HARGIS TELECOMMUNICATIONS ASSESSMENT

DSHS

CHILD STUDY & TREATMENT CENTER

WA STATE PROJECT NUMBER: 2024-429 D (4)

EXECUTIVE SUMMARY

OVERVIEW

The Child Study and Treatment Center (CSTC), established in 1961, is Washington state's sole state-operated and funded psychiatric hospital for children and youth that cannot be met in their communities. It is operated by the Behavioral Health Administration (BHA) of the Department of Social and Health Services (DSHS). The facility "provides culturally competent care to children and youth with severe emotional and behavioral disorders that are typically complicated by medical, social, legal, and developmental issues". The campus is adjacent to Western State Hospital in Lakewood, WA, and features an Administration Building, a secondary school, and several housing units. The Administration Building houses administrative space, four classrooms, nursing, a gym, and a climbing wall. Youth live in one of the four age-specific cottages. Each cottage has staff offices, a day hall, sleeping rooms, a kitchen, and a dining hall.

CONSULTING TEAM

Hargis Engineers, Inc.

Seattle, WA 98101

Patrick Shannon, RCDD, PMP

Principal

Ben Helms, PE, RCDD

Associate

Hargis Engineers was retained to provide an assessment of the current Information Technology Network Infrastructure and develop recommendations for network improvements. 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 and compare the existing conditions to current industry standards specific to this facility type. Excluded from the assessment were electronic systems, applications, and hardware, such as the network switches and servers.

The CSTC campus, being located adjacent to the Western State Hospital (WSH), utilizes the same physical campus network infrastructure. The existing campus telecommunications cabling backbone infrastructure includes inter-building optical fiber cabling and twisted-pair copper backbone cabling installed between the administration building and several of the cottages on campus. The administration building also includes intra-building optical fiber. The new San Juan cottage has fiber and twisted-pair copper cabling directly from the Equipment Room in Building 18 of WSH. In most areas, the backbone cabling is antiquated and is not able to support the deployment of new technologies nor does it comply with current industry standards. At one cottage, there is no optical fiber backbone. The optical fiber backbone cabling routes through one cottage to provide connectivity to two other cottages. The twisted-pair copper backbone is rated for traditional telephony service.

The existing horizontal cabling within buildings includes unshielded twisted-pair copper cabling to provide connectivity to computers, telephones, printers, and other devices. Like the backbone cabling, the horizontal cabling has been installed over time and the condition of the cabling varies. The horizontal cabling is a blend of Category 3 cabling and Category 5e cabling, which does not meet current industry infrastructure standards.

Based on physical inspection and review of existing documentation, it is the determination of the team that the existing IT infrastructure does not comply with any of the current industry standards and that it will not support evolutions to modern and/or future technologies. The existing optical fiber infrastructure is obsolete, consisting mostly of OM1 62.5-micron multi-mode optical fiber cable. Improving the IP backbone connectivity will be a fundamental component to creating an environment that will permit CSTC and DSHS to identify, adapt, and implement new technologies that contribute to safety and operational improvements.

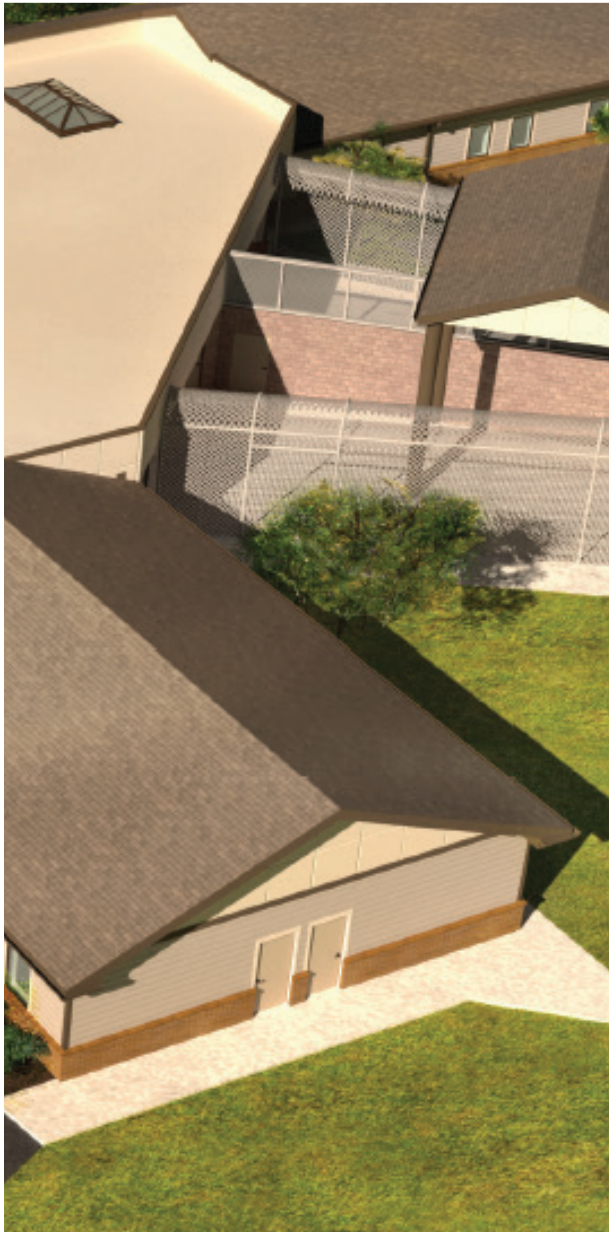
Existing horizontal cabling is not compliant with current TIA standards for this facility type. Upgrading category cabling requires a replacement of the complete channel to include horizontal cabling, patch cords, patch panels, and work area outlets. At CSTC, this upgrade also requires installation of additional cabling to be compliant with port density requirements defined in TIA-1179.

In addition to the cabling noted above, the existing telecommunications spaces do not meet industry standards. Per TIA-1179, a dedicated telecommunications space is required on every floor to support the horizontal cabling infrastructure. Complying with the standard will require new/additional telecommunications rooms to be built on floors that do not currently have a telecommunication room. The additional telecommunications rooms will need to be equipped with supporting systems to include grounding, conduit sleeves, temperature control, and physical security of the space.

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 backbone cabling one-line diagram.

The team sought input from the stakeholder team and consulted current industry standards and best practices. 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. Those recommendations were analyzed to determine a possible project sequence for constructability while limiting downtime for the facility, understanding that the facility will need to remain in operation during any project.

STANDARDS & CODES

- TIA-1179 Healthcare Facility Telecommunications Infrastructure Standard
- TIA-5017 Telecommunications Physical Network Security Standard
- TIA-569 Telecommunications Pathways and Spaces
- BICSI Telecommunications Distribution Methods Manual, 14th Edition
- Health Insurance Portability and Accountability Act (HIPAA)

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**
An environmentally controlled centralized space for telecommunications equipment that usually houses a main or intermediate cross-connect. (TIA)

ER **Equipment Room**
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 Facility**
Legacy term (no longer used) for what is now defined as the TR-HC or TR-IC

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**
Legacy term (no longer used) for what is now defined as the TR-MC and/or TR-MER

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 (previously known as 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 Telecommunications Rooms in Administration, Firwood, Maintenance, Camano, Orcas, Ketron, and Maintenance. - 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 dedicated ductless split system cooling units in new Telecommunications Rooms and where recommended in existing. - 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.).	$532,000
INSTALL BACKBONE OFC TO NEW TELECOM SPACES			
2	N/A	» Pull 12 st OS2 and 12 st OM4 OFC from WSH Building 18 MER to Telecommunications Room B104 in Administration and to each Telecommunications Room in Firwood, Maintenance, Camano, Orcas, Ketron, and Maintenance. - Terminate OFC Cabling if RMFC is installed. » Pull 12 st OS2 OSP and 12 st OM4 OSP OFC from basement MER B104 to attic Telecommunications Room in Administration - Terminate OFC Cabling if RMFC is installed. » Pull 24 st OM4 OSP OFC from WSH Building 18 MER to Telecommunications Room 119 in San Juan - Terminate OFC Cabling if RMFC is installed. » Provide new pathway from MH1 to Admin with new vault. » Provide new pathway from Admin to Firwood School, the Maintenance Building, and Camano, Ketron, and Orcas Cottages.	$910,000
INSTALL HORIZONTAL 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.	$1,046,000
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 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.	$608,000
DEMOLISH DEFUNCT INFRASTRUCTURE			
6	1-5	» Demolish OSP cable. - Demolish OM1 Multi-mode OSP OFC to all CSTC buildings. - Demolish Copper twisted pair OSP Backbone cabling between WSH and Administration, San Juan, Firwood, and Camano. - Demolish Copper twisted pair OSP Backbone cabling from Firwood to Maintenance, and from Camano to both Ketron and Orcas. » Demolish Administration backbone cabling - Demolish OM1 Multi-mode OFC between MER B104 and TR-Attic. » Demolish Defunct telecommmunications rooms. - Remove any salvageable equipment from TR's. - Remove the remaining equipment and dispose of it.	$28,000

EXISTING COMMUNICATIONS INFRASTRUCTURE

BACKBONE CABLING

Service Provider Connections

Service provider connections are provided through WSH as CSTC is on the same campus and served by the same network. Existing voice service is provided from the WSH Equipment Room in Building 18, the telephone system demarcation point, through copper backbone cables to each respective building. Internet Service connection is also provided by WSH through the optical fiber backbone. The fiber and copper backbones route across campus through vaults MH-1, MH-3, MH-4, MH-5, MH-6, MH-16, MH-15, the steam tunnel, then into the equipment room in the basement of the Main Building.

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

Existing Backbone Fiber Patching.

Existing Backbone Cabling.

Existing Backbone Fiber Patching.

INTER-BUILDING BACKBONE CABLING

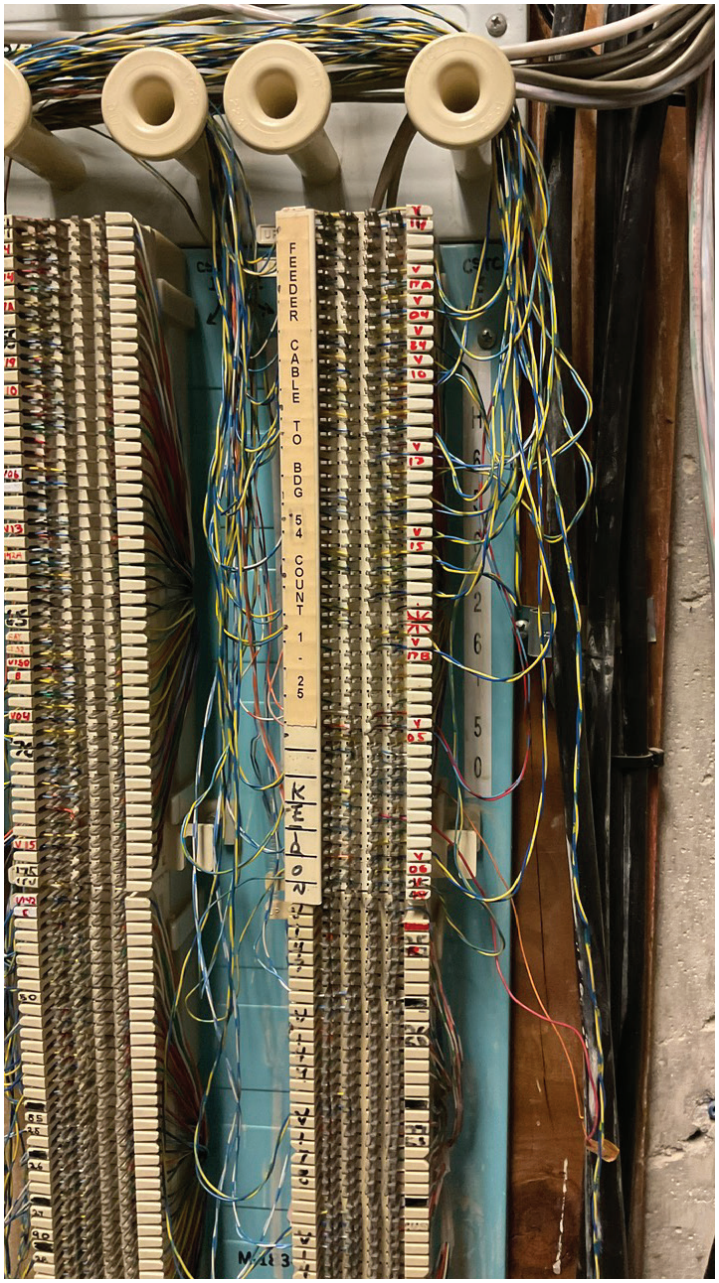
The existing communications infrastructure providing connectivity to the CSTC is a mix of 62.5-micron OM1 multi-mode outside plant optical fiber cable, 50-micron OM3 multi-mode outside plant optical fiber cable, single-mode outside plant optical fiber cable, and twisted-pair copper cable for voice applications.

The administration building is connected to the WSH network through a 12-strand single-mode outside plant optical fiber cabling backbone and twisted-pair copper from Building 18. The Camano and Orcas Cottages, Firwood Secondary School, and the Maintenance Building are all served by OM1 multi-mode outside plant optical fiber cable. San Juan Cottage, being recently constructed has the newest backbone cabling, consisting of a 48-strand single-mode and 24-strand OM3 multi-mode cable.

