

1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 - Common Work Results for Electrical
- .2 Section 26 05 28 - Grounding Secondary
- .3 Section 26 05 34 – Conduits, Conduit Fastening and Conduit Fittings
- .4 Section 27 05 28 – Pathways for Communication Systems
- .5 Section 27 11 16 – Communications Cabinets, Racks, Frames and Enclosures
- .6 Section 27 15 00 – Communications Horizontal Cabling
- .7 Section 27 15 01 – Antennas Communications Cabling

1.2 REFERENCES

- .1 National Research Council Canada (NRC)
 - .1 National Building Code of Canada (2010).
 - .2 National Fire Code of Canada (2010).
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-C22.1 (2015), Canadian Electrical Code, Part I.
- .3 American National Standards Institute
 - .1 ANSI J-STD-607-A-2002, Joint Standard - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- .4 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-606-2002, Administration Standard for the Commercial Telecommunications Infrastructure.
- .5 Building Industry Consulting Services International (BICSI)
 - .1 BICSI Telecommunications Distribution Methods Manual (TDMM) 13th Edition.

1.3 SYSTEM DESCRIPTION

- .1 Telecommunications grounding and bonding system consist of grounding bus bars, bonding backbones, and other bonding conductors.
- .2 Provides ground reference for telecommunications systems within building and bonding of telecommunications rooms.
- .3 Metallic pathways, cable shields, conductors, and hardware within telecommunications spaces are bonded to telecommunications grounding and bonding system.

2 Products

2.1 TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)

- .1 Predrilled copper busbar, listed by NRTL with holes 8 mm and 11 mm diameter for use with standard-sized 2 hole compressing lugs to: ANSI J-STD-607-A.
- .2 Dimensions 6.3 mm thick, 100 mm wide, 450 mm long to: ANSI J-STD-607-A.
- .3 Includes insulated standoffs for wall mounted applications.

2.2 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)

- .1 Predrilled copper busbar, listed by NRTL with holes 8 mm and 11 mm diameter for use with standard-sized 2 hole compressing lugs to: ANSI J-STD-607-A.
- .2 Dimensions 6.3 mm thick, 50 mm wide, 300 mm long to: ANSI J-STD-607-A.
- .3 Includes insulated supports for wall mounted applications.

2.3 BONDING CONDUCTOR FOR TELECOMMUNICATIONS EQUIPMENT (BCT)

- .1 #6 AWG copper conductor, green insulated marked to: ANSI J-STD-607-A.

2.4 TELECOMMUNICATIONS BONDING BACKBONE (TBB)

- .1 #3 AWG copper conductor, green insulated marked to: ANSI J-STD-607-A.

3 Execution

3.1 TELECOMMUNICATIONS GROUNDING BUSBARS

- .1 Install a Telecommunications Main Grounding Busbar (TMGB) in room 120 to ANSI-STD-607-A. It shall be installed on insulated supports at the location indicated on drawings.
- .2 Install #3 AWG copper bonding conductor from TMGB to electrical service entrance ground bus.
- .3 Install #3 AWG copper bonding conductor from TMGB to each satellite telecommunications room (TR) TGB, Room 119.
- .4 Install #6 AWG copper bonding conductor from TMGB and from each TGB to the electrical panel grounding busbar servicing each telecommunications room as indicated on the single line diagram.
- .5 2 hole compression lugs shall be used for all connections to TMGB and TGB.
- .6 1 hole compression lugs shall be permitted for connection to telecommunication equipment.

3.2 BONDING CONDUCTORS GENERAL

- .1 Bond to conduit or EMT that is longer than 1m using grounding bushing and #14 AWG insulated copper conductor to the cable tray.
- .2 Bond each section of cable tray with cable tray grounding lug using a single #6 AWG length of bare copper conductor along the outside edge of the cable tray.
- .3 Use EMT conduit for the radio tower bonding pathway. Avoid using tight radius bends when placing the pathway. Maintain a minimum 2 m separation from all other conductors. Electrical boxes shall not be used to change the direction of the bonding wire; all direction changes shall be done in conduit bends. Electrical pull boxes shall be installed as required. Bond to grounding field as indicated on the drawings.

3.3 BONDING TO TMGB

- .1 Bond main metallic pathways in the main telecommunications room to the TMGB using #6 AWG green insulated copper conductor.

- .2 Cables within the MTR and the TRs having shield or metallic member, bond shield or metallic member to the closest TMGB or TGB using 10 AWG green insulated copper conductor.
- .3 Bond equipment racks and cabinets located in telecommunications room to their respective TMGB/TGB using #6 AWG green insulated copper conductor.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results - Electrical
- .2 Section 26 05 31 – Splitters, Pull, Junction Boxes
- .3 Section 26 05 32 – Outlet and Conduit Boxes
- .4 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings
- .5 Section 27 05 26 – Grounding and Bonding for Communications
- .6 Section 27 05 28 – Pathways for Communications Systems
- .7 Section 28 10 00 – Electronic Access Control and Intrusion Detection
- .8 Section 28 23 00 – Video Surveillance
- .9 Section 28 31 00 – Fire Detection and Alarm

1.2 REFERENCES

- .1 National Research Council Canada (NRC)
 - .1 National Building Code of Canada (2010)
 - .2 National Fire Code of Canada (2010)
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-C22.1 (2015), Canadian Electrical Code, Part I.
- .3 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-606-2002, Administration Standard for the Commercial Telecommunications Infrastructure.

