SECURITY SYSTEM

Each campus has multiple security systems, such as access control system, video surveillance system, emergency communications system, and mass notification system. Each of these systems perform a particular function and, collectively, facilitate for the campuses and District to enforce security and safety policies and measures. These security systems tie/report back to the Dispatch Center at the District office.

The Dispatch Center monitors the campuses and security systems, and coordinates responses to security and safety instances. The Dispatch Center has direct connections to the Oakland Police Department and Alameda Sheriff's office.

Security System \ Access Control Replacement

The District has approximately 3,000 doors throughout the district that requires access control. Some time ago, the District deployed Lenel access control systems throughout the campuses and district offices (which replaced Johnson Controls systems). Recently, the District decided to replace the existing Lenel access control system with a SecureAll keyless entry system throughout the campuses and district offices.

The District has completed the design and planning to deploy a SecureAll keyless entry system to approximately 800 doors at Laney College. This project will solidify the deployment strategy for the access control replacement at the remaining +/- 2,200 doors throughout the district.

MASTER PLAN PROJECTS

As a Master Plan priority, the District seeks funding for the access control replacement throughout the district, less the doors of the currently funded Laney project.

Video Surveillance Cameras

The District has deployed over 500 cameras. Of these, the coverage is not adequate and cameras are failing.

MASTER PLAN PROJECTS

The District seeks funding for maintenance, repairing, and adding new cameras to improve coverage.

New and renovated buildings must include adequate cameras, and each of these buildings will need to fund the cameras associated with their respective projects.

Cost: approximately $3M to $4M to cover maintenance, repairing, and new cameras over a 2-year period

Video Surveillance Maintenance Contract

The District has contracted Ojo Technology Co. to a 3-year agreement (which expires next year). Under this contract, Ojo maintains the District's video surveillance and recording systems.

Neither the District's nor the campuses' OpEx budgets contain funding to cover ongoing renewal of this maintenance contract. An additional review and assessment is required.

MASTER PLAN PROJECTS

The District seeks funding for the maintenance contract covering video surveillance systems. The FMP, being a 5-year plan, shall include 2 contract renewals.

Video System Maintenance Contract

The District has contracted Ojo Technology Co (renewable annually) to maintain the video recording system.

Neither the District's nor the campuses' OpEx budgets contain funding to cover ongoing maintenance contract for the video recording system.

MASTER PLAN PROJECTS

The District seeks funding for contracts to maintain the video recording systems.

Emergency Call Stations

The campuses report that most of the emergency call stations ("blue phones") are in a non-operational state. This poses a risk to the campus and district overall, and it is unsafe for the students and instructors. The District needs to repair, replace or remove the existing stations.

The District has bid repairing/replacing emergency call stations (ref. Bid No. 16-17/23, covering the 'modified' scope of work). However, the bids came in higher than funding was available. The District revised the scope of work to the replace the existing units at Laney College and Merritt College without the additional features, leaving the other campuses untouched for now.

Also, the District is considering emergency call stations that feature surveillance cameras and 'big voice' type mass notification loudspeakers.

MASTER PLAN PROJECTS

The District seeks funding for the full scope on existing units and additional units, that will cover all campuses.

Blackboard Connect

The District subscribes to Blackboard Connect for mass notification services, which includes the following means: land line, mobile line, text, email.

Currently, the District pays $37,500 in annual subscription fees.

MASTER PLAN PROJECTS

The District seeks funding to upgrade the infrastructure of this system and for annual service fees.

WEBS via Phone App

Wide-Area Emergency Broadcast System (WEBS)
The District is considering a technology that is essentially a phone app where someone can 'press a button' that calls to PCCD Dispatch Center. The app, being on the phone, gives location information via the phone's GPS feature – this goes towards abduction events.

Note: The District has studied cellular services on the campuses; most of the coverages are good but found that Merritt had problems. These coverage problems will be addressed in collaboration with the wireless carriers. Also, the District is considering integrating the emergency call system with Blackboard Connect mass notification system.

MASTER PLAN PROJECTS
The District is seeking funding to cover development of this system and, if going forward, the deployment of this system.

Premises Radio System
The District operates a two-way radio system with coverage at BCC, CoA, Aviation, Laney, and Merritt. District-wide, the system is comprised of ~150 radios with repeaters (generally) on roofs. The radios have direct communications with the Sheriff's Office.

Campus Safety Aids, many of which are students, carry radios. These aids perform various safety functions (for example, escort female students at night to cars). The radio systems are becoming unreliable and are failing.

MASTER PLAN PROJECTS
The District seeks funding to replace these radios, mobile units and campus repeaters.

Duress Button System
The District requires a functional duress buttons system (the current duress buttons are unreliable and many are non-functional).

Also, the District desires to add intrusion detection in the District offices and campuses.

MASTER PLAN PROJECTS
The District seeks funding to develop plans for these systems and for the deployment (replacement and expansion) of these systems.

Professional Development
The District puts various staff through Professional Development training (physical defense, use of equipment, crowd control, traffic control, Sheriff's office, etc.). The District's OpEx budget does not include professional development/ training costs.

Current costs are ~$15,000 per staff or aid. The District anticipates training for ~50 staff during the duration of this FMP.

ROUGH ORDER OF MAGNITUTE COSTS

The table below lists the rough-order-of-magnitude (ROM) costs for the projects and initiatives described previously.

The titles are the same to improve relating a cost with a description.

ITEM	BUDGET
Network and Wi-Fi Refreshes	$10,100,000
Cfslfnfz#Djz#Dpnfhf	%2/5##3N
Dpnfhf#pg#Bnbn feb	%2/3##2/9N
Mbofz#Dpnfhf	%2/4##3/5N
Nfssju#Dpnfhf	%3/6N
District Office	%2/5N
Firewalls	$300,000
Network Monitoring	$300,000
Maintenance Contracts	$2,350,000
Djdp#Nbjufobodf#Dpoubdu	%546l#D#zs
Ofuxpsl Dpoofdu	%46l#D#zs
Cloud Data Storage %611L0zfbs	$1,000,000
Cloud Application Deployment # %611L0zfbs	$1,000,000
Power Upgrades	$1,100,000
Qpxfs#Tuvez	%211l
Qpxfs#boe#VQT#Vqhsbeft	%2N
Security Access Control Replacement	$5,060,000
Dptu#Qfs#Epps	%3-411

ITEM	BUDGET
Video Surveillance Cameras	$500,000
Video Surveillance Maint. Contract	$1,200,000
Dptu#Qfs#4.Zfbs#Sfofxbm	%711l
Emergency Call Stations	$4.000,000
Blackboard Connect	$890,000
Tvctdsjqujpo#Gft	%2:1l
Tztufn 0Jogsbtusvduvsf#Vqhsbeft	%811l
Premises Radio System	$1,000,000
Duress Buttons and Intrusion Detection	$2,500,000
Professional Development/Training	$2,000,000
IR Sensors	$800,000
Qfs#Dibttspn	%3l

The total ROM Costs for IT/Network, Telecom, and Security systems during the 5-year duration of this Master Plan is $34,100,000.

Audiovisual Systems Design Guidelines

Technology in the Classrooms

Peralta Community College District

Oakland, CA 94612

TABLE OF CONTENTS

1. Introduction

The Audiovisual Systems Design Guidelines document is intended to assist the PCCD technology teams and faculty in understanding the scope and nature of the technology systems and supporting environments for the Peralta Community College District. These standards range from the high-level functional aspects of the various types of rooms found in the PCCD Colleges to the technical aspects of each type of room.

The layout and format has been designed with four separate but related teams in mind. These teams include the following:

- Management personnel that will own and operate the facility or deployment
- Non-technical readers interested in the overall functionality of the systems along with the OAC team
- PCCD IT technical personnel that will oversee and coordinate the deployments
- Technology Contractors that will execute the actual installation of the systems

NOTE: Examples of typical rooms and equipment layouts are presented for illustration purposes and are based on the existing PCCD standards, coordination meetings with the design teams of the Peralta Community College District IT, and industry best practices for projects of similar scope and size. Each individual College will have variances and unique room layouts specific to their needs. Functionality, however, is expected to remain consistent throughout.

1.1 How to Read this Document

A suggested approach to read this document is for managers and non-technical readers to review sections 1 through 7 of the standards. These sections contain general information and a summary of the systems and technologies included in the document.

Peralta Community College District technical personnel and technology contractors will benefit from reviewing sections 8 through 10. These are the room data sheets and technology appendices for an in-depth description of the technical aspects of the standards.

The room data sheets section is designed to be easily separated from the standards document in order to be used as a field

reference in abridged format. This section is anticipated to receive periodic updates as technology evolves and newer, better systems become available.

The sections have been color-coded with the key as shown above to assist the readers in quickly identifying the sections of interest.

1.2 Design Objectives

The overarching design objectives for the Peralta Community College District builds should include the following:

Reliability – Operation with minimum start-up times, maintenance free, and consistent availability upon command.

Quality – Reproducing high-quality graphics, accurate in detail, resolution, and color. The program and speech audio must be clear, intelligible, and of appropriate volume in all spaces. Rooms with amplified audio support must receive adequate acoustic consideration.

Operation – Simple to operate, consistent in control and user interface, and intuitive in nature. Remote management capabilities must be included in the design to simplify any periodic maintenance, adjustment, and to provide helpdesk support when required.

Global Management – Accessibility and control in a centralized but flexible approach. Global control, management, and reporting should be available, leveraging the converged IP network from anywhere in the PCCD enterprise. The goal is to centralize the management of systems from dedicated workstations with access to all systems. The location of the workstation, however, should be ubiquitous for flexibility.

Expandability – Designed with future capabilities and expandability in mind while taking into consideration present and foreseeable needs, infrastructure requirements, and technology trends in the audiovisual industry.

Consolidation – Designed with a consolidated architecture approach wherever practical; equipment that is shared or does not need to be accessed by the users must be co-located in centralized rooms (telecommunications rooms, IDFs or storage closets) in order to minimize equipment space utilization. This in effect leverages the converged IP network.

1.3 Functional Standards

At a minimum, all spaces will support the following:

Connectivity (Audio and Video) - Content to be presentable within the rooms from laptops, tablets, and other user-provided devices.

Internal (LAN) Network Sharing – Content to be presentable between other technology-enabled spaces via the IP network.

External (Distance) Network Sharing - Via software-based synchronous communication tools.

Whiteboard Collaboration - With one or more walls finished using a dry-erase coating to maximize space utilization. Coating should be properly and professionally applied to maximize results. A protective strip or chair rail wall-guard should be installed on the treated surfaces to prevent chair marks or scuffing.

In-Room AV Systems Control - Control and management of the audiovisual technology via a lectern or wall-mounted control keypad, also accessible via a tablet or similar portable technology device.

IT AV Systems Control - Global management of audiovisual systems with a centralized control approach.

Future Expansion and Upgrade - Infrastructure and cable conveyance systems must support upgrades and technology refresh cycles without considerable reconstruction.