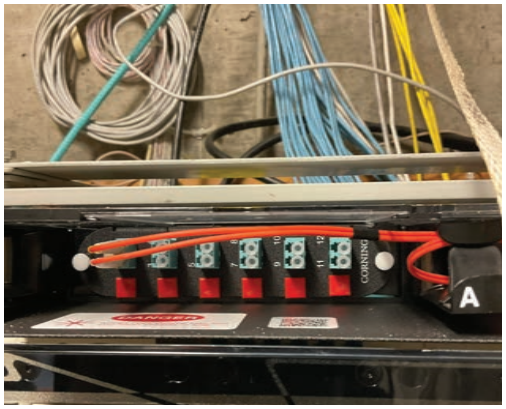
The existing ethernet network is supported by OM1 multi-mode optical fiber backbones between buildings and telecommunication rooms. The fiber backbone serving the cottages originates on a rack mount fiber cabinet in the existing MER located in the basement of the Admin Building, goes to Camano Cottage, then to Ketron Cottage. Orcas Cottage does not have optical fiber backbone cabling to the building. Firwood Secondary School and Maintenance are also served by OM1 multi-mode outside plant optical fiber cable that is not standards compliant.

The current OM1 fiber backbone is extremely limited in bandwidth and data speeds. OM1 fiber is obsolete, is not readily available through distribution, and is not being manufactured in great quantity. 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 to 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 building. The existing OM1 optical fiber backbone cabling should be demolished.

All Buildings are served by Category 3 twisted-pair copper cabling for voice applications. Due to the limited backbone cabling going to each Cottage, it is recommended that the existing Category 3 twisted-pair copper backbone be replaced and/or augmented with industry standard compliant backbone cabling consisting of a hybrid of single-mode and multi-mode optical fiber cabling.



Existing Voice Cable Patching, Building 52



Existing Fiber Type Mismatch, Administration

Existing Telecommunications Cabinet, Building 54

INTRA-BUILDING BACKBONE CABLING

Due to the sizes of the CSTC buildings, there is limited intra-building backbone cabling on the campus. The only building with intra-building backbone cabling is the Administration Building. There is a 12-strand OM3 multi-mode OFC between the basement telecom room and the attic telecom space. A 50-pair Category 3 twisted-pair copper backbone cable is utilized between the basement telecom room and the attic telecom room.

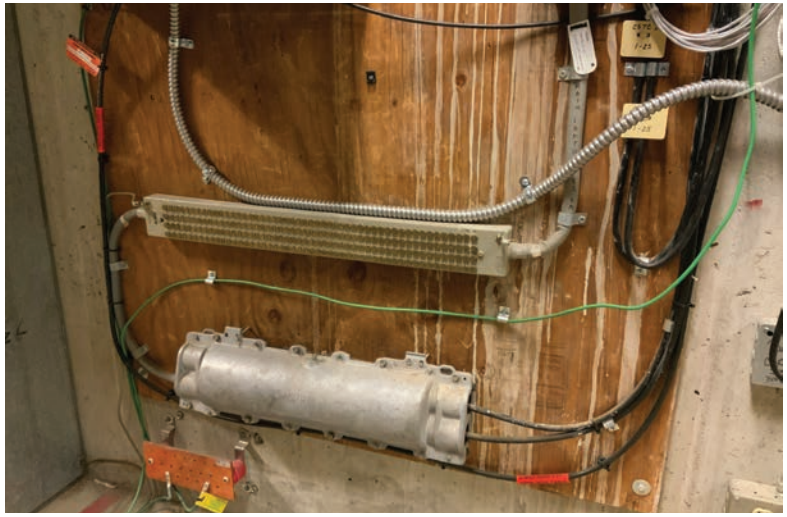
The voice network should be collapsed to a single converged IP based network, and the existing Category 3 cabling should be demolished to align with current standards.

To meet TIA standards, the backbone fiber cabling should be upgraded to a minimum of OM4 multi-mode and augmented with the addition of single-mode optical fiber cable. Providing 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber cables will provide an optical fiber backbone that is compliant with current industry standards.

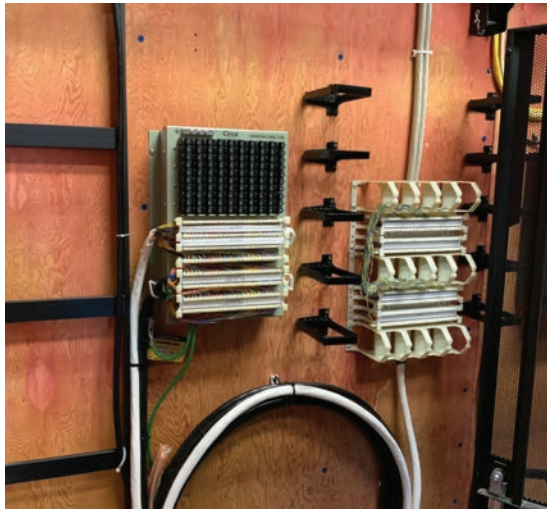
HORIZONTAL CABLING

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

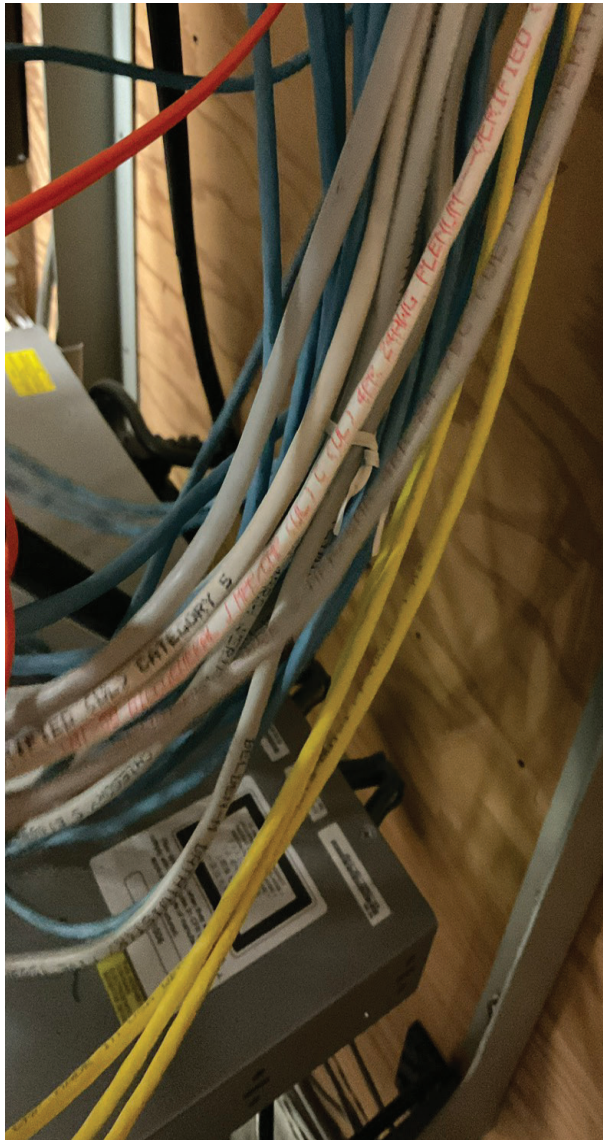
Source: https://tripplite.eaton.com/products/ethernet-cable-types



Existing Voice Backbone Cable Splicing, Building 52.



Existing Voice Patching, Building 55.



Existing Horizontal Cabling, Administration Building.

VOICE HORIZONTAL CABLING

Upon review of the voice infrastructure, it was found to be inadequate to serve the current and future needs of CSTC. 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 cable termination blocks used to interconnect runs of on-premises wiring in a structured cabling system. The service originates from WSH Building 18 and is provided by a 100-pair twisted-pair copper cable that enters the basement telecommunications room in the administration building. The twisted-pair copper cable patches on building entrance protectors, then patches to 66 blocks, then to the workstation cabling.

The newest cottage, San Juan, was recently constructed and features Category 6A cabling and patching for voice infrastructure. This cottage meets TIA-1179 standards for horizontal cabling.

Category 3 cabling does not meet TIA-1179 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. After years of modifications and multiple generations of cabling it is nearly impossible to maintain. 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

Existing Voice Patching, Administration Building.

ETHERNET HORIZONTAL CABLING

The existing ethernet network is comprised of a mix of Category 5 and 5e cabling. Category 5 and 5e cabling is limited to 100 Mbps and is no longer recognized by the standards bodies as a viable infrastructure. The existing patch panels, connectors, and patch panels meet Category 5 and 5e standards. CSTC underwent a project to install wireless access points throughout the buildings on campus. Category 6 and Category 5e cabling was installed to support the wireless infrastructure, depending on the building. The horizontal cabling installed in the recently constructed San Juan cottage was Category 6A.

Over the years, the cabling has been expanded and altered to meet the needs of the staff. Observations during the site visit included surface mounted raceway.

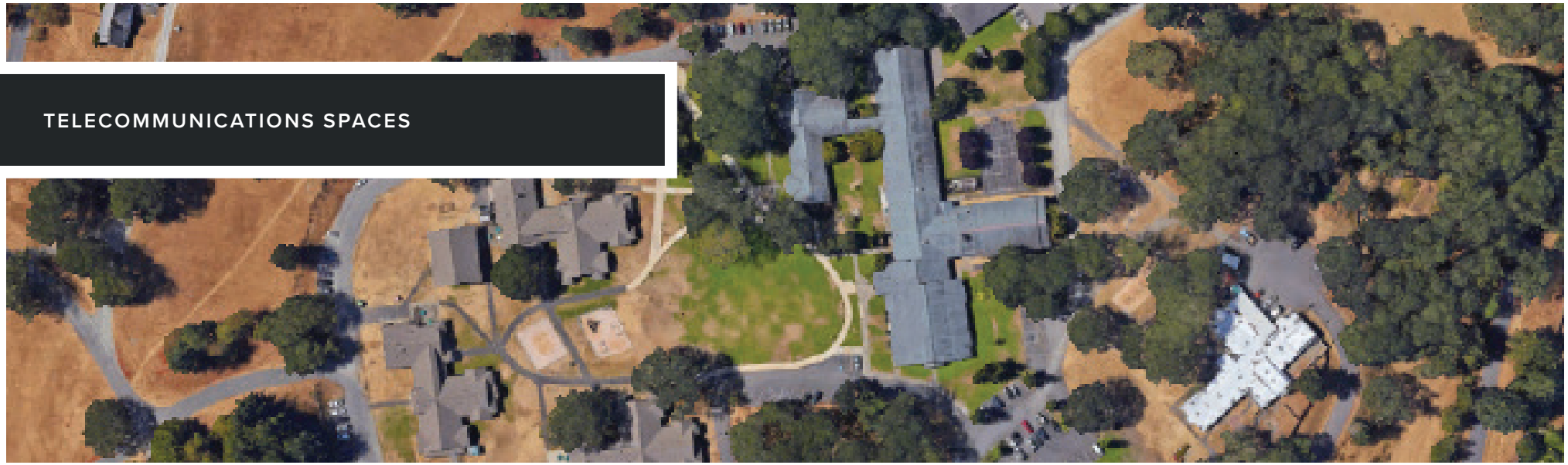
The existing Category 5 infrastructure is not adequate to meet the current and future needs of YVS. The Category 5 cabling is not in compliance with TIA standards for infrastructure. It is recommended that the existing cabling infrastructure be replaced with a new Category 6A cabling infrastructure.

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.

Existing Amp ACO Telecommunications Outlet.

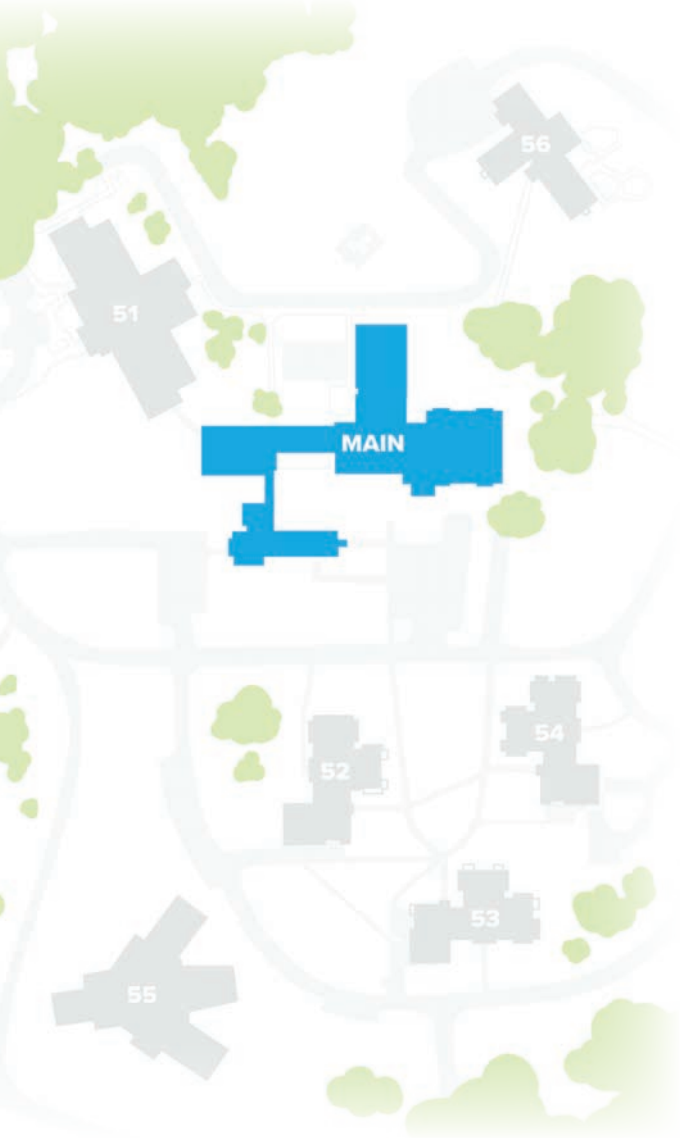
EVALUATION CRITERIA FOR TELECOMMUNICATIONS ROOMS		
Room/Space	»	Quantity, Location, and Size of Telecommunications Room.
	»	Available space to install and terminate new cabling and rack space to mount new equipment
	»	Adequate working clearances to access and maintain additional equipment and cabling
	»	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

TELECOMMUNICATIONS SPACES



The existing telecommunications spaces are not compliant with current standards. Currently, there is not a telecommunications space on every floor as is required. The existing spaces do not have an environmental control system to maintain required temperature and humidity. Inconsistent grounding was observed during the walkthrough, increasing the risk of damage to equipment from transient voltages.

