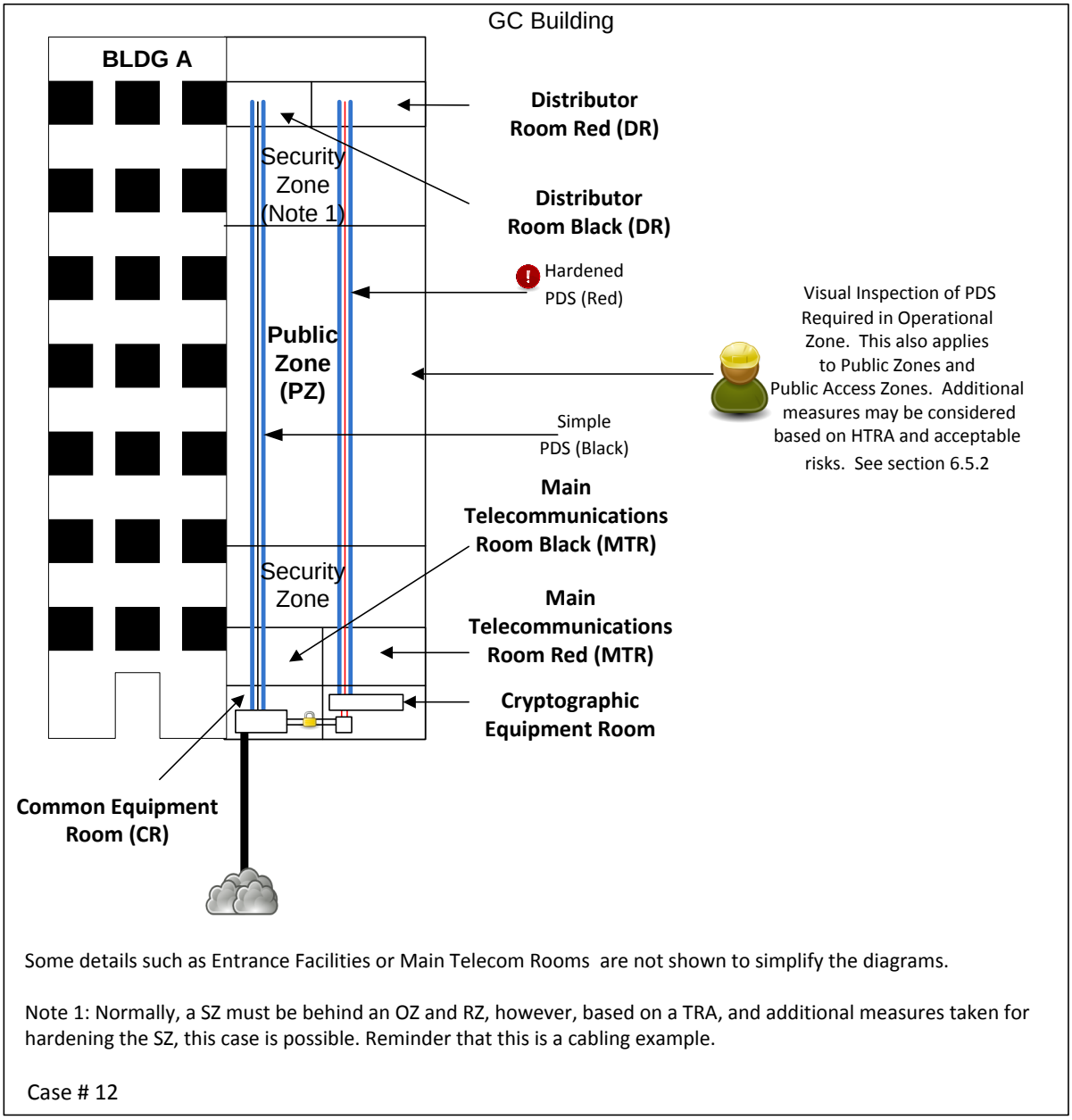


14.11 CASE 11: Fibre connection horizontal (RED and BLACK) between two Security Zones that traverse an Operational Zone



14.12 Case 12: Cabled vertical connection from Security Zone to Security Zone traversing Public Zone

In this case the RED networks must be in a hardened PDS at a significant additional cost, while the BLACK network will only require a simple PDS.



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GOVERNMENT OF CANADA (GC) WORKPLACE FIT-UP – SPECIAL TECHNICAL STANDARD GUIDELINES (SECTION A4)

TELECOMMUNICATIONS (CABLE NETWORKS) PATHWAYS AND SPACES – PLANNING AND IMPLEMENTATION

TELECOMMUNICATION CABLE NETWORKS DESIGN AND ENGINEERING (TCNDE)

INTRA-BUILDING NETWORK ENGINEERING (IBNE) DIVISION

INTRA-BUILDING NETWORKS (IBN) DIRECTORATE
NETWORK AND END USERS BRANCH (NEUB)
SHARED SERVICES CANADA (SSC)

Author:	M. Huard
Status:	Final
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Information Security:	Protected A

Shared Services Canada | Services partagés Canada

Canada

Document Approval

Signing below signifies approval of the ***Government of Canada (GC) Workplace Fit-Up – Special Technical Standards Guidelines (Section A4)***.

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Revision History

Note: This document must be reviewed at least once a year and recorded in the following tables.

Version No.	Status (Draft/ Final)	Date	Consulted/Reviewers	Description of Change	Changed By
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0.2	Draft	2017-09-07	C. Sigouin, Sr Business Analyst/Technical Writer, IBNE	Reformatted, edited and updated with additional features.	C. Sigouin, Sr Business Analyst/Technical Writer, IBNE
0.3	Draft	2017-09-08	P. Beaudry, Technical Advisor, TCNDE, IBNE	Reviewed with comments.	C. Sigouin, Sr Business Analyst/Technical Writer, IBNE
0.4	Draft	2017-09-08	J. Tomas, IBNE Director	Reviewed with comments.	C. Sigouin, Sr Business Analyst/Technical Writer, IBNE
0.5	Draft	2017-10-10	M. Huard, Technical Advisor, TCNDE, IBNE	Reviewed with comments.	C. Sigouin, Sr Business Analyst/Technical Writer, IBNE
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Reviewed and Endorsed By:		
Participant Full Name -- Title	**Participant Department -- Division**	**Date**
Jose Tomas, Director	Shared Services Canada (SSC), Network and End Users Branch (NEUB), Intra-Building Network Engineering (IBNE) Directorate	2017-09-07
P. Beaudry, Technical Advisor	SSC, NEUB, IBNE Directorate	2017-11-08

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2.	**Senior Technical Writer**	Edits and standardizes format, and saves document with GCDOCS number, and sends a GCDOCS link to Subject Matter Experts (SMEs) for review.
3.	**SMEs**	Review **draft** document (**version 0.1**) (in Track Changes mode in Microsoft (MS) Word, highlighted in yellow in Excel and Visio) and send with comments to the Senior Technical Writer by email.
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8.	**Senior Technical Writer/Author**	Consolidates changes from Approver(s)' comments into **final** document as **version 1.0** and sends a GCDOCS link to Approvers for approval.
9.	**Approver(s)**	Signs **final** copy of document (**version 1.0**) and sends to Executive Assistant to have other Approvers sign this final copy.
10.	**Executive Assistant**	Scans document in Portable Document Format (PDF) and sends to Senior Technical Writer.
11.	**Senior Technical Writer**	Places scanned PDF document in GCDOCS and distributes to all SMEs and Contributors.

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Document Version Numbering Convention		
Version Number	**Definition**	**Actor**
0.1	**Working version before release for review.**	Author
0.2	**Document update from SMEs' comments.**	Author
0.3, etc.	**Document update from SMEs' comments.**	Author
1.0	**First release of approved where a scanned copy is placed in GDDOCS distributed to all Approvers, Contributors and SMEs.**	Author
1.1, etc.	**Minor document update distributed to all Approvers, Contributors and SMEs.**	Author
2.0, etc.	**Major document update distributed to all Approvers, Contributors and SMEs.**	Author

Document Roles

The following table identifies the roles and responsibilities of **each area** involved in the development, review and approval of this document.

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Document Contributors	Contributes to the development of the document.	List areas that are to be consulted in the writing of this document (i.e. WAN Services, Data Centre Networks, CITS, etc.).	
Document Reviewer(s)	• Perform the review of the document when the Owner has marked it ready for review. • This phase of the document review is prior Peer Review.	List areas stakeholders that need to be consulted in the review of this document (Working Group, Special Advisory Committees etc.).	**C** (Consulted)
Document Approver(s)	Approves document.	List authorities to approve this document and update Document Approvals section.	**A** (Accountable)
Stakeholders	Major stakeholders that need to be informed.	Identify the stakeholders who have a stake in this initiative and that needs to be kept informed when an approved version is available.	**I** (Informed)

Table of Contents

FIGURES

TABLES

1 Introduction

This document provides guidelines to plan and implement telecommunications (cable networks) pathways and spaces in order to fit up the Government of Canada (GC) Workplace in Crown-owned or leased facilities.

