

SECTION 16720**SOUND SYSTEM****PART 1 - GENERAL****1.01 SUMMARY**

- I. The scope of this work includes a complete intercom system.
- II. The system shall be tested, fully operational and documented for reference to the Employer.

1.02 SUBSTITUTION OF MATERIALS

- I. Equipment as listed herein is considered approved for bidding on this project. Where specific makes and models are referred to, the intention is to establish a minimum level of performance and features. Equipment of another manufacturer may be substituted provided it is suitable for the application and meets or exceeds the specified performance in all areas. Approval of proposed alternate equipment shall be subject to review and approval by the engineer.

1.03 VENDOR QUALIFICATIONS

- I. The installation contractor shall have a minimum of 3 years experience in the installation and service of school communications systems.
- II. Provide 3 reference of projects of comparable size and scope that have been completed within the last 2 years. The reference shall include: project name, address, date of substantial completion, and name and telephone number of manager of the system.

1.04 SUBMITTALS

- I. Clear area shall be provided on the title sheet for shop drawing review stamps.
- II. Material list showing quantity, manufacturer and description of each item being furnished.
- III. Physical and schematic drawings of special and custom components or hardware. Any special installation requirements shall be listed. Include panel layouts.
- IV. Catalog sheets with complete technical data for each item being furnished.

1.05 REFERENCES

- I. All work shall comply with:
 - 1- The standards and practices of the Sound and Communications Industries.
 - 2- National Electric Code (NEC).

1.06 SYSTEM DESCRIPTION

- I. The system shall be a microprocessor controlled voice communications system. All equipment and materials necessary for the proper operation of the system shall be included so as to provide the Employer with a complete voice communication system in the building.
- II. The system shall provide, but not limited to, the following features:
 - 1- One-way voice communications between the intercom master station located in the system headend and any speaker.
 - 2- One-way voice communication between any speaker circuit and the telephone system.
 - 3- All-Call one-way voice paging to all interior speakers.
 - 4- All-Call one-way voice paging to all interior and exterior speakers.
 - 5- One-way voice paging to up to 16 zones of speakers.
 - 6- One channel of program distribution to all speakers, zones or individually.
 - 7- Automatic tone distribution to selected speaker zones.
 - 8- Automatic program distribution to selected speaker zones.
- III. The intercommunications system shall interface directly to the telephone system using a standard analog station or trunk line. Provide a complete interface including all accessories required to accomplish the functions specified. Coordinate with telephone system for the required analog trunk line (or other interface as required) and programming required. The Sound System Contractor, shall be responsible to coordinate with the telephone system to provide all necessary equipment and labor required to assure that the two systems function together to provide the specified functions.
- IV. The system shall provide automatic music programming control to all selected speaker zones.
- V. The system shall be equipped for up to 500 individual speaker circuits.
- VI. Each room equipped with a speaker shall be wired back individually, as indicated on the system schematic, to the terminal block assembly. From each terminal block multiple pair riser cable shall be used to cable the speaker circuits to the system headend. From the point the Contractor shall cross-connect the cabling into the system headend electronics.