1.3 SYSTEM DESCRIPTION

- .1 Pathways for electronic safety and security systems shall be installed in conduit in its entirety.

Pathways for electronic safety and security systems shall support the structured cabling for the intrusion alarm, access control system, video surveillance system and the fire alarm. The installed systems shall be installed in either a physical star or bus configuration originating in their respective controllers where the intrusion alarm and the access control system use common pathways where possible.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 10 01 – General Requirements.

1.5 OPERATION AND MAINTENANCE SUBMITTALS

- .1 Provide operation and maintenance data for incorporation into manual in accordance with Section 01 10 01 – General Requirements.

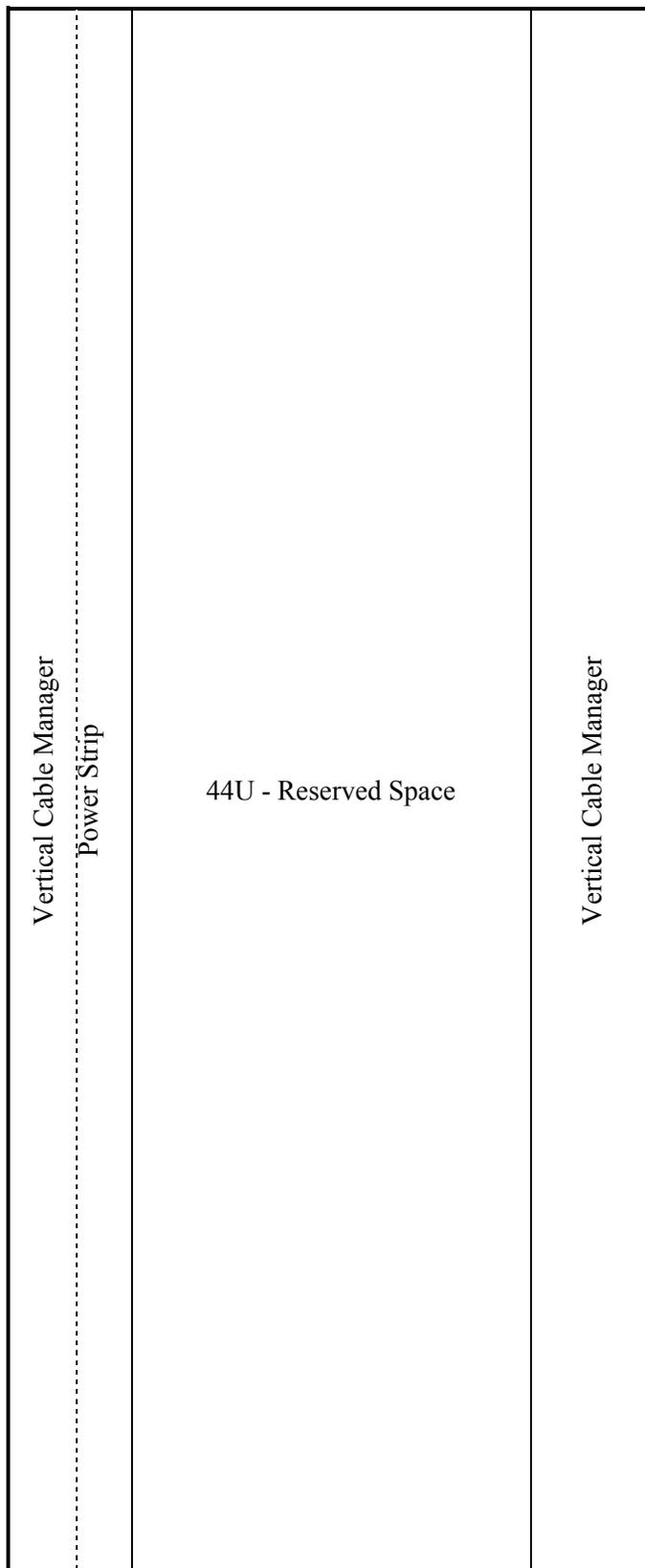
1.6 DELIVERY, STORAGE AND HANDLING

- .1 Equipment shall be shipped to site in original packaging from manufacturer.

- .2 The Contractor is responsible for the storage and security of components until the completion of the project.
 - .3 The Contractor is responsible for the disposal and recycling of waste material.
- 2 Products
- .1 Conduits: in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
 - .2 Junction boxes, cabinets type T: in accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes.
 - .3 Outlet boxes conduit boxes and fittings: in accordance with Section 26 05 32 - Outlet and Conduit Boxes and part 3.1.8 of this section.
 - .4 The use of LB style connectors is prohibited unless LB style connectors designated to maintain communications cabling bend radius are used.
 - .5 Fish wire: polypropylene type in empty conduit.
 - .6 Wire basket tray: basket type, steel, 50mm rail spacing, 150mm deep.
 - .7 Overhead J-hook distribution system.
- 3 Execution
- 3.1 ELECTRONIC SAFETY AND SECURITY PATHWAY INSTALLATION
- .1 Pathways shall be installed and bonded as per sections Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings and 27 05 26 – Grounding and Bonding for Communications.
 - .2 Clearance between wires and cables and heat emitting devices shall be such as to avoid deterioration of these wires and cables due to heat dissipation from these devices. Minimum clearances between wires and cables, and power sources shall be:
 - .1 1194 mm: Electrical motors and transformers.
 - .2 610 mm: Unshielded power lines of electrical equipment in proximity to open or nonmetal pathways.
 - .3 300 mm: Unshielded power lines or electrical equipment in proximity to a grounded metal conduit pathway.
 - .4 150 mm: Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to a grounded metal conduit pathway.
 - .3 Install empty raceway, terminal cabinets, outlet boxes, pull boxes, cover plates, conduit, sleeves and caps, and miscellaneous and positioning material to constitute complete system.
 - .4 Communication cables to be installed in J-hooks where in accessible ceiling spaces up to 25 cables. If amount exceeds 25 cables, install wire basket tray.

