ANYTOWN
Central School District

Comprehensive Technology Report and Plan

- Technology Condition Survey Report
- Telecommunications Room Master Plan
- Comprehensive Technology Plan Roadmap

September 1, 2021

Prepared for Anytown Central School District

Presented by Archi-Technology LLC

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Connecting people, technology and buildings.

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Executive Summary

On August 9 – 10, 2021, Archi-Technology LLC conducted a Technology Conditions Survey (TCS) for the Anytown Central School District's Central School Building.

The TCS is intended to provide the District with an unbiased evaluation of the current state of the technology systems and infrastructure that support the daily educational and business operations within the district.

The survey included a review of these district-wide technology systems as well as its overall technology plans:

1. Technology Infrastructure
- Cable Plant
- Cable Pathways
- Spaces including Telecommunications Rooms (TRs) that house IT equipment

2. Network Hardware
- Wired
- Wireless including Wireless Access Points (WAPs)

3. Communications Systems
- Telephone
- Master Clock
- Public Address (PA)

4. Security Systems
- Access Control
- Video Surveillance
- Integrated Security Management Systems (ISMS)

5. Instructional Technology systems
- Whiteboards and Smartboards
- Display Projectors
- Document Scanners
- Classroom Audio

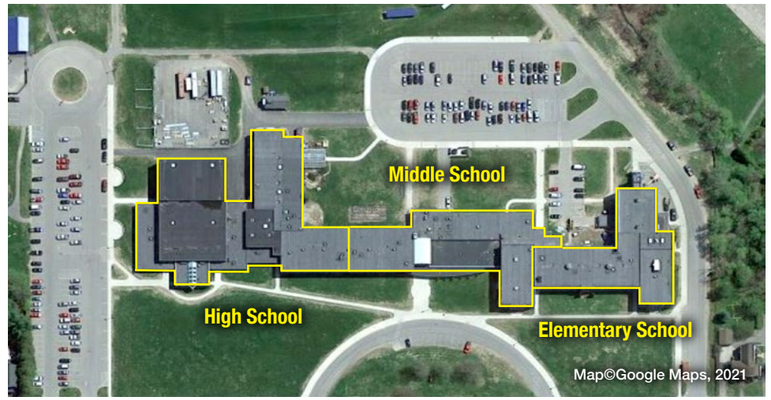
6. Support & Professional Development

continued

Executive Summary (cont.)

About the District

Anytown is a suburb of the City of Anywhere. The current district enrollment is 365 students in grades PK-12. There are three schools in one central building including an Elementary, Middle and High School.



Anytown CSD's Central School building was surveyed for technology conditions.

The survey included a review of the district's recent purchases, deployments and equipment inventory. The survey also included visual on-site inspection of existing infrastructure conditions and foundational questions that were answered by district representatives.

All recommendations are based on industry standards and best practices while taking the districts visions and goals into consideration.

Technology Infrastructure

Each of the three schools has their own Telecommunications Rooms (TRs) with the MTR (Server Room) located in the Middle School. There is also one wall-mounted IT equipment rack in the Computer Room.

The district's MTR was constructed in 2019 as part of a Capital Improvement Project that also upgraded all intra-building fiber and cable throughout the building and installed cable tray in all major corridors.

Archi-Technology recommends making improvements focused on creating a secure, scalable infrastructure. The most notable district-wide recommendations are:

- Upgrade the Elementary School's TR and build out a new High School TR to be standards compliant for size, security, power, lighting, environmental controls. grounding, floor, and ceiling.
- Implement a network switch refresh cycle using E-rate funding.
- Install CAT6A cable to all Wireless Access Points (WAPs) to prepare for increased bandwidth.
- Upgrade video surveillance cameras and increase exterior coverage with new camera installations.
- Replace the existing PA system that is nearing end-of-life with an IP-based hybrid system that includes classroom clock/PA units.
- Implement a labeling and record-drawing system based on industry standards to keep cabling and system documentation current and accurate.

A Rough Order of Magnitude (ROM) Cost Estimate for these and other improvements recommended in this report appears in Appendix C on pg. 30 of this report.

continued

Definitions

Term	Acronym	Description
Americans With Disabilities Act	ADA	
Building Distribution Frame	BDF	A legacy Bell Telephone term for the point where all cabling terminates.
Erie 1 BOCES	E1B	
Entrance Facility	ER	The room where the service provider enters a building and the point of demarcation is established.
Electronic Industries Alliance/ Telecommunications Industry Association	EIA/TIA	A Telecommunications Standards Organization
Full-Time Employee	FTE	
Global Positioning System	GPS	
Intermediate Distribution Frame	IDF	A legacy Bell Telephone term for a room that supports communications cabling and equipment located between the MDF and end device.
inter-building		Between two or more separate buildings.
intra-building		Within a building.
Internet Service Provider	ISP	
Main Distribution Frame	MDF	A legacy Bell Telephone term for the main room that supports communications cabling and equipment.
Multi-Mode	MM	A transmission performance category for fiber optic cabling.
National Electrical Code	NEC	
Network Interface Card	NIC	The interface between a network-connected device and communications cabling.
Network Time Protocol	NTP	Used to synchronize computer clock times in a network.
Public Address System	PA	
Personal Computer	PC	
Power Over Ethernet	PoE	A standard to provide data and power to network connected devices over a 4 twisted-pair Ethernet cable.
Plain Old Telephone Service	POTs	Analog voice-grade telephone service.
Prime Rate Interface	PRI	A digital telecommunications interface.
Redundant Array of Independent Disks	RAID	A data storage virtualization technology used for data redundancy.
Rough Order of Magnitude	ROM	
Session Initiated Protocol	SIP	A communications protocol for signaling and controlling multimedia communications sessions.
Security Management System	SMS	Network based system that integrates video surveillance, access control under a single user platform
Service Set Identifier	SSID	A sequence of characters that names a wireless local area network.
Serving Zone	SZ	The area of a building for which a TR supports the cabling and equipment.
Technology Conditions Survey	TCS	
Technology Room	TR	A room that supports communications systems cabling and equipment.
Telecommunications Ground Bar	TGB	A component of the Telecommunications Bonding and Grounding system that connects the telecommunications bonding backbone conductor to the TMGB to improve the performance of network cabling and equipment.
Telecommunications Main Ground Bar	TMGB	A component of the Telecommunications Bonding and Grounding system that connects the telecommunications bonding conductor to the electrical entrance facility to improve the performance of network cabling and equipment.
Uninterruptible Power Supply	UPS	Equipment that maintains power to network equipment in the event of a power outage.
Vinyl Composition Tile	VCT	The anti-static version of these tiles are used in TRs to reduce the risk of static discharge and potential damage to network equipment.
Video Graphics Array Connector	VGA	An analog connector that transmits a video signal from a source to a display.
Virtual Local Area Network	VLAN	A method of partitioning network traffic on a common network.
Voice Over Internet Protocol	VoIP	
Wireless Access Point	WAP	

Codes and Standards

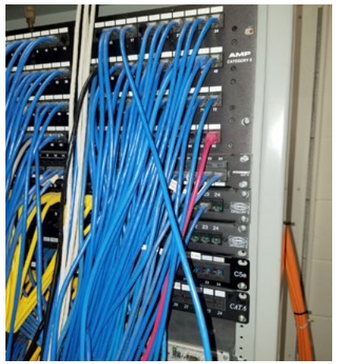
The following is a list of codes and standards that apply to the scope of this document.

