

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Firestopping Requirements	Section 07 84 00
.2	Common Work Results-Electrical	Section 26 05 00
.3	Installation of Cables in Trenches and in Ducts	Section 26 05 44
.4	Voice and Data Communications Cabling	Section 27 05 29
.5	Conduits, Conduit Fastenings and Conduit Fittings	Section 26 05 34
.6	Splitters, Junction, Pull Boxes and Cabinets	Section 26 05 31
.7	Outlet Boxes, Conduit Boxes and Fittings	Section 26 05 32

1.2 REFERENCES

- .1 Latest edition of the following:
 - .1 EIA/TIA-569; Commercial Building Standards for Telecommunications Pathways and Spaces (refer to CSA standards CAN/CSA T530-M90, CAN/CSA-C22.2 No.214-M90)
 - .2 EIA/TIA-607; Commercial Building Grounding and Bonding Requirements for Telecommunications (refer to CSA standard CAN/CSA T527)
 - .3 NBC National Building Code of Canada
 - .4 CAN/CSA-C22.1 Canadian Electrical Code Part One
 - .5 CAN/CSA-C22.1 Canadian Electrical Code Part One Section 60 "Electrical Communication Systems".
 - .6 CAN/CSA-C22.2 No.0-M91 General Requirements - Canadian Electrical Code, Part Two.
 - .7 NRC-CNRC National Building & Fire Codes of Canada
 - .8 IEEE STD 1100 - 1992 IEEE Recommended Practice for Powering & Grounding Sensitive Electronic Equipment "Emerald Book"

1.3 DESCRIPTION OF SYSTEM

- .1 System to include:
 - .1 The communications horizontal cabling pathway shall consist of conduit stubs to a cable tray system.
 - .2 The Voice Communications backbone cabling pathway shall consist of conduit stubs to a cable tray system.

- .3 The Data Communications backbone cabling pathway shall consist of conduit stub's to a cable tray system.
- .4 All backboards, cable support hardware, clamps, bonding clamps, and grounding to provide a complete system as specified.

1.4 STANDARDS

- .1 The equipment and installation shall comply with the following current requirements:
 - .1 National Building Code
 - .2 Manitoba Building Code
 - .3 Canadian Electrical Code
 - .4 EIA/TIA and CSA Telecommunications Building Wiring Standards
 - .5 Manitoba Fire Code
 - .6 Local and Municipal By-laws
 - .7 Authorities having jurisdiction

1.5 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 Submittal Procedures.
- .2 Include:
 - .1 Cable Tray
 - .2 Grounding termination connectors.
 - .3 Grounding bus bars
- .3 This information is to be revised to "as-built" after construction is completed. Insert as part of the Operating and Maintenance Manuals.

1.6 OPERATION AND MAINTENANCE MANUALS

- .1 Provide Operation and Maintenance data for Voice and Data Communications Pathway for incorporation into manual specified in Section 01 33 00 Submittal Procedures.
- .2 Include:
 - .1 Technical data - illustrated parts lists with parts catalogue numbers.
 - .2 Copy of approved shop drawings with corrections completed and marks removed except for reviewed stamps.
 - .3 Complete Record Drawings.

Part 2 Products

2.1 MATERIALS

- .1 Equipment and materials to be CSA or ULC certified. Where there is no alternative to supplying equipment which is not CSA or ULC certified, obtain special approval from local Electrical Inspection Department or authority having jurisdiction.

- .2 Submit for Contract Administrator's approval, a duplicate list of shop drawings for this project prior to placing of orders for same.

2.2 EQUIPMENT BACKBOARDS

- .1 Equipment backboards shall be 19mm plywood backing, located as shown on drawings.

2.3 CABLE TRAY

- .1 Ladder Type Cable Tray:
 - .1 Cable Tray and fittings: to EEMAC F5-1-1977.
 - .2 Single stacked cable tray unless otherwise indicated on drawings.
 - .3 Extruded aluminum tray with depth of 100mm (4in) 9" rung spacing and width as indicated on drawings.
 - .4 Horizontal elbows, end plates, drop outs, vertical risers and drops, tees, wyes, expansion joints and reducers where required.
 - .5 Fittings: manufactured accessories for approved cable tray. Radii on fittings: 600mm/24in minimum.
 - .6 Provide conduit to tray adaptors for the termination of all conduits terminating at the cable tray.
 - .7 Cable tray to be c/w 100mm high center barrier.
 - .8 Cable tray to be suspended using 13mm threaded rods or larger as required, with double locknuts below the tray and single lock nuts above.
 - .9 Finish: natural aluminum.
 - .10 Acceptable Manufacturers: Burndy, Canadian Strut, Pilgrim, Pursley, Unistrut, Newton, Chatsworth.

2.4 EMT CONDUIT

- .1 Refer to Section 26 05 00.
- .2 Minimum trade size shall be 19mm.
- .3 Flexible conduit shall only be utilized for connections from modular furniture to junction boxes.
- .4 The use of 90 degree Condulets is not allowed.

2.5 PVC UNDERGROUND CONDUIT

- .1 Refer to Section 26 05 00.
- .2 PVC conduit shall be heavy duty rigid spec schedule 40 type with 6.4mm/1/4in wall.

2.6 OUTLET BOXES

- .1 Electro-Galvanized Outlet Boxes:
 - .1 Flush wall mounted electro-galvanized steel device box 100mm/4in square x 65mm/2-1/2in deep.

- .2 Single or two gang raised plaster rings with squared corners as required.
- .3 Accepts standard type duplex outlet.

Part 3 Execution

3.1 COMMUNICATIONS PATHWAY

- .1 All communication pathways shall maintain the following distances from the equipment listed:
 - .1 motors or transformers 1.2m4ft
 - .2 wire in conduit and/or cables >300V 1.0m
 - .3 wire in conduit and/or cables <300V 300mm

3.2 EQUIPMENT BACKBOARDS

- .1 Equipment backboards shall be rigidly secured and painted with a ASA #61 industrial gray nonconductive fire-retardant overcoat.

