

## **DIVISION 27 - COMMUNICATIONS**

### **Section 27 10 00      Structured Cabling System**

- 1 Provide a complete structured cabling system as described in the Nova Scotia Government Structured Cabling Guidelines and referenced in DC350 Part 1, Section 2. Provide a riser diagram on the drawings.
- 2 The voice portion of the structured cabling system is to accommodate the following:
  - 2.1 Centrex system (switching performed by the telephone authority). The designated orange field on the equipment rack will accommodate this.
  - 2.2 PBX system (switching performed by the local combination public address / intercom / telephone system). Provide a separate field, blue in colour, on the equipment rack to accommodate this.
  - 2.3 VoIP system (voice over internet protocol utilizing the local area network and high speed internet connection):
    - 2.3.1 VoIP systems are for HRCE and CCRCE schools only at the present time in lieu of the PBX system.
    - 2.3.2 Routers, telephones, LAN switches, and voicemail service are NIC.
    - 2.3.3 Provide Centrex lines for the following:
      - 2.3.3.1 Elevators
      - 2.3.3.2 Mechanical Controls
      - 2.3.3.3 Fire Alarm / Security (2)
      - 2.3.3.4 Fax Service
      - 2.3.3.5 911 Service
  - 2.4 All horizontal voice cables will terminate on the designated blue field and then cross connect to either one of the above fields as required by the end user.
- 3 The structured cabling system is to accommodate all active equipment provided by the regional centre for education, including network switches. Patch panels are to be 48 port, low density.
- 4 All Racks are to contain 25% spare space. Enclosed type racks/cabinets are not to be used.
- 5 Manufacturer testing/verification is to be complete prior to project Substantial Completion. This is to include all labelling.

## **Section 27 40 00      Television and Multimedia System**

- 1 Provide a complete television system. Provide a riser diagram on the drawings.
- 2 This section provides a complete Television System, including, but not limited to the following:
  - 2.1 Head end equipment:
    - 2.1.1 DVD Player in combined DVD/VCR, Video Cassette Recorder in combined DVD/VCR.
    - 2.1.2 Digital Audio Visual (AV) streaming over IP Video decoder with HDMI output compatible with the video encoder c/w suitable mounting hardware.
    - 2.1.3 Provide a live streaming media encoder that accepts DVI, RGB, HDTV, and standard definition signals for delivering media over an IP network. It is to be a three- input switcher with audio (minimum), consisting of Composite VGA and DVI (and / or HDMI); which accepts standard definition and high resolution video signals up to WUXGA 1920x1200 and HDTV 1080p/60. Equipment is to provide IP video stream decoding compatible with the digital video encoder, and support streaming resolutions from 480x320 up to 1080p/60 with an integrated scaler with selectable output resolutions from 640x480 to 1920x1200.
    - 2.1.4 Equipment wiring c/w all necessary connections and rack mounting hardware for equipment.
    - 2.1.5 Head end equipment is to be mounted in a lockable cabinet located in the library or other location as directed by DTIR.
  - 2.2 TV / Monitor decoder equipment with HDMI output and cable.
  - 2.3 Mobile Internal Broadcast Equipment
    - 2.3.1 Provide a mobile Television cart c/w an additional video encoder mounted in a suitable enclosure, 1080p NTSC video camera and tripod; include equipment wiring c/w all necessary connections for this mobile broadcast station.
- 3 Multimedia Projectors:
  - 3.1 All multimedia projectors are to be short throw wall mounted units; these projectors are NIC and will be installed prior to occupancy by the Regional Centre for Education.
  - 3.2 Audio for the multimedia projectors is to be fed to the Classroom Sound Amplification system.

