**DOCUMENT NUMBER:** **16770 – IP TELEPHONE, INTERCOM AND CLOCK SYSTEM**

**APPLICATION:** **ELEMENTARY, MIDDLE AND HIGH SCHOOL**

**DATE OF ISSUE:**

**03-04-16 - Revised for IP systems**
10-03-08 - Revised format for equipment update and VoIP options
12-06-05 - Revised format
06-23-05 - General revisions; added Labeling Schematic
11-10-04 - Revised programming requirements
12-08-03 - Added programming requirements
10-23-03 - revised model number of handset, color
For earlier revisions, see older versions of this standard

**NOTES:**
Refer to the Educational Specification and related District standards for additional requirements.

**ATTACHMENTS:**
IP Telephone, Intercom and Clock System Design Guideline, dated 03-04-16
IP Telephone, Intercom and Clock System Specification, dated 03-04-16

**DESIGN GUIDELINE**
03-04-16

Information for Design Professionals:

The IP system in this standard is described in detail for a new facility. Edit this spec as appropriate for your specific project needs, as indicated by **[blue font]**.

The specification makes reference to other specification sections. The Design Professional is required to insert the actual section numbers to ensure that the requirements of those other sections are enforceable.

The telephone equipment is to be located in the Main Data Room, and care must be taken to allow for a minimum of 15 feet from equipment such as photocopiers, electrical motors and other equipment that can produce electromagnetic, radio frequency and electro-static interference.

Require voice outlets and instruments at the locations required in the Educational Specification, including the following. These are to be shown on the plans. Identify whether a desk-mounted or wall-mounted instrument is required.

Each Administrative and Guidance Office.
Provide a distinctive ringer for the Principal's private line to sound in the Administrative Secretarial area.
Each clerical station in the Administrative Reception Area, Assistant Principal's Reception Area, and each Guidance Reception Area.
Administrative Production/Workroom
Each Conference Room
Media Specialists Office (where provided)
Media Center Technical Processing Room
Custodial Office
Faculty Dining Room / Faculty Lounge
Clinic Room, at the Nurse's workstation
Each Teacher Planning Area and Material Storage/ Teacher Planning Area
Kitchen Manager's Office (provide loud ringer in the food preparation area)
Student Dining Room
Each classroom and instructional space indicated to receive a telephone or intercom handset
Room designated as the EHPA Manager's Office, where applicable

Provide additional telephone outlets as required, for example:
At each security panel location as described elsewhere in District standards
Locations where fax machines will be provided
Elevator
Main systems room (MDF), adjacent to telephone backboard.

Part 2 of the following specification includes equipment lists for new elementary, middle and high schools. Include only the list which applies to the specific project.

## PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. This specification establishes a minimum level of quality, features and performance for individual components as well as the integrated system. It is the responsibility of the Contractor to ensure that the proposed product meets or exceeds every standard set forth in these specifications.

C. The Contractor is responsible for providing a complete and functional system including all necessary components whether described herein or not.

1.2 RELATED SPECIFICATIONS

**[List related specification sections here.]**

1.3 SUMMARY

This Section Includes An Integrated VoIP-Based Telephone and Intercom/Paging and Class Program System. It includes requirements for a complete system, including but not limited to the following:

A. Ceiling/wall mounted IP speaker assemblies
B. IP Intercom handsets for classrooms and other spaces
C. Bell/class change signaling system
D. VoIP-based public address and intercommunication system and equipment
E. VoIP-based telephones
F. Controls, amplifiers and terminal equipment
G. Power supplies
H. Wiring and connectors for all call-in stations, speakers and clocks
I. Fiber optic cabling connections
J. Fiber patch cord cabling for connection of fiber interconnect panels to the system
K. POE switches (Owner-furnished / Owner installed)
L. Wall-mounted paging horns – IP type
M. Master program clock
N. IP Secondary clocks
O. Program sources – CD/MP3 player
P. Surge suppression devices
Q. UPS
R. Service Provider coordination

1.4 GENERAL INFORMATION

A. Provide an Avaya Networks IP Office system.

B. The VoIP and IP Intercom shall be one coordinated system with one source of responsibility for installation, set up, programming, training, service and warranty.

C. Furnish and install all equipment, accessories and materials in accordance with these specifications and drawings to provide a complete and operational system.

D. Costs associated with the procurement of telephone circuits for external access to the system from the serving telephone utility shall be borne by the Owner.

1.5 COORDINATION AND RESPONSIBILITIES

A. The Contractor is responsible to coordinate all internal wiring, common carrier-provided network facilities, and Owner-provided equipment with all subcontractors and vendors. Any Owner-provided equipment or equipment to be provided by separate contractors or vendors shall be listed in this Contractor's bid and clearly identified in the shop drawing submittal.