To support future expanded infrastructure and meet industry standards, it is recommended to build new telecommunications rooms. Creating telecommunications rooms will require power upgrades to provide convenience receptacles, and dedicated equipment receptacles. Uninterruptible Power Supplies (UPS) should be provided to provide clean power, protect equipment from transients, and provide backup power. Dedicated cooling should be provided to maintain equipment temperature. Network support equipment will have to be provided: racks, grounding, ladder rack, Category 6A patch panels. To comply with the Health Insurance Portability and Accountability Act (HIPAA) and meet telecommunications standards, access to the space will need to be provided to limit access to authorized staff. Access control can be accomplished using different methods, including, keys and locks or an electronic access control system. Per HIPAA security requirements, the entity must "Implement procedures to control and validate a person's access to facilities based on their role or function…" Electronic access control systems have this capability built in. This capability can be accomplished for keys and locks through the use of third-party key control systems like Keywatcher or other manual processes of controlling the physical keys, which allows keys to be checked out after entering a code or some other means of identifying information to validate a person's access to the telecommunications spaces. See room summaries later in this document.

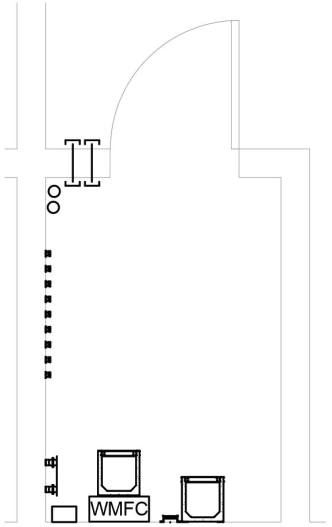


ADMINISTRATION BUILDING

EQUIPMENT ROOM B104 - MAIN EQUIPMENT ROOM

The Main Equipment Room for CSTC is in the basement of the Administration Building. One wall of the room supports the voice horizontal cabling terminations and patching. There is a mix of current and abandoned cabling, building entrance protection, and termination blocks. There is a wall-mounted rack housing fiber patch panels for a 12-strand OM1 multi-mode OFC and 12-strand single-mode OFC. It also houses 48 port Category 5 patch panels. There are two wall-mounted fiber cabinets with limited access because they are installed behind the wall-mounted rack. The room is served by a 12-strand SM OFC and a 100-pair Category 3 twisted-pair copper cable. Room for expansion is available in the form of a second, empty, wall-mounted rack. A grounding rod has been installed in the room, but no grounding bus bar. The empty rack is grounded, but the occupied rack has not been bonded to the ground rod. There is no cooling or humidity control present in the room. There are a few convenience receptacles, but not dedicated equipment receptacles. UPS power is available to provide clean, uninterrupted power for the equipment. The room can be locked but there is no other access control on the room.

To meet industry standards, it is recommended to upgrade the existing backbone and horizontal cabling to OM4/OS2 and Category 6A. Additional Category 6A data ports are required to meet standards. It is also recommended to provide a telecommunications grounding busbar to create a consistent potential across all components. Dedicated cooling, ladder rack, cable management, and dedicated equipment receptacles are required to meet standards. The addition of card-based access control is recommended to control access and track access to the space. The addition of card-based access control is recommended to control access and track access to the space.



Existing Horizontal Cabling.

Existing Backbone Cabling.

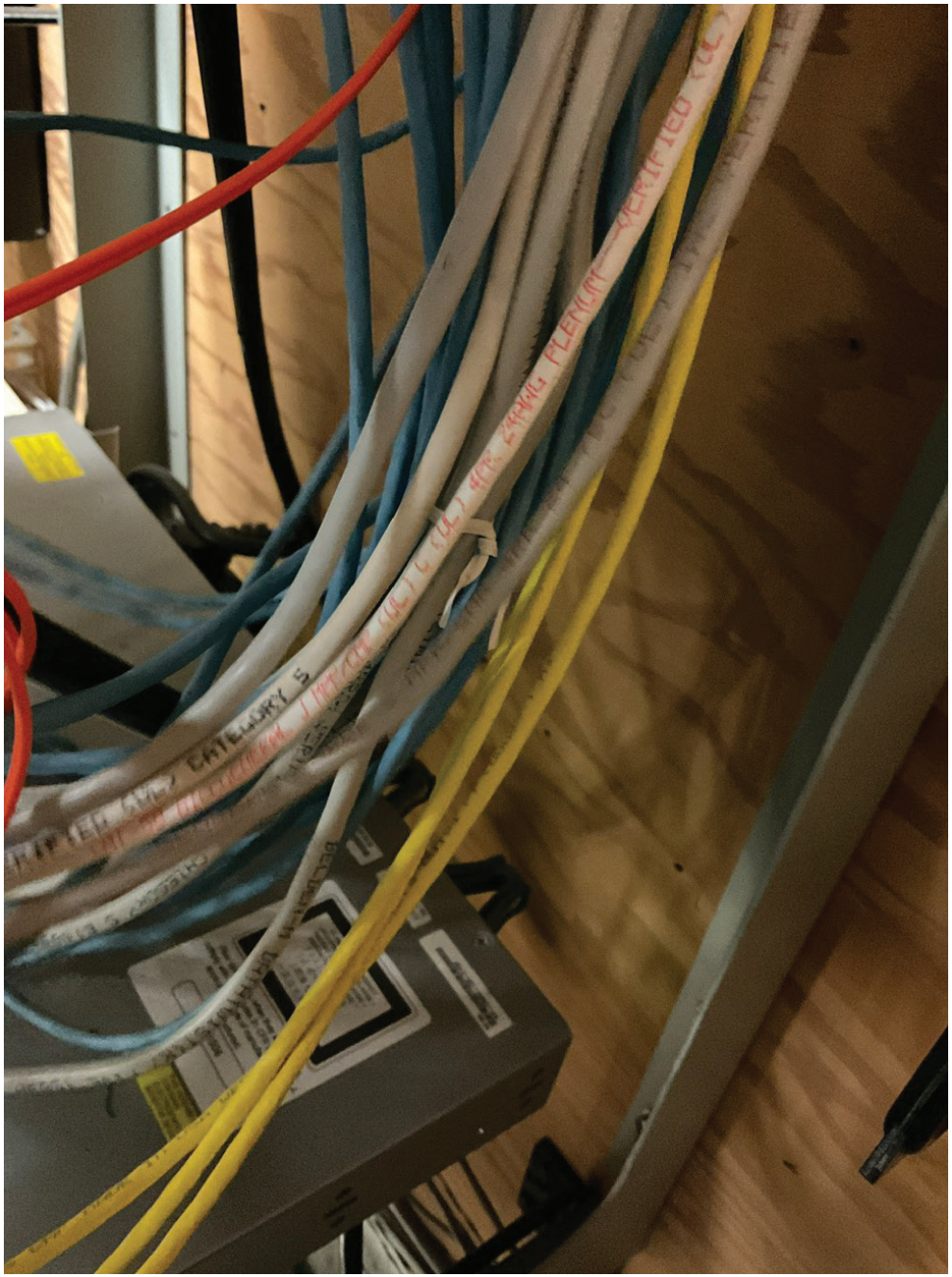
STANDARDS COMPLIANCE

COMPLIANT — NON-COMPLIANT

SCOPE PRIORITIZATION

LOW PRIORITY — HIGH PRIORITY

HARGIS



Existing Horizontal Cabling.

Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- 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 dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.

Recommendations:

- Upgrade existing port locations to Category 6A.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from WSH MER in Building 18.
- Add ladder tray and cable management as needed.
- Add Telecommunications Grounding Busbar.
- Add ductless split-system cooling unit.
- Add power circuits and receptacles as needed.
- Control access to authorized individuals.

ADMINISTRATION BUILDING

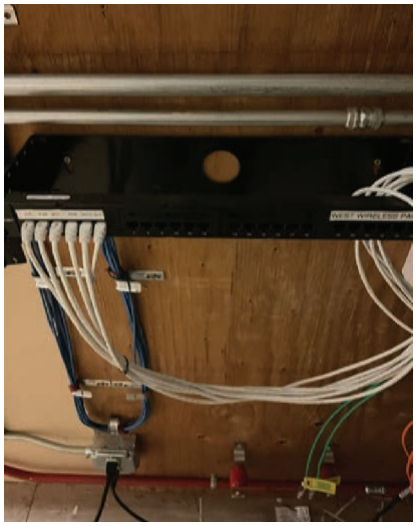
TELECOMMUNICATIONS ROOM - TR-ATTIC

The Administration Building has a second telecommunications space in the attic. It is broken into two parts. One section has open wall mounted racks to house the CSTC infrastructure, the other has an enclosed vertical wall mounted rack that houses the school network infrastructure. In the CSTC area there are two wall mounted racks, one has a 24 port Category 5e patch panel for wireless access points, the other rack has a 24 port Category 5e patch panel. Two switches are vertically installed in a third open wall mounted rack, and all ports are patched to them. The backbone cabling connecting the switches is Category 5e backbone cabling to the Basement MER. There is a grounding bar installed; two racks are bonded to the busbar, the rack with the wireless access point patch panel is not grounded. The grounding busbar is not connected to any ground source; it is floating.

The second section is the enclosed school wall mounted rack. Connectivity is provided by a 6-strand OM1 multi-mode OFC to the Basement MER. There are two 24 port Category 6 patch panels. The top patch panel connects the school wireless access points, and the bottom patch panel connects cameras.

Further down the hall in the attic is some analog voice horizontal cabling terminations and patching.

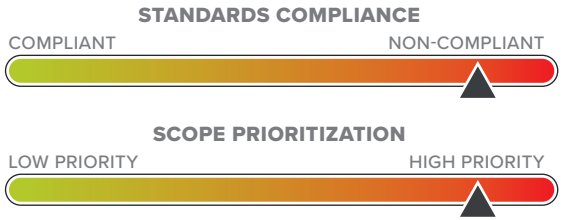
There is no cooling or humidity control present in the space. There are a few convenience receptacles, but not dedicated equipment receptacles. There is no UPS power available for the equipment. Access to the attic can be locked but there is no other access control on the room.



Existing Patch Panel.

To meet industry standards, it is recommended to upgrade the existing backbone and horizontal cabling to OM4/OS2 and Category 6A. Additional Category 6A data ports are required to meet standards. It is also recommended to connect the telecommunications grounding busbar to create a consistent potential across all components. Dedicated cooling, ladder rack, cable management, and dedicated equipment receptacles are required to meet standards. The addition of card-based access control is recommended to control access and track access to the space. The addition of card-based access control is recommended to control access and track access to the space.

Existing Attic Telecom Cabinet.



Deficiencies:

» Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.

» Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.

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

» Grounding busbar for the telecommunications equipment is not grounded.

» No dedicated cooling system to maintain temperature of equipment.

» Electrical infrastructure does not meet minimum requirements per standards.

» Uncontrolled access to space with no identity verification.

Recommendations:

» Upgrade existing port locations to Category 6A.

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

» Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from the MER in the Admin Building basement.

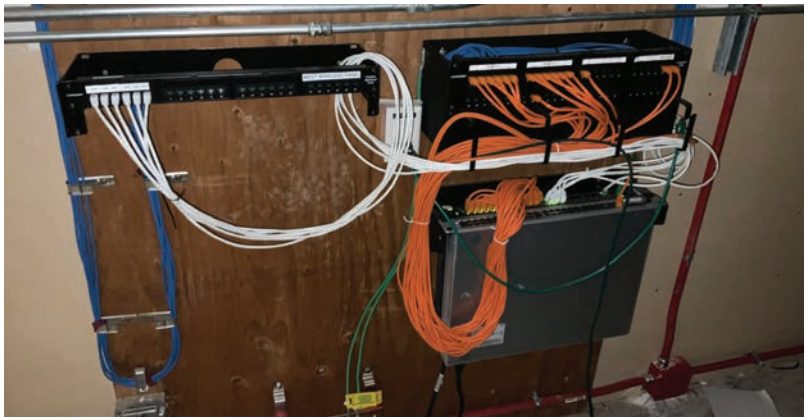
» Add ladder tray and cable management as needed.