- VII. All wiring shall be installed in conduit. However, at the option of the contractor, UL listed insulated cable may be installed in cable tray.
- VIII. The system shall provide the capability of assigning the system speakers to any one, combination, all or none of the sixteen (16) zones for zone paging. Assignment of speakers to zones shall be accomplished by software control that shall be accessible by the Employer. Systems using a mechanical means (such as dip switches or jumpers) to assign zones shall not be acceptable.
- IX. The system shall provide for the distribution of emergency announcements, and for the distribution of tone signals to all speakers or selected zones of speakers. Emergency paging and emergency tones shall override all local volumes controls and local sound systems.
- X. The system shall include interior flush ceiling mounted paging speakers. The speaker assemblies shall consist of a speaker with matching transformer, baffle, back box and ceiling tile support pan. The speaker baffle shall be torsion spring mounted and have no exposed mounting hardware.
- XI. The system shall be equipped with multiple power amplifiers to facilitate the distribution of all-call announcements, zone paging, emergency evacuation tones and program material. The amplification shall be sized for as noted on the riser diagram on the plans.
- XII. The system shall provide for the supervision of any one or all station speakers to detect for wiring errors (shorts) and device faults (opens). This scanning occurs at the top of each hour when no other functions are occurring or it may be manually initiated. Only the circuits programmed for supervision will be scanned.
- XIII. The system shall provide one channel of program distribution to the system speakers either on an individual, zoned and all-call basis. Program sources provided shall be an AM-FM tuner, audio cassette tape deck and CD changer. The program source shall be selected through the receiver. The program sources shall be mounted in the main equipment rack. Car radio/cassette type units are not acceptable. Provide a rack mounted stereo monitor speaker to monitor the program source. The speaker shall be powered by the receiver amplifier. The stereo signal out of the receiver shall be combined into a monaural signal to feed the system.
- XIV. The system shall include an exterior mounted FM dipole antenna and an 84" whip AM antenna mounted on a wall bracket. The Contractor shall provide a 3/4" weather head for routing the cable outside. The two antenna signals shall be routed to the equipment headend by a single coaxial cable. The lead-in cable shall be plenum rated RG-6.
- XV. The system shall include an EIA standard vertical equipment cabinet for mounting of system electronics. In addition, the cabinet include two pull-out storage drawers, internal AC power distribution, any top or side

panels required to provide a secure and complete enclosure and front blank panels for all unused front panel vertical rack space.

PART 2 - PRODUCTS

2.01 PRODUCTS

AMPLIFIERS:

The amplifiers shall exhibit the following features:

a- Distribution factor at 1 kHz, 80% load	< 0.2%
b-Frequency response 100V/50V-3dB	50-18 kHz
c-Input sensitivity	600mV/10kHz
d-Signal to noise ratio	>80

Input stage technical data:0

3 line analogue signal inputs.	Lowest Priority
2 microphone level inputs.	4 th Priority
1 input for advertising text unit.	3 rd Priority
1 input for gong signal generator.	2 nd Priority
1 input for alarm signal generator.	Highest Priority

Outputs for input stage:

- 1 output for recording of music
- 1 output for announcements

Technical data for music sources

Provide an exterior 84" whip AM antenna and an FM dipole exterior antenna. Provide a single RG-59/U 75 ohm coax lead-in cable. The antenna shall be installed complete with mast, lightning protection and lead-in cable.

CD-Player

The CD player shall exhibit the following minimum features:

- a- 5 disk carousel CD-changer.
- b- Ability to change 4-disks while 1 disc is playing.
- c- Multi-level noise shaping AMNS 1 Bit DAC.
- d- 8 times oversampling digital filter.
- e- Digital servo laser mechanism.

- f- 0-18dB level attenuator (12-step)
- g- Dual direction carousal rotation.
- h- Headphone jack.
- i- 19" rack mount kit.

Cassette Deck

The cassette deck shall exhibit the following minimum features:

- a- Twin autoreverse deck with two-speed dubbing.
- b- Automatic relay playback.
- c- Tape counter.
- d- Dolby B/C NR and HX pro.
- e- Wide scale FL level meter.
- f- Music search system.
- g- 19" rack mount kit.

AM/FM Tuner

The AM/FM tuner shall exhibit the following minimum features:

- a- AM/FM 20-station preset memory.
- b- Rapid FM station search.
- c- Last channel memory.
- d- Low impedance output.
- e- Beat-cut Filter for clean FM reception.
- f- 19" Rack mount kit.

19" Rack cabinet for PA equipment.

Shall have a glass front door and a fan for ventilation.

AUDIO MIXER

The mixer shall exhibit the following minimum features:

- a. Shall have 8-input, modular type.
- b. Shall have frequency response (-3dB) 50-15000 Hz

- c. Signal/Noise ratio shall be for mic>55 dB/aux >65dB
- d. Shall be controlled via its front panel.