B. Coordinate the necessary network cabling infrastructure work and ascertain prior to bidding which subcontractor will supply each portion of the required infrastructure. Any conflicts or omissions shall be brought to the Design Professional's attention prior to bidding.

C. Contractor is required to coordinate with the Owner's Telephone Service Provider (Bright House, Verizon or other) for all requirements related to the installation of the service. The Contractor is responsible to communicate with the Service Provider and to schedule the installation.

In addition, the contractor is required to coordinate the installation of temporary telephone lines as required on sites where school staff is temporarily housed during construction, and the transfer of those lines to the permanent facility upon completion of the project.

Contractor is required to coordinate with the Service Provider for the exact route, number and size of underground conduits from the property line to the Demarc location prior to installation.

D. The Owner is responsible to order the appropriate number or circuits (lines) prior to construction and to provide line telephone numbers in advance of construction. Refer to Part 2 of this specification section for the allocation of incoming, outgoing and dedicated lines required.

1.6 SUBMITTALS

General: Submit the following in accordance with the Conditions of the Contract and Division 1 Specification sections:

A. Submit equipment drawings and wiring diagrams. Owner-provided equipment and equipment provided by separate subcontractors and vendors is to be clearly indicated on the drawings and diagrams. Specifically, the following are required:

1. Diagrams showing system equipment rack arrangement

2. Wiring diagrams detailing wiring for power, signal and control, differentiating clearly between manufacturer-installed wiring and field-installed wiring. Identify terminals to facilitate installation, operation and maintenance.

3. Wiring diagrams showing typical connections for each component of the system.

B. Submit catalog data and specification sheets for each system component, including but not limited to the following. Provide a tabulation of the specification clearly comparing the submitted item with the specified item, exhibiting compliance with all written expressed functions and capabilities:

1. All telephone and intercom system equipment and devices complete cut sheets. All system components shall be identified in the submittal package. Highlight, underline, or otherwise identify each applicable item on each sheet. Un-marked submittals will be rejected.

2. UPS

3. Transient voltage / surge suppression

4. Cabling

C. Other submittals:

1. Warranty form, describing limits of coverage

2. Supplier and Installer's Avaya Certification and Authorization.

1.7 QUALITY ASSURANCE

A. All items of equipment shall be designed by a single manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.

B. The Contractor shall be an established telephone, communications and electronics contractor that has had and currently maintains a locally run and operated business for at least 5 years. The Contractor shall utilize a duly authorized distributor of the equipment supplied for this project location with full manufacturer's authorization and warranty privileges.

C. The Contractor shall show satisfactory evidence, upon request, that the supplier maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The suppler shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

D. Electrical Component Standard: provide work complying with applicable requirements of NFPA 70 National Electrical Code, including but not limited to:

1. Article 250 Grounding
2. Article 300, Part A, Wiring Method
3. Article 310, Conductors for General Wiring
4. Article 725, Remote Control, Signaling Circuits
5. Article 800, Communications Systems

E. EIA Compliance: Comply with the following Electronics Industries Association Standards:
1. EIA-160, Sound Systems
2. EIA-299-A, Loudspeakers, Dynamic Magnetic Structures and Impedance
3. EIA-310-A, Racks, Panels and Associated Equipment
4. SE-101-A, Amplifiers for Sound Equipment
5. SE-103, Speakers for Sound Equipment

1.8 SPECIAL REQUIREMENTS

A. The installer shall have service facilities within a fifty (50) mile radius with parts in stock and trained service personnel.

B. Equipment shall be factory new equipment manufactured by Avaya and supplied by an approved Avaya distributor. Gray market equipment will not be accepted.

1.9 DELIVERY, STORAGE AND HANDLING

Deliver products in factory packaging. Store in a clean, dry space in the original containers. Protect products from fumes and construction traffic. Handle carefully to avoid damage.

1.10 OWNER TRAINING

The Contractor is required to provide a minimum of 8 hours of training in two or three separate sessions. The initial training is to be scheduled through the General Contractor. Subsequent sessions, if required, will be scheduled at the Owner's request. Copies of the Owner's Manual and User Guides are to be provided to the users at the initial training session, and also included in the Close Out Documents as specified elsewhere.

1.11 WARRANTY

A. Manufacturer/Installer is required to warrant materials and workmanship for one (1) year commencing on the date of Substantial Completion of the project. The Owner reserves the right to purchase an additional one-year warranty at any time prior to the expiration of the first year warranty.

