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SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

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Title - Sujet Victoria SAR Station Construction	
Solicitation No. - N° de l'invitation F1700-184521/A	**Amendment No. - N° modif.** 004
Client Reference No. - N° de référence du client	**Date** 2019-02-22
GETS Reference No. - N° de référence de SEAG PW-$PWY-039-8541	
File No. - N° de dossier PWY-8-41217 (039)	**CCC No./N° CCC - FMS No./N° VME**
Solicitation Closes - L'invitation prend fin **at - à 02:00 PM** **on - le 2019-03-01**	**Time Zone** **Fuseau horaire** Pacific Standard Time PST
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Les documents français seront disponibles sur demande.

Amendment 004

This amendment is issued to publish the Addendum #3.

All other terms and conditions remain unchanged.

The following changes in the Tender Documents are effective IMMEDIATELY. This addendum will form part of the Contract Documents

Amend/revise the Standard Contract Documents as follows:

Clarifications & General Instructions

1. Contractor is responsible to supply and install service poles on DFO property.(3 locations) Hydro to install pole on public property (1 location) – see electrical addendum 2 attached.

Contractor Questions

Refer to following electrical addendums 1 & 2 for additional answers to electrical questions.

Question:
What is the power available at the pump station?
Response:
Refer to Electrical Drawings

Question:
Do you require an indoor pump control panel?
Response:
Refer to Electrical Drawings

Question:
Will the control panel be sub-fed from a metered source c/w disconnects?
Response:
Refer to Electrical Drawings

Question:
a. The notes on sheet C2 mentions effluent. Is this pump station pumping effluent or raw sewage?
b. Any unusual chemicals in the liquid?

Response:
a. Pumping raw sewage.
b. Nothing expected.

Question:

a. Is this pump station located in a drivable area?
b. -If so, it will have to be a concrete chamber. What load rating do you require for the hatch cover. Load rating – Pedestrian.
c. -if not, do you require a fiberglass chamber? Either fiberglass or concrete is acceptable.

Response:

Refer to Electrical Drawings

a. No
b. Pedestrian.
c. Either fiberglass or concrete is acceptable.

Question:

How are you venting the pump station? Roof vent? What size do you require?

Response:

Station to include goose neck roof vent c/w bug screen. Min. size 100mm.

ARCHITECTURAL

REFER TO ARCHITECTURAL DRAWINGS

1. Drawing A7.04

Roof assembly below deck and over room 110 as noted on drawings:

F3 Conc. pavers on adjustable pedestals
2 ply SBS membrane
16mm ply sheathing
89 x sleepers
Joists- see struct.
22mm rezillient channel @ 400 O.C.
16mmType X GWB

Floor assembly for deck:

F4 Conc. pavers on adjustable pedestals
Galvanized steel grate
Galvanized steel channel substructure-see struct.

ELECTRICAL

1. See electrical Addendum 1 attached. (40 pages)

2. See electrical Addendum 2 attached. (4 pages)

End of Addendum

THE FOLLOWING ADDENDUM SUPERCEDES INFORMATION CONTAINED IN DRAWINGS AND SPECIFICATIONS ISSUED FOR THE PROJECT TO THE EXTENT REFERENCED. THIS ADDENDUM FORMS PART OF THE TENDER DOCUMENTS AND IS SUBJECT TO ALL OF THE CONDITIONS SET OUT IN THE CONTRACT CONDITIONS.

This electrical addendum contains forty (40) pages.

Part 1 Drawing E1.0 Site Plan

1.1 GENERAL NOTES

.1 Change the word fishwire to pullstring.

1.2 LEGEND

.1

	EMERGENCY LUMINAIRE
	DUAL HEAD EMERGENCY LIGHTING HEADS COMPLETE WITH SELF-CONTAINED BATTERY PACK, WALL MOUNTED
	DIMMER SWITCH
	UNIT HEATER
	THERMOSTAT
	FIRE ALARM HORN/STROBE COMBINATION

1.3 SITE PLAN

.1 See addendum #2 for Hydro/Telus/Shaw.

.2 General notes CCTV

.1 All conduits to be 25mm. Provide 25mmC from electrical room to operations room – coordinate with SAR representative.

.3 Fire alarm interconnecting fiber “multimode 62.5/1250FNR. # jacket rating, black color, 12 fiber in a central tub.

.4 Install cable on a 3/8 steel messenger network SAW fire alarm with simplex and manufacturing of fire alarm panel carried in this contract.

1.4 LUMINAIRE SCHEDULE

.1 Type A1 - Revise to 7’’ diameter.

.2 Type ‘C’ - Revise 14,000 lumen to 7,000 lumen.

.3 Type ‘D1’ – Revise 5’’ to 7’’ diameter.

.4 Type ‘N’ - LED strip light (delete photo).

.5 Delete 2 x 9w emergency lights.

.6 All emergency lights to be Type “EMR”.

1.5 DOOR, MOTION, SMOKE SYSTEM (DMS)

.1 Interconnect generator daytank oil leak sensor into DMS system.

Part 2 **Drawing E2.0**

.1 Locate fire alarm annunciators (2) and graphics inside exterior doors of corridor 124 and lobby 102.

.2 24/7 luminaires to be on CCT #A34. Emergency lights with battery back-up on CCT # A34.

.3 Provide a emergency light with battery back up in generator housing CCT# D12.

.4 Workshop: provide one Type 'B' CCT #D1 over counter containing sink and wash dryer.

.5 All exit lights to be on CCT # A36.

.6 Electrical closet (exterior access) switch to be complete with vacancy.

.7 Provide wall mounted security sensor in workshop (E-8) corridor 125 (B-6) Lobby 102 (B–2).

.8 Delete 400A/400AF disconnect CT/Hydro meter. Light, switch, and receptacle. Exterior light located in exterior access electrical closet.