END OF SECTION

1.1 Room 119 – Rack 1



1.2 Room 119 – Rack 2

Vertical Cable Manager	4U - Reserved For Utility	Vertical Cable Manager
	2U - Horizontal Cable Manager	
	2U - 48 Port Patch Panel	
	2U - Horizontal Cable Manager	
	2U - 48 Port Patch Panel	
	2U - Horizontal Cable Manager	
	2U - 48 Port Patch Panel	
	2U - Horizontal Cable Manager	
	1U - Switch (Not In Contract)	
	1U - Switch (Not In Contract)	
	2U - Horizontal Cable Manager	
	1U - Switch (Not In Contract)	
	1U - Switch (Not In Contract)	
	2U Horizontal Cable Manager	
	1U - Switch (Not In Contract)	
	1U - Space	
	2U - Shelf	
	2U - Space	
2U - Shelf		
10U – Reserved Space		

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 - Common Work Results - Electrical
- .2 Section 27 05 28 – Pathways for Communication Systems
- .3 Section 27 13 00 – Communications Backbone Cabling
- .4 Section 27 15 00 – Communications Horizontal Cabling
- .5 Section 27 15 01 – Antennas Communications Cabling

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-C22.1 (2015), Canadian Electrical Code, Part I.
- .2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-568-C.1 (2009), Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
 - .2 TIA/EIA-568-C.2 (2009), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
 - .3 TIA/EIA-568-C.3 (2008), Optical Fiber Cabling Components Standard.
 - .4 TIA/EIA-606-A (2007), Administration Standard for the Commercial Telecommunications Infrastructure.
- .3 Building Industry Consulting Services International (BICSI)
 - .1 BICSI Telecommunications Distribution Methods Manual (TDMM) 13th Edition
 - .2 BICSI Electronic Safety and Security Design Reference Manual (ESSDRM) 3rd Edition

1.3 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 10 01 – General Requirements.

1.4 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into manual in accordance with Section 01 10 01 – General Requirements.
- .2 Include:
 - .1 Operation and maintenance data to permit effective operation and maintenance.
 - .2 Technical data – illustrated parts list with catalog numbers.
 - .3 Copy of approved shop drawings.

2 Products

2.1 DATA RACKS

.1 Floor Mounted Rack:

.1 Overall dimensions of enclosure shall be 2100 mm H x 762 mm W x 1066 mm D with 44U rackspaces using standard EIA compliant 483 mm wide mounting rails. The data rack shall be of fully welded construction shall provide a static load capacity of 4500 kg and a UL Listed 1100 kg weight capacity. Enclosure shall be constructed of the following materials: top and bottom shall be 14-gauge steel, horizontal braces shall be thick steel, all structural elements shall be finished in durable black powder coat. Rack shall include vented, locking and latching sides and front and rear doors. Enclosure shall come equipped with 250 mm fan top and fan guard for ventilation, one pair of vertical cable ducts with steel doors pre-installed in front of rack, two pairs of 11-gauge steel rackrail with 6 mm cage nut mounting holes in universal EIA spacing and finished in a black e-coat with numbered rackspaces. The rack shall have the ability to gang with other racks, have a removable rear knockout panel with several 12 mm, 21 mm, 27 mm, and 41 mm electrical knockouts and come equipped with grounding and bonding studs. The floor mounted rack shall be UL listed in Canada and warrantied to be free from defects in material or workmanship under normal use and conditions for the lifetime of the rack.

.2 Standard of Acceptance: Middle Atlantic DRK-19-RR44PRO

.2 Shelves:

.1 Shelves shall be EIA/TIA compliant 483 mm wide and 2U high. The rack shelf shall feature durable flat black powder coat finish, be rated for 50 pounds, contain a slotted rear flange for cable management and accommodate deeper components.

.2 A minimum of 2 shelves per rack shall be provided.

.3 Power Strips:

.1 Floor Mounted Rack

.1 The power strip shall be 1525 mm long x 30 mm deep x 40 mm wide and mount at the rear of the rack. The power strip shall be equipped with a 3 m long cord terminated with a NEMA 5-20 plug, an integrated 20 A circuit breaker protection, twenty-two (22) NEMA 5-15R outlets, two (2) NEMA 5-20R outlets and the required mounting hardware. The power strip shall be UL listed in Canada and warrantied to be free from defects in material or workmanship under normal use and conditions for a minimum of 3 years.

.2 Standard of acceptance: Middle Atlantic PD-2420SC-NS

3 Execution

3.1 MAIN TELECOMMUNICATION ROOM (MTR)

.1 The Main Telecommunications Room (MTR), room 119, data racks shall be floor mounted in the center of the MTR, offset from the north wall the width of one cabinet. The intention is to create walking space around the perimeter of the room leaving access to all four walls.

