DSHS

YAKIMA VALLEY SCHOOL

WA ST PROJECT NUMBER: 23-412 A (1)

HARGIS

| EXECUTIVE SUMMARY

OVERVIEW

Yakima Valley School (YVS), established in 1958, is a certified nursing facility providing medical, dental, nursing, pharmacy, and psychiatric services. It is part of the Developmental Disabilities Administration (DDA) of the Department of Social and Health Services (DSHS). The facility provides respite care and crisis stabilization beds. The campus features a Main Building housing admin space, a pharmacy, therapy and treatment space, and a kitchen. Residents live in one of seven cottages, which feature living rooms with specially designed amenities and private bedrooms. Currently, YVS is leasing most of the second floor of the Main Building to a private company They have a separate IT infrastructure that was not included in this assessment.

Hargis Engineers was retained to provide an assessment of the current Information Technology Network Infrastructure and develop recommendations for network improvements.

CONSULTING TEAM

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Seattle, WA 98101

Patrick Shannon
Principal

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The objective of the assessment was to review and evaluate the current campus backbone distribution system, the condition of horizontal cabling, telecommunications grounding, existing physical media types, physical pathways, physical spaces, and supporting electrical and mechanical systems. Excluded from the assessment were electronic systems, applications, and hardware, such as the network switches and servers.

The existing campus telecommunications cabling infrastructure includes inter-building optical fiber cabling and twisted-pair copper backbone cabling installed from the Main Building to the cottages on campus and intra-building optical fiber and twisted pair copper cabling. This backbone cabling has been installed and modified over a period of years. In most areas, the backbone cabling is antiquated and is unable to support the deployment of new technologies. At two cottages, there is no optical fiber backbone. The optical fiber backbone cabling routes to one cottage of the pair, then copper connections route to the other cottage. The telephony backbone is a Category 3 rated backbone for telephone service. As DSHS transitions toward Voice over IP (VoIP) technologies, the existing copper backbone is outmoded. New single and multi-mode optical fiber cabling will be required to provide the required backbone capacity.

The horizontal cabling within buildings includes unshielded twisted pair copper cabling to provide connectivity to computers, telephones, printers, and other network attached devices. Like the backbone cabling, the horizontal cabling has been installed over time and the condition of the cabling varies. Most of the existing cabling is Category 5, which does not meet current networking standards. Existing voice cabling is Category 3, also not meeting current standards. The voice cabling has been patched multiple times on old telecom cross connects, making it very difficult to track the cabling. The horizontal cabling will need to be replaced to meet current networking standards and support new technologies.

The existing telecommunications rooms appear to have adequate space for system expansion but do not meet current telecommunications standards. New telecommunications rooms will need to be built to meet current standards.

The IT backbone and horizontal connectivity will be the key component to creating an environment that will permit YVS and DSHS to identify, adapt, and implement new technologies that contribute to safety, operational improvements.

OBJECTIVES

The project objectives are as follows:

- Inventory and document the condition of the existing telecommunications infrastructure, including telecommunications spaces, pathways, backbone, and cabling.
- Identify current deficiencies.
- Recommend infrastructure improvements to bring the campus infrastructure into compliance with current codes and standards.
- Provide As-built drawings, documenting current conditions.
- Provide a ROM cost opinion for infrastructure improvements.

PROJECT APPROACH

Hargis conducted a site visit to review existing conditions including:

- Type of backbone cabling
- Overall architecture of backbone connectivity
- Supporting spaces and systems, including interior and exterior pathways and spaces (telecommunications vaults and rooms)
- Quantity, age, vintage, and condition of the horizontal cabling in each building.

The site review was limited by accessibility. Only what could be seen from plain view was evaluated, the team did not move furniture to look behind, and ceiling access was limited to minimize impact to the facility. Where cabling disappeared in walls and pathways, a certain level of deduction was used to determine the termination point, for example, we can assume that cabling for voice ports terminate at the voice cross connect on their respective floor.

As part of the assessment, the team recorded the existing conditions and the locations of voice and data ports for the purpose of creating as-built documentation. The as-builts include floor plans, enlarged telecom room plans, telecom rack elevations, butterfly diagrams, and a fiber backbone one-line diagram.

The team sought input from the stakeholder team and consulted current industry standards, laws, and industry best practices. Current standards that impact healthcare facility telecom infrastructure design include ANSI/BICSI-004 and TIA Standard TIA-1179-A. Results from the assessment were analyzed and evaluated and a set of recommendations were developed to aid DSHS and YVS stakeholders in planning future network improvement projects, budget requests, and establishing priorities.

STANDARDS

- TIA-1179-A Healthcare Facility Telecommunications Infrastructure Standard
- BICSI Telecommunications Distribution Methods Manual, 14th Edition

PROJECT APPROACH

Review, assess and evaluate systems in each building

Identify the capabilities, deficiencies and vulnerabilities of each system

Provide recommendations for capital improvements to introduce, enhance, expand, or replace security system components as necessary

Develop a rough order of magnitude for the recommended improvement

Chart a migration path to optimize capital investments

ABBREVIATIONS & GLOSSARY

BEP **Building Entrance Protection**
Surge protective device used to mitigate risk of damage to equipment from conductive cabling exiting the building envelope.

BICSI **Building Industry Consulting Service International**
BICSI is a professional association supporting the advancement of information and communications technology (ICT) profession. They publish the Telecommunications Distribution Methods Manual (TDMM) and other Telecommunications standards.

EF **Entrance Facility**
A room in a building where public and private network services can enter the building and be consolidated.

HC **Horizontal Cross-Connect**
A cross-connect of horizontal cabling to other cabling, e.g., horizontal or backbone equipment.

IC **Intermediate Cross-Connect**
A cross-connect between first-level and second-level backbone cabling. This secondary cross-connect in the backbone cabling is used to mechanically terminate and administer backbone cabling between the main cross-connect and horizontal cross-connect (station cables).

IDF **Intermediate Distribution Frame (used interchangeably with TR)**
A metal rack (or frame) designed to hold the cables that connect interbuilding and intrabuilding cabling. The IDF is typically located in an equipment room or telecommunications room. Typically, a permanent connection exists between the IDF and the MDF.

IP **Internet Protocol**
A standard addressing scheme and message routing protocol for communication between nodes of a data network.

ISP **Internet Service Provider**
A company that provides subscribers with access to the internet.

IT **Information Technology**
Use of any computers, storage, networking, and other physical devices, infrastructure, and processes to create, process, store, secure, and exchange all forms of electronic data.

LAN **Local Area Network**
Collection of devices connected together in one physical location, such as a building, office, or home. A LAN can be small or large, ranging from a home network with one user to an enterprise network with thousands of users and devices in an office or school.

MC **Main Cross-Connect**
The centralized portion of the backbone cabling used to mechanically terminate and administer the backbone cabling; this provides connectivity between equipment rooms, entrance facilities, horizontal cross-connects and intermediate cross-connects.

MDF **Main Distribution Frame**
A signal distribution frame or cable rack used in telephony to interconnect and manage telecommunication wiring between itself and any number of intermediate distribution frames and cabling from the telephony network it supports. Used interchangeably with MC, Main Equipment Room (MER) and Main Telecom Room.

MER **Main Equipment Room**
Acts as the main IT location for a building. It is the transition point for all the voice and data cabling that enters the building, and we connect it further to the other equipment rooms.

MM **Multi-mode**
Type of optical fiber designed to carry multiple light rays or modes simultaneously, each at a marginally different reflection angle inside the optical fiber core.

OFC **Optical Fiber Cable**
An optical fiber cable is a type of cable that has a number of optical fibers bundled together, which are normally covered in their individual protective plastic covers. Optical cables are used to transfer digital data signals in the form of light up to distances of hundreds of miles with higher throughput rates than those achievable via electrical communication cables. All optical fibers use a core of hair-like transparent silicon covered with less refractive indexed cladding to avoid light leakage to the surroundings. Due to the extreme sensitivity of the optical fiber, it is normally covered with a high-strength, lightweight protective material like Kevlar.

OMX **Optical Mode**
(X represents the multi-mode fiber classification)
Optical Fiber Classification identifying the fiber type, core size, and properties for multi-mode optical fiber. Currently, OM1-5 are on the market. See Table 1 for more information.

OSX **Optical Single-mode**
(X represents the fiber construction)
Optical Fiber Classification identifying the fiber type and properties for single-mode optical fiber. Currently, OS1 and 2 are on the market. See Table 1 for more information.

OSP **Outside Plant Cabling**
Outside plant refers to all of the physical cablings and supporting infrastructure (such as conduit, cabinets, towers, or poles), as well as any associated hardware, placed between a demarcation point in one switching facility and another switching center or customer premises.

RMFC **Rack Mount Fiber Cabinet**
Also know as an LIU or Fiber Patch Panel. Enclosure mounted in a network rack to allow optical fiber to be terminated and cross-connected.

SM **Single-mode**
Common type of optical fiber that is used to transmit over longer distances. A single-mode fiber is a single glass fiber strand used to transmit a single mode or ray of light.

TIA **Telecommunications Industry Association**
Professional organization providing industry standards, professional certifications, and product standards to further the information communications technology industry.

TR **Telecommunications Room**
(used interchangeably with IDF)
An enclosed architectural space designed to contain telecommunications equipment, cable terminations, or cross-connect cabling.

VoIP **Voice over IP**
A technique that allows voice to be carried in a portion of the bandwidth of an Ethernet signal that is carrying IP traffic.

WAP **Wireless Access Point**
» A wireless access point (WAP) is a hardware device or configured node on a local area network (LAN) that allows wireless capable devices and wired networks to connect through a wireless standard, including Wi-Fi or Bluetooth. WAPs feature radio transmitters and antennae, which facilitate connectivity between devices and the Internet or a network.

» A WAP is also known as a hotspot.

SEQUENCING & RECOMMENDATIONS			
Phase	*Prerequisites*	*Scope*	*ROM Cost Opinion*
PHYSICAL CONSTRUCTION OF NEW TELECOMMUNICATIONS			
1	**N/A**	» Construct Telecom Rooms 021, 113, 237, 309, & 408 in the Main Building » Demolish any obsolete or non-operational existing equipment to make space. » Provide Electrical Infrastructure (Grounding, UPS, Convenience Receptacles, Equipment Receptacles, Power Distribution Units [PDUs]) » Provide a dedicated 3-ton ductless split system cooling unitin the MDF and dedicated 1-ton ductless split system cooling unit for TRs. » Expand existing Access Control, add card reader and electrically locking hardware. » Install Supporting Equipment (Racks, Patch Panels, Cable Management, Rack Mount Fiber Cabinets (RMFC), Adaptor plates, Ladder Rack, etc.) » Install Ventilated Telecommunications Enclosures in attic spaces of Cottages 1-7 » Install Ventilated Rack and Supporting Equipment (Patch Panels, Cable Management, Rack Mount Fiber Cabinets, Adaptor plates, etc.) » Provide Electrical Infrastructure (UPS, Convenience Receptacles, Equipment Receptacles, Power Distribution Units [PDUs])	**$608,000**
INSTALL BACKBONE OFC TO NEW TELECOM SPACES			
2	**N/A**	» Pull 12 st OS2 and 6 st OM4 OFC from third floor MDF 309 to Telecom Rooms 021, 113, 237, and 408. - Terminate OFC Cabling if RMFC is installed. » Pull 12 st OS2 OSP and 6 st OM4 OSP OFC from third floor MDF in Main Building to Telecom Enclosures in Cottage Attics. - Terminate OFC Cabling if RMFC is installed.	**$70,000**
INSTALL HORISONTAL CABLING TO NEW TELECOMMUNICATIONS OUTLETS			
3	**1**	» Install Back boxes and pathway at new telecommunications outlet locations - Existing jacks will need to be maintained in operation. » Install Category 6A cabling and terminate for new telecommunications outlets.	**$1,423,000**
OWNER COORDINATION REQUIRED			
4	**1-3**	» Install new Ethernet Switches » Install Patch cables for active ports. » Cut over Existing workstations to the new infrastructure to allow demolition of existing telecommunications outlets. » Deploy new VoIP phone system on new telecommunications infrastructure.	**By Owner**
INSTALL HORIZONTAL CABLING TO EXISTING TELECOMMUNICATIONS OUTLETS			
5	**1-4**	» Install Category 6A using existing pathway to existing telecommunications outlets and terminate. - Demolish existing horizontal cabling to existing telecommunications outlets.	**$725,000**
DEMOLISH DEFUNCT INFRASTRUCTURE			
6	**1-5**	» Demolish OSP cable. - Demolish OM1 Multi-mode OSP OFC to Cottages - Demolish Copper twisted pair OSP Backbone cabling between EF and Cottages. » Demolish Main Building backbone cabling - Demolish OM1 Multi-mode OFC between MDF and defunct TRs. - Demolish Copper twisted pair backbone cabling between TRs in Main Building. » Demolish Defunct telecommmunications rooms. - Remove any salvageable equipment from TR's. - Remove the remaining equipment and dispose of it.	**$40,000**
CONVERT ROOM 407 TO IT STORAGE			
7	**N/A**	» Expand existing Access Control, add card reader and electrically locking hardware. » Provide Owner Provided shelving for IT storage.	**$9,000**

EXISTING COMMUNICATIONS INFRASTRUCTURE

BACKBONE CABLING

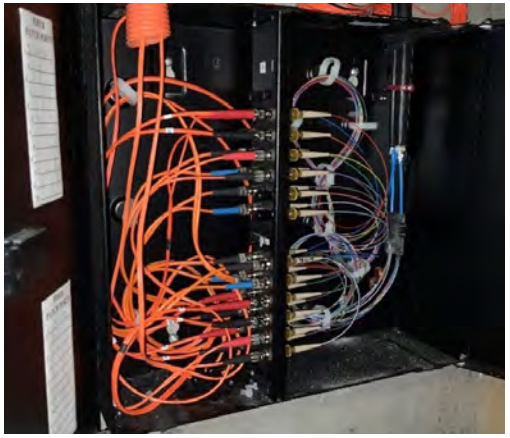
SERVICE PROVIDER CONNECTIONS

Existing voice service comes from the service provider into vault 0C (utility vault) in the form of what appears to be a 200-pair twisted pair copper backbone cable. The labeling is too faded to read. The backbone is routed through vaults 4C, 3C, 2C, and 1C into the Entrance Facility in the basement of the Main Building. It terminates on building entrance protection and then on 66 blocks, where it is patched to the building lines terminated on 110 blocks.