LOUDSPEAKERS TECHNICAL DATA

CEILING LOUDSPEAKERS

- a- Power. 6/9 W
- b- Frequency response. 80-15000 Hz
- c- Sound pressure. 90 dB (1m/1w)
- d- Transformer tapping. 6, 3, 1.5, .75 Watt

COLUMN LOUDSPEAKERS

- a- Power. 15/30 W
- b- Frequency response. 145-14500 Hz
- c- Sound pressure. 95 dB (1m/1w)
- d- Transformer tapping. 15- 7.5- 3.75-2-1 Watt

COMPACT LOUDSPEAKERS

- a- Power. 50 W Continuous
- b- Frequency response. 85-22 KHz
- c- Sensitivity. 86 dB (1m/1w)
- d- Transformer tapping. 5W at 70 V, 10W at 100 V

PROJETOR LOUDSPEAKERS

- a- Power. 10/20 W
- b- Frequency response. 100-18000 Hz
- c- Sound pressure. 109 dB (1m/1w)
- d- Transformer tapping. 10-5-2.5 W

- I. The system terminals blocks shall be mounted on plywood with cable management hardware at each of the closets and at the main headend. The terminals shall be industry standard 50 pair 66 type.
- II. Provide the following plenum rated, 22 gauge solid, shielded twisted pair speaker cabling:

WIRELESS MICROPHONE

It shall be of electret type with anti-noise suspension & feature the following:

- Carrier Frequency 170-240 MHz, 13 standard frequencies as a min.
- Modulation FM
- Frequency Stability + /- 10 KHz
- Frequency Response 40 Hz-18 KHz
- Directivity Cardioid
- Max. Sound Pressure 100 dB SPL
- Signal to Noise Ratio > 100dB (A)

LAVIER MICROPHONE

It shall feature the following:

- Frequency Response 20 Hz-20 KHz
- Directivity Omnidirectional
- Sensitivity 6 mV/Pa

PAGING DESK

It shall feature the following:

- Frequency Response 100 Hz-12 KHz
- Directivity Unidirectional-Cardioid
- Sensitivity 1.4 mV/Pa

- Signal to Noise Ratio > 40dB / 1micro bar
- Load Impedance > 2 Kohm
- Output Impedance 500 Ohm-balanced

PART 3 - EXECUTION

3.01 INSTALLATION

- I. All equipment shall be installed in a professional manner.
- II. Cabling shall be neatly routed and bundled along the equipment cabinet sides. Cabling shall not hang or cross in the racks. Cabling shall be run at right angles to the rack.
- III. Cable connectors shall be the mating connector to the terminal on the equipment. Adapters will not be accepted to interface a cable connector to the equipment jack.
- IV. Provide secure mounting, lightning protection and grounding for the exterior AM/FM antenna assembly per industry standards.
- V. Installer shall follow factory installation guidelines for pulling tension and bending radius.
- VI. Cables shall be one continuous piece between each system device.
- VII. Dress cables routed to equipment with sufficient slack to allow for service of equipment and avoid strain on connections or cable.
- VIII. All wiring shall be installed in conduit. However, at the option of the contractor, UL listed insulated cable may be installed in cable tray.
- IX. All equipment power and signal wiring shall conform to the National Electrical Code and to applicable local codes.
- X. All equipment and devices shall be securely mounted to permanent cabinet or panel. No device shall be supported by it's wires or cables.
- XI. Terminate each cable to terminal blocks in sequence, including grounding drain wires.
- XII. Terminal locations and cables shall be labeled, legibly, with permanent embossed labels or by labeling pen. Identification shall be labeled on As-built Drawings.

3.02 SYSTEM TESTS AND PROGRAMMING

- I. All system functions shall be tested for proper performance. All test results shall be documented for inclusion in the as-built manuals.
- II. The Contractor shall provide complete system programming in coordination with the Engineer. The programming shall be done by a

person that has received factory training in the programming of the installed system. Any programming not coordinated with the Engineer that the Engineer wishes to have changed shall be done at no charge to the Employer.