3.3 CABLE TRAYS

- .1 Refer to Section 26 05 36.
- .2 Refer to Canadian Electrical Code Section 12.
- .3 Remove sharp burrs or projections to prevent damage to cables or injury to personnel.
- .4 Provide additional offsets, bends, etc. as required to adjust cable tray routing and height to avoid conflict with ducts, pipes, beams, etc.
- .5 Support cable tray on 1.5m centers and within 760mm from a connection fitting or end.
- .6 Support cable tray at connection points and at end points
- .7 Each Cable tray section (or 3m interval maximum) shall be grounded with a #3/0 AWG RW90 insulated green copper conductor installed within the cable tray.
- .8 For double stacked cable trays the ground conductor shall be layed in the upper tray. An additional #3/0 AWG RW90 insulated green copper conductor jumper shall be installed from the upper cable tray down to the lower cable tray at each interval.
- .9 Within the Communications Cabling Wiring Closets the cable tray deck shall be located 150mm back from the equipment rack centreline. Clearance of cable tray above finished floor as shown on drawings.
- .10 The cable tray shall be installed so that there is a minimum of 300mm clearance above the cable tray.
- .11 Provide a barrier separation in the cable tray as shown on the detail sheets.
- .12 Arrange for opening in walls and floors for width and depth of cable tray to pass through.

- .13 Provide and install acceptable firestopping of floors and walls after cables have been installed.

3.4 CONDUITS

- .1 Refer to Canadian Electrical Code Section 12.
- .2 Refer to Section 26 05 34.
- .3 Conduit sleeves shall be installed with acceptable fire stop to meet local fire codes.
- .4 Conduit sleeves shall extend a minimum of 100mm above the finished floor.
- .5 Spare sleeves with no cables installed within them shall be fitted with an acceptable firestop.
- .6 Raceways shall enter Communication Cabling Wiring Closets at a minimum height of 2.4m AFF.
- .7 Conduit runs shall not contain more than two (2) 90 degree bends between pull points or pull boxes.
- .8 Conduits shall have long sweep bends.
- .9 Continuous conduit runs shall not exceed 30m without a pull point or pull box.
- .10 Conduits shall be reamed to eliminate sharp edges.
- .11 Conduit couplings and connectors shall be steel type.
- .12 Steel connectors shall be terminated with an insulated bushing.
- .13 Pull boxes shall be installed in such a manner that the conduits that enter the pull box shall be aligned at opposite ends from each other, the cable shall not have a bend within the pull box.
- .14 Conduit runs shall remain clear of areas in which flammable material may be stored. Conduits shall not be installed adjacent to sources of heat.
- .15 All conduits shall be left with a nylon pull cord with a minimum test rating of 90kg.
- .16 Provide four 20mm conduits stubbed up to accessible ceiling space from a four gang communications outlet.
- .17 Conduits stubbed up from communications outlet shall be routed to the nearest point of the cable tray. Conduits shall terminate onto the cable tray with conduit to tray adaptors.
- .18 Conduit fill shall be as per cable manufacturers recommendations, but shall in no case exceed the maximum fill allowed by code.

3.5 PVC UNDERGROUND CONDUIT

- .1 The use of 90 degree corners is not allowed. Use two 45 degree fittings spaced apart to provide a 90 degree corner. The bending radius shall be 410mm minimum.
- .2 Layout underground PVC conduit below the building structure with long sweeping bends around structure piles.
- .3 Underground PVC conduit shall be installed with watertight sealant between each section.

3.6 OUTLET BOXES

- .1 Refer to Section 26 05 32.
- .2 Refer to detail sheets for faceplate configurations.
- .3 Fill boxes with paper, sponges, foam, or similar approved material to prevent entry of debris during construction. Remove upon completion of Work.
- .4 Information outlet boxes shall not be placed back to back when servicing adjacent rooms, there shall be a minimum of 200mm8in offset between boxes.
- .5 Mount communication outlet boxes at the same height as the electrical power outlets unless noted otherwise. Communication outlets shall be mounted adjacent (within 4in.) to power outlets.

End Of Section

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Common Work Results-Electrical	Section 26 05 00
.2	Installation of Cables in Trenches and in Ducts	Section 26 05 44
.3	Conduits, Conduit Fastenings, and Conduit Fittings	Section 26 05 34
.4	Splitters, Junction, Pull Boxes and Cabinets	Section 26 05 31
.5	Voice and Data Communications Pathway	Section 27 05 28

1.2 REFERENCES

- .1 Latest edition of the following:
 - .1 EIA/TIA-568-A; Commercial Building Telecommunications Cabling Standard (refer to CSA standard CAN/CSA T529-M91, CAN/CSA-C22.2 No. 214-M90).
 - .2 EIA/TIA-569; Commercial Building Standards for Telecommunications Pathways and Spaces (refer to CSA standards CAN/CSA T530-M90).
 - .3 EIA/TIA-570 Residential and Light Commercial Telecommunications Wiring Standard.
 - .4 EIA-TIA-606; The Administration Standard for the Telecommunications Infrastructure of Commercial Building (refer to CSA standard CAN/CSA T528-93).
 - .5 EIA/TIA-607; Commercial Building Grounding and Bonding Requirements for Telecommunications (refer to CSA standard CAN/CSA T527-94).
 - .6 EIA/TIA TSB 67 Transmission Performance Specifications for Field Testing of Twisted-Pair Cabling Systems.
 - .7 EIA/TIA TSB 72 Centralized Optical Fiber Cabling Guidelines.
 - .8 EIA/TIA TSB 75 Cabling practices for Open Offices.
 - .9 NBC National Building Code of Canada.
 - .10 CAN/CSA-C22.1 Canadian Electrical Code Part One.
 - .11 CAN/CSA-C22.1 Canadian Electrical Code Part One Section 60 "Electrical Communication Systems".
 - .12 CAN/CSA-C22.2 No. 0-M91 General Requirements - Canadian Electrical Code, Part Two.
 - .13 CSA C22.2 No. 154-1975 Data Processing Equipment.
 - .14 NRC-CNRC National Building & Fire Codes of Canada.
 - .15 IEEE STD 1100 - 1992 IEEE Recommended Practice for Powering & Grounding Sensitive Electronic Equipment "Emerald Book".
 - .16 ISO/IEC 11801 Generic Cabling for Customer Premises.