1. ANSI/TIA/EIA-568-C, Commercial Building Telecommunications Wiring Standard
   a. ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises, published 2009
   b. ANSI/TIA-568-C.1,Commercial Building Telecommunications Cabling Standard, published 2009
   c. ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunication Cabling and Components Standard, published 2009
   d. ANSI/TIA-568-C.3, Optical Fiber Cabling Components Standard , published 2008, errata issued in October, 2008
2. ANSI/TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces.
3. ANSI/TIA-606-A Administration Standard for Commercial Telecommunications Infrastructure
4. ANSI-J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
5. ANSI/TIA-758-A, Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
6. BICSI: Comply with the most current editions of the following BICSI manuals:
   a. BICSI - Telecommunications Distribution Methods Manual
   b. BICSI – Installation Transport Systems Information Manual
   c. BICSI – Network Design Reference Design Manual
   d. BICSI – Outside Plant Design Reference Manual
   e. BICSI – Wireless Design Reference Manual
   f. BICSI -Electronic Safety and Security Design Reference Manual
   g. Infocomm/BICSI – AV Design Reference Manual
7. New York State Uniform Fire Prevention and Building Code
8. New York State Department of Labor Rules and Regulations
9. New York State Department of Health
10. Federal Occupational Safety and Health Administration (OSHA)
11. National Life Safety Code, NFPA 101
12. National Electrical Code, NFPA 70
13. Underwriters Laboratory (UL)
14. IEEE Standards
15. Federal Communications Commission
16. National Electrical Manufacturers' Association (NEMA)
17. Americans with Disabilities Act (ADA)

1. Existing Technology Conditions

Telecommunications Infrastructure

Horizontal Cabling



ES and MS horizontal cable management does not meet standards.

Typical ES and MS cabling with non-conforming labeling

1. Category 6 cable was installed throughout the building as part of the 19/'20 Capital Improvement Project.
2. All cabling is labeled in accordance with current industry standards.
3. As-built drawings are not available for the ES and HS. These drawings reflect serving zones, telecommunications outlets, communications pathways, and cable identification labels. MS documentation is available via hardcopy prints only; there is no secure online access to these or any drawings and system documentation.
3. Most horizontal cabling is installed in the cable tray in the corridors. In the ES and HS, cabling is typically unsupported between the primary pathway (cable tray) and the secondary pathway to the telecommunications outlet.
4. All classrooms have (2) active telecommunications outlets at the teacher's desk; one for the classroom telephone, and the other for the teachers' computing device. Classrooms typically have (2) additional active outlets for a Wireless Access Point and a classroom display.
5. The Computer Lab houses a wall-mount cabinet dedicated to serving the computers within the space. There is sufficient cabling to serve student computer workstations.
6. The administrative office has adequate dedicated cabling to support active devices.
7. District currently uses a VoIP telephone system. Abandoned voice cabling and termination hardware have been removed in the Middle School but still remains in the other two schools.

Example of improperly supported horizontal cable in the High School.

continued

Backbone Cabling

Intra-building Fiber Optic Backbone

1. The current infrastructure consists of 62.5µm fiber optic cable distributed to the building's three Technology Rooms and one cabinet.
   a. 24-strand cables are distributed to (3) wall-mounted interconnect housings. From these locations 8-strand cables are distributed to each TR or cabinet where the cables are terminated in rack-mount housings.
   b. The cables are terminated with field-installed ST connectors at all locations.
2. The fiber optic backbone cable is exposed to accidental or deliberate damage in multiple locations in the ES and HS. This exposure can be attributed to multiple factors including:
   a. Unprotected fiber optic cable (no innerduct) or non-armored fiber optic cable.
   b. Unlocked wall-mount equipment cabinets.
3. The 62.5µm cable will not support the migration to 10 Gigabit speeds.

Inter-building Fiber Optic Backbone

There is no inter-building fiber.

Communications Pathways

1. **Cable Tray.** Cable tray is a center-hung, mono-style tray supported by threaded rod and is distributed throughout the building. It was installed as part of the '19/'20 Capital Improvement Project

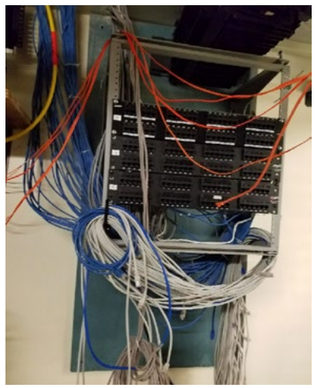
   Typically the cable tray has sufficient capacity for additional cabling except in the Corridor outside ES Room 709 where the density of cable is at or over capacity.
2. **Cable Supports.** Additional cable supports are needed in the MS and ES where the horizontal cabling exits the cable tray where J-hooks are installed with spacing exceeds 48".
3. **Conduit and Conduit Sleeves.** All the building's conduit and conduit sleeves are sized appropriately and meet the standard for fill ratio, installation, material, and bonding.

Ladder racking correctly installed and deployed in the Middle School MTR Rm. 154.

continued

Rooms/Spaces – Telecommunications Rooms (TRs)

TR-3 (ES Rm. 248) is in good condition but needs to be devoted to IT equipment. There would be adequate space for another rack.

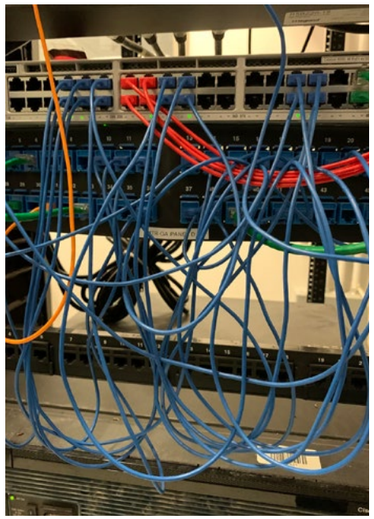


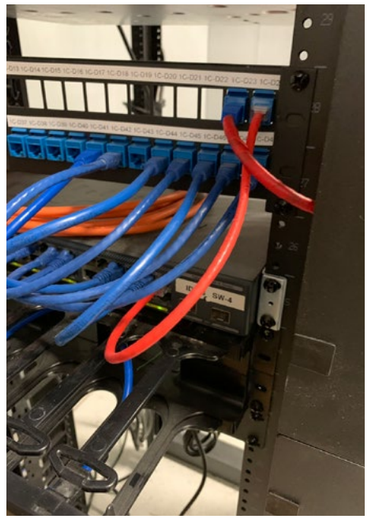
Abandoned legacy cable in ITR-2 (HS Rm. 104).

Telecommunications Rooms (TRs): District-wide Observations

1. The infrastructure is built on a star topology with the Server Room at the center of the star. There are (3) rooms identified as Telecommunications Rooms (TRs) and (1) room (the Computer Lab) has a wall-mounted equipment cabinet.
2. **Main TR (MS Rm. 154 - Server Room)** was constructed during the '19/'20 Capital Improvement Project and is in **very good condition**. However, it does require eliminating non-IT items and water threats, improving security, and implementing a regular PM schedule to maintain peak performance conditions.
3. **Intermediate TR-2 (HS Rm. 104 - Storage)** is in a shared, unsecured space with no air conditioning or grounding, and improper horizontal and vertical cable management. The ITR-2 is in poor condition and requires a complete renovation to meet all TR performance criteria as outlined on pp. 20 – 21.
4. **Intermediate TR-3 (ES Rm. 248 - Storage)** is in **good condition** but does need a number of improvements including increased security, installation of UPS and grounding at the rack, and removal of the drop ceiling to improve air circulation and equipment cooling.
5. The **Computer Room (143) small IT cabinet** that connects computers to the district's wired network is in **excellent condition** with proper connections and labeling, and room for expansion. No improvements are needed for this cabinet.

The observed conditions of the (3) TRs follows. Associated Recommended Improvements appear on pg. 16 of this report in Appendix A.

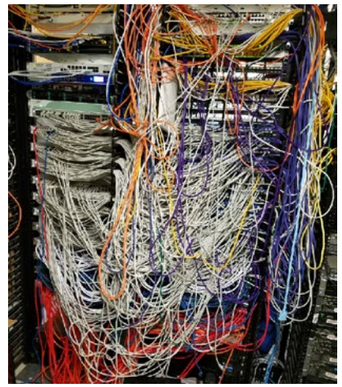




At left, one rack in the MTR (MS Rm. 154) show signs of "cable creep" in patch panels and server cables. At right, another rack in the same TR has correctly sized patch cords are neatly installed in machine-labeled ports.

continued

The rack in the MTR (MS Rm. 154) includes properly installed cable lengths and management.



Extremely poor vertical cable management at the rack in ITR-2 (HS Rm. 104).

Unsecured, shared space with office supplies storage in ITR-2 (HS Rm. 104) with drop ceiling and partial carpet (not visible in photo).

