HARGIS TELECOMMUNICATIONS ASSESSMENT

DSHS

TRANSITIONAL CARE CENTER OF SEATTLE

WA STATE PROJECT NUMBER: 2024-429 O (12)

EXECUTIVE SUMMARY

OVERVIEW

The Transitional Care Center of Seattle (TCCS), established as a Medicare/Medicaid certified skilled nursing facility, is a center under the administration of the EmpRes Healthcare Family within the healthcare sector of Seattle. The TCCS is designed to provide a nurturing environment with strictly controlled access and monitored patient progress, ensuring safety and comfort while offering comprehensive treatment programs.

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

CONSULTING TEAM

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facility type. Excluded from the assessment were electronic systems, applications, and hardware, such as the network switches and servers.

The existing campus telecommunications cabling infrastructure includes intra-building twisted-pair copper, which does not conform with current TIA industry standards for healthcare facilities.

The existing horizontal cabling within the building consists of unshielded twisted-pair copper to provide connectivity to computers, telephones, printers, and other network attached devices. The condition of the cabling consists of Category 3 and 5e, which do not meet current industry infrastructure standards. Based on physical inspection and review of existing documentation, it is determined that the existing IT infrastructure does not comply with most of the current industry standards and will not support evolutions to modern and/or future technologies. The existing backbone infrastructure, consisting of only Category 5e, is antiquated and is unable to support the deployment of new technologies. Improving the IP backbone connectivity will be a fundamental component to creating an environment that will permit Transitional Care Center of Seattle and DSHS to identify, adapt, and implement new technologies that contribute to safety and operational improvements. New single and multi-mode optical fiber cabling will be required to provide the required backbone capacity.

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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, 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 Transitional Care Center of Seattle and DSHS 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-1179B 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

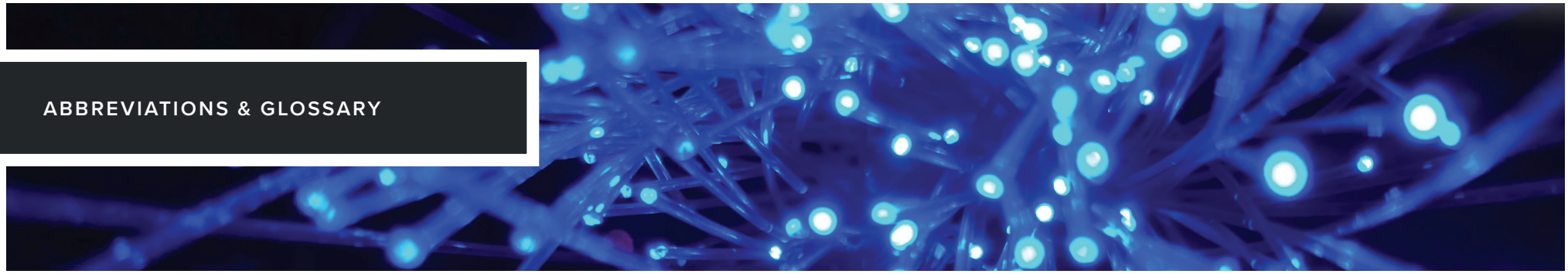
Review, assess and evaluate systems in each building

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	» Retrofit Telecommunications Rooms MER-B03B, TR-129, TR-229, and TR-329. - 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 cooling units in the MER and TRs. - Expand existing Access Control, add card reader and electrically locking hardware. - Install Supporting Equipment (Patch Panels, Cable Management, Rack Mount Fiber Cabinets (RMFC), Adaptor plates, Ladder Rack, etc.)	$429,000
INSTALL BACKBONE OFC TO NEW TELECOM SPACES			
2	N/A	» Pull 12 st OS2 and 12 st OM4 OFC from basement MER-B03B to first floor TR-129, second floor TR-229, and third floor TR-329 - Terminate OFC Cabling if RMFC is installed.	$13,000
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.	$1,962,000
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.	$408,000
DEMOLISH DEFUNCT INFRASTRUCTURE			
6	1-5	» Demolish backbone cable. - Demolish OM3 Multi-mode Backbone OFC between TRs and MER. » Demolish Defunct telecommmunications rooms. - Remove any salvageable equipment from TR's. - Remove the remaining equipment and dispose of it.	$32,000

EXISTING COMMUNICATIONS INFRASTRUCTURE

BACKBONE CABLING

Service Provider Connections

Transitional Care Center of Seattle receives internet through a 24-strand single mode optical cable from CenturyLink. The service provider fiber terminates in a wall-mounted fiber cabinet in MER-B03B, with two strands patched to a service provider router. Two Category 5e cables then connect the service provider router to a Transitional Care Center of Seattle switch.

The existing phone service provider connection is provided with two 100-pair twisted-pair copper backbone cables from the utility to the demarcation point in room B02 in the basement. This phone connection is abandoned and not in use.

