

ITS Infrastructure Facilities Guidelines

Prepared by: Enterprise Technology

Version 1.8

February 5, 2025

DOCUMENT CONTROL

Document Status		
WIP	DRAFT	FINAL

Version Number	v1.8
Release Date	February 5, 2025

Revision History			
Version	Description of Change	Editor	Date
v0.0	Original Source Documents: <ul style="list-style-type: none"> • Telecommunications Room-Feb18,10.doc • DATA CABLING Rev Nov 13 2020.doc • Voice CablingSpecs RevOct.11.2017.doc 	Gary Penak, Stanley Lam, egobuty, smacleod	2017, 2020
v1.0	Consolidated documents; added version control; updated specifications for data, VoIP cabling, racking	Robert Ng	Sept. 8, 2021
v1.1	Updated cabling and rack specifications	Robert Ng	October 14, 2021
v.1.2	Added recommendations for co-located telecom room	Robert Ng	October 29, 2021
v1.3	Added recommendations for: 220VAC, surveillance camera, room lock and climate control	Robert Ng	December 21, 2021
v1.4	Added specifications for enclosed locking IT cabinet	Robert Ng	February 24, 2022
v1.5	Added colour codes (cablings, outlets)	Robert Ng	March 14, 2022
v1.6	Updated BTU ratings for replacement/additional IT equipment in telecom room; specified backbone runs for multi-telecom room set-up	Robert Ng	December 14, 2022
v1.7	Updated product warranties based on Procurement feedback; cable testing and rack set up requirements	Robert Ng	January 5, 2024
V1.8	Updated vendor section	Robert Ng	February 5, 2025

Table of Contents

1	Scope.....	1
2	Telecommunications Room	2
2.1	Location and Size	2
2.2	Construction.....	3
2.3	Environmental.....	3
2.4	Security	3
3	Structured Cabling	4
3.1	General.....	4
3.2	Installation Practices	4
3.3	Cable Specifications and Tolerances.....	4
3.4	Data Communications Outlets.....	5
3.5	Rack Mount Patch Panels.....	5
3.6	Patch Cords and Line Cords	5
3.7	Labeling and Identification.....	5
3.8	Cable Testing Certification and Product Warranties	6
4	Telephony	7
4.1	Analog Telephone Lines (POTS)	7
4.2	IP Telephony Lines (VoIP).....	7
5	List of Preferred Vendors	8

1 Scope

This document outlines the facilities requirements and build specifications for the IT infrastructure at Toronto Public Library (TPL) branch locations. The IT infrastructure hosts user services including staff and patron PC workstations, Telephony and Wi-Fi as well as speciality programs for the public (e.g. learning centres and technology hubs). It will also support operational elements such as Keyscan, security cameras, digital signage and BAS.

The placement and installation of the IT infrastructure by the Contractor undertaking the work must be done in consultation with TPL and the site Project Coordinator and General Contractor according to the site plan and schedule.

2 Telecommunications Room

The primary function of a telecommunications room is the termination of horizontal and backbone cables to compatible connecting hardware, as well as splice closures, grounding and bonding facilities, and protection apparatus where applicable. The telecommunications room provides for the administration and routing of the equipment cables/cords from the horizontal cross-connect to the telecommunications equipment.

A telecommunications room also provides a controlled environment to house telecommunications equipment such as data networking electronic equipment. This room should be a separate space, dedicated exclusively to hosting IT equipment and not shared for other purposes (e.g. mechanical, electrical room).

2.1 Location and Size

1. The Telecommunications Room is strictly dedicated to telecommunications functions and related services (no co-location of other facilities or non IT equipment)
2. Room should be clear of mechanicals such as ventilation ducts, water, sewer, or steam pipes, and high voltage electric
3. No plumbing, HVAC or electrical conduit shall pass through or be directly above the telecommunications room
4. Cable pathway distances from each Telecommunications Room to each serviced workstation must not exceed 295ft or 90m
5. The horizontal cabling from mechanical termination at the communication outlet to mechanical termination in the serving equipment room is not to exceed 295ft, or 90m
6. At least one Telecommunications Room per floor is recommended
7. The telecommunications room should be located on the same floor as and centrally located to the work areas served
8. In a large building, more than one telecommunications room may be necessary to keep horizontal cabling runs within the specified lengths; backbone runs (3x NORDX/CDT IBDN Category 6a cables) should then be introduced to interconnect distributed rooms to main room
9. All telecommunications rooms must be vertically stacked within multi-floor buildings
10. Minimum room height: 8'6"; no suspended ceiling
11. Minimum door dimensions: 36"w and 80"h.
12. Telecommunications Room size is based on the usable floor space to be serviced (see table below)