Part 3 **Drawing E2.1**

.1 24/7 luminaires to be on CCT# A34. Emergency lights with battery back-up on CCT# A34.

.2 Exit lights on CCT# A36.

.3 Corridor 214 (B-6) provide wall mounted security sensor.

.4 Corridor 215 (B-2) provide wall mounted security sensor.

.5 Provide keypad in lobby 102, corridor 124 and workshop 126.

.6 Provide door contact on electrical closet.

.7 Delete exterior service masts (6).

3.2 **WORKSHOP 126**

.1 24/7 luminaire 'C' to be on circuit A34.

.2 Provide three additional 'C' luminaires CCT# D1. Install to create 12' (3'x4') long luminaires between columns C and A.

3.3 **ELECTRICAL ROOM 126A**

.1 One Type 'B' to be 24/7 CCT #A34.

.2 CCTV control panel CCT A39.

.3 Fire alarm panel CCT A5/27.

.4 Door access control panel CCT A37.

.5 Provide rex (security on door).

.6 Provide 400A/400AF disconnect for main incoming service.

.7 Extend incoming two (2) x 50mm conduit to Shaw and Telus Demark.

Part 4 **E2.2 Communication**

.1 Minimum 25 mm conduit to each outlet.

.2 Conduits in kitchen and fitness to go down to first floor distribution.

.3 2 outlets in workshop to go up the wall, across the ceiling to MTR room.

.4 **Note:** Prior to installing conduits and terminating in MTR room, a site meeting is required with cable installer to assure routing is acceptable.

.5 Provide rex (security) on door.

.6 Provide stand-off wall ground bar.

.7 See attached "Special technical standard Guide lines".

Part 5 **E3.0 Details**

5.1 **ELECTRICAL DISTRIBUTION**

.1 125KW/155 KVA diesel generator.

.2 See panel schedule 'A' for further items.

Part 6 **E 3.1 Schedules**

6.1 **PANEL 'A'**

.1 CCT A31, 33, 35 – 100A – 3P 4#2 – 35mm C to panel 'D'.

.2 CCT A37 – 15A - 1P to door control.

.3 CCT A39 - 15A - 1P to CCTV.

.4 CCT A34 – 15A – 1P to 24/7 lights and emergency.

.5 CCT A36 15A – 1P to exit.

.6 CCT A38 -40 – 42 15A – 1P spare.

.7 Change 42 CCT panel to 60 CCT.

6.2 **SPRINKLER PROOF**

.1 Panels, disconnects, and transformers to be sprinkler proof.

6.3 **SPECIFICATIONS**

.1 Section 28-31-00 – Fire Detection and Alarm

.1 Item 2.7 -Audible Signal Device

.1 Delete bells.

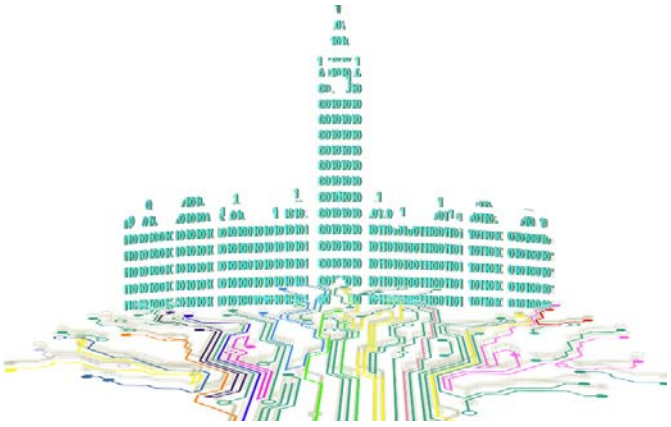
.2 Provide horn and horn strobe.

END OF ELECTRICAL ADDENDUM NO. 01

Service | Innovation | Value

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
Revision Number:	1.1
Publish Date:	2018-01-30
GDDOCS #	15866953
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)***.

Intra-Building Network Engineering (IBNE) Division

Name and Title:	Jose Tomas, Director, Intra-Building Network Engineering (BNE) Division
Branch, Directorate:	Shared Services Canada (SSC), Network and End Users Branch (NEUB), Intra-Building Networks (IBN) Directorate, Intra-Building Network Engineering (IBNE) Division
Signature:	

Telecommunication Cable Networks Design and Engineering (TCNDE) – Manager

Name and Title:	Claude Mathieu, A/Manager, Telecommunication Cable Networks Design and Engineering (TCNDE)
Branch, Directorate:	SSC, NEUB, IBN Directorate, IBNE Division
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Author:	M. Huard
Status:	Final
Revision Number:	1.1
Publish Date:	2018-01-30
GDDOCS #	15866953
Information Security:	Protected A

Document Author(s) & Co-Author(s), Position – Title

Full Name	Role	Department -- Position -- Title
M. Huard	Author	Manager, Telecommunication Cable Networks Design and Engineering (TCNDE)

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
0.1	Draft	2017-08-31	M. Huard, Manager, Telecommunication Cable Networks Design and Engineering (TCNDE)	Initial draft.	M. Huard
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
1.0	Final	2017-11-10	P. Beaudry, Technical Advisor, TCNDE, IBNE	Reviewed with final comments.	C. Sigouin, Sr Business Analyst/Technical Writer, IBNE
1.1	Final	2018-01-30	Comments from Public Services and Procurement (PSPC)	Reviewed with final comments.	C. Sigouin, Sr Business Analyst/Technical Writer, IBNE

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

Contact Information

For any inquiries or comments about this document, contact Jose Tomas, Director, Intra-Building Network Engineering (IBNE) Division at jose.tomas@canada.ca.