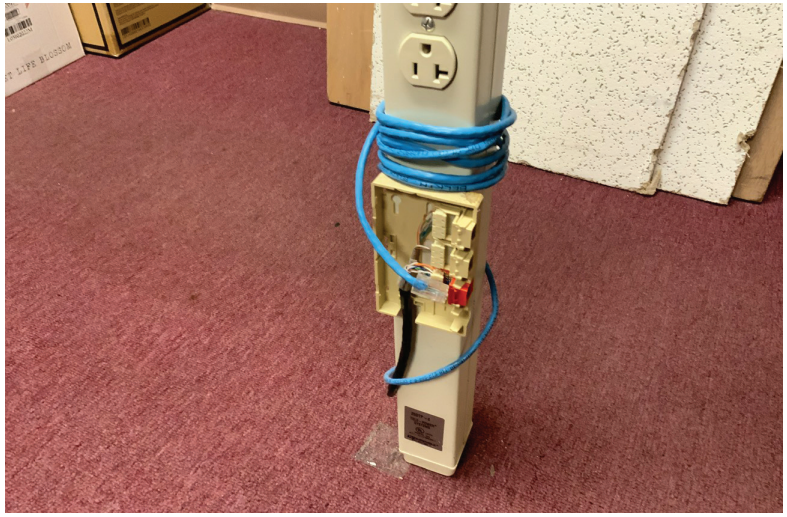
OPTICAL FIBER COMPARISON

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

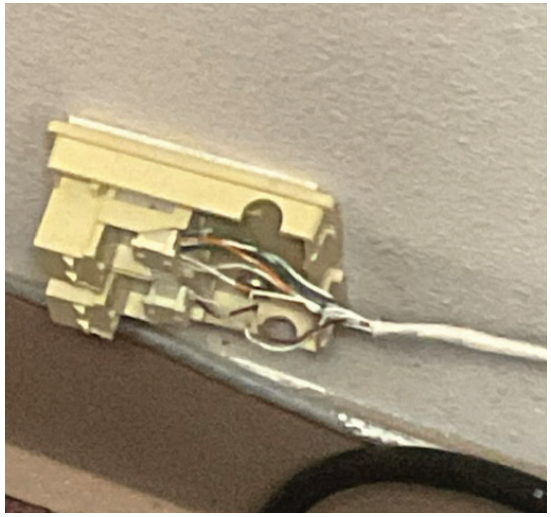
HORIZONTAL CABLING

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 Telecommunications Outlet



Existing Biscuit Jack.

Existing Ceiling Data Cable, Administration

VOICE HORIZONTAL CABLING

Upon review of the voice infrastructure at Transitional Care Center of Seattle, it has been identified as insufficient to meet the current and future communication needs. The existing phone system uses a VOIP system based on Category 5e.

The existing Category 5e infrastructure is not adequate to meet the current and future needs of Transitional Care Center of Seattle. The Category 5e cabling is not in compliance with TIA standards for infrastructure. It is recommended that the existing cabling infrastructure be replaced with new cabling infrastructure, and the voice network be collapsed onto a converged network infrastructure utilizing standards compliant Category 6A cabling.

There is also an unused analog phone system consisting of abandoned Category 3 cabling which is patched at various points to provide service. The cabling system employs 66 and 110 punchdown blocks for cable termination and interconnection within the structured cabling system. The service enters the building in basement room B02, patches on building entrance protectors, then patches again from 66 blocks to 110 blocks to be distributed to the appropriate floor. Once on the respective floor, the cable is patched again on 110 blocks to each patient room. This overall effect of multiple patches degrades the signal and introduces noise, resulting in grainy, poor-quality audio. 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. It is recommended that all Category 3 cabling be removed, and the voice network be integrated into a converged network infrastructure utilizing standards-compliant Category 6A cabling.

MICROSOFT TEAMS BANDWIDTH REQUIREMENTS PER ENDPOINT

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

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

ETHERNET HORIZONTAL CABLING

The existing ethernet network is comprised of Category 5e cabling. The existing patch panels, connectors, and patch panels meet Category 5e and 6 standards. There are also multiple areas where horizontal cablings are left dangling from the wall or ceiling without a wall-plate. This not only presents a potential safety hazard but also impacts the performance and reliability of the network connection.

The existing Category 5e is not adequate to meet the current and future needs of Transitional Care Center of Seattle. The Category 5e cabling is also 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. It is also recommended that additional data ports are added throughout the facilities to adequately provide employees with enough network port connections for their devices. New Category 6A cabling will also require to be secured and all outlet boxes should be fitted with the appropriate faceplates to protect the cabling.

Meeting TIA-1179-A standards will require the entire channel to be Category 6A certified. Meeting this standard will require all new patch panels, modular jacks, and wall outlets comprising a replacement of the entire infrastructure. Existing 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 Copy Room Ceiling Data Cable

TELECOMMUNICATIONS SPACES

The existing telecommunications spaces are not compliant with current standards. 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 modify the telecommunications rooms. Category 6A patch panels will have to be provided and network support equipment will have to be grounded to their bonding busbar. 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 using 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.

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

EQUIPMENT ROOM B03B - MAIN EQUIPMENT ROOM

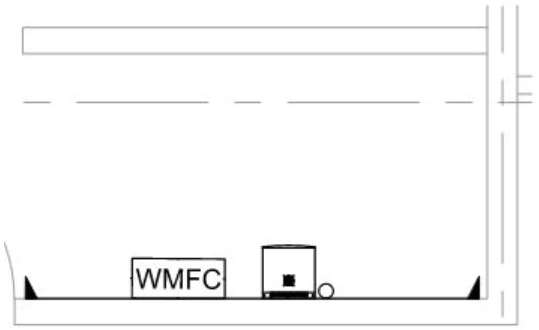
Main Equipment Room B03B is on the basement level. One wall contains a wall-mounted enclosure and service provider equipment. The telecom rack contains multiple 24-port and 48-port Category 6 patch panels. The room is served by a 24-strand single-mode OFC from the service provider and Category 5e cabling to the upper-level telecom rooms.

There is currently no space for expansion on the rack. There is no grounding bus bar in the room. The room does not contain cooling or humidity control. There are a few convenience receptacles, but no 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.

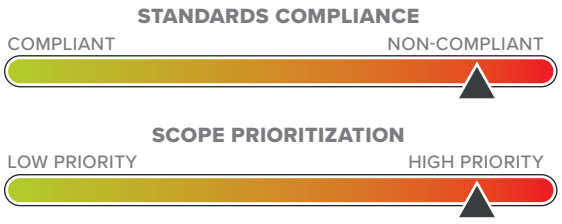
To meet industry standards, it is recommended to upgrade the existing backbone and horizontal cabling to OM4/ OS2 and Category 6A. Additional Category 6A data ports are required to meet standards. It is also recommended to provide a telecommunications grounding busbar to create a consistent potential across all components. The wall-mounted enclosure should be replaced with a floor standing rack to allow more rack space for future growth. 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.

