CONSULTANT NARRATIVES

TECHNOLOGY & SECURITY

168 MAIN STREET
SUITE 3
NORTHFIELD, MA 01360
V. 413.498.5001
F. 413-498-4386
www.3si.net

Northeast Metro Regional Vocational High School
Wakefield, Massachusetts

Preliminary Alternative: B2, Renovation/Addition

I. Overview

The technology and security scope of work for a Renovation or Renovation/Addition alternative shall consist of the following systems.

A. Tele/Data Infrastructure

B. Wireless LAN

C. Voice Infrastructure and Phone System

D. PA/Intercom System

E. Master Clock/Secondary Clock System

F. Integrated Electronic Security System

   CCTV Video Surveillance

   Access Control

   Intrusion Alarm

   Mass Notification

   Duress Alert

G. Large Venue Live Sound Reinforcement Systems

H. Large Venue Video Projection System

I. Classroom Speech / Sound Reinforcement Systems

J. Instructional Audiovisual Systems

K. IPTV Video Distribution and Control System

Typical Room Design descriptions are presented in this document to provide details on Technology/Security systems and device quantities.

A. Tele/Data Infrastructure

The Tel/Data infrastructure shall consist of new Communications Equipment Rooms and Tel/Data cabling. New Communications Equipment Rooms conforming to BICSI standards will be included in the building design to replace the existing makeshift retrofitted spaces used as Communications Equipment Rooms.

New backbone and horizontal cabling shall be installed according to current EIA/TIA and BICSI industry standards to replace the existing non-certified in-house installed premises cabling system.

Communications Equipment Rooms

New Communications Equipment Rooms included in the building design are designated as Main Distribution Frame (MDF) and Intermediate Distribution Frame (IDF).

The new MDF shall be the Demarc location for voice, CATV and Wide Area Network services from the street.

The new MDF and IDF rooms shall be the intermediate wire closets for termination of data, voice, and video horizontal cabling located within 290 cable feet of their locations.

They shall contain the following network cabling equipment:

- 2-post equipment racks and cabinet equipment enclosures
- Ladder rack/cable tray
- Vertical wire managers
- Horizontal wire managers
- Patch panels
- Backboards (one 4’ x 8” minimum)
- Punch down blocks (110 style)

The MDF and IDF rooms shall be environmentally controlled for the quantity of active electronic equipment to reside in them.

All electrical receptacles shall be on an emergency/standby generator.

Cabling and passive equipment shall be included in the base contract.

Active equipment shall be purchased as part of the Technology FF&E equipment procurement process.

Cable Pathways

Cable pathways and Work Area Outlets shall be as follows:

Interior Pathways

Ladder rack/cable tray in wire closets
Multiple 2” sleeves from corridor into rooms
J-Hooks from ladder rack/cable tray and within rooms for station cabling
4” sleeves between floors

Telecommunications Work Area Outlets (WAO)

Wall Outlets:

New Walls - 4” square or 2-gang back boxes with single-gang or dual-gang plaster rings as required

Back boxes shall have $1^{1}/_{4}$” EMT conduit stubbed above ceiling

Existing Walls – Work Area Outlets shall be installed in Dual Channel Raceways.

Dual Channel Raceways shall have a minimum of one 11/4” EMT conduit for low voltage cabling stubbed above ceiling at either end of the Dual Cannel Raceway runs.

Floor Boxes and Poke-Thru Devices:

Typical floor boxes shall be flush combination, low voltage/electrical, Wiremold RFB series or equal sized as required.

Typical Poke-Thru devices shall be Wiremold Evolution series or equal shall be installed.

Cabling

The IDF closets shall be connected to the MDF via new 12-strand 50-micron OM3 multi-mode and 6-strand single mode fiber cables.

The fiber cabling between the IDF closets and the MDF shall be capable of 10GbE.

The IDF closets shall have open 2-post equipment racks with new data switches sized according to the number of data drops served by the individual closets.

New Category 6E cabling shall be installed in all instructional and office spaces. The Category 6E cabling will be run to the MDF or IDF locations and terminated on Patch Panels.

Bandwidth from the IDF closets to the desktop shall be 10/100/1000 Mb/s.

Tel/Data cabling and associated wire closet termination equipment shall be included in the base contract.

Data switches and other active data equipment shall be purchased as part of the Technology FF&E equipment procurement process.

Continuation of Services

A temporary MDF shall be included in the design if required by the construction phasing plan.

Temporary fiber cabling shall be included to connect new and existing IDFs to the MDF during construction phases to ensure continuation of services for areas not under construction throughout the project.

Temporary UTP cabling shall be included as required to accommodate temporary occupancy of swing spaces during construction.

B. Wireless LAN

The Tel/Data infrastructure will include Wireless LAN capabilities.

Access Point enclosures (wall and ceiling mounted) shall be installed as part of the base contract.

Existing newer 802.11ac Access points shall be re-used. Additional new Access Points shall be purchased to replace the school's existing older Access Points and for additional building coverage.

Required new data cabling shall be included under the Tel/Data Infrastructure scope of work.

Access Points shall be procured as part of the Technology FF&E equipment procurement process.

C. Voice Infrastructure and Voice System

The phone system shall be a new Voice over IP system. For life safety capabilities, handsets will be located at all administrative desks, in all classrooms, and in all common spaces to provide internal and external communications for all spaces.

Required new data cabling shall be included under the Tel/Data Infrastructure scope of work.

VoIP equipment shall be purchased as part of the technology FF&E equipment procurement process.