SPECIFIC ROOM OBSERVATIONS

MTR - Server Room: MS Rm. 154 *[Rating 3.8/4.0]*

1. The server room is a secured room that was constructed during the '19/'20 capital project. The room serves multiple building systems.
   a. It is the demarcation point for the incoming voice-service provider cables.
   b. It supports the building PA head-end equipment, intra-building backbone fiber optic cabling, horizontal cabling, and network equipment for wired and wireless IP devices.
2. There is no video surveillance at the TR entrance exterior.
3. A card access reader is installed but the access appears to include non-IT staff based on the observed custodial equipment and supplies in the space.
4. Water lines run above the rack causing a potential source of water damage.
5. The IT equipment fans were dusty probably due to extra traffic through the shared space.

ITR-2 - Storage Room: HS Rm. 104 *[Rating 1.3/4.0]*

1. This secured room is shared with a large office supplies storage area.
2. There is not 3' of clearance to the front and back of the equipment racks due to the narrow room width and non-IT stored items.
3. While the door to the Storage Room 104 is secured with a keyed lock, the IT equipment racks are not secured within the space. The room can also be accessed by non-IT staff.
4. There is no video surveillance at the TR exterior entrance.
5. The room was very hot and no air conditioning system was observed.
6. The racks have dedicated electric but the outlets are not labeled.
7. There is no grounding or bonding infrastructure.
8. No UPS was observed in the space.
9. Overhead, vertical and horizontal cable management do not meet industry standards. Patch cords are excessive lengths that inhibit servicing.
10. Lighting in the space is poor especially at the back of the rack.
11. While some VCT tile in installed the entrance area is carpeted.
12. A drop ceiling is installed which inhibits airflow.

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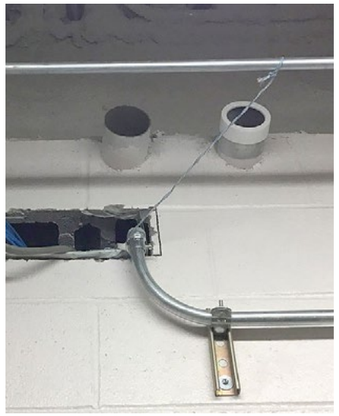


Firestop is needed in the conduits in ITR-3 (ES Rm. 248A).

ITR-3 - Storage Closet: ES Rm. 248A *[Rating 2.9/4.0]*

1. The 6' x 10' space was created by walling off part of a classroom. The room can only be accessed through the classroom; there is no direct hallway access.
2. While the door to the Storage Room 248A is secured with a card reader, the IT equipment racks are not secured within the space. The room can also be accessed by non-IT staff.
3. There is no video surveillance at the TR exterior entrance.
4. HVAC lines were observed over the rack increasing the risk of water damage.
5. The room has good environmental control. The room temperature was 72°F at the time of the survey.
6. Horizontal cable management at the rack is good but vertical cable management needs to be upgraded to industry standards.
7. Patch cords in the rack are excessive lengths that inhibit servicing.
8. The conduits into the room are within capacity limits but are not firestopped.
9. The rack outlet is connected to the district's emergency power generator and a rack-mounted UPS is installed.
10. A drop ceiling is present which inhibits air flow.
11. VCT flooring is installed.

End-of-life and unused IT equipment in ITR-3 (ES Rm. 248A).

The wall-mounted IT equipment cabinet in the Computer Lab (MS Rm. 143) is in excellent condition.

Wall Mounted Equipment Cabinet
Computer Lab: MS Rm. 143

1. This locked IT wall-mounted equipment cabinet connects the room's computers to the district's wired network.
2. The cabinet has (48) ports including (14) open ports.
3. Overall, the cabinet in in excellent shape with good connections and proper labeling.
4. The wall-mounted cabinet was equipped with a rack mounted UPS. The UPS has a limited run time.
5. The cabinet is located in a larger space. The heat load produced by the cabinet equipment is limited and the heat typically dissipates.

continued

Data Network

Network Hardware	1. The current switch network was deployed in 2010. 2. The district has established a 10-year refresh cycle on the switch infrastructure.
Wireless Network	The wireless network is 2 years old or less. The 802.11ac standard devices meet the current capacity and coverage needs in the classrooms. No issues reported.
Network Security	The district's network security systems and policies are excellent.
Network Monitoring	The district's network is monitored for errors, faults and failures by the district IT staff. District staff are alerted when events occur.

Telecommunications Services

Telephone Service	1. The incoming T1 and incoming fiber optic cable enter the building in two separate locations. 2. The district has a Mitel VoIP phone system that was deployed in the 2015 – 2016 school year. Primary Rate Interface (PRI) is the system used for trunking via the T1 located in the telephone room. 3. The voice cable is in conduit from the pole to the basement telephone room.
Internet Service	1. The internet service is through BOCES. 2. The district has a 1-Gigabit connection. 3. There is no physical, or logical redundancy, exposing the district to a single point of failure in the event of damage to the incoming fiber optic cable. 4. The fiber enters the building on the east side and is transition spliced in Room 112A. The cable is in innerduct and runs through the cable tray to the Server Room.

Instructional Technology

Classroom Systems	1. The typical classroom has a ceiling mounted projector and a 64" smartboard. a. The SB660 Series has a posted end-of-support date of 9/1/20. The HS boards are considered undersized when using current display-size calculations. b. Projectors are typically connected to the network. The Epson Powerlite projectors are no longer in production.
PCs/Laptops/Tablets	1. There is one Computer Lab in the building and computer workstations are available in the Library. Approximately ⅓ of the PCs are approaching the 6 – 7 year refresh cycle established by the district. 2. There is a limited number of laptops in the district. The current refresh period is 3 – 5 years on these devices, with most of these devices deployed in 2017. 3. There are approximately (70) iPads or similar devices, and (5) Microsoft Windows-based tablets in use. The district has established a 3-year refresh cycle on these types of devices. Approximately 70% of the iPads are due for refresh. 4. The District has initiated a 1:1 Chromebook policy that it will begin implementing in the '22/'23 school year.

Typical MS-HS Classroom AV system

continued

1. Technology Existing Conditions/**Telecommunications Infrastructure/Rooms & Spaces - TRs (cont.)**

Communication Systems

PA Systems

1. The Acme PA System is more than 15 years old and is nearing end-of-life. It is an analog system with hard-wired devices that does not integrate with the rest of the District's IP platform.
2. In the event of a power failure, the small UPS will support the system for less than 5 minutes at full load. The system is not connected to a generator.
3. Announcements cannot be made through the VoIP system telephones.
4. The system does not auto-mute the PA systems in the gymnasium, or auditorium in the event of a building-wide page.
5. The PA system does not control the time tones nor synchronize with the Master Clock system.

Building PA system nearing end-of-life.

Phone Systems

The telephone system cannot be integrated with the building PA system.

Master Clock System

1. The Primex clock system uses GPS to synchronize the time.
2. There is (1) base station and several repeater antenna distributed throughout the building.
3. The antenna are located in Technology Rooms and are secure.

Security Systems

Overview

The district has Access Control and Video Surveillance systems. The two systems operate independent of each other with no monitoring of in-progress intrusions.

Access Control Systems

1. The Card Access Control system is distributed throughout the building. The system provides control over doors equipped with card readers and monitors the same doors with magnetic door contacts.
2. The main doors to the district, high school, and primary school offices are equipped with video intercom systems. These doors are equipped with electronic door hardware that can be released remotely.
3. System components are equipped with battery backup. There are no records reflecting the age of the batteries.

Video Surveillance System

1. The system has both analog and digital cameras. The system has incrementally been expanded as needs arise with several generations of camera technology.
2. The system is capable of 30 days of recorded video storage.

Technical Support

Current staffing levels are sufficient to support the number of devices in the district.

2. Proposed Technology Improvements

Telecommunications Infrastructure

Horizontal Cabling

1. Re-cable Wireless Access Points with (2) Category 6A cables per WAP.
2. Create physical infrastructure documentation including, at minimum, drawings identifying Technology Rooms, Serving Zones, Drop Locations and Cable Quantities, and Backbone Cable Pathways.
3. Standardize labeling to meet industry standards.
4. Remove all abandoned horizontal cabling.