B. The Installer shall respond to service calls within twenty-four (24) hours during the warranty period, and within four (4) hours for emergency requests. If the equipment cannot be repaired within 24 hours of the service visit, the Contractor is required to provide and install loaner equipment at no charge.

**PART 2 - PRODUCTS**

2.1 SYSTEM MANUFACTURER

Avaya IP Office

2.2 EQUIPMENT

A. General: The Contractor shall furnish, install, program, and place in operation an Avaya IP Office system with voice over IP telephones, all necessary modules (including CAP security module), cartridges, etc., and telephone stations as provided for herein. System is to be wired in accordance with the manufacturer's instructions to make a complete and operable system. No substitutions are allowed. All software and hardware shall be of the latest Avaya version and model available.

B. Control Unit: Avaya IP Office. The system shall be comprised of factory new equipment, including the following, with quantities as shown on plans and as needed to provide the level of service specified herein. Note: part numbers and/or catalog numbers are provided for reference only. The Contractor shall provide the latest model available at the time of bid, including all upgrades and revisions, NO EXCEPTIONS.

**C.** Provide equipment, software and related hardware as follows: **[delete sections below which do not apply]:**

| Quantity | Item |
|---|---|

**Elementary School** – up to 48 digital extensions and up to 16 analog trunks

| | |
|---|---|
| 1 | AVAYA IPO IP500 V2 CONTROL UNIT |
| 1 | AVAYA IPO IP500 V2 SYSTEM SD CARD MU-LAW |
| 1 | AVAYA IPO Rx.x (latest release) USER/ADMIN DVD |
| 48 (up to) | 9608 IP telephone |
| 1 | AVAYA IPO 500 Rx.x UC Module |
| 2 | AVAYA IPO AV IP Endpoint 20 |
| 2 | AVAYA IPO AV IP Endpoint 5 |
| 1 | AVAYA IPO 500 EXP MOD ANLG TRNK 16 |
| 2 | AVAYA IP OFFICE Power Lead (Earthed) US |
| 2 | AVAYA IPO 500 RACK MOUNTING KIT |
| 1 | AVAYA IPO Rx+ ESSENTIAL EDITION+ LIC |
| 1 | AVAYA IPO Rx+ PREFRD EDITION VM PRO RFA LIC:DS |
| 1 | AVAYA IPO LIC Voice Mail Pro Addl 4pt |
| 1 | AVAYA IPO LIC CTI RFA |
| 1 | Avaya IPO RTS 8X5 - 500 V2 1YPP |

**Middle School** – up to 60 digital extensions and up to 16 analog trunks

| | |
|---|---|
| 1 | AVAYA IPO IP500 V2 CONTROL UNIT |
| 1 | AVAYA IPO IP500 V2 SYSTEM SD CARD MU-LAW |
| 1 | AVAYA IPO Rx.x (latest release) USER/ADMIN DVD |
| 60 (up to) | 9608 IP telephone |
| 1 | AVAYA IPO 500 Rx.x UC Module |
| 3 | AVAYA IPO AV IP Endpoint 20 |
| | |
| 1 | AVAYA IPO 500 EXP MOD ANLG TRNK 16 |
| 2 | AVAYA IP OFFICE Power Lead (Earthed) US |
| 2 | AVAYA IPO 500 RACK MOUNTING KIT |
| 1 | AVAYA IPO Rx+ ESSENTIAL EDITION+ LIC |
| 1 | AVAYA IPO Rx+ PREFRD EDITION VM PRO RFA LIC:DS |
| 1 | AVAYA IPO LIC Voice Mail Pro Addl 4pt |
| 1 | AVAYA IPO LIC CTI RFA |
| 1 | Avaya IPO RTS 8X5 - 500 V2 1YPP |

**High School** – up to 120 digital extensions and up to 32 analog trunks

| | |
|---|---|
| 1 | AVAYA IPO IP500 V2 CONTROL UNIT |
| 1 | AVAYA IPO IP500 V2 SYSTEM SD CARD MU-LAW |
| 1 | AVAYA IPO Rx.x (latest release) USER/ADMIN DVD |
| 120 (up to) | 9608 IP telephone |
| 1 | AVAYA IPO 500 Rx.x UC Module |
| 6 | AVAYA IPO AV IP Endpoint 20 |
| | |
| 2 | AVAYA IPO 500 EXP MOD ANLG TRNK 16 |
| 2 | AVAYA IP OFFICE Power Lead (Earthed) US |
| 2 | AVAYA IPO 500 RACK MOUNTING KIT |
| 1 | AVAYA IPO Rx+ ESSENTIAL EDITION+ LIC |
| 1 | AVAYA IPO Rx+ PREFRD EDITION VM PRO RFA LIC:DS |
| 1 | AVAYA IPO LIC Voice Mail Pro Addl 6pt |
| 1 | AVAYA IPO LIC CTI RFA |
| 1 | Avaya IPO RTS 8X5 - 500 V2 1YPP |