Intra-Building Network Engineering (IBNE) Division – Document Review and Approval Process

All documents produced by the Intra-Building Network Engineering (IBNE) Division are going through the following ***IBNE Document Review and Approval Process***:

Document Review and Approval Process		
Step	**Actor**	**Action**
1.	**Author (with Contributors)**	Using the appropriate IBNE template (https://gcdocs.gc.ca/ssc-spc/llisapi.dll/link/17431017), develops initial **draft** as **version 0.1** with Contributors' input, saves a copy to GCDOCS and sends to Senior Technical Writer for editing and standardization.
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.
4.	**Senior Technical Writer**	Consolidates changes from SMEs' comments into document as **version 0.2** and sends a GCDOCS link to SMEs and Author for final review. ***Note: If there are discrepancies in recommended changes, ensures that all SMEs come to a consensus and agree.***
5.	**SMEs**	Review **draft** document (**version 0.2**) (in Track Changes mode in MS Word, highlighted in yellow in Excel and Visio) and send with comments to Senior Technical Writer by email.
6.	**Senior Technical Writer**	Consolidates changes from SMEs' comments into document as **version 0.3** and sends a GCDOCS link to Approvers for review.
7.	**Approver(s)**	Reviews **draft** document (**version 0.3**) (in Track Changes mode in MS Word, highlighted in yellow in Excel and Visio) and sends with comments to Senior Technical Writer by email.
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.

The version numbering convention for all documents produced by IBNE Division is as follows:

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.

Role	Responsibility	OPI	RACI
Document Author (Owner)	• Author/Owner of the document responsible for identifying required Contributors/Reviewers (SMEs etc.) and document review cycle. • Responsible for updating OPI column. • Responsible to apply required revisions resulting from the review cycle(s) and producing final version.		**R** (Responsible)
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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.

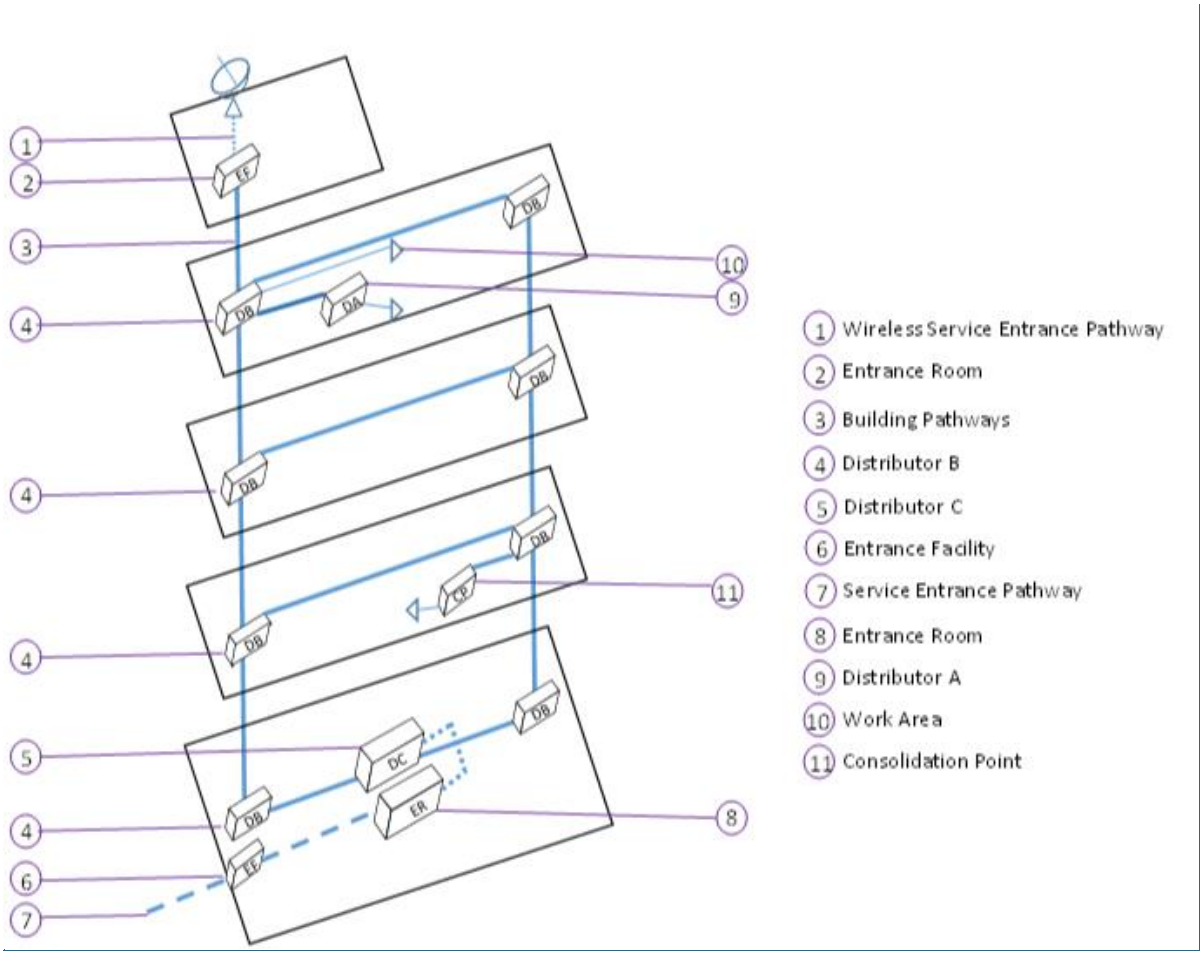
Based on a myriad of technical criteria, the SSC TCNDE Cable Network Designer will determine the technical specifications and architectural requirements for the telecommunications spaces. These technical specifications and architectural requirements will cover the following requirements:

- 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.

