

TENDER SPECIFICATION

FOR

City of Barrie

**SYSTIMAX[®] GigaSPEED[™] X10D, LazrSPEED[™]
Structured Cabling Solution**

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SUPPLY, INSTALL, TESTING AND COMMISSIONING OF SYSTIMAX GigaSPEED X10D, LazrSPEED and TeraSPEED Cabling Solution for the CITY OF BARRIE .

1. SCOPE OF WORK

Retain an acceptable system contractor (sub-contractor) to provide a complete data cabling system as specified herein and as required on drawings.

The following work allocation between Div. 16 and system contractor shall occur:

System contractor shall provide system components, labelling, commissioning and testing.

Div. 16 shall provide the balance of the work including but not limited: rough-in work, raceways, outlet boxes and pull string, etc. Div.16 shall also co-operate in every respect with system contractor and provide works as required by system contractor.

Data cabling system shall include, but not limited to, the following:

- Relocate existing data outlets and reusing existing data cables.

- Provide new data outlets and cables.

- Test and label all the existing relocated and new cabling systems .

- Provide separate price for re-labelling all existing cables and outlets which shall remain.

1.1 INSTALLATION

1.1.1 Supply, deliver, install, test and commission a registered SYSTIMAX Solution for the CITY OF BARRIE Fire Station 6 site

1.1.2 Supply and install all associated equipment specified or required for the successful completion of the above.

1.2 GENERAL

1.2.1 All work shall be done in a thorough and conscientious manner according to SYSTIMAX guidelines and industry standards, and shall be subject to inspection and acceptance.

1.2.2 Local regulations or codes shall be followed at all times.

1.2.3 The contractor shall be certain that all installation work areas are secure and made safe in accordance with Health and Safety regulations.

1.2.4 An appropriate construction schedule shall be developed by the contractor and will be subject to approval by the CITY OF BARRIE . The construction schedule is expected to encompass TBD weeks and should include at least one installation supervisor, or lead technician, for on-site management of the project.

1.2.5 Prior to starting the installation, the assigned installation supervisor, or lead technician, shall participate in a walk through of the project location with the CITY OF BARRIE personnel and Commscope to review the engineering/installation documentation, verify that all construction necessary for the installation has been completed, and verify all installation methods and cable routes.

1.2.6 The contractor shall be responsible for completing a standardized report form addressing the weekly progress of the installation schedule.

1.2.7 The contractor shall maintain a work area free of debris, rubbish, empty cable reels, scrap wire, etc., and dispose of such items on a daily basis.

1.2.8 The contractor shall take precautions to avoid damage to the CITY OF BARRIE premises and property, and will perform restoration if damage should occur.

- 1.2.9 The contractor shall maintain conductor polarity (tip and ring) identification at the main equipment room, splice enclosures encapsulations, service entrances, risers and station connecting blocks in accordance with industry practices.
- 1.2.10 The contractor shall provide any necessary screws, anchors, clamps, tie wraps, distribution rings, miscellaneous grounding and support hardware, etc., necessary to facilitate the installation of the distribution system.
- 1.2.11 The contractor shall be responsible for labeling all cables and cords, distribution frames and outlet locations, according to SYSTIMAX SCS or industry standards. Labels must be computer generated using an thermal transfer label maker and good quality label material. (Telecommunications Industry Association (TIA) specs for each type of cable/fibre.) and must comply with the City's labeling scheme (to be provided prior to work starting).
- 1.2.12 All cable plant installed by the contractor shall be fully tested for continuity, polarity reversals, wire transpositions, AC and DC voltages, opens and shorts prior to acceptance. Please note that cable pair faults (other than factory) shall be cleared by the installation contractor.
- 1.2.13 It shall be the responsibility of the installation contractor to furnish any special installation equipment or tools necessary to properly complete the installation. This may include tools for terminating cables, testing and splicing equipment for copper/fiber cables, communication devices, jack stands for cable reels, or cable winches.
- 1.2.14 Deleted.
- 1.2.15 The contractor shall not roll or store cable reels without an appropriate underlay.
- 1.2.16 The contractor shall not place any distribution cabling alongside power lines, or share the same conduit, channel or sleeve with electrical apparatus. All routing of distribution cabling must adhere to SYSTIMAX best practices.
- 1.2.17 The contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded at any time during the placement of the facilities. Failure to follow the appropriate guidelines may require the contractor to provide the additional material and labor necessary to properly rectify the situation. This shall also apply to any and all damages sustained to the cables by the installation contractor during the implementation.
- 1.2.18 The installation contractor shall mount any equipment or electronics as close to the wiring wall fields (if appropriate) as possible, taking into consideration future growth, to facilitate administration and service.
- 1.2.19 It shall be the responsibility of the contractor to inventory all materials upon their arrival at the CITY OF BARRIE location and notify the CITY OF BARRIE representative of any missing components.
- 1.2.20 The contractor shall be responsible for testing all cable prior to the installation of the cable. If the installation contractor fails to perform this testing operation, the installation contractor shall accept the cable as good and assume all liability for the replacement of the cable should it be found defective at a later date.
- 1.2.21 The contractor shall plug conduits and entrance holes where the cabling has been installed by the installation contractor in the main equipment room, manholes, riser

and other cable entrance locations with re-unutterable duct seal or flame retardant putty.