The existing ISP connections come from the utility vault at the main entrance to the campus, and routes through vaults, 4C, 3C, 2C, and 1C, then into the Entrance Facility in the basement of the Main Building. There appears to be two Internet Service Provider (ISP) connections. Existing cabling is a 12-strand single-mode optical fiber cable and a 6-strand single-mode optical fiber cable. The 6-strand single-mode optical fiber cable was labeled as being provided by Charter Communications. The 12-strand single-mode optical fiber cable was not labeled. Staff on hand was not aware of what ISP provided the 12-strand SM OFC. The ISP OSP terminates in the EF. A Category 3 twisted pair copper backbone connects the campus to the telephone service provider. It follows the same route as the ISP optical fiber cables and routes into the Entrance Facility.

OPTICAL FIBER COMPARISON

Fiber Mode	Fiber Type	Jacket Color	Core Size	Data Rate	Distance	Application	Notes
Multi-mode	OM1	Orange	62.5 µm	1 Gb @ 850 nm wavelength	Up to 300 m	Short-haul networks, Local Area Networks (LANs), & Private networks	None
	OM2	Orange	50 µm	1 Gb @ 850 nm wavelength	Up to 600 m	Short-haul networks, Local Area Networks (LANs), & Private networks	Generally used for shorter distances. Has twice the distance as OM1.
	OM3	Aqua	50 µm	10 Gb @ 850 nm wavelength	Up to 300 m	Larger Private Networks	Able to run 40 GB or 100 GB up to 100 meters utilizing an MPO Connector.
	OM4	Aqua	50 µm	Up to 100 G	Up to 400 m	High-Speed Networks, Data Centers, Financial Centers, and Corporate Campuses	Able to run 100 GB up to 150 meters utilizing an MPO connector.
	OM5	Lime Green	50 µm	Up to 100 G	Up to 500 m	High Speed Networks and Data Centers that require greater link distances and higher speeds.	Designed to support Short Wavelength Division Multiplexing (SWDM)
Single-mode	OS1	Yellow	8-9 µm	Up to 10 G	Up to 6 mi	Moderate distance telecom links, LANs, buildings, factories, office parks, or campuses.	Tight Buffered Cable
	OS2	Yellow	8-9 µm	Up to 100 G	up to 124 mi	High Fiber count, long distance telco backbones, direct bury applications.	Loose Tube Cable



Fiber terminations in cottage 7.

Fiber cabinet in cottage 5.

Rack mount fiber cabinet in MDF.

INTER-BUILDING BACKBONE CABLING

The existing communications infrastructure connecting the Main Building to the Cottages is Corning Infinicor 62.5-micron OM1 multi-mode outside plant optical fiber cable terminated on ST connectors, and twisted pair copper cable for voice applications.

Each Cottage is supported by 6 pairs of twisted pair copper backbone cabling. The cabling originates in the Entrance Facility in the Main Building, where it is terminated on 110 blocks. From there is appears to terminate on building entrance protectors before leaving the building on its way to each cottage.

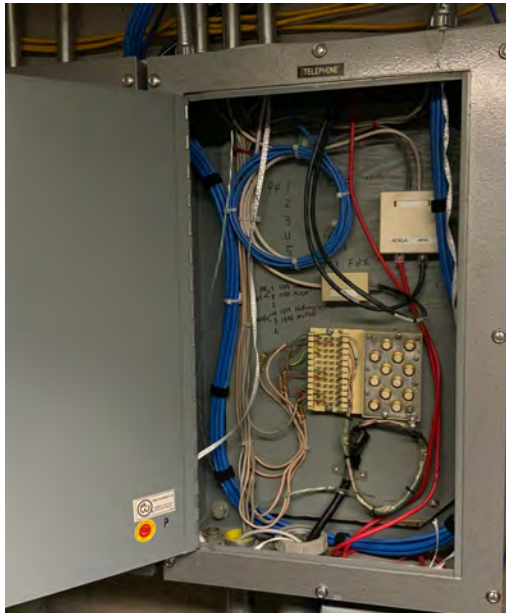
A 25-pair twisted pair copper cable provides voice service to Cottages 1, 2, 3, and 4. The cable routes through vaults 1C, 2C, 3C, and 4C, and goes to service module A. It is spliced at the service module into two separate 6-pair and a12-pair twisted pair copper cable. The 6-pair twisted pair copper cables to Cottages 1 and 2 terminate in the basement on a BEP. The 12-pair twisted pair copper cable goes through vaults 4C, 5C, 6C, 7C, and 8C to service module B, where it is spliced into two 6-pair twisted pair copper cables. Each of the 6-pair cables terminate on BEPs in the basements of Cottages 3 and 4.

Cottages 5, 6, and 7 are served by a 50-pair twisted pair copper cable that is routed from the Entrance Facility located in the Main Building through vaults 1C, 17C, 16C, 15C, 14C, and finally to service module C. At the service module it is spliced into three 6-pair twisted pair copper cables. The three 6-pair twisted pair copper cables go to Cottages 4, 5, and 6 and terminate in the basement on BEPs.

Due to the limited cabling going to each Cottage, they are currently limited to 6 phones in each cottage. The data carrying capacity on Category 3 cabling is such that it is not capable of supporting the technologies being proposed for implementation at YVS. It is recommended that the existing Category 3 twisted pair copper backbone be demolished and that the voice infrastructure be combined with the Ethernet infrastructure on a new optical fiber backbone consisting of a hybrid of single-mode and multi-mode optical fiber cabling.

The existing ethernet network is supported by multi-mode optical fiber backbones between buildings and telecommunication rooms. The fiber backbone serving the cottages originates on a rack mount fiber cabinet in the existing MDF located in the Main Building, goes through the vaults and to the respective Cottages. The two 6-strand OM1 multi-mode outside plant optical fiber backbones for Cottages 1 and 2 and Cottages 3 and 4 are routed through Vaults 1C, 2C, 3C, and 4C. The backbone fiber for Cottages 1 and 2 routes over to service module A, then into the basement of Cottage 2 where it terminates in a wall mount fiber cabinet. The backbone fiber for Cottages 3 and 4 goes through vault 4C and over to vault 5C, where it continues through vaults 5C, 6C, 7C, and 8C to service module C. It then terminates in the basement of Cottage 4.

There are two cables of fiber backbone serving Cottages 5, 6, and 7. The two cables are a 12-strand and a 6-strand OM1 multi-mode outside plant optical fiber cables. They originate in the MDF located in the Main Building and route through vaults 1C, 17C, 16C, 15C, 14C, then to



6-pair twisted pair copper terminating in cottage 5.

6-pair twisted pair copper terminating in cottage 3.

service module C. Both optical fiber cables go to Cottage 7 and terminate on a wall mount fiber cabinet in the basement. The 12-strand optical fiber cable is patched to two 6-strand OM1 multi-mode outside plant optical fiber cables and route back to service module C. From service module C, the cables get routed to Cottages 5 and 6 where they terminate in the basement.

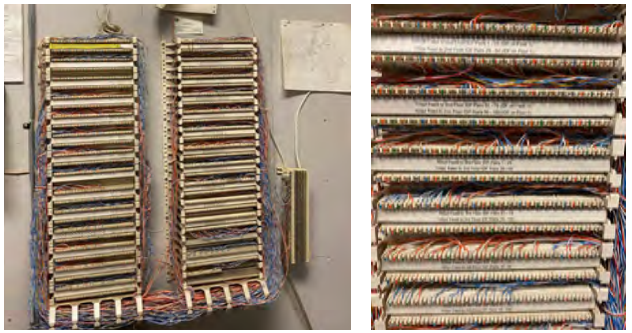
The current OM1 fiber backbone is extremely limited in bandwidth and data speeds. OM1 fiber is obsolete, is not stocked in warehouses, and is barely even manufactured anymore. The limited capabilities of the OM1 optical fiber backbone limit the new technologies that can introduced at YVS. TIA standards for healthcare facilities also dictate the use of single-mode optical fiber or a minimum of OM4 rated multi-mode fiber. To allow future network expansion, technology growth, and meet current standards, it is recommended that the existing OM1 optical fiber backbone be replaced with an optical fiber backbone utilizing 12-strands of OS2 single-mode outside plant optical fiber cable and 12-strands of OM4 multi-mode outside plant optical fiber cable supporting each Cottage. This new backbone will have enough capacity to support any new technologies YVS and DSHS want to introduce for the foreseeable future. The existing OM1 optical fiber backbone cabling should be demolished.

INTRA-BUILDING BACKBONE CABLING

Category 3 twisted pair copper backbone cabling is utilized in the Main Building between the Entrance Facility and Rooms 021, 113, 309, and 408. The twisted pair cabling originates in the Entrance Facility on 110 blocks and goes to its respective floor where it terminates on 110 blocks. The cabling is then patched to the 110 blocks where the outlet cabling coming from the workstation terminates. The basement is served by room 021, the first and second floors are served by room 113, the fourth floor and up are served by room 408.

The Category 3 cabling supporting the telephony system is inadequate to support new technologies being proposed for implementation at YVS. The voice network should be collapsed to a single converged IP based network, and the existing Category 3 cabling should be demolished.

6-strand OM1 multi-mode optical fiber cables are provided between the MDF and telecommunications rooms 111 and 407. To meet TIA standards, the backbone fiber cabling should be upgraded to a minimum of OM4 multi-mode or to single-mode optical fiber cable. It is recommended to provide both as a backbone to meet all possible future needs. Providing 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber cables will provide a backbone with enough capacity to handle new technologies, such as VoIP and electronic medical records, while still having the capability to support unforeseen future technologies.

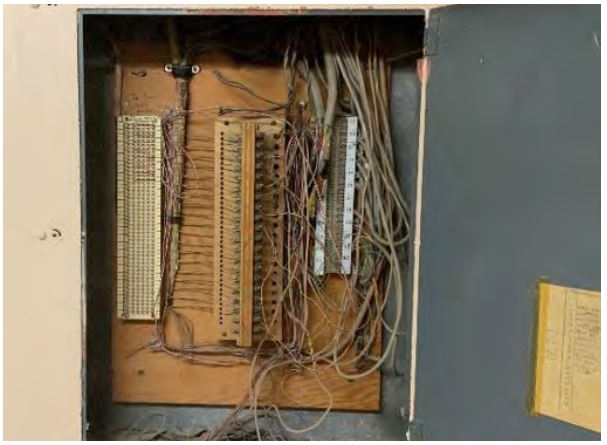


110 block in entrance facility.

HORIZONTAL CABLING

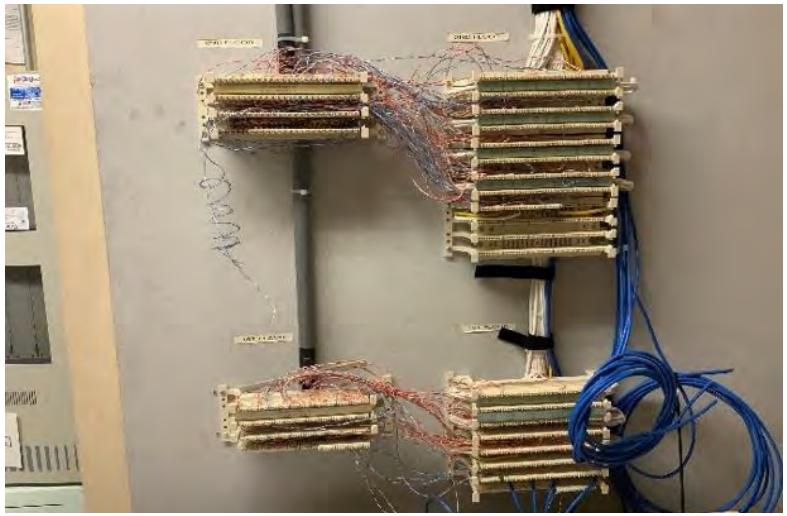
CATEGORY CABLE COMPARISON				
Category	Max. Data Rate	Bandwidth	Max. Distance	Usage
Category 1	1 Mbps	0.4 MHz		Telephone and modem lines
Category 2	4 Mbps	4 MHz		LocalTalk & Telephone
Category 3	10 Mbps	16 MHz	100 m (328 ft.)	Telephone & 10BaseT Ethernet
Category 4	16 Mbps	20 MHz	100 m (328 ft.)	Token Ring
Category 5	100 Mbps	100 MHz	100 m (328 ft.)	100BaseT Ethernet
Category 5e	1 Gbps	100 MHz	100 m (328 ft.)	100BaseT Ethernet, Residential Homes
Category 6	1 Gbps	250 MHz	100 m (328 ft.) 10 Gb at 37 m (121 ft.)	Gigabit Ethernet, Commercial Buildings
Category 6A	10 Gbps	500 MHz	100 m (328 ft.)	Gigabit Ethernet in Data Centers & Commercial Buildings
Category 7	10 Gbps	600 MHz	100 m (328 ft.)	10 Gbps Core Infrastructure
Category 7A	10 Gbps	1000 MHz	100 m (328 ft.) 40 Gb at 50 m (164 ft.)	10 Gbps Core Infrastructure
Category 8	25 Gbps (Cat8.1) 40 Gbps (Cat8.2)	2000 MHz	30 m (98ft.)	25 Gbps/40 Gbps Core Infrastructure

Source: https://tripplite.eaton.com/products/ethernet-cable-types



Existing voice horizontal cross-connect.

Existing telecommunications enclosure.



Existing voice horizontal cross-connect.

Telecommunications outlet with category 3 cabling split to two jacks.

VOICE HORIZONTAL CABLING

Upon review of the voice infrastructure, it was found to be inadequate to serve the current and future needs of YVS. The current phone system utilizes Category 3 cabling, patched at multiple points to provide phone service to the user. 66 and 110 blocks are used to patch the cable. 66 and 110 blocks are types of punchdown blocks used to terminate runs of on-premises wiring in a structured cabling system. The service enters the building in the basement MDF, patches on building entrance protectors, then patches again from 66 blocks to 110 blocks to be distributed to the appropriate floor. Once on the respective floor, the cable is patched again on 110 blocks to the workstation cabling. In some cases, the cabling was patched an additional time through an old telephone/ intercom wall enclosure.

At the workstation, a lot of the Category 3 cabling was split to serve two phone jacks, with each getting two conductor pairs. Splitting pairs like that works fine for analog phones but does not support PoE or Ethernet, which rely on all four conductor pairs to work properly. The overall effect of the multiple patches is a degradation of the signal and introduction of noise, resulting in grainy, poor-quality audio.

Category 3 cabling does not meet TIA-1179-A standards for horizontal cabling. Industry wide, its use has been on a rapid decline for years as it is not manufactured to meet current bandwidth or data rate standards. It is recommended that all Category 3 cabling be removed, and the voice network be collapsed onto a converged network infrastructure utilizing standards compliant Category 6A cabling.