**Section 27 51 16      Public Address and Mass Notification Systems**

1. Provide a complete public address, intercom, and telephone system. Provide a riser diagram on the drawings.
2. Notwithstanding the above, the telephone portion of the system is to be deleted in HRCE and CCRCE schools in favour of a NIC VoIP system provided by the Regional Centre for Education. Coordinate with the Regional Centre for Education IT personnel. Provide an appropriate interface between the Public Address/Intercom System and the VoIP System which will permit remote call-in, with pass code, access to the intercom system.
3. Telephone:
  - 3.1. Complete PBX Telephone System for offices and classrooms; the PBX shall be Centrex (switching performed by the telephone authority) system compatible.
  - 3.2. Auto Attendants.
  - 3.3. Voice Mail with automatic message light indication on all phones.
  - 3.4. Home Work help line.
  - 3.5. Do Not Disturb feature.
  - 3.6. Automatic Page feature.
  - 3.7. Enhanced 911 with on-site notification.
  - 3.8. Urgent call-In.
  - 3.9. 2 X 3 Party conference.
  - 3.10. Power Failure transfer.
  - 3.11. Attendant and Staff PC telephones.
  - 3.12. Automatic Out-Bound dialing.
  - 3.13. Caller ID.
  - 3.14. Automatic call distribution.
  - 3.15. Attendant software.
  - 3.16. Telephone service for the PBX from the Telephone Authority shall be arranged by the owner in conjunction with the equipment supplier.
  - 3.17. Refer to Part 1, Section 2, Division 26 and Part 2, Section 2, Division 26, items 27 10 00 in each, for structured cabling requirements.
4. Public Address / Intercom:
  - 4.1. Characteristics:
    - 4.1.1. All-Call announcements.
    - 4.1.2. Emergency announcements.
    - 4.1.3. Automatic page.
    - 4.1.4. 911 page.
    - 4.1.5. Urgent call-in page.

- 4.1.6. Off-Hook call-in page.
- 4.1.7. Audio program distribution.
- 4.1.8. Zone paging.
- 4.1.9. Monitor areas of the building during a crisis from either the rescue team, or the on-site security officer.
- 4.1.10. Page areas of the building during a crisis from either the rescue team, or the on-site security officer.
- 4.1.11. Caller Identification Single Line Console circuit board to allow a caller to remotely access the P/A system using an access code.
- 4.2. Program Source Unit (desk mounted):
  - 4.2.1. Remote control unit.
  - 4.2.2. AM/FM Tuner.
    - 4.2.2.1. Controls and indicators on front panel:
      - 4.2.2.1.1. AM/FM tuning control.
      - 4.2.2.1.2. Power on/off switch.
      - 4.2.2.1.3. Interchannel push in/out switch.
      - 4.2.2.1.4. AM/FM selector switch.
      - 4.2.2.1.5. Peak meter.
      - 4.2.2.1.6. FM zero center switch.
      - 4.2.2.1.7. Bass, treble, volume controls.
      - 4.2.2.1.8. Tuning meter for FM/AM.
    - 4.2.2.2. Receptacles on rear of panel:
      - 4.2.2.2.1. Audio output jack.
      - 4.2.2.2.2. AM/FM antenna connections.
    - 4.2.2.3. FM channel:
      - 4.2.2.3.1. Tuning range: 87.9 to 107.9 MHz.
      - 4.2.2.3.2. Signal to noise ratio: 70 dB.
      - 4.2.2.3.3. Frequency response: +/- 3 dB, 20 - 20 kHz.
      - 4.2.2.3.4. Stereo Separation: 35 dB at 1000 Hz.
      - 4.2.2.3.5. AM channel:
        - 4.2.2.3.5.1. Tuning range: 530 to 1650 kHz.
        - 4.2.2.3.5.2. Hum and noise level: 56 dB below 100% modulation.
        - 4.2.2.3.5.3. Frequency response: -6 dB at 4.0 kHz.
        - 4.2.2.3.5.4. Antenna: transformer with low impedance primary for use with external antenna wire.
    - 4.2.2.4. Antenna:
      - 4.2.2.4.1. Provide antenna to obtain satisfactory signal.
      - 4.2.2.4.2. Provide external antenna if required.