Continuation of Services

The new VoIP system shall be installed prior to the completion of phase 1 construction. New VoIP handsets shall be installed in existing areas not under construction.

Temporary data cabling shall be installed in existing areas not under construction for new VoIP handsets as required so that the school will utilize one VoIP phone system throughout the project.

D. Public Address/Intercom System

An addressable Public Address system and new cabling shall be installed to replace the existing PA system original to the school. Existing speakers in clock/speaker panels shall be removed and replaced with lay-in speakers on the ceilings, or recessed or surface mounted wall speakers.

For life safety and mass notifications capabilities, PA speakers shall be installed in all corridors, classrooms, offices, and common spaces.

The PA system shall be zoned to allow for announcements to be made to groups of speakers in specific areas and to individual speakers.

The PA system shall be interfaced to the new VoIP voice system to provide the capability for PA and emergency notification announcements to be made from any phone handset.

The PA system shall be interfaced to the Fire Alarm system to interrupt PA announcements during a fire alarm.

The PA system shall be interfaced to all local sound systems so that local sound systems are interrupted during PA announcements and mass notifications.

The PA system shall be interfaced to the Duress/Panic Alarm system to distribute immediate notification of a duress situation.

The PA system equipment and wiring shall be included in the base contract.

Continuation of Services

If the new and existing PA systems can be interfaced, temporary cabling interfacing the new and existing Public Address systems shall be

included to provide for continuation of services in renovated and spaces not under construction throughout the project.

If the new and existing PA systems cannot be interfaced, the new PA system shall be installed prior to completion of phase 1 construction and temporary cabling shall be installed to interface existing speakers in areas not under construction to provide the capability for announcements to be made simultaneously to renovated and spaces not under construction.

E. Master Clock/Secondary Clock System

A wireless synchronized clock system shall be installed to replace the existing clock system.

The Master Clock/Transmitter shall be located in the MDF. The existing clocks in clock/speaker panels shall be removed and replaced with repeater wall clocks.

The Master Clock system shall be interfaced to the PA system to provide for bell tones to specific zones or throughout the building.

Secondary clocks in large areas (Cafetorium, Gymnasium, and Media Center) shall be 16” in diameter. Gymnasium clocks shall have protective wire grilles.

The Clock system equipment shall be included in the base contract.

Continuation of Services

The new Master Clock shall be installed prior to completion of phase 1 construction. Wireless secondary clocks shall be installed in areas as renovations are completed. The existing Master Clock, wiring, and secondary clocks in areas not under construction shall remain.

F. Electronic Security

Electronic Security shall be accomplished by integration of the following systems.

Video Surveillance

Access Control

Intrusion Alarm

Duress / Panic Alarm

Mass Notification

Visitor Management System

CCTV Video Surveillance System

The existing Genetec Video Management system shall be upgraded to the Genetec Security Center version to allow for full integration with the access control system. Additional licenses, new hardware and additional storage shall be installed. Existing functioning IP cameras shall remain.

Approximately (50) additional IP cameras shall be installed to replace existing non-functioning cameras and to provide for more coverage. The additional IP Video Surveillance cameras shall be installed at key locations to provide coverage for areas not covered presently.

Required additional data cabling shall be included in the Tel/Data Infrastructure scope of work.

Additional CCTV equipment and licenses shall be included in the base bid.

Continuation of Services

The existing Genetec Video Management server shall remain interfaced to the school's existing data network for cameras in areas not under construction. The Genetec Video Management server shall also be interfaced to the new data network as new data cabling is installed for new IP cameras in renovated areas.

Access Control System

Proximity / Card Readers

The existing Johnson Controls Access Control database system shall remain. Additional licenses and upgrades to the computer hardware are included in the design.

Existing Proximity / Card Readers shall remain. Additional Proximity / Card Readers shall be installed at approximately eight additional designated doors.

Access Control equipment and low voltage wiring shall be included in the base bid.

Existing electronic door hardware shall remain. New door hardware for additional door locations is included in the design.

Continuation of Services

The new Proximity / Card Readers shall be cabled to the school's existing Galaxy Access Control database system.

Exterior Door Audio / Video Intercom

A new IP based Aiphone door audio video station shall be installed at the main visitor door at the main entrance and at the dental clinic entry doors.

Master stations for door release after a visitor is challenged shall be located at the welcome/security desk and in the main office and principal's office, and in the dental clinic. The dental clinic system shall be separate from the school system.

New cabling shall be included in the Tel/Data scope of work.

Continuation of Services

The existing Aiphone system at the school's main / visitor entry shall remain in place until that area is taken over for renovation.

Intrusion Alarm System

A new addressable Intrusion Alarm system shall be installed. The system shall have door contacts on all exterior doors and motion sensors in all spaces with exterior access including classroom and offices on grade with windows.

The systems shall be programmed as required by the Owner to allow for zones to be independently armed or disarmed and to segregate the dental clinic area from the school proper.

The Intrusion Alarm system shall include a dialer for notification to an alarm monitoring Service Company,

The Intrusion Alarm equipment and low voltage wiring shall be included in the base bid.

Continuation of Services

The existing Intrusion Alarm system will need to remain operational until all construction is completed. Therefore, there will be two operational systems for a period of time.

Duress / Panic/ Alarm System

A Duress Alert system consisting of wireless or fixed duress buttons, wireless transmitters and receivers, school office panels with touch screens, speaker, and strobe, 2-way radio communications, interface to the PA / Intercom system, interface to the Intrusion Alarm dialer, email and text notifications, and cloud base supervision and management shall be installed.