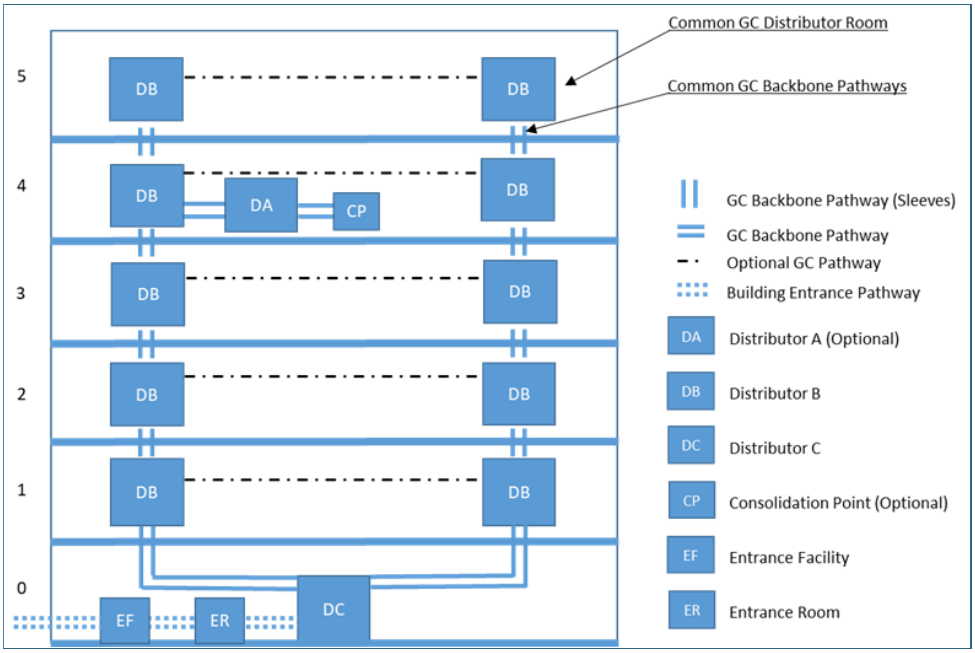
4.2.1 Crown-Owned Building

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



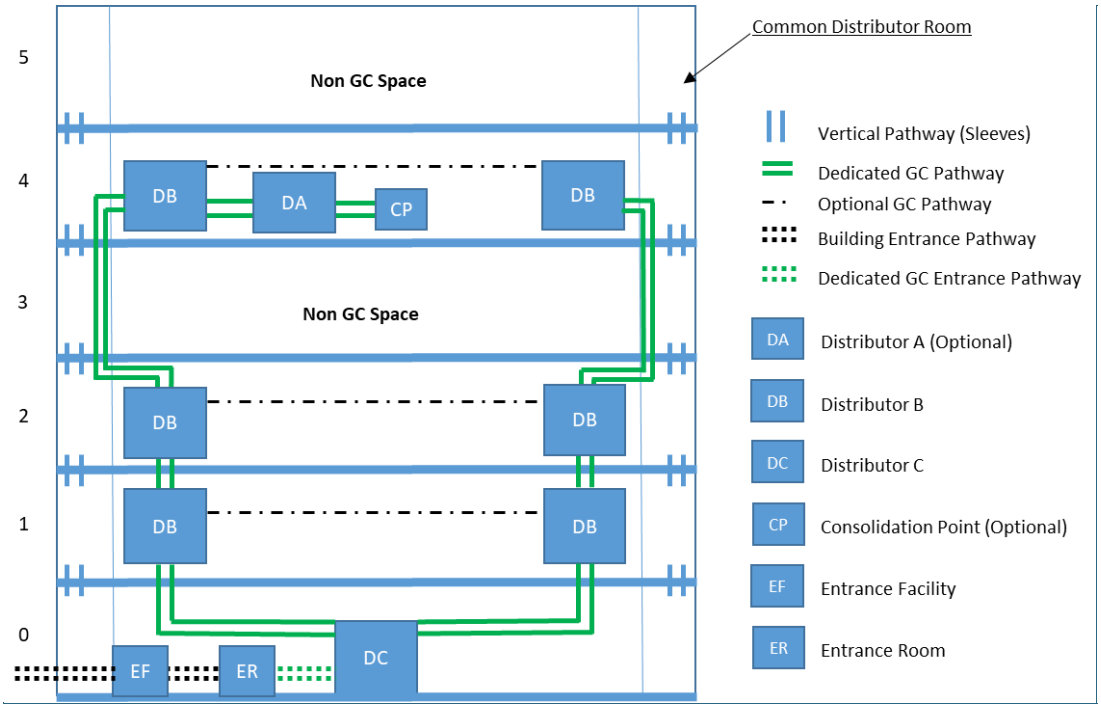
4.2.2 Leased Facility

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)