3.03 CUSTOMER INSTRUCTION

- I. Provide a minimum of four hours of on-site in-service training in the operation of the public address sound and communications system. The training shall be provided by a training specialist specifically schooled in the operation, programming and features of the installed training may be divided into multiple times as required by the Engineer. The hours shall be documented by the Contractor to verify that specified training has been provided to the Employer's staff. If the hours are not documented, the Contractor shall provide additional training to the specified hours.

END OF SECTION

SECTION 16730**TELEPHONE SYSTEMS EQUIPMENT****PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes: Provide on operational Private Branch Exchanges (PABX) telephone system, main frame cross connects and station devices.
- B. Related Work: Work of the contract includes cabling and termination. All work area voice communications outlets are cabled according to EIA/TIA 568A with 2, 3 and 4 pair Category 5 unshielded twisted pair (UTP) cable and terminated per 568B with RJ45 eight (8) pin receptacles. 110 to 110 patch cords to be provided.

1.02 VENDOR QUALIFICATIONS

- A. The contractor of the telephone system must have been in business a minimum of 10 years in the installation and service PABX networked systems.
- B. The contractor shall provide references of the last 2 networked projects of comparable size and complexity for the manufacturer's equipment bid which have been completed before the date of bid for this project. The references shall include the project name, address, and name, title or (position) and telephone number of manager of the system.

1.03 SUBMITTALS

- A. General Requirements: Contractor shall furnish a set of illustrations, specifications and engineering data sheets of the equipment items proposed under these Specifications.

1.04 MAINTENANCE MANUAL

- A. General Requirements: Maintenance Manual shall be turned over to the Employer, including operating and maintenance instructions, replacement parts lists and wiring diagrams. Such manuals shall be submitted for telephone and telecommunication equipment and bound into ring binders on GBC type comb back binders.

1.05 DESCRIPTION OF PABX AND STATION EQUIPMENT

- A. Provide a complete and operating telephone system suitable for per plans and specifications.

- B. PABX shall be a digitally controlled switch for control of data and voice services
- 1- The system shall have facilities for operation with standard analog station equipment including, telephones, FAX machines and Data modems.
 - 2- The system shall have facilities for operation with dedicated digital business station equipment with multi line stations with display panels, hand-free operation, speed dialing, etc.
 - 3- Programming shall be by processor stored program control through a programming station or an import from a computer terminal via a communication port.
 - 4- Programming backup shall be stored on magnetic disk, or tape for retrieval in the event of system failure (method shall be defined in the shop drawings). A second backup copy shall be provided to Employer.
 - 5- The switching matrix shall be essentially non-blocking:
 - a. State the number of lines at which the system is non blocking.
 - b. State the number of simultaneous calls possible with the proposed model and feature package.
 - 6- The PBX shall be directly interconnected to the central sound system in the building and provide for all-call and zoned paging via paging adaptor circuits.
 - 7- The system shall provide the following progress tones:
 - a. Dial tone
 - b. Busy tone
 - c. Ringback tone (queuing)
 - d. Reorder tone
 - 8- The PABX shall have the following capabilities:
 - a. The ability to implement a four digit dialing plan for all locations within the building.
 - b. The ability to provide feature transparency across the network on any telephone:
 1. Call forwarding
 2. Conference calling
 3. Busy/No Answer
 4. Direct inward dialing
 5. Hunting groups.
 - c. The ability to depress "0" from any telephone and revert to the operator located in the building.
 - 9- All feature assignments, station equipment restrictions, and moves and changes shall be software programmable via an on premises terminal. Access to programming shall be restricted by advanced security measures.

