

Approved: 2006-03-31

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 26 – Grounding and Bonding.

1.2 REFERENCES

- .1 American National Standards Institute
 - .1 ANSI J-STD-607-A-2002, Joint Standard - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
 - .2 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-606-2002, Administration Standard for the Commercial Telecommunications Infrastructure.

1.3 SYSTEM DESCRIPTION

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

Part 2 Products

2.1 TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)

- .1 Predrilled copper busbar, electrotin plated with holes 8 mm diameter for use with standard-sized lugs to: ANSI J-STD-607-A.
- .2 Dimensions 0.5”(6 mm) thick, 4”(100 mm) wide, 24”(600 mm) long to: ANSI J-STD-607-A.

2.2 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)

- .1 Predrilled copper busbar, electrotin plated with holes 8 mm diameter for use with standard-sized lugs to: ANSI J-STD-607-A.
- .2 Dimensions 0.5”(6 mm) thick, 4”(100 mm) wide, 18”(450 mm) long to: ANSI J-STD-607-A.

2.3 BONDING CONDUCTOR FOR TELECOMMUNICATIONS

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

2.4 TELECOMMUNICATIONS BONDING BACKBONE (TBB)

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

2.5 GROUNDING EQUALIZER (GE)

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

2.6 WARNING LABELS

- .1 Non-metallic warning labels in English to: ANSI J-STD-607-A.
- .2 Identify labels with wording "If this connector is loose or must be removed, please call the building telecommunications manager".

Part 3 Execution

3.1 TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)

- .1 Install TMGB in entrance room on insulated supports "2"(50 mm) high at location close to electrical power panel if one is installed in same room.
- .2 Install #3 AWG copper bonding conductor from TMGB to alternating current equipment ground (ACEG) of serving electrical power panel (panelboard).

3.2 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)

- .1 Install TGB in main terminal/equipment room and each telecommunications room.
- .2 Install #3 AWG copper bonding conductor from TGB to alternating current equipment ground (ACEG) of serving electrical power panel (panelboard).

3.3 BONDING CONDUCTORS GENERAL

- .1 When placed in ferrous metallic conduit or EMT longer than 1 m, bond to each end of conduit or EMT using grounding bushing and #6 AWG copper conductor.

3.4 BONDING CONDUCTOR FOR TELECOMMUNICATIONS

- .1 Install bonding conductor for telecommunications from TMGB to service equipment (power) ground.
- .2 Use approved 2 hole compression lugs for connection to TMGB.

3.5 TELECOMMUNICATIONS BONDING BACKBONE (TBB)

- .1 Install TBBs from TMGB to each TGB.
- .2 Use approved 2 hole compression lugs for connection to TMGB and TGBs.

3.6 GROUNDING EQUALIZER (GE)

- .1 Install GE between TBBs in multi-storey building by bonding TGBs with GE on top floor and every third floor in between top and bottom floors.

3.7 BONDING TO TMGB

- .1 Bond metallic raceways in telecommunications entrance room to TMGB using #3AWG copper conductor.

- .2 For cables within telecommunications entrance room having shield or metallic member, bond shield or metallic member to TMGB using #6 AWG copper conductor.
- .3 Bond all equipment racks and cabinets located in telecommunications entrance room to TMGB using #3 AWG copper conductor.

3.8 BONDING TO TGB

- .1 Bond metallic raceways in telecommunications room to TGB using #6 AWG copper conductor.
- .2 For cables within telecommunications room having shield or metallic member, bond shield or metallic member to TGB using #6 AWG copper conductor.
- .3 Bond equipment racks and cabinets located in telecommunications room to TGB using #6 AWG copper conductor.

3.9 LABELLING

- .1 Apply warning labels to telecommunications bonding and grounding conductors.
- .2 Apply additional administrative labels to: TIA/EIA-606.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for communication raceway systems and include product characteristics, performance criteria, physical size, finish and limitations.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect communication raceway systems from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SYSTEM DESCRIPTION

- .1 Emptycommunications raceways system consists of outlet boxes, cover plates, terminal and distribution cabinets, conduits, cable trays, pull boxes, sleeves and caps, fish wires, service poles, service fittings, concrete encased ducts.
- .2 Crawlspace cable tray and J-Hook distribution system.
- .3 Accessible ceiling space J-Hook distribution system.

2.2 MATERIAL

- .1 Conduits: EMT type, in accordance with Section 26 05 33 - Conduits.
- .2 Underground cable ducts: PVC type, in accordance with Section 33 65 76 - Direct Buried Underground Cable Ducts.
- .3 Cable trays: basket type, in accordance with Section 26 05 36 - Cable Trays for Electrical Systems.
- .4 Fish wire: Polypropylene type.