- 1.2.22 In some CITY OF BARRIE sites it may be necessary for the contractor to remove or float the existing facilities in order to install the new distribution system.
- 1.2.23 The contractor shall be responsible for providing an approved ground at all newly installed distribution frames and protector locations insuring proper bonding to any existing facilities. The contractor shall also be responsible for ensuring ground continuity by properly bonding all appropriate cabling, closures, cabinets, service boxes and framework. All grounds shall consist of appropriate gauge copper wire and shall be supplied from an approved building ground and bonded to the main electrical ground. Grounding Specification.
- 1.2.24 If the cross connect hardware is wall mounted, it shall be the responsibility of the installation contractor to equip the entire wall surfaces with fire retardant plywood sheets. The plywood sheets shall be 8 feet x 4 feet x 3/4 inches and shall be mounted vertically several inches above the floor level. The plywood sheets shall also be painted to the CITY OF BARRIE specifications.

Qualifications of Cabling System Contractor

Provide installation by telecommunications technicians qualified to install a SYSTIMAX Structured Cabling Solution and to perform related tests as required by manufacturer.

Contractor must meet minimum number of required SYSTIMAX trained personnel to comply with SYSTIMAX Business Partner Program, and shall provide a list of their SYSTIMAX approved technical support staff, together with their working experience. Contractor will provide a current letter of good standing from Commscope to Owner and Contractor, prior to starting work.

Submit proven track record in cabling projects of similar size. Include details of minimum 3 projects of similar size involving category 6a cabling, Multimode and Single-mode fibre optic cabling which have been completed in last 2 years. Include names, addresses, and phone numbers of references for 3 projects.

Third party certification will not be permitted. The awarded contractor shall not sub-contract any work.

Contractors must be approved Commscope contractors and proof must be provided as a submittal to the Owner and Consultant for review and approval prior to starting any related work.

QUALITY ASSURANCE

Qualifications of Manufacturer

The City has standardized on Commscope SYSTIMAX for Voice/Data Cabling System. No alternatives will be accepted.

Submittals

Submit the following information, prior to commencing work:

Required quality assurance documents.

Complete Warranty details.

Repair, order, and escalation procedures.

Complete list and detailed description of complete system components.

Unit prices of complete itemized system components.

Shop drawings:

Submit 3 sets of shop drawings.

Submit complete cabling system layouts showing locations of every component and cable routing.

System riser and detailed data and specification cut-sheets of each system components.

Upon completion of work and prior to final acceptance, submit test report showing recorded test report and a letter of verification that the system has been completely tested and fully operational ..

Manuals and As-built drawings.

Submit 3 sets of manuals and as-built drawing that will include the following:

Detailed information on types of system components and equipment used for whole system.

Accurately and neatly recorded test results.

Accurately and neatly record locations of all system components, equipment and cables routing on As-built drawings.

2. SYSTEM REQUIREMENTS

The system offered and quoted, shall incorporate all features and facilities listed in this specification, except for the items listed under 'Optional Requirements'.

City of Barrie Specifications Execution

Obtain and conform to the specifications of the City, where applicable. The specifications found in the above document shall be considered the minimum standard to be employed in this project. Where differences occur between the tender documents and city's specifications, a higher standard conditions or quality will govern. Report discrepancy to the consultant immediately upon discovery.

The system contractor shall meet with the City's representative(s) throughout the project to ensure that all their requirements are met.

Vertically mount outlet boxes, unless noted otherwise.

Run cables in existing raceways where applicable. Run cables in conduits from outlet boxes to ceiling space.

Fish conduit, clear blockages and outlet and clean out pull boxes at completion of installation. Leave conduit free of water or excess moisture. Install No. 12 gauge galvanized soft iron pull wire, or 1/8" nylon pull cord continuously from outlet to outlet, through conduit and fasten at each box.

Conduit shall have a bending radius of not less than nine times conduit diameter.

Ream out conduit and identify ends with green paint.