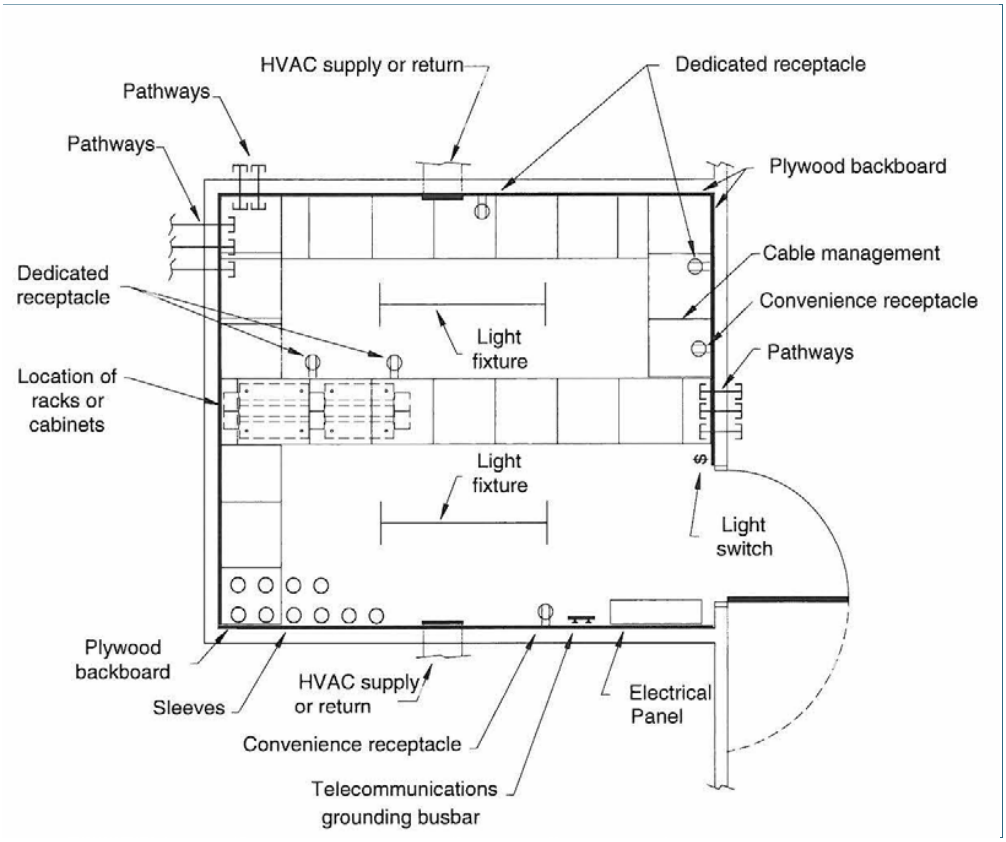
The TIA/EIA 569 standard further states that a distributor room containing Distributor C should be sized at a minimum of 11 m^2 (120 ft^2) for a building with gross area of up to 50,000 m^2 (500,000 ft^2). In larger buildings, the size of the distributor room containing Distributor C should be increased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

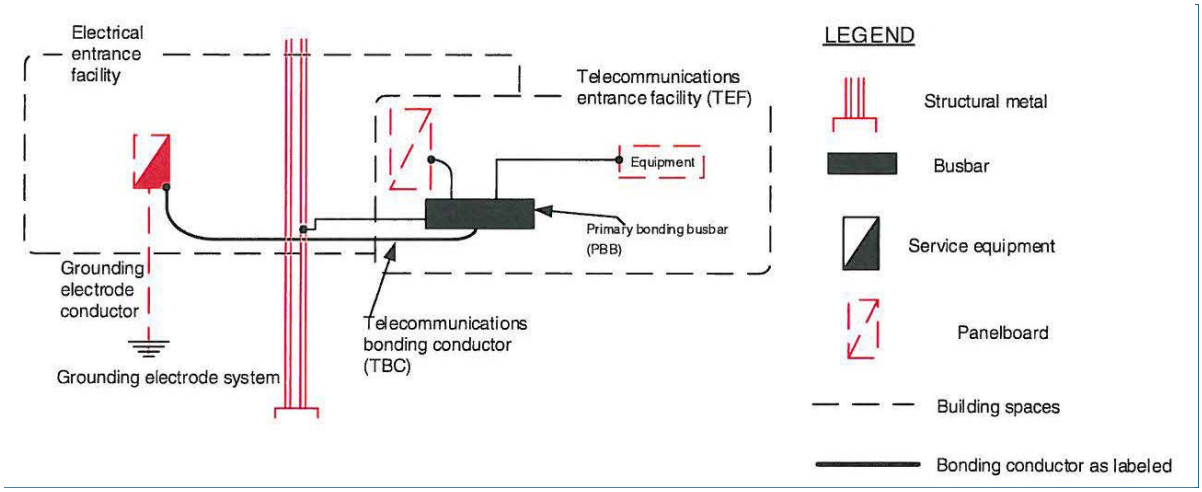


Figure 4-6 illustrates the configuration of a typical telecommunications bonding infrastructure in a large single storey building.