2.1 TELEPHONE SERVICE ENTRY PATHWAY

- .1 Telephone Service Entrance Pathway: Rigid steel conduit inside building, Non-metallic conduit direct buried from point of telephone utility connection at property line to building service terminal backboard.

2.2 TELEPHONE TERMINATION BACKBOARDS

- .1 Material: Softwood plywood.
- .2 Size: 19 mm(3/4 inch) thick or as indicated.

2.3 CABLEVISION SERVICE ENTRY PATHWAY

- .1 Cablevision Service Entrance Pathway: Rigid steel conduit inside building, Non-metallic conduit direct buried from point of cablevision utility connection at property line to building service terminal backboard.

2.4 CABLEVISION TERMINATION BACKBOARDS

- .1 Material: Softwood plywood.
- .2 Size: 19 mm(3/4 inch) thick or as indicated.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for communication raceway systems installation in accordance with manufacturer's written instructions.

3.2 INSTALLATION

- .1 Install empty raceway system, including [underfloor] [overhead] distribution system, fish wire, terminal cabinets, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves and caps, cable tray, service poles, miscellaneous and positioning material to constitute complete system.
- .2 Maintain the following clearances from all electrical equipment as follows:
 - .1 120V power – 50mm
 - .2 208/240V power – 300mm
 - .3 Motors – 1000mm
 - .4 120V lighting – 300mm

3.3 CLEANING

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by pathways for communications systems installation.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

- .1 The following are definitions of terms and expressions used in the specification:
 - .1 DROP means a communication outlet assembly complete with faceplate, cabling, and termination. A DROP may consist of one or more terminated cables assembled into a common faceplate.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for communication cabling systems and include product characteristics, performance criteria, physical size, finish, limitations, and product warranty.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect communication cabling systems from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.4 SYSTEM DESCRIPTION

- .1 Structured cabling system consists of all cabling, terminations, faceplates, outlet jacks, supporting means, racks, cabinets, and patch panels to support interconnections to active telecommunications equipment for voice and data applications in a multi-vendor, multi-product environment.
- .2 The structured cabling system shall adhere to ANSI/TIA 568 C; 569-A; 606-A; J-STD-607-A and TIA 942 standards with respect to pathways, distribution, administration, and grounding of the system.
- .3 Empty telecommunications raceways system consists of outlet boxes, cover plates, terminal and distribution cabinets, conduits, cable trays, pull boxes, sleeves and caps, fish wires, service poles, service fittings, concrete encased ducts.
- .4 Crawlspace overhead cable tray distribution system.
- .5 All cabling, patch panels, termination jacks, and faceplates shall be of one manufacturer.

Part 2 Products

2.1 COPPER CABLE

- .1 Category 6:
 - .1 Meets or exceeds requirements of ANSI/TIA-568-C.2 Category 6 and ISO 11801 2nd Edition Class E channel standards
 - .2 Meets or exceeds requirements of ANSI/TIA-568-C.2 and IEC 61156-5 Category 6 component standards
 - .3 Meets or exceeds requirements of IEEE 802.af and IEEE 802.3at for PoE applications
 - .4 Cable diameter: 0.236”(5.9mm) nominal
 - .5 Configuration:
 - .1 Unshielded
 - .2 Twisted pairs – 4
 - .3 Conductors – 23 AWG
 - .6 Installation temperature range: 32°F to 122°F(0°C to 50°C)
 - .7 Operating temperature range: 14°F to 140°F(-10°C to 60°C)
 - .8 Descending length cable markings enable easy identification of remaining cable.
 - .9 Flammability Rating – Plenum FT6 (CMP)
 - .10 Colour: Yellow

2.2 MULTI-PAIR 100 Ω BALANCED TWISTED PAIR CABLE

- .1 100 ohm, 25 pairs, sheath consists of thermoplastic jacket without underlying metallic shield,
 - .1 Category 3 to: TIA/EIA-568-B.2,
 - .2 Flame test classification: Plenum FT6 (CMP)

2.3 WORK AREA UTP 4-PAIR MODULAR JACK

- .1 Eight-position modular jack ("RJ-45"), type T568A to: TIA/EIA-568-B.2:
 - .1 Category rating to match installed cabling.
 - .2 In self-contained surface-mount box, 4 jacks per box.
 - .3 Mounted in compatible single gang faceplate, angle entry, 4 jack positions per faceplate.

