

Communications Specification for:

University of Toronto
Tower FOI Relocation
481 Spadina Ave., Toronto, ON

Issued for Tender (O4)

UofT Project No.: P164-25-078
Fancom Project No.: 2026-119

This specification includes sections which clearly define IT requirements that affect the Electrical and Mechanical trades and it is encouraged to have the Electrical and Mechanical Contractors review for completion. Any omissions of IT requirements by either trade shall not be eligible for extras.

This document shall also be read in conjunction with University of Toronto 's Faculty of Information Structured Copper Cabling Standard, version Dec 2025

<u>Item</u>	<u>Description</u>	<u>Page</u>
1.0	INTRODUCTION	4
1.1	Project Description	4
1.2	Vendor Inquiries	5
1.3	Completion of Contract	5
2.0	TERMS AND CONDITIONS	6
2.1	Definitions	6
2.2	Tenders	6
2.3	Tender Closing	6
3.0	FLOOR PLANS AND SKETCHES	7
4.0	GENERAL SPECIFICATIONS	7
4.1	General Conditions	7
4.2	Labour	7
4.3	Tools	7
4.4	Payment	7
4.5	Schedule	7
4.6	Dimensions and Quantities	8
4.7	Equipment Locations	8
4.8	Codes, Permits and Inspections	8
4.9	Co-ordination	8
4.10	Owner Furnished Equipment/Materials	8
4.11	Materials Information Sheets	9
4.12	Other	9
5.0	PRODUCT SPECIFICATIONS	10
5.1	General Conditions	10
5.2	Backbone Transmission Media	10
5.3	Horizontal Transmission Media	10
5.4	Termination Hardware – Patch Panels	10
5.5	Termination Hardware – Outlets	11
5.6	Communication Outlets and Accessories	11
5.7	Connectivity Items	11
5.8	Cable Support	12
5.9	Grounding	13
5.10	Racks and Cabinets	14
5.11	Miscellaneous Hardware and Materials	14
5.12	Labelling	15
6.0	INSTALLATIONS	16
6.1	Installation Practices	16
6.2	General Conditions	16
6.3	Horizontal Cable Distribution	17
6.4	Conduit	17
6.5	Testing	18
6.6	Removal	19
6.7	Cut-over Support	19
7.0	FIRESTOPPING	19
7.1	Installation	19

8.0	DOCUMENTATION	20
8.1	Drawings	20
8.2	Cable Test Results	20
8.3	Package Requirements	20
8.4	Testing and Commissioning	21
9.0	WARRANTY AND CERTIFICATION	21
9.1	Warranty and Certification Requirements	21
10.0	UNIT RATES	22
10.1	Horizontal Transmission	22
10.2	Termination Hardware	22
10.3	Racks and Cabinets.....	22
10.4	Hourly Rates	22
11.0	TENDER DOCUMENT	23
11.1	Bid Form	23

1.0 INTRODUCTION

1.1 Project Description

- 1.1.1 This document is the specification for the installation of a copper infrastructure as well as fibre backbone cabling platform for defined further in this document. The installation is for the following location:

University of Toronto,
Tower FOI Relocation
481 Spadina Avenue
Toronto, Ontario

- 1.1.2 This project consists of the installation of cabling for various functionality, they are as follows:

1.1.2.1 IT Infrastructure including

- i. Category 6A cabling solution to support data applications
- ii. Singlemode OS2 backbone fibre solution to support connectivity to each floor

- 1.1.3 There will be a requirement in the bid forms to submit unit pricing for multiple requirements as defined in this document. Separate pricing will be outlined for various cabling requirements and must be adhered to. Failure to submit separated pricing may result in disqualification from bid.

The successful bidder must install a complete Structured Cabling Platform that is manufactured and warranted by a certified cabling manufacturer for copper and fibre.

The successful bidder must be currently authorised to install and warranty the systems defined. Letter of Certification must be supplied with Tender Submission.

- 1.1.5 The successful bidder is to schedule their installers such that the Cut Over schedule is maintained. Work that can be performed in such a way that it does not disturb occupants (no noise or interference) can be completed during regular business hours. If core drilling, x-raying or other work that would disturb or potentially cause injury to other tenants is required, it shall be done after hours, unless approved in writing by General Contractor assigned to this project. Any shift work or overtime that is required to complete the project on schedule should be included in the Cabling Contractor's tender bid.

- 1.1.6 The Cabling Contractor shall supply and install a complete Structured Cabling Platform based on a physical star wiring topology that is designed in accordance with and supported by a manufacturer backed certification as specified herein. The Cabling Contractor shall include all communication outlets, terminating hardware and selected connectivity devices as outlined in this Specification.

- 1.1.7 No additional fees shall be accepted.

The Bidder must understand that their portion of the work will commence almost immediately following their bid submission and must include with their bid any additional costs to extend the pricing for that period of time. Any deviation from the bid request for additional funding once work commences will not be accepted under any circumstances. Please allow for this contingency when submitting your bids.

- 1.1.8 While every attempt has been made to ensure all information is correct at the time of publication, and that the products specified are available, it is the responsibility of the Cabling Contractor to report any errors and/or omissions in this Specification with their bid submissions.