Install additional steel pull boxes in such a manner that, throughout entire system, there shall be not more than two 90 degree or equivalent bends or more than 30m in each run, so that wire or cables may be pulled in or withdrawn with reasonable ease. Minimum space requirements in pull boxes having one conduit each in opposite ends of the box, shall be as follows:

Maximum conduit size	Size of pull boxes in millimetres			For each additional conduit size increase width by:-
	Width	Length	Depth	
21mm	150mm	300mm	100mm	50mm
27mm	200mm	400mm	150mm	75mm
35mm	250mm	450mm	200mm	75mm
41mm	300mm	600mm	250mm	100mm
53mm	350mm	750mm	300mm	125mm

Follow manufacturer's recommended installation specifications for all equipment and materials.

Avoid all sources of EMI (electro-magnetic interference). Keep the following clearance:

- Lighting ballast: 125mm.
- Power feeder: 300mm.
- Power feeder (over 5KVA): 600mm.
- Transformer/larger motor/power panel: 1200 mm.

Avoid sources of heat such as heating ducts and hot water pipes.

Cables carrying signals with a level difference of 30dbV or greater must be run in separate conduit.

Do not exceed a 90° bend radius for any cabling. Use J-hooks to support cables in ceiling space.

Use appropriate professional methods for dressing and securing cables.

Do not allow cabling to rest on drop ceilings.

Ground all equipment used in the installation, i.e. equipment, devices, racks, metallic pathways, and wall mount enclosures in accordance with J-STD-607-A requirements.

All cabling shall be installed to conform to the requirements of the Canadian Electrical Code and applicable Provincial Codes. Cabling shall be sized in accordance with Class 2 requirements, but shall be protected from mechanical injury or other injurious conditions such as moisture, excessive heat or corrosive action in accordance with Class 1 requirements.

Undue pulling tension, abrasion or rough handling must be avoided to ensure that the cables will permit transmission of the intended information with no impairment or degradation of signal quality.

2.1 SPECIFICATION

2.1.1 The SYSTIMAX Solution shall consist of any or all of the following subsystems:

- a) Work location subsystem
- b) Horizontal subsystem
- c) Administration subsystem
- d) Backbone subsystem
- e) Equipment room subsystem
- f) Campus subsystem

2.1.2 The system shall:

- a) Support analogue and digital applications, VOIP, data, local area networks (LAN), and video on a common cabling platform.

The systems that shall be supported include, but are not limited to:

Data Communications - EIA-232-D, RS-422, RS-423, Ethernet (10Base-T), Token Ring, Fiber Distributed Data Interface (FDDI), Twisted Pair Physical Media Dependant (TPPMD), Fast Ethernet, 100Base-T, 100VGAnyLAN, ATM at 155Mbps and transmission speeds of 622Mbps, Gigabit Ethernet and 10 Gbps Ethernet.

Voice Applications – Analogue and digital voice, VOIP, basic rate and primary rate ISDN.

Video - Analogue Video, Digital Video, Video Conferencing, RGB Video and 550mhz broadband video.

- b) Cover its capacity and functionality with minimum components.
- c) Be flexible and capable of including new facilities or technologies as they become required or available.

2.1.3 The system shall specifically support the applications and associated transmission distances described in the SYSTIMAX 'Structured Cabling System Performance Specification'.

2.1.4 The Contractor will supply a statement of compliance that the system proposed meets the requirements of the EEC Directives on EMC. This statement should be backed by test documentation showing the compliance of the cabling system under stated test conditions. The recommended test networks are 10GBaseT, 1000BaseT, 100BaseT, and 10BaseT. EMC compliance should be provided as part of a 20 Year

Extended Product and Applications Assurance Warranty. All test and certification results must be made available to the City in electronic format.

- 2.1.5.1 The wiring vendor (installer) shall guarantee that all Category 6A and fiber optic cabling and components meet or exceed specifications (including installation) of TIA/EIA-568-B.1, 568-B.2, 568-B.3 and 569.

3. SYSTEM DESIGN

3.1 WORK LOCATION SUBSYSTEM

The connection between the information outlet and the station equipment in the work area is provided by the work area subsystem. It consists of cords, adapters, and other transmission electronics.

- 3.1.1 Contractor shall supply the wiring or cords that connect terminal devices to information outlets. This includes mounting cords and connectors, as well as extension cords needed.
- 3.1.2 Contractor shall supply the necessary transmission electronics equipment listed under 'Optional Requirement' in order to complete the system successfully.
- 3.1.3 All modular 360GS10E work area cordages shall incorporate an anti-snag feature that provides maximum protection from snagging during moves and re-arrangements (CPCSSX2-02F0XX)
- 3.1.4 All patch cords shall exceed TIA/EIA and ISO/IEC Category 6A/Classs E_A channel specifications. No field termination of RJ-45 cords is allowed.

3.2 HORIZONTAL SUBSYSTEM

The horizontal subsystem provides connections from the cross connect to the information outlets (IOs) in the work areas. It consists of the horizontal transmission media, the associated connecting hardware terminating this media and IOs in the work area. Each floor of a building is served by its own horizontal subsystem.