The system shall utilize 900 MHz Life Safety technology and will not rely on the school's data wireless network to operate.

The system shall have battery backup so that it is functional during a power outage.

When a duress button is depressed because of an emergency or duress situation, any or all of the following will take place.

- an immediate radio call notification is initiated to the first responder entity (police and/or fire department)
- the school is notified via a special tone or audio message sent to the PA system and via the office panels
- a call is initiated to the school's alarm monitoring company
- Email and/or text messages are distributed to designated personnel.

The system shall also have the ability for first responders to view a map of the school on a wireless device when they are on site and to be able to view their location as they move through the building.

Wireless duress panels will be located in the main office, and superintendent's office.

Fixed wireless duress buttons shall be located in the main office, guidance office, superintendent's office, principal's office, assistant principal's office, and nurse's office.

An additional number of portable duress buttons to be determined will be included with the system.

The master control panel and radio communications devices shall be installed in the MDF.

The wireless Duress Alert system shall be included in the base bid.

Mass Notification

The school's existing Mass Notification system will remain and be interfaced to the new wireless Duress / Panic Alarm system.

Visitor Management System

The school's existing Visitor Management system, Hall Pass, and associated existing hardware shall remain at the welcome / security desk in the main lobby.

G. Live Sound Reinforcement Systems

Live Sound Reinforcement systems shall be installed in the Gymnasium and Cafetorium/Large Group Learning Center.

The systems shall include:

Equipment cabinet

Mixers
Processors
Amplifiers
Speakers
CD / iPod player
Wired and wireless microphones
Audio level feedback sensing microphones
Assistive listening transmitter and receivers
Remote control volume control
Engraved wall plates
Wiring

Cafetorium/Large Group Learning Center

A new Live Sound reinforcement system consisting of DSP processor, amplifiers, mixer, fixed speakers, wireless and wired microphones, remote control panels, and an assisted listening system shall be installed in the Cafetorium.

The system shall include a new sound mixing board.

The system shall be interfaced to a large venue video presentation system.

Gymnasium

A new Live Sound reinforcement system consisting of DSP processor, amplifiers, mixer, fixed speakers, wireless and wired microphones, remote control panels, and an assisted listening system shall be installed in the Gymnasium.

Each Live Sound Reinforcement system shall be interfaced to the Fire Alarm and PA systems for interrupt.

The Live Sound Reinforcement system racks, equipment and wiring shall be included in the base bid.

H. Classroom Speech / Sound Reinforcement Systems

Classrooms shall include All-in-One speech / sound reinforcement systems to provide for enhancement and uniform distribution of speech and sound within the spaces to improve intelligibility for the students.

Each system shall consist of a 2x4 ceiling panel which includes integrated amplifier, speakers and wireless audio receiver/transmitter.

The All-in-One panels shall be hard wired for 120V electrical service.

The systems shall have wireless microphones for teachers and students.

The systems shall also include a wireless multimedia connector device located at the teacher location for connection of the teacher computer to the ceiling panel. This device will also allow for connection of student personal hearing aid systems.

The Speech / Sound Reinforcement systems shall also be utilized as sound systems for the audiovisual presentation systems installed in these spaces

The Classroom Speech / Sound Reinforcement systems shall be included in the base bid.

I. Instructional Audiovisual Systems

All classrooms and the media center shall be designed with provisions for Interactive Video Presentation systems.

Each location shall have a “Low” (18” A.F.F.) A-V outlet and a “High” A-V Outlet.

The “High” A-V outlet shall be a 2-gang back box above the marker board / tack board line on the teaching wall.

Each “Low” A-V outlet shall have an HDMI, 3.5mm, and an RJ-45 connector cabled to the “High” A-V outlet.

The “High” A-V outlet shall have three Cat 6E data cables to provide networking capabilities for the High-Definition Interactive Flat Panel Display, for display to computer interface, and for a wireless device.

Each A-V outlet location shall have an adjacent associated quad electrical receptacle.

The back boxes for the “Low” and “High” A-V outlets shall have 1 ¼” conduits stubbed above ceiling to provide pathways for the A-V cabling.

Interactive Flat Panel Display equipment shall include:

High-Definition Interactive Flat Panel Display
USB Extender

Audiovisual cabling between the teacher/presentation “Low” A-V outlet and the “High” A-V interactive flat panel display outlet shall include:

HDMI
3.5 mm Audio
Cat. 6E

The Interactive Flat Panel Display, USB Extender, and A-V cabling shall be included in the base bid.

J. Large Venue Projection System

A large venue rear screen projector system consisting of a 7000 lumens projector with lens, Blu-Ray player, and motorized rear projection screen shall be installed in the Cafetorium/Stage. There shall be three video/audio source locations for connection of equipment to be used for presentations.

The system shall include a 7000-lumen projector and lens which will project to a rear projection screen. A control system shall be included consisting of a digital media transmitter at each of the three audio/video source outlets, a digital receiver at the projector, and an audio/video switcher.

The projector system shall be interfaced to the live sound system for audio capability.

The projector system, control system and cabling shall be included in the base bid.

K. IPTV Video Distribution and Control System

An IP/TV and Digital Signage system shall be installed for video distribution over the IP data network. The system shall consist of CATV tuners, High-Definition encoders and decoders, live broadcasting cart with tripod and camera, video server, and a management/scheduling system and shall allow for the following capabilities.