Telecommunication Room Dimensions	
Usable Building Floor Space	Recommended Room Dimensions
500 m ² (5,000 sq. ft)	3 x 2.2 m (10 x 7 ft)
800 m ² (8,500 sq. ft)	3 x 2.8 m (10 x 9 ft)
1000 m ² (10,000 sq. ft)	3 x 3.4 m (10 x 11 ft)

If additional equipment, such as coaxial cable amplifiers and splitters are to be housed in the room, then additional floor and wall space should be added according to the space requirements of that equipment and associated cabling and mechanical requirements.

2.2 Construction

1. The design must comply with ANSI/TIA/EIA-569 standard regarding the requirements and recommendations for separation of copper telecommunication cabling from sources of electromagnetic interference
2. The telecommunications room is usually the demarcation point between the service providers (data and voice) and facility owner and contains demarcation point equipment mounted on a plywood backing panel:
 - a. 4' x 8' plywood backboard, 3/4" thick, painted with a light colored fire retardant paint
 - b. Mounted 4" above finished floor (AFF) on all walls
3. Telecommunication room will house 1x equipment rack:
 - a. Rack type (EIA-310-D compliant): 2-post, 42U, 19" wide, 10-32 threaded rails, vertical cable management, floor-standing, open-frame; affixed to floor
 - b. In the absence of a dedicated TPL telecommunications room, an enclosed cabinet with locking door is required: 42U, 19" wide, minimum 26" interior mounting depth, front/rear vented, sides removable, top with knock-outs, 1-pair 10-32 threaded rails, vertical cable management, floor-standing; affixed to floor
 - c. Recommended 3' clearance in front and behind rack for servicing
 - d. Do not locate near alternating current (AC) switchgear as defined in NEC Article 110 and referenced sections
 - e. Co-located with rack: 2x separate 120VAC 20A circuits with four duplex outlets (surge suppression type; coloured red) on each circuit; isolate these feeds from motors, AC switch equipment, lighting circuits; minimum noise and interference
 - f. Note: for larger sites (e.g data centre), the specification is for separate 220VAC 30A circuits in lieu of 120VAC 20A
 - g. Mount 2x vertical PDU power strips within rack and connect to circuits specified above
 - h. Terminate Ethernet cabling runs with patch panels at top of rack
4. Area lighting
 - a. Compact fluorescent lighting with a minimum of two fixtures
 - b. Provide duplex outlet(s) for task lighting
5. Ensure that all power bars are off floors and fastened to racks/walls

2.3 Environmental

1. Localized (in-room) temperature control (thermostat) is preferred
2. Maintain positive pressure with a minimum of 1 air change per hour
3. Control of heat and humidity to be maintained between 64°F - 75°F and between 30%RH - 55%RH non-condensing
4. Current network equipment generates 3793 BTU's per 24 data ports installed; design cooling to maximum number of current and future data ports that can be installed, in addition to other heat generating equipment in the Telecommunications room; budget minimum 20k BTUs
5. Coordinate electronic equipment BTU output with TPL Facilities to achieve cooling requirements; the existing building HVAC system is often sufficient

2.4 Security

1. IT room entry must be secured with programmable keyscan lock
2. Surveillance camera located within interior of IT room to monitor access

3 Structured Cabling

3.1 General

The structured cabling system described in this section is for the build of a TPL Branch Gigabit Ethernet LAN network for data and VoIP communications. The cabling system utilizes a physical hub-and-spoke topology to connect individual workstations (PCs, printers, etc.) to a central Telecommunications room located on-site. The location of each terminal point is given by the site facility plans with the installation coordinated through the site Project Manager and/or General Contractor.