3.2.1 Horizontal Voice and Data Cabling

- 3.2.1.1 Contractor shall supply a horizontal cable to connect each information outlet to the backbone subsystem on the same floor.
- 3.2.1.2 The type of horizontal cables used shall be 4-pair unshielded twisted pair (UTP), Category 6a, 1091B or 2091B GigaSPEED X10D, unless otherwise noted on the floor plans or within this document.
- 3.2.1.3 The cable shall be able to support voice and data, to at least 10 Gbps and shall have electrical performance specified out to 550MHz.
- 3.2.1.6 The 4-pair UTP cable shall be run using a star topology format from the patch panel at the administration subsystem on each floor to every individual information outlet. All cable routes to be approved by the CITY OF BARRIE representative prior to installation of the cabling.
- 3.2.1.7 The length of each individual run of horizontal cable from the administration subsystem (Telecommunications Closet) on each floor to the information outlet shall not exceed 90 meters. If necessary, additional Telecommunications Closets shall be added to maintain the required distances.

3.2.1.8 Contractor shall observe the bending radius and pulling strength requirements, given below, of the 4-pair UTP 1091B or 2091B cable during handling and installation:

- Bending radius - 4 times the cable diameter
- Maximum pulling tension – 25 lbs (11.34 kg)

3.2.1.9 Each run of cable between the patch panel and the information outlet shall be continuous without any joints or splices, except for the optional use of a consolidation point.

3.2.1.10 In existing structures, the contractor shall place distribution cabling following the same basic route of the existing wiring, except where conduits are full or the route is not easily accessible. In new structures, the contractor shall place cabling in the existing, or newly installed, distribution media.

3.2.1.11 In suspended ceiling and raised floor areas where cable trays or conduit are not available, the contractor shall bundle station wiring with velcro cable ties, tied loosely at appropriate distances (approximately 1m). The cable bundling shall be supported via the existing building structure and framework. All old cable should be removed prior to the installation of any new cable.

3.2.1.12 Pull boxes shall be used for the following purposes:

- Fishing the conduit run
- Pulling the cable to the box and then looping the cable to be pulled into the next length of conduit

A pull box shall, therefore, be placed in a conduit run where:

- The length exceeds 30 m
- There are more than two 90° bends
- If there is a reverse bend in the run

3.2.1.13 If the interior of walls is not obstructed, the contractor shall conceal horizontal distribution wiring internally within the walls. If such obstructions exist, the Contractor shall secure approval by CITY OF BARRIE prior to the use of an alternate method.

3.2.1.14 The contractor shall be responsible for removing and replacing all ceiling tiles required for the installation of the wiring. Any damage to the ceiling tiles will be made good by the Contractor.

3.2.2 Information Outlet Data

3.2.2.1 All Category 6A MGS600 outlets shall meet or exceed Category 6A/ Class E_A transmission requirements when installed in a complete channel, as specified in draft TIA/EIA 568-B.2-10 Commercial Building Telecommunications Cabling Standard and ISO/IEC 11801:2002 Second Edition Amendment 1.

3.2.2.2 The Category 6A outlets shall be capable of being installed at either a 45° or a 90° angle in any M-series modular faceplate, frame, or surface-mounted box avoiding the need for special faceplates.

3.2.2.3 The Category 6A outlets shall be installed in the following Commscope/ SYSTIMAX approved faceplates, furniture plates and/or surface boxes:

- M1xLE-262 x port flush mount faceplate, white
- M13C-xxx
- M108FR3-262 3-port Decora-style faceplate, white
- 3-port furniture plate, colour to match furniture
- M202SMB-xxx 2-port surface-mount box, colour to be specified

- 3.2.2.4 The GigaSPEED X10D MGS600 information outlet shall be wired in an EIA/TIA 568A configuration.

3.3 ADMINISTRATION SUBSYSTEM

The administration subsystem links all of the subsystems together. It consists of labeling hardware for providing circuit identification and patch cords or jumper wire used for creating circuit connections at the cross connects.

- 3.3.1 The administration subsystem shall consist of GigaSPEED X10D 360 1100GS5 24 or 48 port RJ45 patch panels for termination of copper cables, both data and voice, and 360G2 19" rackmount patch panels for optical fiber cable. All rack or cabinet layouts, including the choice of panel port counts, are to be approved by the CITY OF BARRIE IT personal prior to installation.