Service Provider Equipment

Existing Backbone Cabling



ER-B03B Floor Plan



Deficiencies:

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

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

» No overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.

» No grounding busbar for the telecommunications equipment.

» Electrical infrastructure does not meet minimum requirements per standards.

» Uncontrolled access to space with no identity verification.

» No dedicated cooling equipment.

» No rack space for expansion.

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 to TR-129, TR-229, and TR-329.

» Add ladder tray and cable management as needed.

» Add Telecommunications Grounding Busbar.

» Add power circuits and receptacles as needed.

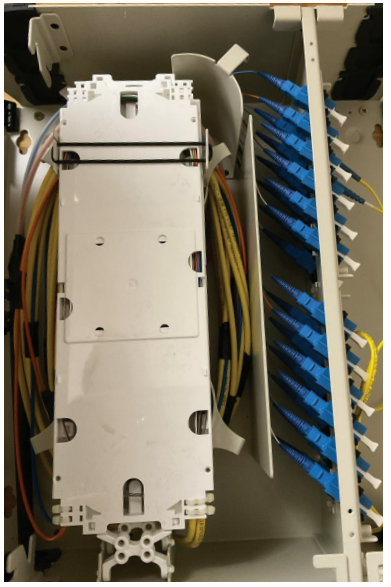
» Add dedicated cooling system.

» Control access to authorized individuals.

» Replace wall-mounted enclosure with new two-post equipment rack to house telecom equipment

Existing Telecom Rack

Service Provider Fiber



Service Provider Fiber

TELECOMMUNICATIONS ROOM 129 - TR-129

Telecommunications Room 129 is on the first floor. One wall contains a wall-mounted enclosure and coax cabinet for CATV. The telecom rack contains multiple 24-port Category 6 patch panels and a 48-port Category 5e patch panel. The room is served only by Category 5e cabling from the Main Equipment Room in the basement.

There is currently no space for expansion on the rack, but there is space in the room for additional floor standing racks. There is also no grounding bus bar in the room. The room does not contain cooling or humidity control. There are a few convenience receptacles, but no dedicated equipment receptacles. UPS power is available to provide clean, uninterrupted power for the equipment. While the room can be locked, in practice, it is often left open because it is also used as an employee's workspace, allowing access to anyone walking by.

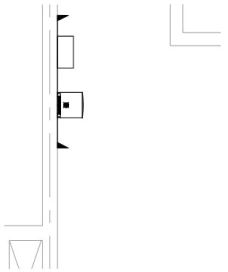
To meet industry standards, it is recommended to upgrade the existing backbone and horizontal cabling to OM4/OS2 and Category 6A. Additional Category 6A data ports are required to meet standards. It is also recommended to provide a telecommunications grounding busbar to create a consistent potential across all components. The wall-mounted enclosure should be replaced with a floor standing rack to allow more rack space for future growth. The employee should be moved to a new space to create a dedicated telecommunications room. 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.

Deficiencies:

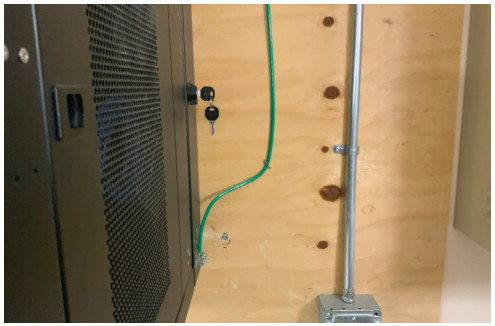
- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- No overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.
- No grounding busbar for the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

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 to MER-B03B.
- Add ladder tray and cable management as needed.
- Add Telecommunications Grounding Busbar.
- Add power circuits and receptacles as needed.
- Add dedicated cooling system.
- Control access to authorized individuals.
- Relocate the employee workspace to allow room to be a dedicated telecom space.
- Replace wall-mounted enclosure with new two-post equipment rack to house telecom equipment



TR-129 Floor Plan



Existing Grounding

Existing Telecommunications Enclosure

STANDARDS COMPLIANCE

COMPLIANT — NON-COMPLIANT

SCOPE PRIORITIZATION

LOW PRIORITY — HIGH PRIORITY

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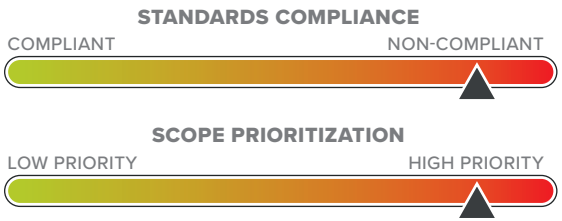
TELECOM ROOM 229 - TR-229

The Telecommunications Room 229 for Transitional Care Center of Seattle is on the second floor. One wall contains a wall-mounted enclosure and coax cabinet for CATV. The telecom rack contains a 48-port Category 6 patch panel. The room is served only by Category 5e cabling from the Main Equipment Room in the basement.

There is currently no space for expansion on the rack, but there is space in the room for additional floor standing racks. There is also no grounding bus bar in the room. The room does not contain cooling or humidity control. There are a few convenience receptacles, but no dedicated equipment receptacles. UPS power is available to provide clean, uninterrupted power for the equipment. While the room can be locked, in practice, it is often left open because it is also used as an employee's workspace, allowing access to anyone walking by.

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. The wall-mounted enclosure should be replaced with a floor standing rack to allow more rack space for future growth. The employee should be moved to a new space to create a dedicated telecommunications room. 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.