- 1.1.9 The following are mandatory conditions to be met by the successful bidder. The successful bidder must obtain warranties for the newly installed Voice and Data cabling. The Warranty obtained for the cabling must be a channel performance Warranty for each floor occupied by the Owner.
- 1.1.10 The Client, Developer, General Contractor, Project Manager, and/or Consultant reserve the right to dismiss any bidder that is more than 15% lower than the next competitive bid. No explanation shall be deemed necessary.
- 1.1.11 The following assumptions are to be used in pricing for the submission of the bid document. It is to be assumed that there will be a total of one (1) final Cut Over throughout the entire project.
- 1.1.12 Communications Contractor to co-ordinate schedule of construction with Project Manager/General Contractor assigned to this project.
- 1.1.13 Communications Contractor to please note that all IT cabinets/racks are already in place.
- 1.1.14 There shall be weekly site reports due, to the consultant, for the duration of the project during the time the communications Contractor is on site. Detailed requirements will be defined once project is awarded.
- 1.1.15 Cabling Contractor must supply the following bid documents to be considered complete, failure to do so will disqualify your bid:

Main Bid	All horizontal cabling systems for a complete end-to-end system as outlined in this specification, including support pathways and fibre backbone.
Documentation	All Bidders shall supply cut sheets of all components of listed manufacturers with their bid package. Any deviation from specification will not be acceptable.
Labour Rates	All labour rates defined in this document.
Unit Rates	All unit rates outlined in this document.
Certification	A Copy of current letter of certification with one of the manufacturer's as defined in this document.

1.2 Vendor Inquiries

- 1.2.1 Vendors who find discrepancies or omissions in this specification, or who have any doubt as to the meaning or intent of any part of this specification, shall direct their questions or other inquiries five (5) business days prior to the posted tender closing date and time in writing or email to:

Alex DiMarco – Director, technical Services
University of Toronto, Faculty of Information
Telephone: (647) 483-0853
Email: alex.dimarco@utoronto.ca

In fairness to all vendors, all questions will be compiled, answered and distributed to all.

1.3 Completion of Contract

- 1.3.1 Before acceptance by the Communications Consultant, all the equipment and cabling must be cleaned and tested. At points of termination, all cabling and terminations must be free of any cable pulling lubricants before acceptance by the Communications Consultant.

- 1.3.2 From the date of issuance of a 'Certificate of Substantial Performance', all equipment, materials and workmanship must be unconditionally Warranted for a period of one (1) year, or such longer periods as may be provided in the Warranty of the manufacturer of individual components, whichever is longer.
- 1.3.3 Provide a manufacturer written certificate and Warranty that the Structured Cabling Platform is installed and fully operating in accordance with this and the manufacturers specifications.

2.0 TERMS AND CONDITIONS

2.1 Definitions

The Owner's Representative is defined below by the term Project Manager.

Owner : University of Toronto

Project Manager: Fancom Connects Ltd.

Cabling Contractor: Pre-qualified Certified Communications Bidders only. All other submissions will be returned to bidder.

2.2 Tenders

- 2.2.1 All prices that are indicated on the Specification tender document to be valid for periods of 60 days from the date of tender closing.
- 2.2.2 Harmonized Sales Tax (HST) is an extra and should be identified separately in the bid documents and on all invoices. Bidders are required to provide their HST registration number at the time of bidding.
- 2.2.3 All prices are to include incidental fees and other fees for items required to successfully install the Structured Cabling Platform that may or may not be indicated in this document. Successful installation of the Structured Cabling Platform is one that meets the requirements of this document and meets all municipal, local, provincial and federal building, safety, fire and electrical codes.
- 2.2.4 The tender documents shall remain property of the Owner. Bidders shall be required to return the tender documents to the Owner with their bids.
- 2.2.5 Bidders must submit documentation verifying their current participation in a manufacturer's certification program for the Structured Cabling Platform that they propose to install. This must be submitted with the bid documents.
- 2.2.6 Two copies of all tenders must be delivered to the Fibrelight Design Solutions Inc. This information will be provided with bid document.
- 2.2.7 Facsimiles will not be accepted under any circumstances.

2.3 Tender Closing

- 2.3.1 All bid submissions must adhere with the requirements set out by the Communications Consultant. The Tender closing date and time shall be confirmed by University of Toronto via the tender invitation/addenda; 'closing date' in this specification refers to that posted closing date and time.

3.0 FLOOR PLANS AND SKETCHES

<u>Drawing No.</u>	<u>Title</u>
A202	Telecommunications Cabling Layout – 2 nd Floor
A203	Telecommunications Cabling Layout – 3 rd Floor
A204	Telecommunications Cabling Layout – 4 th Floor
A-207	Telecommunications Cabling Layout – 7 th Floor
DET1	Telecommunications Details 01

4.0 SPECIFICATIONS

4.1 General Conditions

The equipment, material and installation shall conform to the latest version of the applicable Codes, Standards and regulations of authorities having jurisdiction. All references to Codes, Standards and regulations should first be made with respect to Canadian documents.

4.2 Labour

4.2.1 The Cabling Contractor must comply with all job-site requirements for the duration of the project.

4.2.2 The Cabling Contractor shall not assign or sub-contract any work without the prior written consent of the Owner or his representative. If utilizing a sub-contractor, a list of sub-contractors must be submitted with the tender response.

4.2.3 The Cabling Contractor must comply with all requirements of the Occupational Health & Safety Act.

4.2.4 The Cabling Contractor agrees to use only tradesmen who are fully trained, qualified and experienced on the installation, termination and testing of the Structured Cabling Platform. The installer must be an approved installer of the specific cabling system.

4.3 Tools

4.3.1 The Cabling Contractor is allowed to store job boxes on the site during construction. The tools and the job box are the responsibility of the Cabling Contractor and the Owner and his representative is in no way responsible or liable for any tools of the Cabling Contractor.

4.4 Payment

4.4.1 The value for testing and documentation shall be set at 10% or \$5,000; which-ever is greater, for payment purposes. This amount will be withheld from the Cabling Contractor until testing and correction of deficiencies is 100% complete.

4.5 Schedule

4.5.1 The Project Manager will determine the schedule. Include for all necessary overtime required to carry out the project. Prior to commencing work, Cabling Contractor to submit their anticipated construction schedule.