- .17 ANSI X3T9.5 Requirements for UTP at 100Mbps.
- .18 TBITS-6.9; Canadian Open Systems Application Criteria (COSAC) "Profile for the Telecommunications Wiring System in Government Owned and Leased Buildings", Treasury Board Information Technology Standards.

1.3 DESCRIPTION OF SYSTEM

- .1 System to include:
 - .1 A Category 6 centralized network for the Voice Communications cabling system.
 - .2 A Category 6 centralized network for the Data Communications cabling system.
 - .3 Information outlets, c/w faceplates, recessed enclosures, located in the Work area for connection to communications devices.
 - .4 Unshielded Twisted Pair (UTP) enhanced Category 6 copper cable for the Voice Communications horizontal cabling system (colour to be "Yellow").
 - .5 Unshielded Twisted Pair (UTP) enhanced Category 6 copper cable for the Data Communications horizontal cabling system (colour to be "Blue").
 - .6 All patch panels, troughs, labeling, clamps, bonding clamps, racks, and grounding to provide a complete system as specified.
 - .7 All connector cables, splices, and miscellaneous material to provide a complete system as specified.
 - .8 Wiring connections to the Local Telephone Service Provider shall originate at the demarcation point. The cross connect and disconnect links shall be provided by Voice and Data Contractor.

1.4 SYSTEM PERFORMANCE

- .1 The Category 6 System shall provide the following:
 - .1 Worst case channel performance requirements at 200 MHz shall be:
 - .1 NEXT power sum rated: 37.1dB
 - .2 Attenuation: 21.7dB
 - .3 power sum rated ACR: 15.4dB
 - .4 ELFEXT power sum rated: 20.2dB
 - .5 Return loss: 12dB
 - .6 Propagation delay: 548ns
 - .7 Delay skew: 50ns

1.5 STANDARDS

- .1 The equipment and installation shall comply with the following current requirements:
 - .1 National Building Code
 - .2 Manitoba Building Code
 - .3 Canadian Electrical Code
 - .4 EIA/TIA and CSA Telecommunications Building Wiring Standards
 - .5 Manitoba Fire Code
 - .6 Local and Municipal By-laws
 - .7 Authorities having jurisdiction

- .8 Equipment to be as supplied by:
 - .1 AMP
 - .2 Systemax

1.6 APPROVED VOICE AND DATA CONTRACTOR

- .1 Voice and Data Communications Cabling System Contractors shall adhere to the following:
 - .1 Contractor shall install only approved product.
 - .2 Equipment manufacturer must be supported by at least three certified local installers.
 - .3 Contractor shall be certified by the equipment manufacturer they represent.
 - .4 Contractor shall be experienced in all aspects of this Work and shall have direct experience on recent systems of similar type and size.
 - .5 Contractor shall own and maintain tools and equipment necessary for successful installation and testing of UTP and Optical Fiber Voice and Data Communications Cabling Systems and shall have personnel who are adequately trained in the use of such tools and equipment.
 - .6 Contractor shall not contract any portion of the Work out to other Contractors.
- .2 The following list of Voice and Data Contractors are approved for this project:
 - .1 Kingston Electric Ltd. att: Brian Allen 861 Cockburn St. S. Winnipeg, Manitoba R3L 2N6 Phone: (204) 477-1405 Fax: (204) 474-0853
 - .2 Len Andrews Enterprises Inc. att: Len Andrews 538 Templeton Ave. Winnipeg, Manitoba R2V 3S4 Phone: (204) 338-5174 Fax: (204) 338-5199
 - .3 McCaine Electric Ltd. att: Brian Hogg 630 Erin St. Winnipeg, Manitoba R3G 2V9 Phone: (204) 786-2435 Fax: (204) 783-2180
 - .4 Saltech Computer Cabling Services att: Ray Saltel 833 Dugald Road Winnipeg, Manitoba R2J 0G7 Phone: (204) 237-1127 Fax: (204) 237-4887
 - .5 Static Electric Ltd. att: Richard Robertson 936 Logan Ave. Winnipeg, Manitoba R3E 1P1 Phone: (204) 783-3236 Fax: (204) 786-4823
 - .6 Tri-Star Electric att: Peter Thiessen 203-356 Furby St. Winnipeg, Manitoba R3B 2V5 Phone: (204) 788-4006 Fax: (204) 783-3818
 - .7 Wescan Electric att: Charlie Deeborn, 1049 Logan Avenue, Winnipeg, Manitoba R3E 1P6 Phone: (204) 786-3384 Fax: (204) 783-2750.

1.7 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 Submittal Procedures.
- .2 Include:
 - .1 Technical data sheet supplied by cable manufacturer for the cables which are to be used. The data sheets shall include:
 - .1 Mutual Capacitance
 - .2 Impedance
 - .3 DC Resistance
 - .4 Attenuation

- .5 Near End Crosstalk
- .6 ACR
- .7 Delay Skew
- .8 ELFEXT
- .2 Information outlets c/w faceplates.
- .3 Backboards, patch panels, troughs, equipment racks, wall mounted equipment racks, wire management panels.
- .4 Fiber Optic interconnection units, connectors, couplings.
- .5 Grounding termination connectors.
- .6 All test equipment.
- .7 Instructions for storage, handling, protection, examination, preparation, operation, and installation of products.
- .3 This information is to be revised to "as-built" after construction is completed. Insert as part of the Operating and Maintenance Manuals.

1.8 OPERATION AND MAINTENANCE MANUALS

- .1 Provide Operation and Maintenance data for the Voice and Data Communications Cabling System for incorporation into manual specified in Section 01 33 00 Submittal Procedures.
- .2 Include:
 - .1 Instructions for complete Voice and Data Communications Cabling System to permit effective operation and maintenance.
 - .2 Technical data - illustrated parts lists with parts catalogue numbers.
 - .3 Copy of approved shop drawings with corrections completed and marks removed except for reviewed stamps.
 - .4 Vendor's list of recommended spare parts for system.
 - .5 Provide name, address and telephone number of the Contractors service representative to be contacted during the warranty period.
 - .6 Provide name, address and telephone number of the Vendor's service representative to be contacted during the warranty period.
 - .7 Complete records of all Administration labeling data. Administrative labeling to be in electronic database format on 3-1/2" disk, and included on hardcopy of Record Drawings.
 - .8 A table of all test results to be included in hardcopy and 3½" diskette.
 - .9 Complete Record Drawings.