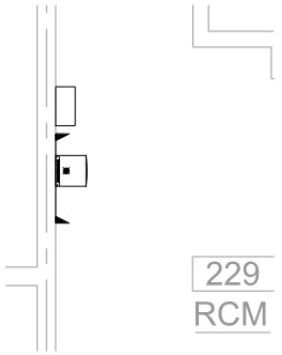


Deficiencies:

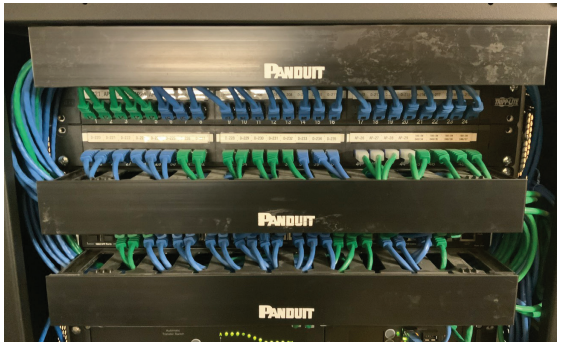
- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- No overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.
- No grounding busbar for the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

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 to MER-B03B.
- Add ladder tray and cable management as needed.
- Add Telecommunications Grounding Busbar.
- Add power circuits and receptacles as needed.
- Add dedicated cooling system.
- Control access to authorized individuals.
- Relocate the employee workspace to allow room to be a dedicated telecom space.
- Replace wall-mounted enclosure with new two-post equipment rack to house telecom equipment



TR-229 Floor Plan



Existing Patch Panel

Existing Telecommunications Enclosure

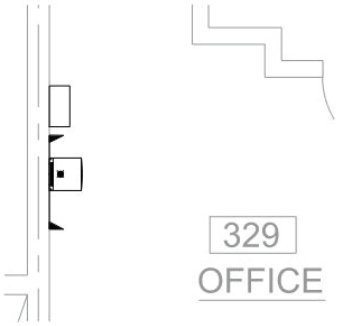
HARGIS

TELECOM ROOM 329 - TR-329

Telecommunications Room 329 is on the second floor. One wall contains a wall-mounted enclosure and coax cabinet for CATV. The telecom rack contains a 48-port Category 6 patch panel. The room is served only by Category 5e cabling to basement Main Equipment Room.

There is currently no space for expansion on the rack, but there is space in the room for additional floor standing racks. There is also no grounding bus bar in the room. The room does not contain cooling or humidity control. There are a few convenience receptacles, but no dedicated equipment receptacles. UPS power is available to provide clean, uninterrupted power for the equipment. While the room can be locked, in practice, it is often left open because it is also used as an employee's workspace, allowing access to anyone walking by.

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. The wall-mounted enclosure should be replaced with a floor standing rack to allow more rack space for future growth. The employee should be moved to a new space to create a dedicated telecommunications room. 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.



TR-329 Floor Plan

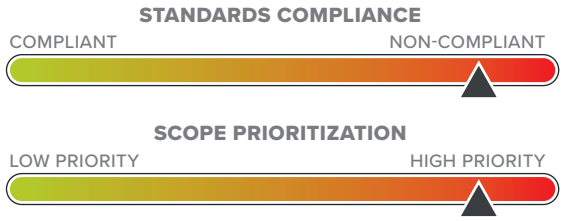
Existing Telcommunications Enclosure

Deficiencies:

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

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 to MER-B03B.
- Add ladder tray and cable management as needed.
- Add Telecommunications Grounding Busbar.
- Add power circuits and receptacles as needed.
- Add ductless split-system cooling unit.
- Control access to authorized individuals.
- Relocate the employee workspace to allow room to be a dedicated telecom space



CROSS-CONNECT - ROOM B02

Cross-connect room B02 is on the basement level. The room contains the unused analog phone cabling, as well as the new Panasonic PBX for the current phone system. The space is only 75 sq ft and is also being shared with electrical equipment. Two walls contain multiple 66 and 110-blocks for voice cross connection.

There is no room for expansion due to the limited space. No grounding bus bar has been installed in the room, and there is also no dedicated cooling equipment. The room can be locked but there is no other access control on the room.

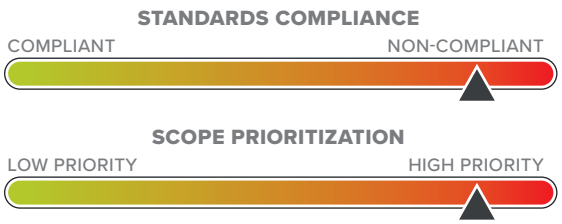
Due to the small size, it is recommended that the room be abandoned with all new voice cabling being routed to ER-B03B on the same floor.

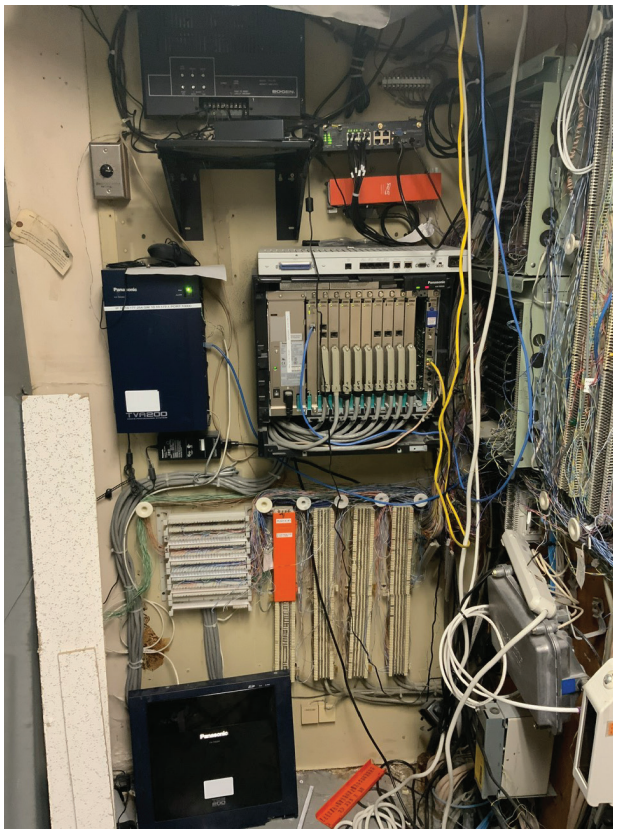
Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- No overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.
- No Telecommunications Grounding Busbar.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.
- No dedicated cooling equipment