4.6 Dimensions and Quantities

- 4.6.1 Dimensions shown on drawings are approximate. Verify dimensions by reference to shop drawings and field measurements. Contractor shall be responsible for checking drawing scales, any error in length calculations shall be the responsibility of the communications contractor.
- 4.6.2 Quantities or lengths indicated in any of the Contract Documents are approximate only and shall not be held to gauge or limit the work.
- 4.6.3 Make any necessary changes or additions to routing of cables, pathways to accommodate structural, mechanical, electrical and architectural conditions. Where pathways or cables are shown diagrammatically run them parallel to building columns. If it is necessary to run cables otherwise to accommodate acceptable cable lengths, written permission for any variation must be obtained from the Communications Consultant prior to installation.

4.7 Equipment Locations

- 4.7.1 Devices, racks, cabinets, backboards or outlets may be relocated, prior to installation, from the location shown on the Contract Drawings, to a maximum distance of 3m (10'-0") without adjustment to the Contract price.

4.8 Codes, Permits and Inspections

- 4.8.1 Comply with the Ontario Hydro Electrical Safety Code, all local, provincial and federal laws, where applicable and with requirements of the Canadian Standards Association (CSA) when mandatory. Make any changes or alterations required by the authorised inspector of the authority having jurisdiction.
- 4.8.2 Where materials are specified which require special inspection and approval of CSA and/or local authorities, obtain such approval for the particular installation with the co-operation of the material supplier.
- 4.8.3 Obtain and pay for permits and inspection required for work performed.
- 4.8.4 Submit required Documents and shop drawings to authorities having jurisdiction in order to obtain approval for the work. Copies of Contract Drawings and Specifications may be used for this purpose. Prepare any additional information, details and drawings that these authorities may require.

4.9 Co-ordination

- 4.9.1 Carefully examine work and Drawings of all related trades and thoroughly plan the work so as to avoid conflict or interference with other services. Report defects that would adversely affect work. Do not commence installation until defects have been corrected.
- 4.9.2 Co-ordinate work of this Contract such that items will properly interface with the work of other Contracts. Prepare installation drawings of critical locations and submit to Communications Consultant for review.

4.10 Owner Furnished Equipment/Materials

- 4.10.1 Arrange for the delivery of customer furnished equipment/materials related to Communications Contract and related items, including unloading of supplier's truck, elevator scheduling and placement on Owner premises as indicated on Contract drawings.

4.10.2 Cabling Contractor is responsible for the assembly of equipment/materials and protection of the above equipment and related items until project Cut Over. Any damage to equipment will be the liability of the Cabling Contractor. All damage must be repaired or at the Owner's request, the equipment must be replaced at no extra charge to the Owner.

4.11 Materials Information Sheets

4.11.1 If requested, the Cabling Contractor must supply all necessary Work Place Hazardous Material Information System (WHMIS) - Material Safety Data Sheets (MSDS) at the request of the Communications Consultant. These must be supplied within 5 business days of the written request.

4.12 Other

4.12.1 It is the responsibility of the Cabling Contractor to perform all cutting, patching and repair related to the communications cabling work.

4.12.2 Any damages to ceiling tiles during the installation of any work described in this document will be the responsibility of the Cabling Contractor. Damages include chipping, breaking or fingerprints. The Project Manager will make final decisions on the trade responsible for any damage to ceiling tiles.

5.0 PRODUCT SPECIFICATIONS

5.0.1 This document section specifies the use of an end-to-end Structured Cabling Platform as manufactured and warranted by a certified cabling platform.

5.1 General Conditions

5.1.1 The Cabling Contractor is responsible for complete storage, handling, delivery, and installation of all materials used in the performance of the work.

5.1.2 The Cabling Contractor is responsible for keeping the workplace clean, safe and free from debris at all times. All debris must be removed from the site on a daily basis. The costs for cleaning are the responsibility of the Cabling Contractor.

5.1.3 The Cabling Contractor must include all manufacturer cut sheets from the end-to-end solution being chosen for acceptance of bid.

5.1.4 All cabling must be terminated using T568A configuration, unless specifically noted otherwise.

5.2 Backbone Transmission Media

5.2.1 9/125µm OS2 singlemode fibre for backbone applications

.1 All backbone is to be supplied and installed as per requirements outlined in UoFT FOI standard.

5.3 Horizontal Transmission Media

5.3.1 UTP Category 6A, FT6 (Plenum rated) twisted 4-pair copper for horizontal distribution

- .1 The copper horizontal distribution cable shall be Category 6A, twisted pair, plenum grade cable (FT6).
- .2 Terminations for all cable is defined in this document.
- .3 If not in conduit, all copper horizontal cable shall be routed via wire basket tray or J-hooks where cable leaves the tray in the ceiling plenum.
- .4 All data copper terminations shall reside on patch panels in the horizontal distribution racks.
- .5 Requirements for outlets shall be as follows:
 - As defined on the tender drawings

5.3.2 Cable colour designations for horizontal distribution shall be as follows:

<i>Premises Colour Schema</i>	<i>Site Standard</i>
End user Data	BLUE

5.4 Termination Hardware - Patch Panels

5.4.1 Category 6A Copper Patch Panels

Category 6A 48-port Patch Panels for all Horizontal Cabling

- .1 All modular 48-port patch panels shall be 1U, Category 6A patch panels.
- .2 All modular 48-port patch panels shall include colour coded jacks to match outlet.

5.5 Termination Hardware - Outlets

5.5.1 Modular UTP, Category 6A Information Outlets

- .1 All Category 6A UTP modules shall be Modular Jacks with dust covers.

5.5.2 Outlet Module Colour

- .1 All outlets/modules colour designations shall follow table in 5.3.2

5.5.3 Outlet Module Position

- .1 For wall outlet locations, Communications Contractor to follow details on drawings for outlet position.
- .2 For systems furniture locations, Communications Contractor to follow details on drawings for outlet position.

5.5.4 Additional Modules

Contractor to supply an additional 10 copper modules of each colour. These can be delivered to client site.