1.9 MANUFACTURERS WARRANTY

- .1 Warranty all passive equipment, materials, installation and workmanship for one(1) year. The warranty must assure the support of all premise standards applications as listed in EIA/TIA standards.

1.10 TRAINING

- .1 Contractor shall provide two 4 hour on-site training sessions, together with vendor's representative, for Voice and Data Communications Cabling System to operational personal in use and maintenance of system. Contractor shall provide all equipment and personal necessary to video tape training session and submit two copies to the City of Winnipeg. Training sessions shall be provided at a time convenient to the City of Winnipeg.
- .2 The Contractor shall provide a technician to assist the City of Winnipeg in cross connecting the voice and data services throughout the facility. Contractor shall also perform cross connecting of the station assignments between the City of Winnipeg's service demarcation.

1.11 CO-ORDINATION WITH LOCAL TELEPHONE UTILITY

- .1 Contractor shall provide and install all cross connects and patch cords required at demarcation. Co-ordinate all cross connects with local telephone utility.

Part 2 Products

2.1 MATERIALS

- .1 Equipment and materials to be CSA or ULC certified. Where there is no alternative to supplying equipment which is not CSA or ULC certified, obtain special approval from local Electrical Inspection Department or authority having jurisdiction.
- .2 All cabling and termination hardware shall be of one manufacturer.
- .3 Submit for Contract Administrator's approval, a duplicate list of shop drawings for this project as specified prior to placing of orders for same.

2.2 APPROVED MANUFACTURERS

- .1 The following is a list of approved manufacturers for the voice and data cabling system. Additional approved manufacturers for miscellaneous hardware shall be as noted in specifications.
 - .1 AMP
 - .2 Systimax

2.3 EQUIPMENT RACKS

- .1 Equipment racks shall meet ANSI/EIA-310.
- .2 Constructed of lightweight steel, charcoal gray or black in color.
- .3 Complete with steel mounting hardware.
- .4 Rack hardware must provide vertical wire management c/w covers on both sides of the equipment rack.

- .5 Rack hardware shall be provided with a top cable trough to facilitate cable management.
- .6 Equipment rack frames shall meet the following specifications:
 - .1 dimensions: 7ft x 20.3in x 3in with 18-5/16in center mounting.
 - .2 footprint: 20.3in length x 15in depth.
 - .3 hole pattern: 5/8in - 5/8in - 1/2in spacing.
 - .4 screw size: 10-24 thread, 1/2in length.
- .7 Each equipment rack or cabinet shall be provided with a surge suppressor power bar. Acceptable Manufacturer: Tripp-Lite #IBR-12
- .8 Additional approved manufacturer: Cabletalk, DL Custom, Hubbell.

2.4 WIRE MANAGEMENT

- .1 Provide a horizontal wire management panel between patch panels or above and below a patch panel for patch cables.
- .2 Horizontal wire management panels shall be 2 rack units high with 5 finger retaining rings minimum.
- .3 Allow for an additional fifteen (15) horizontal wire management panels for active electronics patch cables. Locations to be determined on Site.
- .4 Provide one cable support bar, 5" deep min., on rear of equipment rack or cabinet for each patch panel mounted on the equipment rack or cabinet.

2.5 FACEPLATE AND PATCH PANEL ICONS

- .1 The following icon descriptions and colors shall be utilized throughout the voice and data networking systems at all workstations and patch panels.
 - .1 Telephone - "Phone", gray
 - .2 Fax - "Fax", gray
 - .3 Modem - "Modem", gray
 - .4 Data LAN - "Data", blue
- .2 Provide blank icons for all unused ports.

2.6 FACEPLATES

- .1 Faceplates shall accept dual port installation kits.
- .2 Faceplates shall accept a minimum of four workstation jacks as specified.
- .3 Faceplates shall be iconable.
- .4 Faceplates shall be provided with integral administrative labeling strips.

2.7 MODULAR FURNITURE FACEPLATES

- .1 Faceplate shall accept a minimum of 3 workstation jacks as specified.
- .2 Faceplate shall be iconable.
- .3 Faceplate provided shall suit the modular furniture supplied by the City of Winnipeg. Contractor to co-ordinate on Site.

2.8 CATEGORY 6 WORKSTATION JACKS

- .1 Jacks shall incorporate insulation displacement connections specified for 24 AWG wire.
- .2 Jacks shall be 8 position, 8 conductor modular type.
- .3 All unused jack locations shall be installed with blank inserts.
- .4 The connecting hardware for the enhanced Category 56 cabling system channel shall meet the electrical characteristics of the cabling system as specified in Clause 1.4 System Performance. The channel shall meet the requirements specified with the connecting hardware provided.
- .5 Jacks shall be an unshielded T568A wiring configuration.

2.9 CATEGORY 6 PATCH PANELS

- .1 Patch Panels shall be 8-position, 8-conductor modular jack on face to 110 terminations on rear of panel. Wiring patterns to be T568A.
- .2 All patch panels shall be CSA or ULC approved and shall be of one manufacturer.
- .3 Termination blocks shall have the following characteristics:
 - .1 Type: all plastic insulants.
 - .2 Termination type: insulation displacement, dry, gas tight.
 - .3 Wire Size supported: 24AWG
 - .4 Retermination rate: greater than 200.
 - .5 Wire insertion force (24AWG): 59-127 Newtons.
 - .6 Wire retention force: (24AWG): 8lbs Horizontal. 1.8 lbs Vertical.
 - .7 Insulation resistance: 100M ohms
 - .8 Dielectric strength: 2.0kV at 60 Hz.
 - .9 The patch panels for the enhanced Category 56 cabling system channel shall meet the electrical characteristics of the cabling system as specified in Clause 1.4 System Performance. The channel shall meet the requirements specified with the patch panels provided.
- .4 Designation strips shall be provided for each jack. All cables shall be terminated in numerical sequence and labeled as per approved labelling scheme.