3.2 IDENTIFICATION

- .1 Communication racks shall be labeled as: *TRroom#* - Rack #.
- .2 All labels to be mechanically generated and placed on Size 2 lamacoids as per section 26 05 00 – Common Work Results - Electrical.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 - Common Work Results for Electrical
- .2 Section 27 05 26 - Grounding and Bonding for Communications
- .3 Section 27 05 28 – Pathways for Communication Systems
- .4 Section 27 15 01 – Antennas Communications Cabling

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-C22.1 (2015), Canadian Electrical Code, Part I.
- .2 American National Standards Institute
 - .1 ANSI J-STD-607-A-2002, Joint Standard - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- .3 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-606-2002, Administration Standard for the Commercial Telecommunications Infrastructure.
- .4 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-568-C.1 (2009), Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
 - .2 TIA/EIA-568-C.2 (2009), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
 - .3 TIA/EIA-568-C.3 (2008), Optical Fiber Cabling Components Standard.
 - .4 TIA/EIA-606-A (2007), Administration Standard for the Commercial Telecommunications Infrastructure.
 - .5 TIA-1152 (2009), Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling.
- .5 Building Industry Consulting Services International (BICSI)
 - .1 BICSI Telecommunications Distribution Methods Manual (TDMM) 13th Edition

1.3 SYSTEM DESCRIPTION

- .1 Structured telecommunications wiring system consist of Category 6 (Cat 6) unshielded-twisted-pair cables, terminations, connectors, cross-connection hardware and related equipment installed inside building for occupant's telecommunications systems.
- .2 The installed system shall be installed in a physical star configuration originating from one of the telecommunications room with separate horizontal cables for each communications outlet.

1.4 QUALITY ASSURANCE

- .1 The system shall be installed and certified by a manufacturer's certified installer. The Contractor must prove they have successfully installed Category 6 (Cat 6) cabling and components in end-to-end system configurations to be considered. The Contractor must also include evidence of their certification, training, work experience and site references for structured cabling systems.

- .2 The system installer shall have a contractual relationship with the manufacturer they represent, and be able to offer a minimum of twenty years assurance warranty from the manufacturer for the installed structured cabling system. This warranty shall guarantee against defects in materials and workmanship for the duration of the warranty period and the certified system installer shall repair or replace failed component, including costs and labour. This warranty is also to guarantee performance and provide applications assurance for the life of the installation. Provide a warranty certificate issued in the name of the Departmental Representative to this effect.
- .3 The system installer shall employ field service technicians with valid Communications Cabling Specialists (CCS) certificates and a minimum of one Registered Communications Distribution Designer (RCDD).

1.5 SUBMITTALS

- .1 Submit shop drawings and product data in accordance with Section 01 10 01 – General Requirements.
- .2 Valid certification and/or membership certificates for the following:
 - .1 BICIS membership
 - .2 RCDD certificate
 - .3 CCS certificates
 - .4 NSCSA member in good standing certificate
 - .5 Certified System Certificate
 - .6 Certified installed system warranty certificate.

1.6 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into manual in accordance with Section 01 10 01 – General Requirements.
- .2 Include:
 - .1 Operation and maintenance data to permit effective operation and maintenance.
 - .2 Technical data – illustrated parts list with catalog numbers.
 - .3 Copy of approved shop drawings.
 - .4 Submit 2 copies of tests results printed on letter size (216 mm x 279 mm) paper format and both .pdf and Fluke LinkWare digital versions a CD to the Departmental Representative.

1.7 CLOSEOUT SUBMITTALS

- .1 Provide closeout submittals in accordance with Section 01 10 01 – General Requirements.
- .2 Record Drawings:
 - .1 Record drawings shall provide the following information:
 - .1 Work area telecommunications outlet locations as constructed.
 - .2 Project administration system identifiers for communications outlets.
 - .3 Project administration system identifiers for communications rooms.
- .3 Submit for review complete floor plan drawing set laminated and mounted in main telecommunications room. B1 size (707mm x 1000mm).

2 Products

2.1 FOUR-PAIR 100 Ω BALANCED TWISTED PAIR CABLE

- .1 Four-pair, 100 ohm balanced unshielded non-bonded twisted-pair (UTP) cable, flame test classification FT6 to: CSA-C22.2 No. 214, Category 6 (Cat 6) to: TIA/EIA-568-C.2.
- .2 Cabling to us the following colour code:
 - .1 Blue for data.
 - .2 White for telephone.
 - .3 Green for radio.
 - .4 Yellow for CCTV.
- .3 Standard of Acceptance:
 - .1 Belden – 2413.