5.6 Communication Outlets and Accessories

5.6.1 Office Outlets

- .1 Wall Locations - all horizontal cabling that is to be connected to wall outlets are to utilise a 2-port or 4-port Decora Adapters (colour to match electrical),
- .2 Furniture Outlets - all horizontal cabling that is to be connected to furniture outlets are to utilise a 2-port or 4-port module on service or pack poles

5.6.2 Blank modules

Any unused communication positions in workstation outlets must be filled with manufacturer's blank module matching the colour of the Decora strap or furniture monument.

5.6.3 Data and Voice ID Tabs

- .1 ID Tabs are to be installed for every communications module. The ID Tab should match the use of the cable. The ID Tab should match the colour of the modular outlet defined in this section.

5.7 Connectivity Items

- 5.7.1 The Project Manager reserves the right to switch out at no additional cost any patch cords to a shorter length. If this does occur, the Project Manager or his representative will notify the Cabling Contractor in writing prior to the cut over date.

- 5.7.2 The lengths requested must be common available lengths. If uncommon lengths are requested, the Communications Contractor shall have two (2) weeks to substitute them. If common lengths are requested 48 hours shall be sufficient time to exchange to the desired length.

- 5.7.3 The colour of all patch cords must be confirmed with the Communications Consultant prior to placing the order.

5.7.4 Patch Cords – CAT6A Copper

- .1 ALL patch cords shall be Category 6A, 26 AWG, UTP, factory-terminated patch cords with reduced-profile (high-density) snagless boots suitable for use in 1U 48-port patch panels without obstructing adjacent ports.
- .2 The Patch Cords are to be CMR rated FT4 and stamped accordingly. The 8-pin modular/8-pin modular Patch Cords are to be consistent with the grade and manufacturer of the Data Cable that is being warranted.
- .3 The Cabling Contractor is required to supply and install all Patch Cords for complete connectivity of Horizontal Cables (quantities listed below).
- .4 The Cabling Contractor must provide a complete mapping of the end-to-end connectivity including horizontal cable number and active equipment port number. (In both hard and soft copy format - using Microsoft Excel)
- .5 Patch Cords for connectivity are defined on the tender drawings:
 - For each horizontal Data outlet terminated on the Telecommunications Room patch panel(s), provide one (1) 1-ft blue patch cord at the Telecommunications Room rack, plus 5% spare.
- .6 Additional Patch Cords required for the Server Room shall be:
 - For server room terminations only: for each horizontal Data outlet terminated in the Server Room rack(s), provide one (1) 7-ft blue patch cord at the Server Room rack, plus 5% spare.
- .7 Each Data Patch Cord is to be labelled sequentially from 1 through XXX (Patch Cords and Line Cords use the same numbering scheme).
 - Each Patch Cord is to be labelled with a shrink-wrap label within 4 inches of both ends of the cable. The labels are to have the sequential Patch Cord number and the Patch Cord length. Example: 14-7 would be Patch Cord 14 and it would be 7 feet in length.
 - Provide lengths based on outlet feed point and desktop location. These will vary between seven feet (7') and twenty-five feet (25') in length.

5.8 Cable Support

5.8.1 Communications Conduit (as required)

- .1 All conduit shall be supplied and installed by bidding Contractor or coordinated for Div. 16 on site.
- .2 Communications Contractor shall be responsible to co-ordinate drawings to ensure all locations are provided for.
- .3 No additional fees or extra's shall be accepted for omitted cable support.

5.8.2 Communications Wire Basket Tray (WBT)

- .1 All cable tray shall be WBT or equivalent continuous, rigid, welded steel wire mesh cable management system with the following requirements:
 - Mesh system permits continuous ventilation of cables and maximum dissipation of heat.
 - Continuous top wire must be kinked.
 - Wire mesh welded at all intersections.
 - White Powder Coated finish
 - Wire Diameter: 0.197 inch (5mm) minimum on all mesh sections.
 - All mesh sections must have at least one (1) bottom longitudinal wire along entire length.
- .2 UL Classification: Straight sections 2 x 6 inches (50 x 150mm), 4 x 12 inches (100 x 300 mm), and are UL classified as an equipment grounding conductor.
- .3 Specify finish as defined on drawings. Consult John Saunders at Saunders Canada (416) 570-1679 for assistance in selecting all peripheral components for a complete system.
- .4 Material: [Carbon steel wire, ASTM A510, Grade 1008. Wire welded, formed, and then surface treated.]
[Stainless steel wire, AISI 316L, 2B, finished cold drawn wire.]

- .5 Inserts: WBTFORM2X6 and WBTFORM4X12 in WHITE for full length of all trays.
- .6 Nominal Dimensions:
 - Straight Section Length: 120 inches (3,000 mm).
 - Standard Widths [6 inches (150 mm)] [12 inches (300 mm)]
 - Standard Channel Depths: [2 inches (50mm)] [4 inches (105mm)]
 - Non-Standard widths and depths are available upon request.
- .7 Fittings:
 - Field fabricated, (in accordance with manufacturer's instructions), from straight sections.
- .8 Hardware:
 - Hardware, including splice connectors and support components available from manufacturer.
- .9 Accessories:
 - All accessories including waterfalls, tray size matching 90's, and support structure shall comply with Wire Basket Tray (WBT) series tray.
- .10 Grounding:
 - Grounding Clip is available for continuous ground of cable management system. [aluminium]
 - Grounding of the Wire Basket Tray (WBT) shall be the responsibility of the Communications Contractor.
- .11 Installation
 - Communications Contractor shall supply and install all required Wire Basket Tray for horizontal distribution as outlined on drawings.
 - All Wire Basket Tray and fittings shall conform to ANSI NFPA 70, Article 318-Cable Trays.
 - Contact your supplier or distributor for ordering information.
 - Supply and install all sections of tray including required coupling/joining hardware, support and attachment hardware, dividing accessories, dropouts and bend plates where required.
 - The radii on all fittings shall be 6" (150mm) minimum for 6" wire basket tray, 12" (300mm) minimum for 12" wire basket tray.
 - The inside of the cable tray must be free of burrs, sharp edges, or projections, which can damage the cable insulation.
 - Supply and install all required rods for support of wire basket tray structure. Wire basket tray shall be supported on recommended centers and a support must be placed within 2 feet (600mm) on each side of any connection to a fitting.
 - All painted Wire Basket Trays must be grounded. Clearly mark any tray that is used as an equipment grounding conductor, as specified in ANSI/NFPA 70, Section 318-3 (c).
 - Communications Contractor must follow routing laid out on the Communications drawings for all Wire Basket Tray in the computer room and on the floors.
 - All Wire Basket Tray must be installed above bulkheads where possible.
 - Single rod support shall NOT be accepted.