2.10 CATEGORY 6 PATCH CABLES

- .1 Shall meet EIA/TIA 568A standards.
- .2 24 AWG stranded tinned copper, insulated with high density polyethylene data grade cordage. The cord shall be jacketed in flame retardant PVC.
- .3 Shall be four pair configuration and terminate with eight pin modular plug.
- .4 Capable of high data rates to support voice, data, and video applications.
- .5 DC resistance per lead: 94 ohms/100m maximum.
- .6 DC resistance unbalanced: 5% maximum.
- .7 Mutual capacitance: 6.6nF/100m maximum.
- .8 Characteristic Impedance: 100 ohms \pm 15% @ 1 to 100 MHz.
- .9 The patch cables for the enhanced Category 56 cabling system channel shall meet the electrical characteristics of the cabling system as specified in Clause 1.4 System Performance. The channel shall meet the requirements specified with the Category 5 patch cables provided.

2.11 HORIZONTAL CABLING

- .1 Horizontal cabling shall consist of the following:
 - .1 four pair 100 ohm unshielded twisted pair (UTP).
 - .1 CSA or ULC certified.
 - .2 The horizontal cable for the Category 6 cabling system channel shall meet the electrical characteristics of the cabling system as specified in Clause 1.4 System Performance. The channel shall meet the requirements specified with the horizontal cable provided.
 - .3 24AWG solid copper conductor.
 - .4 insulation shall meet FT-4 fire rating.
 - .5 DC resistance: 9.38 ohms/100m maximum.
 - .6 DC resistance unbalanced: 5% maximum.
 - .7 Mutual capacitance: 5.6nF/100m maximum.
 - .8 Capacitance Unbalance (pair to ground): 330pF/100m.
 - .9 Characteristic Impedance: 100 ohms \pm 15% at 1 to 100MHz.

2.12 BACKBONE CABLING

- .1 Data backbone cabling shall consist of:
 - .1 Category 6 UTP 4-pair cable as specified.

2.13 GROUNDING

- .1 Provide a #3/0 AWG RW-90 insulated green copper ground from each communications wiring closet back to the building main electrical ground.

- .2 Provide grounding bus bar in each wiring closet to terminate ground conductors.

Part 3 Execution

3.1 EQUIPMENT

- .1 Provide a minimum of 1m clearance between exposed live parts of equipment and cross connect fields.
- .2 Racks and cabinets shall be secured and grounded to communications ground with a #2 RW90 insulated green copper ground.
- .3 Racks and cabinets shall be located so as to provide 800mm clearance in front and behind each rack or cabinet as measured from the outermost point of the rack, cabinet, or equipment which is mounted within the rack or cabinet.
- .4 Wall mounted equipment, racks, cabinets or brackets shall be mounted on 19mm3/4" backboard 2.1m7 ft. to the top AFF.
- .5 Equipment shall be mounted on backboards, racks, or cabinets a minimum of 300mm12in AFF.
- .6 Equipment shall be mounted to provide a minimum clearance of 300mm12in from end walls.
- .7 Equipment connected directly to a cross connect shall be connected with cables not more than 3m/10ft in length.
- .8 Install the surge suppressor power bar on the rack designated for active electronics as directed on Site.

3.2 CONNECTORS AND FACEPLATES

- .1 Modular jacks shall be mounted with the contacts up.
- .2 Four pair 100 ohms UTP cable:
 - .1 Terminate each four pair 100 ohms UTP cable directly to an 8 position, 8 conductor modular jack assembly at the Work area.
 - .2 Terminate all 8 position, 8 conductor modular jacks as per T568A pin assignment.

3.3 UTP PATCH CABLES

- .1 Patch cables shall not exceed a combined length of 6m/20ft in a channel.
- .2 Provide all patch cables required to cross connect and connect all patch panels and active electronics, and telephone cross connects throughout the communications system including the telephone demarcation field.
- .3 Provide 3m patch cables for all workstations.

- .4 Install patch cables in an organized manner, neatly laced within the wire management provided.

3.4 HORIZONTAL CABLING

- .1 Horizontal cabling shall be installed in a star topology.
- .2 Cables shall be "combed" within cable tray in an organized manner.
- .3 Bridged taps shall not be used within the horizontal cabling system.
- .4 Hard splices shall not be used within a twisted pair horizontal cabling system.
- .5 Equipment shall not be connected directly to horizontal cables.
- .6 Ensure minimum cable bend radius and maximum pulling tension, as recommended by the cable manufacturer, is not exceeded. Minimum bend radii for UTP cable is four (4) times the cable diameter, manufacturers recommendations may be greater.
- .7 Cables shall be bundled with Velcro cable straps. No traps are permitted. Velcro cable straps are for bundling only, Velcro cable straps shall not support the weight of the cable.
- .8 When terminating cable in connecting hardware insure that the amount of untwisted wire of UTP cable at the termination does not exceed 13mm.
- .9 Ensure cable is mounted, terminated, and managed to meet manufacturers specifications.
- .10 Horizontal cabling shall not exceed a distance of 90 meters from cross connect to information outlet.
- .11 Provide 3m10ft coil of slack in the Telecommunications Closet in the cable tray above the equipment rack.
- .12 UTP cable at the information outlet shall be provided with 300mm12in coil of slack in the cable tray prior to entering conduit stub.
- .13 All horizontal cabling shall maintain the following distances from EMI producing equipment:
 - .1 1.2m48in: motors or transformers
 - .2 1.0m40in: conduit and/or cables used for electrical power distribution with voltages greater than 300V.
 - .3 300mm12in: conduit and/or cables used for electrical power distribution with voltages less than 300V.
 - .4 300mm12in: fluorescent lighting.
 - .5 When horizontal cabling is required to cross fluorescent lighting, conduit and/or cables used for power they shall cross perpendicular to each other.
- .14 When a building lightning protection system is utilized the communications cabling shall not be installed closer than 1.8m6ft from any lightning protection system conductors.

- .15 All horizontal cabling that penetrates fire rated barriers must be provided with fire stop to meet local fire codes.