2. Core Systems - Conceptual Descriptions

2.1 Presentation, Collaboration, and Teaching Systems

A. The Concept

Presentation, collaboration, and teaching systems enable users to communicate with audiences of various sizes, to share and generate ideas, knowledge, information, and collaboration materials in a variety of formats. A successful presentation and collaboration space must support the use of multiple types of media, including legacy audiovisual materials, and the latest digital resources. Support for hand written expression must also be provided in the form of whiteboards of various sizes and styles.

In addition, the presentation and collaboration spaces must support multiple types of hardware, being flexible in configuration, form, and function. They must support presentation and collaboration activities ranging from small, simultaneous sessions, to larger collaboration functions for work groups that require extended capacity and connectivity for multiple displays, sound systems, and multi-space dissemination of information.

Audible and visual information may be presented through the use of displays, projection systems, sound systems, localized media players, and user-provided personal technology devices. To support this, a robust infrastructure is required. It must be capable of transporting signals in a flexible and reliable manner, leveraging the converged network as a form of transport.

B. Dedicated Equipment

Teaching functions are supported with equipment dedicated to the room, including video, audio, and control systems. The intent is to require minimal equipment of the presenters' own provisioning to successfully use the facility. Dedicated spaces may be combined physically or electronically by deploying a partition wall or by distributing the audio and video signal to multiple spaces for overflow.

Although these systems are relatively independent for each dedicated space, a centralized management approach must be deployed in order to efficiently and effectively manage and support the operations of the facility while addressing the different needs of the users.

C. Representative Form

Illustrated below are presentation, collaboration, and teaching spaces that emphasize the utilization of video displays for visual information sharing between local and remote collaborators.

Example of Classrooms with Dedicated Technology and Flexible Environments supporting collaboration

3. Core Technologies – Functional Descriptions

3.1 Audiovisual Systems and Capabilities

This section identifies the specific scope of audiovisual features and systems to be installed within the classrooms, and conveys how audiovisual systems and infrastructure will be integrated within the areas identified. Audiovisual systems should optimize the display potential for local sources including but not limited to computers and media players. Audio capabilities of the room should also be optimized, leveraging the digital audio processing systems and the acoustic properties of the room.

The terminologies and systems used in this report to describe the range of audiovisual capabilities in scope are listed below. The intent is to define a common denominator for the users of this document to have a common understanding of the systems referred to when discussing and planning a deployment.

A. Speech Reinforcement

Speech reinforcement systems should utilize microphones, amplifiers, signal processors, and loudspeakers to enhance the voice of the presenter to ensure that all participants can adequately hear the material.

Considerations should be made when using wired microphones on tables or lecterns to utilize shock and vibration isolation mounts.

In divisible room applications, audio processing systems should provide for automated configuration and speaker zoning capabilities.

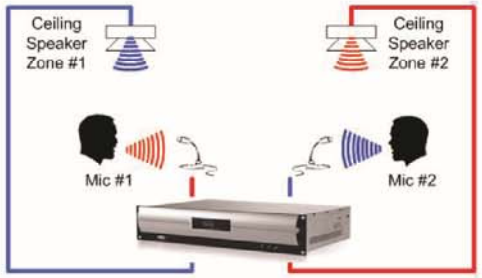
Speech reinforcement loudspeakers should be ceiling-mounted and zoned appropriately for the application. Loudspeakers should be distributed to provide even coverage throughout the space.

Example of Typical Speech Reinforcement Components

B. Voice Lift

Voice lift systems should utilize microphones, amplifiers, signal processors, and loudspeakers to enhance the voice of the presenter and participants to ensure that all in the room can adequately hear the material. This includes the assisted listening system if it exists in the space where voice lift is deployed.

A voice lift system should leverage the capabilities of the audio digital sound processor (DSP), providing amplification only when and where needed as well as with the appropriate level of amplification.



Voice Lift Principle Diagram

C. Program Audio Reinforcement

Program audio reinforcement systems should utilize playback devices, amplifiers, signal processors, and loudspeakers to enhance the audio from the playback source to ensure that all participants can adequately hear and understand the material.

In divisible room applications, audio processing systems should provide for automated configuration and speaker zoning capabilities.

D. Assistive Listening

An assisted listening system consists of audio processing devices and transducers, providing transmission of both speech and program audio to participants using a headset receiver. The systems should be provided in accordance with The Americans with Disabilities Act (ADA) guidelines.

Refer to the publication by Listen Technologies "A Guide to Assistive Listening: Understanding Legislative Compliance", found in the Appendix.

Dedicated Assistive Listening System

E. Video Display

Video display systems, consisting of source devices, matrix switchers, signal processors, distribution devices, and display equipment, should ensure that all participants can adequately view presented material on display devices appropriately sized for the space they support.

Systems should be designed utilizing a digital infrastructure with support for analog devices and support various aspect ratios and resolutions.

Display equipment should be calculated so that the height of the screen is equal to a minimum of one-fifth to one-sixth the distance of the furthest viewer. Displays should be placed at a minimum of 48 inches above finished floor. Motorized projection screens should be utilized where projectors are used.

F. Digital Annotation System

The digital annotation system should allow real time annotation over any still or motion content being viewed on the video display system. The system should allow for electronic mark-ups from annotation tablets, typically integrated with the presenting computer or as a stand-alone system on the lectern or teaching station. The digital annotation system should have recording capabilities for archival and post-distriburion.

G. Control System

A control system consisting of user interface devices, processors, and software should be provided for the management, monitoring, and operation of local and remote equipment and systems. Control systems should be dedicated to the room, but centrally managed via a remote access procedure.

H. Campus-wide Distribution

Campus-wide distribution systems enable the transport of content between audiovisual-enabled spaces. The transport of signals should be digital and utilize the telecommunications backbone of the building. The system should utilize a digital broadband or baseband transport system as required by the type of desired distribution.

I. Digital Signage

The digital signage systems consists of video displays and signal transport systems capable of accepting and displaying information from local or remotely generated sources, such as overflow content, video players, streaming servers, databases, and scheduling systems. Digital signs may be used for way-finding, schedule information, visual messaging, and conveyance of other visual information as required by PCCD.

J. MDF/IDF Equipment Cabinets

Equipment cabinets should be provided in the MDF and IDF rooms to accommodate for the audiovisual systems in the various spaces of the facility. Equipment cabinets should match both the manufacturer and series of the Telecommunications racks and cabinets in order to ensure proper integration between the two systems. The quantity and size of equipment cabinets should accommodate for all initial and future elements of the audiovisual and technology systems. Equipment located in these cabinets will provide background support for the audiovisual systems; they will only be accessed by service personnel. This will allow for a more efficient power distribution, cooling, monitoring, and maintenance for audiovisual system.

K. Distance from MDF/IDF to AV Equipped Rooms

Audiovisual systems should follow the same distance limitation standards prescribed for telecommunication systems given the adoption of converged IP networks for audiovisual use. Each cable run must be kept to a maximum of 295 feet (90 meters),

so that with patch cords, the entire channel is no more than 328 feet (100 meters).

L. Cable Pathways

Whenever possible, the audiovisual cabling should utilize the telecommunications pathway infrastructure. When routing signal-specific cables, best practices should be observed to avoid signal cross-contamination.

M. Power for audiovisual system equipment

Energy-efficient equipment should be utilized. Power to the audiovisual systems' components should be provided by dedicated circuits. These circuits can be shared amongst different equipment in the audiovisual system, but should not supply power to any other systems' equipment, such as lighting or service outlets.

Where system components require a proper shutdown procedure, or where power fluctuation could damage equipment, an uninterruptable power supply (UPS) should be utilized.

N. Architectural Integration

Basic architectural integration issues and design criteria are described schematically. Resolution of specific issues will occur during the design stage of work on the project. It should be noted that, while the information provided in this report identifies areas where audiovisual capabilities may be developed, it is not intended to imply that any specific systems or particular level of capabilities will be installed in those areas on day 1. The information provided here is intended to identify only the extent to which the architectural designs and building infrastructure are being developed to support audiovisual capabilities at whatever time PCCD chooses to implement them.

4. Workspace Types and Variants

4.1 New Spaces

The following types of workspaces have been identified as the core areas that will receive audiovisual technology considerations. These spaces are considered new rooms and are deployed in new construction projects.

Support of various functions and technologies must be provided through a universal infrastructure approach that must enable modular deployment of functionality as needed.

The functionality anticipated in these spaces is didactic in nature, focusing on the ability to present, inform, and collaborate with local and remote users.

The spaces have been categorized by type and sub-categorized by functionality. The table below presents a summary of capabilities per room.

The rooms include the following:

- Small Classrooms
- Medium Classrooms
- Large Classrooms
- Breakout / Huddle / Overflow
- Auditoriums / Lecture Halls
- All-Hands Spaces
- Conference and Meeting Spaces
- Athletic Facility

4.2 Existing Spaces

Consideration must be given to existing spaces that may have legacy technology and will undergo a technology refresh cycle to bring them up to current standards.

In cases where systems are operational, either partially or to a full extent, the upgrade path consists of a remediation effort designed to bring them to satisfactory operation in the short term.

There are three possible operational solutions based on the room's anticipated life cycle and the needs of the user groups. These consist of short and long term execution cycles as described below.

A. Short Term Solution

Engage an audiovisual integrator to repair the current systems utilizing the current equipment and infrastructure as much as possible.

Replace only the necessary devices to enable the systems to work in a satisfactory manner consistent with the requirements of the PCCD user groups.

Anticipated implementation should be two to six weeks.

Recommended tasks include, but are not limited to, the following:

1) Troubleshoot and repair computer video and audio connections at the teaching station.
2) Adjust video screens and projector to properly align.
3) Revise program in the control system so that the control panel functions are consistent with those in the room. Simplify the design wherever possible.
4) Provide PCCD with a training strategy for the proper use of the systems. Implement a remote access procedure for helpdesk via a dedicated channel or integrating into the centralized management system model.
5) Integrator to provide PCCD with a service strategy to maintain the AV systems and repair when necessary. The strategy should include a loaner program to ensure that the rooms continues to operate when a device fails.

B. Long Term Solution A – Technology Refresh

Implement a design of AV systems that will include new equipment consistent with current technology and best industry practices, with the overarching goal to utilize the infrastructure in place and as much as possible with existing equipment without compromising the functionality in the space.

Anticipated deployment cycle – six to eight months

Recommended tasks include (but are not limited to) the following:

1) Upgrade switching solution to an HDBaseT solution. Provide automatic switching at the teaching station inputs.
2) Program control systems with a simplified graphical user interface with added macros for systems automation and enhanced features.
3) Install ceiling-mounted microphone arrays.
4) Repair all audio functions and calibrate audio systems to optimize for audio and video sessions.
5) Integrator to provide PCCD with a training strategy for the proper use of the systems. Implement a remote access procedure for helpdesk.
6) Integrator to provide PCCD with a service strategy to maintain the AV systems and repair when necessary. The strategy should include a loaner program to ensure that the rooms continues to operate when a device fails.