10- The system shall have the following features:

- a. ARS - Automatic Route Selection
- b. DID - Direct Inward (Extension) Dialing
- c. DISA - Direct Inward System Access
- d. Optional capability for Automatic Number Identification (ANI)
- e. Flexible system numbering plan
- f. Intercept treatments
- g. Misc. trunk restrictions
- h. Multiple listed directory numbers
- i. Music on hold
- j. Recorded announcement interface
- k. SMDR Station Message Detail Recording
- l. System speed dialing
- m. Data channel transport of 64 Kbs
- n. Through dialing
- o. Traffic measurement capabilities
- p. Trunk queuing on all outgoing trunk groups, with or without implementing ARS.
- q. Trunk or trunk transfer
- r. Toll fraud prevention

11- The system shall have the following attendant features:

- a. Alternate console position
- b. Attendant access to trunk groups
- c. Attendant access to individual trunks.
- d. Attendant control of trunk groups
- e. Attendant selective answering priority
- f. Automatic timed recall on camped on calls
- g. Automatic timed recall on station no answer calls
- h. Busy override
- i. Busy verifications of station lines and trunks
- j. Call hold
- k. Call status display
- l. Calling station number display
- m. Calling trunk number display incoing call ID

- n. Outbound trunk queuing
 - o. Conferencing
 - p. Flexible key assignment
 - q. Station status display – busy lamp field
 - r. Timed reminders
 - s. Executive override or priority calling
- 12- The system shall have the following station features
- a. Automatic callback from busy or not answered station – station to station queuing
 - b. Automatic trunk queuing
 - c. Call forwarding and no answer
 - d. Call hold
 - e. Call park
 - f. Call transfer with automatic station to station connection when busy
 - g. Call waiting originating, or terminating
 - h. Conference, three way both internal and external
 - i. Distinctive ring on all instruments for external/internal calls.
 - j. Do not disturb
 - k. Last number redial
 - l. Personal central office line appearances on business phone
 - m. Individual speed dialing
 - n. Station controlled trunk to trunk call transfer
 - o. Minimum of three distinctive ring selections
 - p. Station controlled trunk to trunk call transfer
 - q. Hands free intercom.
- C. The PABX system software shall be current version.
- D. Provide station equipment. Station equipment to include single line, analog wall and desk phones, and PABX dedicated business stations and a dedicated attendant console.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Only one manufacturer's brand of telephone equipment shall be used throughout the network.

2.02 EQUIPMENT - PABX

- A. Definitions: The systems provided including but not limited to equipment, hardware, software, wiring, ... etc. must have the minimum capacities as shown on the plans and described in specifications.
- B. Provide the required Private Branch Exchange PABXs for this facility. The PABX shall be a digital type system as described in this specifications. Refer to the plans for the minimum required equipment.

2.03 EQUIPMENT - MDF

- A. Provide the following MDF Terminal Equipment. Terminal equipment shall be AT&T 110 terminal block system.

2.04 EQUIPMENT – STATION SETS

- A. Provide the following Single Line Wall/Desk Telephones. The single line desk telephones shall be digital telephones with intercom, FCC registered and meet EIA RS-470 specifications. Coordinate with Engineer about the phone and hand sets housings construction and color prior to BID.

Interconnection for handset and base shall be by Modular plug termination. Phones shall have a tap button and a minimum of 6 programmable feature buttons.

Quantity: As shown on the plans.

- B. Provide the following Digital Display Desk Telephones with Handsfree Speaker-Phone capability. The multi-line desk telephones shall be digital telephones with intercom. The sets shall have a minimum of 12 feature buttons for functions such as: lines, speed dialing, hold, conference call, park, tap, etc. the sets shall have a display screen for display of features as they are being used for calling features. Phones shall have a minimum of three selectable ring tones to differentiate between sets in close proximity to each other. Sets shall have a tap button. Coordinate with the Engineer about the telephone and handsets housing construction and color prior to bid. Interconnection for handset and base shall be by Modular plug termination. Telephones must be fully compatible with the PABX equipment supplied.

Quantity: as showed on the plans.