Backbone Cabling

Intra-building Fiber Optic Backbone

1. Install 50-micron fiber-optic cable to permit future migration to 10G in the backbone. Terminate fiber in rack-mounted housing.
2. Provide industry recognized cable supports for service provider cabling. J-hooks spaced every 4'.
3. Establish a fiber optic cable link to an off-site location to increase redundancy. The off-site location could house a backup core switch, VoIP controller and Wireless controller.

Communications Pathways

Conduit Sleeves

a. Replace non-metallic sleeves with metallic sleeves and bushings.
b. Bond all metallic conduits over 6' in length to the Grounding and Bonding Infrastructure for Communications.
c. Install firestopping where needed.

Rooms/Spaces – Telecommunications Rooms (TRs)

District-wide Improvements although all TRs may not require all improvements.

1. Eliminate equipment cabinets and wall-mounted fiber optic interconnect locations. Consolidate the cabling back to the TR located in the appropriate serving zone to simplify the network infrastructure, and secure the network equipment and cabling that are currently exposed to accidental or deliberate damage.
2. The Server Room shall be 10'x12' with walls that extend to the deck and are sealed.
3. All other Communication Equipment Rooms (TRs) shall be 10'x10' with walls that extend to the deck and are sealed.
4. All rooms shall have at least one wall covered with ¾" AC grade plywood.
5. Ceiling shall be open to the deck without obstructions. The lowest point between the floor and ceiling shall be 9'.
6. Floor shall consist of anti-static VCT flooring.
7. Lighting shall be 500 lux horizontal/300 lux vertical at the front and back of the racks.
8. Independent environmental control to maintain an operating temperature between 60-80°F, with 30-65% humidity.
9. 4-post open equipment racks with 3' of clear floor space to the front and the back shall be provided for cabling and equipment.
10. Construct a Grounding and Bonding Infrastructure for pathways.
11. Provide adequate overhead, vertical and horizontal cable management.

The major improvements needed for each TR are summarized in the chart on the next page. See the *Summary of Recommended TR Improvements* on pages 16 – 17 for more specific recommendations within each TR performance category.

continued

2. Proposed Technology Improvements/**Telecommunications Infrastructure/Spaces - TRs (cont.)**

Anytown CSD
Telecomm Room Summary by Performance Category

X = IMPROVEMENTS NEEDED

TR ROOM NO.	MTR MS Rm. 154	ITR-2 HS Rm. 104	ITR-3 ES Rm. 248A
TR SURVEY GRADE (1 = poor, 4 = excellent) ▶ PERFORMANCE CATEGORY ▼	**3.8**	**1.3**	**2.9**
1. Size. The TR needs to be adequately sized with 3' clearance to the front and back of the IT-equipment racks.			
2. Location. Provide hallway access and/or alleviate water threats.	X	X	X
3. Security. Clean, secure and dedicate the TR to IT equipment with video surveillance.	X	X	X
4. HVAC. Install environmental system with independent controls.		X	
5. Power. Install a dedicated, redundant power source.		X	
6. UPS. Install new, adjust existing Uninterruptible Power Source (UPS)/Emergency Management (EM) system.		X	
7. Grounding. Install grounding or bonding infrastructure to racks.		X	
8. Division 27. Build out D27-compliant TR with overhead cable management and fire-retardant plywood.		X	
9. Cabling. Correct cable termination, management and labeling.		X	X
10. Construction. Walls extend to the deck with compliant, sealed cable penetrations. Lighting is adequate for servicing equipment.		X	X
11. Flooring. Install Vinyl-Coated Tile (VCT) flooring.		X	
12. Ceiling. Open the ceiling to the deck with a minimum height of 10'.		X	X
See pp.16 – 17 for a the *Summary of Recommended TR Improvements* for details within each category. See pp. 20 – 21 for a more information about these (12) Telecomm Room Performance categories.	▲ recommend $	▲ recommend $$$	▲ recommend $$

continued

2. Proposed Technology Improvements (cont.)

Data Network

Network Hardware

1. The network switches will be due for replacement in the '22/'23 school year. Evaluation of the current port density and usage versus anticipated needs wired and wireless connected devices and systems should be taken into account.
2. Establish a preventative maintenance program for all network equipment to maximize performance and life.

Internet Service

The district should take steps to eliminate the single point of failure that is created by the entrance of a single internet service provider cable. Construct a physically separate entrance point and internet service cable path.

Instructional Technology

Classroom Displays

1. Plan for the replacement of the Smartboards. Replace the Smartboards with interactive displays that meet current screen size and resolution guidelines.
2. Replace projectors over 5 years old.

Communication Systems

PA Systems

1. Add video messaging capabilities to the existing Telecor system.
2. Add generator power to system head end and distributed equipment.

Security Systems

System Improvements

Add new Video Surveillance cameras at the TR entrance exteriors to the District's Integrated Security Management System (ISMS).

Video Surveillance System

Replace remaining analog cameras with digital cameras. connected to the ISMS

Technical Support

Staff Qualifications
No improvements needed.

Support Ratio
No improvements needed.

Appendix A. Summary of Recommended Telecommunications Room Improvements

ANYTOWN CENTRAL SCHOOL DISTRICT

X indicates a deficiency was observed that the recommended improvement will correct.

CATEGORY/RECOMMENDED IMPROVEMENT	MTR - Server Room (MS Rm. 154)	ITR-2 - Storage Room (HS Rm. 104)	ITR-3 - Storage Closet (ES Rm. 248A)
OVERALL TR SURVEY RATING (out of 4.0)	**3.8**	**1.3**	**2.9**
M = Move to new-build TR ($$$) S/B = Stay/build new TR ($$) S/R = Stay/renovate current TR ($)	**$**	**$$$**	**$$**
SIZE AND RACK ACCESSIBILITY	**4**	**1**	**3**
Clean out all non IT-materials including classroom and custodial supplies and equipment so there is a minimum of 3' clearance at front and back of racks.		X	
Install a locked cage to secure the racks within shared spaces and/or dedicate the room to IT equipment.		X	X
ENVIRONMENT/LOCATION	**3**	**2**	**2**
Wall off the door from the classroom and install a new door secured with Card Access from the hallway to provide direct access to the TR.			X
Reroute water lines that are directly above the rack.	X	X	X
Fix the incoming HVAC water line and remove the bucket from on top of the rack.			X
SECURITY	**3**	**1**	**2**
Install an IP-based video surveillance camera with coverage of the exterior of the TR entrance that is part of the Integrated Security Management System (ISMS) to provide an audit trail.	X	X	X
Install an access control card reader at the TR entrance.		X	
Re-key the access card so only IT staff and authorized vendors can access the TRs,	X	X	X
ENVIRONMENTAL CONTROLS	**3**	**1**	**3**
Install an Air Conditioning unit with independent controls.		X	
Clean the rack-mounted IT equipment fans and implement a Preventative Maintenance schedule.	X	X	X
DEDICATED LABELED POWER	**4**	**1**	**3**
Label all electrical outlets.		X	
UPS/EM POWER	**4**	**1**	**4**
Install a UPS capable of running all connected equipment.		X	
GROUNDING INFRASTRUCTURE	**4**	**1**	**4**
Install grounding infrastructure.		X	
DIVISION 27 FIT OUT	**4**	**2**	**3**
Install and bond a ladder rack for overhead cable management, and install all cables into it based on industry standards.		X	
Install additional conduit and/or firestop conduits and all other wall penetrations.		X	X
CABLE TERMINATION AND MANAGEMENT	**4**	**1**	**3**
Install vertical and horizontal cable management systems and install cable based on industry standards.		X	
Shorten patch cords and clean up installation using rack cable management system.		X	X
ROOM CONSTRUCTION	**4**	**2**	**3**
Install additional lighting to improve visibility in the rack.		X	
VCT FLOORING	**4**	**1**	**4**
Install bonded anti-static VCT flooring.		X	
CEILING	**4**	**1**	**1**
Remove all remaining drop ceiling.		X	X

Appendix B. Telecommunications Room (TR) Master Plan

Introduction

Purpose
To ensure all the district's Telecommunications Rooms—the spaces that securely house IT telecommunications and other systems' equipment—are designed to the same industry best practices, system technology, and manufacturer-specific standards.