MICROSOFT TEAMS BANDWIDTH REQUIREMENTS PER ENDPOINT

	MINIMUM		RECOMMENDED		BEST PERFORMANCE	
	Download	*Upload*	*Download*	*Upload*	*Download*	*Upload*
AUDIO						
One-to-One	10 kbps	10 kbps	58 kbps	58 kbps	76 kbps	76 kbps
Meetings	10 kbps	10 kbps	58 kbps	58 kbps	76 kbps	76 kbps
VIDEO						
One-to-One	150 kbps	150 kbps	1.5 Mbps	1.5 Mbps	4 Mbps	4 Mbps
Meetings	150 kbps	200 kbps	2.5 Mbps	4 Mbps	4 Mbps	4 Mbps
SCREEN SHARING						
One-to-One	200 kbps	200 kbps	1.5 Mbps	1.5 Mbps	4 Mbps	4 Mbps
Meetings	250 kbps	250 kbps	2.5 Mbps	2.5 Mbps	4 Mbps	4 Mbps
TOGETHER MODE						
Meetings	1 Mbps	1.5 Mbps	1.5 Mbps	2.5 Mbps	2.5 Mbps	4 Mbps

Source: https://learn.microsoft.com/en-us/microsoftteams/prepare-network

ETHERNET HORIZONTAL CABLING

The existing ethernet network is comprised of Category 5 cabling. As can be seen in the Category Cable Comparison, Category 5 cabling is limited to 100 Mbps. The existing patch panels, connectors, and patch panels all meet Category 5 standards. Recently, YVS had a project to install wireless access points throughout the buildings on campus. Category 6A cable was installed to support the wireless infrastructure.

Over the years, the cabling has been expanded and altered to meet the needs of the staff. One interesting observation was some exposed loose cables on the floor terminated in a box sitting on the floor. Another was a situation where a port was needed on the opposite side of a room, so a patch cable was plugged into an existing port and a hole was cut into the surface raceway to get in the raceway to route the cable to the other side. A pinch point had been created by conduit being installed over the raceway, so the cable was then routed outside the surface raceway again to avoid it.

With the push towards VoIP, video conferencing, and remote work, the existing Category 5 network is not adequate to meet the current and future needs of YVS. The Category 5 cabling is not in compliance with TIA standards for infrastructure. It is recommended that the ethernet cabling infrastructure be replaced with a new Category 6A cabling infrastructure.

Existing telecommunications outlet laying on the floor.

Existing condition.

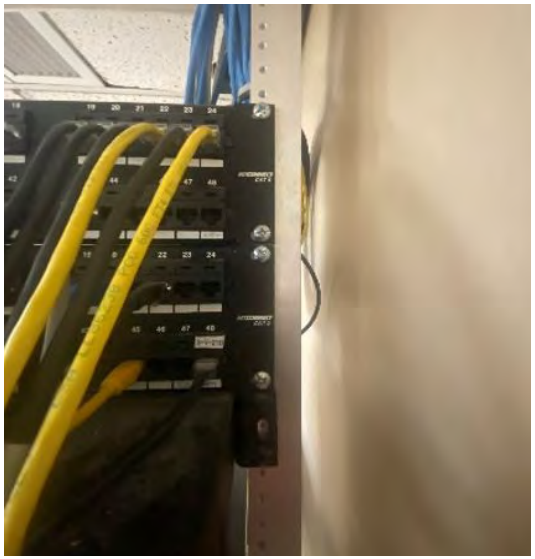
Existing condition.

Meeting TIA-1179 standards will require the entire channel to be Category 6A certified. Meeting this requirement will require all new patch panels, modular jacks, and wall outlets comprising a replacement of the entire infrastructure. Existing Category 5, Category 5e, and Category 6 patch panels will be removed in favor of the Category 6A infrastructure. See sequencing and recommendations for sequencing of the project to minimize down time while the infrastructure is replaced.

To support this new infrastructure, and meet industry standards, it is recommended to build new telecommunications rooms in stacked rooms next to the elevators, Rooms 021, 113, 237, 309, and 408. Creating telecommunications rooms in these spaces will require power upgrades to provide convenience receptacles, dedicated equipment receptacles, and Uninterruptible Power Supplies (UPS). Dedicated cooling will be necessary to maintain equipment temperature. Network support equipment will have to be provided: racks, grounding, ladder rack, Category 6A patch panels. Access Control will be needed to limit access to authorized staff and provide an audit trail. Observed during the site visit were paper sign in sheets hanging in the telecom rooms; an access control system will provide a more reliable means of tracking access. See room summaries later in this document.

Category 5 telecommunications outlet.

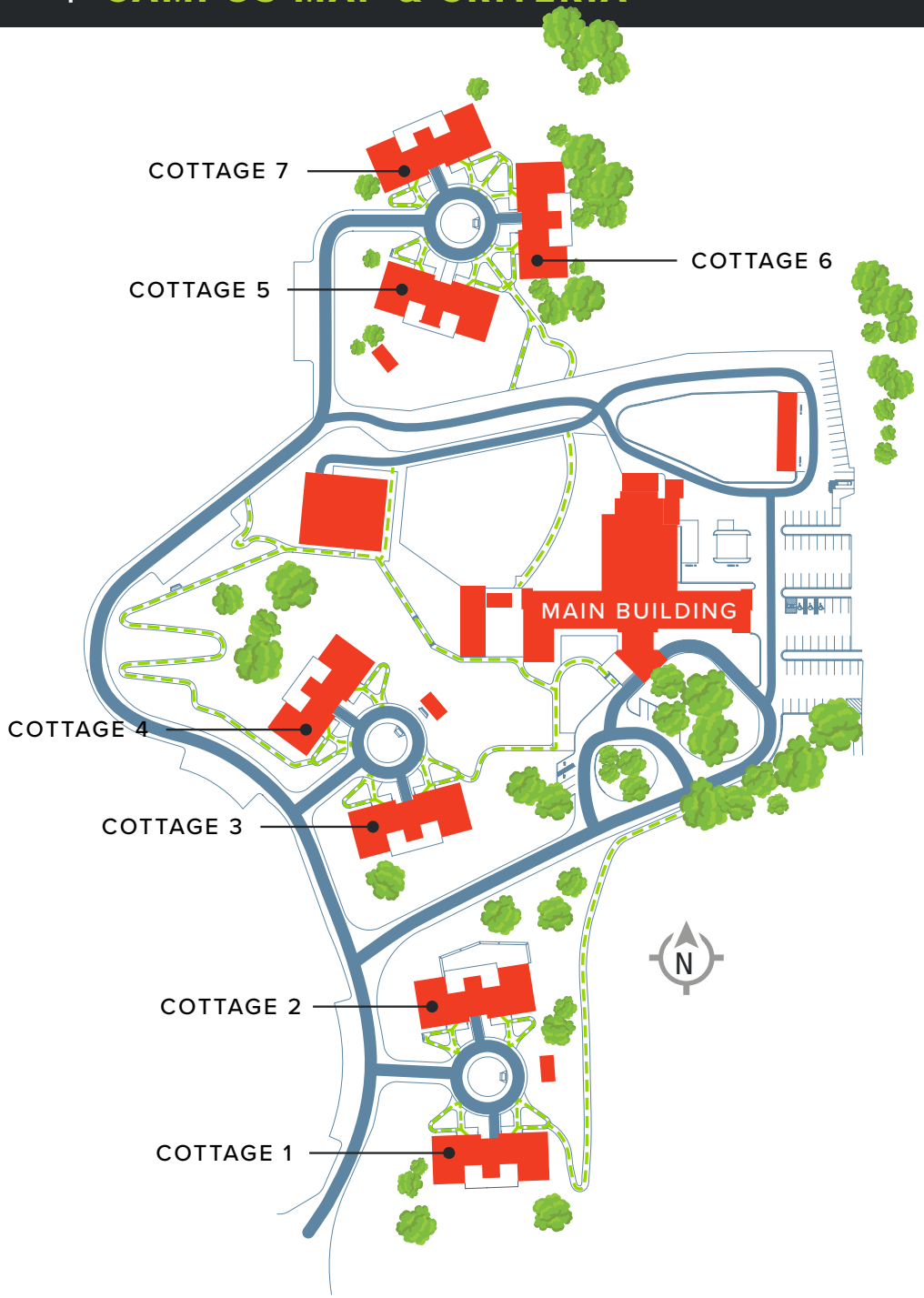
Existing wireless access point.



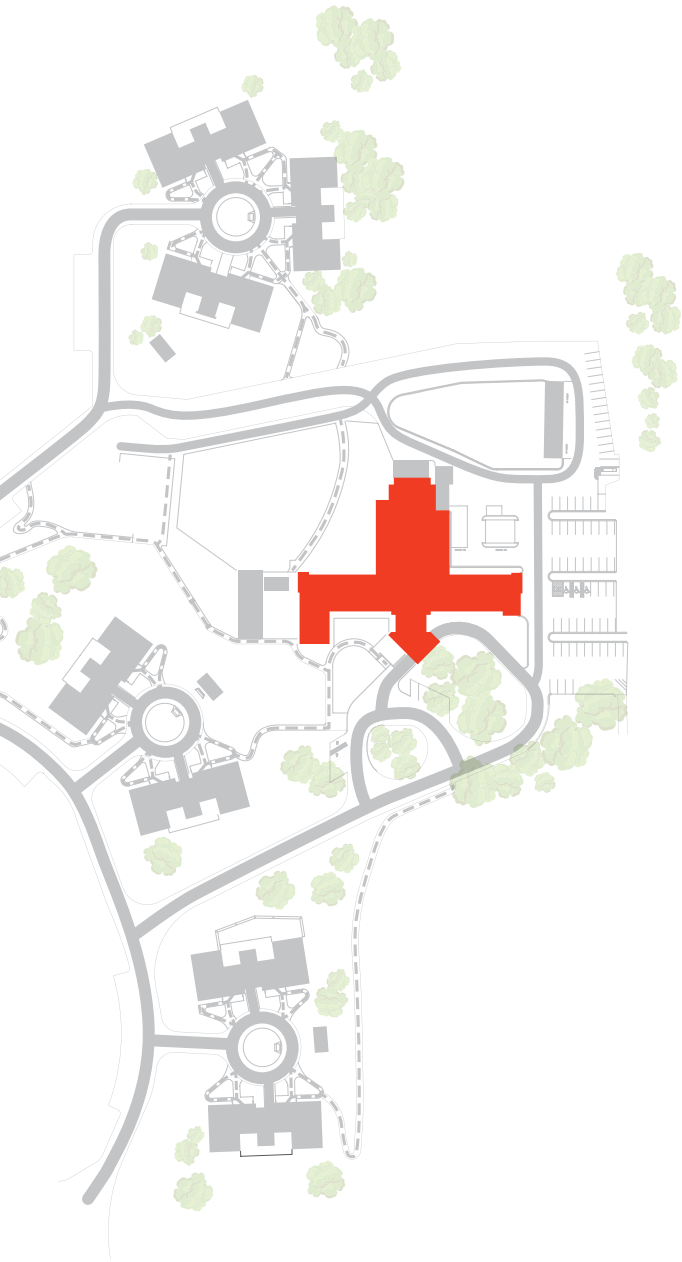
Existing category 5 rated patch panels.

Existing telecommunications outlet.

CAMPUS MAP & CRITERIA



EVALUATION CRITERIA FOR TELECOMMUNICATIONS ROOMS	
Room/Space	» Quantity, Location, and Size of Telecommunications Room. » Available space to install and terminate new cabling and rack space to mount new equipment » Adequate working clearances to access and maintain additional equipment and cabling » Space is dedicated to telecommunications » Space is secured to prevent unauthorized access.
Racks	» Equipment racks with available space for new rack mounted network equipment required to support programs housed in building or area
Grounding & Bonding	» Grounding bus bar bonded to NEC recognized grounding systems » Equipment and cabling bonded to ground
UPS	» Uninterruptable Power Supply (UPS) in place and operational to provide backup power in case of power failure » UPS sized to provide adequate run time to support new network equipment
Cooling	» Dedicated cooling equipment for equipment housed in space » Expected life span of existing equipment » Adequate capacity to support new equipment
Backbone Cabling	» Existing fiber backbone with bandwidth and capacity to support current and future applications » Minimum of 12 single-mode and 12 multi-mode optical fiber cables.
Cable Management	» Cable trays and wall mounted support systems » Rack-mounted vertical and horizontal cable management systems
Pathway	» Dedicated telecommunications standard compliant pathways » Spare conduits available with capacity for new cabling

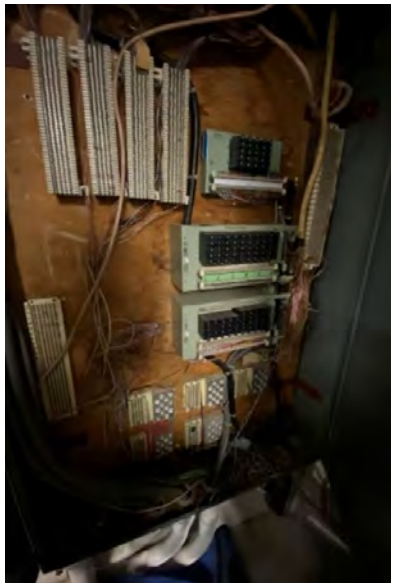


MAIN BUILDING

ROOM 015 - ENTRANCE FACILITY (EF)

The Entrance Facility is located in the basement of the Main Building. It is the demarcation point for the ISP fiber cable and the copper backbone cable. The copper backbone cabling terminates on Building Entrance Protectors (BEPs), then is patched to a combination of 66 and 110 blocks. The copper phone lines are then patched to upper floors. The two OFCs from the ISPs terminate in the EF on ISP provided equipment. The ISP cabling then routes upstairs to the third floor MDF/IT Office, which contains additional ISP provided equipment and the DSHS firewall. From there it connects to the core switches.

Existing 11 blocks.



Existing BEP and 66 blocks.

Existing ISP demarcation point.

ROOM 317 - MDF/IT OFFICE

The IT Office is on the third floor of the main building. Currently it is being utilized as the main equipment room, housing the physical servers and switching equipment. This is not an adequate location for the equipment as it does not meet TIA standards. The door is left open, allowing access to anyone walking by.

Deficiancies:

» Minimal overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.

» No grounding busbar for the telecommunications equipment.

» No Access Control to limit access and create an audit trail.

» No dedicated cooling system to maintain temperature of equipment.

» Electrical infrastructure does not meet minimum requirements per standards.

» Noisy equipment located in a workspace.