3.5 ADMINISTRATION

- .1 Labelling shall be as per EIA/TIA 606 standards.
- .2 All administrative labelling shall be typewritten with electronic label maker printed on self-adhesive ribbon or on integral labeling strip provided with equipment. Clean area where label will be applied with alcohol or equivalent cleaner to remove dirt and grease.
- .3 Workstation and Horizontal Patch Panel labeling:
 - .1 R1-1000/2000
R R - Rack, C - Cabinet
1 Rack or Cabinet #
1000 sequential cable identification number
2000 room number or workstation location
 - .2 Provide icons as specified on workstation devices and patch panels.
- .4 Backbone Patch Panel labeling:
 - .1 D1000-R1/C2
D D - data backbone, T - telephone backbone
1000 sequential cable identification number
R Head end; R - rack, C - cabinet
1 Head end rack or cabinet identification
C Intermediate end; R - rack, C - cabinet
2 Intermediate end rack or cabinet identification
 - .2 Provide icons as specified on workstation devices and patch panels.
- .5 All horizontal and backbone cabling shall be provided with cable labeling identification at both ends. Provide clear plastic cover over cable labeling.
- .6 All administrative labelling shall be recorded on as-built drawings and included in the Operation and Maintenance Manuals.
- .7 The use of colored backboards, connections, covers, or labels are an approved method of color coding for the cross connect fields.

3.6 TESTING

- .1 UTP Cabling:
 - .1 Testing shall be made in accordance with EIA/TIA TSB67 and EIA/TIA-568A Annex A.
 - .2 Test kit must have been calibrated/re-calibrated within one year prior to test results submitted. Provide a dated paper copy of the calibration/re-calibration report. Include serial number(s), firmware version and date of manufacturer. An accredited laboratory that is traceable to NIST must have completed the calibration.
 - .3 Only special adapters and/or special patch cables or OEM of test kit are allowed to be used to perform a Channel Link test.

- .4 Test results must show a "headroom" figure for each cable.
- .5 Test reports must be from software/firmware that is the latest version.
- .6 Test kit must test for stray noise on the cable prior to performing test.
- .7 The following tests shall be performed and recorded on all the individual Voice and Data Communications cables from both directions using a level 2 tester at 100MHz sweeps.
 - .1 Continuity or wiremap testing consisting of:
 - .1 Open/short testing.
 - .2 Polarity testing.
 - .3 Pair transposition testing.
 - .2 Signal Attenuation test.
 - .3 Near End Crosstalk (NEXT) at both Telecommunications Closet and information outlet.
 - .4 DC loop resistance test.
 - .5 length in meters
- .8 Tests shall be performed on the individual links. Link test to TSB 67.
- .9 Cables not complying with EIA/TIA 568A Category 5 standards for 100MHz or passing TSB 67 test guidelines shall be identified to the Contract Administrator for corrective action which may include replacement at no additional expense to the City of Winnipeg.

End Of Section

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

- | | | |
|----|---|------------------|
| .1 | Common Work Results-Electrical | Section 26 05 00 |
| .2 | Conduits, Conduit Fastenings And Conduit Fittings | Section 26 05 34 |
| .3 | Wires and Cables (0-1000V) | Section 26 05 21 |
| .4 | Outlet Boxes, Conduit Boxes and Fittings | Section 26 05 32 |
| .5 | Video Surveillance | Section 28 23 00 |

1.2 CARE, OPERATION AND START-UP

- .1 Provide instructions in accordance with Section 26 05 00.

1.3 PRODUCT DATA

- .1 Submit product data in accordance with Section 26 05 00.
- .2 Include riser diagram, talk paths of complete intercom system.

1.4 OPERATION AND MAINTENANCE DATA

- .1 Provide data for incorporation into maintenance manual specified in Section 26 05 00.
- .2 Include description of system operation.
- .3 Include parts list using component identification numbers standard to electronics industry.

Part 2 Products

2.1 MATERIALS

- .1 Conduits: type EMT, size as indicated, to Section 26 05 34.
- .2 Communication conductors: type Category 6 UTP, as per manufacturers requirements.

2.2 CENTRAL EXCHANGE

- .1 The Central Intercommunications Exchange shall be provided with all the necessary components to connect and control slave and master stations. The exchange shall be TOA #N-8000EX or approved equal.

2.3 MASTER STATION "TYPE A" (HANDSETS)

- .1 The master station shall be TOA #N-8000MS speakerphone type master. It shall require 24vDC supplied by the central exchange and consume no more than 2.4W.
- .2 Communication shall be loudspeaking voice-actuated, or voice actuated with handset.
- .3 Calling shall be by pretone and call LED illumination.
- .4 Mounting shall be desk or surface wall mount.

2.4 SLAVE STATION

- .1 The slave station shall be TOA #N-8031MS open-voice type master. It shall require 24vDC supplied by the central exchange and consume no more than 10MA.
- .2 Communication shall be loudspeaking voice-actuated.
- .3 Calling shall be by pretone and call LED illumination.
- .4 Mounting shall be flush wall mount with a stainless steel front panel.
- .5 Provide phone numbers in glazed frames adjacent to station to indicate department master phone numbers.

2.5 WEATHERPROOF SLAVE STATION

- .1 The slave station shall be TOA #N8050DSWP.
- .2 Communication shall be loudspeaking voice-actuated.
- .3 Mounting shall be flush, weatherproof.

Part 3 Execution

3.1 INSTALLATION

- .1 Install equipment and wiring as indicated and in accordance with manufacturer's instructions.
- .2 Interconnect system components.
- .3 Program as required.
- .4 Exterior station located at parking lot, activates CCTV camera when used.

3.2 TESTS

- .1 Perform tests in accordance with Section 26 05 00.
- .2 Conduct intelligibility performance test and submit test results to Contract Administrator.

End Of Section

Signaling and Nurse Call Equipment, conforming to UL 1069 standards. Proof of such listings shall be made in the form of submitting the UL listing cards describing the equipment by model number with the bid documents. Alternate manufacturers shall submit the listing cards as part of prior approval ten days before the bid date.