C. Long Term Solution B – Systems Full Redesign, PCCD Design Guidelines and Standards Implementation

This solution is similar to Solution A; however, it proposes a full redesign of AV systems that will include new equipment consistent with the PCCD AV Design Standards.

Anticipated deployment cycle – eight to ten months

5. Space Descriptions and Features

The AV systems are intended to provide support for the various functions to be carried out in the daily operations of the Colleges within PCCD. The following table, descriptions, and diagrams illustrate the fundamental requirements for each type of space:

Room Type	Single Display	Multiple Display	Projector and Screen	Laptop / BYOD Presentation	Local Dedicated Computer Presentation	Video Capture / Recording	Distance Education	Overflow to Adjacency or Huddle Space	Voice Amplification / Audience Participation	Assisted Listening	Control Touch Panel / Keypad	Room Scheduler / Roster	Local AV Furniture / Lectern / Teaching Station	Annotation Board	Wireless Microphones	Beamforming Microphone	Broadcasting Connectivity
Small Classrooms	x			x		x	x			x	x	x	x	x			
Medium Classrooms		x	x	x		x	x			x	x	x	x	x			
Large Classrooms		x	x	x		x	x	x	x	x	x	x	x	x	x		
Breakout/Huddle/Overflow	x			x		x				x	x						
Auditoriums/Lecture Halls			x	x		x	x		x	x	x	x	x	x	x		
All-Hands Spaces		x		x		x	x		x	x	x		x	x	x		
Conference / Meeting	x			x	x	x				x	x	x	x			x	
Athletic Facility		x	x	x	x	x	x	x	x	x	x			x	x	x	x

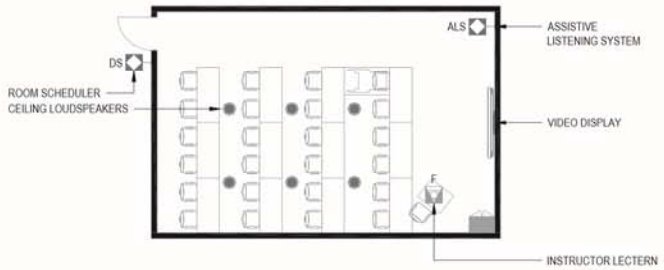
Summary of Capabilities per Room Type

X Denotes item under consideration

5.1 Small Classrooms

The small classrooms are simple teaching spaces with front teaching configuration.

- Learning functions for up to 24 people, supporting laptops and BYOD wireless connectivity.
- Video support with single display.
- Audio supported via ceiling-mounted speakers.
- Technology connectivity at the instructor's table - Document camera, end-user device, control dashboard.

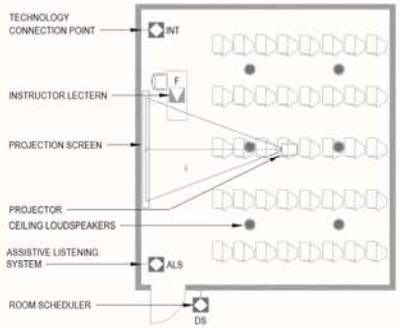


5.2 Medium Classrooms

The medium classrooms are intended to be flexible spaces with variations in configuration as follows:

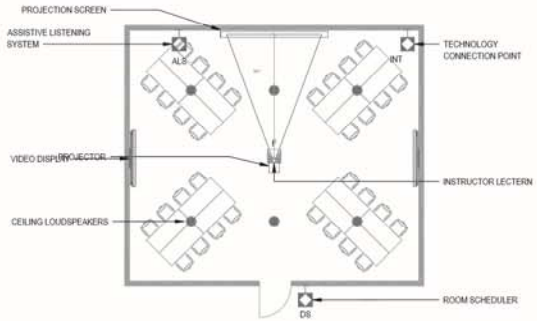
A. Tablet Configuration

- Learning functions for up to 40 people, supporting laptops and BYOD wireless connectivity.
- Video support with projection system.
- Audio supported via ceiling-mounted speakers.
- Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.



B. TEAL Configuration

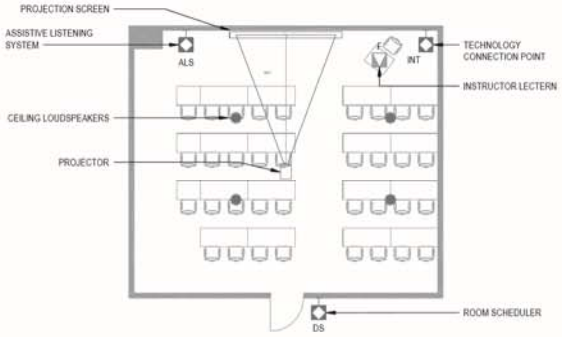
- Collaboration and teaching functions for up to 40 people, supporting laptops and BYOD wireless connectivity.
- Video support with both displays and projection system.
- Audio supported via ceiling-mounted speakers.
- Technology connectivity at a local equipment station - Document camera, laptop, annotation board, control dashboard.



Example of Teal Style Classroom

C. Lecture Configuration

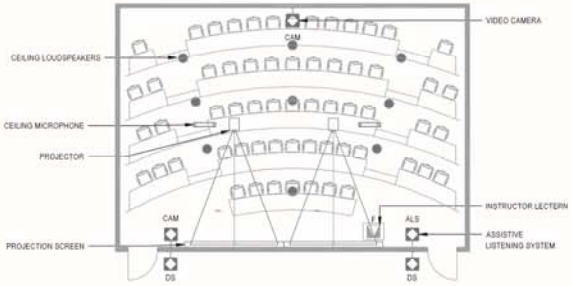
- Teaching functions for up to 40 people, supporting laptops and BYOD wireless connectivity.
- Video support with system.
- Audio supported via ceiling-mounted speakers.
- Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.



D. Tiered Configuration

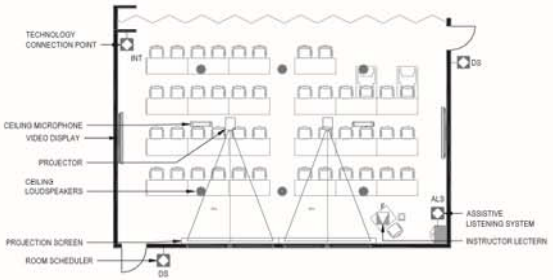
- Teaching and lecture-style functions for up to 60 people, supporting laptops and BYOD wireless connectivity.
- Video support with large projection system.

- Audio supported via ceiling-mounted speakers.
- Audience participation with ceiling microphones.
- Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.



E. Divisible Configuration

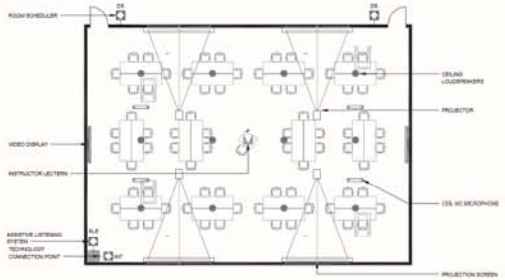
- Collaboration and teaching functions for up to 48 people, supporting laptops and BYOD wireless connectivity.
- Video support with both displays and projection system.
- Audio supported via ceiling-mounted speakers.
- Audience participation with ceiling microphones.
- Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.



5.3 Large Classrooms

The large classrooms are flexible, configurable spaces intended to support various teaching modalities, including TEAL and all-hands activities

- Collaboration and teaching functions for up to 70 people, supporting laptops and BYOD wireless connectivity.
- Video support with both displays and projection system.
- Audio supported via ceiling-mounted speakers.
- Audience participation with ceiling microphones.
- Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.



5.4 Breakout/Huddle/Overflow

The breakout/huddle/overflow spaces are intended to provide support for audiovisual presentation and collaboration activities requiring up to five users to interact. These are typically connected to and adjacent larger room.

Display of laptops and Bring Your Own Devices (BYODs) should be accomplished via direct connection to the display.

- Video support with wall-mounted display with built-in speakers.
- Display of multiple images from the users, including laptops and portable devices, using wired and wireless technology.

Example of Huddle Room

5.5 Auditoriums/Lecture Halls

The auditoriums/lecture Halls will support audiovisual presentations, lectures, all-hands meetings, special events and collaboration activities requiring up to 160 users to interact.

Technology capabilities in these rooms accommodate for flexible configurations, wired and wireless microphones, session capture, and dedicated assisted listening systems as required by the ADA.

Display of computer materials, video program, laptops and BYODs should be accomplished via scaled switched connection to the display. The connection may be accomplished via floor boxes (poke-thru) to the equipment location.

The systems should be designed for running simple operations and presentations not requiring assistance for the IT department.

Connectivity to the media via a press plate is available for special events, supporting industry standard signals and transport mechanisms.

- Audio support via ceiling-mounted loudspeakers, ceiling-mounted microphones for voice pick-up, dedicated DSP and amplification, wired and wireless microphones for lectern, presenters, and audience.
- Video is supported with projectors and projection systems
- Display of multiple images from the presenter, and connectivity for audience or users including laptops and portable devices, using wired and wireless technology.

- Self-contained capture system to record sessions utilizing the video cameras and audio mix-down channels available for the VC system.
- Remote collaboration supported via dedicated computer with built-in software clients and utilizes a connection to dedicated USB cameras mounted at the front and back of the room, ceiling-mounted. USB camera signals also available at the lectern for connectivity for presenter laptop.
- Audio conferencing will be supported utilizing the room dedicated audio system.

Control system:

- Wall-mounted keypads, self-contained and integrated with the global control management system.
- Lectern control panel, wired.
- Capable of control via a wireless device.

Rendering of Lecture Room

5.6 All-Hands Spaces

All-hands spaces are similar in form and function to the large classroom style, flexible and configurable with support for presentation and collaboration activities.

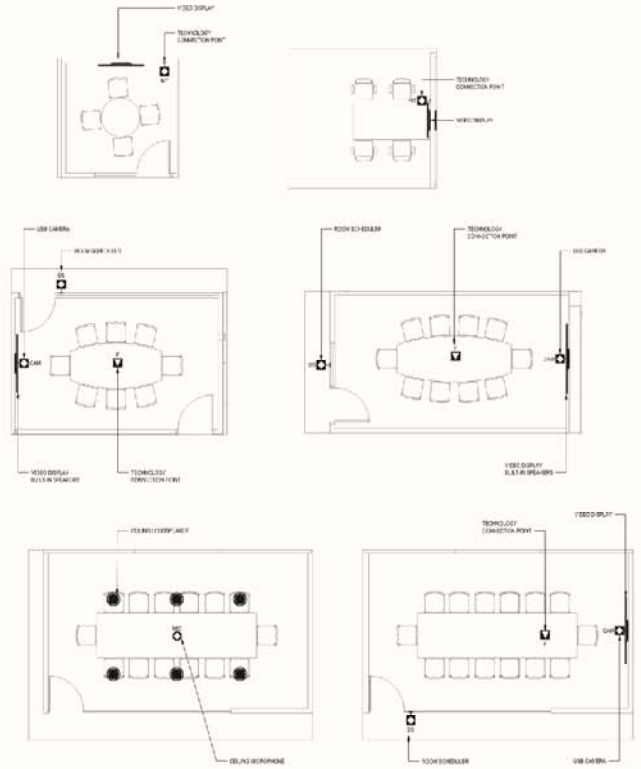
MIT's Teal Configuration / All-Hands Space

5.7 Conference and Meeting Spaces

The Conference and Meeting Spaces in the Admin area will support audiovisual presentations and audiovisual collaboration activities requiring up to eight users to interact. These are typically dedicated rooms for departments or business units that require a higher quality conferencing system.