2.2 WORK AREA UTP 4-PAIR MODULAR JACK

- .1 Eight-position modular jack ("RJ-45"), type T568A Category 6 to: TIA/EIA-568-C.2:
 - .1 Jacks to use the following colour code:
 - .1 Yellow for data.
 - .2 Blue for telephone.
 - .3 Green for radio
 - .2 Standard of Acceptance:
 - .1 Belden PS6+ Keyconnect Module – AX1013xx
- .2 Faceplates:
 - .1 Compatible single gang faceplate, keystone flush entry, 4 jack positions per faceplate, white finish with ID window. Radio outlets shall be mounted in a similar style face plate such that there are no spare positions on the faceplate.
 - .2 Standard of Acceptance:
 - .1 Belden – Keyconnect White Faceplate – AX102249

2.3 TERMINATION AND CROSS-CONNECTION HARDWARE FOR UTP

- .1 UTP voice horizontal terminations and cross connects in telecommunications rooms:
 - .1 IDC Terminal strips, 25 pair, for terminating 25 pair 100 Ω balanced twisted pair cables and supporting cross-connections using jumper wires or compatible plug-ended patch cords: Category 6 to: TIA/EIA-568-C.2.
 - .1 Acceptable manufacturer or approved equal:
 - .1 Belden Distribution Connector, 25 pair marking – AX101448
 - .2 Belden Distribution Connector, 6 port marking – AX1011447
 - .2 Mount or block for housing 12 IDC terminal strips, mounted on wall next to the incoming utility's demarcation point.
 - .1 Acceptable manufacturer or approved equal:
 - .1 Belden GigaBIX Mount, connector – AX101472
 - .3 Designation Strips capable of mating with the above mount for managing cross-connection labeling. Install as required with mechanically generated labels to BICSI standards.
 - .1 Acceptable manufacturer or approved equal:
 - .1 Belden GigaBix Designation Strip – AX101483
 - .4 Termination bar for installation on cables prior to termination. Install as required.
 - .1 Acceptable manufacturer or approved equal:
 - .1 Belden GigaBix Termination Bar – AX101719

- .5 Distribution rings or channels capable of externally mating with the above mount for managing cross-connection wires. Install as required.
 - .1 Acceptable manufacturer or approved equal:
 - .1 Belden GigaBix Management Ring – AX101478
 - .2 UTP horizontal data terminations and cross connects:
 - .1 Patch panel, 2 rack units high, 48 ports:
 - .1 Each patch panel shall be fully populated with un-terminated grey field installed modular jacks, type T568A, Category 6 to: TIA/EIA-568-C.2.
 - .2 Standard of Acceptance:
 - .1 Belden KeyConnect 2U, 48 port patch panel – AX103115.
- 2.4 UTP TELECOMMUNICATIONS ROOM PATCH CORDS
 - .1 Provide a variety of 2.1 m, 3 m and 4.5 m long, with factory-installed male plug at one end to mate with "RJ-45" jack and with factory-installed male plug at other end to mate with "RJ-45" jack Category 6, 4 pairs to: TIA/EIA-568-C.2.
 - .1 Supply 1 cord per drop + 25%
 - .2 Patch cord colour code:
 - .1 Yellow for data.
 - .2 Blue for telephone.
 - .3 Green for radio.
 - .3 Standard of Acceptance:
 - .1 Belden – CA6110xxxx
- 2.5 UTP WORK AREA CORDS
 - .1 2.1 m long, with factory-installed male plug at one end to mate with "RJ-45" jack and with factory-installed male plug at other end to mate with "RJ-45" Augmented Category 6, 4 pairs to: TIA/EIA-568-C.2.
 - .1 Supply 1 cord per drop + 25%
 - .2 Patch cord colour code:
 - .1 Yellow for data.
 - .2 Blue for telephone.
 - .3 Green for radio.
 - .3 Standard of Acceptance:
 - .1 Belden – CA6110xx10
- 2.6 TELEPHONE BACKBONE CABLE
 - .1 100 ohm, 25 pair Cat. 5e, sheath consists of thermoplastic jacket without underlying metallic shield, gray in colour; to TIA/EIA-568-C.2, flame test classification FT4 to CSA-C22.2 No. 214.
 - .1 Standard of Acceptance:
 - .1 Belden IBDN25R
- 2.7 HORIZONTAL COAXIAL CABLE
 - .1 18 AWG solid bare copper-covered steel conductor, foam FEP insulation, aluminum braid shield (60% coverage), 75 Ω , Sweep Tested from 5 MHz to 3 GHz bandwidth, flame test classification FT6 to: CSA-C22.2 No. 214, RG-6 to: TIA/EIA-568-C.2.
 - .1 For installation to a maximum of 70 m.
 - .2 Standard of Acceptance:
 - .1 Belden – 1829P

- .2 Cable Connectors
 - .1 RG-6
 - .1 "F" male connector, indoor rated.
 - .2 Insertion loss: -0.2 dB.
 - .3 Compression O-ring snap seal.
 - .4 Standard of Acceptance:
 - .1 Belden # DB6U (RG-6).
 - .3 Coaxial Wall Plate Couplers
 - .1 Female F-Type to Female F-Type pass-through keystone style recessed module, white in colour.
 - .1 Standard of Acceptance:
 - .1 Belden – A0407001
- 2.8 FLOOR BOX ADAPTOR
 - .1 Communications
 - .1 Communications in the room 104 floor boxes shall terminate on white port keystone decorator style faceplates.
 - .1 Standard of Acceptance:
 - .1 Belden – AX104117
- 2.9 EXTERIOR TELEPHONE SET
 - .1 Weatherproof ring down telephone, wall mounted complete with tamperproof stainless steel hardware.
 - .2 Complete with autodialling software.
 - .3 Acceptable product - No substitutions: Guardian WTR-41.
- 2.10 VANDAL PROOF TELEPHONE SET
 - .1 Corrections institute analogue telephone, wall mounted complete with tamperproof stainless steel hardware.
 - .2 Vandal proof metal keypad and reduced length armoured handset cord.
 - .3 Acceptable product - No substitutions: Guardian CIT-40.
- 3 Execution
 - 3.1 HORIZONTAL CABLING INSTALLATION
 - .1 Unless indicated otherwise, install dedicated Category 6, 4-pair AWG 24 solid core plenum rated UTP cables from the telecommunication closet to each telecommunications outlet.
 - .2 Horizontal permanent link cables shall not exceed 90 m in length from the telecommunications rack to the telecommunications outlet. A total of 10 m is available for patch cords. Communication links shall not exceed an overall length of 100 m from switch port to workstation.
 - .3 Cabling shall be continuous without joints from the cross-connect devices in the riser/wiring closet to the work station modular outlets. In no case shall a crimp on RJ-45 connector be used on the telecommunications cabling for direct connection into equipment.