Recommendations:

» Move telecommunications equipment to a dedicated equipment room with adequate power, grounding, cooling, and access control.

Existing MDF.

ROOM 021 - FUTURE IDF-0A

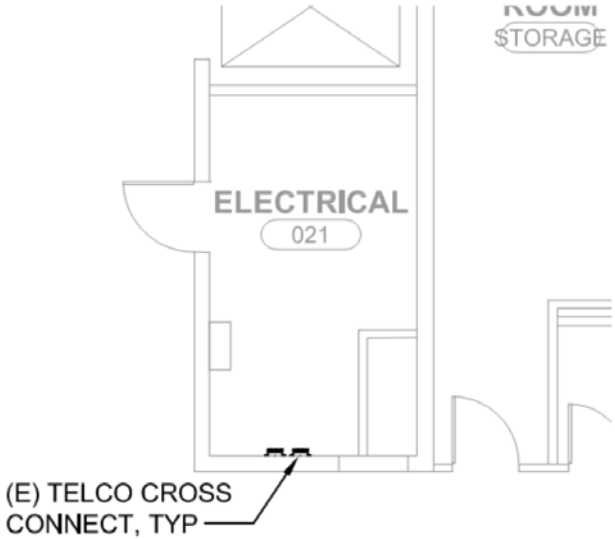
This room in the basement houses one of the existing voice cross-connects serving the basement. The main electrical bus duct goes up through this room.

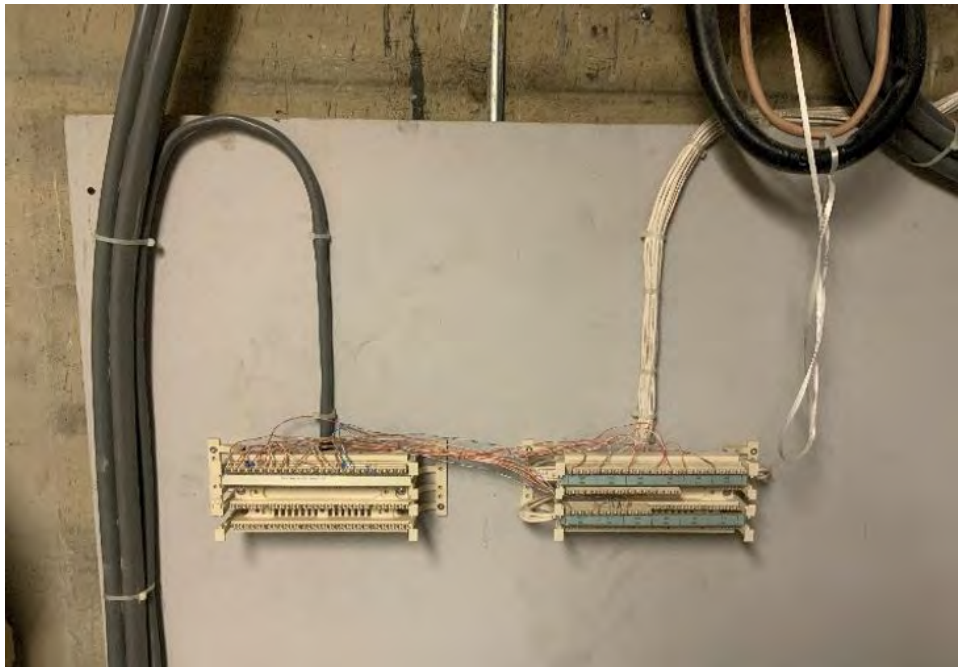
Deficiencies:

- Not currently used as a telecommunications room except for the voice cross-connect.
- Electrical equipment in room.
- No dedicated cooling system.
- No Access Control to limit access and create an audit trail.

Recommendations:

- Utilize room as a telecommunications room to serve the basement floor.
- Add racks, ladder tray, cable management as needed.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add 1-ton ductless split-system cooling unit.
- Add Access Control
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.





Existing horizontal cross-connect.

ROOM 111 - IDF-01A

Room 111 is a first-floor telecommunications room. It has two equipment racks, one is used for YVS, the other is a locked rack that belongs to the tenant on the second floor. The backbone cabling is a 6-strand 62.5-micron OM1 multi-mode optical fiber cable of which 2 strands are used. The horizontal cabling is terminated on four patch panels. Wireless access points are cabled with Category 6A and terminate on a Category 6A patch panel. The rest of the cabling is a mix of Category 5 and Category 6 and terminates on three patch panels, a Category 5 and two Category 5e patch panels.

Deficiencies:

» No grounding busbar for the telecommunications equipment.

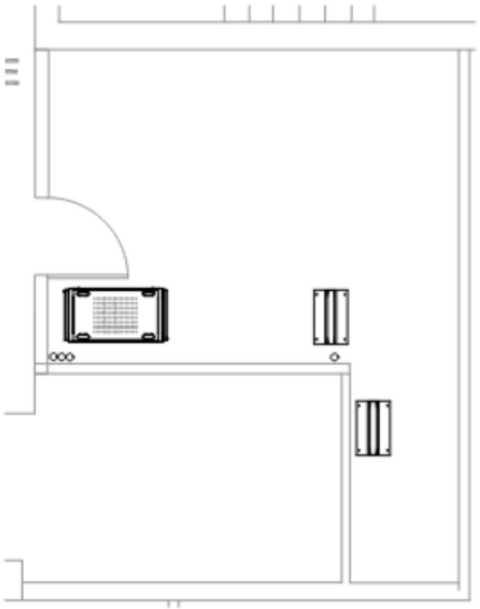
» No dedicated cooling system to maintain temperature of equipment.

» Electrical infrastructure does not meet minimum requirements per standards.

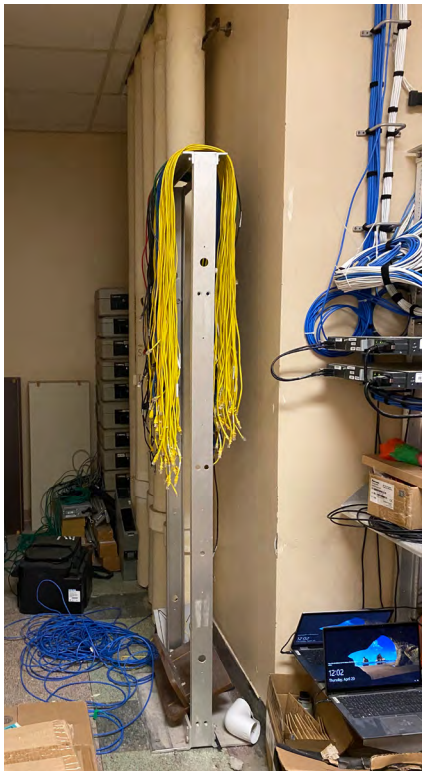
» No Access Control to limit access and create an audit trail.

Recommendations:

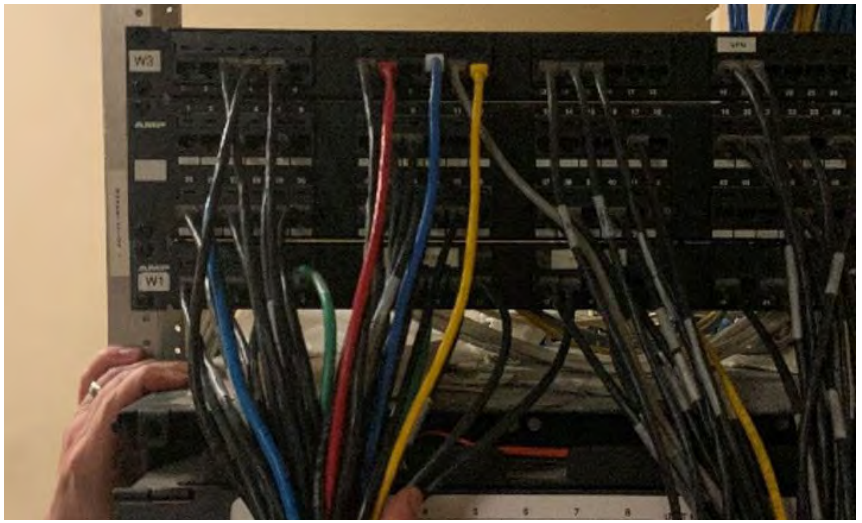
» Abandon room and build a new telecommunications room in Room 113.



Existing IDF rack.



Existing spare rack.



Existing patching.

ROOM 113 - FUTURE IDF-01A

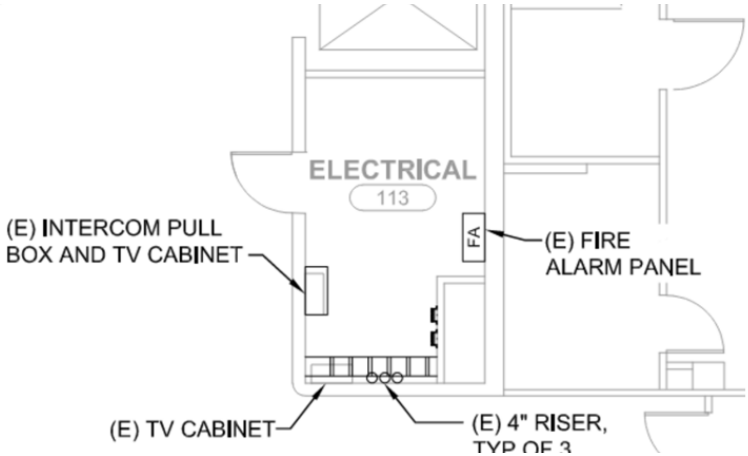
This room on the first floor houses a voice cross-connect serving the first and second floor phones. The main electrical bus duct goes up through this room.

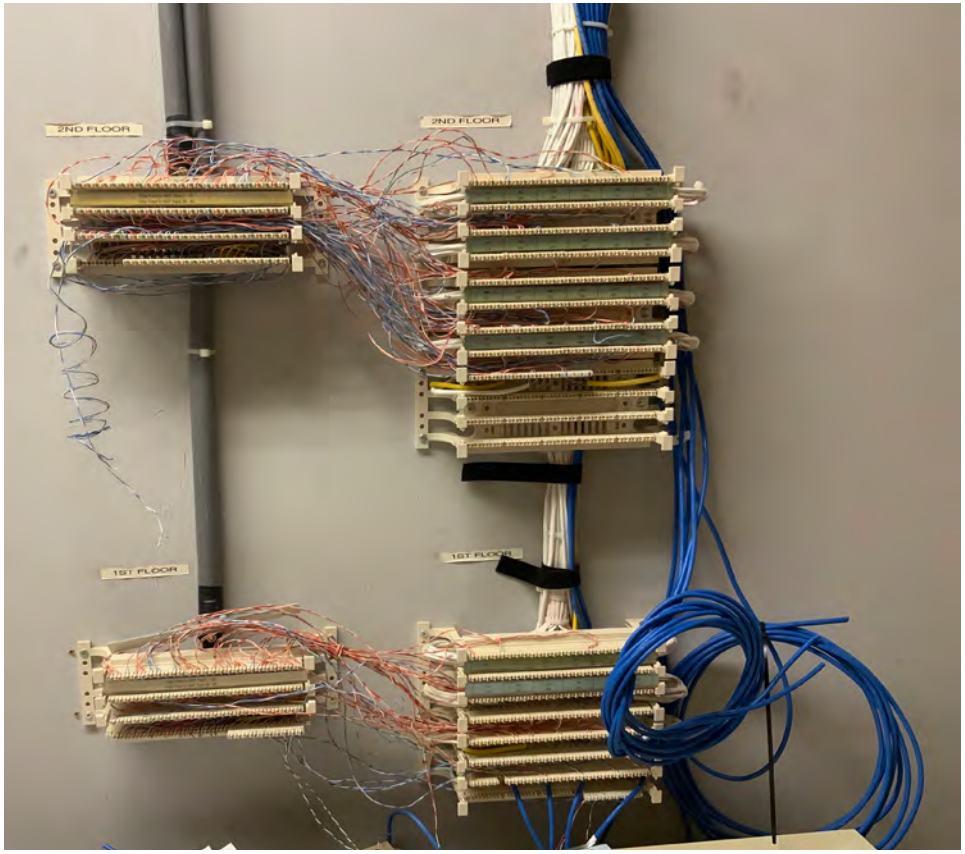
Deficiencies:

- Not currently used as a telecommunications room except for the voice cross-connect.
- Electrical equipment in room.
- No dedicated cooling system.
- No Access Control to limit access and create an audit trail.

Recommendations:

- Utilize room as a telecommunications room to serve the 1st floor.
- Add racks, ladder tray, cable management as needed.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add 1-ton ductless split-system cooling unit.
- Add Access Control
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.





Existing horizontal cross-connect.

ROOM 237 - FUTURE IDF-2A

The main electrical bus duct goes up through this room. This room is in the area leased by the current tenant, so the review team was not able to access the space. It is assumed to be available for use to create stacked telecommunications rooms.

Deficiencies:

» Not currently used as a telecommunications room except for the voice cross-connect.

» Electrical equipment in room.

» No dedicated cooling system.

» No Access Control to limit access and create an audit trail.

Recommendations:

» Utilize room as a telecommunications room to serve the 2nd floor.

» Add racks, ladder tray, cable management as needed.

» Add Telecommunications Grounding Busbar.

» Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.

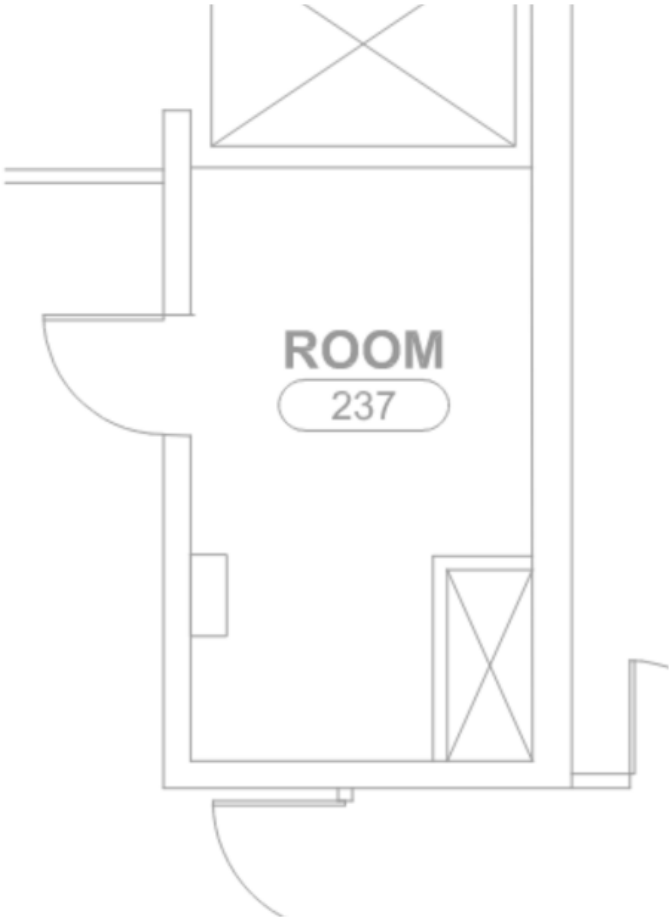
» Add power circuits and receptacles as needed.