Telecommunications (cable networks) pathways and spaces support more than just voice and data connectivity requirements. Telecommunications (cable networks) pathways and spaces also support many other building systems connectivity requirements such as environmental control, security (access control), audio, television (Closed-Circuit Television [CCTV], Cable Television [CATV] and Video Conferencing), sensing, alarms and paging.

The selection of cable networks' pathways, spaces, physical configuration, as well as design and specification criteria, are influenced by the following factors:

- Information Technology Security Posture;
- Mandatory Codes and Standards;
- Emerging Technologies/Shared Services Canada (SSC) Transformation;
- End Users' Information Technology (IT) Requirements; and
- Cost Effectiveness, etc.

As such, telecommunications (cable networks) pathways and spaces must be configured to cater to present and future requirements while providing a secure, code and standard compliant, robust, efficient, flexible and cost effective solution to support the end users. Indeed, telecommunications (cable networks) pathways and spaces support all wired and wireless means for sending and receiving information within buildings.

1.1 Background

On November 15th, 2011, following the Order in Council (OIC) 2011-1297, SSC became the Government of Canada (GC) Functional Authority (control and supervision) of telecommunications (cable networks) configuration management and Design Authority. Responsibilities were subsequently assigned to SSC's Network End User Branch (NEUB), Intra-Building Network Engineering (IBNE) Directorate, Telecommunication Cable Networks Design and Engineering (TCNDE) section.

1.2 Scope

The scope of this document is limited to the configuration, design and specification of telecommunications (cable networks) pathways and spaces for Crown-owned or leased facilities. The information provided can be applied to single tenants, multiple GC tenants, as well as GC-shared and private tenants.

1.3 Purpose

The purpose of these Guidelines is to provide guidance in planning and implementing telecommunications (cable networks) cable pathways and spaces for the fit-up of GC Workplace in Crown-owned or leased facilities.

1.4 Audience

These Guidelines are intended to be used by personnel involved in the GC Workplace, in consultation with the telecommunications (cable networks) Design Authority residing at SSC, NEUB, IBNE Directorate, TCNDE section.

2 Considerations – Technologies and Compliances

2.1 Technical – IT Security Posture

Due to specific standards and rules governing IT network security, end user's IT security requirements must be clearly identified in Use Cases (UC's) prior to developing the design for telecommunication pathways and spaces, as well as technical specification packages. Each UC must be reviewed and investigated individually to permit the selection of pathways' physical configuration.

For shared facilities (public and Government of Canada [GC]), the following zone occupancy types impact on the configuration, design and specification of telecommunications (cable networks) pathways and spaces:

- Public Zone (PZ);
- Operation Zone (OZ);
- Security Zone (SZ);
- High Security Zone (HSZ); and
- IT networks classification levels (Unclassified, Controlled Black and Classified),

2.2 Mandatory Codes and Standards

To ensure a holistic approach for the provision of robust, secure and flexible IT networks, the planning and installation of telecommunications pathways and spaces, as well as cable networks must be performed in compliance with the most recent version of applicable codes and standards such as, but not limited to:

- American National Standards Institute (ANSI) – ANSI 156.13 – Mortise Locks & Latches Series 1000;
- ANSI/Telecommunications Industry Association (TIA) – ANSI/TIA-568.0 – Generic Telecommunications Cabling for Customer Premises;
- ANSI/TIA-570 – Residential Telecommunications Infrastructure Standard;
- ANSI/TIA-606 – Administration Standard for Commercial Telecommunications Infrastructure;
- ANSI/TIA-607 – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premise;
- ANSI/TIA-862 – Building Automation Systems Cabling Standard for Commercial Buildings;
- ANSI/TIA-942 – Telecommunications Infrastructure Standard for Data Centres;
- ANSI/TIA-1005 – Telecommunications Infrastructure Standard for Industrial Premises;

- BICSI-Telecommunication Distribution Methods Manual;
- Communications Security Establishment (CSE) – Information Technology Security Group (ITSG) ITSG-11A Emission Security (EMSEC) Guidance;
- National Building Code of Canada (NBCC);
- National Fire Code of Canada (NFCC);
- National Energy Code for Buildings (NECB) for Electrical Power Systems;
- Royal Canadian Mounted Police (RCMP) – RCMP G13-01 Secure Storage Rooms (SSR);
- Shared Services Canada (SSC) – SSC-TS01 Technical Standard on Premises Telecom Cabling Fit-up in Spaces under SSC Mandate;
- SSC TS09 Power and Cooling in Distributor (Telecom) Rooms;
- SSC TS10 Data Centre Cabling Specifications;
- TIA-569 – Telecommunications Pathways and Spaces;
- UL 634 Standard for Connectors and Switches for Use with Burglar-Alarm Systems; and
- UL 437 Standard for Key Locks.

2.3 Emerging Technologies/SSC Transformation

Shared Services Canada (SSC) has been mandated by the Government of Canada (GC) to initiate transformation of Information Technology (IT) networks to align with modern, resilient and cost-effective technologies. The numerous transformation programs will see the migration of existing IT networks to the following modern technologies:

- Voice over Internet Protocol (VoIP);
- Wi-Fi;
- Power over Ethernet (PoE); and
- Virtual Hosted Desktop (VHD).

To avoid costly infrastructure refit requirements, telecommunications pathways and spaces must be configured to support present and future IT network transformation programs. Of special interests are the size and configuration of pathways, as well as fit-up requirements for specific telecommunications spaces that will affect Heating, Ventilation, and Air Conditioning (HVAC), power, grounding and footprint.

2.4 End-User IT Requirements

The configuration of telecommunications pathways and spaces is also dependant on end-users' specific IT requirements. Although a great amount of efforts is deployed to virtualize networks, national security departmental partners tend to require additional connectivity to desktop in support of classified or international networks that cannot be easily virtualized. The following systems are typical IT networks that are commonly supported by SSC's telecommunications pathways and spaces:

- Telephony;
- Data Networks (Classified and Unclassified);
- Security (Closed-Circuit Television [CCTV], access control and intrusion alarms);
- Cable Television (CATV);
- Building Automation System (BAS); and
- Video Conferencing (VC).

2.5 Cost Effectiveness

The development of telecommunications (cable networks) pathways and spaces design and technical specification packages must be approached with a view to minimize both implementation and future operating maintenance costs. Consideration must be given to investment value for short-term lease. A good pathways and spaces design will cater to present requirements, but will also support future growth. This will be made possible by sound planning and by complying with applicable mandatory codes and standards.

Note: Cost savings cannot override the requirement to comply with IT network security requirements and to prescribed pathways and space standards. Failure to do so will prohibit the activation of circuits requiring enhance security safeguards and may, in the short term, require implementation of costly and operational impacting refits.

3 Telecommunication Cable Networks Design and Engineering (TCNDE) – Service Catalogue

3.1 Statement of Requirements

The Telecommunication Cable Networks Design and Engineering (TCNDE) section provides the following service catalogue itemized as a Statement of Requirements (SOR) for design and engineering services relating to telecommunications (cable networks) of SSC's 43 partners departments (listed in ***Table 3-1***).

Table 3-1: Statement of Requirements – TCNDE Section

Service	Statement of Requirements (SOR)
Define Connectivity and Construction Requirements	• meet with Project Manager (PM) to discuss project scope; • review end user requirement; • provide technical advice to the Project Management Office (PMO) and to end users.
Completion of Site Visit	• review site layout; • investigate accessibility to access cabling pathways and spaces (outside departmental networks).
Development of Construction Option Analysis	• propose standard and code compliant pathways and space solutions.
Completion of Pathways and Space Design	• produce standard and code compliant pathways and spaces design of classified / unclassified networks.
Development of Cost estimate	• develop Class D cost estimate for Treasury Board of Canada Secretariat (TBS) Preliminary Project Approval (PPA) submission; • assist in the development of a Class A cost estimates for TBS Effective Project Approval (EPA) submissions; • develop and final SSC cost estimate for Chief Financial Officer (CFO) letter of attestation (Capital Vote 5 projects).
Production of Design and Specification Package	• produce and submit technical documentation relating to pathways, spaces and grounding system's installation requirements.
Attend PMO team Meetings	• attend cyclical project meeting and advise stakeholders of cabling network requirements.
Review of Contractor's Design and Specification Proposal	• review and approve contractor's design sand specification proposals, • review and approve material shop drawings, • review and validate 33%, 66% and 99% proposals.
Performance of Quality Control and Quality Assurance visits	• perform cyclical on-site visits to confirm compliance of work being performed.