- .4 Wires installed shall be contained in properly mounted conduit or raceways. Where none of these distribution mediums exist, the individual plenum cables will be formed into cable harnesses, neatly run, properly dressed, supported and secured with appropriate J-hooks in accessible ceilings only. If cable trays are used, the UTP plenum cables will be partitioned from each other and neatly bundled with Velcro ties.
- .5 Furniture installer is to provide faceplates for the telephone/data/radio outlets in each workstation. Contractor is to coordinate requirements with regards to modular jacks and work area cords with furniture installer.
- .6 Install telecommunications outlets in mechanical, intrusion alarm, fire alarm, and access control panels as directed on drawings. Coordinate requirements with other disciplines.
- .7 Wires and cable shall be short as practical except that sufficient slack shall be provided to:
 - .1 Prevent undue stress on cable forms, wires and connections.
 - .2 Enable network components to be removed and replaced during servicing without disconnection other parts.
 - .3 The communications cabling shall take the longest route around the telecommunications room before terminating in the data rack.
 - .4 Facilitate movement of equipment for maintenance purposes.
 - .5 Provide 2 m of slack cable above each communications outlet with a minimum bend radius of 200 mm supported by a minimum of one (1) J-hook.
- .8 Wires and cables shall be placed and protected to avoid contact with rough surfaces or sharp edges. Where wires or cables run through holes in metal, they shall be protected by suitable grommets or bushings.
- .9 Horizontal pathways fill ratios shall comply with the Canadian Electrical Code and BICSI recommendation and allow for an additional 25% expansion.
- .10 Communications cabling exiting the cable tray downward from the bottom, sides or ends shall be supported by a waterfall attached to the cable tray to maintain the minim cable bend radius.
- .11 Minimum size vertically run conduit from box to accessible ceiling space to be minimum 21 mm.
- .12 Use Velcro straps for securing communication cabling.
- .13 Telecommunication outlets shall be labeled as: *TRRoom # -Type drop #*:
 - .1 Where type equals
 - .1 D = Horizontal data cable
 - .2 V = Horizontal voice cable
 - .3 C = Horizontal coax cable
 - .4 R = Horizontal radio cable
 - .2 All labels to be mechanically generated and placed in the faceplate ID windows.
 - .1 Data outlet labelling example: TR184-D001 / TR154-D001.
 - .2 Voice outlet labelling example: TR190-V001 / TR130-V001.
 - .3 Data backbone labelling example: TR190-C001 / TR130-C001.
 - .4 Radio backbone labelling example: TR154-R001
- .14 Radio outlets will terminate in Room 119.
- .15 Empty ports on modular patch panels shall be fully populated with blank inserts.
- .16 The TV Wall should be installed with both a RG-6 and Cat 6 data drop.

3.2 TESTING AND CERTIFICATION

.1 Copper Testing

.1 The system installer must be prepared, trained and equipped to properly test the cable system, including patch panel to work station outlet for the horizontal system. Horizontal data drops shall be tested individually and will only be accepted if they operate within the Augmented Category 6 link performance limits. Conditional pass test results (PASS*) will not be accepted as the test result is outside the accuracy of the tester. Cables and interface components shall be tested as a system to exceed the limits as specified in the TIA-1152 standards:

.1 The following cable parameters shall be tested:

- .1 Length
- .2 Wire Map
- .3 Propagation Delay
- .4 Delay Skew
- .5 Resistance
- .6 Insertion Loss
- .7 Frequency
- .8 Near-End Crosstalk (NEXT)
- .9 Power-Sum Near-End Crosstalk (PS NEXT)
- .10 Attenuation to Crosstalk Ratio – Far End (ACR-F)
- .11 Power-Sum Attenuation to Crosstalk Ratio – Far End (PS ACR-F)
- .12 Attenuation to Crosstalk Ratio – Near End (ACR-N)
- .13 Power-Sum Attenuation Crosstalk Ratio – Near End (PSACR-N)
- .14 Return Loss (RL)
- .15 Additional alien cross talk testing is not required unless required by cabling manufacturer for certification.

.2 Horizontal UTP cables shall be tested to Category 6 Permanent Link standards (Class E) using a certified level III tester to TIA/EIA-568-C.2.