- TV distribution
- Video on Demand
- Digital Signage
- Origination broadcasting
- Control of all video devices

The IPTV system shall reside in a rack/enclosure located in the MDF/Head End Room. The equipment shall be interfaced to the CATV feeds and to the data IP network.

There will be four large screen TV monitors for digital signage.

The system shall include a High-Definition decoder/controller at each interactive flat panel display, video projector, and TV monitor.

The IPTV Video Distribution and Control system shall be included in the base contract.

Typical Technology Designs

Typical Academic Classrooms

Typical academic classrooms shall have the following design.

- Two data drops at the teacher location
- A Low A-V outlet at the teacher location
- A High A-V Outlet at the Interactive Flat Panel Display location above the teaching wall marker board
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- There shall be two data drops above ceiling for a Wireless Access Point
- A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service
- An interactive flat panel display system
- A VoIP desk phone hand set
- PA lay-in speaker panel on the ceiling
- A twelve-inch wireless analog secondary clock at 8’-0” A.F.F.

Data cabling, A-V cabling, classroom speech/sound system, and interactive flat panel display shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Typical Science Classroom

Typical science classrooms shall have the following design.

- Two data drops at the teacher location
- A Low A-V outlet at the teacher location
- A High Outlet at the Interactive Flat Panel Display location above the teaching wall marker board
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E

- The High A-V outlet shall also have two data drops
- Two data drops above ceiling for a Wireless Access Point
- Six dual data drop outlets at above counter height at student work counters
- A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service
- An interactive flat panel display system
- A VoIP desk phone hand set
- PA lay-in speaker panel on the ceiling
- A twelve-inch wireless analog secondary clock at 8’-0” A.F.F.

Data cabling, A-V cabling, classroom speech/sound system, and interactive flat panel display shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

VoIP handset, access points, and computer equipment shall be in the Technology FF&E package.

Typical Academy Shops

Typical Academy Shops shall have the following design.

- Two Wireless Access points with two data drops each
- Two data drops for VoIP wall phones with handsets
- Data drops for specialized equipment such as CNC and auto shop diagnostic equipment systems
- Four PA horn speakers
- Two 16” wireless analog secondary clocks
- A Proximity / Card Reader at the exterior door
- Door contacts on the exterior door
- An Intrusion Alarm keypad

Data cabling shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

Proximity / Card Reader, door contacts, and intrusion alarm keypad shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Typical Academy Theory/Computer Labs

Academy Theory Classrooms

Academy Theory Classrooms are laid out similar to the Academic Classrooms.

- Two data drops at the teacher location
- A Low A-V outlet at the teacher location
- A High Outlet at the Interactive Flat Panel Display location above the teaching wall marker board
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- There shall be two data drops above ceiling for a Wireless Access Point
- A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service
- An interactive flat panel display system
- A VoIP desk phone hand set
- PA lay-in speaker panel on the ceiling.
- A twelve-inch wireless analog secondary clock at 8’-0” A.F.F.

Data cabling, A-V cabling, classroom speech/sound system, and interactive flat panel display shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Academy Computer Labs

The following academies will have computer labs.

Metal Shop

Information Technologies – two separate computer labs

Engineering

Graphics Arts – two separate computer labs

Typical Academy Computer Labs shall have the following design.

- Two data drops at the teacher location
- A Low A-V outlet at the teacher location
- A High Outlet at the Interactive Flat Panel Display location above the teaching wall marker board.
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops

- Data drops for (20) student computer stations
- There shall be two data drops above ceiling for a Wireless Access Point
- A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service
- An interactive flat panel display system
- A VoIP desk phone hand set
- PA lay-in speaker panel on the ceiling.
- A twelve-inch wireless analog secondary clock at 8’-0” A.F.F.

Data cabling, A-V cabling, classroom speech/sound system, and interactive flat panel display shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Learning Commons/Media Center

The Learning Commons/Media Center shall have the following design.

- Four data drops at the circulation desk
- Eight data drops for lookup computer locations
- One data drop on a wall for a digital signage monitor
- There shall be four Wireless Access Point enclosures on walls with two data drops in each
- A VoIP desk phone hand set at the circulation desk
- Seven to nine PA lay-in speaker panels on the ceiling.
- Two 16” inch wireless analog secondary clocks at 8’-0” A.F.F.
- Instructional Area
  - Twenty data drops for computer locations
  - A Low A-V outlet
  - A High Outlet at the Interactive Flat Panel Display location above a marker board
  - A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
  - The High A-V outlet shall also have two data drops
  - Data drops for (20) student computer stations
  - A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service
  - An interactive flat panel display system

Data cabling, A-V cabling, classroom speech/sound system, digital signage monitor, and interactive flat panel display shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

VoIP handset, access points, and computer equipment shall be in the Technology FF&E package.

Common Areas – Gymnasium and Cafetorium/Large Group Learning Center

The Gymnasium shall have the following design.

- Four wall enclosures for Wireless Access Points with two data drops each
- One data drop for a VoIP wall phone
- Five recessed wall PA horn speakers
- Two 16” inch wireless analog secondary clocks with wire guards at 8’-0” A.F.F.
- Local sound speakers and Local Live Sound Reinforcement system equipment rack

Data cabling and sound system cabling, sound rack and equipment shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

VoIP handset, access points, and computer equipment shall be in the Technology FF&E package.

The Cafetorium/Large Group Learning Center shall have the following design.