3.3.2 RJ45 Patch Panels

- 3.3.2.1 The 360 1100GS5 RJ45 Patch Panel shall be able to accommodate stranded and solid cable conductors. The panels shall meet or exceed the ANSI/EIA/TIA 568-B, ISO IS 11801 and EN 50173 Category 6a standards. 24 port or 48 port versions shall be selected as appropriate.
- 3.3.2.2 The modular RJ45 patch panels must have patch cord routing incorporated in the panel
- 3.3.2.3 A full complement of 360 GS10E Category 6a patchcords must be provided (CPCSSX2-02Fxxx, where "xxx" = length in feet), quantities and lengths to be specified

3.3.3 Network Racks and Cable Management

- 3.3.3.1 Network rack shall be 19"w x 45U high with 3" deep channel – CommScope RK3-45A
- 3.3.3.2 Vertical cable manager shall be installed on both sides of the network rack. They shall have cable support fingers spaced at 1U increments and include dual hinge latching doors which can be opened left or right. Door shall be brushed silver in colour – CommScope VCM-SS-84-6 at ends and VCM-SS-84-10 in between racks.
- 3.3.3.3 Horizontal cable managers shall include covers which hinge up or down, and shall be 2U in height – CommScope HTK-19-SS-2U

3.4 BACKBONE SUBSYSTEM

- 3.4.1 The contractor shall supply multi-pair Category 3 cables for voice and low speed data applications in the backbone sub-system to be terminated on BIX blocks OR patch panels. The contractor shall supply 4 pair GigaSPEED XL copper cables and/or multi-core fiber optic cables for the high speed data applications in the backbone sub-system. The decision whether to install GigaSPEED XL copper cables or fiber optic should take into account distance and bandwidth requirements. These cables shall be able to support voice, data and building services applications. These cables shall meet or exceed the attenuation and PowerSum NEXT requirements of ANSI/EIA/TIA 568-B, ISO IS 11801 and EN 50173 standards. The contractor shall observe the appropriate bending radius and pulling strength requirements of all backbone cables during handling and installation.

3.5 FIBRE OPTIC INFRASTRUCTURE

3.5.1 Fibre Optic Cable

The optical fiber cable shall consist of LazrSPEED 300 multimode and TeraSPEED Enhanced singlemode fibers. The fiber cable shall meet the following specifications :

3.5.1.1 Multimode Fiber Cable

OM3 Laser Optimized 50/125 μm Multimode Guaranteed Channel Performance

1. The 50/125 μm fiber channel shall support single-channel serial transmission, in both the building riser and campus backbones, to 10 gigabits per second (Gb/s) for a distance of 300 meters with up to 5 LC connections.
2. The 50/125 μm fiber channel shall be backward compatible with legacy applications such as: Ethernet, Token Ring, FDDI, Fast Ethernet and ATM for in-building network distances) ensuring a smooth migration path from 10Mb/s to 10 Gb/s using achievable technology.
3. The channel shall support 10 Gb/s short wavelength (850 nm) emerging technology applications using vertical cavity surface emitting lasers (VCSELs) and low bit rate LED applications for legacy systems.
4. The 50 μm fiber shall be optimized to control differential mode delay (DMD) so that "pulse splitting" at 10 Gb/s is eliminated.
5. A single manufacturer shall manufacture the 50 μm fiber cable, 50 μm fiber connectors, 50 μm patch cords and apparatus, which comprise the channel.
6. The 50 μm fiber shall meet or exceed the following standards, as applicable, for OSP or Plenum cables: ICEA S-83-596, ISO/IEC-794, GR-409, TIA/EIA455, TIA/EIA492, TIA/EIA568-B, ANSI-FDDI, IEEE 802, UL 910, OFNP classification as described in the National Electric Code (NEC2), OFN-LS Low Smoke Cables, CSA Certified (OFN FT4/FT6) and approved component industry standards.
7. The manufacturer shall warrant the 10 Gb/s channel's cable, components, and applications for a period of 20 years.
8. The 20-year warranty shall be a transferable warranty and include all labor to replace any defective components as well as the component replacement

Mechanical Performance

- Cable minimum bend radius : 20 times cable diameter, during installation and 10 times cable diameter, after installation.
- Buffered fiber minimum bend radius : 19 mm
- Operating temperature range : 0 to +50 degrees C
- Storage temperature range : -40 to +70 degrees C

Optical Specifications

- Maximum fiber loss :
 - 3.0 dB/km at 850 nm
 - 1.0 dB/km at 1300 nm
 - Minimum bandwidth :
 - 1500 MHz-km at 850 nm (OFL)
 - 500 MHz-km at 1300 nm (OFL)
 - 2000MHz.km at 850 nm (DMD)
 - 500 MHz.km at 1300 nm (DMD)
- Fiber cable shall be 6 or 12-strand as required indoor distribution cable, 5201 0XXA ZPAQ (for plenum rated) or 5200 0XXA ZRAQ (for riser rated).

3.5.1.2 Singlemode Fiber Cable

Singlemode fiber optic OSP cable – Zero Water Peak - Dielectric Loose Tube

1. The loose tube dielectric cable shall be constructed with industry standard 3mm buffer tubes, stranded around a central strength member.
2. The buffer tubes shall be compatible with standard hardware, cable routing

and fan-out kits.