1. Telephone Loud Ringer – located in Kitchen, connected to the Kitchen Manager's Office phone line. If required, provide a separate dedicated Cat 6 line back to the MDF.
2. Single USB Player for Music on Hold (MOH) (Intelitouch, USB Flash Driver Reader, MOH, Model 8000N or pre-approved equal)
3. MOH MP3 recording for MOH (furnished by Owner)
4. UPS – installed on telephone KSU – APC SU1400XLNET or pre-approved equal
5. Components as required for interconnection with Energy Management Controls and the Public Switched Telephone Network (PSTN) to allow for communication to the central control station.
6. Integrated IP Intercom System components to allow for all telephone stations to access all-call and office to room communications. Only specific stations shall be programmed for all call.
7. Components as required for interconnection between elevator and PSTN to allow for emergency communication to the School Security Services Central Control Station (813-623-3996).
8. Equipment and program as required to provide the Call Security Module. Unit to be programmed per District Standards. Contact Ancom Business Systems at 813-884-5273.
9. Intercom clock/program module. Provide for amplification as required, and adjustable amplification for all IP speakers throughout the facility.
10. Amplification as required for intercom program tones and announcements.

C. EMI/Lightning Protection: Provide adequate transient voltage/surge suppression on all power and communication circuits at each entry and exit of a building and at the main Telephone System KSU. (Example: Porta Systems Corp. 581P2 25GT or equivalent) Each incoming line shall have a maximum surge protection of 235 volts and each digital station shall have a maximum surge protection of 39 volts, or as otherwise recommended by Avaya.

D. System shall be programmed with the District defaults per the HCSB standards. See HCSB Web site defaults.

E. Voice Mail: Must be capable of providing enough capacity to accommodate below average usage.

1. Elementary Schools: 128 seats.
2. K-8 and Middle Schools: 160 seats
3. High Schools: 200 seats

F. Provide a telephone and intercom handset for each port indicated on the plans, clocks, 2-way speakers, and one-way paging and program speakers as indicated on the plans.

## 2.3 GENERAL PERFORMANCE REQUIREMENTS

A. Provide complete and satisfactorily operating integrated IP based system as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with published product information. Coordinate the features of all materials and equipment so they form an integrated system, with components and interconnections matched for optimum performance of specified functions.

B. The system shall provide the state of the art in technology for all features including, but not limited to, intercommunications, call-in notification, school safety paging and evacuation tones, IP based clocks and class change tones with schedules. All standard system programming is to be provided in user-friendly format to allow the user the ability to easily program system features.

C. The system shall be a single system consisting of head end equipment, amplified intercom channels, IP speakers, interior and exterior IP horns, IP handsets, IP secondary clocks and master clock/program.

D. Features offered by the system shall be implemented and controlled by a single software program that can be changed and expanded as needs evolve.

E. The system shall lend itself to expansion by simple addition of hardware and software licensing.

F. The system shall provide the ability to selectively communicate or monitor individual rooms in emergency situations from any telephone within the facility or outside the facility. Monitoring shall be hands free, i.e. not requiring any interaction by the user in the space being monitored.

G. Room speakers and handsets shall be programmable and may be assigned any two, three, four or five digit room number. Any room number designation may be reassigned at any time and it shall not be dependent on wiring or circuit numbers.

H. Amplified two-way voice communication shall be available from any dialing telephone through any two-way speaker in the system to allow hands-free communication to any room speaker or loudspeaker unit. A programmable pre-announce tone shall sound immediately before the intercom path is opened and a supervisory tone shall continue to sound at regular intervals when speaker monitoring is active, complying fully with all privacy legislation.

I. Integrated Master Program Clock to be provided, with capacity for a minimum of 16 schedules and 1000 events and providing automatic adjustment for Daylight Savings Time.

J. System must be compatible with a structured cable plant with rack-mounted equipment connected over an Ethernet LAN consisting of fiber and/or Cat 6 cabling. Provide separate Cat 6 cabling and patch panels dedicated to the IP system. Refer to Data Networking specification **section** for network cabling infrastructure requirements.

K. System components are to be connected to the to the data network via a Cat 6 cable drop for each handset, clock and speaker in accordance with the requirements shown and specified elsewhere.

L. Intercom and clock components are to be integrated with the VoIP phone system which provides a standard POTS CO interface with caller-ID to provide all system features including call-in information on associated telephone displays.

M. Time synchronization is a system requirement, with the ability to offset local System Time in one minute increments, +/- 15 minutes from true time.