- C. Provide the following PABX Digital Attendant Console. The console shall be a full featured attendant call routing center with Visual Display terminal. The console shall have features for functions such as: lines, speed dialing, hold, conference call, park, tap, etc. The sets shall have a display screen for display of features as they are being used for programming and calling features. The Visual Display Terminal shall display status of all active CO trunks and station lines and display status of any requested trunk or station. The attendant console must be fully compatible with the PABX equipment supplied.

Provide ONE (1) hand held receiver and ONE (1) head worn receiver set for hands free operation at the console.

Quantity: Provide one (1) where shown on the plans.

- D. Provide the following single Line Wall Telephones with Enclosures. The single line wall telephones with enclosures shall be Allen Tel model GB92-02 and be FCC registered and meet EIA RS 470 specifications. Have provisions for a-lead control, and feature a polarity guarded DTMF keypad. Interconnection for handset and base shall be by Modular plug termination.

PART 3 EXECUTION

3.01 INSTALLATION

- A. **Demonstrations:** The contractor shall provide a demonstration of operation of the telephone system within 14 days of award of contract. The demonstration shall include features and operation of the PABX station equipment.
- B. **Coordination:** The contractor shall be responsible for coordinating the installation of trunk lines from the local telephone service point to the facility as shown on the plans.
- C. **Installer Qualification:** Installation shall be by a factory certified vendor/installation contractor of the equipment to be installed. Bidder shall furnish, with the shop drawings, certification documents showing factory authorized training record of installation personnel.
- D. **Installation:** All equipment shall be installed in a clean professional manner
- 1- Mounted equipment shall be vertically plumb and fastened securely with appropriate hardware for the application.
 - 2- Pertaining cable terminations, the pair twist shall continue as close as possible to the termination point.
 - 3- Pertaining to MDF installation, blocks shall be vertically plumb and securely fastened to the back boards. Station and riser cables shall be routed in D-rings, brackets, and troughs and be securely fastened to prevent strain at the terminations.
 - 4- Cables routed to SUB-PABX equipment located on the floor shall be harnessed and neatly dressed with enough slack to allow equipment movement as necessary for installation and service.
- E. **Labeling:** Terminal blocks shall be labeled legibly with permanent embossed labels or by labeling pen.

3.02 GROUNDING

- A. Riser cable shields, equipment frames and cabinets shall be grounded with 10mm² connected to the nearest building ground location. Grounding shall be in accordance with NEC and Local Codes.

- B. All equipment shall be grounded per manufacturers recommendations and in accordance with NEC and Local Codes.

3.03 TESTING

- A. Station equipment connected to the PABX(s) system shall be rested for all functions of operation including software programmed attributes and restrictions.
- B. Perform all equipment tests as directed by the equipment manufacturers. Submit results of tests with as-built documents.

304 CUSTOMER TRAINING

- A. A vendor shall provide in service training to Employer selected staff
 - 1- Provide on site training for console operators and any other Employer selected staff. Training services shall be furnished to the Employer as required for the entire warranty period as defined in paragraph 3.05 of this specification.

305 WARRANTY AND SERVICE

- A. Warranty shall be for one full year from the successful commissioning work as follows:
 - 1- Service Response Times: Contractor shall perform corrective work as follows:
 - a. Three hour response time after receiving the request for service call.
 - 2- Repair parts: repair parts shall be available on-site within 8 hours after receiving the request for service call for any system equipment.

END OF SECTION

SECTION 16735**TELEVISION CABLING****PART 1 - GENERAL****1.01 SUMMARY**

- A. Television signal distribution cabling system as described herein shall support distribution of broad and modulated television signals throughout the building.
- B. The distribution system shall include outlets, cable, signal splitters, directional couplers taps, and termination devices for connection to CATV and connection to Interactive Video equipment.
- C. The cabling system shall be tested and documented for reference by the owner.
- D. The equipment and installation shall meet the voltage and format requirements of the Kingdom of Saudi Arabia including and especially the Secam video standard.