» Add 1-ton ductless split-system cooling unit.

» Add Access Control

» Add additional Category 6A 8P8C RJ45 ports to meet standards.

» Upgrade existing port locations to Category 6A.



ROOM 309 - FUTURE MDF

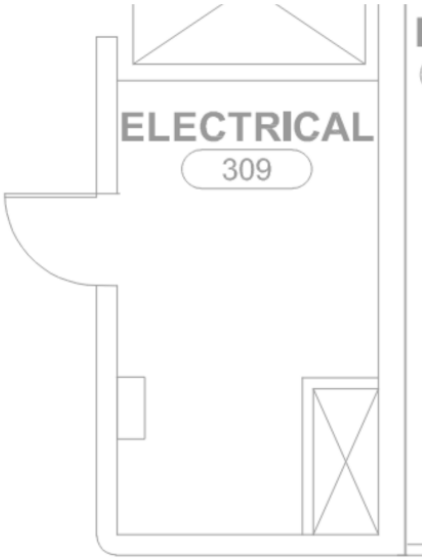
This room on the third floor houses a voice cross-connect serving the third-floor phones. The main electrical bus duct goes up through this room.

Deficiencies:

- Not currently used as a telecommunications room except for the voice cross-connect.
- Electrical equipment in room.
- No dedicated cooling system.
- No Access Control to limit access and create an audit trail.

Recommendations:

- Utilize room as a telecommunications room to serve the 3rd floor.
- Add racks, ladder tray, cable management as needed.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add 3-ton ductless split-system cooling unit.
- Add Access Control
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.



Existing horizontal cross-connect.

Existing equipment in Room 309.

ROOM 407 - IDF-4A

Room 407 is a fourth-floor telecommunications room. It has a single equipment rack. The existing backbone cabling is a 6-strand 62.5-micron OM1 multi-mode optical fiber cable of which 2 strands are used. The horizontal cabling is terminated on four patch panels. Wireless access points are cabled with Category 6A and terminate on a Category 6A patch panel. The rest of the cabling is a mix of Category 5 and Category 6 and terminates on three patch panels, a Category 5 and two Category 5e patch panels.

Deficiencies:

» No grounding busbar for the telecommunications equipment.

» No dedicated cooling system to maintain temperature of equipment.

» Electrical infrastructure does not meet minimum requirements per standards.

» No Access Control to limit access and create an audit trail.

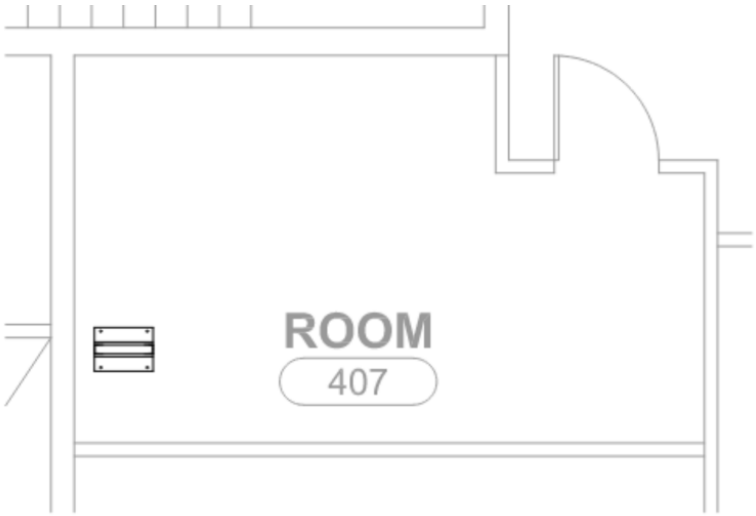
Recommendations:

» Abandon room and build a new telecom room in Room 408.

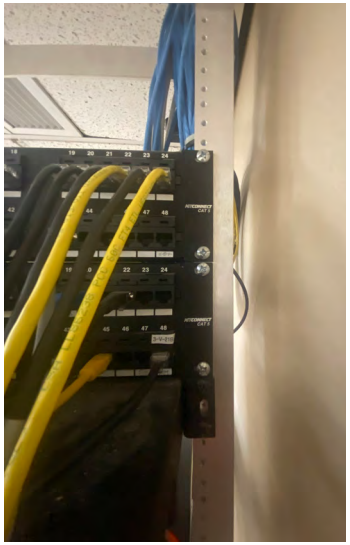
» Relocate equipment to Room 408.

» Add shelving and convert room to IT Storage.

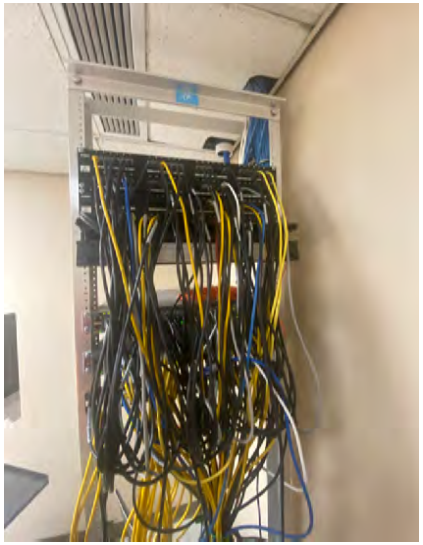
» Add Access Control to limit Access and create an audit trail.



Existing telecommunications room.



Existing category 5 patch panels.



Existing equipment rack.

ROOM 408 - FUTURE IDF-4A

This room on the fourth floor houses a voice cross-connect serving the fourth-floor phones. The main electrical bus duct goes up through this room.

Deficiencies:

» Not currently used as a telecommunications room except for the voice cross-connect.

» Electrical equipment in room.

» No dedicated cooling system.

» No Access Control to limit access and create an audit trail.

Recommendations:

» Utilize room as a Telecommunications Room to serve the 3rd floor.

» Add racks, ladder tray, cable management as needed.

» Add Telecommunications Grounding Busbar.

» Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.

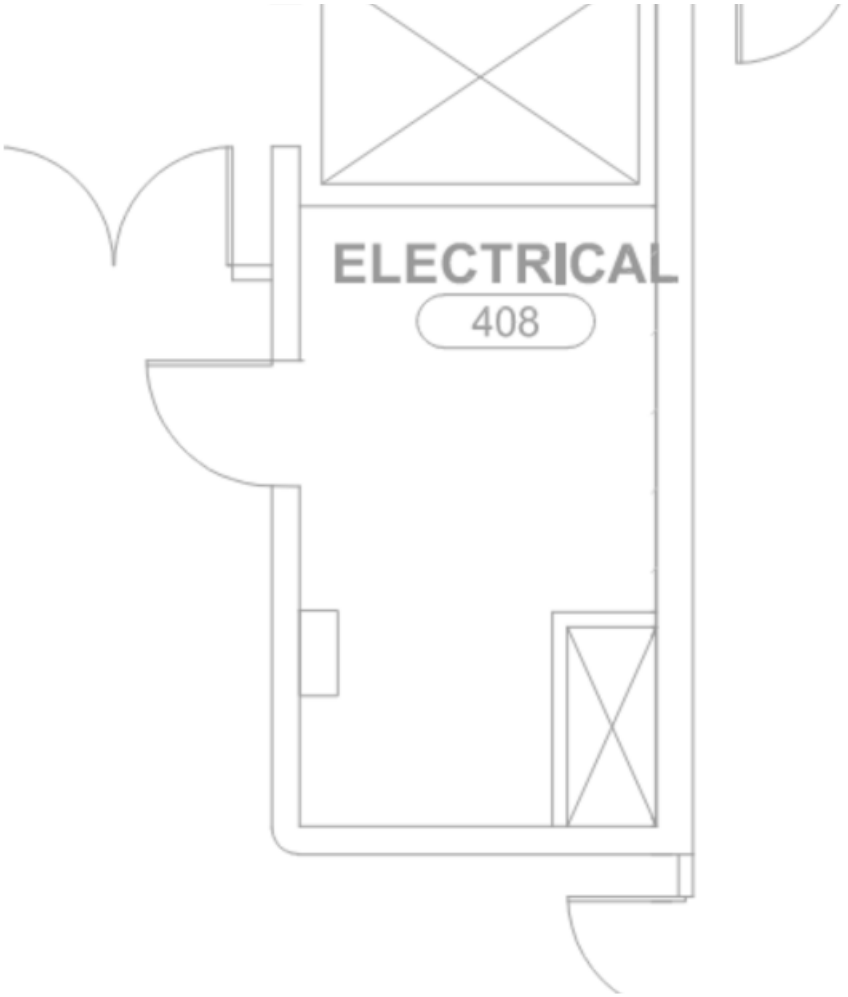
» Add power circuits and receptacles as needed.

» Add 1-ton ductless split-system cooling unit.

» Add Access Control

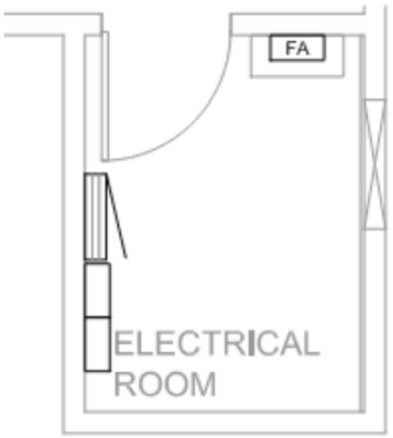
» Add additional Category 6A 8P8C RJ45 ports to meet standards.

» Upgrade existing port locations to Category 6A.



COTTAGE 1

The telecommunications space in Cottage 1 is located in the basement. The existing telecommunications backbone consists of Category 3, 6-pair copper twisted pair cabling. The horizontal voice cabling consists of Category 3, 4-pair cabling terminating in the basement telecommunications room. Ethernet horizontal cabling consists of Category 6 outside plant cables provided from Cottage 2. To meet industry and TIA standards, it is recommended to provide a new vented telecommunications enclosure in the attic of the Cottage and provide new backbone cabling from the MDF located in the Main Building for connectivity. The new telecommunications enclosure will require new Category 6A patch panels and supporting equipment. Existing wireless access points will need to be re-cabled to the new enclosure. Existing ports will need to be upgraded to Category 6A. Additional Category 6A 8P8C RJ45 ports are required to meet standards and will require new Category 6A cabling.



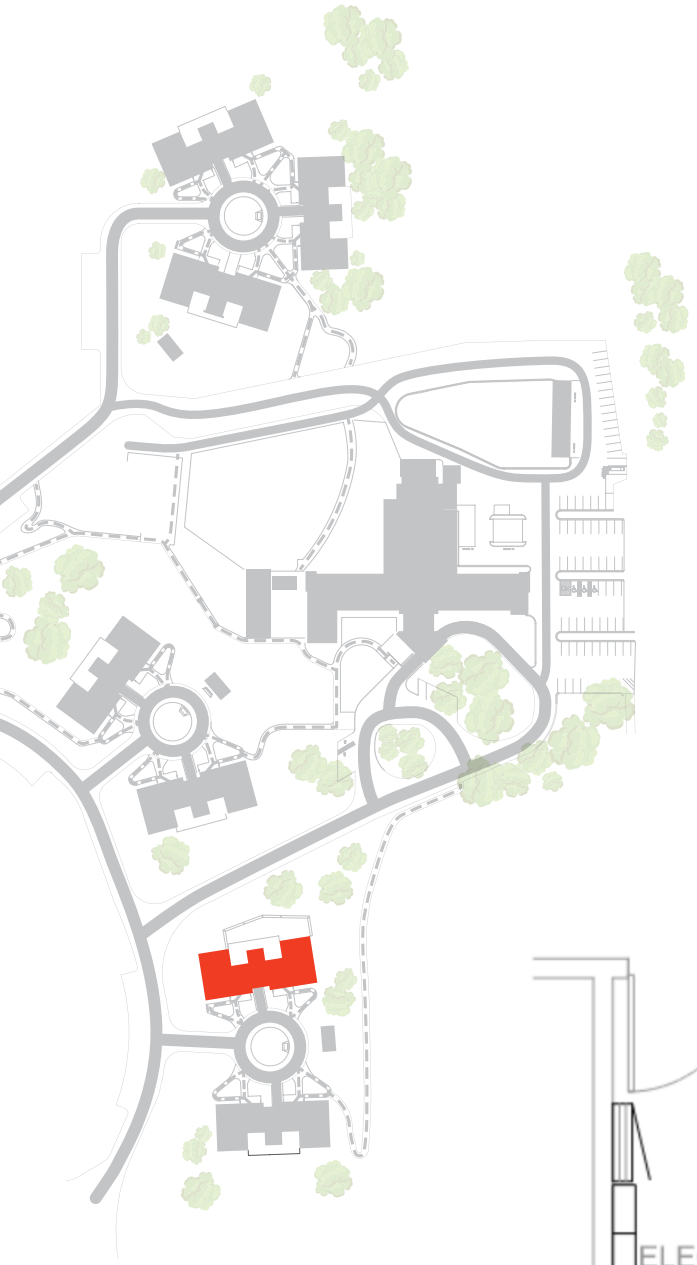
Cottage 1 telecommunications room.

Deficiencies:

- No grounding busbar for the telecommunications equipment.
- No dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- No Access Control to limit access and create an audit trail.

Recommendations:

- Abandon room and locate a new telecommunications enclosure in attic of Cottage.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.