5.8.3 Communications Cable Support - All Other Ceiling Locations

- .1 For bundles of up to 16 cables utilise J-hook assemblies. These are to be supplied and installed by Communications Contractor.
- .2 All J-hooks shall be supported by Angled Hanger Bracket. These are to be supplied and installed by Communications Contractor.
- .3 *J-hooks in exposed ceiling areas are not permitted.*

5.9 Grounding

- 5.9.1 Ground all patch panels, racks, cabinets, ZDB's, voice cables, and data equipment to building ground busbars (provided by others) using minimum #6 AWG insulated ground wire.

- 5.9.2 Ground cable shall be insulated green jacket, braided copper wire installed in each communication room that connects to the building ground system. Minimum wire size shall be #6 AWG for Telecommunications closets and #1/0 for main building communications room.
- 5.9.3 Grounding system for main building communications room shall be designed such that the individual grounding runs to each piece of equipment does not exceed 5' from the main loop.
- 5.9.4 Grounding to tie into a single ground point only.
- 5.10 Racks & Cabinets
 - 5.10.1 Wall Mount Cabinets
 - .1 Hubbell Re-BOX 5U or equivalent wall mounted cabinets in gray for all distribution on the floors as noted on drawings. Contractor to coordinate with IT staff for use of space.
 - .2 Please verify that all racks are connected to the telecommunications grounding bus bar as defined in the grounding section.
 - .3 Mount equipment in racks as coordinated with client.
 - 5.10.2 2-post Rack
 - .1 All communication rack(s) to be bolted in place, location TBD on site.
 - .2 All racks must be connected to the telecommunications grounding bus bar as defined in the grounding section.
 - .3 Locate racks as shown on contract drawing, anchor racks securely to the floor. Bolts/anchors used to mount must be made flush and any sharp edges must be removed. Mount equipment in racks as shown on detail sketches.
 - .4 Ground racks, patch panels, cabinets, Voice cables, metal raceways and Data equipment to building ground busbars (provided by others) using minimum #6 AWG insulated ground wire.
 - .5 Ground cable shall be insulated green jacket, braided copper wire installed in each communication room that connects to the building ground system. Minimum wire size shall be #6 AWG for Telecommunications closets and #1/0 for main building communications room.
 - .6 Grounding system for main building communications room shall be designed such that the individual grounding runs to each piece of equipment does not exceed 5' from the main loop.
 - .7 Grounding to tie into a single ground point only.
 - .8 Acceptable Requirements.
 - a) Hubbell HPW84RR19 Equipment Rack, 84" H x 19" W, Black or equivalent' 10-32 threaded
 - 1500 lb. load capacity
 - Two (2) HDC HDC Adjustable Cable Management Trough, Black
 - Two (2) VME Vertical Cable Manager, 84" H X 6" W Cover, 5 Rung and Gates, Black
- 5.11 Miscellaneous Hardware and Materials
 - 5.11.1 Velcro ty-wraps
 - .1 It should be noted that **only** Velcro ty-wraps are acceptable, under no circumstance are traditional ty-wraps to be used. Velcro ty-wraps are to be used to neatly dress cables; they are to be placed at a maximum of 3-foot intervals for all horizontal distribution.
 - .2 Velcro ty-wraps are also to be used to dress horizontal cables into racks. For each row of the patch panel cables are to be dressed horizontally (from the middle to the left and the right) to the vertical cable manager (maximum spacing of 3 inches). Maximum spacing of Velcro for horizontal cables into or along

vertical cable managers is to be no more than 6 inches; this includes cabling dropped from the ladder tray or ceiling above.

5.12 Labelling

- 5.12.1 All labelling shall adhere to CAN/CSA-528, EIA/TIA-606 AND EIA/TIA-568A guidelines.
- 5.12.2 All adhesive cable labels shall meet the legibility, defacement, and adhesion requirements specified in UL 969 (Ref. D-16). In addition, the labels shall meet the general exposure requirements in UL 969 for indoor use.
- 5.12.3 Cable Labels shall be of self-laminating vinyl construction with a white printing area and a clear tail that self laminates the printed area when wrapped around a cable. The clear area should be of sufficient length to wrap around the cable at least one and one-half times.
- 5.12.4 All labels must be mechanically printed using a laser printer. Hand-written labels are not permitted.
- 5.12.5 Any nameplates shall be securely fastened to the equipment they are identifying.
- 5.12.6 Labels should be attached to the front of the workstation faceplate, one to the front of the distribution connector/IDC field, and one at each end of the copper or fibre optic cable (within 4 inches of end).
- 5.12.7 The Cabling Contractor will confirm the proper cable designations with the Communications Consultant prior to installation.
- 5.12.8 Labels for the distribution connectors and patch panels are to be mechanically printed and are to follow the guidelines in CSA-T528-93 for colour coding.
- 5.12.9 All labels shall have a minimum 1/8" font, block style letters that are clearly legible from a distance of six (6') feet.
- 5.12.10 The Cabling Contractor shall supply and install 5 additional labels (per floor) of ½ inch lettering height (up to 25 letters each label) for use on cabinets, racks, patch panels or active equipment to be used at the Communications Consultants discretion.