- Four wall enclosures for Wireless Access Points with two data drops each
- One data drop for a VoIP wall phone
- Four data drops in two floor boxes for Point of Sales computer equipment
- Six recessed wall PA horn speakers
- Two 16” inch wireless analog secondary clocks at 8’-0” A.F.F.
- Local sound speakers and Local Live Sound Reinforcement system equipment rack with sound system equipment
- Motorized rear screen projection screen
- Large Venue Video Projector system
- Recessed wall mounted Audiovisual Control Panel
- Equipment rack for A-V control equipment
- Three Video Source Digital Transmitter Outlets

Data cabling and sound system cabling, sound rack and equipment shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

VoIP handset, access points, projector system, and A-V rack with control equipment shall be in the Technology FF&E package.

Typical Administrative, Guidance, Nurse, and Teacher/Instructor Offices

Typical offices shall have the following design.

- Two data drops at each desk location for VoIP desk phones and wired networked computer
- Two data drops above ceiling for a Wireless Access Point
- A lay-in PA speaker on ceiling
- A PA speaker volume control at the entry door
- A 12” wireless analog secondary clock at 8’-0” A.F.F.

Data cabling shall be in the base contract.

PA speakers, volume controls, and wiring shall be in the base contract.

Clocks shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

168 MAIN STREET
SUITE 3
NORTHFIELD, MA 01360
V. 413.498.5001
F. 413-498-4386
www.3si.net

Northeast Metro Regional Vocational High School
Wakefield, Massachusetts

Preliminary Alternatives: C1, C2, C3, New Construction

I. Overview

The technology and security scope of work for New Construction alternatives shall consist of the following systems.

A. Tele/Data Infrastructure

B. Wireless LAN

C. Voice Infrastructure and Phone System

D. PA/Intercom System

E. Master Clock/Secondary Clock System

F. Integrated Electronic Security System

   CCTV Video Surveillance

   Access Control

   Intrusion Alarm

   Mass Notification

   Duress Alert

G. Large Venue Live Sound Reinforcement Systems

H. Large Venue Video Projection System

I. Classroom Speech / Sound Reinforcement Systems

J. Instructional Audiovisual Systems

K. IPTV Video Distribution and Control System

Typical Room Design descriptions are presented in this document to provide details on Technology/Security systems and device quantities.

A. Tele/Data Infrastructure

The Tel/Data infrastructure shall consist of Communications Equipment Rooms and Tel/Data cabling.

Communications Equipment Rooms will conform to BICSI standards.

Backbone and horizontal cabling shall be installed according to current EIA/TIA and BICSI industry standards.

Communications Equipment Rooms

Communications Equipment Rooms included in the building design are designated as Main Distribution Frame (MDF) and Intermediate Distribution Frame (IDF).

The MDF shall be the Demarc location for voice, CATV and Wide Area Network services from the street.

The MDF and IDF rooms shall be the intermediate wire closets for termination of data, voice, and video horizontal cabling located within 290 cable feet of their locations.

They shall contain the following network cabling equipment:

2-post equipment racks and cabinet equipment enclosures
Ladder rack/cable tray
Vertical wire managers
Horizontal wire managers
Patch panels
Backboards (one 4’ x 8” minimum)
Punch down blocks (110 style)

The MDF and IDF rooms shall be environmentally controlled for the quantity of active electronic equipment to reside in them.

All electrical receptacles shall be on an emergency/standby generator.

Cabling and passive equipment shall be included in the base contract.

Active equipment shall be purchased as part of the Technology FF&E equipment procurement process.

Cable Pathways

Cable pathways and Work Area Outlets shall be as follows:

Interior Pathways

Ladder rack/cable tray in wire closets
Multiple 2” sleeves from corridor into rooms
J-Hooks from ladder rack/cable tray and within rooms for station cabling
4” sleeves between floors

Telecommunications Work Area Outlets (WAO)

Wall Outlets:

4” square or 2-gang back boxes with single-gang or dual-gang plaster rings as required

Back boxes shall have $1^1/_4$” EMT conduit stubbed above ceiling

Floor Boxes and Poke-Thru Devices:

Typical floor boxes shall be flush combination, low voltage/electrical, Wiremold RFB series or equal sized as required.

Typical Poke-Thru devices shall be Wiremold Evolution series or equal shall be installed.

Cabling

The IDF closets shall be connected to the MDF via new 12-strand 50 micron OM3 multi-mode and 6-strand single mode fiber cables.

The fiber cabling between the IDF closets and the MDF shall be capable of 10GbE.

The IDF closets shall have open 2-post equipment racks with data switches sized according to the number of data drops served by the individual closets.

Category 6E cabling shall be installed in all instructional and office spaces. The Category 6E cabling will be run to the MDF or IDF locations and terminated on Patch Panels.

Bandwidth from the IDF closets to the desktop shall be 10/100/1000 Mb/s.

Tel/Data cabling and associated wire closet termination equipment shall be included in the base contract.

Data switches and other active data equipment shall be purchased as part of the Technology FF&E equipment procurement process.

B. Wireless LAN

The Tel/Data infrastructure will include Wireless LAN capabilities.

Access Point enclosures (wall and ceiling mounted) shall be installed as part of the base contract.

The school's existing newer 802.11ac Access points shall be re-used. Additional new Access Points shall be purchased to replace the school's existing older Access Points and for additional building coverage.

Required data cabling shall be included under the Tel/Data Infrastructure scope of work.