3.2 Statement of Work

The Telecommunication Cable Networks Design and Engineering (TCNDE) section provides the following service catalogue in the form of a Statement of Work (SOW) for design and engineering services relating to telecommunication cable networks of SSC's 43 partners departments (listed in ***Table 3-2***).

Table 3-2: Statement of Work – TCNDE Section

Service	Statement of Work (SOW)
Completion of Site Visit	• coordinate with PMO team and or end user group to discuss IT connectivity requirement; • review existing pathways and spaces' capacity to accommodate additional cabling.
Define Connectivity Requirements	• based on end user input, available technologies (Virtual Hosted Desktop [VHD], Voice Over Internet Protocol [VoIP]) and on current Government of Canada (GC) and SSC standards, define connectivity requirement for typical work area, meeting rooms, common area, special purpose area and enclosed office spaces.
Attend PMO team Meetings	• attend cyclical project meeting and advise stakeholders of cabling network requirements.
Development of Option Analysis	• propose standard and code compliant cabling network solutions.
Completion of Cable Network Design	• produce standard and code compliant pathways and spaces design of classified / unclassified networks based on end user requirements.
Development of Cost estimate	• develop Class D cost estimate for TBS PPA submission; • assist in the development of a Class A cost estimates for TBS EPA submissions; • develop and final SSC cost estimate for CFO letter of attestation (Capital Vote 5 projects).
Development of Cable Network Statement of Work Directive	• produce and submit technical documentation relating to pathways, spaces and grounding system's installation requirements.
Review of Contractor's Cabling Statement of Work Directive Proposal	• review and approve contractor's design sand specification proposals; • review and approve material shop drawings; • review and validate 33%, 66% and 99% proposals.
Production of Bill of Materials	• produce a Bill of Material (BoM) detailing materials required to complete the installation of the cable network.
Coordinate Procurement of Materials	• arrange for the procurement and delivery of cable materials through GC procurement vehicles or Government Cabling Service (GCS) cabling services contract.
Coordinate Cable Network Installation	• arrange for the allocation of workforce using in-house resources or through GCS cabling services contract.
Performance of Quality Control and Quality Assurance visits	• perform cyclical on-site visits to confirm compliance of work being performed.

Table 3-2: Statement of Work – TCNDE Section

Service	Statement of Work (SOW)
Performance of Commissioning Activities	• review cable network test results; • perform on site cabling network validation testing; • provide PMO team with work commissioning report.

4 Configuration and Design for Telecommunications Pathways and Spaces

4.1 Components of Telecommunications Pathways and Spaces

Telecommunications spaces include a variety of rooms and locations that are used by a building's occupants to interact with telecommunications equipment, and are the location for the placement, termination and interconnection of cabling and telecommunications equipment. The telecommunications pathways and spaces' technical specifications are to be determined in consultation with the Telecommunication Cable Networks Design and Engineering (TCNDE) Cable Network Designer at Shared Services Canada (SSC). The following telecommunications spaces are normally found in buildings:

1. **Distributor Room:** an enclosed architectural space designed to contain Distributor A, Distributor B or Distributor C;
2. **Distributor A:** an optional connection facility in a hierarchical star topology that is cabled between the equipment outlet and Distributor B or Distributor C;
3. **Distributor B:** an optional intermediate connection facility in a hierarchical star topology that is cabled to Distributor C;
4. **Distributor C:** a central connection facility in a hierarchical star topology;
5. **Common Distributor Room:** a distributor room that services tenants in a multi-tenant building;
6. **Entrance Room or Space:** a space in which the joining of inter or intra building telecommunications facilities takes place; an entrance room may also serve as a distributor room; and
7. **Entrance Facility:** an entrance to a building for both public and private network service cables (including wireless) including the entrance point of the building and continuing to the entrance room or space.

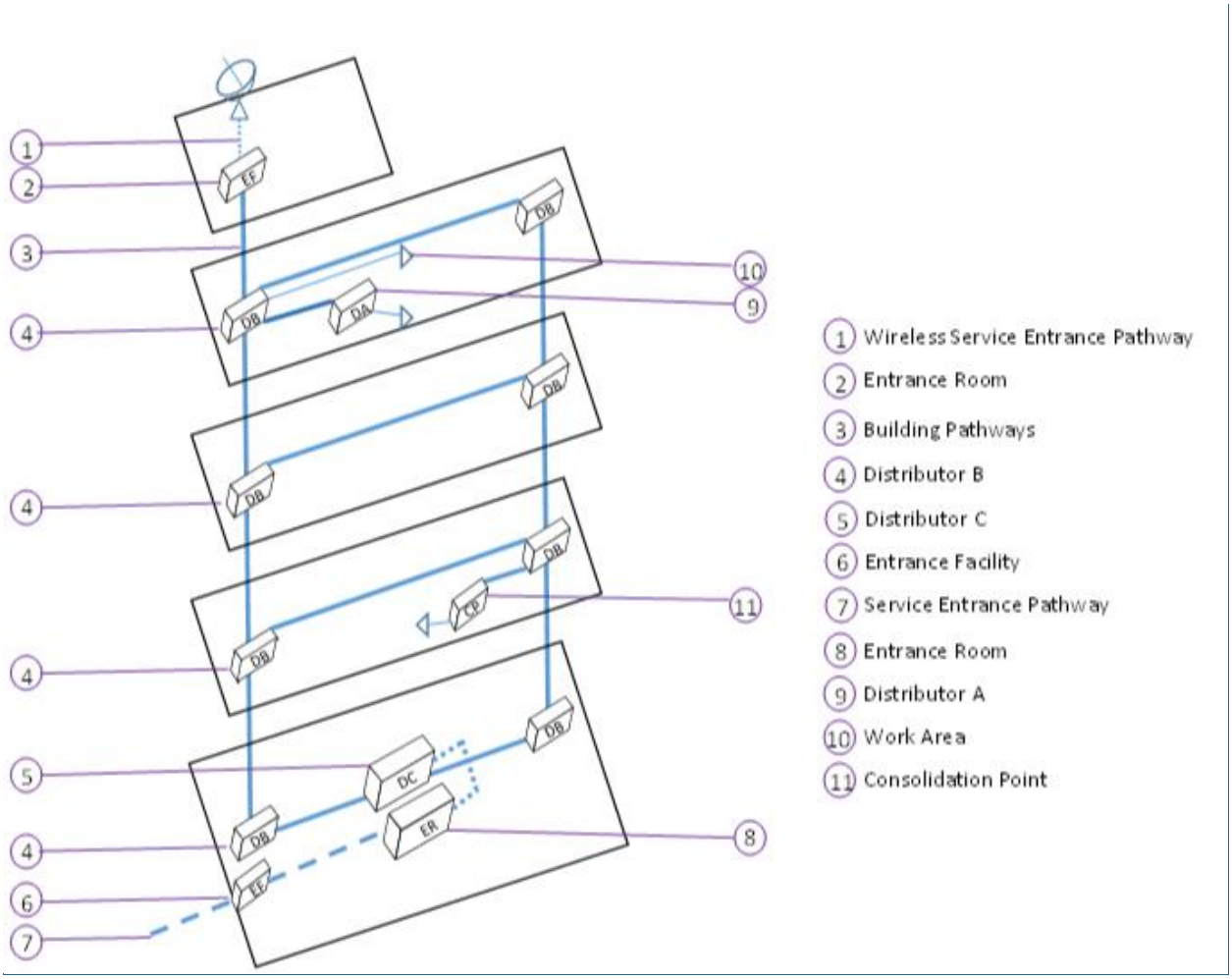
Based on a myriad of technical criteria, the SSC TCNDE Cable Network Designer will determine the technical specifications and architectural requirements for the telecommunications spaces. These technical specifications and architectural requirements will cover the following requirements:

- Heating, Ventilation, and Air Conditioning (HVAC);
- power;
- spaces positioning;
- vertical pathways requirements (sleeves or slots);
- floor/wall treatment;
- lighting;
- grounding;
- ceiling;

- telecommunication spaces size;
- internal telecommunications pathways; and
- fire protection, etc.

Figure 4-1 illustrates typical components of telecommunications pathways and spaces.

Figure 4-1: Typical Building Components of Telecommunications Pathways and Spaces



4.2 Crown-Owned Building and Leased Spaces

Specific design parameters must be applied to telecommunications pathways and spaces infrastructure in Crown owned or leased spaces. This is mainly to ensure the integrity of GC-cabling infrastructure and to safeguard against IT network security issues.