6.0 INSTALLATION

- 6.0.1 All Cabling Contractors must be trained in the proper installation practices of the particular Structured Cabling Platform being quoted. It is not the intent of this document to re-issue the installation requirements but to ensure that the Cabling Contractors comply with these practices.
- 6.0.2 The Cabling Contractor is to adhere to all Standards, regulations and documents listed throughout this document.
- 6.0.3 All products installed must meet or exceed all local, provincial and federal building, fire, health, safety and electrical codes.

6.1 Installation Practices

- 6.1.1 Supply and install cabling as detailed on floor plan(s). The Cabling Contractor shall use the J-hooks and conduits to distribute the cables throughout the facility. Where the cables leave the J-hooks and extend to the termination point they shall be routed through conduit to the outlet box.
- 6.1.2 All Cables and components to be installed and terminated in accordance with CSA, ANSI/EIA/TIA-568A and its' Amendments as well as UL Guidelines. Particular attention must be given to maintaining the integrity of the pair twists, bend radius and ensuring proper distance is kept from fluorescent light fixtures, electrical cables or any other source of EMI.
- 6.1.3 Ensure ANSI/EIA/TIA-568A installation practices are followed. Cables are to be combed and bundled in a neat and organised manner. The Communications Consultant will determine neatness of the installation. Cables that have not been properly combed and dressed will have to be re-dressed at the Cabling Contractor's expense. The Cabling Contractor shall co-ordinate with the Communications Consultant prior to termination in any communications room. State Street shall supply installation drawings prior to installation.
- 6.1.4 The maximum horizontal run length is not to exceed 90-metres. If the 90-metre constraint cannot be met, the Cabling Contractor is to notify the Communications Consultant of any cables that exceed 90-metres, prior to their installation.

6.2 General Conditions

- 6.2.1 All cables and pathways such as conduits, cable tray or other systems used for communication cable distribution to be run parallel or perpendicular to building lines.
- 6.2.2 To minimise any possibilities of disruption maintain the following minimum clearances from electrical and heat sources when routing cables.

<u>Item</u>	<u>Minimum Clearance</u>	
Motor	1.2 m	(4'-0")
Transformers	1.2 m	(4'-0")
Conduit and cables used for electrical distribution less than 1kV	0.3 m	(1'-0")
Conduit and cables used for electrical distribution greater than 1kV	1.0 m	(3'-0")
Fluorescent Luminaries	12 cm	(0'-5")
Pipes (gas, oil, water, etc.)	30 cm	(1'-0")
HVAC (equipment, ducts, etc.)	15 cm	(0'-6")

- 6.2.3 Any deviation from the cable routing, outlet and equipment locations shown on drawings must be approved by the Communications Consultant and documented on as-built drawings.

- 6.2.4 Avoid scraping, denting, or otherwise damaging cables, before, during or after installation. The Cabling Contractor without any additional compensation shall replace damaged cables.
- 6.2.5 Ensure that all cable lengths are sufficient to allow for slack, vertical runs, wastage, connectorization and future moves.
- 6.2.6 Bush, ream and remove any sharp projections on all conduits prior to installation of communications cables.
- 6.2.7 When terminating copper cables remove only enough cable jacket to perform termination, untwist pairs a maximum of 6.5 mm (1/4 inch) for Category 6 cables.
- 6.3 **Horizontal Cable Distribution**
 - 6.3.1 Pull all cables in a continuous run. No cable splices will be permitted. The Cabling Contractor must utilise pulling grips for all cables.
 - 6.3.2 Provide 1 m (3'-0") of slack (unless noted differently in section 5.0) at user end of each cable to permit future outlet relocation. Neatly coil slack in ceiling space. Do not exceed the 90m-length constraint.
 - 6.3.3 Neatly bundle and ty-wrap all cables using Velcro ty-wraps. Separate copper cables and fibre cables into separate distinct bundles for identification purposes.
 - 6.3.4 When bundling Category 6 cables, comply with manufacturer's recommended bundling practices for installation. Ensure that excess pressure is not placed on the cable at any point that may result in the compression or deformation of the cable jacket and internal pair/conductor geometry.
 - 6.3.5 Follow proper installation and termination practices for Category 6 and Enhanced Category 6 cabling. Do not kink or exceed the cable minimum bend radius or maintain a minimum of four (4) times cable diameter as bend radii if the manufacturer specifies no bend radius.
 - 6.3.6 Utilise all indicated and available cable pathways such as conduits, cable tray, raceways and furniture system channels except where otherwise noted. Exercise caution when pulling cables in such pathways to avoid damage to any existing cables and follow manufacturer's maximum pull-force and minimum bend radii.
 - 6.3.7 Ground all cables and components to manufacturer's specifications and standard practices.
 - 6.3.8 Terminate all pairs of cable. Terminate all spare cables in telecommunication closet and store service point in a neat coil in ceiling space.
 - 6.3.9 Provide blank filler plates for all unused modular jack positions on faceplates and outlets.
- 6.4 **Conduit**
 - 6.4.1 Apply manufacturer's recommended lubricant to cables to reduce friction between the cable and the conduits.
 - 6.4.2 Cable grip to be attached to the sheath and its strength members so that no direct force is applied to the conductors. The cable grip shall have a ball bearing swivel to prevent the cable from twisting during pulling.
 - 6.4.3 Station personnel at each access point (i.e. Handhole, manhole, etc.) to observe and lubricate the cables being pulled.