- .7 Each major component shall bear the manufacturer's name, catalog number, place of manufacture (USA), and UL label.
- .8 The contractor must guarantee, and make available to the purchaser, the service department of a local, duly authorized and franchised Dukane distributor who shall service the signal system and supply on-the-premise maintenance during normal working hours at no cost to the purchaser for a period of twelve months from the date of completion of installation unless damage is caused by accident, abuse, improper operation, or neglect. The contractor shall also agree that service will be furnished at other than normal working hours for which the charge will be at the current labor rate.

Part 2 Systems Description

2.1 GENERAL

- .1 The solid-state Dukane ProCare 1000 Visual Nurse Call System shall provide simultaneous audible and visible annunciation of four call priority levels, both routine and emergency, made from staff emergency and room occupied stations. Audible and visible annunciation of all calls shall be made at the centralized location and duty station locations, and visible annunciation shall occur at the corridor lights and zone lights associated with each call.
- .2 The system shall consist of a central control assembly with power supply, one annunciator panel, emergency (help) stations, on/off stations (interview in progress), corridor lights, zone lights, duty stations, and all system cabling as indicated on the plans.
- .3 The system shall be of modular construction. All components used in signal control shall be plug-in for easy replacement and maintenance. Any system that does not have separate plug-in components shall be disqualified. A solid-state plug-in flasher shall be incorporated to provide the steady and interrupted alerting tones and indicating lights.
- .4 The alerting tones shall be electronically generated, rather than mechanically generated at duty stations. There shall be provisions for decreasing the tone level as required during night hours.
- .5 The call origination and holding circuitry in all stations shall have reliable ESD protection. All capacitors, resistors, and other components shall be operated at less than 75 percent of rating for extra reliability.
- .6 The centralized control assembly shall consist of a flush-mounted cabinet containing the electronic sub-assemblies and power supply necessary for the functioning of the system. Future expansion shall be built in the original equipment, and it shall not be necessary to increase the size or add components to the centralized control assembly for expansion. The cabinet shall have a maximum depth of 4 inches (10.2 cm) and shall be provided with a door. The electronic circuitry necessary for system functions, including a

- solid-state, plug-in printed circuit flasher board and solid-state foldback power supply, shall be contained in the cabinet.
- .7 All emergency stations, interview in progress stations and duty stations shall be installed into standard single-gang electrical wallboxes and shall require not more than 2-1/2 inches (6.4 cm) in depth. Conduit between the main conduit system and the room stations shall require a maximum conduit diameter of 1/2 inch (1.3 cm). Stations requiring larger backboxes and conduit shall not be acceptable.
 - .8 All station components shall be mounted on a non-conductive chassis having a single one-sided printed circuit board.
 - .9 The chassis shall be of standard size and have the necessary adjustment mounting holes for fastening to a standard single-gang backbox. A separate single-gang molded trim ring of contrasting color shall be provided for concealing the mounting screws. All controls on the station shall be properly and permanently designated by a one piece plastic overlay.
 - .10 The pushbutton emergency station components shall be mounted on a non-conductive chassis for proper mounting on a single-gang backbox. The components shall be arranged so that these stations can be operated in an emergency, and independently or in conjunction with other emergency stations.
 - .11 All stations shall be located as indicated on the plans and shall operate from a Hospital Signaling grade (UL 1069 Listed) 24Vdc source through the cabling system. Systems operating on voltages other than specified shall be deemed undesirable.
 - .12 All calls from emergency (help) stations shall be visibly and audibly annunciated at a designated annunciator panel. Each station call shall be indicated by a separate indicator lamp. The capacity of each panel shall be a minimum of 50 stations.
 - .13 All calls from a "interview in progress" on-off station shall be visibly (only) annunciated at the annunciator, with a unique lamp color.
 - .14 The color of any lamp in the annunciator panel can be changed at any time by inserting a colored, translucent lamp cover over the lamp to indicate, by color code, the priority or status of any particular station. The lamps of the annunciator panel shall be replaceable from the front of the panel.

Part 3 System Components

3.1 GENERAL

- .1 The emergency station shall be provided in a Dukane Model 9A2210 pushbutton version, equipped with a CANCEL switch and call assurance LED, and mounted on a single-gang, non-conductive chassis. When a help call is originated, the following shall occur:
 - .1 The LED shall flash to indicate that the call has been placed.
 - .2 The red section of the corridor light associated with the room shall flash at a rate of 60 ppm.

- .3 The red section of all associated zone lights shall flash at a rate of 60 ppm.
 - .4 The system monitor LED shall flash on duty stations at a rate of 60 ppm.
 - .5 The tones shall sound at all associated duty stations at a rate of 60 ppm, and shall continue to sound unless the call is canceled from the room by momentarily touching the CANCEL switch on the station originating the call.
 - .6 All plug-in connections shall be made on a color-coded basis having a division of functions for easy identification and installation.
- .2 Dukane Model 4A2235 Duty Stations shall be located adjacent to the annunciator panel and in rooms where staff may be normally located, as shown on the floor plans, to audibly and visibly announce calls placed from all emergency stations.
 - .1 The station control panel shall have all components mounted to a molded single-gang chassis. This panel shall mount into a standard single-gang electrical backbox and shall be adjustable to allow for improperly aligned wallboxes.
 - .2 The panel shall contain all components including an electronic tone alert, incoming call light, and local high/low tone switch.
 - .3 The tone shall be generated and amplified at each duty station to ensure distinction of normal, emergency, staff emergency, and code blue calls.
 - .4 A pushbutton switch shall control the high/low tone level at the station.
 - .5 All plug-in connections shall be made on a precoded color basis having a division of functions for easy identification and installation.
 - .3 Dukane Model 9A2215 "Interview In Progress" Stations shall be located on the floor plans as shown, and shall audibly and visibly announce at all duty stations and annunciator panels on a predetermined visual level of priority.
 - .1 The station shall be identical to the 9A2220 staff station except a blue "Interview In Progress" pushbutton shall be used to place a call to the annunciator panel and the tone rates generated at the duty stations shall be distinguished differently from all other call types.
 - .4 Dukane Model 18A522 Multisection Corridor Lights, suitable for wall or ceiling mounting, shall be provided outside the entrance to rooms, and shall be clearly visible from all directions.
 - .1 The chassis, similar in design and material to the patient station, shall accommodate two long-life, color-coded lamps, separated by snap-in metal barriers to meet the functional requirements of each room.
 - .2 Each colored lamp shall function as follows:
 - .1 Interview In Progress - steady red
 - .2 Emergency Call-60 ppm flashing green
 - .3 The single-piece lens, suitable for room number designations, shall snap onto the chassis, allowing quick and easy lamp replacement.
 - .5 Model 18A510 Dual Lamp Zone Lights shall be located at corridor intersections to announce normal and emergency calls made in an assigned zone. The zone light shall be the same in appearance as the corridor light except it shall have one white and one red lamp section. The white section shall illuminate steadily to announce a normal call in the zone, and the red section shall flash to announce any call in the zone.