- 4.3. Speakers:
  - 4.3.1. All locations unless otherwise noted:
    - 4.3.1.1. Cone type: 8" diameter.
    - 4.3.1.2. Finish colour: white.
    - 4.3.1.3. Magnet: 6 ounce ceramic.
    - 4.3.1.4. Range: 50 Hz - 14 kHz.
    - 4.3.1.5. Power input to voice coil: 10W continuous.
    - 4.3.1.6. Complete with back box, baffle assembly.
    - 4.3.1.7. Ceiling or wall mount.
    - 4.3.1.8. 25 V line matching transformer.
    - 4.3.1.9. Speakers recessed in either T-Bar or dry-wall type ceilings, require independent supporting, and are not to be reliant on tiles or dry-wall for their support.
  - 4.3.2. Exterior:
    - 4.3.2.1. Horn Type: 8" wide, 8" high, 9" deep.
    - 4.3.2.2. Finish: beige baked enamel.
    - 4.3.2.3. Frequency response: 275 Hz - 14 kHz.
    - 4.3.2.4. Power rating: 15 watts full range.
    - 4.3.2.5. Complete with adjustable mounting brackets, shockproof and weatherproof housing, transformer.
    - 4.3.2.6. Provide at least one unit per building exposure.
- 4.4. Intercom:
  - 4.4.1. Individual Assisted Care washroom, office and classroom speakers.
  - 4.4.2. Urgent (emergency priority) call placement from Assisted Care washrooms and other designated locations.
  - 4.4.3. Identify location calling-in by room #.
  - 4.4.4. Classroom speaker intercom during 911 call from on-site security officer.
  - 4.4.5. Classroom speaker intercom during 911 call from operator.
  - 4.4.6. Classroom speaker intercom during a crisis from the rescue team.
  - 4.4.7. AM/FM, and CD player components with Bluetooth capability and auxiliary input.
  - 4.4.8. Individual call switches are to be provided in each office and classroom.
- 5. Time Control And Event Scheduler:
  - 5.1. (8) Schedules of classroom change signals.
  - 5.2. (8) Zones of classroom change signals.
  - 5.3. (512) Classroom change signal events.
  - 5.4. Weekly system event scheduler.
  - 5.5. (114) Weekly team events.
  - 5.6. Storm alert tones.
  - 5.7. Digital synchronized clock displays.

6. Back-Up Power Source:

- 6.1. Provide on-line, double conversion, solid state, rack mounted UPS to support previous noted items. UPS to be complete with surge suppression, power factor correction, rectifier, charger, inverter, batteries, and internal bypass. UPS shall operate during power outage for a minimum of 30 minutes. Minimum capacity to be 1800VA/1440W.

7. Classroom Sound Amplification System, provide in all classrooms:

- 7.1. Individual Classroom Sound Amplification Systems as indicated below. In addition to the infra red voice enhancement system noted below, the mixer / amplifier shall have an input from the multi-media receiver, and shall be connected to the main P/A system in a manner such that an input from the main P/A system shall mute this classroom sound amplification systems. All components are to be RoHS compliant.

- 7.2. Classroom Sound Amplification System:

- 7.2.1. Mixer/Amplifier

- 7.2.2. 15 watt

- 7.2.3. 5 input channels

- 7.2.4. 25V, 70V and 4 ohm speaker outputs

- 7.2.5. 70 Hz - 20kHz frequency response

- 7.2.6. Less than 1% at 1kHz total harmonic distortion

- 7.2.7. System mute input.

- 7.2.8. Dedicated mini-jack output for an assistive listening system (NIC).

- 7.3. Ceiling Speakers:

- 7.3.1. Frequency Response: 70 Hz – 20 kHz  $\pm$  10dB

- 7.3.2. Power handling: 30 W RMS

- 7.3.3. Enclosure: sealed metal enclosure

- 7.3.4. Backbox.

- 7.3.5. Safety support wire.

- 7.3.6. Support brackets.

- 7.4. Infra Red Voice Enhancement System

- 7.4.1. Each system shall include the following components:

- 7.4.1.1. Classroom Infrared Wireless Tuner with the following features:

- 7.4.1.1.1. Two IR channels with independent volume controls.

- 7.4.1.1.2. Two stereo audio inputs with independent volume controls.

- 7.4.1.1.3. Two speaker outputs.

- 7.4.1.1.4. Infrared sensor/receiver input, c/w provision to add an additional sensor.