2.4 TERMINATION AND CROSS-CONNECTION HARDWARE FOR UTP

- .1 IDC Terminal strips, 25 pair, for terminating multi pair 100 Ω balanced twisted pair cables and supporting cross-connections using jumper wires or compatible plug-ended patch cords: Category 3 to: TIA/EIA-568-B.2.
- .2 Mount or block for housing 10 IDC terminal strips, mounted on wall.
 - .1 Distribution rings or channels capable of externally mating with the above mount for managing cross-connection wires.
- .3 Patch panel, 2 rack units high, 48 ports:

- .1 Each port equipped with factory installed "RJ-45" jacks, type T568A to: TIA/EIA-568-B.2. Category rating to match installed cabling.
- .2 Horizontal cable-management unit for every 48 ports.
 - .1 Horizontal cable-management to be installed above and below all patch panels.

2.5 UTP CROSS-CONNECT WIRE

- .1 Category 3 1 pair to: TIA/EIA-568-B.2.

2.6 UTP PATCH CORDS

- .1 3 metres (10') long, with factory-installed male plug at one end to mate with "RJ-45" jack and with factory-installed male plug at other end to mate with "RJ-45" jack, 4-pairs to: TIA/EIA-568-B.2. Category rating to match installed cabling.
- .2 Colour - Blue
- .3 Provide one patch cord for every terminated cable installed.

2.7 UTP WORK AREA CORDS

- .1 3 metres (10') long, each end equipped with "RJ-45" plug to: TIA/EIA-568-B.2. Category rating to match installed cabling.
- .2 Colour - Blue
- .3 Provide one work area cord for every terminated cable installed.

Part 3 Execution

3.1 INSTALLATION

- .1 Provide all labor, materials, tools and equipment required for the complete installation of the structured cabling system.
- .2 Install, terminate, test and guarantee each drop
- .3 Install structured cabling in accordance with manufacturer's recommendations and best industry practices.
- .4 A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
- .5 Cable raceways shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular raceway type
- .6 Cables shall be installed in continuous lengths from origin to destination (no splices).
- .7 The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
- .8 If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 36" (900mm) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.
- .9 Horizontal distribution cables shall be bundled in groups of no more than 25 cables.

- .10 Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
- .11 Cables shall not be attached to ceiling grid or lighting fixture wiring. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.
- .12 Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the City.
- .13 Cables shall be identified by a self-adhesive label in accordance with ANSI/TIA/EIA-606-A. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.
- .14 Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.
- .15 Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

3.2 CONTRACTOR CERTIFICATION

- .1 The cabling system shall be installed by a contractor or sub-contractor certified by the cable manufacturer.

3.3 WARRANTY

- .1 The installation Contractor shall support the installed system for a period of two years from the date of acceptance by the City.
- .2 Contractor shall be responsible for obtaining all documentation necessary to achieve manufacturer's warranty
- .3 The manufacturer shall provide a minimum 15 year warranty for the complete cabling system.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by structured cabling systems installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Public address system equipment and accessories.

1.2 RELATED SECTIONS

- .1 Section 26 05 19 - Building Wire and Cable.
- .2 Section 26 05 34 - Boxes.
- .3 Section 26 05 26 - Grounding and Bonding.

1.3 SYSTEM DESCRIPTION – PUBLIC ADDRESS SYSTEM

- .1 Description: Public address system complete with desktop paging microphone and remote volume control override as indicated.

1.4 SUBMITTALS FOR REVIEW

- .1 Section 01 33 00: Submission procedures.
- .2 Product Data: Submit product data for each item of equipment.
- .3 Shop Drawings: Indicate cable routing and connections. Include layout of equipment within racks and cabinets complete with component interconnections with wiring diagrams.

1.5 SUBMITTALS FOR INFORMATION

- .1 Section 01 33 00: Submission procedures.
- .2 Installation Data: Manufacturer's special installation requirements.

1.6 CLOSEOUT SUBMITTALS

- .1 Section 01 78 10: Submission procedures.
- .2 Maintenance Contracts: Provide service and maintenance of public address system for one (1) year from Date of Substantial Completion.
- .3 Operation Data: Include instructions for routine operation of system components.
- .4 Maintenance Data: Include instructions for minor troubleshooting, preventive maintenance, and cleaning.
- .5 Record Documentation: Accurately record actual locations of devices and wiring.

1.7 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.
- .2 Supplier Qualifications: Authorized distributor of specified manufacturer with minimum five (5) years documented experience.

Part 2 Products

2.1 MANUFACTURERS

- .1 Manufacturer: Specification is based on TOA product.
- .2 Substitutions: Substitutions: Refer to Section 01 62 00.

2.2 MIXER/AMPLIFIER

- .1 Mixer Amplifier: Five channel mixer amplifier for paging, background/foreground music distribution and music/messaging-on-hold complete with five (5) inputs.
- .2 Product: TOA BG-2035.