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

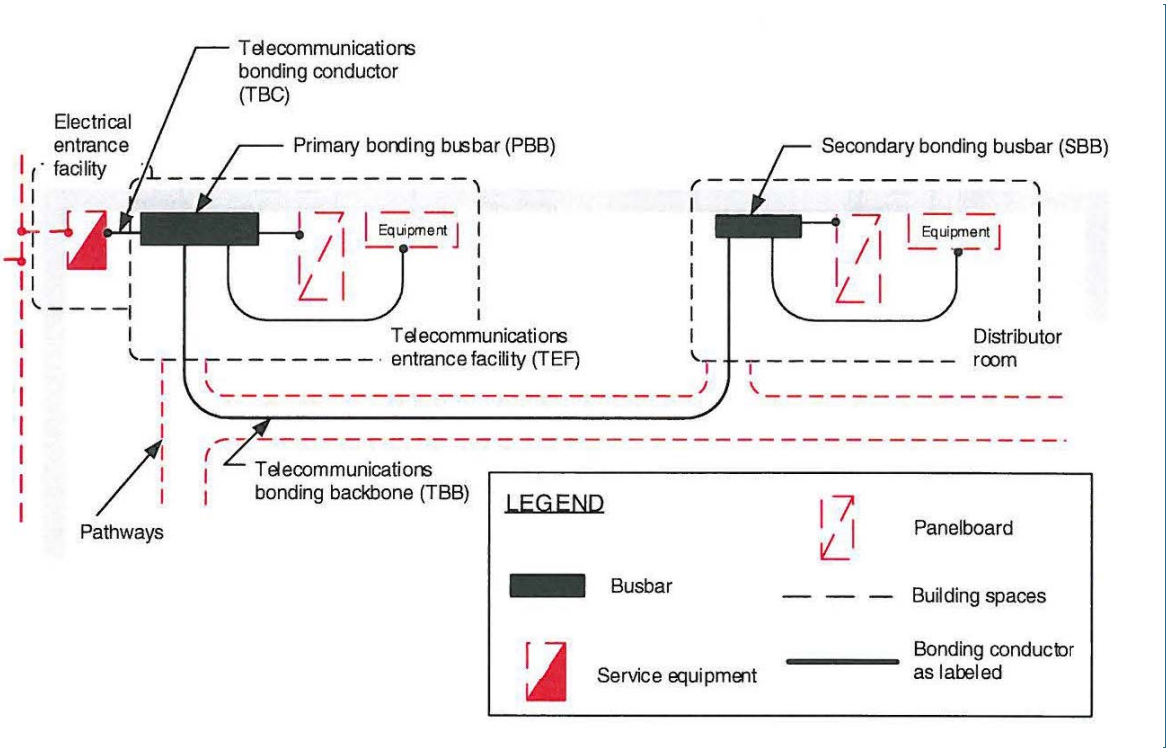
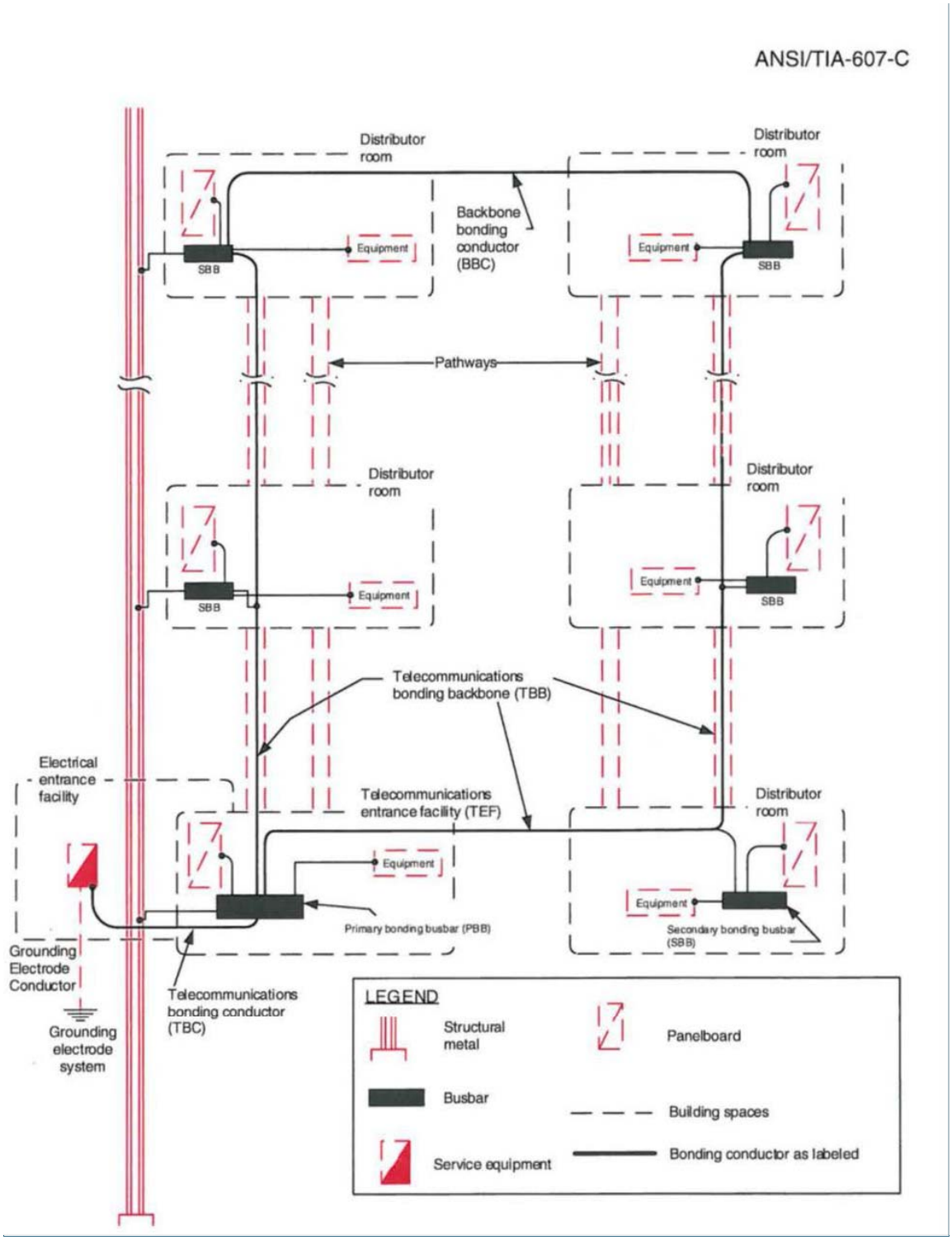


Figure 4-7 illustrates the configuration of a typical telecommunications bonding infrastructure in a multi-storey building.

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

THE FOLLOWING ADDENDUM SUPERCEDES INFORMATION CONTAINED IN DRAWINGS AND SPECIFICATIONS ISSUED FOR THE PROJECT TO THE EXTENT REFERENCED. THIS ADDENDUM FORMS PART OF THE TENDER DOCUMENTS AND IS SUBJECT TO ALL OF THE CONDITIONS SET OUT IN THE CONTRACT CONDITIONS.

This electrical addendum contains four (4) pages.

Part 1 **Drawing E1.0 Site Plan**

1.1 **GENERAL NOTES**

.1 Change the word fishwire to pullstring.

Part 2 **Electrical contractor questions**

2.1 **REFERENCE E2.1 AND DETAIL 3/E3.0 COULD YOU PLEASE CONFIRM AS IT IS NOT CLEAR THE LOCATION OF THE METERING AND DISCONNECTS, AS WELL THE CT LOCATION FOR THE TENANT METER AND IF HYDRO WILL SUPPLY THE TENANT CT AND METER?**

.1 B.C Hydro will install a pole on the public property side East of the sidewalk. Contractor will provide a 35' – Class 'C' pole adjacent to the South- East corner of the SAR building (10 plus feet). Hydro/Telus/Shaw cables will be installed to the contractor supplied pole. Hydro will terminate at a contractor provided combination CT (meter cabinet). Contractor to continue two (2) runs 4 #3/0 – 50mm conduit feeder to 400A/400AF disconnect in mezzanine electrical room. Two (2) x 50mm Conduits (ducts) to continue up to upper electrical room for Telus and Shaw Demark.