2.4 EQUIPMENT AND MATERIALS

A. General: The system is to include:

1. Ceiling and wall mounted IP speakers
2. IP handset 9608 with wall and desk mounting as required
3. Bell/Class change signaling system
4. VoIP-based public address and intercom system
5. Controls and terminal equipment
6. Wiring and connectors for call-in stations, speakers, clocks
7. Interface to provide for program distribution including CD/MP3 player, tuner and cassette.

8. Fiber optic cabling as required
9. Fiber-to-copper transceivers where necessary
10. Surge suppression and UPS's
11. POE switches (Owner furnished and installed)
12. Wall mounted IP paging horns
13. Master program clock
14. Secondary IP clocks
15. Program sources – CD/MP3 player

B. VoIP Based Controller/server: Provide a VoIP-based integrated system on the Avaya IPO 500 V2 for individual room intercommunications, all page and zone page, evacuation tones, multilevel call-in, secondary clock correction and class change tones. The system shall interface with any enterprise voice system providing standard POTS CO interface supporting caller-ID. The following may be used to access the system. A "telephone" in this specification is defined as any telephone connected to the system, including:

1. Telephones on associated enterprise voice system such as a PBX, networked VoIP system or KTS system.
2. Cell phones with a dedicated telephone number
3. Remote telephone access through a DISA line connected to the system
4. Administrative phones connected directly to the system

C. The Integrated Communications Network shall, at a minimum, have the following features and capabilities:

1. An Ethernet port for the connection of on-site or off-site diagnostics by distributor or factory-trained personnel. The gateways shall not tie directly into the facilities Ethernet Lan/WAN but shall be interconnected over their own Ethernet network.

2. For remote access and to dial out to remove telephones, the system can connect to Public Switched Telephone Network (PSTN) via POTS Central Office (CO) trunk(s) or T-1/PR1 channel(s).

3. Support a flexible numbering plan as previously described, including leading or tailing alpha digits to match a room numbering scheme

4. Support for multiple administrative handsets capable of answering internal intercom call-ins and performing all other system functions including but not limited to Emergency Page, all page, program distribution, active class change schedule selection and active system configuration selection. Any phone or handset shall be capable of programming as an administration phone. All phones/handsets shall be capable of phone-to-phone calls.

5. Ability to place two levels of call-in and remote cancel from any handset.

6. The ability to answer intercom call-ins registered at any administrative handset by merely pressing a user definable single response button.

7. Universal wiring utilizing data network topology for the intercom speakers, handsets, and clocks using a single category 6 cable. Systems requiring a custom cable plant will not be acceptable.

8. The ability to change system configurations either manually or automatically based on time of day, day of week and calendar date. The system can store up to four (4) different system configurations at any time.

9. Preannounce tone prior to connecting any intercom conversation to alert the user to the call and prevent unauthorized monitoring, as previously described.

10. Audio paging access from any telephone to any single intercom speaker, zone (group) of intercom/paging speakers, or all speakers/paging horns throughout the entire facility.

11. Single button access from Administrative handsets to distribute emergency announcements within the facility to all or select locations equipped with speakers. Emergency announcements originating from any assigned administrative console shall have priority over all regular system functions.

12. Single button access from any administrative handset on the system to initiate alarm signals within the facility to all or select locations equipped with speakers. Up to nine (9) separate distinct alarm signals shall be provided.

13. Capability of automatically broadcasting emergency instructions throughout an entire facility when an alarm (e.g. security, fire) is activated. The emergency instructions are pre-recorded by the user and require no user intervention. The system provides redundant alarm annunciation over intercom/paging speakers and does not replace primary alarm systems.

14. Capability for multilevel call-ins to be placed from a handset. Call-ins can be routed within the system to administrative handsets and answered by a single button press on the handset, connecting the user to the speaker. Alternately, call-ins will be displayed via caller-ID on any phone by ringing that phone. Once the call has been answered, the user will hear a recording and can press a single button to connect to the speaker.

15. Capability to order call-ins for answer according to priority and length of time in system, so that the most urgent, oldest call-in is answered first.

16. Option for call-in privacy. When the privacy switch is activated, telephone users are prevented from monitoring the intercom speaker.

17. Capability for one-button emergency call-in from intercom handsets via red button labeled “Emergency”.

18. Option for Call Assurance Call-In. When the normal or emergency button is pressed, an LED lights up to visually confirm that a call-in has been placed.

19. Capability for automatic class change tones to be sent through all or selected intercom/paging speakers and/or horns. Any combination of up to nine (9) tones can be sounded to indicate different events. Up to sixteen (16) different class change schedules can be stored in the system and selected manually from an administrative telephone or selected automatically based on time, day of the week and date. Tone type and duration are selectable for each class change event. A total of one thousand (1000) class change events can be stored on the system.