2.3 RECESSED SPEAKER ASSEMBLY

- .1 Round Ceiling Speaker: 325mm(12-7/8inch) diameter complete with 8" dual-cone 10W speaker complete with white finish.
 - .1 Product: TOA PC-580RU.
- .2 Recessed Backbox: 325mm(12-3/4inch) x 250mm(10inch) x 110mm(4-3/8inch)black steel backbox.
 - .1 Product: TOA HY-BC580U.

2.4 SURFACE SPEAKER ASSEMBLY

- .1 Square Ceiling Speaker: 318mm(12inch) square complete with 8" dual-cone 10W speaker complete with white finish.
 - .1 Product: TOA PC-580S.
- .2 Surface Backbox: 325mm(12-7/8inch) square x 100mm(4inch) deep white powder coated finish steel backbox.
 - .1 Product: TOA Q-BB-580W.

2.5 PENDANT SPEAKER ASSEMBLY

- .1 Pendant Speaker: Bass reflex125mm(5inch) cone type complete with balanced dome tweeter suitable for ceiling suspension mounting complete with HIPS resin enclosure.
 - .1 Product: TOA PE-304.

2.6 DESK MOUNT PAGING MICROPHONE

- .1 Desk Mount Paging Microphone: Low impedance dynamic microphone complete with integral stand and base complete with push-to-talk pushbutton control
 - .1 Product: TOA PM-660U

2.7 REMOTE VOLUME CONTROL

- .1 Volume Control Attenuator: Wall mounted decorator style remote volume control complete with continuous rotary control with stops at MIN and MAX levels complete with 24VDC input relay for emergency bypass/override complete with white finish.
 - .1 Product: TOA AT-100EMG

2.8 EMERGENCY OVERRIDE PUSHBUTTON

- .1 Emergency Override Pushbutton: Wall mounted red pushbutton control for emergency bypass override of remote volume control.

Part 3 Execution

3.1 EXAMINATION

- .1 Section 01 70 00: Verify existing conditions before starting work.
- .2 Verify that surfaces are ready to receive work.
- .3 Verify field measurements are as instructed by manufacturer.
- .4 Verify that required utilities are available, in proper location, and ready for use.
- .5 Beginning of installation means installer accepts conditions.

3.2 INSTALLATION

- .1 Install components to manufacturer's written instructions.
- .2 Wiring Methods:
 - .1 Install wiring in raceway except within consoles, desks, and counters, and except in accessible ceiling spaces, and in gypsum board partitions, where cable wiring method may be used. Use UL listed plenum cable in environmental air spaces including plenum ceilings.
- .3 Wiring Within Enclosures:
 - .1 Provide adequate length of conductors. Bundle, lace, and train the conductors to terminal points with no excess. Provide and use lacing bars.
 - .2 Provide physical isolation from each other for speaker-microphone, line-level, speaker-level, and power wiring. Run in separate raceways, or where exposed or in same enclosure, provide 12 inch minimum separation between conductors to speaker-microphones and adjacent parallel power and telephone wiring. Provide physical separation as recommended by equipment manufacturer for other Integrated Electronic Communications Network system conductors.
- .4 Splices, Taps, and Terminations:
 - .1 Make splices, taps and terminations on numbered terminal punch blocks in junction, pull, and outlet boxes, terminal cabinets and equipment enclosures.
- .5 Identification of Conductors and Cables:
 - .1 Use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams.
- .6 Weatherproofing:
 - .1 Provide weatherproof enclosures for items to be mounted outdoors or exposed to weather.
- .7 Repairs:

.1 Wherever walls, ceilings, floors, or other building finishes are cut for installation , repair, restore, and refinish to original appearance.

.8 Ground and bond equipment and circuits to Section 26 05 26.

3.3 FIELD QUALITY CONTROL

.1 Section 01 45 00: Field inspection and testing.

.2 Manufacturer's Field Services:

.1 Provide services of a duly factory authorized service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.

.3 Inspection:

.1 Make observations to verify that units and controls are properly labeled, and interconnecting wires and terminals are identified. Provide a list of final tap settings of paging speaker line matching transformers.

.4 Testing:

.1 Perform operational test on completed installation to verify proper operation.

.5 Replace equipment, components, and wiring to eliminate audible noise, clicks, pops, or hum when system is in standby or operation.

3.4 CLOSEOUT ACTIVITIES

.1 Demonstration:

.1 Allow minimum of two (2) hour training session to facilitate the training of staff.

.2 Provide detailed operation and maintenance instruction and training.

.3 Use submitted operation and maintenance manual as reference during demonstration.

END OF SECTION