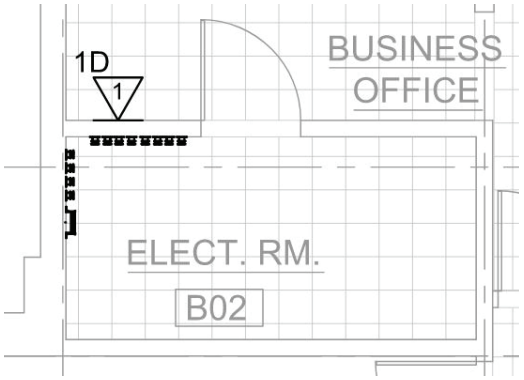
Recommendations:

- Abandon the closet and route all future cabling to ER-B03B.
- Relocate the current phone headend to ER-B03B.





Current And Abandoned Phone Headend



Cross-Connect B02 Floor Plan

CROSS-CONNECT ROOM - B33

Cross-connect room B33 is on the basement level. The room currently contains a cross-connect point for the abandoned voice Category 3 cabling. One wall contains an abandoned 12-port Category 5e patch panel for voice cross connection.

There is no active equipment in the room and no room for expansion due to the limited space. No grounding bus bar has been installed in the room, and there is also no dedicated cooling equipment. The room can be locked but there is no other access control on the room.

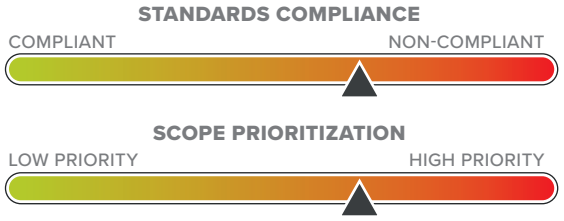
It is recommended that the room be abandoned with all new voice cabling being routed to ER-B03B on the same floor.

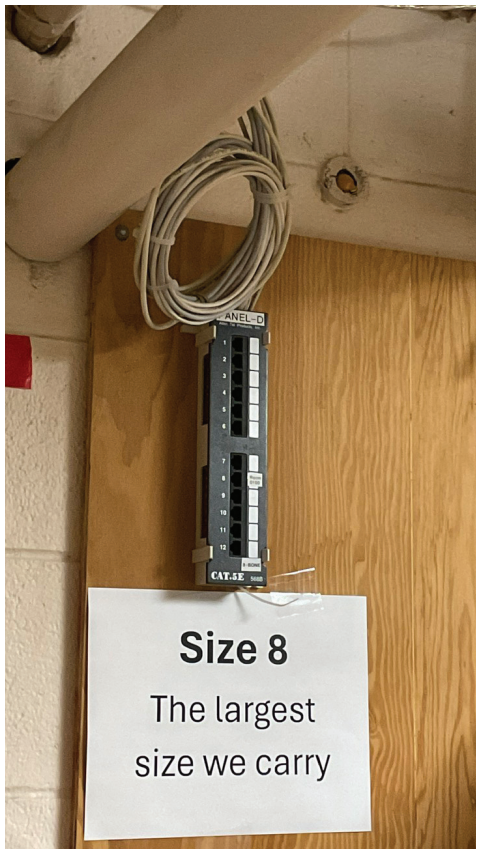
Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- No overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.
- No Telecommunications Grounding Busbar.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.
- No dedicated cooling equipment

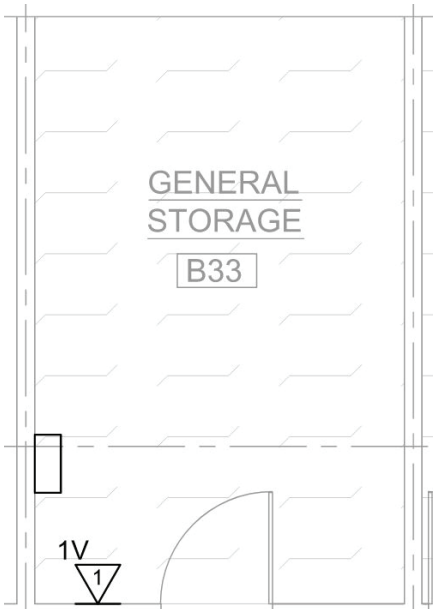
Recommendations:

- Remove the unused equipment and route all future cabling to ER-B03B





Abandoned Category 5e Patch Panel



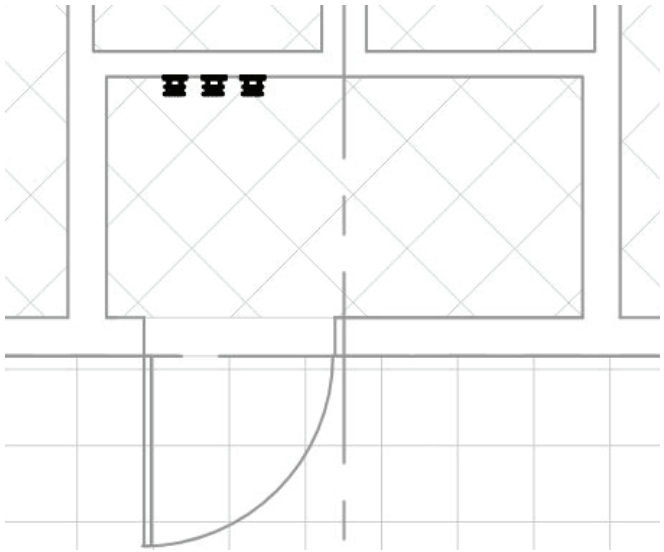
B33 Floor Plan

CROSS-CONNECT - ROOM 114

Cross-connect room 114 is on the first floor. The room is roughly 20 sq ft and used to be a supply closet. The room is currently used as a cross-connect point for the abandoned voice Category 3 cabling. One wall contains multiple 66-blocks for voice cross connection.