20. Capability for “Music-on-Class-Change”. A program source can be automatically routed to select zones of paging speakers or all speakers within the facility during class changes.

21. Equipment, wiring and programming to allow program material to be distributed via CD or radio tuner broadcasts in the following manner:

    a. The user can cue remotely located music source or selected radio station.

b. The user can select the room(s) or areas to distribute program and can turn the program on or off.

c. Automated distribution based on event schedule.

d. Via CD and radio tuner provided as part of the system, with all required remote connection devices. Equipment to be mounted within the rack.

22. Capability to sync system time to the National Clock Signal or to the facility or District's network time server.

23. Capability to provide security notifications and handset supervision with the following features and functions:

a. Security alarms may be programmed to automatically trigger pre-recorded emergency announcements and/or emergency tones to sound in select areas or through the facility when an alarm is activated.

b. Multiple alarm inputs shall be provided to the main security and/or fire alarm system. Emergency tones and/or announcements can be triggered, via the primary security and/or fire alarm system, to provide redundant annunciation using the classroom and corridor speakers.

c. The capability to assign speaker locations to any one or more of the sixteen (16) zones for zone paging, program/music distribution, or class change tone reception; this assignment is a software programmable function. All of these zones may be configured to be independent of the other zones and in any combination. Initially, paging zones shall be programmed based on the Needs Assessment Analysis with the user.

24. Program memory to be non-volatile type.

D. IP TELEPHONE AND INTERCOM HANDSETS

1. Provide Avaya 9608 IP telephone instruments in locations where telephone and intercom ports are indicated on the plans.

2. Instruments will have the following minimum functions and features.

a. Voice over IP based communications with system.

b. Three (3) line by twenty (20) character Alphanumeric Display indicating call-in room number, level of call-in, and calling room's alpha description.

c. Standard twelve (12) number keypad handset.

d. Four (4) predefined soft keys: Release, Speaker, Transfer and Hold.

e. Five (5) facility-wide programmable keys and ten (10) or twenty-five (25) individually programmable feature keys. The following programmable functions can be selectively programmed at each administrative console:

1) Speed Dial – one touch dialing of any other administrative console

2) DSS (Direct Station Select) – one touch dialing of any intercom speaker

3) Night Mode – places the system in and out of night answer mode.

4) Call-In Answer – one touch answering of any call-in queued to the administrative console.

5) System Configuration Select – manually select among one (1) to four (4) available system configurations.

6) Class Tone Schedule Select – manually select among the class change tone schedules.

7) Evacuation Tones – initiate evacuation tones to selected areas within the facility or throughout the entire facility. While tones are sounding, voice page may interrupt the tones.

8) Zone Page – initiate pages to any combination of one (1) to sixteen (16) paging zones and the ability to combine zones into user defined paging groups using speed dial buttons.

9) Mute – one touch ability to mute audio to distant party.

10) Page – all page over all intercom/paging speakers and horns within the facility.

11) Volume Up/Down – while the console is ringing, the volume up/down keys change the level of ring volume. During a conversation, the keys change the level of the listen-back audio.

f. Each telephone shall be assigned, through software, the following individually programmable (allowed or restricted) features/options using the class of service attribute:

1) Initiating zone page announcements

2) Initiating emergency all page with override

3) Initiating all page announcements

4) Initiating emergency/evacuation tones

5) Initiating class change tones

6) Receipt of class change tones and/or zone pages

3. IP Intercom Handsets are to be Avaya 9608 IP Telephone Instrument, same as above, only not programmed with administrative capability, with wall mount accessory.

E. IP CLOCKS

1. Clocks shall be IP based clocks, 12” diameter, wall mount, with analog type numbers.

2. The clock lens shall use a shatterproof polycarbonate material with no visible molding marks.

3. Clocks shall have black hour and minute hands, and a red second hand.

4. Clocks shall have a low-profile, semi-flush design that mounts security to the back box.

5. Provide Valcom IP Clock, VIP-A12 or pre-approved equal.

F. IP SPEAKERS

1. Speakers located in common areas, not designed for talk-back, and shall be IP ceiling 2x2 lay-in type, Valcom VIP-402.

2. All other speakers shall be two-way talk back type, IP ceiling 2x2 lay-in type, Valcom VIP-422.

3. Outdoor speakers are to be weatherproof, flush mounted IP flex-horn type, one way, vandal resistant, with stainless steel faceplate. Provide Valcom VIP-480AL speaker with V-9805 enclosure, installed with tamperproof screws with associated weatherproof backbox, or pre-approved equal.