3. The cable core shall be water blocked with dry waterblocking materials, making access and handling of individual tubes easier and craft-friendly.
4. The cables shall be designed for point-to-point applications as well as mid-span access, and provide a high-level of protection for fiber installed in the outside plant environment.
5. The singlemode fiber shall be a dispersion-unshifted fiber which meets the ITUT G.652c requirements.
6. The fiber shall be fully capable of handling existing and legacy singlemode applications which traditionally operate in the 1310 nm and 1550 nm regions shall also be designed to handle the new and emerging applications that utilize the "Extended" E-band, 1360 nm to 1460 nm.
7. The fiber shall be designed to provide optimum performance from 1265 nm to 1625 nm making it ideal for 16-channel Course Wavelength Division Multiplexing applications

Physical Specifications:

Fiber Count	Subunits	Outer Diameter	Weight	Minimum Bend		Max.Tensile Load		Maximum
		in.(mm)	lbs/ft (kg/km)	Radius Loaded	Radius Unloaded	Short Term	Long Term	Vertical Rise Feet (Meters)
4 - 48	5	0.46 (11.7)	63 (94)	9.2 (23.4)	4.6 (11.7)	607.0 (2700)	180.0 (800)	2856 (871)
72	6	0.50 (12.7)	72 (107)	10.0 (25.4)	5.0 (12.7)	607.0 (2700)	180.0 (800)	2509 (765)
96	8	0.58 (14.7)	95 (141)	11.5 (29.4)	5.8 (14.7)	607.0 (2700)	180.0 (800)	1904 (580)
144	12	0.74 (18.9)	146 (217)	14.8 (37.8)	7.4 (18.9)	607.0 (2700)	180.0 (800)	1237 (377)
288	24	0.86 (21.9)	211 (315)	17.2 (43.8)	8.6 (21.9)	607.0 (2700)	180.0 (800)	852 (-260.0)

Note* There are 12 fibers per tube.

Environmental and Mechanical:

	Specification	Test Method
Operating Temperature	-40°to +70°C	FOTP - 3
Installation Temperature	-20°to +70°C	N/A
Storage Temperature	-40°to +70°C	N/A
Crush Resistance	44 N/mm	FOTP - 41
Impact Resistance	Exceeds	FOTP - 25
Flexing	Exceeds	FOTP - 104
Twist Bend	Exceeds	FOTP - 85

Cable Identification

Buffer Tubes and Fibers are identified with standard color coding:

1 - Blue	5 - Slate	9 - Yellow
2 - Orange	6 - White	10 - Violet
3 - Green	7 - Red	11 - Rose
4 - Brown	8 - Black	12 - Aqua

Buffer tubes 13 through 24 repeat the color sequence with tracer stripe:e.g.fiber 13 is blue with tracer stripe.

SYSTIMAX Solutions TeraSPEED™ Loose Tube Dielectric Enhanced Singlemode Cable 5024 xxxA WXBK, Black (2– 288 fibers) approved

3.5.2 Fiber Optic Connectors

3.5.2.1 The LC connectors shall meet or exceed the following specifications:

- Operating temperature: -40 to +75 degree C
- Average loss: 0.3 dB/mated connector or better (0.1 dB) for multimode LC
- Average loss: 0.3 dB/mated connector or better (0.2 dB) for singlemode LC
- Pre-radiused ceramic tip, product number MFC-LCR-09-BG for multimode
- Pre-radiused ceramic tip, product number SFC-LCR-09-BL for singlemode

3.5.3 Fiber Optic Patch Cords

3.5.3.1 The fiber patch cordage shall consist of two single, buffered, laser-optimized LazrSPEED 550 multimode fibers for multimode and TeraSPEED singlemode fibers for singlemode connections. The fiber patch cord shall be terminated with LC connectors on at least one end, with the opposing end's connector choice to be approved by the CITY OF BARRIE (based on equipment requirements)

3.5.3.2 The multimode fiber patch cords shall meet the following specifications:

Physical Specifications:

Minimum Bandwidth	@ 850 nm: 4700 MHz-km (laser), 3500 MHz-km (OFL) @ 1300 nm: 500 MHz-km (laser), 500 MHz-km (OFL)
Attenuation:	3.0 dB/Km @ 850 nm, 1.0dB/Km @ 1300 nm
Cable Outside Diameter:	Duplex: 1.6 x 3.7 mm
Min. Bend Radius:	2.5 cm for 3.0mm cord// 1.6mm 2.0" (5.1cm) for 1.6mm cord
Operating Temperature Range:	-20 to 70 °C
Average Connection Loss:	LC = 0.1 dB
Return Loss Minimum:	-20 dB
Tip Material:	Ceramic
Mating Durability for:	500 Reconnects
Insertion Loss Change:	<0.2 dB
Temperature Stability:	-40 to + 75 °C
Insertion Loss Change:	<0.3 dB