This section is also designed to provide preliminary Serving Zone (SZ) drawings for district use. Serving Zones are determined by building architecture, existing labeling, and cable IDs, and are designed to keep cabling within 300' of the TR for optimal performance. These SZ drawings will assist with the planning of future cabling projects.

Audiences
These Design Standards shall be used by the following involved parties in the design, procurement, or installation of Telecommunications Rooms and other IT-equipment spaces:

- Architectural/Engineering firms
- Design professionals
- System integrators/vendors
- Tradespeople

Sections and Subsections
Each section focusing on a technology infrastructure system includes the following subsections:

- **Overview** describing the major functional requirements of the system.
- **Product Standards** to use when purchasing products from vendors.
- **Implementation Standards** to use when designing, installing and deploying these systems.
- **Documentation Standards** to use for Design and As-Built documentation for these subsystems.

Contents

continued

Applicable Industry Standards

- Americans with Disabilities Act
- ANSI/BICSI 005-2103 Electronic Safety and Security (ESS) System Design and Implementation Best Practices
- ANSI/TIA-568-C
- ANSI/TIA-569-C
- ANSI/TIA-606-B
- ANSI/TIA-758-B
- ANSI/NECA/BICSI 568
- ANSI/TIA-862-B Building Automations Systems
- ANSI/
- Building Code of New York State
- BICSI Telecommunications Distribution Methods Manual
- BICSI Customer-Owned Outside Plant Design Manual
- Federal Communications Commission
- Federal Occupational Safety and Health Administration
- Institute of Electrical and Electronics Engineers, Inc. (IEEE)
- Insulated Cable Engineers Association
- ISO/IEC 11801-International Organization for Standardization
- National Life Safety Code, NFPA 101
- National Electrical Code, NFPA 70 (NEC)
- NYS State Education Department (NYSED), Office of Facilities Planning - Manual of Planning Standards for school buildings
- New York State Department of Labor Rules and Regulations
- New York State Department of Health
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA)
- OSHA (Standards-29 CRF) Telecommunications –1910.268
- TIA/EIA-J-STD-037
- Underwriters Laboratory

continued

Appendix B. TR Master Plan (cont.)

12 factors that influence Telecommunications Room (TR) performance

IMPORTANT
EdLaw2 specifies that student data be stored in a secure location. Telecom Rooms with security issues (e.g., in a shared and/or unsecured space) put a district at risk both operationally and via increased exposure to liability.

You may know them as MDFs, IDFs, or by some other acronym. Whatever you call them, the spaces dedicated to housing IT equipment are among the most important in your district to maintain digital connectivity among and between IP-based systems including security, life safety, instructional, and wireless access.

If your district's Telecommunications Rooms (TRs) are in disarray, there's a good chance that critical infrastructure behind the ceilings and walls—cables and pathways—is in equally poor shape.

These conditions can also cause performance issues (e.g., intermittent errors) for existing and newly installed technology systems due to unstable data transport.

What makes a poor TR bad…

[2] Overhead utility pipes leave racks susceptible to damage from leaks/bursts.

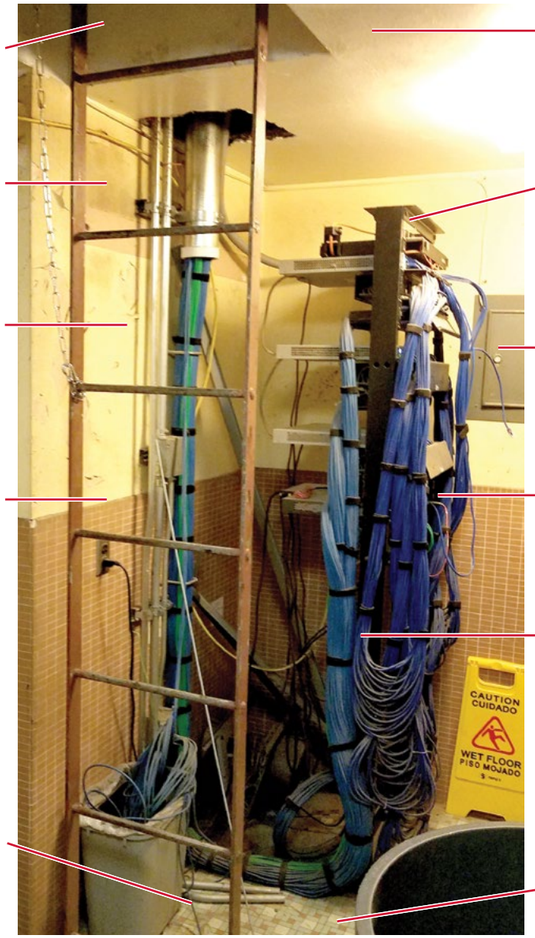
[10] Poor room construction with no deck access and poor cable penetrations.

[7] Lack of grounding infrastructure increases risk of electrical shortage and equipment damage.

[3] Unsecured, shared space creates a life safety and security risk as well as causing possible accidental damage.

[6] Lack of Uninterruptible Power Supply (UPS) or emergency power source creates life safety risks during power outages, and reduces equipment lifespan due to a lack of conditioned power.

[2] Dirty, dusty environment increases risk of operating issues with rack components and reduces equipment lifespan.



[12] Hard ceiling inhibits inspection and serviceability, and limits airflow while trapping heat.

[8] No Division 27 fit out without proper overhead cable management increases likelihood of cable damage.

[5] No dedicated power circuit increases likelihood of power outage or failure.

[9] No vertical cable management makes troubleshooting difficult.

[1] Inadequate rack clearances inhibit serviceability.

[4] No environmental controls increases risk of equipment overheating.

[11] Floor tile is not anti-static increasing risk of Electro-Static Discharge.

12-Point Checklist for IT Equipment Spaces

1. Size with 3' clear space front and back
2. Environment/location/hallway access
3. Secure/dedicated space or locked cabinet
4. Environmental controls
5. Dedicated, redundant power
6. Uninterruptible Power Source (UPS)/ Emergency Management (EM) power
7. Grounding infrastructure
8. Division 27 fit-out including overhead cable management and fire-retardant plywood
9. Cable termination and management
10. Room construction with walls extended to deck, and compliant, sealed cable penetrations
11. Vinyl-Coated Tile (VCT) flooring
12. Ceiling open to deck with minimum height of 10'

…and a good TR great.

[2] Environment/ location. Provides hallway access without any overhead utility pipes.

[3] Security. Secure or dedicated space, or locked cabinet, with IP camera coverage and access control.

[4] Environmental control. AC and exhaust fan with independent controls in same room.

[7] Grounding infrastructure. Telecommunications Grounding Busbar (TGB) is installed.

[6] UPS/EM Power. Uninterruptible Power Supply and/ or Emergency Power source.

[1] Room size. Allows rack front and back clearances.

[12] Ceiling. Open to deck with 10' minimum height

[8] Division 27 fit out. Overhead (horizontal) cable management and fire-resistant plywood wall. Overhead ladder racks reduce strain on cabling and improve performance.

[9] Cable Termination and Management. Adequate racks/cabinets and cable management. Horizontal and vertical management systems are in the rack to reduce strain on cabling and improve performance.

[10] Room construction. Walls extend to deck. Cable penetrations are compliant and sealed (fire stopped).

[5] Power. Dedicated circuit with circuit ID labels from two different panels.

[11] VCT flooring. Anti-static tile.

Telecommunications Rooms (TRs) and Spaces

Overview
Telecommunications Rooms (TRs) contain Network, Voice, Access Control, Intrusion Detection, Video Surveillance and Public Address (PA) equipment and cabling. There are several types of these rooms which are described below along with their functions and requirements. The terms and definitions are specific to the NYMUFS IT Department. They also hold sensitive data on servers such as student data, surveillance video.