- .6 The Model 18A505 Annunciator Lamp Display Module shall have 50 individual lamps. One modules shall be provided at each location as indicated on the floor plans.
 - .1 Each lamp shall be separated by a metal divider to provide permanent and distinct visual indication of adjacent station calls.
 - .2 The lamps shall have a standard bayonet base, replaceable from the front, and shall have a five year system life. It shall be possible to change the color to red, green, or amber for staff indicators or patient status.
 - .3 The station designation plate covering the lamps shall be translucent Mylar? with a photographic grid laminated between glass for bright, clear and lasting identification under at least 200 cp room illumination.
 - .4 The layout and station identification shall be electronically generated by the user to correspond to the required lamp quantity and color.

- .7 The ProCare 1000 Central Equipment Cabinet shall be Dukane Model 12A1335. It shall be flush mounted and located as shown on the floor plans. The equipment shall be contained in a single backbox not deeper than 4 inches (10.2 cm), and shall be capable of controlling up to 100 system-related stations, and their associated corridor/zone lights, as required in each system.
 - .1 The central flasher assembly and remote stations shall obtain their power from a single, fully regulated, foldback 24Vdc power supply, Model 110-2170A, located in the same backbox.
 - .1 The power supply shall operate on a continuous duty basis at temperatures from 32° F to 138° F (0° to 50° C), with a primary line voltage from 105Vac to 125Vac, 60Hz, without the use of primary transformer taps. The primary shall be protected by a replaceable slow-blow fuse.
 - .2 The output shall be regulated 24Vdc, with protection against loads exceeding the 3.2-ampere limit as required by UL 1069. Line-to-load regulation shall not exceed 2.5%, with ripple and noise remaining below the 10mV (rms) level.
 - .3 Output protection against overloads or system shorts shall be provided by an electronic foldback circuit, factory-set to limit the volt-ampere output to less than 100VA.
 - .4 The power shall be restored automatically upon removal of the overload without resetting any circuit breakers or replacing any fuses. Powered systems using resettable, replaceable, or non-replaceable fuses shall not be acceptable.
 - .5 All output connections shall be screw terminals. The primary AC input shall be a conventional twist type connector in a separate compartment.
 - .6 The power supply shall support simultaneous calls from approximately 10-20% of the total system stations, depending on the number of annunciation panels, zone lights, and corridor lights in the system.
 - .2 The flasher assembly shall be constructed for ease of installation and maintenance, with pressure-type screw terminations, and shall contain a plug-in printed circuit flasher board.
 - .1 The flasher PCB shall be completely solid-state, designed for long life, and constructed for pressure pin plug-in connection to be compatible with earlier Series 2000 and ProCare 1000 Systems.

- .1 The tone generation section shall have the capability to produce a tone at four rates, slow (10 PPM) for normal calls, 60 PPM for lavatory/emergency calls, modified double-tone at 80 PPM for staff emergency calls and fast (120 PPM) for code blue calls.
 - .2 The tone frequency shall be set at the time of installation for 800Hz or 1,200Hz. Up to ten duty stations can be controlled simultaneously at a volume that will penetrate relatively high ambient room noise. The maximum tone level shall be preset but limit-adjustable.
 - .3 In addition to producing a steady rate for normal patient and resident calls, the lamp driver section shall produce a flashing emergency rate of 60 PPM when any lavatory, staff emergency, or code blue stations are activated.
 - .4 Separate drivers shall be provided to individually control the corridor and zone light sections with red for interview in progress calls and green for staff emergency calls.
 - .5 Optionally, each zone/corridor light driver shall have a separate power supply to increase the number of simultaneous calls that can be supported.
- .3 All components shall be modular in design for mounting into a Dukane Model 145-184 Backbox, 14-1/2 inches (36.8 cm) high, 15 inches (38.1 cm) wide, and 4 inches (10.2 cm) deep. SPECIFIER: Include paragraph 4 if stand-by battery backup is required.
 - .4 A stand-by battery unit, Model 110-1488, shall be provided in a separate but same model backbox as the central equipment, to maintain complete operation of the ProCare 1000 system in the event of primary power loss for up to 6 minutes at full rated output.
 - .5 The backbox shall be flush-mounted, and the door/cover shall be Dukane Model 110-2190, 16-1/2 inches (41.9 cm) high by 17 inches (43.2 cm) wide.
- .8 Wiring for the system shall be provided by the system supplier, to the Electrical Contractor to install as directed by the equipment supplier.

Part 4 System Operation

4.1 GENERAL

- .1 Emergency calls from emergency (help) stations:
 - .1 Staff shall originate an emergency call on the system by pressing a red PUSH FOR HELP button. The call shall remain placed until acknowledged at the originating station by pressing the CANCEL switch. Originating a call from these stations shall:
 - .1 Flash the red call assurance LED at the station.
 - .2 Flash the red section of the station corridor light and the red section of any zone lights associated with the station.
 - .3 Flash the call lamp and sound a tone at all duty stations at the rate of one second on and one second off.

- .4 Flash the red station annunciator lamp at the rate of one second on and one second off at the central annunciator panel.
- .2 Emergency calls from a "Interview In Progress" station:
 - .1 A staff member shall originate a call only from the station by momentarily pressing the button. The call shall remain placed until it is acknowledged at the originating station by pressing the CANCEL switch. Originating call shall:
 - .1 Flash the red call assurance LED at the station.
 - .2 Illuminate the blue section of the dome light.
 - .3 Illuminate the call LED at the duty station (No Audible Tones).

End Of Section