» Provide grounding for the Telecommunications Grounding Busbar.

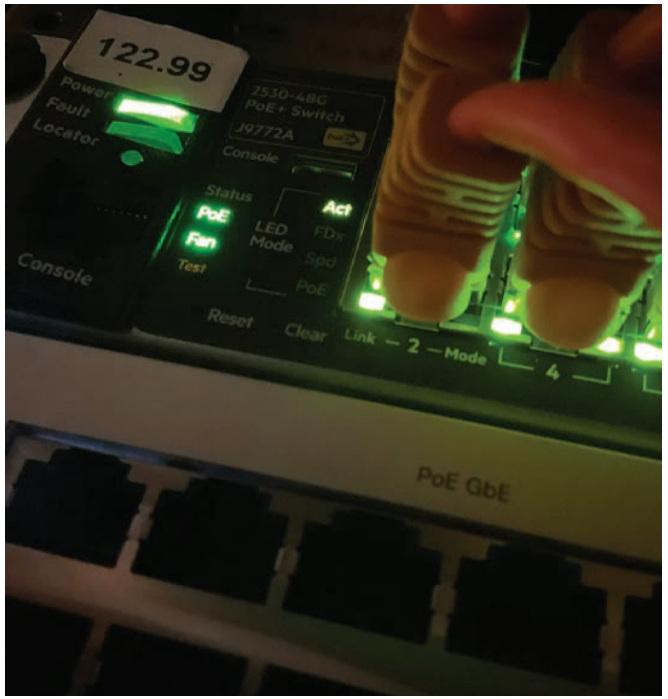
» Add ductless split-system cooling unit.

» Add power circuits and receptacles as needed.

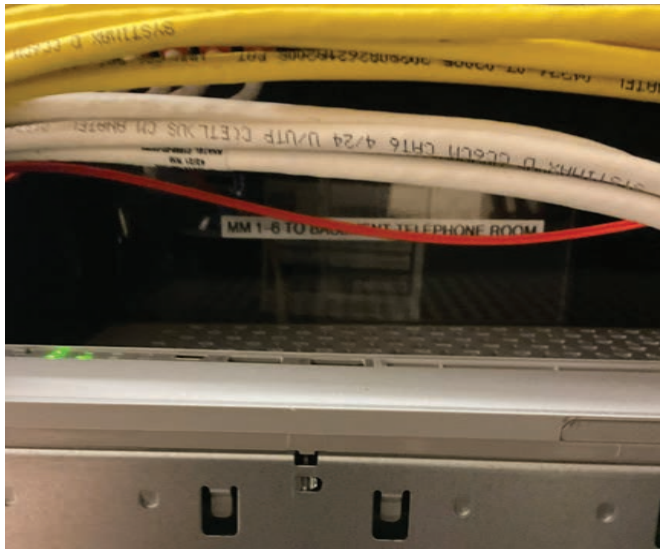
» Control access to authorized individuals.



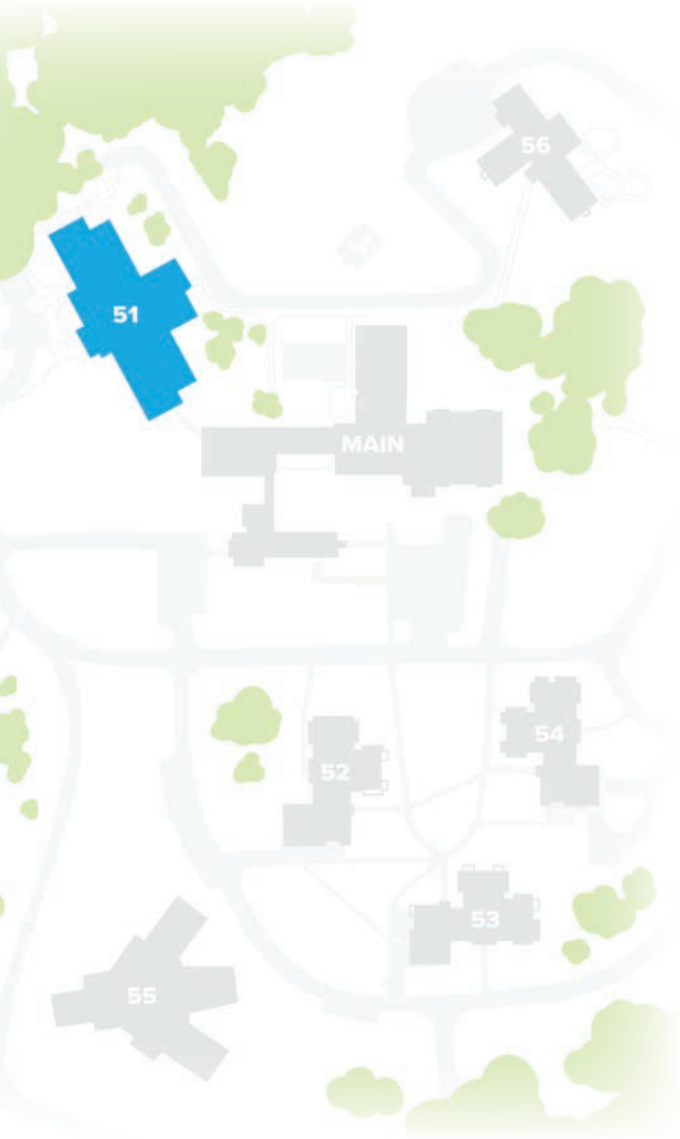
Existing Attic Telecom Backboard.



Existing Patch Panel.



Existing Horizontal Cabling.



STANDARDS COMPLIANCE

COMPLIANT — NON-COMPLIANT

SCOPE PRIORITIZATION

LOW PRIORITY — HIGH PRIORITY

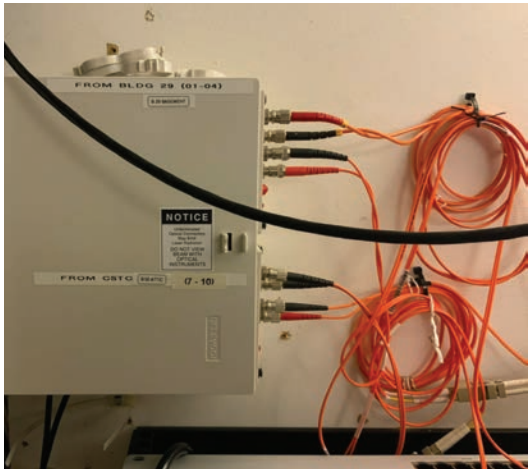
BUILDING 51 – FIRWOOD SECONDARY SCHOOL

ATTIC TELECOMMUNICATIONS ROOM - TR-ATTIC

The attic telecommunications space serving Firwood school is located in the attic space. Connectivity is provided by a 6-strand multi-mode OM1 OFC from WSH Building 28 and from a 6-strand multi-mode OM1 OFC from the Administration Building. The space is also served by a 100-pair twisted-pair copper cable from Building 18 for voice applications. There is also a 6-strand multi-mode OM1 Ofc that connects to the Maintenance Building.

The attic space consists of a plywood backboard with multiple wall mounted racks. Some hold a single patch panel, cable management, or both, while one is an enclosed wall mounted rack with patching and switching for the school network. 66 blocks are mounted on the backboard for termination of the copper backbone and patching for voice horizontal cabling. There is no cable tray or ladder rack to support cabling. There is no grounding busbar present. The telecom space does not have dedicated cooling.

To meet industry standards, it is recommended to provide a new telecommunications room with ladder rack for cable support. It is also recommended to provide a telecommunications grounding busbar to create a consistent potential across all components. New standards compliant backbone and horizontal cabling are recommended. The addition of card-based access control is recommended to control access and track access to the space.



Existing Wall Mount Fiber Cabinet.

Existing Voice Patching.

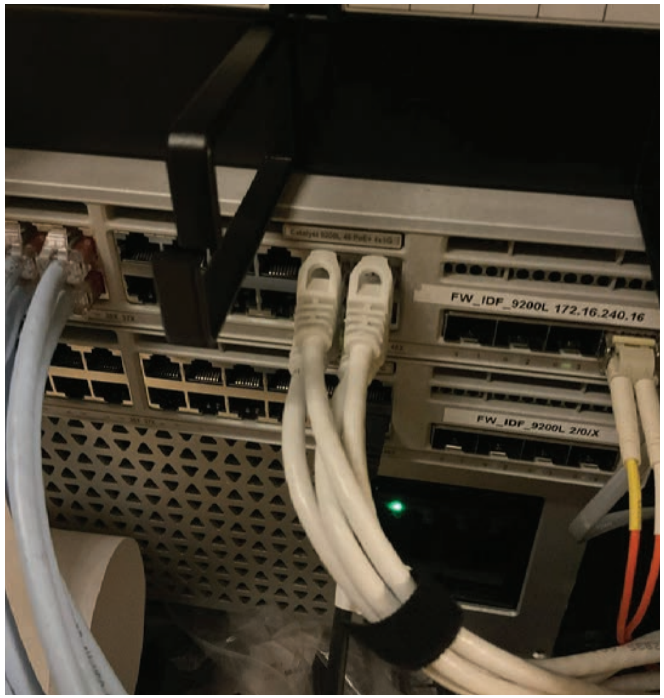
HARGIS

Deficiencies:

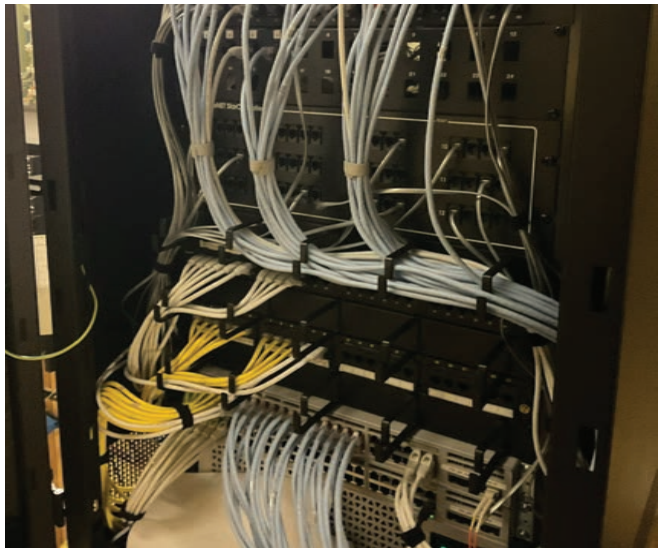
- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- Minimal overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.
- No grounding busbar for the telecommunications equipment.
- No dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.

Recommendations:

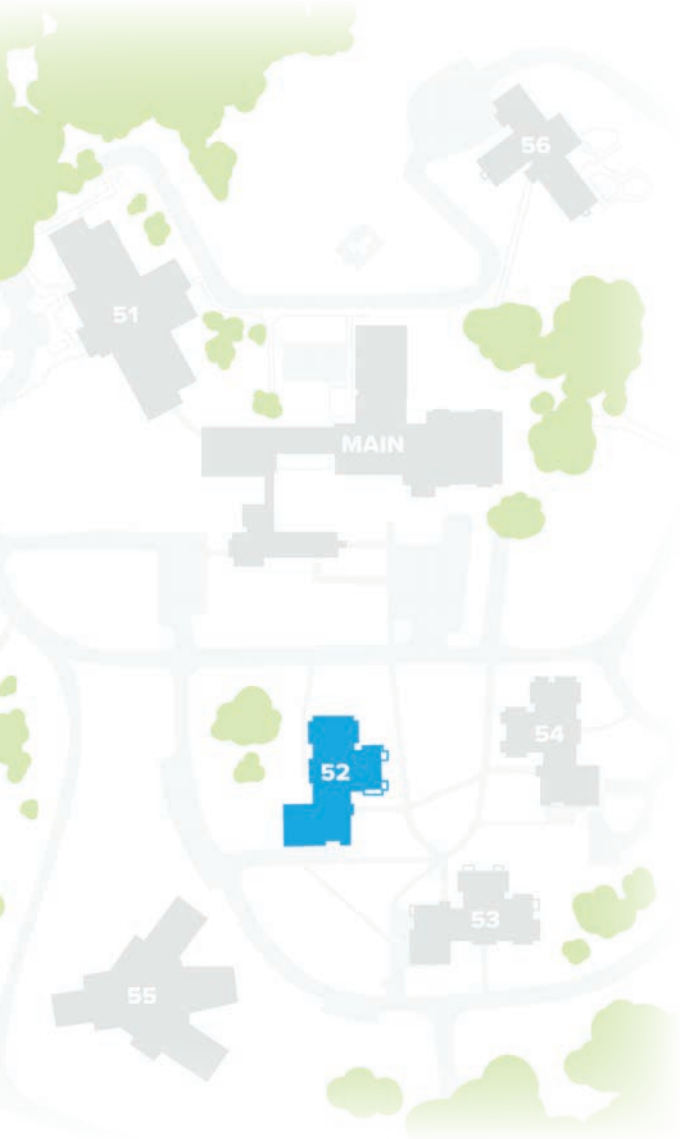
- Upgrade existing port locations to Category 6A.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from WSH MER in Building 18.
- Add ladder tray and cable management as needed.
- Add Telecommunications Grounding Busbar.
- Provide new telecommunications rack.
- Add power circuits, receptacles, and UPS power as needed.
- Control access to authorized individuals.