Access Points shall be procured as part of the Technology FF&E equipment procurement process.

C. Voice Infrastructure and Voice System

The phone system shall be a Voice over IP system. For life safety capabilities, handsets will be located at all administrative desks, in all classrooms, and in all common spaces to provide internal and external communications for all spaces.

Required data cabling shall be included under the Tel/Data Infrastructure scope of work.

VoIP equipment shall be purchased as part of the technology FF&E equipment procurement process.

D. Public Address/Intercom System

An addressable Public Address system and cabling shall be installed. Speakers shall be lay-in speakers on the ceilings, or recessed wall speakers.

For life safety and mass notifications capabilities, PA speakers shall be installed in all corridors, classrooms, offices, and common spaces.

The PA system shall be zoned to allow for announcements to be made to groups of speakers in specific areas and to individual speakers.

The PA system shall be interfaced to the VoIP voice system to provide the capability for PA and emergency notification announcements to be made from any phone handset.

The PA system shall be interfaced to the Fire Alarm system to interrupt PA announcements during a fire alarm.

The PA system shall be interfaced to all local sound systems so that local sound systems are interrupted during PA announcements and mass notifications.

The PA system shall be interfaced to the Duress/Panic Alarm system to distribute immediate notification of a duress situation.

The PA system equipment and wiring shall be included in the base contract.

E. Master Clock/Secondary Clock System

The clock system shall be low voltage wired clock system.

The Master Clock/Transmitter shall be located in the MDF.

The Master Clock system shall be interfaced to the PA system to provide for bell tones to specific zones or throughout the building.

Secondary clocks in large areas (Cafetorium, Gymnasium, and Media Center) shall be 16” in diameter. Gymnasium clocks shall have protective wire grilles.

The Clock system equipment shall be included in the base contract.

F. Electronic Security

Electronic Security shall be accomplished by integration of the following systems.

Video Surveillance

Access Control

Intrusion Alarm

Duress / Panic Alarm

Mass Notification

Visitor Management System

CCTV Video Surveillance System

The existing Genetec Video Management system shall be upgraded to the Genetec Security Center version for full integration with the access control system. Additional licenses, new hardware and additional storage shall be installed. The school's existing functional IP cameras shall be re-used.

Approximately (50) additional IP cameras shall be installed. The existing and additional IP Video Surveillance cameras shall be installed at key locations to provide for full building coverage.

Required data cabling shall be included in the Tel/Data Infrastructure scope of work.

CCTV equipment and licenses shall be included in the base bid.

Access Control System

Proximity / Card Readers

The school's existing Johnson Controls Access Control database system shall be upgraded to the latest version and re-used. Additional licenses and upgrades to the computer hardware are included in the design.

Proximity / Card Readers shall be installed at all staff entry doors.

Access Control equipment and low voltage wiring shall be included in the base bid.

Door hardware is included in the design.

Exterior Door Audio / Video Intercom

IP based door audio video stations shall be installed at the main visitor door and at the dental clinic entry door.

Master stations for door release after a visitor is challenged shall be located at the welcome/security desk and in the main office and principal's office, and in the dental clinic. The dental clinic system shall be separate from the school system.

Required data cabling shall be included in the Tel/Data scope of work.

Intrusion Alarm System

An addressable Intrusion Alarm system shall be installed. The system shall have door contacts on all exterior doors and motion sensors in all spaces with exterior access including classroom and offices on grade with windows.

The systems shall be programmed as required by the Owner to allow for zones to be independently armed or disarmed and to segregate the dental clinic area from the school proper.

The Intrusion Alarm system shall include a dialer for notification to an alarm monitoring Service Company,

The Intrusion Alarm equipment and low voltage wiring shall be included in the base bid.

Duress / Panic/ Alarm System

A Duress Alert system consisting of wireless or fixed duress buttons, wireless transmitters and receivers, school office panels with touch screens, speaker, and strobe, 2-way radio communications, interface to the PA / Intercom system, interface to the Intrusion Alarm dialer, email and text notifications, and cloud base supervision and management shall be installed.

The system shall utilize 900 MHz Life Safety technology and will not rely on the school's data wireless network to operate.

The system shall have battery backup so that it is functional during a power outage.

When a duress button is depressed because of an emergency or duress situation, any or all of the following will take place.

- an immediate radio call notification is initiated to the first responder entity (police and/or fire department)
- the school is notified via a special tone or audio message sent to the PA system and via the office panels
- a call is initiated to the school's alarm monitoring company
- Email and/or text messages are distributed to designated personnel.

The system shall also have the ability for first responders to view a map of the school on a wireless device when they are on site and to be able to view their location as they move through the building.

Wireless duress panels will be located in the main office, and superintendent's office.

Fixed wireless duress buttons shall be located in the main office, guidance office, superintendent's office, principal's office, assistant principal's office, and nurse's office.

An additional number of portable duress buttons to be determined will be included with the system.

The master control panel and radio communications devices shall be installed in the MDF.

The wireless Duress Alert system shall be included in the base bid.

Mass Notification

The school's existing Mass Notification system will be re- used and be interfaced to the wireless Duress / Panic Alarm system.

Visitor Management System

The school's existing Visitor Management system, Hall Pass, and associated existing hardware shall be re-used. The system shall be located at the welcome / security desk in the main lobby.

G. Live Sound Reinforcement Systems

Live Sound Reinforcement systems shall be installed in the Gymnasium, Cafeteria, and Auditorium/Large Group Learning Center.