There is no active equipment in the room and no room for expansion due to the limited space. No grounding bus bar has been installed in the room, and there is also no dedicated cooling equipment. The room can be locked but there is no other access control on the room.

Due to the small size, it is recommended that the room be abandoned with all new voice cabling being routed to TR-129 on the same floor.



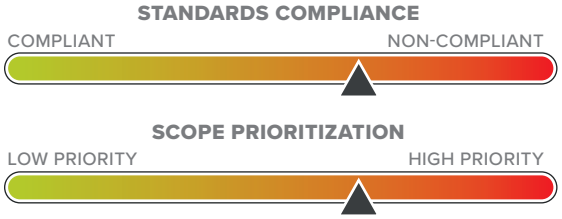
B114 Floor Plan

Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- No overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.
- No Telecommunications Grounding Busbar.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.
- No dedicated cooling equipment

Recommendations:

- Remove the unused equipment and route all future cabling to TR-129.



Abandoned 66-blocks

Abandoned Category 3 Cables

CROSS-CONNECT - ROOM 214

Cross-connect room 214 is on the first floor. The room is roughly 20 sq ft and used to be a supply closet. The room is currently used as a cross-connect point for the abandoned voice Category 3 cabling. One wall contains multiple 66-blocks for voice cross connection.

There is no active equipment in the room and no room for expansion due to the limited space. No grounding bus bar has been installed in the room, and there is also no dedicated cooling equipment. The room can be locked but there is no other access control on the room.

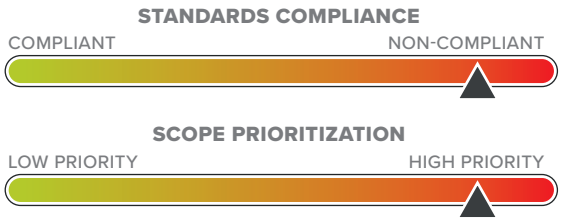
> ***Due to the small size, it is recommended that the room be abandoned with all new voice cabling being routed to TR-229 on the same floor.***

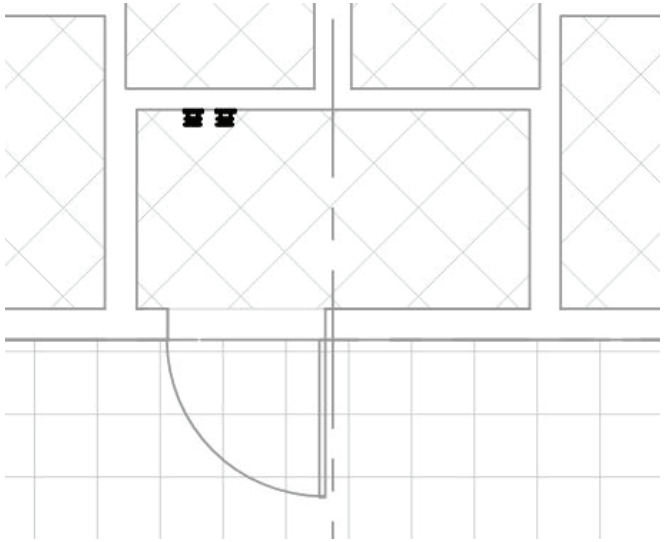
Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- No overhead ladder tray for cable support, leading to cables being draped or placed directly on equipment.
- No Telecommunications Grounding Busbar.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.
- No dedicated cooling equipment

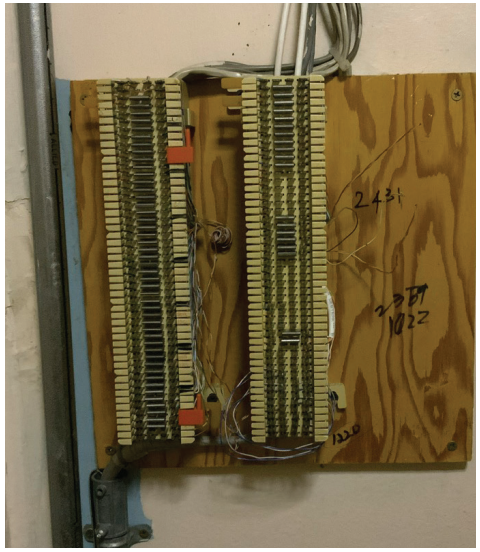
Recommendations:

- Abandon the closet, remove all unused equipment, and route all future cabling to TR-229





B214 Floor Plan



Abandoned 66-blocks

Abandoned Category 3 Cables

CROSS-CONNECT - STAIR-1

Cross-connect Stair-1 is located in the stairwell landing on the third floor. The cross-connect is located in a panel on the wall of the landing, next to the panel containing the coaxial headend. The cross-connect panel contains multiple 66-blocks for the abandoned voice Category 3 cabling.

There is no active equipment in the panel and the space has no room for expansion due to the it being in the stairwell. No grounding bus bar has been installed in the panel, and there is also no dedicated cooling equipment. The panel can be locked but there is no other access control on the enclosure.