Existing School Switches.



Existing School Telecommunications Enclosure.



STANDARDS COMPLIANCE

COMPLIANT — NON-COMPLIANT

SCOPE PRIORITIZATION

LOW PRIORITY — HIGH PRIORITY

BUILDING 52 – CAMANO COTTAGE

BASEMENT TELECOMMUNICATIONS ENCLOSURE - TR-021

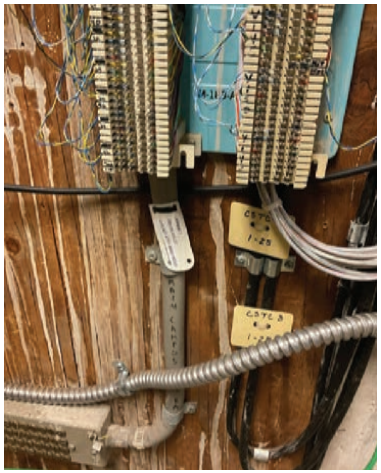
The telecommunications space in the Camano Cottage is a wall mounted enclosure in the basement of the cottage. Connectivity is provided to the cottage through a 12-strand OM1 multi-mode OFC from Admin and a 50-pair twisted-pair copper from Building 18 on the WSH campus. Horizontal cabling is Category 5e cable for data and Category 5 cabling for analog voice applications. The wall mounted enclosure houses a 2RU rack-mount fiber enclosure, ethernet switches, copper data patching, cable management, and a Wi-Fi router.

The telecommunications enclosure is mounted on a plywood backboard. 66 blocks are mounted on the backboard for termination of the copper backbone and patching for voice horizontal cabling. There is no cable tray or ladder rack to support cabling. There is no grounding busbar present. The basement space that contains the enclosure, while it maintains a cool temperature, does not have dedicated cooling.

To meet industry standards, it is recommended to provide an enclosed vented standalone rack with ladder rack for cable support. It is also recommended to provide a telecommunications grounding busbar to create a consistent potential across all components. New standards compliant backbone and horizontal cabling are recommended. The addition of card-based access control to the basement area is recommended to control access and track access to the space.

Existing Category 5e Patch Panels.

Existing Telecom Backboard.



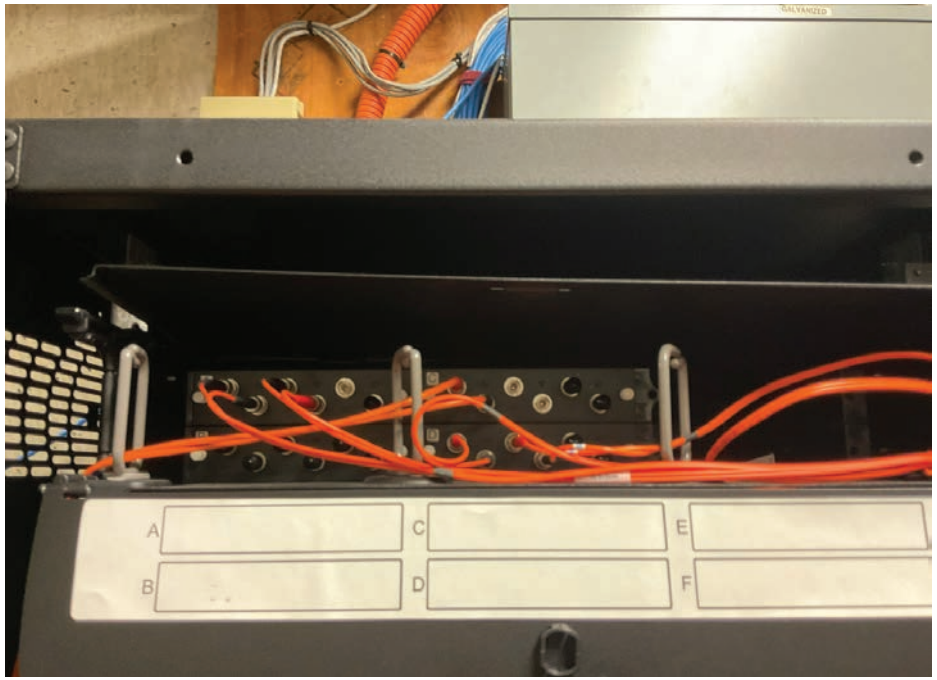
Existing Voice Cable Patching.

Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179-A.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179-A.
- 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 dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.

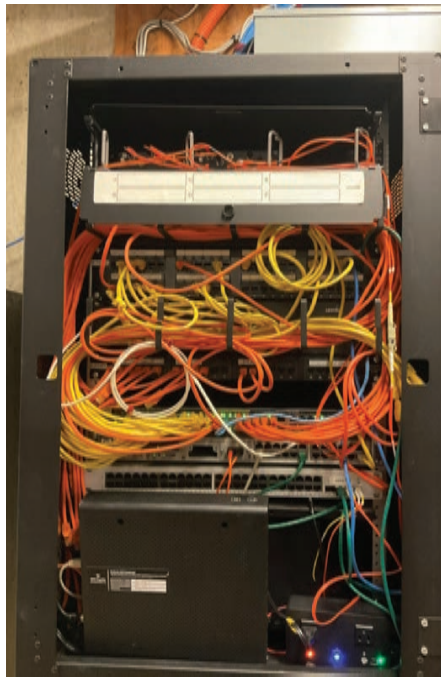
Recommendations:

- Upgrade existing port locations to Category 6A.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from WSH MER in Building 18.
- Add ladder tray and cable management as needed.
- Add Telecommunications Grounding Busbar.
- Add vented telecommunications enclosure.
- Add power circuits, receptacles, and UPS power as needed.
- Control access to authorized individuals.



Existing Rack Mount Fiber Cabinet.

Existing Voice Backbone Cabling Splicing & Grounding.



Existing Telecommunications Enclosure.

STANDARDS COMPLIANCE

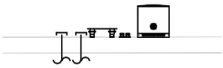
COMPLIANT — NON-COMPLIANT

SCOPE PRIORITIZATION

LOW PRIORITY — HIGH PRIORITY

BUILDING 53 – ORCAS COTTAGE

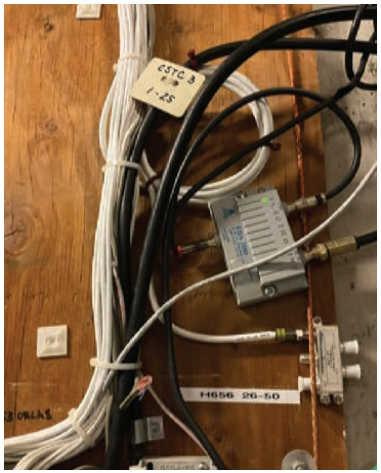
BASEMENT TELECOMMUNICATIONS ENCLOSURE - TR-010



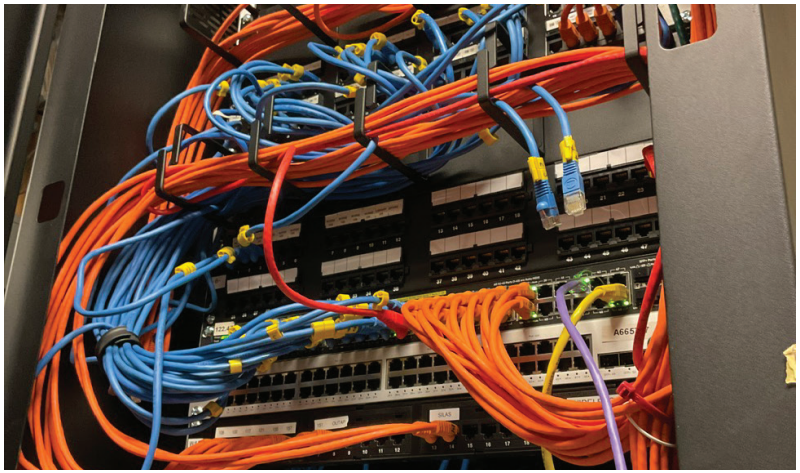
The telecommunications space in the Orcas Cottage is a wall mounted enclosure in the basement of the cottage. Connectivity is provided to the cottage through 2 Category 5e cables and a 25-pair twisted-pair copper from Camano Cottage. Horizontal cabling is Category 5e cable for data and Category 5 cabling for analog voice applications. The wall mounted enclosure houses ethernet switches, copper data patching, and cable management.

The telecommunications enclosure is mounted on a plywood backboard. 66 blocks are mounted on the backboard for termination of the copper backbone and patching for voice horizontal cabling. There is no cable tray or ladder rack to support cabling. The basement space that contains the enclosure, while it maintains a cool temperature, does not have dedicated cooling.

To meet industry standards, it is recommended to provide an enclosed vented standalone rack with ladder rack for cable support. New standards compliant backbone and horizontal cabling are recommended. The addition of card-based access control to the basement area is recommended to control access and track access to the space.

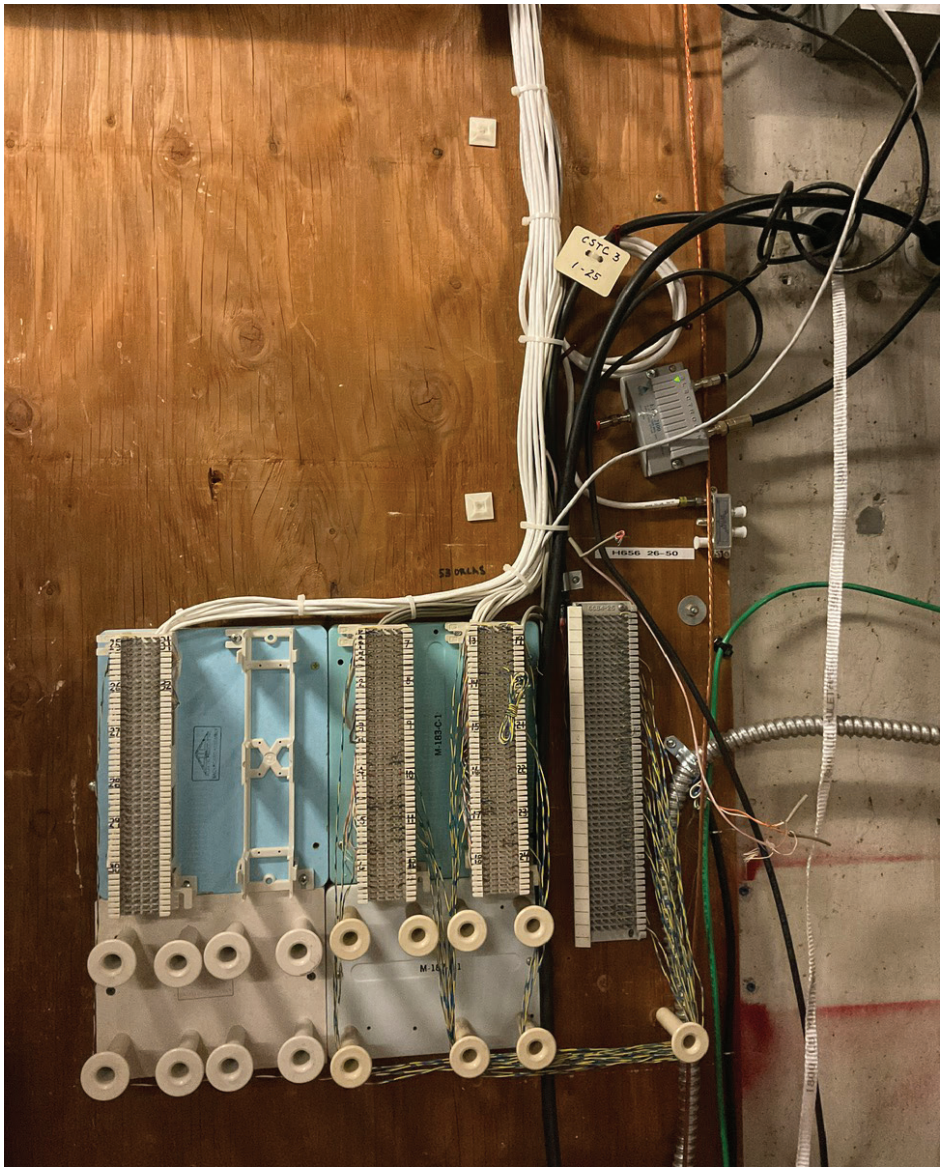


Existing Cabling.



Existing Telecom Enclosure.

HARGIS



Existing Voice Patching.

Deficiencies:

» Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.

» Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.

» 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 dedicated cooling system to maintain temperature of equipment.

» Electrical infrastructure does not meet minimum requirements per standards.

» Uncontrolled access to space with no identity verification.

Recommendations:

» Upgrade existing port locations to Category 6A.