Approved multimode patch cord: FPCXLCLC22-RFxxx (xxx = length in feet)

3.5.3.3 The singlemode fiber patch cords shall meet the following specifications:

Physical Specifications

Fiber Type:	TeraSPEED ZWP-SM				
Maximum Attenuation:	.70 dB/km @ 1310nm .70 dB/km @ 1383 (+3nm) .70 dB/km @ 1550nm				
Complies with:	TIA/EIA 568b.3				
Outside Diameter (simplex):	1.6mm		3.0mm		
Minimum Cable Retention Strength lbs. (N):	11.24 (50)		11.24 (50)		
Outside Diameter (zip cord):	1.6mm x 3.3mm		3.0mm x 5.9mm		
Min. Bend Radius in.(cm):	Loaded 2.0 (5.1)	Unloaded 1.4 (3.5)	Loaded 2.3 (5.8)	Unloaded 1.4 (3.5)	
Maximum Cordage	Short Term	Long	Short Term		Long Term
Tensile Load lbs.(N):	70 (311)	21 (93)	90 (400)		27 (120)
Connector:	LC	ST		SC	
Min. Return Loss:	.55dB	.50dB		.50dB	
Insertion Loss (max):	<.25dB	<.50dB	<.50dB		
Insertion Loss (avg):	.10dB	.30dB		.30dB	
Mating Durability:	500				

Operating Temp. Range: -40c to +75c

Approved singlemode patch cord: FPCWLC22-RFxxx (xxx = length in feet)

3.5.4 Fiber Optic Patch Panels

- 3.5.4.1 The fiber patch panels shall be a 19" rack mounted sliding shelf, and 1U in height - 360G2-1U-MOD-SD. The fiber panel shall accept up to four modular fiber cassettes.
- 3.5.4.2 Modular fiber cassettes shall consist of six duplex LC adapters, 360G2 Cartridge 12-LC-LS-AQ for 50um mmode and 12-LC-SM-BL for singlemode.
- 3.5.4.3 360G2-MOD-Blank-4PK panels shall be installed in any unpopulated slots on fiber panel.

3.5.5 Fiber Optic Conduit

- 3.5.5.1 Conduit for fibre optic cabling shall be EMT , minimum 2" in diameter.
- 3.5.5.2 All corner shall be 90 degree sweeps (no LBs).
- 3.5.5.3 Pull boxes shall be installed every 150 feet or after every 2 – 90 degree corners which ever comes first. These boxes shall be no less than 12" x 12" x 4" in size. **Pull boxes shall not be used as a corner.**
- 3.5.5.4 All ends of the conduit shall be terminated using an end connector complete with nylon bushing.

3.6 OUTLETS DENSITY

- 3.6.1 The quantity and location of outlets for both IT and building services are shown in the detail drawing plans.
However, if the drawing plans are not available, the following general design guidelines should be adopted:

	Number of IT Outlets	Work Area (sq m)	Grid system
General Office Area	3	9	3 m grid (?)
Meeting Rooms	?	?	3 m grid (?)

3.7 ENGINEERING

- 3.7.1 The authorized contractor selected for this GigaSPEED X10D / LazrSPEED / TeraSPEED Solution must be a certified Systimax VAR and shall adhere to all SYSTIMAX Solution design, engineering and installation procedures and utilize authorized SYSTIMAX GigaSPEED X10D and LazrSPEED / TeraSPEED components in provisioning the Project.
- 3.7.2 An initial planning meeting will be held with the contractor to clarify all requirements (systems, services, distribution methods, etc), identify responsibilities, and schedule the events that will transpire during the implementation of the project. Within two (2) weeks of the initial meeting, the contractor shall provide a written report and project schedule to clearly document the events and responsibilities associated with the project.
- 3.7.3 In order to start the initial engineering phase, the CITY OF BARRIE shall provide the contractor with one (1) clearly readable, up-to-date scale copy of all architectural, electrical and mechanical drawings, two (2)weeks prior to the commencement of any engineering design activities. This will allow for a one (1) week review of the diagrams

by the contractor, and allow one (1) week for CITY OF BARRIE to answer any queries pertaining to the contractor's review.

3.7.4 Upon completion of the initial engineering stage, the contractor shall provide two (2) draft copies of engineering documentation for approval by the CITY OF BARRIE. These should be in hardcopy and softcopy CAD format. The CITY OF BARRIE will review the engineering documentation within a two (2) week period. If no revisions are required, the documentation shall be formally accepted in writing by the CITY OF BARRIE. Any revisions shall be completed by the contractor within a two (2) week time period and resubmitted for review.

3.7.5 The final engineering diagrams and documentation shall include two "D" size (24" x 36") copies of the items listed below: These should be in hardcopy and softcopy CAD format.