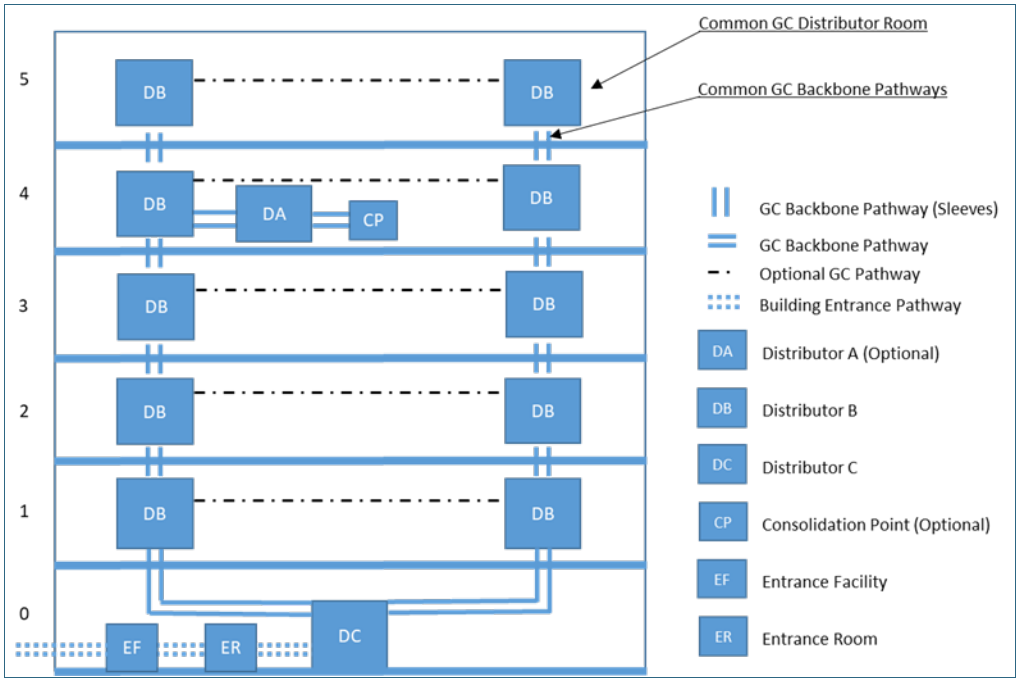
4.2.1 Crown-Owned Building

In a Crown-owned building, the telecommunications pathways and spaces infrastructure will adopt a holistic approach, whereas the pathways and spaces will provide telecommunications cable connectivity support to building occupants notwithstanding what department they represent. The cabling network will be regarded as a Government of Canada (GC) cable network suitable for all GC tenants.

Figure 4-2 illustrates the holistic approach to be applied to telecommunications and spaces infrastructure in Crown-owned buildings.

In some cases, classified networks will require a dedicated telecommunications pathway and space infrastructure. Furthermore, departmental classified network pathways and spaces may or may not be shared with other GC departments based on specific departmental security regulations. This could be as a result of a Threat Risk Analysis (TRA) or, in some cases, based on international agreements. The SSC TCNDE Cable Network Designer will determine the requirement for a classified pathways and space based on end users' specific requirements and in consultation with the Authority Having Jurisdiction (AHJ).

Figure 4-2: Infrastructure for Telecommunications Pathways and Spaces – Crown-Owned Buildings



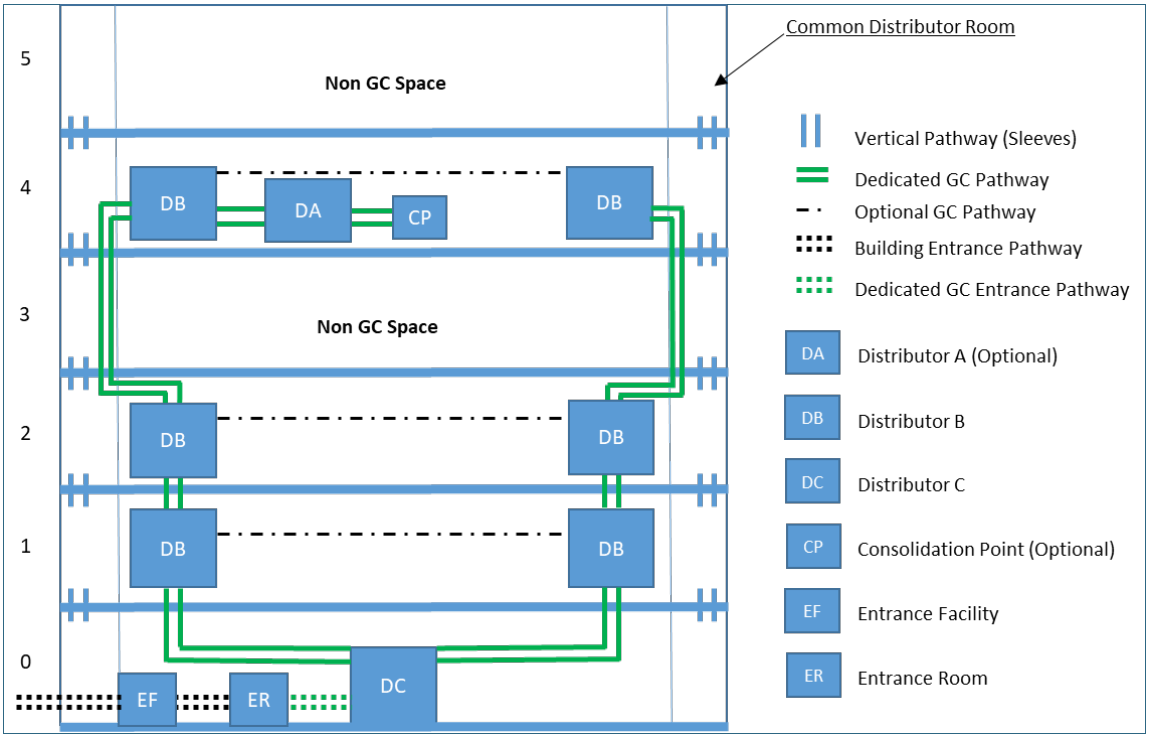
4.2.2 Leased Facility

In a leased space, a dedicated GC telecommunications pathways and spaces infrastructure needs to be established in order to maintain physical separation with non GC tenants. Common riser space can be used as a pathway between floors given that proper security measures have been put in place to avoid unauthorized access to dedicated GC cable infrastructure. The GC telecommunications spaces must remain under the strict control of the GC and cannot be shared with the private sector.

To that end, an inter-departmental holistic approach can still be achieved between GC tenants by applying the telecommunications pathways and spaces configuration used for Crown-owned buildings.

Figure 4-3 illustrates the configuration of a typical leased facility with a telecommunications pathways and spaces infrastructure.

Figure 4-3: Typical Leased Space Configuration – Multi-Tenant Telecommunications Pathways and Spaces



4.3 Design Parameters – Telecommunications Spaces

The TIA/EIA 569 standard of the Telecommunications Industry Association/Electronic Industries Alliance (TIA/EIA) provides technical specifications and design parameters associated with telecommunications pathways and spaces infrastructure.

Of specific importance is the size of telecommunications spaces. As numerous building systems are migrating to Internet Protocol (IP)-addressable technologies, telecommunications spaces need to provide sufficient floor spaces to accommodate the placement of floor-mounted racks and cabinets.

As stated in the TIA/EIA 569 standard, the distributor room must be sized to meet the known requirements such as the function of the room, the numbers of equipment and equipment racks needed, and the number of equipment outlets that it will serve. The sizing plan must include projected future, as well as present requirements. Each floor must be equipped with at least one telecommunications space.

Table 4-1 provides metrics of minimum recommended floor spaces for distributor rooms.

Table 4-1: Minimum Recommended Floor Spaces for Distributor Room Dimensions

Equipment Outlets Served	Minimum Floor Space – m^2 (ft^2)	Typical Dimensions – m (ft.)
Up to 100	9 (100)	3 X 3 (10 X 10)
101 to 200	13.5 (150)	3 X 4.5 (10 X 15)
201 to 800	36 (400)	6 X 6 (20 X 20)
801 to 1,600	72 (800)	6 X 12 (20 X 40)
1,601 to 2,400	108 (1,200)	9 X 12 (30 X 40)