3.2 Installation Practices

Installation of the structured cabling encompasses material and labour for a certified NORDX/CDT IBDN Category 6a Cabling System or equivalent, conducted in accordance with manufacturer guidelines and IBDN EIA/TIA 568A wiring standards.

Additional outlet boxes, raceways, and cable trays will be installed as required following proper cable installation techniques for raceways and cable trays as well as the use of proper supports for suspending and supporting the horizontal cable as per the manufacturer specifications.

All cables shall be neatly bundled, tie wrapped and routed together. Velcro wraps ties shall be used to prevent side to side movement of the cable. The Velcro wraps shall not be installed so as to deform the cable jacket. Secure cable bundles to vertical and horizontal supports and neatly fasten to the 4" ducting system supplied on each telecommunications rack when routing to the termination panels. Under no circumstance shall cables or conduits be fastened to suspended ceiling support systems. Cable bundles shall be supported to building structure independent of other support systems.

All conduit systems and cable bundles shall be left with a nylon fish string to allow for future additional cables.

All installation work shall be performed in a neat and professional manner and in accordance with applicable building codes.

Upon completion, all rubbish and refuse created by the Vendor will be removed by the Vendor at the Vendor's expense. This includes repair and/or replacement of damage to TPL property (e.g. walls, floors, ceilings, etc.).

3.3 Cable Specifications and Tolerances

1. All data communications cabling shall be BELDEN NORDX/CDT IBDN Category 6a, NEC/UL CMP (CSA FT6), UL CMP-LP (0.5A) rated or equivalent and coloured blue
 - a. Conductors: 4 pair, 23 AWG solid copper conductor, unshielded twisted pair (UTP)
 - b. Worst pair near end crosstalk loss < 32 dB/1000 ft. (32 dB/300m) @ 100 MHz
 - c. Maximum mutual capacitance: 17 pF/ft. (17 pF/300mm)
 - d. D. C. resistance: 28.6 Ohms/1000 ft. (28/.6 Ohms/300m)
 - e. Nominal impedance (1-100 MHz) = 100 +/- 15%
 - f. Maximum signal attenuation: 67 dB/1000 ft. (67 dB/300m) at 100 MHz
2. All cables are to be pulled in a continuous run; no cable splices shall be permitted
3. Cable run lengths not to exceed 295ft (90m)
4. Adherence to cable maximum pull force and minimum bend radius specifications

3.4 Data Communications Outlets

1. All modular jack inserts shall be BELDEN NORDX/CDT IBDN MDVO Category 6a, pinned T568A or equivalent
2. Jack inserts are to be black at the workstation location and white at the patch panel
3. All face plates will be off-white colour and may consist of either surface or flush mount style
4. Due to the nature of some room layouts, wire mold may be the only alternative for certain outlets (to be assessed as necessary)

3.5 Rack Mount Patch Panels

1. Patch panels shall be BELDEN NORDX/CDT IBDN rack mountable for Category 6a or equivalent
2. Each connector module shall have a T568A (ISDN) eight pin RJ-45 jack on the front of the panel and a 4-pair IDC termination on the back
3. Patch panels must be mounted to the upper portion of a standard EIA 19" equipment rack
4. Patch panels shall be black in colour
5. The patch panel system shall include all required accessories for patch cord management (retaining inter-bay racking panels, horizontal wire management per patch panel, etc.)

3.6 Patch Cords and Line Cords

1. Patch cords shall be BELDEN NORDX/CDT IBDN Category 6a, 23 AWG stranded modular or equivalent
 - a. Length is to be a mixture of 4ft and 7ft
 - b. Install all hub room patch cables
2. Workstation line cords shall be BELDEN NORDX/CDT IBDN Category 6a, 23 AWG solid or equivalent
 - a. Length is to be 10ft
 - b. Line cords are to be left at the equipment cabinet
3. There will be a patch cord and line cord supplied for each data outlet
4. Velcro wrap shall be used on wiring bundles; tie wraps are not acceptable

3.7 Labeling and Identification

1. All horizontal cabling shall be labeled at both ends according to the naming convention "xxxF9H9-999" outlined in the following table.