- a) Riser Distribution Plan
- b) Layout of all Distribution Frames
- c) Cable Tray, Conduit and Raceway Plans
- d) Campus Distribution Plan (if applicable)
- e) Equipment Room Plans
- f) Work Area Floor Plans
- g) Building Control Plans

3.7.6 In addition to the engineering diagrams, the following items shall be provided by the contractor:

- a) Cable records and Assignments
- b) Cable Management Software to include computer and printer
(Please provide a description of the software and hardware to be provided.)
- c) Project Management

4. SUPPORT AND EXPERIENCE

4.1 TECHNICAL SUPPORT STAFF

4.1.1 Contractor shall provide a list of their SYSTIMAX approved technical support staff, together with their working experience and provide a current letter of good standing from Commscope.

4.1.2 Contractor shall state if their support staff are trained by the manufacturer, on-site training or other means.

4.1.3 Contractor shall state their nearest branch office in relation to the site proposed for the installation of a SYSTIMAX SCS. If none, the location of the main office shall be stated.

4.1.4 Contractor shall state their nearest location of their principal's support center. This center shall have permanently stationed support staff who are capable of providing technical support if required.

5. CONTRACTOR RECORD

6. HANDOVER AND SITE REGISTRATION

6.1 TESTING and Warranty

The System Contractor shall provide a system warranty covering the installed cabling system against defects in workmanship, components, and performance, and follow-up support after the project for a period of one year from the date of system

acceptance by the City. The warranty shall cover all labour and materials necessary to correct a failed portion of the system.

6.1.1 Copper Cable Testing

Testing of all copper wiring shall be performed prior to system cutover. 100 percent of the horizontal and riser wiring pairs shall be tested for opens, shorts, polarity reversals, transposition and presence of AC voltage. Horizontal wiring pairs shall be tested from the telecommunications outlet to the TC. 100% of the cable runs shall be tested for conformance to the channel specifications of Category 6a. Testing shall be done with a TIA/EIA Level III test set using the approved SYSTIMAX adaptor and settings of the test set manufacturer. Test shall include length, mutual capacitance, characteristic impedance, attenuation, and near-end crosstalk. Near end crosstalk measurements shall be done at both the information outlet and the cross connect. Any pairs not meeting the requirements of the standard shall be brought into compliance by the contractor, at no charge to the CITY OF BARRIE . Complete, end to end test results must be submitted to the CITY OF BARRIE .

6.1.2 Optical Fiber Cable Testing

All fiber testing shall be performed on all fibers in the completed end to end system. There shall be no splices unless clearly defined in this RFP. Testing shall consist of a bi-directional end to end. The system loss measurements shall be provided at 850 and 1310 nanometers for multimode fibers and 1310 and 1550 for single mode fibers.

Any link not meeting the requirements of the standard shall be brought into compliance by the contractor, at no charge to the CITY OF BARRIE .

Documentation shall be provided in both hard copy and softcopy to the point of contact.

All fiber cables shall be tested in accordance with the SYSTIMAX fiber testing guidelines dated 2009.

Upon completion of the testing, the Consultant may ask the contractor to perform random tests of up to 30% of the cables. A penalty of \$50.00 will be deducted from the contract amount for each cable that fails the test.

All tests shall be in accordance with EIA/TIA-568B.

6.2 Manufacturer Warranty

Contractor shall provide a 20 year SYSTIMAX SCS Extended Product Warranty and System Assurance Warranty for this cabling system.

6.3 Additional Warranty

Contractor shall state any additional Contractor supplied warranty.

7. CITY OF BARRIE ACCEPTANCE

- 7.1.1 At the conclusion of the installation a preliminary walk through with the installation contractor will be performed to check for installation quality, accurate performance of the work, and to verify engineering diagrams. Any modifications to the documentation or the installation that may be required shall be accomplished within a two (2) week period. "CITY OF BARRIE Acceptance" shall consist of a final walk through with the installation contractor. The walk through shall be scheduled within three (3) weeks of the completion of the installation in order to turn the project and documentation over to the CITY OF BARRIE . Please note that "CITY OF BARRIE

Acceptance" does not release the installation contractor from repairing any cabling errors or improperly labeled circuits, caused by the installation contractor, that may be discovered at a later date.

DEFINITIONS

- MTR Main Telecommunication Room
- TC Telecommunications Closet
- TCs Telecommunications Closets
- RCDD Registered Communications Distribution Designer
- BICSI Building Industry Consulting Service International
- MDTS Main Distribution Terminal System
- IDC Insulation Displacement Connection
- OTDR Optical Time-Domain Reflectometer
- BCS Backbone Cabling System
- IDT Intermediate Distribution Terminal
- BTS Backbone Terminal System
- AP Wireless Access Point