Telecommunications Room (TR)
These are rooms that contain equipment and cabling for systems such as Network, Voice, Public Address (PA), Access Control, Intrusion Detection, Video Surveillance, Life Safety, and CATV cabling and equipment. Each TR provides a connection point between the work area outlets and edge devices of each system and the network in a predetermined serving zone. Each building must have at at least one TR but most buildings have several. The number of TRs a building has depends on the several factors such as:

- Distance limitations of the Horizontal cabling
- Connected Device counts
- Building Construction

Because of their function TRs are specialized rooms that have unique requirements that need to be considered during the Design such as;

- Security
- Environmental control
- Power/ Emergency Power
- Telecommunications Grounding Backbone

TRs are grouped into two categories:

- Main Telecommunications Rooms (MTR) and;
- Intermediate Telecommunications Rooms (ITRs).

An MTR connects all ITRs via Intra-building backbone cabling and pathways. The MTR is also the location where the building Network equipment connects to the Inter-building Outside Plant Cabling (OSP) cabling of the District's CORE Networks.

Entrance Facilities (EF)
Entrance Facilities (EF) are communications spaces that provide a Transition Point between the Outside Plant cabling and the Service Provider cabling. EFs can be located within a TR but, due to code considerations with respect to OSP cabling, these are often separate spaces near the point where the OSP cabling enters the building. Entrance Facilities also provide a Demarc location between Outside Service Providers where the district can connect to the Services.

Server Rooms (SR)
Server Rooms (SR) are climate controlled spaces dedicated to the continuous operation of computer servers. These spaces shall have min 36" doors to allow for the installation and removal of large equipment.

Location: Shall not be located on the top floor or in basements. Avoid exterior walls with windows to maximize security. Ideally the room should be located in a centralized location within the building. The Server Room shall be accessible from a corridor and without having to use stairs of any type. Generally first levels are preferred locations.

continued

Product Standards for TRs and Spaces

Racks

- **Size:** 19"w x 84"h
- **Type:** 4 post
- **Fittings**
  - Provide communications racks within each TR.
  - Racks must accommodate at least 33% growth after original design.

Cabinets

- **Size:** 19"w x 7'h x 28"d

Important Note: Cabinets are only to be used upon approval of the IT department.

Cable Management

- **Size:** 16"w x 7"h
- **Vertical Cable Management Fittings:** Provide a minimum of (2) vertical Front/ Rear cable management to each rack.

Cable Runway

- **Size:** 12" – 18"w
- **Type:** Hollow bar, Telco-style construction with 9" spacing between rungs and black powder coated.
- **Fittings:** Hollow-bar, metal cable runway shall be provided around the room and over the communication racks. (Wire basket tray or any other cable tray is not permitted. See details for typical room configuration).
  - The cable runway shall be mounted 7'6" above the Communications Racks.
  - Provide a rack mount kit that connects to the cable runway to the Communications Racks.
  - Provide radius drop out kits where cables will drop into vertical management of the Communications Racks.
  - Runway must accommodate at least 33% growth after original design.
  - Runway must be supported by wall brackets, trapeze hangers and ⅜"-threaded rod and rack connection kits (provide threaded rod covers as required).

Power Distribution Units

- **Type:** 8-outlet, 20 Amp
- **Fittings:** Provide (2) power strips for each rack.
- **UPS:** Connect to UPS.

continued

Implementation Standards for TRs and Spaces

TR Location

The TR **shall be:**

- Centrally located within the Serving Zone.
- Free of water or drain pipes not directly required in support of the equipment within the room.
- Located in an accessible area on each floor. Access to the TR should be directly from hallways or service corridors; not through classrooms, offices, or spaces not accessible by maintenance level keys.
- Vertically stacked between floors where possible. When staking TRs, make sure that the doors are also aligned to prevent conflicts with the riser pathways and cabling between floors.

The TR **shall not** be located:

- In any place that may be subject to water, steam, humidity, heat, and any other corrosive atmospheric or environmental substance.
- Near electrical power supply transformers, elevator or pump motors, generators, radio transmitters, induction heating devices, and any other potential sources of electromagnetic interference (EMI).
- Near sources of mechanical vibration that could be conveyed to the room through the building structure such as air handlers and exhaust fans.
- In a shared space or near electrical closets, boiler rooms, washrooms, janitorial closets and storage rooms.

TR Sizing

Recommended **minimum** IT Room sizes:

- **Entrance Facility:** 6’w x 4’d
- **Main Telecommunications Room (MTR):** 10’w x 12’d
- **Intermediate Telecommunications Room (ITR):** 9’w x 10’d

TR Layout

- In a TR dedicated to communications infrastructure, the communications rack(s) shall be installed adjacent to each other and parallel to the wall with the greatest length.
- A clearance of 6” should be maintained from the first rack to the wall, and a minimum of 3’. should be left at the anticipated end of the row of equipment racks. A 3’ minimum clearance at the front and back of the equipment racks will allow space for wall mounted equipment and cable terminations.
- In larger buildings requiring additional rows of equipment racks, the racks shall be lined up in rows with 5’ separation row-to-row, and 3’ row-to-wall. The number of equipment racks required will determine the dimension.

continued

TR Requirements

Major factors that must be considered when designing the ER/TR include:

Ceiling

- The minimum ceiling height must be 9’.
- Ceiling protrusions need to be removed to assure a minimum clear height of 8’6 inches to provide space over the equipment facilities for cables and suspended racks.
- For maximum flexibility, accessibility and airflow, drop ceilings shall not be installed.

Entrance Doors

- The door shall be a minimum of 36”w x 80”h. Door shall be fire rated for a minimum of one hour or more as required by local code requirements.
- Doors must open outward (code permitting).
- TR doors shall be equipped with Card Access.
- Provide double doors for shallow closet TRs.

Walls

- Interior finishes shall be in a light color (linen) to enhance room lighting.
- TRs shall be supplied with void-free, ¾-inch AC-grade plywood 8’ in length. Quantity and layout will be based on cable support structure and routing pathways required in the space.
- The plywood must be securely fastened to the wall-framing members.
- Plywood shall be fire retardant or painted with fire retardant paint. Plywood will be mounted vertically starting at 6” above the finished floor.

Floors

- Floors must be anti static Vinyl Composition Tile (VCT) that has been bonded to minimize dust and static electricity that can damage electronics located in the room.
- Floor loading capacity in the TR shall be designed for a minimum distributed load rating of 50 lbf/ft².

Environmental Controls

- The recommended operating temperature should be set between 60°F to 80°F.
- The recommended humidity level should fall between 30% and 65%. Humidity should be a concern if it is anticipated that normal level within the TR would fall outside these parameters.
- Heating, ventilation, and air-conditioning sensors and dedicated control equipment related to the environment within the TR must be located in the TR.

Lighting

- Provide a min of 50 ft. candles measured 3’ above finished floor.
- Suspended light fixtures should be mounted at 8’6” above the finished floor.
- Position the light fixture(s) above an aisle area, front and back only, and not directly over equipment racks or cabinets.
- Wall-mounted fixtures are permissible if lighting standards are met. Wall mounts should be placed in such a manner that they will not interfere with infrastructure pathways, protective equipment, and cables.
- Emergency lighting should ensure that the loss of power to normal lights will not hamper emergency exits from the telecommunication spaces.

continued

TR Requirements (cont.)

Electrical

- All TRs shall have a minimum of (2) 20A dedicated power circuits per equipment rack.
- These power circuits shall be sourced from two different electrical risers and one shall be sourced from emergency power if available.
- TRs shall also have a minimum of two courtesy outlets mounted on two different walls with in the room.
- Check with IT Department for additional power requirements for UPS's

Bonding and Grounding

- Bonding and Grounding shall conform to ANSI/TIA-J-STD-607-B Generic Telecommunications Grounding and Bonding (Earthing) for Customer Premises, NEC Article 250 and hardware manufacturer's grounding requirements.
- The telecommunications grounding main busbar must be connected to the electrical system building ground electrode. All TRs must be provided with a Telecommunications Grounding Busbar (TGB) that is ANSI approved and UL listed.
- The IT bonding and grounding system shall be dedicated to the TRs within the building.