COTTAGE 2

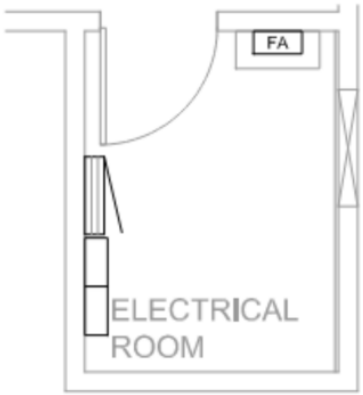
The telecommunications space in Cottage 2 is located in the basement. The existing telecommunications backbone consists of Category 3, 6-pair copper twisted pair cabling and a 6-strand OM1 multi-mode outside plant optical fiber cable, of which 2 strands are connected to an ethernet switch. The horizontal voice cabling consists of Category 3, 4-pair cabling terminating in the basement telecommunications room. Ethernet horizontal cabling consists of a mix of Category 5 and Category 6 cables. To meet industry and TIA standards, it is recommended to provide a new vented telecommunications enclosure in the attic of the Cottage and provide new backbone cabling from the MDF located in the Main Building for connectivity. The new telecommunications enclosure will require new Category 6A patch panels and supporting equipment. Existing wireless access points will need to be re-cabled to the new enclosure. Existing ports will need to be upgraded to Category 6A. Additional Category 6A 8P8C RJ45 ports are required to meet standards and will require new Category 6A cabling.

Deficiencies:

- No grounding busbar for the telecommunications equipment.
- No dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- No Access Control to limit access and create an audit trail.

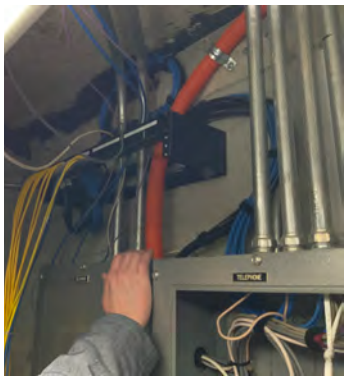
Recommendations:

- Abandon room and locate a new telecommunications enclosure in attic of Cottage.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.



Existing fiber cabinet.

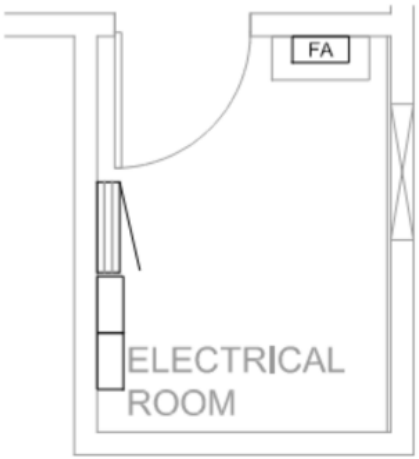
Existing ethernet switch.



Existing category 6A patch panel.

COTTAGE 3

The telecommunications space in Cottage 3 is located in the basement. The existing telecommunications backbone consists of Category 3, 6-pair copper twisted pair cabling. The horizontal voice cabling consists of Category 3, 4-pair cabling terminating in the basement telecommunications room. Ethernet horizontal cabling consists of Category 6 outside plant cables provided from Cottage 4. To meet industry and TIA standards, it is recommended to provide a new vented telecommunications enclosure in the attic of the Cottage and provide new backbone cabling from the MDF located in the Main Building for connectivity. The new telecommunications enclosure will require new Category 6A patch panels and supporting equipment. Existing wireless access points will need to be re-cabled to the new enclosure. Existing ports will need to be upgraded to Category 6A. Additional Category 6A 8P8C RJ45 ports are required to meet standards and will require new Category 6A cabling.



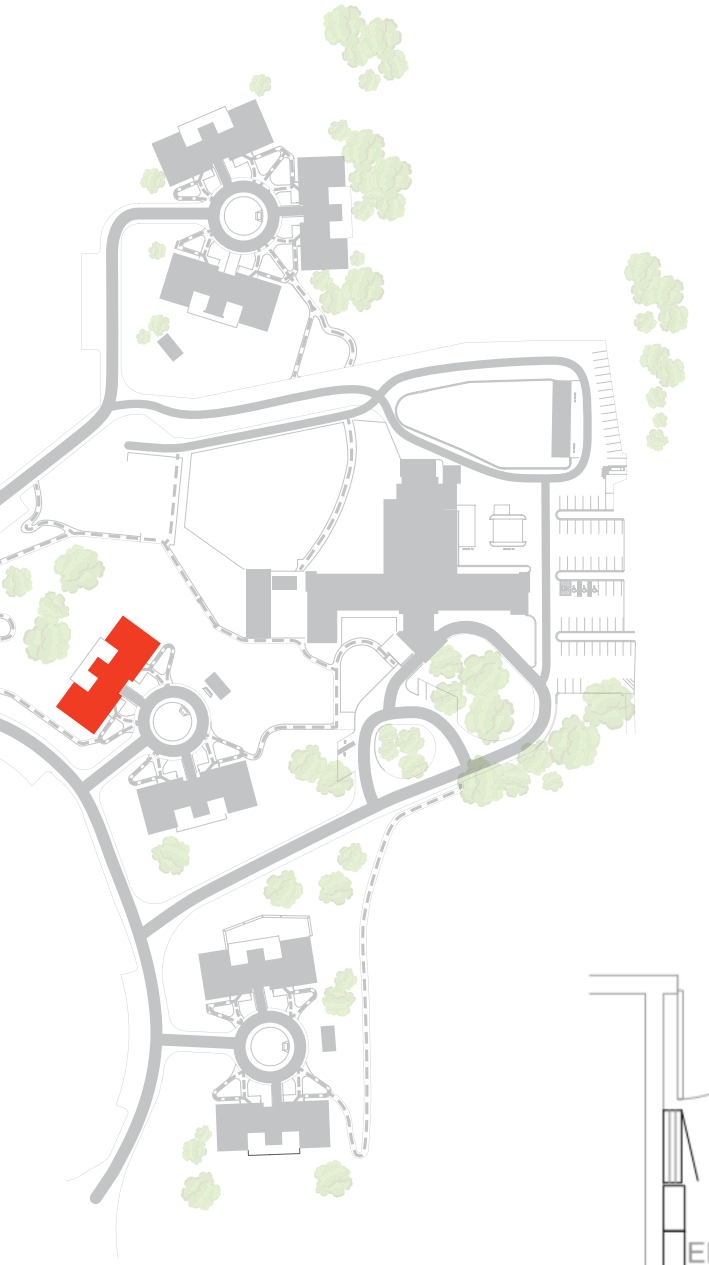
Existing telecommunications infrastructure.

Deficiencies:

- No grounding busbar for the telecommunications equipment.
- No dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- No Access Control to limit access and create an audit trail.

Recommendations:

- Abandon room and locate a new telecommunications enclosure in attic of Cottage.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.



COTTAGE 4

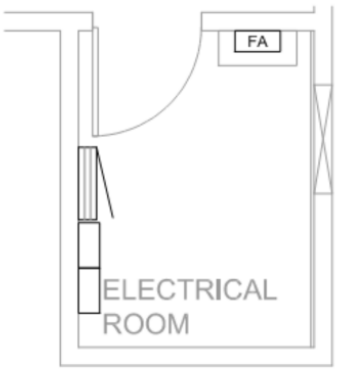
The telecommunications space in Cottage 4 is located in the basement. The existing telecommunications backbone consists of Category 3, 6-pair copper twisted pair cabling and a 6-strand OM1 multi-mode outside plant optical fiber cable, of which 2 strands are connected to an ethernet switch. The horizontal voice cabling consists of Category 3, 4-pair cabling terminating in the basement telecommunications room. Ethernet horizontal cabling consists of a mix of Category 5 and Category 6 cables. To meet industry and TIA standards, it is recommended to provide a new vented telecommunications enclosure in the attic of the Cottage and provide new backbone cabling from the MDF located in the Main Building for connectivity. The new telecommunications enclosure will require new Category 6A patch panels and supporting equipment. Existing wireless access points will need to be re-cabled to the new enclosure. Existing ports will need to be upgraded to Category 6A. Additional Category 6A 8P8C RJ45 ports are required to meet standards and will require new Category 6A cabling.

Deficiencies:

- No grounding busbar for the telecommunications equipment.
- No dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- No Access Control to limit access and create an audit trail.

Recommendations:

- Abandon room and locate a new telecommunications enclosure in attic of Cottage.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.

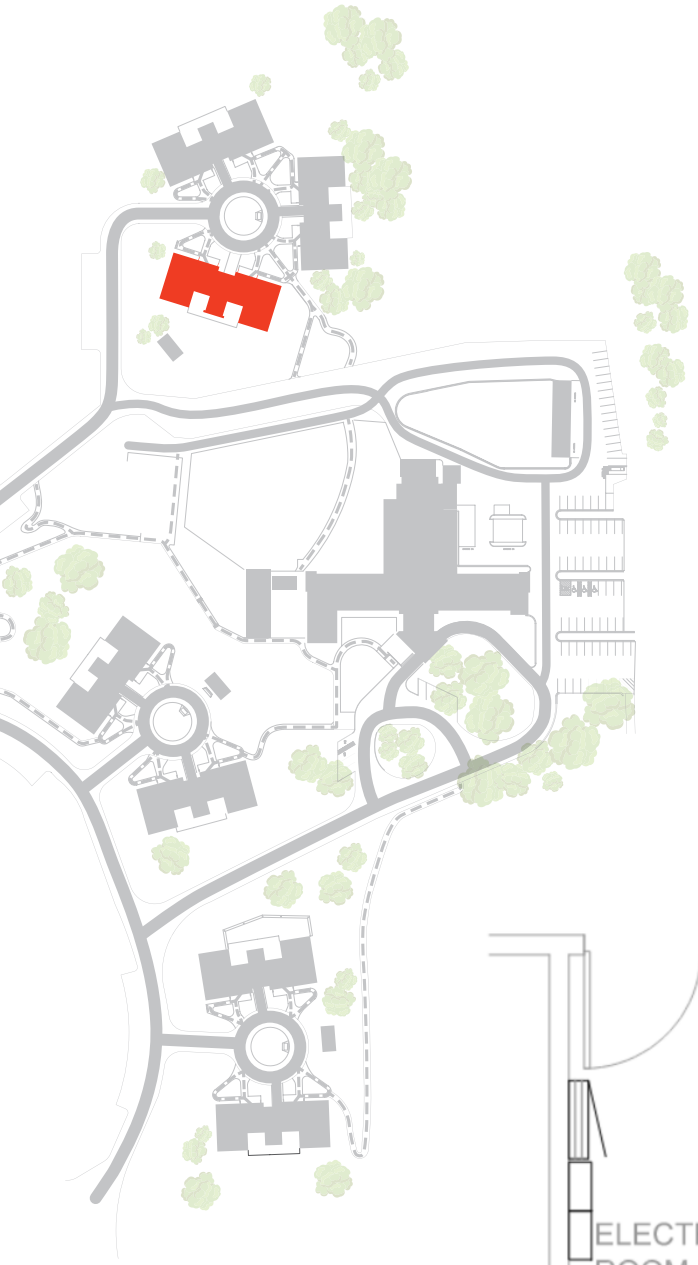


Existing ethernet switch.

Existing category 6A patch panel.

Existing fiber cabinet.

Existing category 3 terminations.



COTTAGE 5

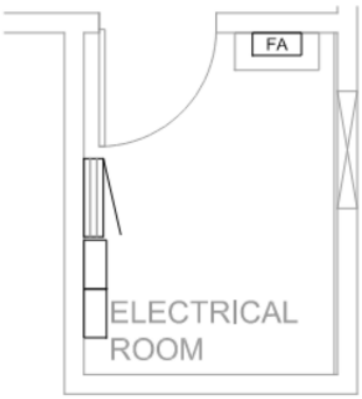
The telecommunications space in Cottage 5 is located in the basement. The existing telecommunications backbone consists of Category 3, 6-pair copper twisted pair cabling and a 6-strand OM1 multi-mode outside plant optical fiber cable, of which 2 strands are connected to an ethernet switch. The horizontal voice cabling consists of Category 3, 4-pair cabling terminating in the basement telecommunications room. Ethernet horizontal cabling consists of a mix of Category 5 and Category 6 cables. To meet industry and TIA standards, it is recommended to provide a new vented telecommunications enclosure in the attic of the Cottage and provide new backbone cabling from the MDF located in the Main Building for connectivity. The new telecommunications enclosure will require new Category 6A patch panels and supporting equipment. Existing wireless access points will need to be re-cabled to the new enclosure. Existing ports will need to be upgraded to Category 6A. Additional Category 6A 8P8C RJ45 ports are required to meet standards and will require new Category 6A cabling.

Deficiencies:

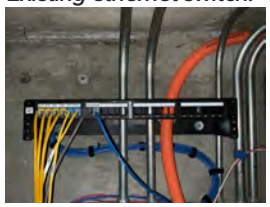
- No grounding busbar for the telecommunications equipment.
- No dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- No Access Control to limit access and create an audit trail.

Recommendations:

- Abandon room and locate a new telecommunications enclosure in attic of Cottage.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.

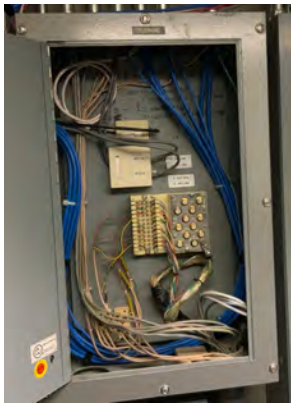


Existing ethernet switch.



Existing category 6A patch panel.

Existing fiber cabinet.



Existing voice infrastructure.

COTTAGE 6

The telecommunications space in Cottage 6 is located in the basement. The existing telecommunications backbone consists of Category 3, 6-pair copper twisted pair cabling and a 6-strand OM1 multi-mode outside plant optical fiber cable, of which 2 strands are connected to an ethernet switch. The horizontal voice cabling consists of Category 3, 4-pair cabling terminating in the basement telecommunications room. Ethernet horizontal cabling consists of a mix of Category 5 and Category 6 cables. To meet industry and TIA standards, it is recommended to provide a new vented telecommunications enclosure in the attic of the Cottage and provide new backbone cabling from the MDF located in the Main Building for connectivity. The new telecommunications enclosure will require new Category 6A patch panels and supporting equipment. Existing wireless access points will need to be re-cabled to the new enclosure. Existing ports will need to be upgraded to Category 6A. Additional Category 6A 8P8C RJ45 ports are required to meet standards and will require new Category 6A cabling.

Deficiencies:

- No grounding busbar for the telecommunications equipment.
- No dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- No Access Control to limit access and create an audit trail.