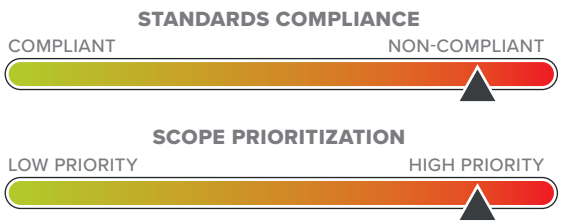
> ***Due to the location, it is recommended that the cross-connect be abandoned with all new voice cabling being routed to TR-329 on the same floor.***

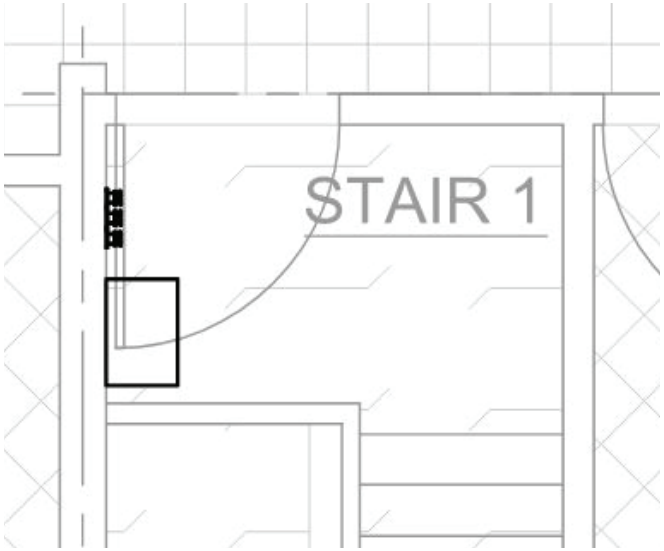
Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- No Telecommunications Grounding Busbar.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.
- No dedicated cooling equipment

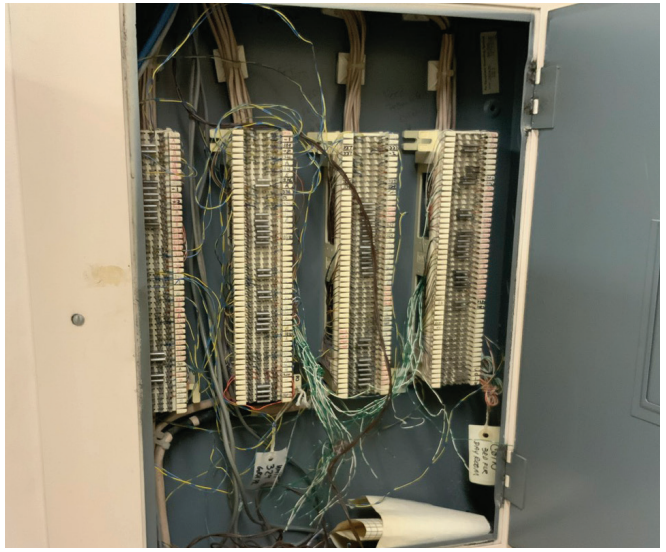
Recommendations:

- Remove the unused equipment and route all future cabling to TR-329.





Stair-1 Floor Plan



Abandoned 66-blocks

CROSS-CONNECT - ROOM 321

Cross-connect Stair-1 is located in the stairwell landing on the third floor. The cross-connect is located in a panel on the wall of the landing, next to the panel containing the coaxial headend. The cross-connect panel contains multiple 66-blocks for the abandoned voice Category 3 cabling.

There is no active equipment in the panel and the space has no room for expansion due to the it being in the stairwell. No grounding bus bar has been installed in the panel, and there is also no dedicated cooling equipment. The panel can be locked but there is no other access control on the enclosure.

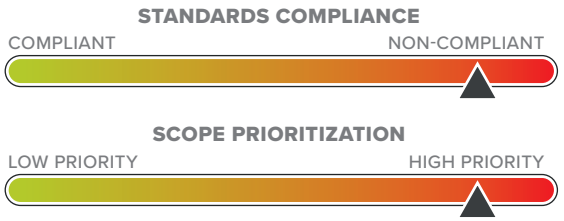
Due to the location, it is recommended that the cross-connect be abandoned with all new voice cabling being routed to TR-329 on the same floor.

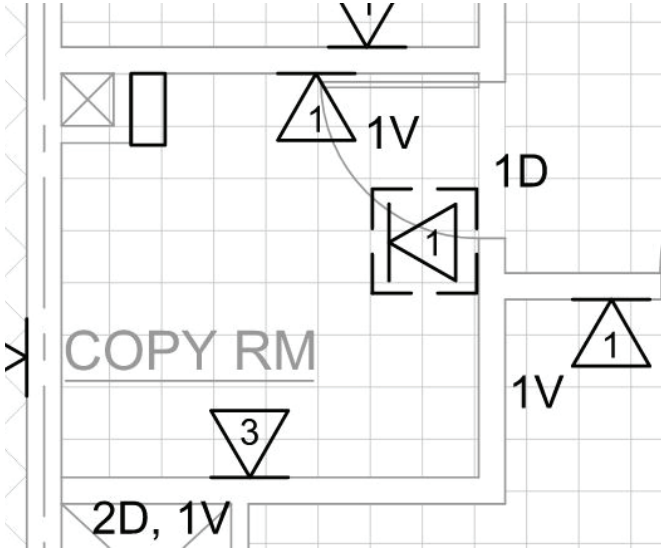
Deficiencies:

- Horizontal Cabling infrastructure does not meet minimum standards per TIA-1179.
- Backbone Cabling Infrastructure does not meet minimum standards per TIA-1179.
- No Telecommunications Grounding Busbar.
- Electrical infrastructure does not meet minimum requirements per standards.
- Uncontrolled access to space with no identity verification.
- No dedicated cooling equipment

Recommendations:

- Remove the unused equipment and route all future cabling to TR-329.