Display of laptops and BYODs should be accomplished via scaled switched connection to the display and/or wireless technology. The connection may be accomplished via floor box (poke-thru) to the equipment location.

The equipment may be located within the room in a credenza or in the nearest IDF if the deployment is centralized.



Conference and Meeting Rooms, Typical Layout

- Audio support is supported with ceiling-mounted loudspeakers and microphones.
- Wall-mounted display for presentations of multiple images from the users, including laptops, collaboration, and portable devices, using wired and wireless technology.
- Direct local collaboration with laptops and BYODs. Remote collaboration should be supported via dedicated computer with pre-installed software and utilize a

connection to a dedicated camera mounted at the front of the room, above the display.

- Audio conferencing is supported utilizing the room's dedicated audio system.
- Wall-mounted keypad, self-contained and integrated with the global control management system.
- Capable of control via a wireless end-user device.

5.8 Athletic Facility

The athletic facility serves as a flexible venue that utilizes various elements of display technologies along with teaching tools to assist the coaches and instructors address the needs of the students engaged in athletic activities.

In general, the athletic facilities should provide support for:

- Large scale video presentations for groups, annotation boards, audio amplification, video recording capabilities, wired and wireless presentation capabilities.
- Digital signage and scoreboards. These can be used for local and sponsor advertising with the intent to generate a revenue stream for the college district.

Design specific to the athletic facilities will be addressed as needed in the design phase of the campus or college.

6. Additional Considerations

Additional elements to support the audiovisual technologies that should be taken into consideration in the planning and execution include:

6.1 Infrastructure Design (Consolidation)

The technical rooms are intended to be technology-consolidation spaces where the audiovisual equipment is co-located with other equipment that services the facility, such as the telecommunications, network, and VoIP systems. The design team should explore the possibilities and opportunities to consolidate spaces for equipment as much as possible. This will result in efficient space utilization and provide a centralized point of service and management.

6.2 Network Design (Global Management)

In order to support the various deployments anticipated for Peralta Community College District, an enterprise solution is required in order to remotely manage the audiovisual systems.

Although centralized in nature, the enterprise solution must be flexible to provide ubiquitous support from a single platform to monitor and manage AV equipment and the environment of the rooms in which the equipment operates. In addition, the enterprise solution must be capable of providing support to the users (helpdesk) and assist the Peralta Community College District IT personnel in managing the devices that utilize the converged IP network to communicate.

The support solution must, at a minimum:

- Enable IT managers to centrally monitor, manage, and schedule AV presentations, distance learning, and session capture resources.
- Track device and room usage to schedule routine maintenance, provide real-time remote technical support, and receive instant alert notifications via email or other standard tracking means for the Peralta Community College District.
- Monitor room occupancy to automatically turn AV devices on/off throughout the day, saving energy, and preserving the life of the equipment.

- Take control of AV devices to provide technical support in all rooms throughout the Peralta Community College District enterprise with the goal to eliminate downtime.
- Provide analytics reports to track room, facility, and equipment utilization to assist in the deployment decision-making process.
- Utilize a web-based user interface, customizable to portrait the rooms and spaces specific to the Peralta Community College District deployments.

In order to achieve this requirement, Peralta Community College District will standardize in the utilization of specific control products in combination with other enabled products that make use of the PCCD network infrastructure. The rollout plan will be implemented through the new deployments and retrofitted in the legacy systems as the technology refresh cycle progresses into the spaces.

6.3 Architectural / Structural Coordination

Coordinate location of ceiling mounted projectors, screens, loudspeakers, etc. with other building systems (e.g., fire sprinklers, light fixtures, HVAC), structure, and architectural features of ceilings.

Blocking should be provided at all locations where AV equipment is mounted at wall brackets (e.g., cameras, monitors, loudspeakers).

Floor standing audiovisual equipment racks should be equipped with casters to allow the racks to be pulled away from the wall for rear equipment service access. Any seismic bracing required should be removable to facilitate movement of the racks for service.

Recessed projection screens installed in the ceiling will require structural support. Depending on the specific screen used and applicable building codes, it may be necessary to build a fire-rated enclosure around the screen assembly.

A. Accessibility

Facilities with electronically reinforced sound systems will require assistive listening systems for the hearing impaired, per the ADA.

Coordinate placement of assistive listening transmitters where they occur to ensure uninterrupted coverage of audience areas.

B. Architectural Finishes

In spaces using video cameras (e.g., classrooms or conference rooms), color, pattern, and other characteristics of architectural finishes within camera view will critically impact camera performance and image quality.

On walls within the field of view of installed video cameras, avoid use of finishes with intensely saturated colors, detailed patterns and heavy textures, which can cause unwanted anomalies in video camera images.

Dark table surfaces should be avoided in videoconferencing and distance collaboration facilities. Light colored table surfaces will help reflect light up onto faces and improve lighting quality for camera imaging.

C. Acoustics

Acoustic conditions in AV areas will critically impact the performance and effectiveness of the audiovisual systems. Therefore, careful consideration must be given to such issues as wall construction, finish treatments, background noise levels (e.g., HVAC), and other factors that will affect the acoustic character and noise levels of the AV facilities.

Detailed acoustic requirements for audiovisual areas of the project should be as specified by the project's Acoustic Consultant. Audiovisual Consultant will review acoustic designs and recommendations related to audiovisual areas to confirm compatibility with the audiovisual systems designs.

6.4 Electrical Coordination

A. Power Service and Grounding

Line voltage (i.e., 110/208/277 VAC) power service specified by the AV Consultant to support audiovisual equipment and related activities should be identified as Technical Power.

All construction documentation, including plans and specifications describing electrical power service associated with the project's audiovisual program, should be engineered and documented by the project's Electrical Engineer. Documentation provided by the Audiovisual Consultant should be for reference only.

B. Low Voltage Signal Distribution

All low voltage cabling for AV systems will be routed through conduit, wireways, or other dedicated containment.

The project electrical contractor will be expected to install the conduit required for all AV cabling.

Pull strings are to be installed in the AV conduit by the electrical contractor to facilitate later installation of the low voltage cable by the AV contractor.

All conduits specified to support the audiovisual systems should be EMT type. Flexible metal conduit may be used in runs of less than ten feet (10'), or where approved by the AV Consultant.

The depth of AV connection boxes and conduit diameters may require non-standard wall depths in some locations. Such conditions are identified in construction documents specific to each project.

Flush floor power distribution outlets and signal connection boxes will be required at locations where connections cannot reasonably be made at wall outlets.

Flush floor electrical boxes will be required at designated locations for audiovisual signal and power connections. The size and density of cabling and connections will preclude the use of standard "poke-thru" type fittings. Recommended specifications for flush floor electrical boxes will be provided in the audiovisual drawings.

Where oversized flush floor electrical connections are specified for AV applications, consideration must also be given to the structural and other building design implications.

C. Low Voltage Remote Control Interfacing

Line voltage powered devices, such as projection screens, motorized window coverings, and lighting control systems that are to be operated by low voltage AV control systems, will require interface electronics between line voltage power and low voltage switching. Such interface electronics are referred to in this document as Low Voltage Interfaces (LVI).

Where low voltage remote control interfaces are required per the Architect's and Audiovisual Consultant's recommendations, such electronics should be specified and documented for construction by the project's Electrical Engineer.

Wherever available, Low Voltage Interfaces should be provided by the manufacturer of the line voltage device being controlled (e.g., projection screen interface by projection screen manufacturer).

Where the manufacturer of a line voltage powered device does not offer a low voltage control interface, a third party interface or standard relay product may be used.

Wherever available, serial digital control interfaces operating on industry standard communications protocols should be utilized.

6.5 Lighting Considerations

A. Lighting for Video Cameras

Supplemental lighting is desired where video camera systems are installed for use in applications, such as distance learning and collaboration, and video capturing.

Where video camera systems are used in association with projected image displays, special precautions to control lighting must be taken. This is observed in video conferencing and distance learning and collaboration spaces.

Lamp color temperature for video camera lighting should be in the range of 3000 - 3400 degrees Kelvin. All lamps used for video camera lighting within a given room should be of the same color temperature specification.

Illumination levels for video camera lighting should provide a minimum of 70 foot-candles of illumination at the vertical facial plane of the subject(s).

In specialized capture or video-enabled rooms, provide illumination of background surfaces located behind camera subject(s) to enhance the separation of the subject(s) from the background in the camera's view.

Example of Built-in Lighting in a Training Environment

Special caution must be taken in distance education and collaboration facilities to avoid conflicts between image displays and camera subject illumination. This issue is particularly difficult in distance collaboration where instructors like to move around the classroom while they lecture, often taking them in proximity to a projected image display.

B. Lighting for Projection

Where visual image display systems (e.g., monitors, projection screens) are utilized, it is imperative that careful consideration be given to the design of room lighting and its impact on the image displays.

Lights in AV rooms should be circuited to allow fixtures adjacent to projection screens to be turned off during projection.

Indirect architectural lighting should be avoided in rooms with large screen image projection since increased ambient light levels on projection screens will decrease the intensity of projected images.

Light fixtures should provide maximum directivity of illumination and minimal surface brightness to reduce the opportunity for glare and distribution of stray light onto image display screens.

Examples of ACT Grid Lighting for VC

C. Lighting of Presenters

Where it is appropriate to provide spotlighting of presenters in AV areas, provide narrow beam lamps in adjustable fixtures.

Lighting fixtures providing spotlighting of presenters in AV facilities should be dimmable.

Spotlighting of presenters should provide illumination from three lighting positions, or minimum of two positions, to minimize shadows on the presenter. This is particularly critical where video cameras are being used.

D. Task Lighting

In instructional areas and meeting rooms, direct task lighting should be designed to provide appropriate levels of illumination at the work surface with minimal diffusion onto adjacent surfaces. This prevents deterioration of image display quality and is particularly critical in facilities utilizing front projection display systems.

It is recommended that source fixtures providing task lighting at lecterns and instructor stations be positioned on the furniture to minimize reflection onto presentation images.

E. Daylight Control

Where window glazing allows exterior daylight or lighting from adjacent interior spaces into an AV space, blackout or shaded window coverings should be provided.