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

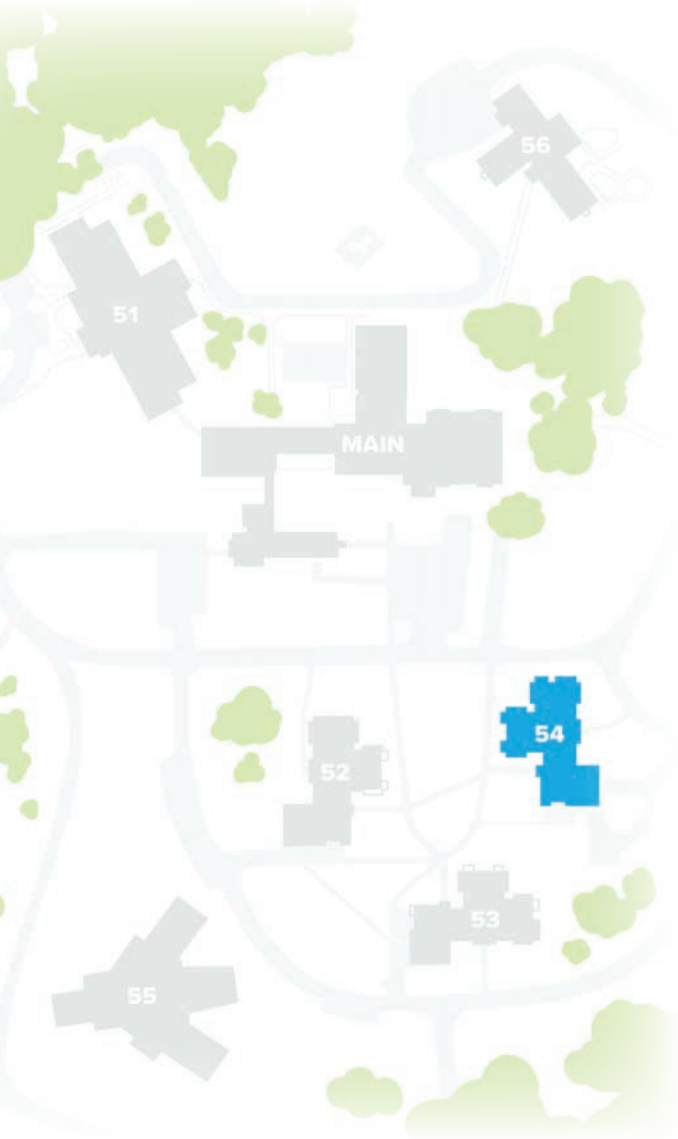
» Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from WSH MER in Building 18.

» Add ladder tray and cable management as needed.

» Add vented telecommunications enclosure.

» Add power circuits, receptacles, and UPS power as needed.

» Control access to authorized individuals.



STANDARDS COMPLIANCE

COMPLIANT — NON-COMPLIANT

SCOPE PRIORITIZATION

LOW PRIORITY — HIGH PRIORITY

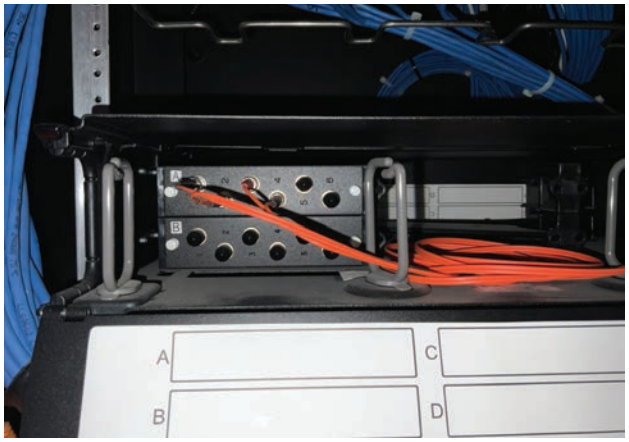
BUILDING 54 – KETRON COTTAGE

BASEMENT TELECOMMUNICATIONS ENCLOSURE - TR-010

The telecommunications space in the Camano Cottage is a wall mounted enclosure in the basement of the cottage. Connectivity is provided to the cottage through a 12-strand OM1 multi-mode OFC and a 25-pair twisted-pair copper from Camano Cottage. Horizontal cabling is Category 5e cable for data and Category 5 cabling for analog voice applications. The wall mounted enclosure houses a 2RU rack-mount fiber enclosure, ethernet switches, copper data patching, and cable management.

The telecommunications enclosure is mounted on a plywood backboard. 66 blocks are mounted on the backboard for termination of the copper backbone and patching for voice horizontal cabling. There is no cable tray or ladder rack to support cabling. There is no grounding busbar present. The basement space that contains the enclosure, while it maintains a cool temperature, does not have dedicated cooling. The rack is located next to the electrical distribution equipment which could cause emf interference.

To meet industry standards, it is recommended to provide an enclosed vented standalone rack with ladder rack for cable support. It is also recommended to provide a telecommunications grounding busbar to create a consistent potential across all components. New standards compliant backbone and horizontal cabling are recommended. The addition of card-based access control to the basement area is recommended to control access and track access to the space.



Existing Rach Mount Fiber Cabinet.

Existing Optical Fiber Backbone Cabling.

HARGIS

Deficiencies:

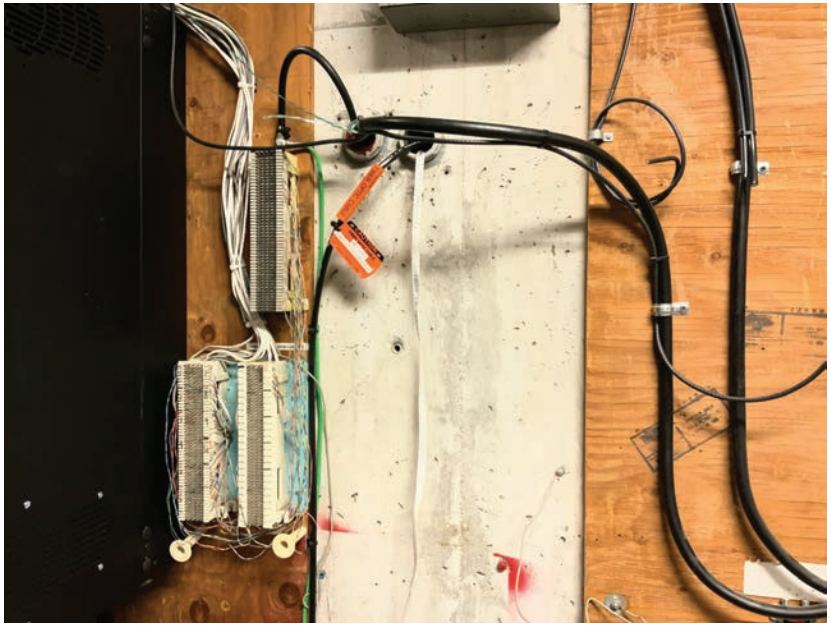
- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- Minimal overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.
- No grounding busbar for the telecommunications equipment.
- No dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.

Recommendations:

- Upgrade existing port locations to Category 6A.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from WSH MER in Building 18.
- Add ladder tray and cable management as needed.
- Add Telecommunications Grounding Busbar.
- Add vented telecommunications enclosure.
- Add power circuits, receptacles, and UPS power as needed.
- Control access to authorized individuals.

Existing Telecommunications Cabinet.

Existing Telecommunications Grounding.



Existing Telecommunications Backboard.

STANDARDS COMPLIANCE

COMPLIANT — NON-COMPLIANT

SCOPE PRIORITIZATION

LOW PRIORITY — HIGH PRIORITY

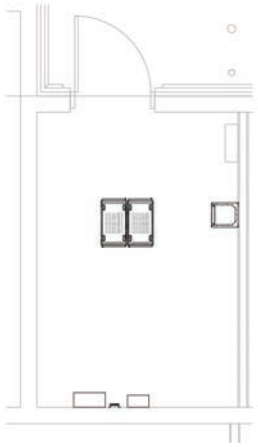
BUILDING 55 – SAN JUAN COTTAGE

TELECOMMUNICATIONS ROOM - TR-119

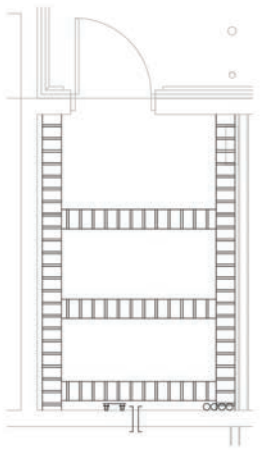
The telecommunications space in the San Juan Cottage is a telecommunications room accessible on the exterior of the cottage. Connectivity is provided to the cottage through a 48-strand SM OFC, a 24-strand OM3 multi-mode OFC and a 100-pair twisted-pair copper from the MER in WSH Building 18. Horizontal cabling is Category 6 cable for data and voice applications. The TR has two 4-post enclosed racks housing two rack mounted fiber panels, one for single-mode OFC, and one for multi-mode OFC. They also contain patch panels, cable management, and security video servers.

Plywood backboards are provided on the walls. 66 blocks are mounted on the backboard for termination of the copper backbone and patching for voice horizontal cabling. Ladder rack is available around the room and over the racks to support cabling. There is a grounding busbar present. A split system cooling unit is present to provide dedicated cooling.

To meet industry standards, new standards compliant backbone and horizontal cabling are recommended, though it should be considered very low priority. The OM3 multi-mode fiber present is one generation lower than the recommended OM4 and the Category 6 horizontal cabling does not meet the recommended Category 6A requirement. The addition of card-based access control to the telecommunications room is recommended to control access and track access to the space.

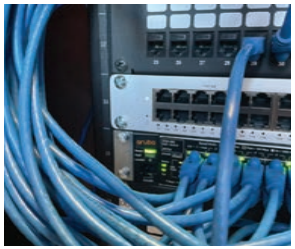


TR-119 Plan.



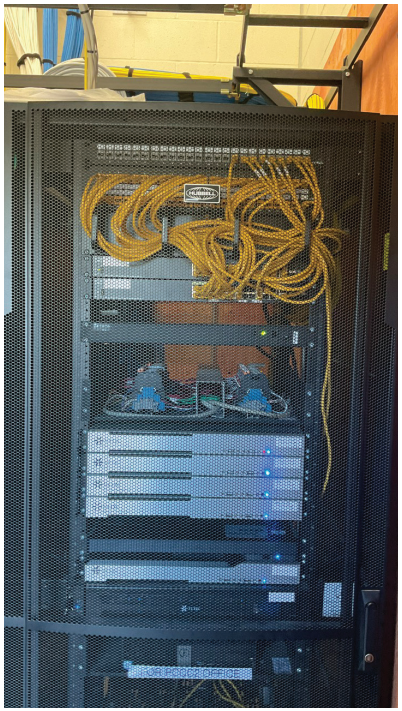
Ladder Rack Plan.

Existing Telecommunciations Grounding.



Existing Horizontal Cabling.

Existing Voice Patching.



Existing Security Telecom Cabinet.

Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- Uncontrolled access to space with no identity verification.

Recommendations:

- Upgrade existing port locations to Category 6A.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Provide 24-strand OM4 multi-mode optical fiber backbone from WSH MER in Building 18.
- Control access to authorized individuals.

Existing Voice and Data Patching.

Existing Backbone Voice Cabling.

STANDARDS COMPLIANCE

COMPLIANT — NON-COMPLIANT

SCOPE PRIORITIZATION

LOW PRIORITY — HIGH PRIORITY

BUILDING 56 – MAINTENANCE BUILDING

TELECOMMUNICATIONS ROOM - TR-122

The telecommunications space serving the Maintenance Building is located in room 122. Connectivity is provided by a 6-strand multi-mode OM1 OFC and a 25-pair twisted-pair copper cable from Firwood School.

The telecommunications space consists of a wall mounted fiber cabinet, a shelf holding two switches, a wall mounted 12-port patch panel, and 66 blocks for termination of the copper backbone and patching for voice horizontal cabling. There is no cable tray or ladder rack to support cabling. There is no grounding busbar present. The telecom space does not have dedicated cooling.

To meet industry standards, it is recommended to provide a new telecommunications room with ladder rack for cable support. It is also recommended to provide a telecommunications grounding busbar to create a consistent potential across all components. New standards compliant backbone and horizontal cabling are recommended. The addition of card-based access control is recommended to control access and track access to the space.

Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- 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 dedicated cooling system to maintain temperature of equipment.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.

Recommendations:

- Provide new standards compliant telecommunications space
- Upgrade existing port locations to Category 6A.
- Add additional Category 6A 8P8C RJ45 ports to meet standards.
- Provide new 12-strand OS2 single-mode and 12-strand OM4 multi-mode optical fiber backbone from WSH MER in Building 18.
- Add ladder tray and cable management as needed.
- Add Telecommunications Grounding Busbar.
- Add new telecommunications rack.
- Add power circuits, receptacles, and UPS power as needed.
- Control access to authorized individuals.