Documentation Standards

All Technology Infrastructure projects shall have the following components for Design and As-Built documentation.

Design Documentation

T-Drawings Technology drawings shall be identified as "T" series (Technology) drawings in the approved construction drawings, separated from "E" (Electrical) drawings. These T-series drawings shall include:

- Symbols and Legends: Use industry standard symbols with explanatory legends.
- Riser diagrams for communications cabling.
- System one-line drawings
- Serving Zone Boundaries Identified
- Plan view drawings showing outlets, cable pathways, sleeves, and conduits.
- Telecommunications Room layout/elevations
- Equipment rack layouts
- Installation Details to include, but not limited to:
  - Communications outlets
  - Teaching Stations
  - Cable trays
  - Grounding and bonding
  - Wireless Access Points
  - Camera locations
  - IP clocks and PA speaker locations.
  - Installation information
- Outside plant, cabling, methods and paths with footages and bends.

Documents MUST be provided to the District for review and approval before final design acceptance will be issued.

continued

As-Built Drawings

Upon completion of each project, a complete As-built of the installed cable plant shall be provided by the contractor to the district's IT department. As-built documentation shall include the following:

Drawings

Including cable routing, termination location and labeling information

- CAD files of the As-builts
- PDFs of the As-builts
- Hard copies: (1) set of drawings printed at the same size as the Contract Construction drawings.

Cable schedules

Excel formatted minimally with individual columns labeled:

- TR
- Cable ID# (ex 1A-A-48)
- Room #

Cable Test results

- **Copper test results:** Organized by TR in electronic format
- **Fiber test results:** Organized by TR in electronic format

Documents MUST be provided to the District for review and approval before final acceptance will be issued and or the project closed out.

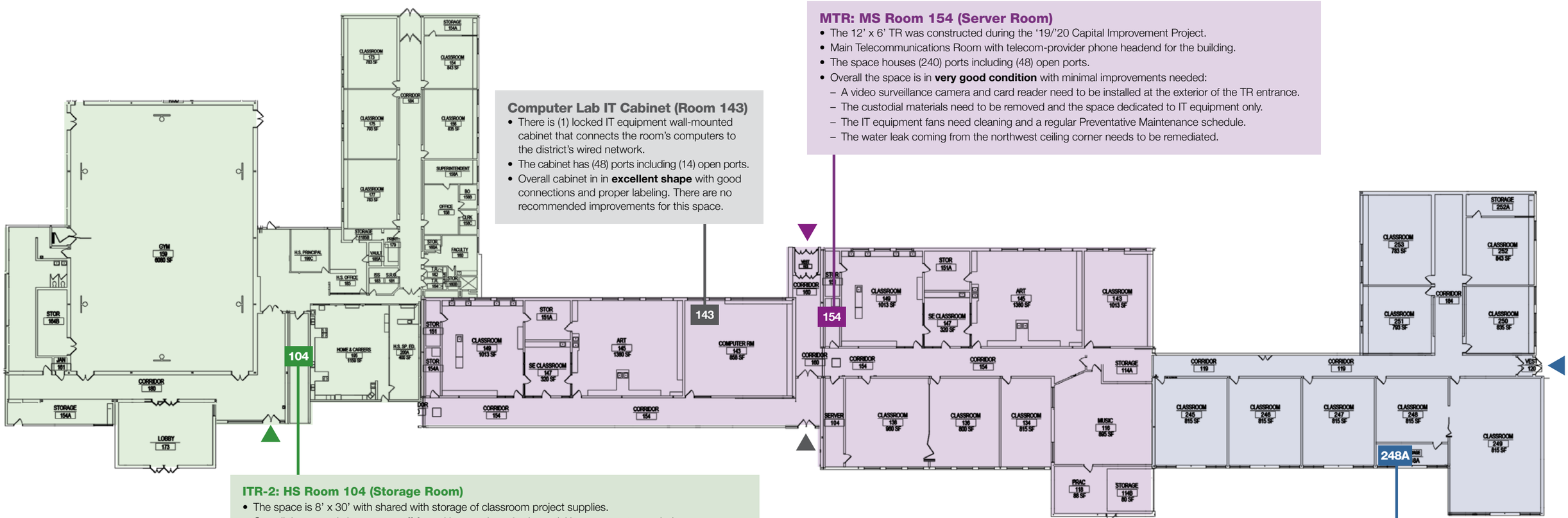
Anytown CSD's building Serving Zone As Built drawings appear on the next page of this report.

Appendix B. TR Master Plan (cont.)

Anytown CSD Central School Building - First Floor Serving Zones

Based on floor plans provided by Anytown Architects, P.D.C.

▲ Closest TR exterior entrance



Computer Lab IT Cabinet (Room 143)

- There is (1) locked IT equipment wall-mounted cabinet that connects the room's computers to the district's wired network.
- The cabinet has (48) ports including (14) open ports.
- Overall cabinet in in **excellent shape** with good connections and proper labeling. There are no recommended improvements for this space.

MTR: MS Room 154 (Server Room)

- The 12' x 6' TR was constructed during the '19/'20 Capital Improvement Project.
- Main Telecommunications Room with telecom-provider phone headend for the building.
- The space houses (240) ports including (48) open ports.
- Overall the space is in **very good condition** with minimal improvements needed:
  - A video surveillance camera and card reader need to be installed at the exterior of the TR entrance.
  - The custodial materials need to be removed and the space dedicated to IT equipment only.
  - The IT equipment fans need cleaning and a regular Preventative Maintenance schedule.
  - The water leak coming from the northwest ceiling corner needs to be remediated.

ITR-2: HS Room 104 (Storage Room)

- The space is 8' x 30' with shared with storage of classroom project supplies.
- Overall the space is in **poor condition** with a number of substantial improvements needed:
  - All non-IT items must be removed and the space made available only to IT staff.
  - A video surveillance camera and card reader need to be installed at the exterior of the TR entrance.
  - Water pipes above the rack need to be rerouted to eliminate the risk of water damage.
  - A dedicated air conditioning unit with independent controls needs to be installed.
  - A rack-mounted UPS needs to be installed and all equipment connected to it.
  - A grounding infrastructure needs to be installed and the rack and all appropriate items must to attached.
  - Legacy telecomm cable needs to be removed.
  - Ladder racking needs to be installed and all horizontal cable needs to be properly installed in it.
  - Updated systems documentation needs to be gathered and made available to technicians.
  - The drop ceiling needs to be removed so the space is open to the deck above.
  - Floor carpeting needs to be removed and replaced with VCT flooring.

ITR-3: ES Room 248A (Storage Closet)

- This is a 6' x 10' space that has been walled off from the classroom.
- The TR has no direct hallway access.
- The TR houses (264) cables, (7) switches, and (48) open ports.
- The space is shared with classroom supplies and equipment.
- Overall the space is in **good condition** with the following improvements needed:
  - The cabinet could easily be caged off to increase security without encroaching on much storage space.
  - A video surveillance camera and card reader need to be installed at the exterior of the TR entrance.
  - The water lines above the rack need to be rerouted to eliminate the risk of water damage.
  - The vertical cable management needs to be upgraded to industry standards with shorter patch cords and consistent machine-printed identification labels.