The systems shall include:

Equipment cabinet
Mixers
Processors
Amplifiers
Speakers
CD / iPod player
Wired and wireless microphones
Audio level feedback sensing microphones
Assistive listening transmitter and receivers
Remote control volume control
Engraved wall plates
Wiring

Cafeteria/Student Commons Area

A Live Sound reinforcement system consisting of DSP processor, amplifiers, mixer, fixed speakers, wireless and wired microphones, remote control panels, and an assisted listening system shall be installed in the Cafeteria.

Gymnasium

A Live Sound reinforcement system consisting of DSP processor, amplifiers, mixer, fixed speakers, wireless and wired microphones, remote control panels, and an assisted listening system shall be installed in the Gymnasium.

Auditorium/Large Group Learning Center

A Live Sound reinforcement system consisting of DSP processor, amplifiers, mixer, fixed speakers, wireless and wired microphones, remote control panels, and an assisted listening system shall be installed in the Auditorium.

The system shall be interfaced to a large venue video presentation system.

Each Live Sound Reinforcement system shall be interfaced to the Fire Alarm and PA systems for interrupt.

The Live Sound Reinforcement system racks, equipment and wiring shall be included in the base bid.

H. Classroom Speech / Sound Reinforcement Systems

Classrooms shall include All-in-One speech / sound reinforcement systems to provide for enhancement and uniform distribution of speech and sound within the spaces to improve intelligibility for the students.

Each system shall consist of a 2x4 ceiling panel which includes integrated amplifier, speakers and wireless audio receiver/transmitter.

The All-in-One panels shall be hard wired for 120V electrical service.

The systems shall have wireless microphones for teachers and students.

The systems shall also include a wireless multimedia connector device located at the teacher location for connection of the teacher computer to the ceiling panel. This device will also allow for connection of student personal hearing aid systems.

The Speech / Sound Reinforcement systems shall also be utilized as sound systems for the audiovisual presentation systems installed in these spaces

The Classroom Speech / Sound Reinforcement systems shall be included in the base bid.

I. Instructional Audiovisual Systems

All classrooms and the learning commons/media center shall be designed with provisions for Interactive Video Presentation systems.

Each location shall have a “Low” (18” A.F.F.) A-V outlet and a “High” A-V Outlet.

The “High” A-V outlet shall be a 2-gang back box above the marker board / tack board line on the teaching wall.

Each “Low” A-V outlet shall have an HDMI, 3.5mm, and an RJ-45 connector cabled to the “High” A-V outlet.

The “High” A-V outlet shall have three Cat 6E data cables to provide networking capabilities for the High-Definition Interactive Flat Panel Display, for flat panel display to computer interface, and for a wireless device.

Each A-V outlet location shall have an adjacent associated quad electrical receptacle.

The back boxes for the “Low” and “High” A-V outlets shall have 1 ¼” conduits stubbed above ceiling to provide pathways for the A-V cabling.

Interactive Flat Panel Display equipment shall include:

High-Definition Interactive Flat Panel Display
USB Extender

Audiovisual cabling between the teacher/presentation “Low” A-V outlet and the “High” A-V flat panel display outlet shall include:

HDMI
3.5 mm Audio
Cat. 6E

The Interactive Flat Panel Display, USB Extender, and A-V cabling shall be included in the base bid.

J. Large Venue Projection System

A large venue rear screen projector system consisting of a 7000 lumens projector with lens, Blu-Ray player, and motorized rear projection screen shall be installed in the Cafeteria/Student Commons Area. There shall be three video/audio source locations for connection of equipment to be used for presentations.

The system shall include a 7000-lumen projector and lens which will project to a rear projection screen. A control system shall be included consisting of a digital media transmitter at each of the three audio/video source outlets, a digital receiver at the projector, and an audio/video switcher.

The projector system shall be interfaced to the live sound system for audio capability.

The projector system, control system and cabling shall be included in the base bid.

K. IPTV Video Distribution and Control System

An IPTV and Digital Signage system shall be installed for video distribution over the IP data network. The system shall consist of CATV tuners, High-Definition encoders and decoders, live broadcasting cart with tripod and camera, video server, and a management/scheduling system and shall allow for the following capabilities.

- TV distribution
- Video on Demand
- Digital Signage
- Origination broadcasting
- Control of all video devices

The IPTV system shall reside in a rack/enclosure located in the MDF/Head End Room. The equipment shall be interfaced to the CATV feeds and to the data IP network.

There will be four large screen TV monitors for digital signage.

The system shall include a High-Definition decoder/controller at each interactive flat panel display, video projector, and TV monitor.

The IPTV Video Distribution and Control system shall be included in the base contract.

Typical Technology Designs

Typical Academic Classrooms

Typical academic classrooms shall have the following design.

- Two data drops at the teacher location
- A Low A-V outlet at the teacher location
- A High A-V Outlet at the Interactive Flat Panel Display location above the teaching wall marker board
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- There shall be two data drops above ceiling for a Wireless Access Point
- A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service
- An interactive flat panel display system
- A VoIP desk phone hand set
- PA lay-in speaker panel on the ceiling
- A twelve-inch wireless analog secondary clock at 8’-0” A.F.F.

Data cabling, A-V cabling, classroom speech/sound system, and interactive flat panel display shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Typical Science Classroom

Typical science classrooms shall have the following design.