Labeling Convention	
Code	Designation
xxx	indicates Branch code
F9	indicates floor number
H9	indicates hub number
999	indicates cable number

Example: ACDF2H3-125 = Albert Campbell District, floor 2, hub #3, cable #125

2. Workstation faceplates shall be marked in an identical duplicate manner corresponding with the cabling sequence and labeled with mechanically printed labels
3. Patch panel ports, and patch cords shall be identified at both ends in simple numeric fashion

4. Provide as-built documentation (hardcopy and softcopy) detailing all cabling/labeling information, indexed by Branch

3.8 Cable Testing Certification and Product Warranties

1. The structured cable system must be IBDN certified verifying Category 6a data transmission speeds
2. **Lifetime Application Assurance**
IBDN certification shall provide the assurance that all present and future applications engineered for the performance level of the cabling system used will work for the lifetime of the certified IBDN Cabling System
3. **25-year Product Warranty**
IBDN certification shall provide a twenty-five year (25) product warranty for all IBDN passive components used in the installed IBDN Cabling System; defective/improperly installed products shall be replaced/correctly installed at no cost to the Purchaser.
4. A hardcopy and softcopy of all test results (i.e. wire map testing) shall be provided to TPL upon completion of the installation along with a completed and labeled as-built wiring diagram
5. If the original manufacturer is unavailable, the selected bidder is responsible for sourcing suitable alternate components in the event of demise or failure of the installed components.
6. The selected bidder shall provide a guaranteed twenty-four (24) hour response time to any warranty claims and the repair of reported damaged cables for a period of one (1) year upon installation completion.
7. Contractors must ensure that the selected network cabling component manufacturer and the wiring manufacturer must have contractual relationship to ensure that the system warranty is a true “end-to-end” structured cabling system warranty

4 Telephony

4.1 Analog Telephone Lines (POTS)

Specific equipment requires analog telephone lines (e.g. elevator, POS, fax, saferoom, alarm panel, ISR 911 gateway).

These lines will be run directly from the equipment and/or voice jack to the Telecommunications room and terminated on a BIX block. The cross-connect wiring between the BIX block and the telephone carrier BIX block (demarcation point) will be completed by the ILEC. The location of each voice jack is given by the site facility plans with the installation coordinated through the site Project Manager and/or General Contractor.

To allow for future VoIP, cabling should be BELDEN NORDX/CDT IBDN Category 6a, NEC/UL CMP (CSA FT6), UL CMP-LP (0.5A) rated or equivalent with a voice jack termination. Each voice cable must be individually numbered (1 to the number of voice cables) at both ends with the voice jack numbers (1-the number of voice cables) marked according to floor plans.

Conduits will be provided by the electrical contractor from each voice jack to an accessible ceiling location. The voice cabling contractor is to use conduit raceway provided and free air installation, depending on the exact site characteristics. When cabling is installed in accessible ceiling spaces, it must be supported independently from the ceiling. All work is to be completed and recorded in accordance with the Structured Cabling guidelines for data communication outlined in this document.

4.2 IP Telephony Lines (VoIP)

The location of each VoIP jack is given by the site facility plans with the installation coordinated through the site Project Manager and/or General Contractor. Should the location of a VoIP jack coincide with a data communications jack, then only a single jack is necessary. This combined (dual-purpose) jack will have VoIP overlaid with data communication service.

Follow the Structured Cabling guidelines for data communication outlined in this document with all applicable terms and conditions found therein.

5 List of Preferred Vendors

Shortlist of recommended vendors for performing the work outlined in this document.

Recommended Vendors		
	Vendor	Contact Information
1	Randall Electric	Randall Tyas Office phone 416-281-1722 Fax 416-281-8108 Cell 416-918-4240 cell 55 Colonel Danforth Trail Toronto Ontario M1C 1P8 randall@randall.ca
2	RJ Winters Services	Bob Winters Office phone 905-668-7497 Cell 905-424-8804 9 Pheasant Street, Whitby Ontario L1N 7E7 bob.winters@rogers.com
3	CaTECH Systems Ltd	Kevin May 201 Whitehall Drive, Unit 4, Markham, Ontario Office phone 905-944-0000 x 4168 Fax 905-944-4844 Cell 416-427-4296 kmay@catech-systems.com