- 7.4.1.2. Infrared Receiver with the following features:

- 7.4.1.2.1. Powered from amplifier.

- 7.4.1.2.2. Reception coverage: 360 degrees.

- 7.4.1.2.3. Ceiling mounting bracket.

- 7.4.1.2.4. Reception radius: 8 M.

- 7.4.1.3. Teacher's Microphone with the following features:

- 7.4.1.3.1. External Lapel style microphone with a 3.5mm jack.
- 7.4.1.3.2. Capable of being worn around a teacher's neck as a hands-free microphone via a break-a-way lavalier microphone cord complete with belt mounting hardware.
- 7.4.1.3.3. Rechargeable via cradle charger.
- 7.4.1.3.4. Audio distortion: <1%.
- 7.4.1.3.5. Integrated microphone type: uni-directional.
- 7.4.1.3.6. On / off / mute switch.
- 7.4.1.3.7. Input jack for external lapel style microphone: 3.5mm.
- 7.4.1.3.8. Two selectable channel frequencies.
- 7.4.1.3.9. Alkaline Charge Protection.
- 7.4.1.3.10. Battery Charger: cradle charger
- 7.4.1.3.11. Battery Power: NiMH rechargeable battery.
- 7.4.1.4. Student Share Microphone with the following features:
  - 7.4.1.4.1. Hand-held-style with a cylindrical case.
  - 7.4.1.4.2. Two selectable channel frequencies.
  - 7.4.1.4.3. Standard sub-carrier frequencies: 2.06/2.54 MHz.
  - 7.4.1.4.4. Alternative sub-carrier frequencies: 3.20/3.70 MHz.
  - 7.4.1.4.5. Audio distortion: <1%.
  - 7.4.1.4.6. Integrated microphone type: uni-directional.
  - 7.4.1.4.7. On / off switch.
  - 7.4.1.4.8. Alkaline Charge Protection.
  - 7.4.1.4.9. Battery Charger: cradle charger.
  - 7.4.1.4.10. Battery Power: NiMH rechargeable battery.
- 7.4.1.5. Battery Charger:
  - 7.4.1.5.1. Unit shall be capable of charging both microphones simultaneously.
  - 7.4.1.5.2. Input Supply @ 120 Volt AC
- 7.4.1.6. Cables and connectors.
- 7.4.1.7. Provide 10% spare components for all of the preceding items.

### Section 27 51 16.01 Cafeteria/Gymnasium Public Address System

- 1 Provide a complete cafeteria/gymnasium public address system. Provide a riser diagram on the drawings.
- 2 Shall consist of, but not necessarily limited to the following components:
  - 2.1 Central Control Unit
  - 2.2 Mixer / pre-amplifier
  - 2.3 Compressor/Limiter
  - 2.4 Graphic equalizer
  - 2.5 Microphones (2 hard wired and 2 wireless required):

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- 2.5.1 Cardioid pattern.
  - 2.5.2 Dynamic element.
  - 2.5.3 Frequency response: 20 Hz to 20 kHz.
  - 2.5.4 Impedance: Low (150-250 ohms).
  - 2.5.5 Mic Switch: Line Shorting.
  - 2.5.6 Provide 2 table stands and 2 floor stands.
  - 2.5.7 Wired microphone connections at the rack are to be XLR plug-in type, not hard wired.
  - 2.6 Provide charging stations and wireless receivers for the wireless microphones.
  - 2.7 Power Amplifiers
  - 2.8 Speakers
  - 2.9 Microphones
  - 2.10 CD Player
  - 2.11 Assistive Listening Equipment.
  - 2.12 Surge Protected Power Strips.
  - 2.13 Equipment rack. Rack shall be sized for all equipment c/w 20% spare space for future growth and c/w locking front and rear door. Rack shall be bolted to the floor. Provide code required clearances in front, in back, and on at least one side.
- 3 Central Control Unit.
- 3.1 Multichannel, microprocessor controlled, programmable unit.
- 4 Mixer/Pre-amplifier:
- 4.1 Rack mounted.
  - 4.2 Inputs:
    - 4.2.1 Up to 8 Program inputs
      - 4.2.1.1 Minimum 2 microphone-level, XLR, balanced inputs
      - 4.2.1.2 Minimum 2 line-level, unbalanced RCA or 1/4" TS inputs for CD player and one spare
  - 4.3 Controls:
    - 4.3.1 Up to 8 input level controls
    - 4.3.2 Base & treble controls.
    - 4.3.3 Master volume control.
    - 4.3.4 Tone control bypass switch.
  - 4.4 Outputs:
    - 4.4.1 Balanced, line-level XLR male to Compressor/Limiter
    - 4.4.2 1/4" TS unbalanced or RCA male, line-level, mono sum to assistive hearing transmitter
    - 4.4.3 1/4" TS unbalanced or RCA male stereo, line-level to cassette deck record
  - 4.5 Frequency response: 20 Hz-20 kHz, +/- 3 dB, 0.01% THD