APPENDIX A: FULL COST OPINIONS

telecommunications **cost opinion**

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Telecommunications Infrastructure Assessment Recommendations
Child Study And Treatment Center (CSTC)

BASIS OF OPINION	Pre-Design	**PREPARED BY**	Tin Vo	**DATE**	June 20, 2024
JOB NUMBER	24028	**CHECKED BY**	Ben Helms	**OVERHEAD & PROFIT**	15%

telecommunications summary			subtotal	OH&P	total
Building 50 - Administration			$ 643,035	$ 96,455	$ 739,490
Building 51 - Firwood Secondary			$ 344,034	$ 51,605	$ 395,639
Building 52 - Camano			$ 285,736	$ 42,860	$ 328,597
Building 53 - Orcas			$ 327,762	$ 49,164	$ 376,927
Building 54 - Ketron			$ 303,221	$ 45,483	$ 348,704
Building 55 - San Juan			$ 183,718	$ 27,558	$ 211,276
Building 56 - Maintenance			$ 205,003	$ 30,751	$ 235,754
Sub-Total			$ 2,292,510	$ 343,876	$ 2,636,387
General Contractor OH&P	**15%**				$ 395,458
Escalation	**7%**				$ 27,682
Total					**$ 3,059,527**

EXCLUSIONS

1 - Design contingency

2 - Sales Tax

telecommunications **cost opinion**

Building 50 - Administration Building

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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	10,579.87	10,580	21,160	21,160	31,740	4,761	36,501
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	18,149.07	18,149			18,149	2,722	20,871
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - HC	2	EA	4,500.00	9,000	1,200.00	2,400	11,400	1,710	13,110
Adaptor Plates - LC ACP	16	EA	150.00	2,400	50.00	800	3,200	480	3,680
Rack Mount Fiber Cabinet - 2RU	3	EA	300.00	900	110.00	330	1,230	185	1,415
Ladder Rack	60	LF	7.50	450	20.00	1,200	1,650	248	1,898
2000VA UPS	1	EA	3,000.00	3,000	110.00	110	3,110	467	3,577
Demolish Defunct Infrastructure After System Cutover	1	LS			4,000.00	4,000	4,000	600	4,600
12 Strand Singlemode Outside Plant (OSP) OFC	3,200	LF	2.50	8,000	.05	160	8,160	1,224	9,384
12 Strand Multimode Outside Plant (OSP) OFC	3,200	LF	1.19	3,802	.05	160	3,962	594	4,556
Trenching	700	LF	7.50	5,250	15.00	10,500	15,750	2,363	18,113

telecommunications **cost opinion**

Building 50 - Administration Building

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 15%

	quantity		material cost		labor cost		engineering opinion		
description	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
(4)4"C w/ 3" 3-Cell Textile Innerduct	700	LF	61.40	42,980	71.00	49,700	92,680	13,902	106,582
Utility Vault (Medium)	1	EA	4,335.00	4,335	3,500.00	3,500	7,835	1,175	9,010
12 Strand Singlemode Plenum Rated OFC	250	LF	.94	234	.05	13	247	37	283
12 Strand Multimode Plenum Rated OFC	250	LF	1.25	313	.05	13	325	49	374
Telecommunications Device - 4-Port	79	EA	1,100.00	86,900	473.67	37,420	124,320	18,648	142,968
Telecommunications Device - 4-Port - Existing	85	EA	1,100.00	93,500	473.67	40,262	133,762	20,064	153,827
CAT 6A Quickport Connector	632	EA	36.16	22,851	25.00	15,800	38,651	5,798	44,448
CAT 6A Quickport Connector - Existing	680	EA	36.16	24,586	26.00	17,680	42,266	6,340	48,606
CAT 6A Patch Panel	14	EA	320.11	4,482	150.00	2,100	6,582	987	7,569
Copper 6-port Empty Cassette	112	EA	100.00	11,200	50.00	5,600	16,800	2,520	19,320
Telecom Room - Electrical Improvements	2	EA	4,000.00	8,000	2,500.00	5,000	13,000	1,950	14,950
Telecom Room - HVAC - Ductless Split System	2	EA	7,500.00	15,000	1,500.00	3,000	18,000	2,700	20,700
Pathway per Drop	79	EA	200.00	15,800	150.00	11,850	27,650	4,148	31,798
Subtotal Low-Voltage Systems (Divisions 27)							**624,467**	**93,670**	**718,138**

telecommunications **cost opinion**

Building 50 - Administration Building

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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 28									
LIFE SAFETY & SECURITY SYSTEMS - DIVISIONS 28									
General Provisions (Submittals, Mobilization, Permits)	1	LS	209.64	210	419.28	419	629	94.34	723
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	390.40	390			390	58.56	449
Raceway, Cabling Supports and Outlet Boxes	2	EA	200.00	400	200.00	400	800	120	920
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	1	EA	535.00	535	85.00	85	620	93	713
Power Supply 10A/24V - 8-Door	1	EA	925.00	925	170.00	170	1,095	164	1,259
Portal Licenses	2	EA	100.00	200	50.00	100	300	45	345
Card Reader	2	EA	325.00	650	127.50	255	905	136	1,041
Electrified Hardware (Electrified Lock and Power Transfer)	2	EA	1,800.00	3,600	600.00	1,200	4,800	720	5,520
Request To Exit (REX)	2	EA	125.00	250	85.00	170	420	63	483
Wiring - Per Access Control Door	2	EA	400.00	800	700.00	1,400	2,200	330	2,530
Programming	1	LS			1,952.00	1,952	1,952	293	2,245
Engineering	1	LS			976.00	976	976	146	1,122
Subtotal Life Safety and Security Systems (Divisions 28)							**18,567**	**2,785**	**21,352**

telecommunications **cost opinion**

Building 51 - Firwood Secondary

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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	5,776.76	5,777	11,554	11,554	17,330	2,600	19,930
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	9,450.65	9,451			9,451	1,418	10,868
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - HC	1	EA	12,000.00	12,000	2,500.00	2,500	14,500	2,175	16,675
Adaptor Plates - LC ACP	8	EA	150.00	1,200	50.00	400	1,600	240	1,840
Rack Mount Fiber Cabinet - 4RU	1	EA	390.00	390	110.00	110	500	75	575
Ladder Rack	20	LF	7.50	150	20.00	400	550	83	633
2000VA UPS	1	EA	3,000.00	3,000	110.00	110	3,110	467	3,577
Telecommunication Room Demolition	1	EA			2,000.00	2,000	2,000	300	2,300
Demolish Defunct Infrastructure After System Cutover	1	LS			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	2,500	LF	2.50	6,250	.05	125	6,375	956	7,331
12 Strand Multimode Outside Plant (OSP) OFC	2,500	LF	1.19	2,970	.05	125	3,095	464	3,559
Trenching	500	LF	7.50	3,750	15.00	7,500	11,250	1,688	12,938

telecommunications **cost opinion**

Building 51 - Firwood Secondary

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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
(4)4"C w/ 3" 3-Cell Textile Innerduct	500	LF	61.40	30,700	71.00	35,500	66,200	9,930	76,130
Utility Vault (Medium)	1	EA	4,335.00	4,335	3,500.00	3,500	7,835	1,175	9,010
Telecommunications Device - 4-Port	44	EA	1,100.00	48,400	473.67	20,842	69,242	10,386	79,628
Telecommunications Device - 4-Port - Existing	26	EA	1,100.00	28,600	473.67	12,316	40,916	6,137	47,053
CAT 6A Quickport Connector	352	EA	36.16	12,727	25.00	8,800	21,527	3,229	24,756
CAT 6A Quickport Connector - Existing	208	EA	36.16	7,520	26.00	5,408	12,928	1,939	14,868
CAT 6A Patch Panel	6	EA	320.11	1,921	150.00	900	2,821	423	3,244
Copper 6-port Empty Cassette	48	EA	100.00	4,800	50.00	2,400	7,200	1,080	8,280
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	1	EA	7,500.00	7,500	1,500.00	1,500	9,000	1,350	10,350
Pathway per Drop	44	EA	200.00	8,800	150.00	6,600	15,400	2,310	17,710
Subtotal Low-Voltage Systems (Divisions 27)							**331,329**	**49,699**	**381,028**
DIVISION 28 **LIFE SAFETY & SECURITY SYSTEMS - DIVISIONS 28**									
General Provisions (Submittals, Mobilization, Permits)	1	LS	138.02	138	276.03	276	414	62.11	476
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	280.40	280			280	42.06	322
Raceway, Cabling Supports and Outlet Boxes	1	EA	200.00	200	200.00	200	400	60	460

telecommunications **cost opinion**

Building 51 - Firwood Secondary

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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JOB NUMBER 24028 **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	1	EA	535.00	535	85.00	85	620	93	713
Power Supply 10A/24V - 8-Door	1	EA	925.00	925	170.00	170	1,095	164	1,259
Portal Licenses	1	EA	100.00	100	50.00	50	150	23	173
Card Reader	1	EA	325.00	325	127.50	128	453	68	520
Electrified Hardware (Electrified Lock and Power Transfer)	1	EA	1,800.00	1,800	600.00	600	2,400	360	2,760
Request To Exit (REX)	1	EA	125.00	125	85.00	85	210	32	242
Wiring - Per Access Control Door	1	EA	400.00	400	700.00	700	1,100	165	1,265
Programming	1	LS			1,402.00	1,402	1,402	210	1,612
Engineering	1	LS			701.00	701	701	105	806
Subtotal Life Safety and Security Systems (Divisions 28)							**12,705**	**1,906**	**14,611**

telecommunications **cost opinion**

Building 52 - Camano

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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seattle, washington 98101
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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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	4,911.53	4,912	$ 9,823	$ 9,823	$ 14,735	$ 2,210	$ 16,945
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	7,622.20	7,622	$ -	$ -	$ 7,622	$ 1,143	$ 8,766
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Adaptor Plates - LC ACP	8	EA	150.00	1,200	50.00	400	1,600	240	1,840
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack	20	LF	7.50	150	20.00	400	550	83	633
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
2000VA UPS	1	EA	3,000.00	3,000	110.00	110	3,110	467	3,577
Demolish Defunct Infrastructure After System Cutover	1	LS			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	2,600	LF	2.50	6,500	.05	130	6,630	995	7,625
12 Strand Multimode Outside Plant (OSP) OFC	2,600	LF	1.19	3,089	.05	130	3,219	483	3,702
Trenching	550	LF	7.50	4,125	15.00	8,250	12,375	1,856	14,231
(4)4"C w/ 3" 3-Cell Textile Innerduct	550	LF	61.40	33,770	71.00	39,050	72,820	10,923	83,743
Utility Vault (Medium)	1	EA	4,335.00	4,335	3,500.00	3,500	7,835	1,175	9,010
Telecommunications Device - 4-Port	36	EA	1,100.00	39,600	473.67	17,052	56,652	8,498	65,150
Telecommunications Device - 4-Port - Existing	11	EA	1,100.00	12,100	473.67	5,210	17,310	2,597	19,907
CAT 6A Quickport Connector	288	EA	36.16	10,413	25.00	7,200	17,613	2,642	20,255
CAT 6A Quickport Connector - Existing	88	EA	36.16	3,182	26.00	2,288	5,470	820	6,290
CAT 6A Patch Panel	4	EA	320.11	1,280	150.00	600	1,880	282	2,163
Copper 6-port Empty Cassette	32	EA	100.00	3,200	50.00	1,600	4,800	720	5,520
Telecom Room - Electrical Improvements	1	EA	4,000.00	4,000	2,500.00	2,500	6,500	975	7,475

telecommunications **cost opinion**

Building 52 - Camano

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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
Telecom Room - HVAC - Ductless Split System	1	EA	7,500.00	7,500	1,500.00	1,500	9,000	1,350	10,350
Pathway per Drop	36	EA	200.00	7,200	150.00	5,400	12,600	1,890	14,490
Subtotal Low-Voltage Systems (Divisions 27)							**273,031**	**40,955**	**313,986**
DIVISION 28									
LIFE SAFETY & SECURITY SYSTEMS - DIVISIONS 28									
General Provisions (Submittals, Mobilization, Permits)	1	LS	138.02	138	276.03	276	414	62.11	476
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	280.40	280			280	42.06	322
Raceway, Cabling Supports and Outlet Boxes	1	EA	200.00	200	200.00	200	400	60	460
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	1	EA	535.00	535	85.00	85	620	93	713
Power Supply 10A/24V - 8-Door	1	EA	925.00	925	170.00	170	1,095	164	1,259
Portal Licenses	1	EA	100.00	100	50.00	50	150	23	173
Card Reader	1	EA	325.00	325	127.50	128	453	68	520
Electrified Hardware (Electrified Lock and Power Transfer)	1	EA	1,800.00	1,800	600.00	600	2,400	360	2,760
Request To Exit (REX)	1	EA	125.00	125	85.00	85	210	32	242
Wiring - Per Access Control Door	1	EA	400.00	400	700.00	700	1,100	165	1,265
Programming	1	LS			1,402.00	1,402	1,402	210	1,612
Engineering	1	LS			701.00	701	701	105	806
Subtotal Life Safety and Security Systems (Divisions 28)							**12,705**	**1,906**	**14,611**