- 6.4.4 Do not exceed the copper cables maximum tensile rating during installation. Monitor tension of the cable during installation.
- 6.4.5 Minimum bend radius to be as per manufacturer's recommendations.
- 6.4.6 Make cable pulls continuous and steady between pull points. Do not interrupt the pull unless necessitated by excessive tension on the cable.
- 6.4.7 Following the installation of all cables, all duct entrances into the building to be sealed with duct sealing compound to prevent ingress of moisture, foreign material and rodents.
- 6.4.8 Protect exposed cable ends from moisture ingress.
- 6.4.9 Conduit fill capacities must be maintained. The recommended 40% fill for conduits (without bends) table is shown below. It defines the compulsory fill capacities for both voice and data cables in this project installation. Degrade the fill capacity by 15% for each 90° bend (up to two bends).

For Category 6A Cables (based on max O.D of 0.22"):

Conduit size	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"
Cable Capacity	-	3	5	8	11	22	39	59	99

If larger conduits are required, notify General Contractor and Communications Consultant immediately. This will ensure the proper size be installed within the timelines of the project.

- 6.5 Testing
- 6.5.1 The Communications Consultant must approve the testing procedure prior to testing commencing and may request to be present during the initial testing.
- 6.5.2 Upon completion of the testing by the Cabling Contractor the Communications Consultant may ask the Cabling Contractor to perform a random test of up to 10% of the cables. A penalty of \$50.00 will be deducted from the Contract amount for each cable that fails to pass the random test.
- 6.5.3 All deficiencies must be corrected before the Communications Consultant will provide a certificate to release the Holdback on the project.
- 6.5.4 Cabling Contractor is required to submit a soft copy of test results in the tester's native export format and in a non-proprietary tabular format (CSV and/or Microsoft Excel).
- 6.5.5 The Cabling Contractor is to use a Level III tester that is capable of testing the specified cable to the performance level(s) indicated in this document. The tester is to use the latest version of firmware and software to test the UTP cabling system and an Optical Loss test set for all fibre optic testing.
- 6.5.6 Test patch cords to portable tester must be designed for testing by the manufacturer. Field assembled patch cords are not acceptable. Field testers must use the appropriate jack/tester adapter specified for use with the cabling jack(s) specified within this document.
- 6.5.7 Testing of horizontal cables is to be completed in accordance with the following test criteria. The testing must be completed on the Channel Level. Testing is to be completed from both ends of the installed cable.

- 6.5.8 Cabling Contractor to produce a test report based on the cable schedules. The report should indicate for each cable, when it was tested successfully and the signature of the technician that performed the test, location, cable type, cable number and tester make and model. A copy of the test report must be submitted to the Consultants for approval. The entire report must be signed by an authorised person for the Cabling Contractor at the end of the project.
- 6.5.9 Correct all cable faults. Splicing of any cables will not be permitted, for any reason, unless prior authorisation is received in writing from the Consultant.
- 6.6 **Removal**
 - 6.6.1 The Communications Contractor is to remove all cabling that has been replaced from jack to panel and dispose of it in an environmentally safe fashion at their cost
 - 6.6.2 The communications Contractor shall be responsible to remove all old jacks and panels and dispose of them in an environmentally safe fashion at their cost.
- 6.7 **Cut-over Support**
 - 6.7.1 The Communications Contractor must include in their Tender Bid one (1) person for duration of eight (8) hours each for the final cutover for this project. Please allow for any overtime or premium time that may be required. Communications Contractor shall be given a proposed schedule for the duration of the project at commencement. Three (3) business days are required to book changes for the scheduled cutover weekend.
 - 6.7.2 The General Contractor may request additional cutover support than that indicated above.
- 7.0 **FIRESTOPPING**
 - 7.1 **Installation**
 - 7.1.1 Follow the criteria set by ULC Standard CAN4-S115 for fire stopping requirements. The Cabling Contractor must establish/re-establish the integrity of all fire-rated structures and assemblies that they have created or disturbed.
 - 7.1.2 Cabling Contractor must adhere to the fire rating classifications (F, FH, FT, FTH, and H).
 - 7.1.3 Supply and install non-permanent CSA approved intumescent fire stopping, to cap all empty sleeves and around cabling passing through sleeves or walls. All fire stopping must maintain a minimum one-hour rating and must meet applicable Federal, Provincial and local building codes.

8.0 DOCUMENTATION

8.1 Drawings

- 8.1.1 The Cabling Contractor is required to provide as-built drawing(s) of the cable installation. This shall include the pathway of the cables from the telecommunications room(s) to the workstations.
- 8.1.2 The as-built drawing(s) shall include all additional cables installed during the project.
- 8.1.3 The as-built drawings shall reflect all data MDVO termination locations, labelling, elevation detail of final rack layout for horizontal cabling (digital photo's are acceptable), elevation details of backboards (digital photo's are acceptable), Consolidation Points (if applicable) zoning (if applicable), and all wire basket tray and support structure routing.
- 8.1.4 Upon completion of the installation the Cabling Contractor shall provide 2 copies of the as-built drawing(s) to the Communications Consultant. As-built drawings must be forwarded to Communications Consultants office within 5 business days of the completion of the project. An additional copy of the as-built drawing is to be posted on the wall in each Telecommunications Wiring Room.
- 8.1.5 All changes to drawings to be engineer drafted standards.

8.2 Cable Test Results

- 8.2.1 The Cabling Contractor shall produce a test report based on the cable schedules.
- 8.2.2 The report should indicate for each cable, when it was tested successfully and the signature of the technician that performed the test. An authorised person for the Cabling Contractor must sign the entire report.
- 8.2.3 The Cabling Contractor will forward 2 copies electronically to the Communications Consultant office within 5 business days of the completion of the project. This is only to be done for smaller projects under 100 drops. All larger projects shall require a summary of test results and full results outlined in 8.3.