.2 400A/400AF disconnect and meter cabinet in ground floor electrical closet to be deleted.

.3 400A/400AF min service disconnect in mezzanine electrical room to be provided.

.4 Telus and Shaw cables to extend up to mezzanine electrical room (Demark).

.5 Meters

.1 Hydro will supply incoming service main 'Meter Globe'.

.2 Contractor to provide tenant both tenant and solar meters.

.3 See attached DWG # ESK-2 – incoming services.

2.2 **WILL THERE BE A CONFLICT WITH THE ARCHITECTURAL DESIGN TO LIMIT THE CONDUIT RUNS FROM OVERHEAD DOWN EXTERIOR OF BUILDING AND UP AGAIN TO THE SECOND FLOOR?**

.1 Overhead services on building removed.

2.3 **CAN WE RUN A STRUT RACK INSIDE THE SHOP?**

.1 Yes. There is no issue with strut rack. Must be seismically supported.

2.4 **IS IT POSSIBLE TO CONSIDER A DIP SERVICE FROM THE PRIVATE POLE?**

.1 See reply #1.

2.5 **COULD YOU PLEASE PROVIDE SPECIFICATIONS FOR THE FIBER CABLE TO RUN OVERHEAD?**

.1 Fibre was specified in previous addendum #1.

SPECIFICATION

Part 3 General

3.1 SECTION INCLUDES

.1 This Section specifies switches, receptacles, wiring devices, cover plates and their installation.

3.2 PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

3.3 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CSA-C22.2 No.42.1, Cover Plates for Flush Mounted Wiring Devices.

.3 CSA-C22.2 No.55, Special Use Switches.

.4 CSA-C22.2 No.111, General Use Snap Switches.

Part 4 Products

4.1 COLOUR

.1 All devices to be decora style white.

.2 Receptacles that are switched via occupancy control or similar automatic controls shall be gray unless noted otherwise in the drawings.

4.2 RECEPTACLES – GENERAL

.1 Heavy duty specification grade.

.2 Duplex receptacles, CSA type L5-15 R, 125 V, 15 A, U ground, with following features:

.1 White nylon molded housing (red for emergency power circuits)

.2 Suitable for No.10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight back wired entrances, four side wiring screws.

.5 Triple wipe contacts and non riveted grounding contacts.

.3 Receptacles of one manufacturer throughout project.

4.3 RECEPTACLES – PARTICULAR APPLICATION

.1 Isolated Ground type to be 15 Amp, 125 volt duplex receptacles to be 2 pole, 3 wire, orange face, parallel blade, U ground, impact resistant nylon face.

.2 Ground Fault Interrupter type to be 15 Amp, 125 volt duplex receptacles to be 2 pole, 3 wire, white face, parallel blade, U ground, impact resistant nylon face, complete with breaker and reset button.

.3 20 Amp Receptacles Duplex receptacles – T-slot type CSA type L5-20R 125V. 20 Amp u ground with features matching 15 Amp rated Receptacles.

.4 Safety Tamper Resistant Receptacles. Receptacles indicated with an 'S' on the drawings shall be Tamper Resistant type. Hubbell RR15xx.TR series.

.5 All other single outlet and special purpose receptacles to be similar to the grade and series indicated above. Confirm ampacity, voltage and pin configuration prior to installation.

4.4 DIMMERS/VACANCY

.1 Flush mounted - Specification grade.

.2 LED application: 600-1500 watts based on connected load plus 25% spare.

.3 Electronic driver application: compatible with luminaire driver specified.

.4 Radio interference suppression.

.5 Thin profile: slide to OFF feature.

.6 Finished in white or as indicated.

.7 Adjust delay off time up to 15 minutes.

.8 Manual on and automatic off.

4.5 VACANCY SWITCH

.1 Sensor Lighting Controls

.1 Wall mounted switch/vacancy

.1 PIR occupancy sensor.

.2 Adjustable delayed- off time setting 30 seconds to 30 minutes.

.3 180 degree field of view.

.4 120V supply as required.

.5 Manual on and automatic off.

4.6 EXTERIOR MOTION SENSOR

.1 Weather proof 180 degree sensing. At sunset the lights switch on. At dawn the lights turn off.

4.7 INTERIOR OCCUPANCY SENSOR

.1 Ceiling Mounted Controls 120V supply

.1 Dual-tech technology (Ultra sonic and passive).

.2 Adjustable delayed-off time 20 seconds to 15 minutes.

.3 360 degree field of view.

.4 120V supply.

.5 Built in isolated relay.

.6 Automatic on/off.

4.8 COVER PLATES

.1 Nylon plates: Heavy duty, unbreakable and flush. All nylon plates to match wiring device colour.

.2 Steel: sheet steel hot dip galvanized with rolled edges for surface mounted utility boxes.

.3 Wall plates to be flush mounting with "positive bow" feature to ensure that all edges of plate are flush with wall or surface box when installed.

.4 All plates to be beveled type with smooth rolled outer edge and smooth face. Exposed sharp edges are not acceptable.