telecommunications **cost opinion**

Building 53 - Orcas

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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	5,651.92	5,652	$ 11,304	$ 11,304	$ 16,956	$ 2,543	$ 19,499
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	8,812.54	8,813	$ -	$ -	$ 8,813	$ 1,322	$ 10,134
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Adaptor Plates - LC	8	EA	150.00	1,200	50.00	400	1,600	240	1,840
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack	20	LF	7.50	150	20.00	400	550	83	633
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
Demolish Defunct Infrastructure After System Cutover	1	LS			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	3,300	LF	2.50	8,250	.05	165	8,415	1,262	9,677
12 Strand Multimode Outside Plant (OSP) OFC	3,300	LF	1.19	3,920	.05	165	4,085	613	4,698
Trenching	600	LF	7.50	4,500	15.00	9,000	13,500	2,025	15,525
(4)4"C w/ 3" 3-Cell Textile Innerduct	600	LF	61.40	36,840	71.00	42,600	79,440	11,916	91,356
Utility Vault (Medium)	1	EA	4,335.00	4,335	3,500.00	3,500	7,835	1,175	9,010
Telecommunications Device - 4-Port	44	EA	1,100.00	48,400	473.67	20,842	69,242	10,386	79,628
Telecommunications Device - 4-Port - Existing	16	EA	1,100.00	17,600	473.67	7,579	25,179	3,777	28,956
CAT 6A Quickport Connector	352	EA	36.16	12,727	25.00	8,800	21,527	3,229	24,756
CAT 6A Quickport Connector - Existing	128	EA	36.16	4,628	26.00	3,328	7,956	1,193	9,149
CAT 6A Patch Panel	5	EA	320.11	1,601	150.00	750	2,351	353	2,703
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	1	EA	7,500.00	7,500	1,500.00	1,500	9,000	1,350	10,350

telecommunications **cost opinion**

Building 53 - Orcas

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

HARGIS
1201 third avenue, ste 600
seattle, washington 98101
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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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
Pathway per Drop	44	EA	200.00	8,800	150.00	6,600	15,400	2,310	17,710
Subtotal Low-Voltage Systems (Divisions 27)							**315,058**	**47,259**	**362,316**
DIVISION 28									
LIFE SAFETY & SECURITY SYSTEMS - DIVISIONS 28									
General Provisions (Submittals, Mobilization, Permits)	1	LS	138.02	138	276.03	276	414	62.11	476
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	280.40	280			280	42.06	322
Raceway, Cabling Supports and Outlet Boxes	1	EA	200.00	200	200.00	200	400	60	460
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	1	EA	535.00	535	85.00	85	620	93	713
Power Supply 10A/24V - 8-Door	1	EA	925.00	925	170.00	170	1,095	164	1,259
Portal Licenses	1	EA	100.00	100	50.00	50	150	23	173
Card Reader	1	EA	325.00	325	127.50	128	453	68	520
Electrified Hardware (Electrified Lock and Power Transfer)	1	EA	1,800.00	1,800	600.00	600	2,400	360	2,760
Request To Exit (REX)	1	EA	125.00	125	85.00	85	210	32	242
Wiring - Per Access Control Door	1	EA	400.00	400	700.00	700	1,100	165	1,265
Programming	1	LS			1,402.00	1,402	1,402	210	1,612
Engineering	1	LS			701.00	701	701	105	806
Subtotal Life Safety and Security Systems (Divisions 28)							**12,705**	**1,906**	**14,611**

telecommunications **cost opinion**

Building 54 - Ketron

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

HARGIS
1201 third avenue, ste 600
seattle, washington 98101
206.448.3376

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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	5,244.00	5,244	$ 10,488	$ 10,488	$ 15,732	$ 2,360	$ 18,092
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	8,090.66	8,091	$ -	$ -	$ 8,091	$ 1,214	$ 9,304
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Adaptor Plates - LC ACP	8	EA	150.00	1,200	50.00	400	1,600	240	1,840
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack	20	LF	7.50	150	20.00	400	550	83	633
Ventilated Rack	1	EA	7,500.00	7,500	800.00	800	8,300	1,245	9,545
Demolish Defunct Infrastructure After System Cutover	1	LS			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	3,800	LF	2.50	9,500	.05	190	9,690	1,454	11,144
12 Strand Multimode Outside Plant (OSP) OFC	3,800	LF	1.19	4,514	.05	190	4,704	706	5,410
Trenching	600	LF	7.50	4,500	15.00	9,000	13,500	2,025	15,525
(4)4"C w/ 3" 3-Cell Textile Innerduct	600	LF	61.40	36,840	71.00	42,600	79,440	11,916	91,356
Utility Vault (Medium)	1	EA	4,335.00	4,335	3,500.00	3,500	7,835	1,175	9,010
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	10	EA	1,100.00	11,000	473.67	4,737	15,737	2,361	18,097
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	80	EA	36.16	2,892	26.00	2,080	4,972	746	5,718
CAT 6A Patch Panel	5	EA	320.11	1,601	150.00	750	2,351	353	2,703
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	1	EA	7,500.00	7,500	1,500.00	1,500	9,000	1,350	10,350

telecommunications **cost opinion**

Building 54 - Ketron

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

HARGIS
1201 third avenue, ste 600
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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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
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)							**290,516**	**43,577**	**334,093**
DIVISION 28									
LIFE SAFETY & SECURITY SYSTEMS - DIVISIONS 28									
General Provisions (Submittals, Mobilization, Permits)	1	LS	138.02	138	276.03	276	414	62.11	476
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	280.40	280			280	42.06	322
Raceway, Cabling Supports and Outlet Boxes	1	EA	200.00	200	200.00	200	400	60	460
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	1	EA	535.00	535	85.00	85	620	93	713
Power Supply 10A/24V - 8-Door	1	EA	925.00	925	170.00	170	1,095	164	1,259
Portal Licenses	1	EA	100.00	100	50.00	50	150	23	173
Card Reader	1	EA	325.00	325	127.50	128	453	68	520
Electrified Hardware (Electrified Lock and Power Transfer)	1	EA	1,800.00	1,800	600.00	600	2,400	360	2,760
Request To Exit (REX)	1	EA	125.00	125	85.00	85	210	32	242
Wiring - Per Access Control Door	1	EA	400.00	400	700.00	700	1,100	165	1,265
Programming	1	LS			1,402.00	1,402	1,402	210	1,612
Engineering	1	LS			701.00	701	701	105	806
Subtotal Life Safety and Security Systems (Divisions 28)							**12,705**	**1,906**	**14,611**

telecommunications **cost opinion**

Building 55 - San Juan

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

HARGIS
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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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	2,643.75	2,644	$ 5,288	$ 5,288	$ 7,931	$ 1,190	$ 9,121
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	5,247.95	5,248	$ -	$ -	$ 5,248	$ 787	$ 6,035
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Adaptor Plates - LC	8	EA	150.00	1,200	50.00	400	1,600	240	1,840
Demolish Defunct Infrastructure After System Cutover	1	LS			2,000.00	2,000	2,000	300	2,300
24 Strand Multimode Outside Plant (OSP) OFC	2,800	LF	1.19	3,326	.05	140	3,466	520	3,986
Telecommunications Device - 4-Port	24	EA	1,100.00	26,400	473.67	11,368	37,768	5,665	43,433
Telecommunications Device - 4-Port - Existing	40	EA	1,100.00	44,000	473.67	18,947	62,947	9,442	72,389
CAT 6A Quickport Connector	192	EA	36.16	6,942	25.00	4,800	11,742	1,761	13,503
CAT 6A Quickport Connector - Existing	320	EA	36.16	11,570	26.00	8,320	19,890	2,983	22,873
CAT 6A Patch Panel	6	EA	320.11	1,921	150.00	900	2,821	423	3,244
Copper 6-port Empty Cassette	48	EA	100.00	4,800	50.00	2,400	7,200	1,080	8,280
Pathway per Drop	24	EA	200.00	4,800	150.00	3,600	8,400	1,260	9,660
Subtotal Low-Voltage Systems (Divisions 27)							**171,013**	**25,652**	**196,665**

telecommunications **cost opinion**

Building 55 - San Juan

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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 28									
LIFE SAFETY & SECURITY SYSTEMS - DIVISIONS 28									
General Provisions (Submittals, Mobilization, Permits)	1	LS	138.02	138	276.03	276	414	62.11	476
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	280.40	280			280	42.06	322
Raceway, Cabling Supports and Outlet Boxes	1	EA	200.00	200	200.00	200	400	60	460
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	1	EA	535.00	535	85.00	85	620	93	713
Power Supply 10A/24V - 8-Door	1	EA	925.00	925	170.00	170	1,095	164	1,259
Portal Licenses	1	EA	100.00	100	50.00	50	150	23	173
Card Reader	1	EA	325.00	325	127.50	128	453	68	520
Electrified Hardware (Electrified Lock and Power Transfer)	1	EA	1,800.00	1,800	600.00	600	2,400	360	2,760
Request To Exit (REX)	1	EA	125.00	125	85.00	85	210	32	242
Wiring - Per Access Control Door	1	EA	400.00	400	700.00	700	1,100	165	1,265
Programming	1	LS			1,402.00	1,402	1,402	210	1,612
Engineering	1	LS			701.00	701	701	105	806
Subtotal Life Safety and Security Systems (Divisions 28)							**12,705**	**1,906**	**14,611**

telecommunications **cost opinion**

Building 56 - Maintenance

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

HARGIS
1201 third avenue, ste 600
seattle, washington 98101
206.448.3376

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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	3,419.69	3,420	$ 6,839	$ 6,839	$ 10,259	$ 1,539	$ 11,798
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	5,411.70	5,412	$ -	$ -	$ 5,412	$ 812	$ 6,223
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
Telecommunications Rooms - HC	1	EA	12,000.00	12,000	2,500.00	2,500	14,500	2,175	16,675
Adaptor Plates - LC	8	EA	150.00	1,200	50.00	400	1,600	240	1,840
Rack Mount Fiber Cabinet - 2RU	1	EA	300.00	300	110.00	110	410	62	472
Ladder Rack	20	LF	7.50	150	20.00	400	550	83	633
2000VA UPS	1	EA	3,000.00	3,000	110.00	110	3,110	467	3,577
Demolish Defunct Infrastructure After System Cutover	1	LS			2,000.00	2,000	2,000	300	2,300
12 Strand Singlemode Outside Plant (OSP) OFC	3,500	LF	2.50	8,750	.05	175	8,925	1,339	10,264
12 Strand Multimode Outside Plant (OSP) OFC	3,500	LF	1.19	4,158	.05	175	4,333	650	4,983
Trenching	450	LF	7.50	3,375	15.00	6,750	10,125	1,519	11,644
(4)4"C w/ 3" 3-Cell Textile Innerduct	450	LF	61.40	27,630	71.00	31,950	59,580	8,937	68,517
Utility Vault (Medium)	1	EA	4,335.00	4,335	3,500.00	3,500	7,835	1,175	9,010
Telecommunications Device - 4-Port	16	EA	1,100.00	17,600	473.67	7,579	25,179	3,777	28,956
Telecommunications Device - 4-Port - Existing	3	EA	1,100.00	3,300	473.67	1,421	4,721	708	5,429
CAT 6A Quickport Connector	128	EA	36.16	4,628	25.00	3,200	7,828	1,174	9,002
CAT 6A Quickport Connector - Existing	24	EA	36.16	868	26.00	624	1,492	224	1,716
CAT 6A Patch Panel	2	EA	320.11	640	150.00	300	940	141	1,081
Copper 6-port Empty Cassette	16	EA	100.00	1,600	50.00	800	2,400	360	2,760
Telecom Room - Electrical Improvements	1	EA	4,000.00	4,000	2,500.00	2,500	6,500	975	7,475

telecommunications **cost opinion**

Building 56 - Maintenance

Telecommunications Infrastructure Assessment Recommendations

Child Study And Treatment Center (CSTC)

HARGIS
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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** June 20, 2024

JOB NUMBER 24028 **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
Telecom Room - HVAC - Ductless Split System	1	EA	7,500.00	7,500	1,500.00	1,500	9,000	1,350	10,350
Pathway per Drop	16	EA	200.00	3,200	150.00	2,400	5,600	840	6,440
Subtotal Low-Voltage Systems (Divisions 27)							**192,298**	**28,845**	**221,143**
DIVISION 28									
LIFE SAFETY & SECURITY SYSTEMS - DIVISIONS 28									
General Provisions (Submittals, Mobilization, Permits)	1	LS	138.02	138	276.03	276	414	62.11	476
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	280.40	280			280	42.06	322
Raceway, Cabling Supports and Outlet Boxes	1	EA	200.00	200	200.00	200	400	60	460
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	1	EA	535.00	535	85.00	85	620	93	713
Power Supply 10A/24V - 8-Door	1	EA	925.00	925	170.00	170	1,095	164	1,259
Portal Licenses	1	EA	100.00	100	50.00	50	150	23	173
Card Reader	1	EA	325.00	325	127.50	128	453	68	520
Electrified Hardware (Electrified Lock and Power Transfer)	1	EA	1,800.00	1,800	600.00	600	2,400	360	2,760
Request To Exit (REX)	1	EA	125.00	125	85.00	85	210	32	242
Wiring - Per Access Control Door	1	EA	400.00	400	700.00	700	1,100	165	1,265
Programming	1	LS			1,402.00	1,402	1,402	210	1,612
Engineering	1	LS			701.00	701	701	105	806
Subtotal Life Safety and Security Systems (Divisions 28)							**12,705**	**1,906**	**14,611**