8.3 Package Requirements

- 8.3.1 Communications Contractor must provide an electronic closeout package via secure file transfer (e.g., SFTP or secure download link approved by the Owner/Consultant) with the following information:
 - UTP Test Results in Microsoft Excel format or in a format that is easily interpreted by any text reader (i.e. '.txt' extension). DO NOT submit paper test results for projects greater than 100 drops. Testing requirements are outlined further in this document.
 - Digital pictures in '.jpg' or '.gif' format. Pictures shall include all relevant information such as top/bottom picture of all racks and cabinets (both front and rear), backboard elevations of all main backboards, all secondary backboards and all riser backboards that are utilized, as well as consolidation points (if applicable).
 - Package shall include sufficient folder structure and space for the Consultant to add as-built drawings.

8.4 Testing and Commissioning

- 8.4.1 Provide testing and commissioning documentation for all items and their related components to the Project Manager prior to the completion of the project or at the Project Managers request. Include maintenance manuals, operating instructions for Owner's staff use.

9.0 WARRANTY AND CERTIFICATION

9.1 Warranty and Certification Requirements

- 9.1.1 The manufacturer is required to provide minimum 20-year parts and labour Warranty for the entire Structured Cabling Platform, including both UTP copper and fibre. Response time for Warranty items is to be 24 hours. The Cabling Contractor may be required to repair deficient cabling system components outside regular working hours. Bidders are to include a statement of Warranty terms and conditions with their response.

The Warranty for the Category 6A Performance Cabling must be such that the cable meets or exceeds the requirements of the applicable ANSI/TIA-568 series 'Transmission Performance Specifications for 100 Ohm 4-pair Category 6A cabling' defined up to 500 MHz.

If a Warranty issue arises for the cabling the Warrantor must make arrangements to undertake the repair or replacement of Warranty issues within 24 hours of notification. This may require the repair/replace of cabling components outside regular working hours. Bidders are to include a statement of Warranty terms and conditions with their response.

- 9.1.2 The Cabling Contractor shall forward the Structured Cabling Platform certification request form(s) to the proper authority and ensure that a Plaque or Certificate is issued to the Project Manager along with the Structured Cabling Platform user manual. The successful bidder will provide a certification number within two weeks of award of this project. Please note that the Plaque/Certificate must have the Project Managers Client name on the Plaque/Certificate.
- 9.1.3 The Cabling Contractor will provide letter(s) of Certification within two weeks of substantial completion of the project to the Communications Consultant. This document will include the following: verification of the performance of the installed system, identification of the installation by location and project number and a copy of the Warranty.
- 9.1.4 Upon award of contract, the Cabling Contractor shall forward copies of the Structured Cabling Platform certification request for Certification form complete with certification number(s) for the project to Communications Consultants office within 7 days of the award of contract. Provide a copy of the form with Specification submission.
- 9.1.5 Upon request and at no additional cost to the Project Manager the Cabling Contractor must provide a manufacturer's technical representative to conduct an on-site visit to ensure complete technical compliance.
- 9.1.6 The Cabling Contractor must ensure that a Warranty plaque and letter of certification is issued to the Project Managers Client along with a user manual for the Warranty. The letter must be issued within 2 weeks of substantial completion of the project. This document will include the following: verification of the performance of the installed system, identification of the installation by location and project number and a copy of the Warranty to the Communications Consultant.

- 9.1.7 The Cabling Contractor must supply a sample (at the time of bidding) of the Warranty including all related terms and conditions. This sample will be the standard to which the Warranty will be held. No changes will be accepted unless it is deemed to benefit the Project Managers Client. Any proposed changes to the Warranty must be submitted in writing to the Project Manager/their representative for review. The changes will then be accepted or declined by the Project Authority at their discretion. This is to remain valid for the entire Warranty period.

10.0 UNIT RATES

10.1 Horizontal Transmission

10.1.1 Category 6A UTP

- .1 Provide pricing for the supply and install of a 4-pair Category 6A UTP cable including Patch Cords terminated on existing horizontal patch panels. Horizontal cable is to be of same type as indicated in Horizontal Transmission Media in this Specification. All cables are to be terminated, labelled and tested as outlined in the Project Specification. All Cables are to be priced on an average of 200 feet.

Single Drop	Add	_____	Delete	_____
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Dual Drop	Add	_____	Delete	_____
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10.2 Termination Hardware

10.2.1 Copper Patch Panels

- .1 Provide pricing for the supply and install of one (1) 48-port Copper Patch Panel. Termination is to be of same type as indicated in Termination Hardware Section in this Specification.

6A UTP	Add	_____	Delete	_____
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10.3 Racks and Cabinets

10.3.1 Hubbell ReBOX

- .1 Provide pricing for the supply and install of one (1) wall mounted Hubbell ReBOX.

ReBOX	Add	_____	Delete	_____
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- .2 Provide pricing for the supply and install of one (1) floor mounted Hubbell Rack with accessories

2-post Rack	Add	_____	Delete	_____
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10.4 Hourly Rates

- 10.4.1 Contractor to provide hourly rates for all staff anticipated on site.

11.0 TENDER DOCUMENT

11.1 Bid Form

Name of bidder: _____

Address: _____

To: University of Toronto

Re: FOI Tower Relocation

Dear Sir:

We the undersigned declare that we have carefully examined and understood the terms and conditions of the attached Specifications and agree to be bound by the conditions within. If notified of the award of the contract based on the tender document, within 60 days of tender closing, we will provide all labour and materials requested and described in these documents for the stipulated price of:

Main Bid Pricing

1. Bid Price _____ (\$ _____) Dollars.
2. Harmonized Sales Tax (HST) not included in the above shall be: (\$ _____) dollars in lawful money of Canada, included in which are all applicable provincial Sales tax, customs duties, freight, exchange, permits and all other charges.
3. Provide additional sheets as required for all option bids.

Yours Truly,

Vendor _____

Date: _____

Signature of Authorised Official or Vendor

Print: _____

Title: _____

CONTRACTOR NOT TO WRITE BELOW THIS LINE

Bid Accepted: _____
Signature of Authorised Signing Officer

Date: _____

Print Name of Authorised Signing Officer

P.O. #: _____