.2 Horizontal coaxial cables shall be tested to for the following parameters:

- .1 RG-6 Coaxial Cables:
- .1 DC Loop Resistance
 - .2 Impedance (75 Ω)
 - .3 Length
 - .4 Propagation Delay
 - .5 Insertion Loss

.2 Cable Tester

.1 Standard of acceptance:

- .1 Fluke DTX-1800 Cable Analyzer
- .2 Fluke DSX-5000 Cable Analyzer

.2 Testing equipment shall have been calibrated within one (1) year prior to the test date and updated with the latest testing standards. The calibration date and testing standards used shall be included with each test result.

.3 Deficiencies shall be corrected at the expense of the Contractor prior to acceptance by the Departmental Representative.

.4 Provide test results along with the manufacturer's legal system assurance warranty and certification certificate as outlined in part 1.5 - Quality Assurance.

3.3 COMMISSIONING

- .1 Perform commissioning in accordance with Section 01 91 13 – General Commissioning Requirements and per manufacturer’s recommendations.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results for Electrical
- .2 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings
- .3 Section 27 05 26 – Grounding and Bonding for Communications
- .4 Section 27 15 00 – Communications Horizontal Cabling

1.2 REFERENCES

- .1 National Research Council Canada (NRC)
 - .1 National Building Code of Canada (2010)
 - .2 National Fire Code of Canada (2010)
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-C22.1 (2015), Canadian Electrical Code, Part I.
- .3 American National Standards Institute
 - .1 ANSI J-STD-607-A-2002, Joint Standard - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- .4 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-606-2002, Administration Standard for the Commercial Telecommunications Infrastructure.
- .5 Building Industry Consulting Services International (BICSI)
 - .1 BICSI Telecommunications Distribution Methods Manual (TDMM) 13th Edition.

1.3 SYSTEM DESCRIPTION

- .1 The antenna system will consist of 2 – 78mm conduits running between the exterior weather head installed on the penthouse roof between gridlines 2 and 3, and room 119 complete with two (2) Antenna cables in each conduit. Individual radio outlets will be installed under Division 27 15 00.
- .2 One antenna mast will be mounted along gridline B between gridlines 2 and 3 while the other mast will be mounted along gridline B between gridlines 3 and 4. Each mast shall reach 3m above the finished roof line and be mounted to the side of the penthouse with wall brackets. The installation of the mast grounding to be coordinated with Division 26.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and complete product data in accordance with Section 01 10 01 – General Requirements.

1.5 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for dry type transformers for incorporation into manual in accordance with Section 01 10 01 – General Requirements.
- .2 Include:
 - .1 Operation and maintenance data to permit effective operation and maintenance.
 - .2 Technical data – illustrated parts list with catalog numbers.
 - .3 Copy of approved shop drawings.

2 Products

2.1 RADIO COAXIAL ANTENNA CABLE

- .1 13mm Superflexible Foam Dielectric communications cable, 50 Ω , Sweep Tested from 0.5MHz to 10.2GHz bandwidth, 3.6db/30m @ 1GHz, Indoor/outdoor rated, -55 °C to +85 °C, flame test classification FT-4 to: TIA/EIA-568-C.2.
 - .1 Standard of acceptance:
 - .1 Commscope – FSJ4-50B
 - .2 Cable Connectors
 - .1 LMR-400
 - .1 Maximum 1.25:1 VSWR
 - .2 50 Ω Impedance
 - .3 Spring finger inner contact
 - .4 Clamp outer contact
 - .5 Heat shrink weather seal
 - .6 N-Type Male
 - .1 Straight
 - .2 Standard of acceptance:
 - .1 Commscope – F4PNMV2
 - .7 N-Type Female
 - .1 Straight
 - .2 Standard of acceptance:
 - .1 Commscope – F4PNF
 - .3 N-Type Surge Arrestor
 - .1 N-Female to N-Type Female connector
 - .2 Minimum DC-1GHz Bandwidth
 - .3 Maximum 1.25:1 VSWR
 - .4 50 Ω Impedance
 - .5 Minimum 5 KA Surge Arrest current.

2.2 MAST CLAMPS

- .1 Clamp assembly to be adjustable two pipe connector. Pipe 1 clamp to be adjustable from 19mm to 38mm. Pipe 2 clamp to be adjustable from 38mm to 60mm.
- .2 Acceptable manufacturer or approved equal:
 - .1 Sinclair – Clamp 135

2.3 MAST SUPPORT

- .1 Mast support to be wall mounted with a 610 mm offset from the wall, and accept masts up to 53mm in diameter.
- .2 Standard of acceptance:
 - .1 Wade Antenna – 2124

3 Execution

3.1 RADIO CABLING INSTALLATION

- .1 All antenna radio cabling, shall be continuous without joints or kinks from the surge suppressors to Room 119.

- .2 The surge suppressors shall be accessible for maintenance and installed on the radio mast prior to entering the facility. Division 26 to install radio communications grounding conductor as indicated.
- .3 The radio antenna cables shall be installed in 78 mm conduit originating from each mast to room 119. Electrical boxes and LB style connectors shall not be used to change the direction of the radio cable; all direction changes shall be done in conduit bends. Electrical pull boxes shall be installed as required. Install a weather head on the grounding conduit stub conduit at the radio mast base to prevent debris/water from entering the conduit.
- .4 Exterior connections shall be fully waterproofed using Teflon tape on the connector threads and heat shrink tubing over the entire connection past the connector crimp ring heat shrink by a minimum of 25mm. Insure the connectors are free of moisture prior to waterproofing the connectors. Using electrical tape, cover the outer heat shrink tubing to prevent UV breakdown of the tubing.
- .5 Straight N-Type Male connectors shall be used on the radio cable except at the radio faceplate. Confirm antenna connector and install appropriate with the Departmental Representative. Install all connector according to manufacturer's instructions.
- .6 Install the surge arrestors at the base of the radio mast. Weather seal the open end of the surge arrestor for protection. The Departmental Representative will install and commission the radio system.
- .7 Leave 3 meters un-terminated coils for each of the four (4) cables at their respective radio racks.
- .8 Install three (3) mast wall brackets per antenna mast to minimize vibration.
- .9 Install mast supports, mast, and clamps in the locations identified.