Standard window blinds and sun shading devices are typically insufficient for controlling daylight intrusion in visual display environments. In facilities with direct sun exposure or where the highest degree of presentation quality is required, edge and bottom channels are recommended on blackout window coverings to prevent light leakage at shade perimeters.

Where a large number of individual blackout window coverings are provided and presentation environments (e.g., lecture halls, auditoria), it is recommended that the window coverings be motorized with remote control capability tied to the AV system controls.

F. Lighting Controls

Where lighting is controllable through the AV control system, redundant wall-mounted controls should also be provided per Architect's specification, typically near the instructor's station and at the entrance of the room for practical purposes.

Where designated, provide a Low Voltage Interface for remote switching of lights from the AV system in designated AV facilities.

Lighting control equipment and all associated installation, setup, and programming should be provided by the electrical contractor, not the AV contractor, per electrical engineer's specifications.

6.6 Furniture and Millwork

A. Lecterns and Teaching Stations

Formal presentation facilities frequently provide lecterns or presenter stations at the front of the room. Electrical connections may be required to support integrated or portable audiovisual devices and other presentation support equipment.

Lecterns and teaching stations may be fixed or movable. However, where more than one or two electrical (power or low voltage) connections are required, lecterns and presenter stations should be considered fixed due to the risk of damage or improper connections when setting up and removing equipment. Where trained technical support is available to install and remove equipment, greater flexibility may be provided.

Lecterns and teaching stations must anticipate the need to distribute power and low voltage electrical between equipment used on the tabletop and remote equipment and systems (e.g., computer network, sound systems, controls, etc.). Connections may be provided in the floor below the furniture or may be extended up into the tabletop. Cable retractors may be included in a deployment to minimize the amount of cable slack under the furniture.

Provide accessible cable pathways through tables when integrating audiovisual and power connections into tables.

Technology Connection at Tabletop

Lectern selection must be coordinated with the architectural team assigned for the deployment to ensure that finishes and styles are consistent with the theme or style of the project.

Example of Technology Lectern

B. Mobile AV Furniture

Electrical power and AV signal distribution to mobile AV equipment should be provided in a manner that avoids service cables running across the floor to wall receptacles. Provide flush floor electrical distribution wherever possible.

Unless otherwise noted, mobile AV furniture will be specified by the PCCD and provided by the AV Contractor. Furniture styles and finishes must be coordinated with the Architect to ensure that the material provided is compatible with other furniture and finishes.

6.7 Integration with 3rd Party Systems

Connectivity and integration with soft-clients, enterprise software, and cloud-based solutions is desirable in order to provide seamless support and collaboration features. We understand the following to be part of the enterprise solutions currently in use by PCCD:

- Microsoft Skype for Business – Enterprise collaboration
- GoTo Meeting
- Moodle – Open-source learning platform (being phased out)
- Canvas – Learning management system (expected to be implemented in 2018)

The design team should take into consideration possible levels of integration with these and other technologies of similar type based

on the structure and design strategy of the selected systems for the project.

6.8 Non-Standard AV Components

A. Scheduling panels

Various solutions for scheduling panels are available in the market with features ranging from basic room name and scheduling display to full integration with the PCCD calendaring system, resource allocation, and utilization reporting capabilities.

The design team should review the type and capabilities of these devices so that the functionality can be determined and deployed during the technology refresh cycle.

Example of Room Scheduling Panel

7. General AV Systems Infrastructure

7.1 Power Requirements

A. Power serving the AV systems within a room should be from the same phase leg.

B. An electrical power outlet should be located at each wall and floor box, and be served from the same circuit.

C. Collaboration rooms must have electrical power and data connections under the tables.

D. Equipment cabinets or terminal panel locations will require at least one 20 amp circuit stubbed out either inside or adjacent to the rack/box. Larger rooms with more complex AV systems will require more circuits.

E. Each wall-mounted display will require a consolidation back box with provisions for power, data, and AV signal.

F. Each projector will require a dedicated 15-amp circuit, 120-volt convenience outlet adjacent to the AV signal box.

G. Projection screen may be manual or electric. In instances where electric screens are specified, each projection screen will require electrical power be stubbed out on the left side of the screen enclosure. Projection screens can be served from the projector circuit. A low-voltage cabling pathway will be required from the projection screen and the projector to the AV equipment rack.

7.2 Data Requirements

Below are general infrastructure requirements for data provisions. Refer to the Peralta Community College District Telecommunication Standards for specific requirements.

A. Each floor box with AV connectivity will require a minimum of two network ports.

B. Each equipment rack terminal panel will require four network ports and one voice port.

C. Each display will require a minimum of two network drops.

D. Each ceiling-mounted projector location will require a minimum of two network drops.

8. Room Data Sheets

The Room Data Sheets are intended to convey information representative of the functionality in each type of standard room in both form and function.

Although the detailed furniture layout for these spaces will vary from deployment to deployment, the general layout and functionality should remain consistent throughout the Colleges.

The Room Data Sheets section can be separated from the Standards document in order to provide Peralta Community College District IT technical personnel, as well as the technology contractor, a portable document or manual that can be used for reference during the planning process.

In addition, the Room Data Sheets will undergo a revision process - or technology refresh - on a 2 to 3 year cycle to account for improvements in technology evolution.

Information contained within the data sheets include:

8.1 Baseline AV

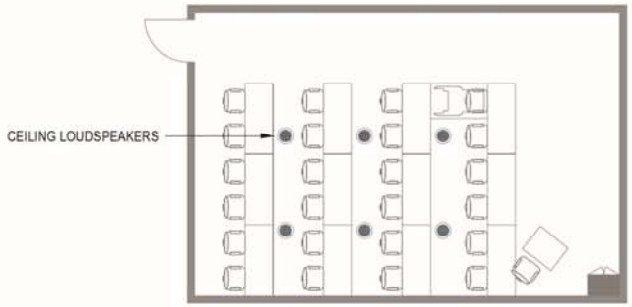
A brief description of the room purpose, overall capacity and salient technical characteristics.

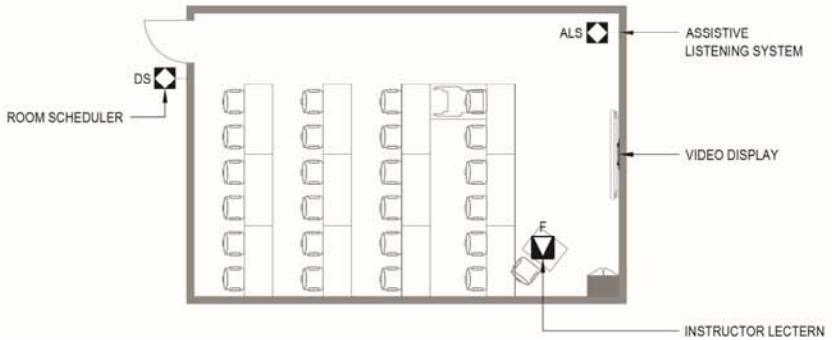
8.2 Baseline Technology

An outline of the technology elements that are supported in the room or space.

8.3 Optional Technology

An outline of the technology elements that are deemed desirable options to enhance the functionality of the room or space.





BASELINE TECHNOLOGY

- ■ Single Display
- □ Dual Display
- □ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- □ Local Dedicated Computer Presentation
- □ Voice Amplification / Audience Participation
- ■ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Learning functions for up to 24 people, supporting laptops and BYOD wireless connectivity.
Video support with single display.
Audio supported via ceiling-mounted speakers.
Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.

OPTIONAL TECHNOLOGY

- ■ Video Capture / Recording
- □ Distance Learning
- □ Overflow to Adjacency or Huddle Space
- ■ Annotation Board

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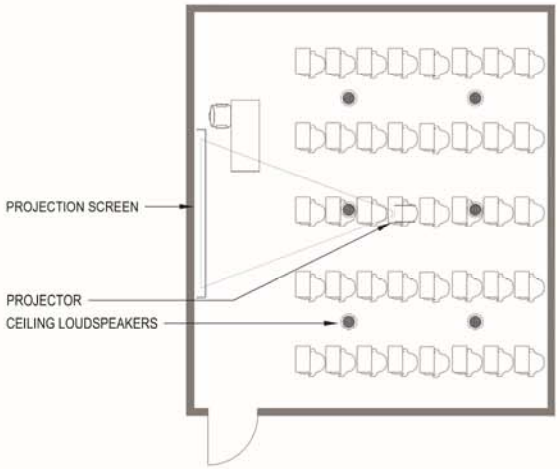
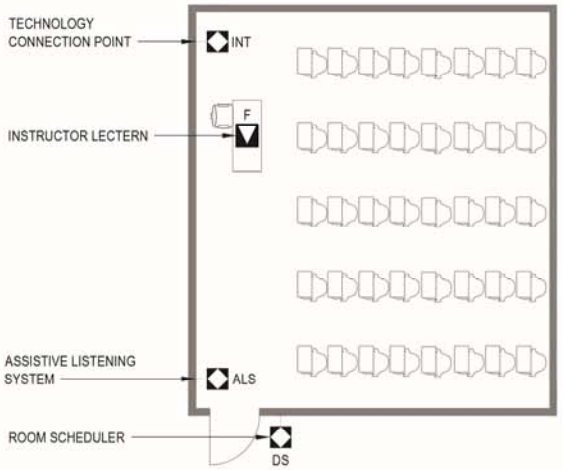
PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
SMALL FLEXIBLE CONFIGURATION

SKETCH No:	TA 001
DATE:	09/08/2017
REVISION:	V 1.0
SCALE:	NTS





BASELINE TECHNOLOGY

- ☐ Single Display
- ☐ Dual Display
- ■ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ☐ Local Dedicated Computer Presentation
- ☐ Voice Amplification / Audience Participation
- ■ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Learning functions for up to 40 people, supporting laptops and BYOD wireless connectivity.
Video support with projection system.
Audio supported via ceiling-mounted speakers.
Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.