- Two data drops at the teacher location
- A Low A-V outlet at the teacher location
- A High Outlet at the Interactive Flat Panel Display location above the teaching wall marker board
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- Two data drops above ceiling for a Wireless Access Point
- Six dual data drop outlets at above counter height at student work counters
- A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service

- An interactive flat panel display system
- A VoIP desk phone hand set
- PA lay-in speaker panel on the ceiling
- A twelve-inch wireless analog secondary clock at 8’-0” A.F.F.

Data cabling, A-V cabling, classroom speech/sound system, and interactive flat panel display shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

VoIP handset, access points, and computer equipment shall be in the Technology FF&E package.

Typical Academy Shops

Typical Academy Shops shall have the following design.

- Two Wireless Access points with two data drops each
- Two data drops for VoIP wall phones with handsets
- Data drops for specialized equipment such as CNC and auto shop diagnostic equipment systems
- Four PA horn speakers
- Two 16” wireless analog secondary clocks
- A Proximity / Card Reader at the exterior door
- Door contacts on the exterior door
- An Intrusion Alarm keypad

Data cabling shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

Proximity / Card Reader, door contacts, and intrusion alarm keypad shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Typical Academy Theory/Computer Labs

Academy Theory Classrooms

Academy Theory Classrooms are laid out similar to the Academic Classrooms.

- Two data drops at the teacher location
- A Low A-V outlet at the teacher location

- A High Outlet at the Interactive Flat Panel Display location above the teaching wall marker board
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- There shall be two data drops above ceiling for a Wireless Access Point
- A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service
- An interactive flat panel display system
- A VoIP desk phone hand set
- PA lay-in speaker panel on the ceiling.
- A twelve-inch wireless analog secondary clock at 8’-0” A.F.F.

Data cabling, A-V cabling, classroom speech/sound system, and interactive flat panel display shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Academy Computer Labs

The following academies will have computer labs.

Metal Shop

Information Technologies – two separate computer labs

Engineering

Graphics Arts – two separate computer labs

Typical Academy Computer Labs shall have the following design.

- Two data drops at the teacher location
- A Low A-V outlet at the teacher location
- A High Outlet at the Interactive Flat Panel Display location above the teaching wall marker board.
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- Data drops for (20) student computer stations
- There shall be two data drops above ceiling for a Wireless Access Point

- A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service
- An interactive flat panel display system
- A VoIP desk phone hand set
- PA lay-in speaker panel on the ceiling.
- A twelve-inch wireless analog secondary clock at 8’-0” A.F.F.

Data cabling, A-V cabling, classroom speech/sound system, and interactive flat panel display shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Learning Commons/Media Center

The Learning Commons/Media Center shall have the following design.

- Four data drops at the circulation desk
- Eight data drops for lookup computer locations
- One data drop on a wall for a digital signage monitor
- There shall be four Wireless Access Point enclosures on walls with two data drops in each
- A VoIP desk phone hand set at the circulation desk
- Seven to nine PA lay-in speaker panels on the ceiling.
- Two 16” inch wireless analog secondary clocks at 8’-0” A.F.F.
- Instructional Area
  - Twenty data drops for computer locations
  - A Low A-V outlet
  - A High Outlet at the Interactive Flat Panel Display location above a marker board
  - A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
  - The High A-V outlet shall also have two data drops
  - Data drops for (20) student computer stations
  - A wireless classroom speech/sound reinforcement system on ceiling hard wired for 120 VAC electrical service
  - An interactive flat panel display system

Data cabling, A-V cabling, classroom speech/sound system, digital signage monitor, interactive flat panel display, PA speakers, and secondary clocks shall be in the base contract.

VoIP handset, access points, and computer equipment shall be in the Technology FF&E package.

Common Areas – Gymnasium, Auditorium, and Cafeteria/Student Commons Area

The Gymnasium shall have the following design.

- Four wall enclosures for Wireless Access Points with two data drops each
- One data drop for a VoIP wall phone
- Five recessed wall PA horn speakers
- Two 16” inch wireless analog secondary clocks with wire guards at 8’-0” A.F.F.
- Local sound speakers and Local Live Sound Reinforcement system equipment rack

Data cabling and sound system cabling, sound rack and equipment shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

VoIP handset, access points, and computer equipment shall be in the Technology FF&E package.

The Cafeteria/Student Commons Area shall have the following design.

- Four wall enclosures for Wireless Access Points with two data drops each
- One data drop for a VoIP wall phone
- Four data drops in two floor boxes for Point of Sales computer equipment
- Six recessed wall PA horn speakers
- Two 16” inch wireless analog secondary clocks at 8’-0” A.F.F.
- Local sound speakers and Local Live Sound Reinforcement system equipment rack with sound system equipment
- Motorized rear screen projection screen
- Large Venue Video Projector system
- Recessed wall mounted Audiovisual Control Panel
- Equipment rack for A-V control equipment
- Three Video Source Digital Transmitter Outlets

Data cabling and sound system cabling, sound rack and equipment shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

VoIP handset, access points, projector system, and A-V rack with control equipment shall be in the Technology FF&E package.

Typical Administrative, Guidance, Nurse, and Teacher/Instructor Offices

Typical offices shall have the following design.

- Two data drops at each desk location for VoIP desk phones and wired networked computer
- Two data drops above ceiling for a Wireless Access Point
- A lay-in PA speaker on ceiling
- A PA speaker volume control at the entry door
- A 12” wireless analog secondary clock at 8’-0” A.F.F.

Data cabling shall be in the base contract.

PA speakers, volume controls, and wiring shall be in the base contract.

Clocks shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.