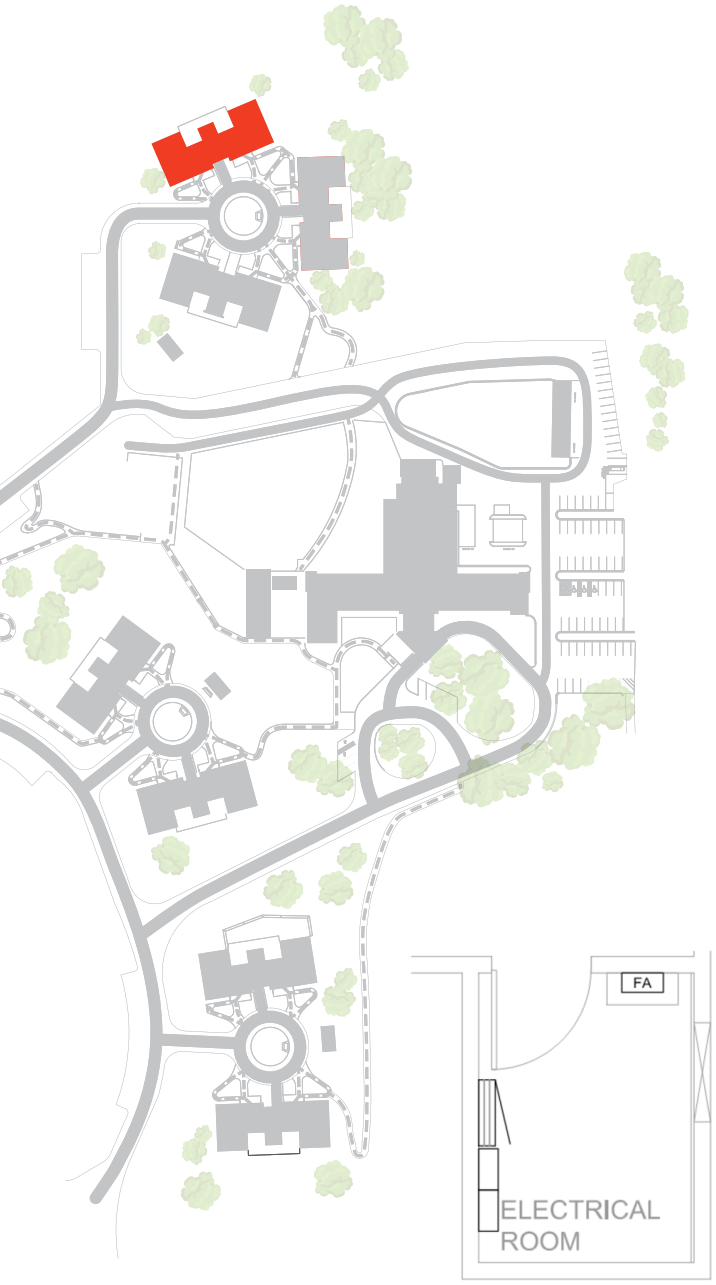
Recommendations:

- Abandon room and locate a new telecommunications enclosure in attic of Cottage.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.

Existing telecommunications room.

Existing ethernet switch.

Existing category 6A patch panel.



COTTAGE 7

The telecommunications space in Cottage 7 is located in the basement. The existing telecommunications backbone consists of Category 3, 6-pair copper twisted pair cabling, a 6-strand OM1 multi-mode outside plant optical fiber cable, and a 12-strand OM1 multi-mode outside plant optical fiber cable. The 12-strand optical fiber cable is terminated and patched to two 6-strand OM1 multi-mode outside plant optical fiber cables to serve Cottages 5 and 6. Two strands of the 6-strand optical fiber cable are connected to an ethernet switch. The horizontal voice cabling consists of Category 3, 4-pair cabling terminating in the basement telecommunications room. Ethernet horizontal cabling consists of a mix of Category 5 and Category 6 cables. To meet industry and TIA standards, it is recommended to provide a new vented telecommunications enclosure in the attic of the Cottage and provide new backbone cabling from the MDF located in the Main Building for connectivity. The new telecommunications enclosure will require new Category 6A patch panels and supporting equipment. Existing wireless access points will need to be re-cabled to the new enclosure. Existing ports will need to be upgraded to Category 6A. Additional Category 6A 8P8C RJ45 ports are required to meet standards and will require new Category 6A cabling.

Deficiencies:

- No grounding busbar for the telecommunications equipment.
- No dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- No Access Control to limit access and create an audit trail.

Recommendations:

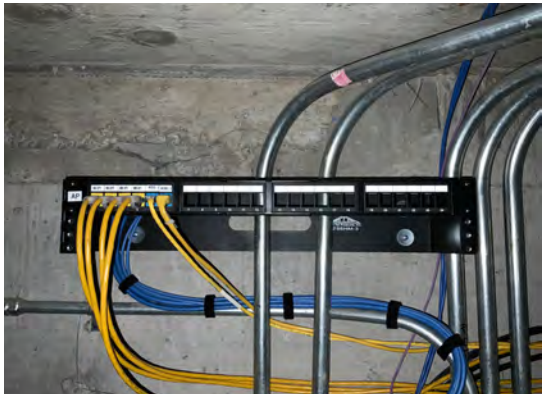
- Abandon room and locate a new telecommunications enclosure in attic of Cottage.
- Add Telecommunications Grounding Busbar.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MDF.
- Add power circuits and receptacles as needed.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Upgrade existing port locations to Category 6A.

Existing ethernet switch.

Existing voice infrastructure.

COTTAGE 7 *Cont.*

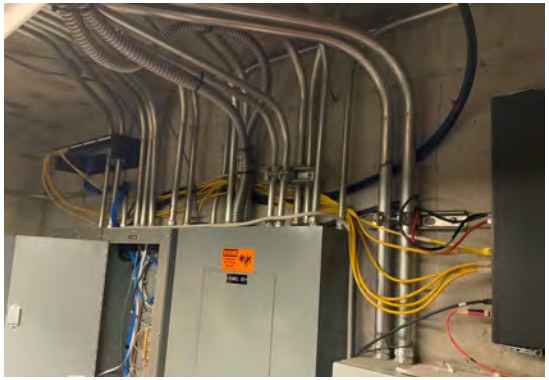
Existing cabling.



Existing category 6A patch panel.

Existing fiber cabinet.

Existing fiber terminations.



Existing cabling.

APPENDIX A: FULL COST OPINIONS

telecommunications **cost opinion**

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Telecommunications Infrastructure Assessment Recommendations
Yakima Valley School

BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 30, 2023

JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

telecommunications summary			subtotal	OH&P	total
Main Building			$ 1,025,257	$ 153,789	$ 1,179,045
Cottage 1 (101/102)			$ 163,586	$ 24,538	$ 188,124
Cottage 2 (103/104)			$ 163,586	$ 24,538	$ 188,124
Cottage 3 (201/202)			$ 164,390	$ 24,659	$ 189,049
Cottage 4 (203/204)			$ 164,390	$ 24,659	$ 189,049
Cottage 5 (401/402)			$ 163,586	$ 24,538	$ 188,124
Cottage 6 (403/404)			$ 164,390	$ 24,659	$ 189,049
Cottage 7 (405/406)			$ 164,390	$ 24,659	$ 189,049
Sub-Total			$ 2,173,575	$ 326,036	$ 2,499,613
General Contractor OH&P	**15%**				$ 374,942
Escalation	**7%**				$ 26,246
Total					**$ 2,900,801**

EXCLUSIONS

1 - Design contingency

2 - Sales Tax

telecommunications **cost opinion**

Main Building

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
DIVISION 27									
LOW-VOLTAGE SYSTEMS - DIVISIONS 27									
General Provisions (Submittals, Mobilization, Permits)	1	LS	14,374.60	14,375	$ 28,749	$ 28,749	$ 43,124	$ 6,469	$ 49,592
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	30,998.88	30,999	$ -	$ -	$ 30,999	$ 4,650	$ 35,649
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - MC	1	EA	18,000.00	18,000	5,000.00	5,000	23,000	3,450	26,450
Telecommunications Rooms - HC	4	EA	12,000.00	48,000	2,500.00	10,000	58,000	8,700	66,700
Telecommunications Rooms - HC		EA	4,500.00		1,200.00				
Backbone Cabling - Copper & Optical Fiber		LF	3.00		2.75				
Adaptor Plates - LC ACP	22		150.00	3,300	50.00	1,100	4,400	660	5,060
Rack Mount Fiber Cabinet - 4RU	7		390.00	2,730	110.00	770	3,500	525	4,025
Rack Mount Fiber Cabinet - 2RU			300.00		110.00				
Ladder Rack	100	LF	7.50	750	20.00	2,000	2,750	413	3,163
Ventilated Rack		EA	7,500.00		800.00				
20KVA UPS	1	EA	12,600.00	12,600	110.00	110	12,710	1,907	14,617
2000VA UPS	4	EA	3,000.00	12,000	110.00	440	12,440	1,866	14,306
Telecommunication Room Demolition	4	EA			2,000.00	8,000	8,000	1,200	9,200
Demolish Defunct Infrastructure After System Cutover	1	LS			6,000.00	6,000	6,000	900	6,900

telecommunications **cost opinion**

Main Building

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description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
12 Strand Singlemode Outside Plant (OSP) OFC		LF	2.50		.05				
12 Strand Multimode Outside Plant (OSP) OFC		LF	1.19		.05				
12 Strand Singlemode Plenum Rated OFC	300	LF	.94	281	.05	15	296	44	340
12 Strand Multimode Plenum Rated OFC	300	LF	1.25	375	.05	15	390	59	449
Telecommunications Device - 4-Port	140	EA	1,100.00	154,000	473.67	66,314	220,314	33,047	253,361
Telecommunications Device - 4-Port - Existing	154	EA	1,100.00	169,400	473.67	72,946	242,346	36,352	278,698
CAT 6A Quickport Connector	1,120	EA	36.16	40,495	25.00	28,000	68,495	10,274	78,769
CAT 6A Quickport Connector - Existing	1,232	EA	36.16	44,544	26.00	32,032	76,576	11,486	88,063
CAT 6A Patch Panel	25	EA	320.11	8,003	150.00	3,750	11,753	1,763	13,516
Copper 6-port Empty Cassette	200	EA	100.00	20,000	50.00	10,000	30,000	4,500	34,500
Telecom Room - Electrical Improvements	5	EA	4,000.00	20,000	2,500.00	12,500	32,500	4,875	37,375
Telecom Room - HVAC - Ductless Split System	5	EA	7,500.00	37,500	1,500.00	7,500	45,000	6,750	51,750
Pathway per Drop	140	EA	200.00	28,000	150.00	21,000	49,000	7,350	56,350
Subtotal Low-Voltage Systems (Divisions 27)							981,592	147,239	1,128,831
DIVISION 28									
LIFE SAFETY & SECURITY SYSTEMS - DIVISIONS 28									
General Provisions (Submittals, Mobilization, Permits)	1	LS	510.87	511	1,021.74	1,022	1,533	229.89	1,763
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	873.20	873			873	130.98	1,004
Raceway, Cabling Supports and Outlet Boxes	6	EA	200.00	1,200	200.00	1,200	2,400	360	2,760

telecommunications **cost opinion**

Main Building

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
SECTION 281300 ACCESS CONTROL SYSTEM									
Access Control Panel w/ Controller	1	EA	2,800.00	2,800	680.00	680	3,480	522	4,002
Door Controller - 2-Door	3	EA	535.00	1,605	85.00	255	1,860	279	2,139
Power Supply 10A/24V - 8-Door	1	EA	925.00	925	170.00	170	1,095	164	1,259
Power Supply 10A/24V - 16-Door		EA	1,950.00		255.00				
Portal Licenses	6	EA	100.00	600	50.00	300	900	135	1,035
Card Reader	6	EA	325.00	1,950	127.50	765	2,715	407	3,122
Electrified Hardware (Electrified Lock and Power Transfer)	6	EA	1,800.00	10,800	600.00	3,600	14,400	2,160	16,560
Request To Exit (REX)	6	EA	125.00	750	85.00	510	1,260	189	1,449
Wiring - Per Access Control Door	6	EA	400.00	2,400	700.00	4,200	6,600	990	7,590
Programming	1	LS			4,366.00	4,366	4,366	655	5,021
Engineering	1	LS			2,183.00	2,183	2,183	327	2,510
Subtotal Life Safety and Security Systems (Divisions 28)							43,665	6,550	50,215

telecommunications **cost opinion**

Cottage 1 (101/102)

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
DIVISION 27									
LOW-VOLTAGE SYSTEMS - DIVISIONS 27									
General Provisions (Submittals, Mobilization, Permits)	1	LS	1,974.60	1,975	$ 3,949	$ 3,949	$ 5,924	$ 889	$ 6,812
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	6,130.02	6,130	$ -	$ -	$ 6,130	$ 920	$ 7,050
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - MC		EA	20,000.00		5,000.00				
Telecommunications Rooms - HC		EA	14,000.00		2,500.00				
Adaptor Plates - LC ACP	2	EA	150.00	300	50.00	100	400	60	460
Rack Mount Fiber Cabinet - 4RU		EA	390.00		110.00				
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack		LF	750.00		110.00				
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
2000VA UPS		EA	3,000.00		110.00				
Telecommunication Room Demolition	1	EA			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	1,200	LF	2.50	3,000	.05	60	3,060	459	3,519
12 Strand Multimode Outside Plant (OSP) OFC	1,200	LF	1.19	1,426	.05	60	1,486	223	1,708
12 Strand Singlemode Plenum Rated OFC		LF	.94		.05				
12 Strand Multimode Plenum Rated OFC		LF	1.25		.05				
Telecommunications Device - 4-Port	39	EA	1,100.00	42,900	473.67	18,473	61,373	9,206	70,579
Telecommunications Device - 4-Port - Existing	13	EA	1,100.00	14,300	473.67	6,158	20,458	3,069	23,526
CAT 6A Quickport Connector	312	EA	36.16	11,281	25.00	7,800	19,081	2,862	21,943
CAT 6A Quickport Connector - Existing	104	EA	36.16	3,760	26.00	2,704	6,464	970	7,434
CAT 6A Patch Panel	5	EA	320.11	1,601	150.00	750	2,351	353	2,703

telecommunications **cost opinion**

Cottage 1 (101/102)

Telecommunications Infrastructure Assessment Recommendations

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JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
Copper 6-port Empty Cassette	40	EA	100.00	4,000	50.00	2,000	6,000	900	6,900
Telecom Room - Electrical Improvements	1	EA	4,000.00	4,000	2,500.00	2,500	6,500	975	7,475
Telecom Room - HVAC - Ductless Split System		EA	7,500.00		1,500.00				
Pathway per Drop	39	EA	200.00	7,800	150.00	5,850	13,650	2,048	15,698
Subtotal Low-Voltage Systems (Divisions 27)							163,586	24,538	188,124

telecommunications **cost opinion**

Cottage 2 (103/104)