1.02 SUBMITTALS

- A. Furnish complete shop drawings of the proposed system. The submittal shall be bound in a comb or three ring type binder, with protective covers. The cover must identify the project, system, date and vendor name. This submittal shall consist of, but not be limited to:
 - 1- Material list showing quantity, manufacturer and description of each item being furnished.
 - 2- Functional schematic diagrams showing all equipment, connections and calculated signal strengths.
 - 3- Physical and schematic drawings of special and custom components or hardware. Any special installation requirements shall be listed. Include panel layouts.
 - 4- Catalog sheets with complete technical data for each item being furnished.
- B. Shop drawings shall be clearly legible. Poorly made reproductions of originals will not be accepted and will be returned without approval.

1.03 VENDOR QUALIFICATIONS

- A. The installation contractor shall have a minimum of 3 years experience in the installation and service of television signal distribution systems.
- B. If so requested by the Architect, provide 3 references of projects of comparable size and scope that have been completed within the last 2 years. The reference shall include: project name, address, date of substantial completion, and name and telephone number of manager of the system.

1.04 REFERENCES

- A. All work shall comply with:
 - 1- The rules and regulations, and technical standards as set forth in the Federal Communications Commission Rules, Part 76.
 - 2- The standards and practices of the Cable Access Television and Closed Circuit Television Industries.
 - 3- National Electric Code, state and local electrical codes.
 - 4- Local Codes as they apply.

1.05 QUALITY ASSURANCE

- A. The television distribution system shall be installed to meet the minimum requirements of the following:
 - 1- The operating bandwidth of all passive devices shall be from 5 MHz to 1GHz.
 - 2- Isolation between any two outlets in the system shall be a minimum of 20dB for any frequency between 5MHz and 750MHz.
 - 3- All outlets in the system shall provide a minimum level of +6dBmV and a maximum level of +12dBmV to any channel from 52MHz to 550MHz.
 - 4- The signal strength difference between any 2 adjacent channels shall be no greater than 5dB.

1.06 DESCRIPTION

- A. The television signal distribution system shall be a single cable distribution system with an operating bandwidth of 5MHz to 1000MHz.
- B. Distribution of the modulated television signal from the main communications closet to the building directional taps shall be low loss 13mm hard line cable.
- C. Distribution of the modulated television signal from the directional taps to the TV outlets shall be by quad shielded RG-6/U cable.
- D. The system shall operate as a 2 way sub-band split system that allows RF signal origination from any outlet to be transmitted back to the headend for reprocessing and redistribution.

All equipment in the system shall support this 2 way operation.

- E. The system shall include the cabling for all outlets in the buildings that include interconnections of audio, video and computer video between outlets to allow for the connection of A/V and computer equipment to television receiver-monitor. Outlet terminals shall be provided in television outlet plates.
- F. Provide right angle coaxial connectors for all connections that will not permit the required bending radius of the coaxial cable.

PART 2 - PRODUCTS

2.01 CABLE

- A. Approved manufacturers: Not Applicable
- B. Hard line trunk and distribution cable shall be low loss 13 mm hardline type cable shall have a center conductor of copper clad aluminum with expanded polyethylene dielectric and solid aluminum sheath as manufactured by Comm/Scope or approved equal.
- C. Drop cable shall be RG-6/U type cable. Cable shall have a center conductor of copper clad steel with foam dielectric, four layer shield consisting of alternating layers of aluminum foil and aluminum braid. The first foil shield shall be bonded to the core dielectric as manufactured by Comm/Scope or approved equal.
- D. Audio Cable shall be 22awg shielded twisted pair cable as manufactured by West Penn Wire or approved equal.
- E. Video Cable shall be video type 75 ohm coaxial as manufactured by West Penn Wire or approved equal.