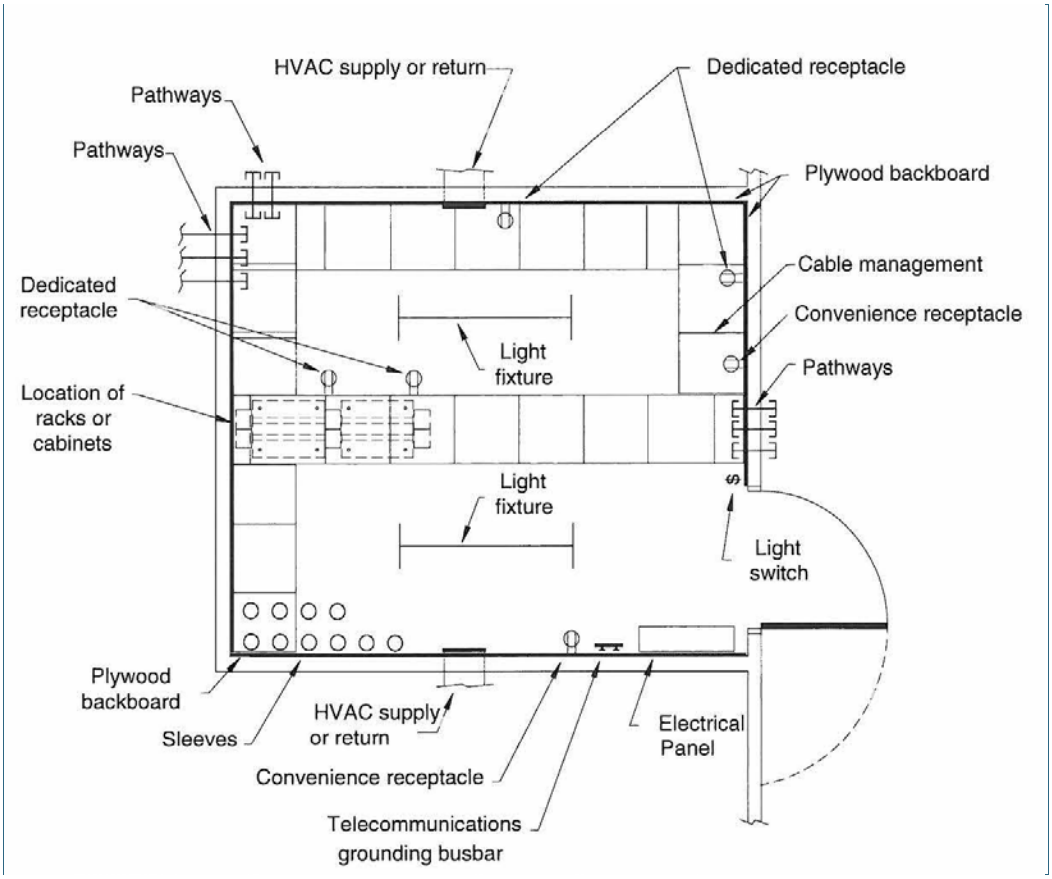
The TIA/EIA 569 standard further states that a distributor room containing Distributor C should be sized at a minimum of 11 m^2 (120 ft^2) for a building with gross area of up to 50,000 m^2 (500,000 ft^2). In larger buildings, the size of the distributor room containing Distributor C should be increased in increments of 1 m^2 (10 ft^2) for every increase of 10,000 m^2 (100,000 ft^2) in gross building area.

Note: For leased portions of a building occupied by the Government of Canada (GC), consider only the numbers provided in Table 4-1.

For further technical specifications and architectural requirements regarding telecommunications pathways and spaces, refer to the latest version of TIA/EIA 569 standard (Telecommunications Pathways and Spaces).

Figure 4-4 illustrates the configuration of a typical Distributor room.

Figure 4-4: Typical Distributor Room Configuration – Telecommunications Pathways and Spaces



4.4 Telecommunications Space Construction Parameters

Telecommunications spaces' architectural specifications are dependent-specific guidelines listed in Telecommunications Industry Association (TIA) – TIA/EIA 569 standard. Enhanced security measures may be required to safeguard sensitive and classified information in accordance with G13-01 Secure Storage Rooms (SSR). Enhanced security measures requirement is normally defined following a Threat Risk Assessment (TRA) administered by a Departmental Security Officer (DSO).

TIA/EIA 569 standard provides telecommunications pathways and spaces' architectural specifications which would normally apply to Protected A and Protected B telecommunication networks. The following are an overview of some of the specifications that apply to the construction of telecommunications spaces:

- **Telecommunications Space Location –** When selecting the site, avoid locations that are restricted by building components that limit expansion such as elevators, core, outside walls, or other fixed building walls. Accessibility for the delivery of large equipment should be provided. The telecommunications space should be located away from sources of electromagnetic interference, or designed to mitigate the effects of this interference. Special attention must be given to electrical power supply transformers, motors and generators, X-ray equipment, radio or radar transmitters, and induction sealing devices.

- **Security –** The design and location of the telecommunications space should be developed in accordance with the security plan of the building.

- **Plywood Backboards –** A minimum of one wall must be covered with 19-mm (3/4-in.) plywood. The backboard must be made of 1.2-m (4-ft.) x 2.4-m (8-ft.) sheets, mounted vertically, with the bottom of the plywood mounted 150 mm (6 in.) above the finished floor and its best side toward the room. Plywood must be A/C grade and finished with two (2) coats of fire-retardant paint. Plywood must be painted prior to installation of any equipment. Plywood must be permanently fastened to the wall by means of wall anchors utilizing galvanized, zinc plated, or stainless steel hardware with a flat head. Finished installation must have flush appearance with countersunk screw heads to prevent splitting of the plywood. Drywall screws are not acceptable.

- **Ceiling Height –** Clear height in the space must be 2.4 m (8 ft.) without obstructions. The height between the finished floor and the lowest point of the ceiling should be a minimum of 3 m (10 ft.) to accommodate taller frames and overhead pathways. For maximum flexibility, false (suspended} ceiling should not be provided.

- **Treatment to Interior –** Floors, walls and ceiling must be treated to minimize dust. Finishes must be light in color to enhance room lighting. Floors must have anti-static properties.

- **Floor Loading –** Floor loading (static and dynamic) capacity in the space must be sufficient to bear both the distributed and concentrated load of the installed equipment. A Structural Engineer must be consulted during the design to specify the floor loading limit. If equipment that exceeds these limits is anticipated, the floors for the areas where the equipment will be moved and installed must be appropriately reinforced.

- **Door** – The door must be a minimum of 0.9 m (36 in.) wide and 2 m (80 in.) high with no doorsill, hinged to open outward (code permitting), slide side-to-side, or be removable. The door must be fitted with a lock. If it is anticipated that large equipment will be delivered to the entrance room, a double door 1.8 m (72 in.) wide by 2.3 m (90 in.) high with no doorsill or center post, is recommended. If the door must open inwards, the size of the room (floor space) must be increased accordingly.

- **Seismic Considerations –** Seismic specifications for telecommunications infrastructure and related facilities must accommodate applicable seismic requirements per the AHJ.

Standard G13-01 – Secure Storage Rooms (SSR) provides further specifications pertaining to Protected A and Protected B telecommunications spaces, such as, but not limited to:

- Recommended alternatives for SSR for storage of Protected A and Protected B:
    - 1/2-in. plywood instead of sheet metal or steel mesh;
    - UL 634, door contact and Intrusion Detection Systems (IDS) (where recommended in TRA);
    - ANSI 156.13 Grade 1 mortise lock with UL 437 High Security (keyed) Cylinder.

RCMP G13-01 Secure Storage Rooms (SSR) standard provides security specifications pertaining to Protected C, Secret and Top Secret IT networks. Where deemed necessary by a Departmental Security Officer (DSO) and following a Threat Risk Assessment TRA, enhanced security measures must be put in place to safeguard the integrity of sensitive or classified information.

Secure Storage Rooms primarily protect against surreptitious attacks but also detect and delay forced entry. The SSR is designed for location in a Security Zone or High Security Zone in a federal government building (or Canadian Industrial Security Directorate [CISD]-approved equivalent in contractor facilities) in urban centres. SSR constructed in remote locations may require additional safeguards.

A Vulnerability Assessment should be conducted to determine if a potential adversary can access the perimeter (or any space above or below) of the SRR undetected and unobserved for long periods of time. If so, additional measures are required to limit access or actively monitor activity in the perimeter areas.

Floors and ceilings are assumed to be constructed of highly intrusion-resistant materials such as structural concrete, reinforced concrete block or concrete on steel (roofs and floors). Wood or steel assemblies should be steel-strengthened and vibration-monitored the same as the walls.

RCMP G13-01 Secure Storage Rooms (SSR) standard must be consulted to define applicable telecommunications space construction specifications such as but not limited to:

- Fire Protection;
- Slab-to-Slab Construction Requirement;
- Intrusion Detection Systems (IDS);
- Wall Framing;
- Wall Protection Material (sheet metal or steel mesh);
- Wall Finishing Details;
- Door, Frame and Hardware; and
- Ventilation Duct Pass-Throughs.

Note: In all cases, SSC TCNDE Cable Network Specialist, in consultation with applicable Network Security Representative, will define applicable security measures and construction specifications to be applied to telecommunications spaces.

4.5 Telecommunications Pathways

TIA/EIA 569 standard provides telecommunications pathways specifications and installation parameters. Telecommunications pathways can take the form of cable trays, perimeter raceways, conduit system, underfloor duct systems, non-continuous support (J hooks) and a cellular floor system.