Anytown CSD Central School Building - First Floor

Anytown CSD Comprehensive Technology Planning: 10-Year Roadmap

ANYTOWN Central School District

SCHOOL CODES ES Elementary School · MS Middle School · HS High School · ALL All schools

FUNDING SOURCES SSBA Smart School Bond Act · BOCES BOCES Aidable · CIP Capital Improvement Project · CO Capital Outlay Project · E-RATE E-Rate · G State Hardware/Software Grants · OPS Operations · ESSER CARES Act (3 & 12/2020) · CRR Coronavirus Response and Relief Supplemental Appropriations · ARP American Rescue Plan (3.2021)

2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

DISTRICT GOALS | **LIST OF PLANNED PROJECTS** | **ESTIMATED GRAND TOTAL $1,758,100** | **VISION**

1 Reliable Sustainable Technology Infrastructure

- 1.1 Telecom Room upgrades — $90,000 — ALL CIP
- 1.2 Add Cable Support J hooks, replace conduit sleeves, and correct bondings — $45,000 — ALL CIP
- 1.3 Replace all 62.5 micron MM fiber cable with 50 microns — $50,000 — ALL E-RATE
- 1.4 Replace WAP CAT6 cables with (2) CAT6A cables — $19,000 — ALL E-RATE

SUBTOTAL $204,000

2 Highly Reliable Network Connectivity

- 2.1 Refresh All Network Switches — $40,000 — ALL E-RATE
- 2.2 Refresh WiFi System (Controller & WAPs) — $38,000 — ALL E-RATE
- 2.3 Refresh All UPSs — $7,500 — ALL E-RATE
- 2.1 Refresh All Network Switches — $40,000 — ALL E-RATE
- 2.2 Refresh WiFi System (Controller & WAPs) — $38,000 — ALL E-RATE
- 2.3 Refresh All UPSs — $7,500 — ALL E-RATE

SUBTOTAL $171,000

3 Enhanced Communications

- 3.1 Establish Phone Refresh Cycle — $1,120/year (x) 10 years = $11,200 — ALL BOCES
- 3.2 Replace All PA Systems with Clock/PA Systems — $40,000 — ALL BOCES

SUBTOTAL $51,200

4 Safe School Environment

- 4.1 Continue Camera Refresh Cycle — $2,000/year (x) 10 years = $20,000 — ALL BOCES

SUBTOTAL $20,000

5 Technology-Enriched Environment

- 5.1 Replace SMART Boards with IFPs and Classroom Sound Systems — $140,000 — ALL ESSER
- 5.1 Establish Maker Space Lab — $25,000 — ALL ARP
- 5.1 Begin Planned Presentation Systems Refresh — $15,000 (x) 5 years = $75,000 — ALL SSBA
- 5.2 Printer/Copiers - Deferred Payment Plan - 5 Machines — $7,500 (x) 10 years = $75,000 — ALL BOCES
- 5.3 Replace Physical Servers with VMware Servers & SAN — $50,000 — ALL G

SUBTOTAL $365,000

6 Personalized Learning

- 6.1 Initiate 1:1 ChromeBook Policy — $110,000 — ALL BOCES
- 6.1 Begin ChromeBook Replacement Cycle (K-12) — $268,400 — ALL BOCES

SUBTOTAL $378,400

7 Anywhere/Anytime Learning

SUBTOTAL $0

8 Teachers and Staff Computing Devices

- 8.1 Replace Teacher Laptops — $18,750 — ALL BOCES
- 8.2 Replace Office Desktop PCs — $10,500 — ALL BOCES
- 8.1 Replace Teacher Laptops — $18,750 — ALL BOCES
- 8.2 Replace Office Desktop PCs — $10,500 — ALL BOCES

SUBTOTAL $58,500

9 Annual Software Subscriptions

- 9.1 Annual Professional Development — $2,600 (x) 10 years = $26,000 — ALL BOCES
- 9.1 Instructional Software Subscription Renewals — $9,000 (x) 10 years = $90,000 — ALL BOCES
- 9.2 Administrative Software Subscription Renewals — $9,000 (x) 10 years = $90,000 — ALL BOCES

SUBTOTAL $440,000

10 Service Maintenance Agreements

- 10.1 PA System Maintenance Contract — $3,500 (x) 10 years = $35,000 — ALL BOCES
- 10.1 Phone System Maintenance Contract — $3,500 (x) 10 years = $35,000 — ALL BOCES

SUBTOTAL $70,000

VISION: School of the Future

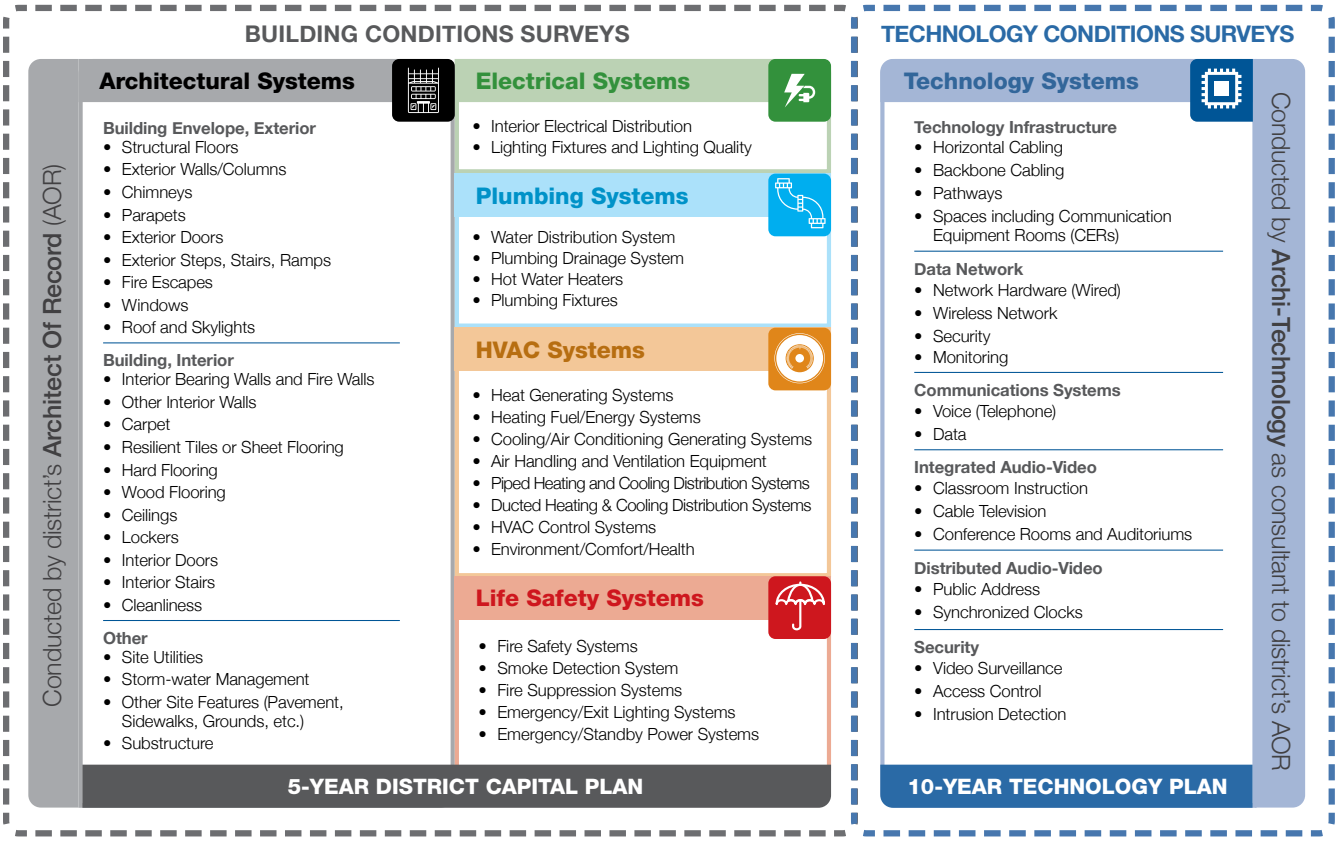
2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

Discover the current conditions of your district's technology systems

Having an accurate, objective picture of the current conditions of a school district's technology infrastructure and related IP-connected systems is critical for both short-term operations and long-range strategic planning.

However, most organizations lack qualified staff to perform these surveys while system vendors may not take a client-centric approach.

Archi-Technology, LLC has conducted Technology Conditions Surveys (TCS) for more than 20 upstate New York school districts of all sizes to help them determine the current conditions of the technology systems as listed below right:



Our qualified, unbiased technology professionals can survey these systems in a specific building or on a district-wide basis with our BOCES-aidable services. One of the final deliverables from our survey services is a report like this one customized for your district's technology systems.

Add a Technology Conditions Survey to your next Building Conditions Survey

For more information about our proven Technology Conditions Survey services:

- Please visit our website at **www.Archi-Technology.com/districts** or;
- Call **585.785.4429** to discuss your district's specific needs.

Archi-Technology Technology Consultants LLC

Connecting people, technology and buildings.

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