2.02 PASSIVE DEVICES

- A. Approved manufacturers:
 - 1- Not Applicable
- B. Drop taps, directional couplers, and splitters shall be cable type passive devices with KS type connectors operating with a bandwidth of 1GHz. Drop taps shall be 8 port configurations with KS connector thru ports and F connector drop ports. All trunk line passive devices shall be designed for the particular type QR trunk cable.

2.03 TERMINATION EQUIPMENT

- A. Approved manufacturers: Not Applicable
- B. Television signal outlets shall be industry standard F type bulkhead fittings.
- C. Audio outlets shall be RCA type jacks with solder connections on the back side of connector as manufactured by Switchcraft or approved equal.
- D. Video outlets shall be RCA type jacks with solder connections on the back side of connector as manufactured by Switchcraft or approved equal.
- E. Outlet plates shall be high impact thermoplastic plates with positions for 2, 3, 4, 6, or 8 modular jack inserts of the same manufacturer. Plate color shall be white. Plates shall be labeled with identification as described herein. The label shall be covered with clear plastic to protect the label.
- F. Termination devices shall be shielded F type and KS type fittings with 75 ohm termination impedance.
- G. RG-6F connectors: terminate cable with matching connectors for size and type of cable as manufactured by Raychem or approved equal.

2.04 AMPLIFIERS

- A. Approved manufacturers:
 - 1- Not Applicable
- B. Broadband Amplifiers – The amplifiers shall be line extender type for internal use with facilities for two-way operation. The amplifiers shall have low-split diplex filters and return amplifiers installed. Return frequency response shall be 5MHz to 40MHz. Forward frequency response shall be 50MHz to 750MHz. Provide equalization and attenuation components required for system balancing.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All equipment shall be installed in a professional manner.
- B. Cable terminations: Connector terminations on the cable shall be checked to ensure a binding crimp and that connectors are secure.
- C. Proper crimping tool shall be employed for each type of termination. Terminations that fail shall be replaced.
- D. Installation of F connectors to devices shall include final tightening with a wrench.
- E. Cable connectors shall be the mating connector to the terminal on the equipment. Adapters will not be accepted to interface a cable connector to the equipment jack.
- F. Passive devices and electronics with the exception of in-line pads and couplers shall be securely fastened to an adjacent support system. Distribution passives shall be mounted to wall brackets or to ceiling joist-truss system.
- G. Installer shall observe factory installation guidelines for pulling tension and bending radius for all cables.
- H. Cables shall be one continuous piece between each system device.
- I. Cables routed to equipment shall be dressed with sufficient slack to allow for service of equipment and avoid strain on connections or cable.
- J. The ends of each distribution branch and all unused ports shall be terminated.
- K. All cable fastening devices and ties shall be approved for plenum use.
- L. Audio connections shall be soldered using rosin core solder. The shield and black conductor of the audio cable shall be connected to the outer conductor of RCA jack and the red conductor connected to the center terminal of the RCA jack. All exposed conductors away from the jack shall be insulated to prevent shorts and wire leads outside of the cable jacket shall be less than 10mm.
- M. Documentation shall include signal levels at amplifier input and output. Signal levels at first, middle and last tap of each backbone cable leg. Documents shall be type written and included in As-built documents.
- N. Output from headend system shall be nominally +40dBmV to provide signal level to operate the trunk cable system.

3.02 TESTING

Upon completion of the installation, the system must be tested by the manufacturer's representative and all necessary modifications and/or adjustments must be made to assure compliance with this specification.

3.03 CERTIFICATION

Upon completion of the testing, the manufacturer or his representative shall issue to the Owner a letter of certification attesting to the fact that he has tested and adjusted the system, that all components are properly installed and free of defects, and that the system is in compliance with this specification.

3.04 INSTRUCTION

The work shall include supplying the services of a field service representative who shall be a full-time employee of the manufacturer. The field service representative shall have specialized experience in the operation and maintenance of the system, and shall instruct the Owner's personnel in the technique involved in the operation of the system. These services shall be for a 1-day period minimum.

END OF SECTION