Room 321 Floor Plan

Abandoned Category 5e Patch Panel

APPENDIX A: FULL COST OPINIONS

telecommunications **cost opinion**

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

www.hargis.biz

Telecommunications Infrastructure Assessment Recommendations
Transitional Care Center of Seattle

BASIS OF OPINION	Pre-Design	**PREPARED BY**	Tin Vo	**DATE**	July 12, 2024
JOB NUMBER	24075	**CHECKED BY**	Ben Helms	**OVERHEAD & PROFIT**	20%

telecommunications summary	subtotal	OH&P	total
Main Building	$ 1,925,675	$ 385,135	$ 2,310,811
Sub-Total	$ 1,925,675	$ 385,135	$ 2,310,811
General Contractor OH&P **15%**			$ 346,622
Escalation **7%**			$ 24,264
Total			**$ 2,681,696**

EXCLUSIONS

1 - Design contingency

2 - Sales Tax

telecommunications **cost opinion**

Main Building

Telecommunications Infrastructure Assessment Recommendations

Transitional Care Center of Seattle

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** July 12, 2024

JOB NUMBER 24075 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 20%

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	29,288.77	29,289	58,578	58,578	87,866	17,573	105,440
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	58,138.93	58,139			58,139	11,628	69,767
SECTION 271100 TELECOMMUNICATION DISTRIBUTION SYSTEM									
New Telecommunications Rooms - MC		EA	18,000.00		5,000.00				
New Telecommunications Rooms - HC	4	EA	12,000.00	48,000	2,500.00	10,000	58,000	11,600	69,600
New Telecommunications Rooms - HC		EA	4,500.00		1,200.00				
Backbone Cabling - Copper & Optical Fiber		LF	3.00		2.75				
Adaptor Plates - LC	24	EA	150.00	3,600	50.00	1,200	4,800	960	5,760
Rack Mount Fiber Cabinet - 4RU	1	EA	390.00	390	110.00	110	500	100	600
Rack Mount Fiber Cabinet - 2RU	3	EA	300.00	900	110.00	330	1,230	246	1,476
Ladder Rack	270	LF	7.50	2,025	20.00	5,400	7,425	1,485	8,910
Ventilated Rack		EA	7,500.00		800.00				
20KVA UPS	1	EA	12,600.00	12,600	110.00	110	12,710	2,542	15,252
2000VA UPS	3	EA	3,000.00	9,000	110.00	330	9,330	1,866	11,196
Telecommunication Room Demolition	6	EA			2,000.00	12,000	12,000	2,400	14,400
Demolish Defunct Infrastructure After System Cutover	1	LS			8,000.00	8,000	8,000	1,600	9,600
12 Strand Singlemode Outside Plant (OSP) OFC		LF	2.50		.05				
12 Strand Multimode Outside Plant (OSP) OFC		LF	1.19		.05				
12 Strand Singlemode Plenum Rated OFC	500	LF	.94	468	.05	25	493	99	592
12 Strand Multimode Plenum Rated OFC	500	LF	1.25	625	.05	25	650	130	780

telecommunications **cost opinion**

Main Building

Telecommunications Infrastructure Assessment Recommendations

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** July 12, 2024

JOB NUMBER 24075 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 20%

	quantity		material cost		labor cost		engineering opinion		
description	number	unit	unit cost	total	unit cost	total	subtotal	OH&P	total
Telecommunications Device - 4-Port	509	EA	1,100.00	559,900	473.67	241,100	801,000	160,200	961,200
Telecommunications Device - 4-Port - Existing	123	EA	1,100.00	135,300	473.67	58,262	193,562	38,712	232,274
CAT 6A Quickport Connector	4,072	EA	36.16	147,227	25.00	101,800	249,027	49,805	298,833
CAT 6A Quickport Connector - Existing	984	EA	36.16	35,578	26.00	25,584	61,162	12,232	73,394
CAT 6A Patch Panel	53	EA	320.11	16,966	150.00	7,950	24,916	4,983	29,899
Copper 6-port Empty Cassette	424	EA	100.00	42,400	50.00	21,200	63,600	12,720	76,320
Telecom Room - Electrical Improvements	4	EA	4,000.00	16,000	2,500.00	10,000	26,000	5,200	31,200
Telecom Room - HVAC - Ductless Split System	4	EA	7,500.00	30,000	1,500.00	6,000	36,000	7,200	43,200
Pathway per Drop	509	EA	200.00	101,800	150.00	76,350	178,150	35,630	213,780
Subtotal Low-Voltage Systems (Divisions 27)							**1,894,559**	**378,912**	**2,273,471**
DIVISION 28									
LIFE SAFETY & SECURITY SYSTEMS - DIVISIONS 28									
General Provisions (Submittals, Mobilization, Permits)	1	LS	360.26	360	720.51	721	1,081	216.15	1,297
Basic Materials and Methods (Consumables, Small Tools, Equip Rental, Grounding, Identification, etc.)	1	LS	631.80	632			632	126.36	758
Raceway, Cabling Supports and Outlet Boxes	4	EA	200.00	800	200.00	800	1,600	320	1,920

telecommunications **cost opinion**

Main Building

Telecommunications Infrastructure Assessment Recommendations

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BASIS OF OPINION Pre-Design **PREPARED BY** Tin Vo **DATE** July 12, 2024

JOB NUMBER 24075 **CHECKED BY** Ben Helms **OVERHEAD & PROFIT** 20%

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	696	4,176
Door Controller - 2-Door	2	EA	535.00	1,070	85.00	170	1,240	248	1,488
Power Supply 10A/24V - 8-Door	1	EA	925.00	925	170.00	170	1,095	219	1,314
Power Supply 10A/24V - 16-Door		EA	1,950.00		255.00				
Portal Licenses	4	EA	100.00	400	50.00	200	600	120	720
Card Reader	4	EA	325.00	1,300	127.50	510	1,810	362	2,172
Electrified Hardware (Electrified Lock and Power Transfer)	4	EA	1,800.00	7,200	600.00	2,400	9,600	1,920	11,520
Request To Exit (REX)	4	EA	125.00	500	85.00	340	840	168	1,008
Wiring - Per Access Control Door	4	EA	400.00	1,600	700.00	2,800	4,400	880	5,280
Programming	1	LS			3,159.00	3,159	3,159	632	3,791
Engineering	1	LS			1,579.50	1,580	1,580	316	1,895
Subtotal Life Safety and Security Systems (Divisions 28)							**31,116**	**6,223**	**37,339**