OPTIONAL TECHNOLOGY

- ■ Video Capture / Recording
- ☐ Distance Learning
- ☐ Overflow to Adjacency or Huddle Space
- ■ Annotation Board

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PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
MEDIUM TABLET CONFIGURATION

SKETCH No:	TA 002
DATE:	09/08/2017
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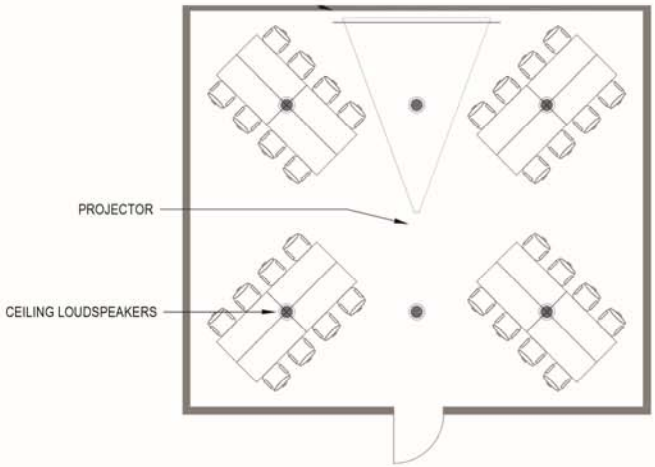

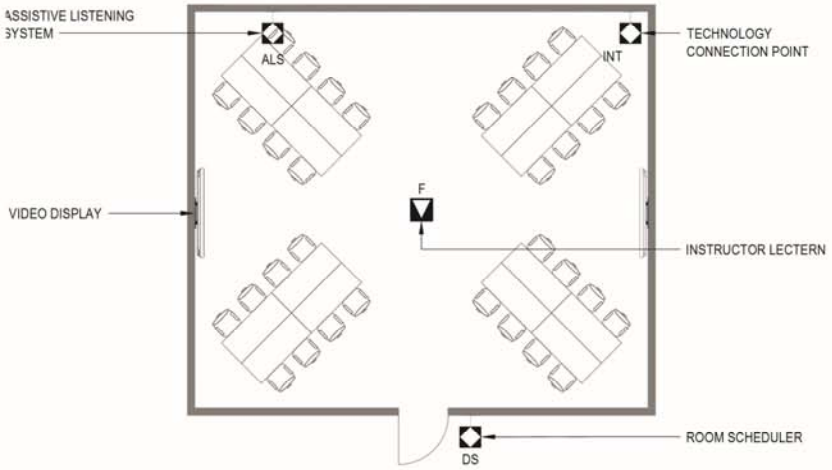

BASELINE TECHNOLOGY

- ☐ Single Display
- ■ Dual Display
- ■ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ■ Local Dedicated Computer Presentation
- ☐ Voice Amplification / Audience Participation
- ■ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Collaboration and teaching functions for up to 40 people, supporting laptops and BYOD wireless connectivity.
Video support with both displays and projection system.
Audio supported via ceiling-mounted speakers.
Technology connectivity at a local equipment station - Document camera, laptop, annotation board, control dashboard.

OPTIONAL TECHNOLOGY

- ■ Video Capture / Recording
- ☐ Distance Learning
- ☐ Overflow to Adjacency or Huddle Space
- ■ Annotation Board

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PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
MEDIUM FLEXIBLE CONFIGURATION

SKETCH No:	TA 003
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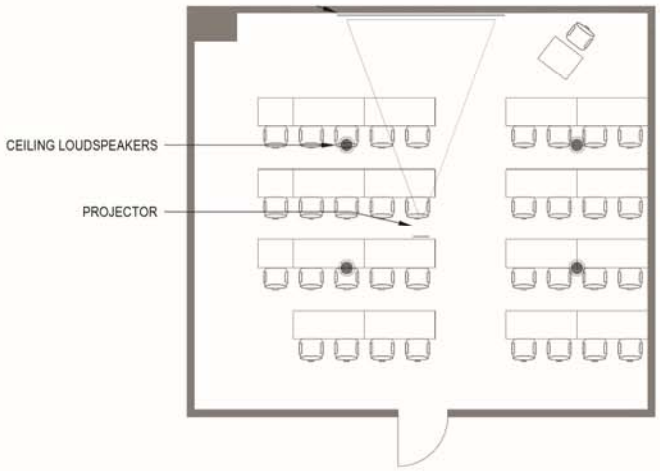

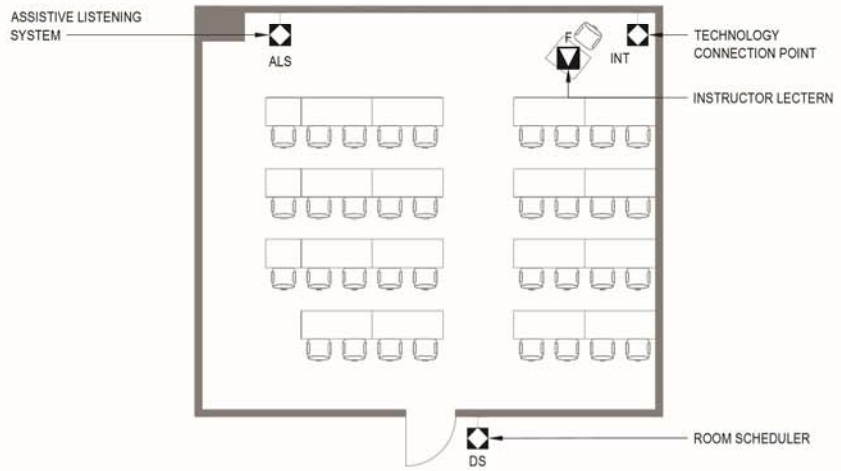

BASELINE TECHNOLOGY

- ☐ Single Display
- ☐ Dual Display
- ■ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ☐ Local Dedicated Computer Presentation
- ☐ Voice Amplification / Audience Participation
- ■ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Teaching functions for up to 40 people, supporting laptops and BYOD wireless connectivity.
Video support with system.
Audio supported via ceiling-mounted speakers.
Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.

OPTIONAL TECHNOLOGY

- ■ Video Capture / Recording
- ☐ Distance Learning
- ☐ Overflow to Adjacency or Huddle Space
- ■ Annotation Board

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DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
MEDIUM FLEXIBLE CONFIGURATION

SKETCH No:	TA 004
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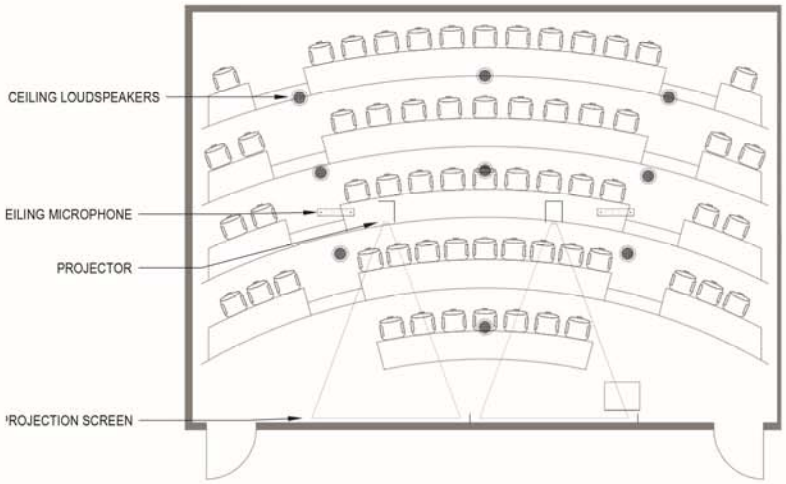

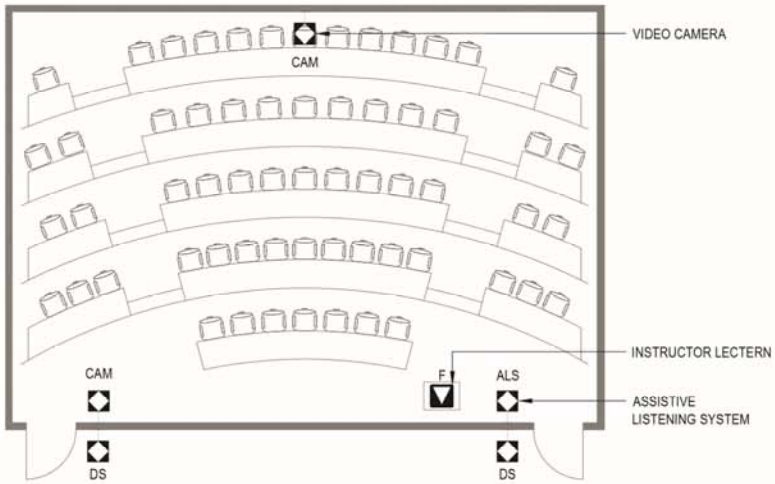

BASELINE TECHNOLOGY

- ☐ Single Display
- ☐ Dual Display
- ■ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ☐ Local Dedicated Computer Presentation
- ■ Voice Amplification / Audience Participation
- ■ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Teaching and lecture-style functions for up to 60 people, supporting laptops and BYOD wireless connectivity.
Video support with large projection system.
Audio supported via ceiling-mounted speakers.
Audience participation with ceiling microphones.
Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.

OPTIONAL TECHNOLOGY

- ■ Video Capture / Recording
- ☐ Distance Learning
- ☐ Overflow to Adjacency or Huddle Space
- ■ Annotation Board

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PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
MEDIUM TIERED CONFIGURATION

SKETCH No:	TA 005
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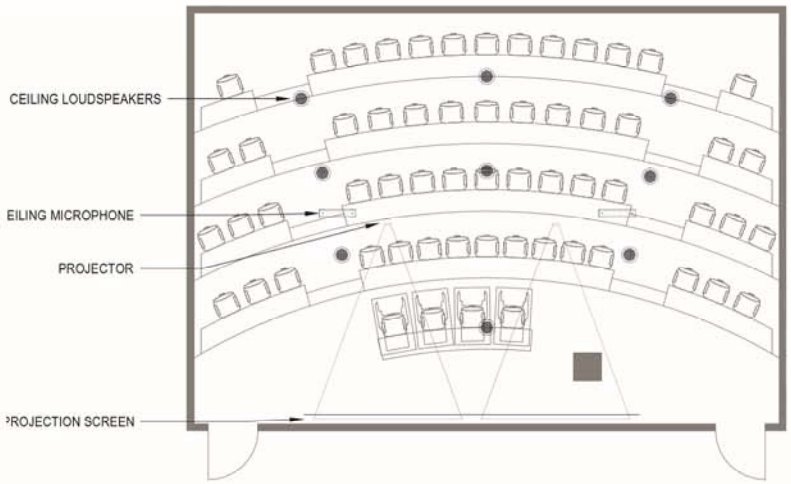

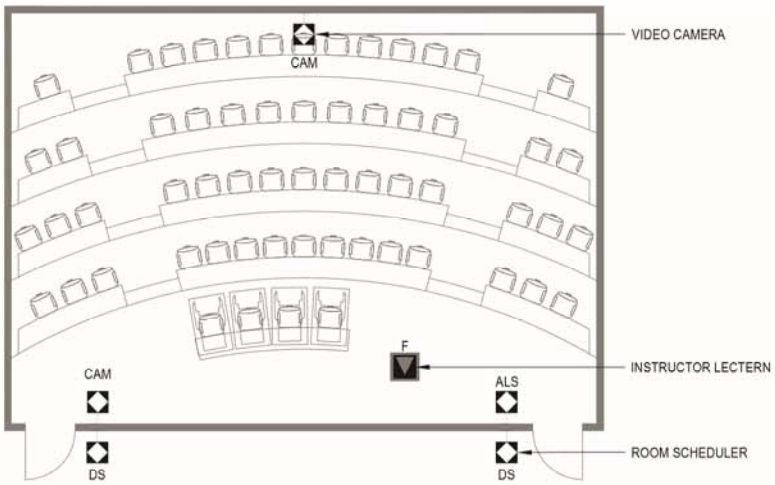

BASELINE TECHNOLOGY

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- ■ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ☐ Local Dedicated Computer Presentation
- ■ Voice Amplification / Audience Participation
- ■ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Teaching and lecture-style functions for up to 60 people, supporting laptops and BYOD wireless connectivity.
Video support with double large projection system.
Audio supported via ceiling-mounted speakers.
Audience participation with ceiling microphones.
Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.