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description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
DIVISION 27									
LOW-VOLTAGE SYSTEMS - DIVISIONS 27									
General Provisions (Submittals, Mobilization, Permits)	1	LS	1,974.60	1,975	$ 3,949	$ 3,949	$ 5,924	$ 889	$ 6,812
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	6,130.02	6,130	$ -	$ -	$ 6,130	$ 920	$ 7,050
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - MC		EA	20,000.00		5,000.00				
Telecommunications Rooms - HC		EA	14,000.00		2,500.00				
Adaptor Plates - LC ACP	2	EA	150.00	300	50.00	100	400	60	460
Rack Mount Fiber Cabinet - 4RU		EA	390.00		110.00				
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack		LF	750.00		110.00				
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
2000VA UPS		EA	3,000.00		110.00				
Telecommunication Room Demolition	1	EA			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	1,200	LF	2.50	3,000	.05	60	3,060	459	3,519
12 Strand Multimode Outside Plant (OSP) OFC	1,200	LF	1.19	1,426	.05	60	1,486	223	1,708
12 Strand Singlemode Plenum Rated OFC		LF	.94		.05				
12 Strand Multimode Plenum Rated OFC		LF	1.25		.05				
Telecommunications Device - 4-Port	39	EA	1,100.00	42,900	473.67	18,473	61,373	9,206	70,579
Telecommunications Device - 4-Port - Existing	13	EA	1,100.00	14,300	473.67	6,158	20,458	3,069	23,526
CAT 6A Quickport Connector	312	EA	36.16	11,281	25.00	7,800	19,081	2,862	21,943
CAT 6A Quickport Connector - Existing	104	EA	36.16	3,760	26.00	2,704	6,464	970	7,434
CAT 6A Patch Panel	5	EA	320.11	1,601	150.00	750	2,351	353	2,703

telecommunications **cost opinion**

Cottage 2 (103/104)

Telecommunications Infrastructure Assessment Recommendations

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description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
Copper 6-port Empty Cassette	40	EA	100.00	4,000	50.00	2,000	6,000	900	6,900
Telecom Room - Electrical Improvements	1	EA	4,000.00	4,000	2,500.00	2,500	6,500	975	7,475
Telecom Room - HVAC - Ductless Split System		EA	7,500.00		1,500.00				
Pathway per Drop	39	EA	200.00	7,800	150.00	5,850	13,650	2,048	15,698
Subtotal Low-Voltage Systems (Divisions 27)							163,586	24,538	188,124

telecommunications **cost opinion**

Cottage 3 (201/202)

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description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
DIVISION 27									
LOW-VOLTAGE SYSTEMS - DIVISIONS 27									
General Provisions (Submittals, Mobilization, Permits)	1	LS	1,975.40	1,975	$ 3,951	$ 3,951	$ 5,926	$ 889	$ 6,815
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	6,174.28	6,174	$ -	$ -	$ 6,174	$ 926	$ 7,100
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - MC		EA	20,000.00		5,000.00				
Telecommunications Rooms - HC		EA	14,000.00		2,500.00				
Adaptor Plates - LC ACP	2	EA	150.00	300	50.00	100	400	60	460
Rack Mount Fiber Cabinet - 4RU		EA	390.00		110.00				
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack		LF	750.00		110.00				
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
2000VA UPS		EA	3,000.00		110.00				
Telecommunication Room Demolition	1	EA			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	1,400	LF	2.50	3,500	.05	70	3,570	536	4,106
12 Strand Multimode Outside Plant (OSP) OFC	1,400	LF	1.19	1,663	.05	70	1,733	260	1,993
12 Strand Singlemode Plenum Rated OFC		LF	.94		.05				
12 Strand Multimode Plenum Rated OFC		LF	1.25		.05				
Telecommunications Device - 4-Port	39	EA	1,100.00	42,900	473.67	18,473	61,373	9,206	70,579
Telecommunications Device - 4-Port - Existing	13	EA	1,100.00	14,300	473.67	6,158	20,458	3,069	23,526
CAT 6A Quickport Connector	312	EA	36.16	11,281	25.00	7,800	19,081	2,862	21,943
CAT 6A Quickport Connector - Existing	104	EA	36.16	3,760	26.00	2,704	6,464	970	7,434
CAT 6A Patch Panel	5	EA	320.11	1,601	150.00	750	2,351	353	2,703

telecommunications **cost opinion**

Cottage 3 (201/202)

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description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
Copper 6-port Empty Cassette	40	EA	100.00	4,000	50.00	2,000	6,000	900	6,900
Telecom Room - Electrical Improvements	1	EA	4,000.00	4,000	2,500.00	2,500	6,500	975	7,475
Telecom Room - HVAC - Ductless Split System		EA	7,500.00		1,500.00				
Pathway per Drop	39	EA	200.00	7,800	150.00	5,850	13,650	2,048	15,698
Subtotal Low-Voltage Systems (Divisions 27)							164,390	24,659	189,049

telecommunications **cost opinion**

Cottage 4 (203/204)

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
DIVISION 27									
LOW-VOLTAGE SYSTEMS - DIVISIONS 27									
General Provisions (Submittals, Mobilization, Permits)	1	LS	1,975.40	1,975	$ 3,951	$ 3,951	$ 5,926	$ 889	$ 6,815
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	6,174.28	6,174	$ -	$ -	$ 6,174	$ 926	$ 7,100
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - MC		EA	20,000.00		5,000.00				
Telecommunications Rooms - HC		EA	14,000.00		2,500.00				
Adaptor Plates - LC ACP	2	EA	150.00	300	50.00	100	400	60	460
Rack Mount Fiber Cabinet - 4RU		EA	390.00		110.00				
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack		LF	750.00		110.00				
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
2000VA UPS		EA	3,000.00		110.00				
Telecommunication Room Demolition	1	EA			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	1,400	LF	2.50	3,500	.05	70	3,570	536	4,106
12 Strand Multimode Outside Plant (OSP) OFC	1,400	LF	1.19	1,663	.05	70	1,733	260	1,993
12 Strand Singlemode Plenum Rated OFC		LF	.94		.05				
12 Strand Multimode Plenum Rated OFC		LF	1.25		.05				
Telecommunications Device - 4-Port	39	EA	1,100.00	42,900	473.67	18,473	61,373	9,206	70,579
Telecommunications Device - 4-Port - Existing	13	EA	1,100.00	14,300	473.67	6,158	20,458	3,069	23,526
CAT 6A Quickport Connector	312	EA	36.16	11,281	25.00	7,800	19,081	2,862	21,943
CAT 6A Quickport Connector - Existing	104	EA	36.16	3,760	26.00	2,704	6,464	970	7,434
CAT 6A Patch Panel	5	EA	320.11	1,601	150.00	750	2,351	353	2,703

telecommunications **cost opinion**

Cottage 4 (203/204)

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 30, 2023

JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
Copper 6-port Empty Cassette	40	EA	100.00	4,000	50.00	2,000	6,000	900	6,900
Telecom Room - Electrical Improvements	1	EA	4,000.00	4,000	2,500.00	2,500	6,500	975	7,475
Telecom Room - HVAC - Ductless Split System		EA	7,500.00		1,500.00				
Pathway per Drop	39	EA	200.00	7,800	150.00	5,850	13,650	2,048	15,698
Subtotal Low-Voltage Systems (Divisions 27)							164,390	24,659	189,049

telecommunications **cost opinion**

Cottage 5 (401/402)

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
DIVISION 27									
LOW-VOLTAGE SYSTEMS - DIVISIONS 27									
General Provisions (Submittals, Mobilization, Permits)	1	LS	1,974.60	1,975	$ 3,949	$ 3,949	$ 5,924	$ 889	$ 6,812
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	6,130.02	6,130	$ -	$ -	$ 6,130	$ 920	$ 7,050
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - MC		EA	20,000.00		5,000.00				
Telecommunications Rooms - HC		EA	14,000.00		2,500.00				
Adaptor Plates - LC ACP	2	EA	150.00	300	50.00	100	400	60	460
Rack Mount Fiber Cabinet - 4RU		EA	390.00		110.00				
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack		LF	750.00		110.00				
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
2000VA UPS		EA	3,000.00		110.00				
Telecommunication Room Demolition	1	EA			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	1,200	LF	2.50	3,000	.05	60	3,060	459	3,519
12 Strand Multimode Outside Plant (OSP) OFC	1,200	LF	1.19	1,426	.05	60	1,486	223	1,708
12 Strand Singlemode Plenum Rated OFC		LF	.94		.05				
12 Strand Multimode Plenum Rated OFC		LF	1.25		.05				
Telecommunications Device - 4-Port	39	EA	1,100.00	42,900	473.67	18,473	61,373	9,206	70,579
Telecommunications Device - 4-Port - Existing	13	EA	1,100.00	14,300	473.67	6,158	20,458	3,069	23,526
CAT 6A Quickport Connector	312	EA	36.16	11,281	25.00	7,800	19,081	2,862	21,943
CAT 6A Quickport Connector - Existing	104	EA	36.16	3,760	26.00	2,704	6,464	970	7,434
CAT 6A Patch Panel	5	EA	320.11	1,601	150.00	750	2,351	353	2,703

telecommunications **cost opinion**

Cottage 5 (401/402)

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
Copper 6-port Empty Cassette	40	EA	100.00	4,000	50.00	2,000	6,000	900	6,900
Telecom Room - Electrical Improvements	1	EA	4,000.00	4,000	2,500.00	2,500	6,500	975	7,475
Telecom Room - HVAC - Ductless Split System		EA	7,500.00		1,500.00				
Pathway per Drop	39	EA	200.00	7,800	150.00	5,850	13,650	2,048	15,698
Subtotal Low-Voltage Systems (Divisions 27)							163,586	24,538	188,124

telecommunications **cost opinion**

Cottage 6 (403/404)

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
DIVISION 27									
LOW-VOLTAGE SYSTEMS - DIVISIONS 27									
General Provisions (Submittals, Mobilization, Permits)	1	LS	1,975.40	1,975	$ 3,951	$ 3,951	$ 5,926	$ 889	$ 6,815
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	6,174.28	6,174	$ -	$ -	$ 6,174	$ 926	$ 7,100
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - MC		EA	20,000.00		5,000.00				
Telecommunications Rooms - HC		EA	14,000.00		2,500.00				
Adaptor Plates - LC ACP	2	EA	150.00	300	50.00	100	400	60	460
Rack Mount Fiber Cabinet - 4RU		EA	390.00		110.00				
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack		LF	750.00		110.00				
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
2000VA UPS		EA	3,000.00		110.00				
Telecommunication Room Demolition	1	EA			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	1,400	LF	2.50	3,500	.05	70	3,570	536	4,106
12 Strand Multimode Outside Plant (OSP) OFC	1,400	LF	1.19	1,663	.05	70	1,733	260	1,993
12 Strand Singlemode Plenum Rated OFC		LF	.94		.05				
12 Strand Multimode Plenum Rated OFC		LF	1.25		.05				
Telecommunications Device - 4-Port	39	EA	1,100.00	42,900	473.67	18,473	61,373	9,206	70,579
Telecommunications Device - 4-Port - Existing	13	EA	1,100.00	14,300	473.67	6,158	20,458	3,069	23,526
CAT 6A Quickport Connector	312	EA	36.16	11,281	25.00	7,800	19,081	2,862	21,943
CAT 6A Quickport Connector - Existing	104	EA	36.16	3,760	26.00	2,704	6,464	970	7,434
CAT 6A Patch Panel	5	EA	320.11	1,601	150.00	750	2,351	353	2,703

telecommunications **cost opinion**

Cottage 6 (403/404)

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
Copper 6-port Empty Cassette	40	EA	100.00	4,000	50.00	2,000	6,000	900	6,900
Telecom Room - Electrical Improvements	1	EA	4,000.00	4,000	2,500.00	2,500	6,500	975	7,475
Telecom Room - HVAC - Ductless Split System		EA	7,500.00		1,500.00				
Pathway per Drop	39	EA	200.00	7,800	150.00	5,850	13,650	2,048	15,698
Subtotal Low-Voltage Systems (Divisions 27)							164,390	24,659	189,049

telecommunications **cost opinion**

Cottage 7 (405/406)

Telecommunications Infrastructure Assessment Recommendations

Yakima Valley School

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 30, 2023

JOB NUMBER 22129 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
DIVISION 27									
LOW-VOLTAGE SYSTEMS - DIVISIONS 27									
General Provisions (Submittals, Mobilization, Permits)	1	LS	1,975.40	1,975	$ 3,951	$ 3,951	$ 5,926	$ 889	$ 6,815
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	6,174.28	6,174	$ -	$ -	$ 6,174	$ 926	$ 7,100
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - MC		EA	20,000.00		5,000.00				
Telecommunications Rooms - HC		EA	14,000.00		2,500.00				
Adaptor Plates - LC ACP	2	EA	150.00	300	50.00	100	400	60	460
Rack Mount Fiber Cabinet - 4RU		EA	390.00		110.00				
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack		LF	750.00		110.00				
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
2000VA UPS		EA	3,000.00		110.00				
Telecommunication Room Demolition	1	EA			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	1,400	LF	2.50	3,500	.05	70	3,570	536	4,106
12 Strand Multimode Outside Plant (OSP) OFC	1,400	LF	1.19	1,663	.05	70	1,733	260	1,993
12 Strand Singlemode Plenum Rated OFC		LF	.94		.05				
12 Strand Multimode Plenum Rated OFC		LF	1.25		.05				
Telecommunications Device - 4-Port	39	EA	1,100.00	42,900	473.67	18,473	61,373	9,206	70,579
Telecommunications Device - 4-Port - Existing	13	EA	1,100.00	14,300	473.67	6,158	20,458	3,069	23,526
CAT 6A Quickport Connector	312	EA	36.16	11,281	25.00	7,800	19,081	2,862	21,943
CAT 6A Quickport Connector - Existing	104	EA	36.16	3,760	26.00	2,704	6,464	970	7,434
CAT 6A Patch Panel	5	EA	320.11	1,601	150.00	750	2,351	353	2,703

telecommunications **cost opinion**

Cottage 7 (405/406)

Telecommunications Infrastructure Assessment Recommendations

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description	quantity		material cost		labor cost		engineering opinion		
	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
Copper 6-port Empty Cassette	40	EA	100.00	4,000	50.00	2,000	6,000	900	6,900
Telecom Room - Electrical Improvements	1	EA	4,000.00	4,000	2,500.00	2,500	6,500	975	7,475
Telecom Room - HVAC - Ductless Split System		EA	7,500.00		1,500.00				
Pathway per Drop	39	EA	200.00	7,800	150.00	5,850	13,650	2,048	15,698
Subtotal Low-Voltage Systems (Divisions 27)							164,390	24,659	189,049