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- 5 Compressor / Limiter:
  - 5.1 Rack mounted.
  - 5.2 Up to 45 dB of signal compression at ratios of infinity: 1 to 1 with variable attack times of 0.2 ms to 10 ms and release times from 0.5 seconds to infinity.
  - 5.3 Maximum output of 6 VRMS into 600 ohm load.
  - 5.4 Total Harmonic Distortion: less than 0.05%.
  - 5.5 Frequency Response: 20 - 20 kHz +/- 3.0dB.
  - 5.6 Input: Balanced XLR or 1/4" TRS female, line-level left and right from Mixer/Preamplifier
  - 5.7 Output: Balanced XLR or 1/4" TRS male, line-level left and right to EQ.
  
- 6 Graphic Equalizer:
  - 6.1 Rack mounted.
  - 6.2 31 active filters @ 20 - 20 kHz.
  - 6.3 31 slide controllers through a range of +/- 12dB.
  - 6.4 Adjustable high/low pass filters with a slope of 12 dB/octave and a high pass range of 10- 400 Hz and a low pass range of 10 kHz to 30 kHz.
  - 6.5 Input impedance greater than 50 k $\Omega$ .
  - 6.6 Distortion less than 0.05% @ 1 VRMS.
  - 6.7 Input: Balanced XLR or 1/4" TRS female, line-level left and right from Compressor/Limiter
  - 6.8 Output: Balanced XLR or 1/4" TRS male, line-level left and right to Power Amplifier.
  
- 7 Power Amplifiers:
  - 7.1 Rack mounted.
  - 7.2 Cafeteria Power Amplifier:
    - 7.2.1 Power Output: 120W RMS
    - 7.2.2 Total Harmonic Distortion: 0.05%, 45 - 20 kHz
    - 7.2.3 Frequency Response: 20 Hz - 20 kHz, +/- 3dB
    - 7.2.4 Signal to Noise Ratio: greater than 90 dB below rated output.
  - 7.3 Gymnasium Power Amplifier (1 required):
    - 7.3.1 Power Output: 225 Watts RMS into 8 Ohms, left and right
    - 7.3.2 Total Harmonic Distortion: less than 0.05% at 1 kHz.
    - 7.3.3 Frequency Response: 20 Hz - 20 kHz, +/- 3dB
  - 7.4 Connections:
    - 7.4.1 Input: Balanced XLR or 1/4" TRS female, line-level left and right from EQ
    - 7.4.2 Output: Direct, low-impedance, 8 Ohms and common terminals for both left and right, stereo signal to loudspeakers
  
- 8 Speakers:
  - 8.1 Gymnasium:
    - 8.1.1 Three way units as follows:
      - 8.1.1.1 1-15 inch LF.