OPTIONAL TECHNOLOGY

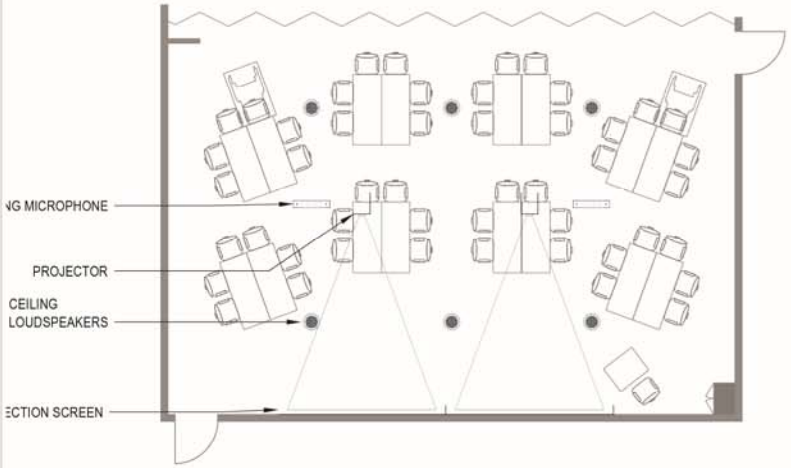
- ■ Video Capture / Recording
- ☐ Distance Learning
- ☐ Overflow to Adjacency or Huddle Space
- ■ Annotation Board

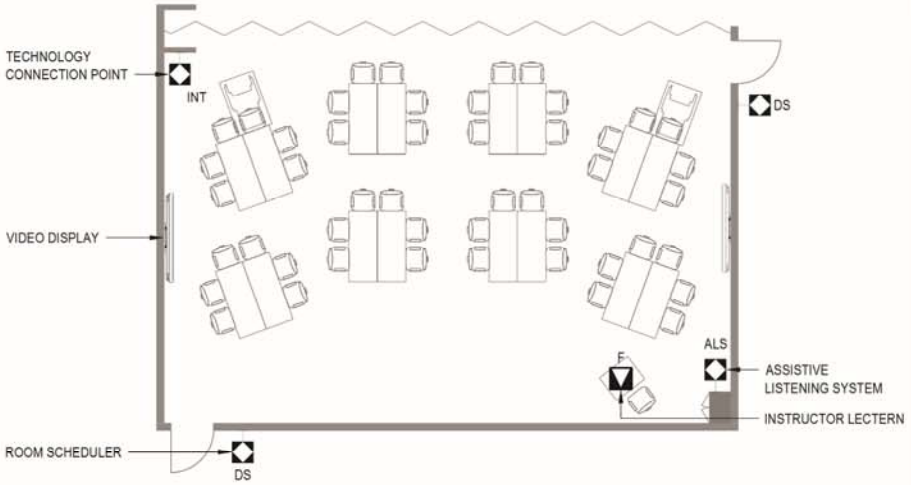
TEECOM
1333 Broadway
Suite 601
Oakland, CA 94612
510 337 2800
www.teecom.com

PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
MEDIUM TIERED CONFIGURATION

SKETCH No:	TA 006
DATE:	09/08/2017
REVISION:	V 1.0
SCALE:	NTS





BASELINE TECHNOLOGY

- ☐ Single Display
- ■ Dual Display
- ■ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ■ Local Dedicated Computer Presentation
- ■ Voice Amplification / Audience Participation
- ■ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Collaboration and teaching functions for up to 48 people, supporting laptops and BYOD wireless connectivity.
Video support with both displays and projection system.
Audio supported via ceiling-mounted speakers.
Audience participation with ceiling microphones.
Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.

OPTIONAL TECHNOLOGY

- ■ Video Capture / Recording
- ☐ Distance Learning
- ■ Overflow to Adjacency or Huddle Space
- ■ Annotation Board

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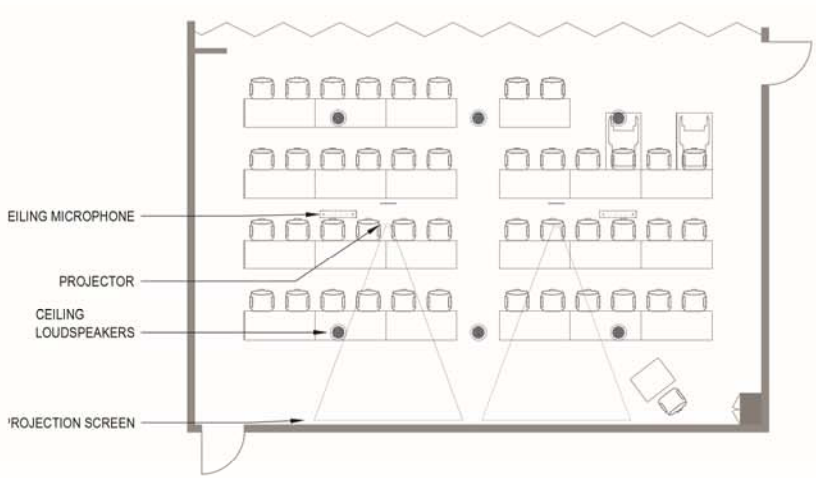
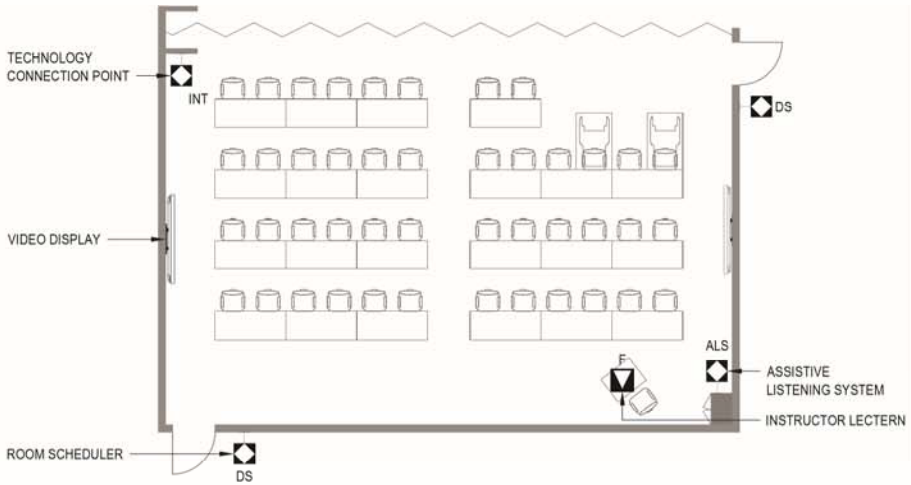
1333 Broadway
Suite 601
Oakland, CA 94612
510 337 2800
www.teecom.com

PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
MEDIUM FLEXIBLE CONFIGURATION

SKETCH No:	TA 007
DATE:	09/08/2017
REVISION:	V 1.0
SCALE:	NTS





BASELINE TECHNOLOGY

- ☐ Single Display
- ■ Dual Display
- ■ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ■ Local Dedicated Computer Presentation
- ■ Voice Amplification / Audience Participation
- ■ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Collaboration and teaching functions for up to 48 people, supporting laptops and BYOD wireless connectivity.
Video support with both displays and projection system.
Audio supported via ceiling-mounted speakers.
Audience participation with ceiling microphones.
Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.

OPTIONAL TECHNOLOGY

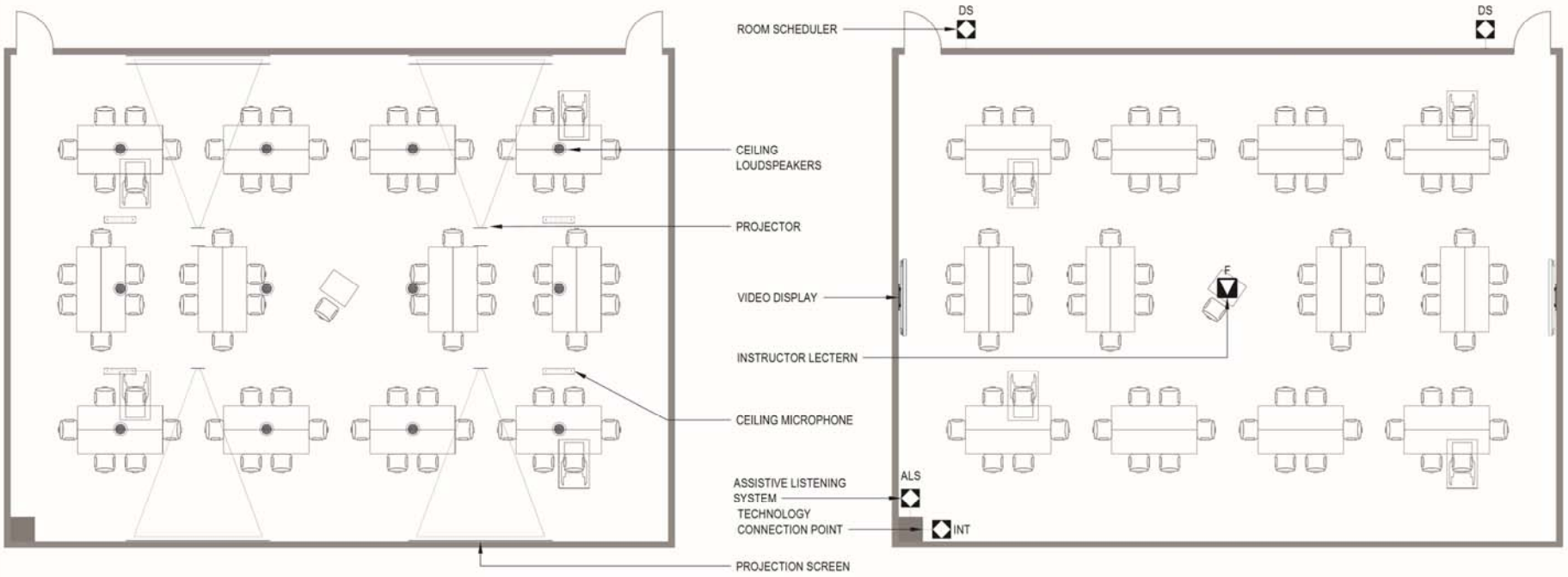
- ■ Video Capture / Recording
- ☐ Distance Learning
- ■ Overflow to Adjacency or Huddle Space
- ■ Annotation Board

TEECOM
1333 Broadway
Suite 601
Oakland, CA 94612
510 337 2800
www.teecom.com

PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
MEDIUM FLEXIBLE CONFIGURATION

SKETCH No:	TA 008
DATE:	09/08/2017
REVISION:	V 1.0
SCALE:	NTS



BASELINE TECHNOLOGY

- ☐ Single Display
- ■ Dual Display
- ■ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ■ Local Dedicated Computer Presentation
- ■ Voice Amplification / Audience Participation
- ■ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Collaboration and teaching functions for up to 70 people, supporting laptops and BYOD wireless connectivity.
Video support with both displays and projection system.
Audio supported via ceiling-mounted speakers.
Audience participation with ceiling microphones.
Technology connectivity at the instructor's table - Document camera, laptop, annotation board, control dashboard.