Pathways are generally installed in a plenum or under floor space, and must terminate in the telecommunications spaces.

While selecting the type and size of pathways, designers must consider, present requirements, future growth, pathways flexibility as well as maximum pathways fill ratio.

The routing of pathways systems needs to be thoroughly planned prior to installation to reduce unnecessary changes in direction or elevation. Changes in direction or elevation restrict the installation of cables and result in the de-rating of the pathway system by up to 15% for each occurrence, which may necessitate the installation of additional pathways and pull boxes.

The following pathway information was extracted from TIA/EIA 569 standard:

- **Cable Tray –** Cable trays must be planned for an initial maximum calculated fill of 25%. The maximum fill of any cable tray must be 50%. The maximum fill depth of any cable tray must be 150 mm (6 in.).

- **Cable Runway –** Cables installed on cable runway must be stacked no higher than 150 mm (6 in). Retaining posts may be installed on runway to contain cables.

- **Pathway Support –** The span for cable support systems should be determined in accordance with the manufacturer's maximum recommended load capacity for a given span. These systems may be supported by three basic methods:

  - cantilever brackets from a wall;
  - trapeze or individual rod supports from above; or
  - trapeze or individual rod supports from below.

- Cable tray supports should be located where practicable so that connections between sections of the tray fall between the support point and one-quarter the distance of the span. A support should be placed within 600 mm (24 in.) on each side of any connection to a bend, tee, or cross.

- **Non-continuous Supports (J hooks) –** Non-continuous support shall be located at intervals not to exceed 1.5 m (5 ft.). Non continuous supports shall be selected to accommodate the immediate and anticipated quantity, weight, and performance requirements of cables. Steel, masonry, independent rods, independent support wires or other structural parts of the building shall be used for cable support attachment points up to the total weight for which the fastener is approved. Rods or wires that are currently employed for other functions (e.g. suspended ceiling grid support) must not be utilized as attachment points for non-continuous supports.

- **Conduit System –** The use of conduit as a horizontal raceway system for telecommunications cabling is considered when:

  - it is required by code;
  - outlet locations are permanent;
  - device densities are low;
  - special mechanical protection is required; or
  - flexibility is not required.

- In-floor conduit systems are especially inflexible as they are usually buried in concrete. The use of flexible metal conduit is not recommended. If flexible metal conduit is used, the length should be less than 6 m (20 ft.) for each run, and the conduit selected should minimize cable abrasion during the pulling in operation. Other products including inner duct (also known as sub-duct) are typically non-metallic pathways within a pathway, and may be used in accordance with appropriate codes for installation of cable to facilitate subsequent placement of additional cable in a single pathway. Conduit systems consists of Electrical Metallic Tubing (EMT) conduits and metallic pull boxes. No section of conduit shall be longer than 30 m (100 ft.) between pull points. For additional specifications, refer to TIA/EIA 569 standard and to BICSI-Telecommunication Distribution Methods Manual.

Note: In all instances, pull boxes must be placed in straight sections of conduit run and must not be used in lieu of a bend. Corresponding ends of the conduit are to be aligned with each other. Conduit fittings such as, but not limited to C, LB, LL, LR and T fittings, must not be used in lieu of pull boxes or bends.

- **Furniture Pathway Systems –** Furniture pathway percent fill is calculated by dividing the sum of the cross-sectional area of all cables by the most restricted cross-sectional area of the pathway (including utility post). For furniture pathways, the maximum pathway fill must be 40%. This maximum limit may be impacted by variables such as cable helix, pathway intersections, cable bending radii, and space for outlets/connectors. Actual cable installation on furniture mock-ups is the preferred method to determine pathway cable capacity. Utility columns should be attached to and supported by main ceiling support channels; they should not be attached to the transverse or short length channels unless they are also rigidly secured to the main support channel. When utility columns are used, the main ceiling rails shall be rigidly installed and braced to overcome movement, both vertical and horizontal. The maximum distance between horizontal pathways (conduit, raceway, J hook) and the utility column must not exceed 250 mm.

- **Perimeter (Surface) Raceways –** Raceway systems consist of bases, covers, associated fittings, and accessories. Fittings (e.g., coupler, corner, end cap, adapter and device box) must be used to connect, change direction, or terminate a surface raceway. Accessories must provide the means of mounting specific or generic devices (e.g., service area outlet, conduit connection), either internal or external to the raceway system. Surface raceway systems must be configured as either single-channel or multi-channel systems. Single-channel systems must be designed and used for either telecommunications cabling or power cabling. Multi-channel systems must contain divider wall(s), either pre-configured or modular.

- Under conditions of maximum fill, surface raceway systems shall not force cable into a bend radius that is less than the greater of:

  - the minimum bend radius requirement of ANSI/TIA-568-C.O;
  - the manufacturer's recommended minimum bend radius; or
  - 25 mm (1 in.).

- **Perimeter Raceways –** Raceways may have square, rectangular, triangular or semi-circular cross-sectional areas while covers may be flat, concave or convex. For planning perimeter pathways, the maximum pathway fill shall be 40%. Pathway (raceway) fill is calculated by dividing the summation of the cross-sectional area of all cables by the most restrictive cross-sectional area of the raceway system. This fill capacity does not consider the additional constrictions caused by service area outlets. Raceway manufacturers shall provide the internal cross-sectional area of each pathway component. Sizing a raceway using 40% cable fill will facilitate the installation of typical telecommunications cables and outlets/connectors as well as provide space for future modifications and expansion to the cabling system.

4.5.1 Telecommunication Pathways (Classified or Protected C Networks)

With the exception of Controlled Black networks, Classified or Protected C networks generally require a dedicated pathway system consisting of EMT conduits and pull boxes. This pathway system is referred to as a Protected Distribution System (PDS). The PDS is required to provide adequate electrical, electromagnetic and physical safeguards to deter exploitation of Classified or Protected C data. The classified cabling system may not share its pathway with unclassified networks. Classified network pathways must terminate in a telecommunications spaces or enclosure dedicated for the management and operation of classified data. Cabling system carrying un-encrypted classified data must be protected over its entire length from the classified telecommunications space or enclosure to the work area outlet. As such, dedicated-PDS conduit system must be physically connected to the furniture's utility columns or to a dedicated-modular furniture cable channel.

SSC TCNDE Cable Network Specialist will consult with applicable Departmental Security Officer (DSO) and with Communication Security Establishment (CSE) to develop the PDS-pathway system in accordance with CSE ITSG-11A.

4.6 Telecommunications Cabling

SSC TS01 Technical Standard on Premises Telecom Cabling Fit-up in Spaces under SSC Mandate provides information pertaining to telecommunications cables to be utilized on Government of Canada IT networks. These cables are as follows:

- Unshielded Twisted Pair Category 3 (riser and outside plant application);
- Unshielded Twisted Pair Category 5E;
- Unshielded Twisted Pair Category 6;
- Unshielded Twisted Pair Category 6A;
- Shielded Twisted Pair Category 5E;
- Shielded Twisted Pair Category 6;
- Shielded Twisted Pair Category 6A;

- Multimode OM2 fibre optic cable;
- Multimode OM3 fibre optic cable;
- Multimode OM4 fibre optic cable;
- Single mode OS1 fibre optic cable;
- Single mode OS2 fibre optic cable; and
- Coaxial cable.

Cable color preference may be specified by department. Red cables are usually reserved for security or life and safety system.

Note: Fire and building codes regulate the specific cable fire rating of telecommunication cables (FT4 used in riser systems whereas FT6 used in return air plenum).

4.7 Other Systems Supported by Telecommunication Cable Networks

In addition of voice and data networks, modern telecommunications pathways and spaces provide support to other networks such as, but not limited to:

- Building Automated System (BAS);
- Wireless Systems Access Point (AP);
- Building Security Networks; and
- Closed Circuit Television (CCTV).

To avoid accidental or intentional tempering or disruption, building security networks require a dedicated pathway infrastructure consisting of conduits and pull boxes. The dedicated pathway will originate from applicable building security devices and terminate in adjacent telecommunication spaces used for unclassified networks.

4.8 Telecommunications Bonding and Grounding Infrastructure

Telecommunications bonding and grounding systems within a building are intended to have electrical potential. This is achieved, to a large extent, by following the requirements and guidelines provided in the American National Standards Institute (ANSI)/TIA ANSI/TIA-607-C (***Generic Telecommunications Bonding and Grounding [Earthing] for Customer Premises***) standard. The technical specifications for the telecommunications bonding infrastructure are to be determined in consultation with the SSC TCNDE Cable Network Designer.

Note: Telecommunication bonding and grounding systems differ from normal electrical bonding and grounding systems used for building power distribution infrastructure.