4. Volume Controls: volume to speakers shall be controlled and programmed through the system. Provide and adjust amplification as needed to ensure proper sound level and sound quality.

G. ACCESSORIES AND OTHER EQUIPMENT

1. Provide compatible housings and backboxes for all clock, handsets, and speakers.

2. Provide equipment racks, patch panels and fiber interconnect panels in accordance with Data Networking specification requirements.

3. Provide all other equipment, cards, modules and devices required for a complete and operational system.

4. Provide MP3 player.

5. UPS: install rack-mounted U.P.S. in locations noted herein. Provide A.P.C. SU1400-RMXLNET or equal.

2.5 WIRING, CONDUIT AND BACKBOARD

A. The horizontal copper distribution for the interior telephone distribution shall be combined with the data network following the EIA/TIA and BICSI Infrastructure Cabling standards. Refer to other specification **sections** for requirements. Provide all structured cabling, including all voice patch panels and any required 66 style punch blocks. Provide cross-connection from the telephone IP server to the data network structured cabling plant, and from the data network structured cabling plant to the telephone instruments using Cat 6 BLUE colored patch cables.

1. Provide hard-wired phone lines for the elevator, fax machines, security panels, and the energy management system. All inter-building cables shall be a minimum 25 pair and shall have surge protection at each end.

2. Provide all wiring and connections for an integrated campus IP phone and intercom system, so that telephone handsets can access all intercom system components.

B. The telecommunication wiring system is to meet the requirements of ANSI/EIA/TIA-568.

C. Coordinate connection between the telephone switch/server and the data network structured cabling plant. Connection shall maintain compliance with the ANSI/EIA/TIA-568 standards of the data network structured cabling plant.

D. As necessary to connect the telecommunications services, furnish and install hardware and devices on the telephone terminal board in quantities to suit the system as follows:

1. Connecting blocks – Siemon Co. S66M1-50 or equivalent
2. Protective covers – Siemon Co. S66MC4 or equivalent
3. Brackets – Siemon Co. 89D or equivalent
4. Posts – Siemon Co. S-20B or equivalent
5. Bridging Clips – ITW LINX BCSS-2 or equivalent
6. 25 pair cable connectors – Ortronics OR-80425PC015-1GY or equivalent
7. Surge suppression on all cables

E. Provide plywood backboard treated with fire retardant coating.

F. Provide two (2) underground 4" conduits with pull string from the backboard to the property line, route in the location shown on the drawings. Terminate in appropriately sized box with cover marked "communications".

2.6 PROTECTION

A. The Contractor shall provide all necessary transient protection on the AC power and on all station lines leaving or entering the building. Surge protection shall be installed in the terminal cabinets. Protectors shall meet the following criteria:

1. UL-497B listed and labeled
2. Multi-stage hybrid protection design
3. Plug-in replaceable system design or individually mounted units
4. Fail-open only / NO FAIL-SHORT DEVICES
5. Surge Capacity: 3000 amp (8/20 µs waveform)
6. Clamp Voltage: 150% of circuit peak operating voltage (2000 A, 8/20 µs waveform)
7. Maximum Continuous Operating Voltage: at least 125% of peak operating voltage
8. Acceptable manufacturers:
   a. EDCO Model OPX48V (or equal) surge protection for every call – in circuit, speaker circuit. Protection sall be provided on any lines routed to the exterior of the buildings (all exterior copper lines).
   b. EDCO Model TSP-200 Surge Protection for Every Telephone Circuit
   c. Approved equivalent by Atlantic Scientific or DITEK

B. UPS Power: UPS to be provided at main data rack where head end equipment is located, and at each intermediate rack wherever communications equipment is installed. UPS to provide a minimum 120V, 1400 watts of instantaneous power in the event of a power failure. Refer to Part 2 – Products for additional information.

2.7 OUTDOOR HANDSETS AND SPEAKERS

A. Exterior Handsets: Provide outdoor handsets in the locations shown on the drawings. These handsets shall provide for a "zone" all call announcement to the respective speakers/horns in these areas. Handsets shall be mounted in a weatherproof enclosure, with the required Cat 6 jack/connector, and Cat 6 cabling back to the nearest IDF. Enclosure shall be a GAI-Tronics Industrial Telephone Enclosure, Model 255-001, or equivalent.

B. Exterior Speakers: Exterior speakers shall be mounted using tamper-proof screws and shall utilize a vandal-proof stainless steel face plate. Junction boxes shall be recess-mounted and shall be FS type, weatherproof cast boxes with a neoprene watertight gasket. Where any horn type speaker is provided, provide with a stainless steel protective cage.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine site for compliance with requirements and report any conditions that may affect the installation and performance of the system.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 WIRING

A. General: Install system in accordance with NFPA 70 and other applicable codes and standards. Install equipment in accordance with manufacturer's instructions.