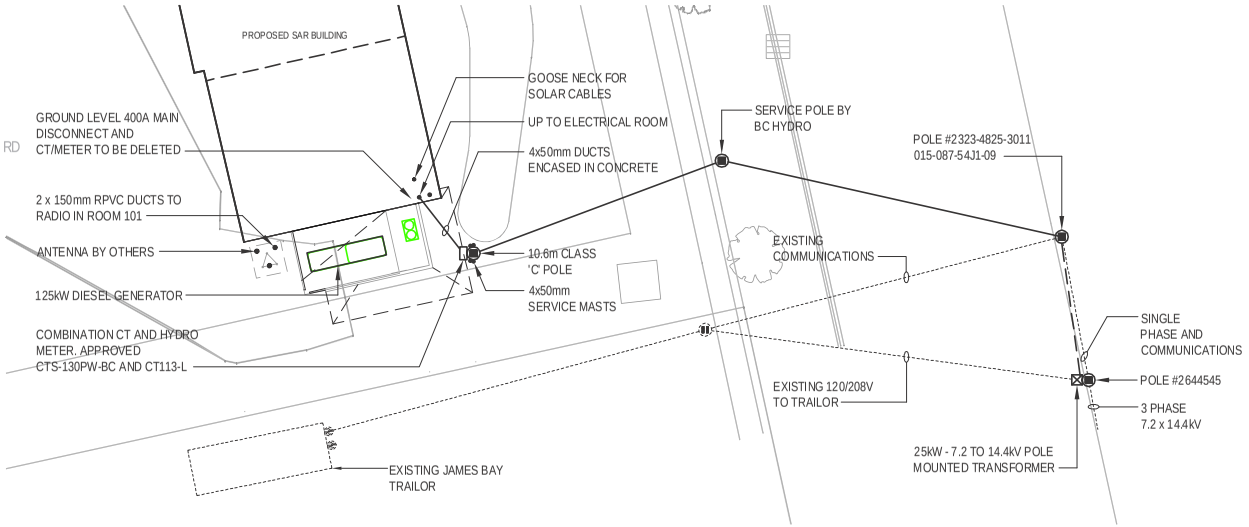
.5 Cast metal: die cast profile, ribbed for strength, flash removed, primed with grey enamel finish and complete with four mounting screws to box for special purpose wiring devices.

.6 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for wiring devices as indicated. Double doors for standard duplex receptacles. Cover plates to fasten to box by four screws.

.7 Gaskets: resilient rubber or close cell foam urethane.

.8 Cover plates for all wiring devices to be from one manufacturer throughout project.

END OF ELECTRICAL ADDENDUM NO. 02

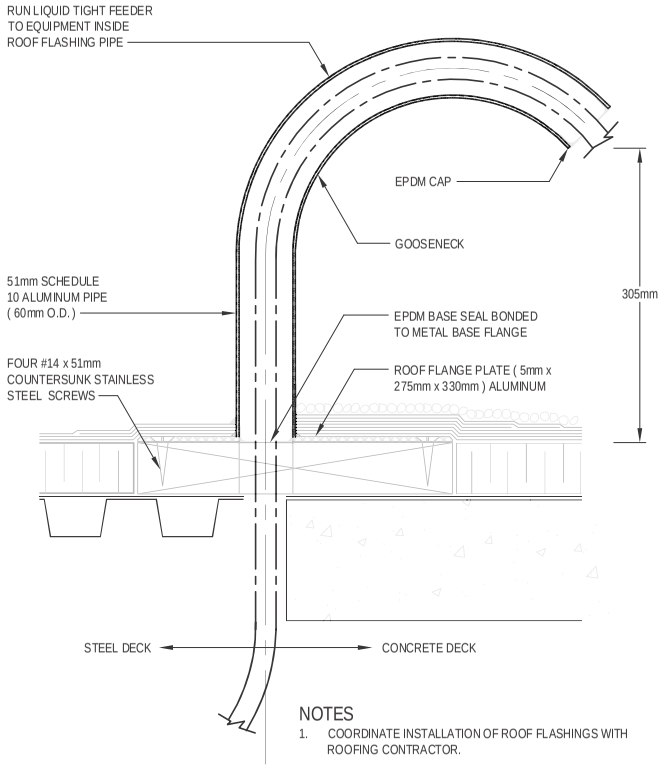


SITE PLAN

SCALE: 1:300

NOTES:

1. BC HYDRO TO INCLUDE SERVICE POLE (PUBLIC PROPERTY) AND OVERHEAD CABLE TO COMBINATION CT AND METER.
2. TELUS AND SHAW TO INCLUDE CABLE FROM STREET TO DEMARK IN MEZZANINE ROOM.
3. CONTRACTOR TO PROVIDE 10.6m CLASS C POLE, COMBINATION CT AND METER CABINET, 4x50mm SERVICE MASTS AND DUCTS/CONDUITS UP TO MEZZANINE ELECTRICAL ROOM.
4. CONTRACTOR TO PROVIDE 2 RUNS OF 4#3/0 PLUS GROUND FROM SECONDARY SIDE OF COMBINATION CT AND METER TO 400A/400A MAIN DISCONNECT IN MEZZANINE ELECTRICAL ROOM.
5. COORDINATE WITH HYDRO, TELUS AND SHAW.
6. 400A/400A DISCONNECT AND CT AND METER IN GROUND FLOOR ELECTRICAL CLOSET TO BE DELETED.



NOTES

1. COORDINATE INSTALLATION OF ROOF FLASHINGS WITH ROOFING CONTRACTOR.
2. PROVIDE THALER MEF - 2A ROOF FLASHINGS AS SHOWN ABOVE FOR ALL ROOF PENETRATIONS.
3. LEAVE 1m SLACK IN LIQUID TIGHT FEEDER BETWEEN ROOF FLASHING PIPE AND EQUIPMENT BEING CONNECTED.

ROOF GOOSENECK DETAIL

SCALE: NTS

N

seal

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project

VICTORIA SAR STATION

drawing title

INCOMING SERVICE

designed: CT	scale: 1:200	date: 2018-08-29
drawn: GL	project no.: 1-18-121	
checked: RTD	drawing no.: ESK2	rev.
approved		