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- 8.1.1.2 1-6.5 inch MF.
  - 8.1.1.3 1-PST Horn HF.
  - 8.1.2 Frequency response: 40 Hz - 20 kHz.
  - 8.1.3 Impedance: 8 ohms.
  - 8.1.4 Power handling rating: 200 Watts RMS into 8 Ohms, each channel
  - 8.1.5 Complete with aluminum extrusion grille.
  - 8.1.6 Finish colour: white.
  - 8.1.7 Minimum number of units: 2 (if more than 2, connected in parallel to provide 8 Ohms load to amplifier)
  - 8.1.8 Connections to amplifier via appropriate gauge, shielded, copper wire so as to broadcast stereo signal and reject RF energy.
- 82 Cafeteria:
- 8.2.1 Two way units as follows:
    - 8.2.1.1 1-8 inch LF.
    - 8.2.1.2 1-3 inch HF.
  - 8.2.2 Frequency response: 45 Hz - 18 kHz.
  - 8.2.3 Power rating: 20 W RMS.
  - 8.2.4 Complete with back box, baffler assembly, transformer.
  - 8.2.5 Finish colour: white.
  - 8.2.6 Minimum number of units to be not less than (4).
- 9 Microphones ( 2 required):
- 9.1 Cardioid pattern.
  - 9.2 Dynamic element.
  - 9.3 Frequency response: 20 Hz to 20 kHz.
  - 9.4 Impedance: Low (150-250 ohms).
  - 9.5 Mic Switch: Line Shorting.
  - 9.6 Provide 2 table stands and 2 floor stands.
  - 9.7 Microphone connections at the rack are to be XLR plug-in type, not hard wired.
- 10 Compact Disc Player.
- 10.1 Rack mounted.
  - 10.2 Standard Audio CD Player
  - 10.3 Able to hold up to 5 CD at one time.
  - 10.4 Remote control unit.
  - 10.5 Frequency response 20 Hz - 20 kHz, +/-3dB.
  - 10.6 Harmonic Distortion: Less than 0.03% at 1 kHz.
  - 10.7 S/N ratio more than 100 dB.
  - 10.8 RCA or 1/4" TS, unbalanced stereo line-level output to mixer.
- 11 Assistive Listening Equipment:
- 11.1 Gym / Cafeteria

- 11.1.1 Rack mounted base station as follows:
  - 11.1.1.1 Frequency Modulation.
  - 11.1.1.2 RCA female, line-level mono-sum input from Mixer
  - 11.1.1.3 Automatic gain control range: 30 dB.
  - 11.1.1.4 Signal to noise ratio: 58 dB.
  - 11.1.1.5 Maximum radiated power: 50 mW.
  - 11.1.1.6 Frequency band: 72-76 MHz.
  - 11.1.1.7 Frequency deviation: 125 kHz.
  - 11.1.1.8 Rack mount kit
  - 11.1.1.9 RF fault indicator
  - 11.1.1.10 Overload indicator
  - 11.1.1.11 Digital display
  - 11.1.1.12 Large area antenna
  - 11.1.1.13 Omni directional lapel microphone.
- 11.1.2 Portable Transmitter
  - 11.1.2.1 Beltpack transmitter as follows:
    - 11.1.2.1.1 Audio input characteristics:
      - 11.1.2.1.1.1 High level auxiliary: 27 mV.
      - 11.1.2.1.1.2 MIC level auxiliary: 3mV.
      - 11.1.2.1.1.3 MIC/ANT Jack - Adjustable: 3 to 30 mV
    - 11.1.2.1.2 Automatic gain control: 40 dB.
    - 11.1.2.1.3 Signal to noise ratio: 45 dB.
    - 11.1.2.1.4 2 AA batteries.
    - 11.1.2.1.5 Maximum radiated power: 8000 iV/m at 30m.
    - 11.1.2.1.6 Battery life: 30 hours NICAD.
- 11.1.3 Receivers:
  - 11.1.3.1 Eighteen channel model.
  - 11.1.3.2 Power requirements: 2 AA NICAD
  - 11.1.3.3 Sensitivity: 0.5 iV typical, 1.0 iV maximum, 12 dB SINAD.
  - 11.1.3.4 Signal to noise greater than 55 dB.
  - 11.1.3.5 Distortion: less than 2%.
  - 11.1.3.6 Controls: volume, on-off control.
  - 11.1.3.7 Various ear buds available.
  - 11.1.3.8 Indicator light
  - 11.1.3.9 FCC and Industry Canada Approved.
  - 11.1.3.10 Receiving Frequency Band 72-76MHz.

END