B. Wiring Methods and Requirements:

1. Install wiring in conduit except above accessible ceilings where cabling may be free wired. Use UL listed plenum-rated cable where cabling is not in conduit. Free-wired cabling, where permitted, shall be supported to the structure at a minimum spacing of 5'-0" and shall be installed in accordance with EIA/TIA and 569 and in accordance with the requirements in the Data Networking **section** of this specification.

2. Cabling in walls and above inaccessible ceilings shall be installed in minimum ¾" conduit.

3. Terminate all cables on patch panels and surge suppressers.

4. Label each cable at each end and label each fiber with to/from destinations. Color code cabling and apply markings so that each cable is coordinated with and can be identified on the system wiring diagrams. Refer to the data network specification for complete labeling requirements.

5. Provide adequate length of conductors. Bundle, lace and train the conductors to the terminal points with no excess. Provide and install lacing bars.

6. Provide weatherproof enclosures to protect wiring at outdoor devices.

7. Fire stop penetrations at fire and smoke rated partitions using UL listed fire stop materials and methods. Submit proposed UL method and materials for approval.

2.3 GROUNDING

A. Provide equipment grounding connections for systems. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.

B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

C. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

D. The contractor shall note in his system drawings, the type and location of these protection devices as well as all wiring information.

E. The contractor shall furnish and install a dedicated, isolated earth ground from each central equipment rack and bond to the incoming electrical service ground buss bar or communications system bus bar.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Inspection Services:

Provide factory-authorized service representative to supervise the field assembly and connection of system components, and the pre-testing, testing and adjustment of the system.

B. Contractor's Inspection:

Inspect the work to verify that components and controls are properly labeled, and that interconnecting wires and terminals are identified. Provide a list of final tap settings of paging speaker line matching transformers.

C. Testing:

Perform a system and device-by-device check out to confirm that the installation is fully operational and meets all requirements of these specifications, including related sections, and that the work complies with applicable standards. Test to be conducted in the presence of the factory-authorized service representative and the Design Professional. Written test results, including device-by-device checklist, is to be presented to the Design Professional prior to the substantial completion inspection.

3.5 TRAINING

Train Owner's staff in the procedures and schedules involved in operating, troubleshooting, servicing and preventative maintenance of the system. Provide a minimum of 8 hours training, as previously described in Part 1 above.

3.6 ADJUSTMENTS

When requested by the Owner within one year of substantial completion, provide on-site assistance in adjusting sound levels, resetting matching transformer taps, and adjusting controls to suit actual occupied conditions. Provide up to three (3) visits to the site for this service.

3.7 PROJECT CLOSE OUT DOCUMENTS

A. Provide Owner's manual, technical manuals, schematics, maintenance instructions, parts listings and warranties, as generally described in the Project Close Out specification **section**.

B. In addition, provide the following:

1. Complete wiring diagram indicating all wiring tags and termination identifications and locations. Information shall be provided in Autocad format on CD.

2. System check-out test and device-by-device checklist, as described previously, to exhibit that the installation is fully operational and compliant.

3. Software interface, with any required hardware interfaces between a laptop computer and control panel, with a copy of the final program.

4. Provide two copies of the system program on CD and place one at the system head location. The other to be provided with the Close Out Documents.

5. Self-paced Training Course on CD-ROM with licensing for technical training for two (2) Owner technicians to become factory-certified in the maintenance of this system at no additional expense to the Owner.

6. Copy of purchase documents showing that the equipment was purchased from an authorized Avaya distributor, to include equipment part numbers and serial numbers.

3.8 PROGRAMMING

A. The system shall be fully programmed and operational prior to acceptance. The system shall have the capability to be fully programmable by the Owner's personnel. Provide all necessary software access to the Owner to allow re-programming. Program data shall be stored on non-volatile memory with battery back-up. Program data shall not be vulnerable to temporary outages, surges, dips, etc.

B. Provide all programming and re-programming necessary to meet the needs of the end users. Programming shall be customized for each type of facility as described in the District requirements. Refer to the telephone set-up and programming instructions on the District web site. Provide all required software, cards, hardware, and accessories required for functionality.

C. Avaya Standards and Passwords: Refer to the District web site for the current telephone system standards, including:

1. Passwords
2. Automated Attendant Structure
3. Custom Call Routing
4. Telephone Lines / extensions / voice mail allocations
5. Programming Standards
6. Telephone Labeling Requirements

END OF SECTION