As stated in ANSI/TIA-607 standard, the generic telecommunications bonding infrastructure originates at the electrical entrance facility ground and extends throughout the building. It includes but is not limited to the following major components:

- Primary Bonding Busbar (PBB);
- Telecommunications Bonding Conductor (TBC);
- Telecommunications Bonding Backbone (TBB);
- Secondary Bonding Busbar (SBB); and
- Backbone Bonding Conductor (BBC).

These telecommunications bonding components are intended to work with telecommunications pathways and spaces, installed cabling, and administration system in a building.

Figure 4-5 illustrates the configuration of a typical telecommunications bonding infrastructure in a smaller building.

Figure 4-5: Typical Telecommunication Bonding Infrastructure – Smaller Building

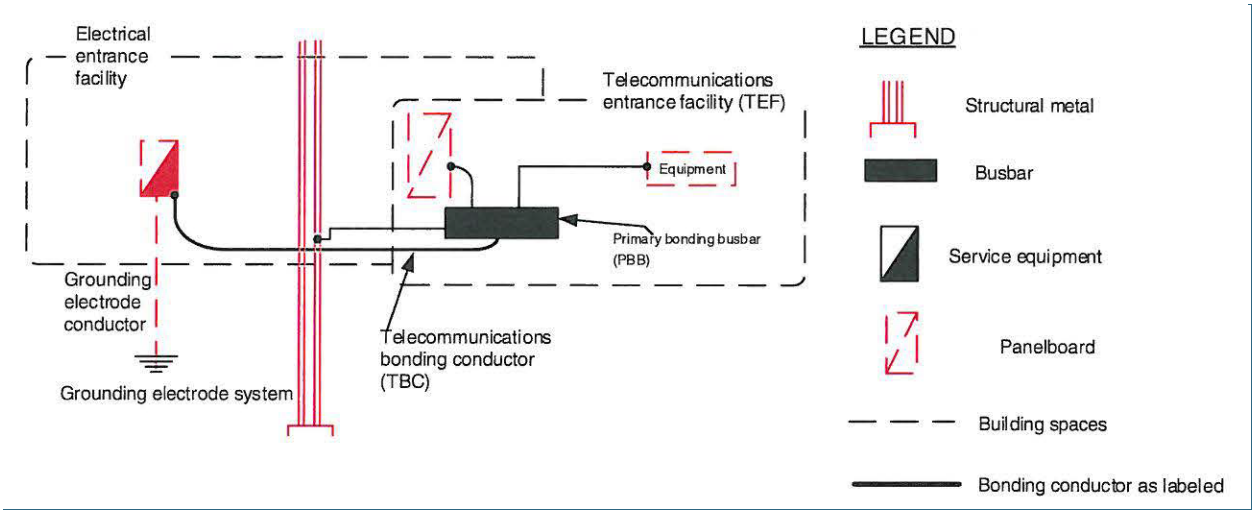


Figure 4-6 illustrates the configuration of a typical telecommunications bonding infrastructure in a large single storey building.

Figure 4-6: Typical Telecommunication Bonding Infrastructure – Large Multi-Storey Building

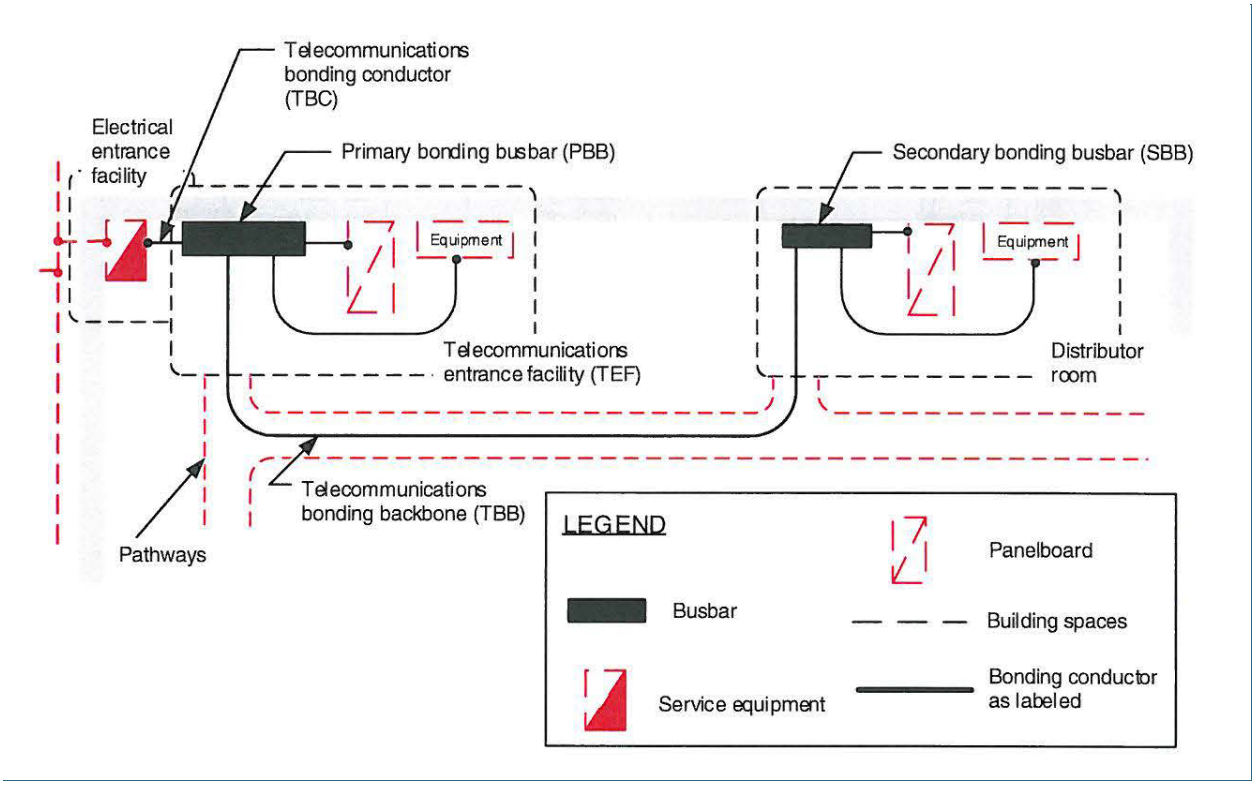
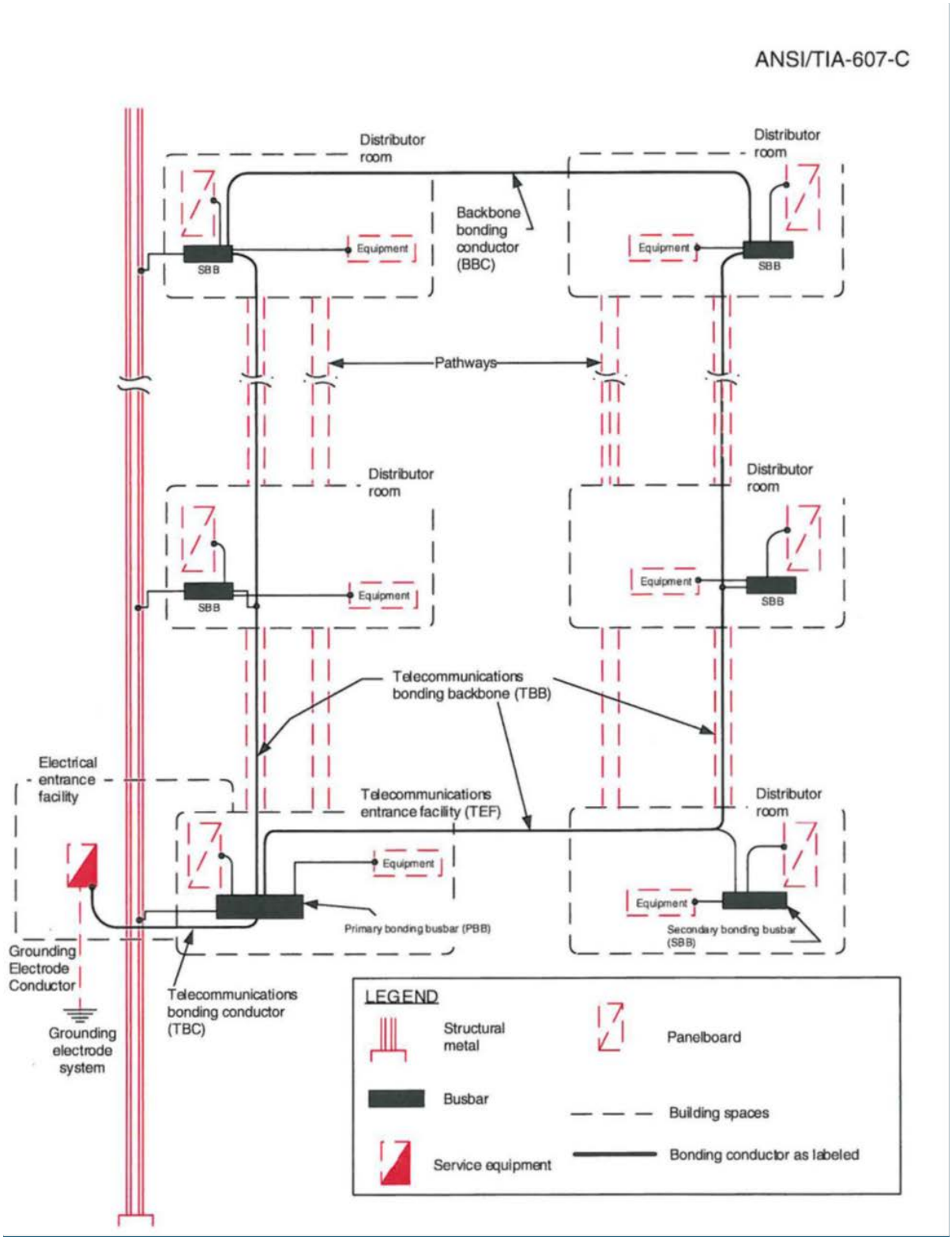