3.2 TESTING AND CERTIFICATION

- .1 Horizontal coaxial cables shall be tested to for the following parameters:
 - .1 Radio Coaxial Antenna Cable:
 - .1 DC Loop Resistance
 - .2 Impedance (50 Ω)
 - .3 Length
 - .4 Propagation Delay
 - .5 Insertion Loss
 - .2 Standard of Acceptance:
 - .1 Fluke DTX-1800 Cable Analyzer
 - .2 Fluke DSX-5000 Cable Analyzer
- .3 Testing equipment shall have been calibrated within one (1) year prior to the test date.
- .4 Deficiencies shall be corrected prior to Departmental Representative acceptance.
- .5 Provide test results along with the manufacturer's legal system assurance warranty and certification certificate as outlined in part 1.5 - Quality Assurance.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 - Common Work Results Electrical.
Section 26 05 21 - Wires and Cables.
Section 26 05 31 - Splitter, Pull, Junction Boxes.
Section 26 05 34 – Conduit.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings to include wiring and interconnection diagrams and installation and configuration instructions.

1.3 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for video surveillance system for incorporation into manual in accordance with Section 01 33 00 - Submittal Procedures.

1.4 QUALITY ASSURANCE SUBMITTALS

- .1 Submit the following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Test Reports: Submit certified test reports.
 - .2 Instructions: Submit manufacturer's installation instructions.
 - .4 Manufacturer's Field Services: Submit copies of manufacturer's field reports.

1.5 DESCRIPTION OF WORK

- .1 Contractor's work shall include all labour, materials, tools, appliances, hardware, devices, wiring and conduit, junction boxes, and equipment for the complete installation of a fully operational emergency call system as indicated in the contract drawings and described in this specification.

2 Products

2.1 GENERAL

- .1 System to consist of:
 - .1 Hardwired emergency pull cord stations,
 - .2 Corridor dome buzzer/strobes,
 - .3 Central monitoring panel.

2.2 CENTRAL MONITORING PANEL

- .1 Master control panel flush mounted, modular design providing:
 - .1 Power supply: Primary 120 volt, 60 Hz.
 - .2 Standby power: gel cell battery c/w solid state charger.
 - .3 24VAC transformer sized for pullcords / corridor lights.
 - .4 Digital input/output module for connection to emergency pullcords as indicated.
 - .5 Surface mount back box and enclosure.
 - .6 Spare contacts for emergency alarm output to security system.

- .2 Standard of acceptance: DSC #PC1832 panel.
- .3 Approved manufacturer or approved equal:
 - .1 Edwards
 - .2 GE

2.3 PULL CORD STATIONS

- .1 Flush mount pull cord switch:
 - .1 24VAC
 - .2 Heavy duty stainless steel faceplate permanently labelled "EMERGENCY" or similar.
 - .3 Complete with replaceable 3m nylon pull cord with plastic knob.
 - .4 Activation of pull cord to initiate corridor light/buzzer and activate associated alarm at central panel.
- .2 Standard of acceptance: Edwards #9504-1001.
- .3 Approved manufacturer or approved equal:
 - .1 Leviton
 - .2 GE

2.4 CORRIDOR DOME LIGHTS

- .1 Dome Light:
 - .1 Surface mount on single gang box.
 - .2 Complete with white lens covers.
 - .3 Stainless Steel faceplate.
 - .4 24VAC.
- .2 Standard of acceptance: Edwards 7641-1G5.
- .3 Approved manufacturer or approved equal:
 - .1 Leviton
 - .2 GE

2.5 KEYPAD

- .1 Keypad:
 - .1 2-Line LCD backlit display.
 - .2 5 programmable function keys.
 - .3 Multiple door chime per zone.
 - .4 Full 32-character programmable labels.
 - .5 Wire Channel.
 - .6 3-one touch emergency keys.
- .2 Standard of Acceptance: DSC #PK5500
- .3 Approved manufacturer or approved equal:
 - .1 GE
 - .2 Honeywell.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install panel and components in accordance with manufacturer's written installation instructions to locations, heights and surfaces shown on reviewed shop drawings.
- .2 Install panel and devices secure to walls, ceilings or other substrates.
- .3 Install wiring in concealed EMT conduit. Wiring and cable in accordance with manufacturer's instructions.
- .4 Provide for a qualified manufacturer's representative to fully verify the system prior to energizing the system.
- .5 The contractor shall provide, at the Owner's facility, training to familiarize the Owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the system.
- .6 The Contractor shall commission and test complete system and all devices. This shall include, but not be limited to, adjustment of all components for correct functionality, verification of operation of each device.

END OF SECTION