Figure 4-7 illustrates the configuration of a typical telecommunications bonding infrastructure in a multi-storey building.

Figure 4-7: Typical Telecommunication Bonding Infrastructure – Large Single Storey Building



4.8.1 Telecommunications Bonding Infrastructure – Components Descriptions

Table 4-2 provides descriptions for each component in the telecommunications bonding infrastructure (from ANSI/TIA-607-C).

Table 4-2: Telecommunications Bonding Infrastructure – Component Descriptions

Component	Description
Backbone Bonding Conductor (BBC)	• when multiple TBBs, BBC is employed to interconnect them through the associated busbars, either on the same floor in a multi-story building or in the same general area of a single story building.
Primary Bonding Busbar (PBB)	• dedicated extension of the building grounding electrode system for the telecommunications infrastructure; • central attachment point for the TBBs and equipment.
Secondary Bonding Busbar (SBB)	• bonding connection point for telecommunications systems and equipment in the area served by a distributor.
Telecommunications Bonding Conductor (TBC)	• element that bonds the PBB to the service equipment (power) ground (main power panel).
Telecommunications Bonding Backbone (TBB)	• conductor that interconnects all SBBs with the PBB; • intended to reduce or equalize potential differences; • not intended to serve as a ground fault current return path; • originates at the PBB, extends throughout the building using the telecommunications backbone pathways, and connects to the SBBs in distributor rooms.

4.9 Technical Requirements – Telecommunications Bonding Infrastructure

Telecommunications bonding infrastructure possesses specific technical requirements that must be met to ensure intended goal of equalizing potential is achieved throughout the building being serviced. These requirements govern the size of conductors, type of connection, size and format of busbars and bonding methodology. Refer to the most recent version of ANSI/TIA-607-C to determine applicable telecommunications bonding requirements.

Table 4-3 lists the technical requirements for telecommunications bonding infrastructure.

Table 4-3: Telecommunications Bonding Infrastructure – Technical Requirements

Elements	Specification
Bonding Conductors	• to be copper and may be insulated; • if insulated, to be listed for the application; • not to decrease in size as the bonding path moves closer to the termination point of the grounding electrode system; • if insulated, the bonding conductor is to be green or green and yellow stripe in color.
Busbars	• Primary Bonding Busbar (PBB) and Secondary Bonding Busbar (SBB) are to be installed in distributor rooms to provide a common bonding point for equipment, power panel and pathways located within the distributor rooms

Table 4-3: Telecommunications Bonding Infrastructure – Technical Requirements

Elements	Specification
Connectors	• to be equipped with listed a two (2) hole connectors suitable to the size of conductor being terminated; • irreversible compression type (mechanical connectors are not to be used).
Telecommunications Bonding Backbone (TBB)	• minimum size to be a 6 AWG (American Wire Gauge).; • should be sized at 2 kcmil (Thousand Circular Mil) per linear foot of conductor length, up to a maximum size of 750 kcmil; • Refer to ***Table 4-4*** for applicable TBB size.

Table 4-4 provides a comparison of Telecommunications Bonding Backbone (TBB)/Backbone Bonding Conductor (BBC) conductors between size and length.

Table 4-4: Telecommunications Bonding Backbone (TBB)/Backbone Bonding Conductor (BBC) – Conductor Size vs. Length

TBB/BCC Linear Length – m (ft.)	Conductor Size (AWG)
Less than 4 (13)	6
4 – 6 (14 – 20)	4
6 – 8 (21 – 26)	3
8 – 10 (27 – 33)	2
10 – 13 (34 – 41)	1
13 – 16 (42 – 52)	1/0
16 – 20 (53 – 66)	2/0
20 – 26 (67 – 84)	3/0
26 – 32 (85 – 105)	4/0 kcmil
32 – 38 (106 -– 125)	250 kcmil
38 – 46 (126 – 150)	300 kcmil
46 – 53 (151 – 175)	350 kcmil
53 – 76 (176 – 250)	500 kcmil
76 – 91 (251 – 300)	600 kcmil
Greater than 91 (301)	750 kcmil

Note: Use Table 4-4 to determine the size of all bonding conductors based on overall length between equipment and termination point. As an example, an equipment rack located at a distance of 5 meters from the distributor busbar will require 4 AWG bonding conductor.

4.9.1 Sizing the Telecommunications Bonding Conductor (TBC)

The Telecommunications Bonding Conductor (TBC) shall be, as a minimum, the same size as the largest TBB.

4.9.2 Sizing the Backbone Bonding Conductor (BBC)

The Backbone Bonding Conductor (BBC) shall be, as a minimum, the same size as the largest TBB to which it is connected.

4.9.3 Connection to Telecommunication Bonding Backbone (TBB)

The Telecommunication Bonding Backbone (TBB) shall be of continuous length over its entire course. Connections to the TBB shall be performed with the use of listed irreversible compression fittings or the use of exothermic connection.

Note: The use of mechanical connection is not permitted.

Annex A: Glossary, Abbreviations and Acronyms

Refer to ***Table A-1*** for the List of Abbreviations and Acronyms used in this document.

Table A-1: GC Wi-Fi Guest Service – List of Abbreviations and Acronyms

Acronym	Full Name
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
AP	Access Point
AWG	American Wire Gauge
BAS	Building Automation System
BBC	Backbone Bonding Conductor
BICSI	Building Industry Consulting Service International
CATV	Cable Television
CBC	Canadian Building Code
CCTV	Closed-Circuit Television
CEC	Canadian Electrical Code
CFC	Canadian Fire Code
CFO	Chief Financial Officer
CISD	Canadian Industrial Security Directorate
CSE	Communications Security Establishment
DSO	Departmental Security Officer
EIA	Electronic Industries Alliance
EMSEC	Emission Security
EMT	Electrical Metallic Tubing
EPA	Effective Project Approval
GC	Government of Canada
GCS	Government Cabling Service
HSZ	High Security Zone
HVAC	Heating, Ventilation, and Air Conditioning
IBNE	Intra-Building Network Engineering
IT	Information Technology
ITSG	Information Technology Security Group
kcmil	Thousand Circular Mil
NEUB	Network and End Users Branch
OIC	Order in Council
OZ	Operation Zone
PBB	Primary Bonding Busbar
PM	Project Manager
PMO	Project Management Office
PoE	Power over Ethernet
PPA	Preliminary Project Approval
PDS	Protected Distribution System

Table A-1: GC Wi-Fi Guest Service – List of Abbreviations and Acronyms

Acronym	Full Name
PSPC	Public Services and Procurement Canada
PZ	Public Zone
RCMP	Royal Canadian Mounted Police
SBB	Secondary Bonding Busbar
SOW	Statement of Work
SOR	Statement of Requirements
SSR	Secure Storage Rooms
SSC	Shared Services Canada
SZ	Security Zone
TBB	Telecommunications Bonding Backbone
TBC	Telecommunications Bonding Conductor
TCNDE	Telecommunication Cable Networks Design and Engineering
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TRA	Threat Risk Analysis
UC	Use Case
VC	Video Conferencing
VHD	Virtual Hosted Desktop
VoIP	Voice over Internet Protocol
WP	Workplace

ADDENDUM #6

Date: June 22, 2020

PACIFIC REGION
PORT HARDY LOGISTICS DEPOT
PORT HARDY, B.C.
Project No: 8H500

The following revisions supersede the information contained in the original drawings and specification issued for the above named project, and shall become part thereof. No consideration will be allowed for extras due to the contractor or any subcontractor not being familiar with this Addendum.

END ADDENDUM #6