OPTIONAL TECHNOLOGY

- ■ Video Capture / Recording
- ☐ Distance Learning
- ☐ Overflow to Adjacency or Huddle Space
- ■ Annotation Board

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Oakland, CA 94612
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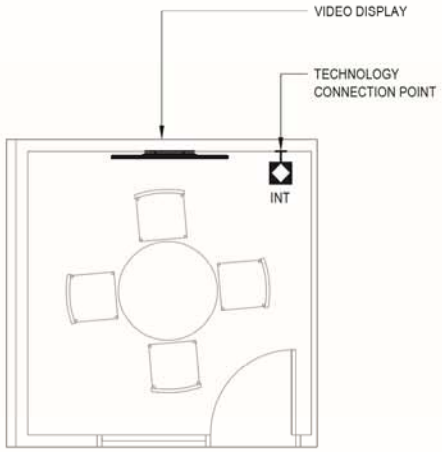
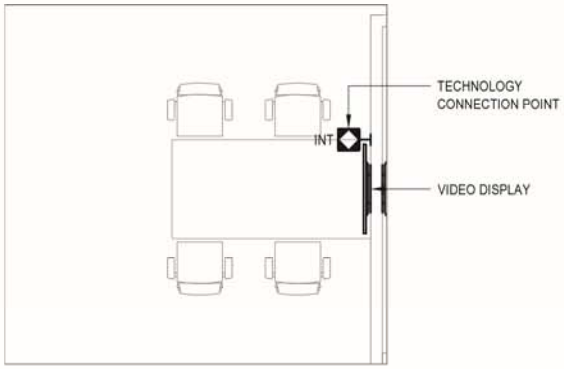
PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
LARGE FLEXIBLE CONFIGURATION

SKETCH No:	TA 009
DATE:	09/08/2017
REVISION:	V 1.0
SCALE:	NTS





BASELINE TECHNOLOGY

- ■ Single Display
- ☐ Dual Display
- ☐ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ☐ Local Dedicated Computer Presentation
- ☐ Voice Amplification / Audience Participation
- ☐ Assisted Listening
- ☐ Control Touch Panel / Keypad
- ☐ Room Scheduler / Roster
- ☐ Local AV Furniture / Lectern

BASELINE AV

Meeting functions for up to 4 people, supporting laptops and BYOD wireless connectivity.
Video support with single display.
Audio supported via display speakers.
Technology connectivity at the wall.

OPTIONAL TECHNOLOGY

- ☐ Video Capture / Recording
- ☐ Distance Learning
- ☐ Overflow to Adjacency or Huddle Space
- ☐ Annotation Board

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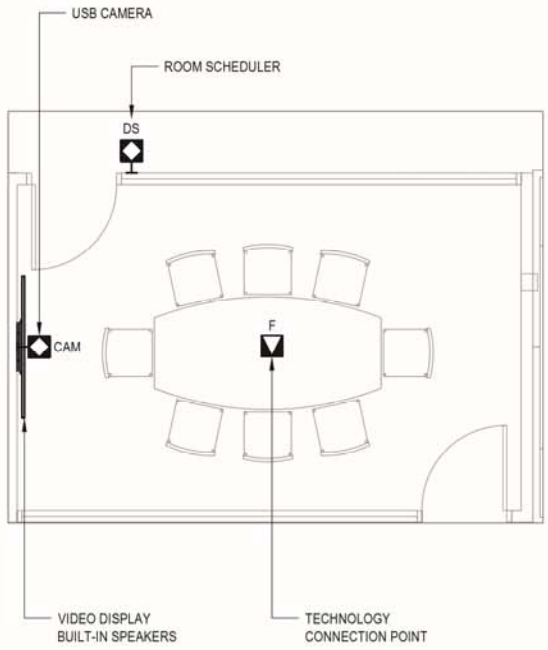
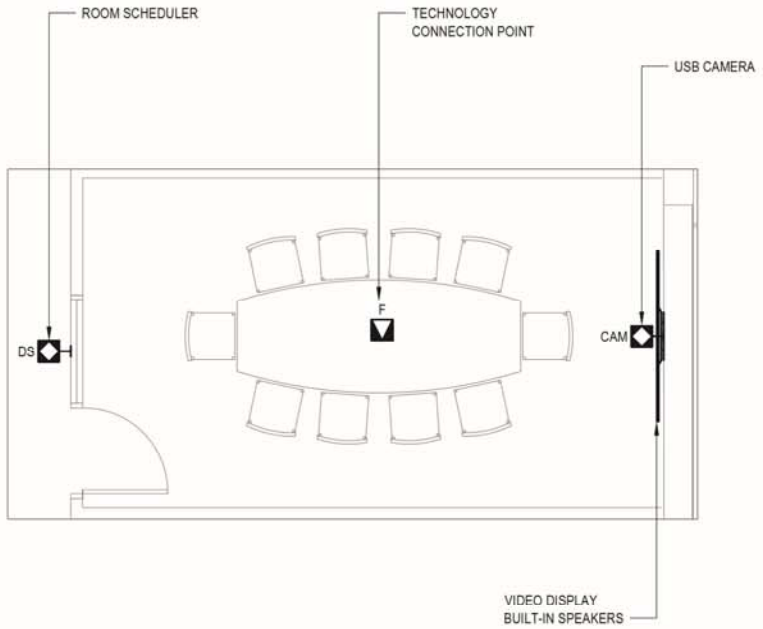
PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE ADMIN AREAS
HUDDLE AND SMALL CONFERENCE ROOMS

SKETCH No:	TA 010
DATE:	09/08/2017
REVISION:	V 1.0
SCALE:	NTS





BASELINE TECHNOLOGY

- ■ Single Display
- ☐ Dual Display
- ☐ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ■ Local Dedicated Computer Presentation
- ☐ Voice Amplification / Audience Participation
- ☐ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ☐ Local AV Furniture / Lectern

BASELINE AV

Meeting functions for up to 8 people, supporting laptops and BYOD wireless connectivity.
Video support with single display.
Audio supported via display speakers.
Technology connectivity at the table.

OPTIONAL TECHNOLOGY

- ☐ Video Capture / Recording
- ☐ Distance Learning
- ☐ Overflow to Adjacency or Huddle Space
- ☐ Annotation Board

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1333 Broadway
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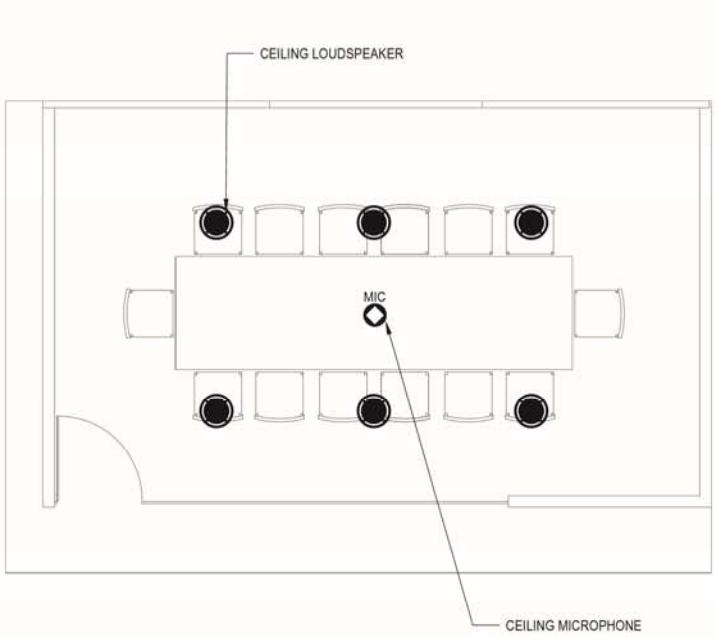
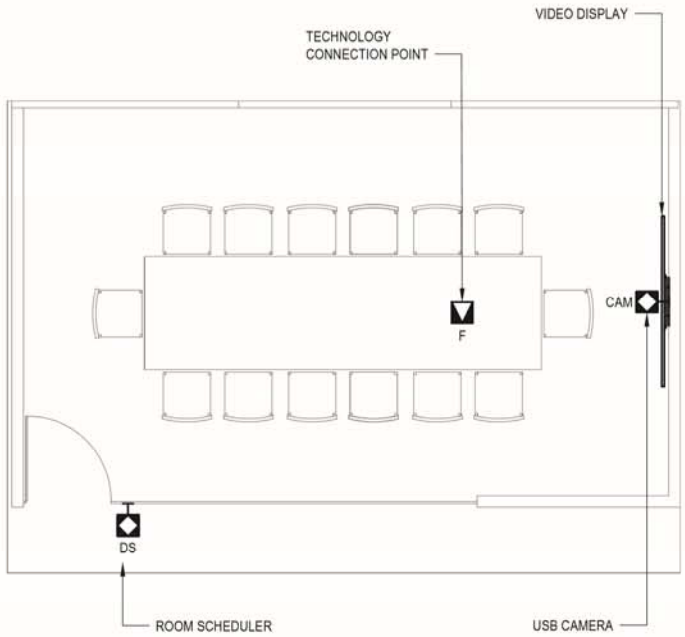
Oakland, CA 94612
510 337 2800
www.teecom.com

PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE ADMIN AREAS
MEDIUM CONFERENCE ROOMS

SKETCH No:	TA 011
DATE:	09/08/2017
REVISION:	V 1.0
SCALE:	NTS





BASELINE TECHNOLOGY

- ■ Single Display
- ☐ Dual Display
- ☐ Video Projector and Electric Screen
- ■ Laptop / BYOD Presentation
- ■ Local Dedicated Computer Presentation
- ☐ Voice Amplification / Audience Participation
- ☐ Assisted Listening
- ■ Control Touch Panel / Keypad
- ■ Room Scheduler / Roster
- ■ Local AV Furniture / Lectern

BASELINE AV

Meeting functions for up to 14 people, supporting laptops and BYOD wireless connectivity.
Video support with single display.
Audio supported via ceiling-mounted speakers.
Technology connectivity at the table.

OPTIONAL TECHNOLOGY

- ☐ Video Capture / Recording
- ☐ Distance Learning
- ☐ Overflow to Adjacency or Huddle Space
- ☐ Annotation Board

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Oakland, CA 94612
510 337 2800
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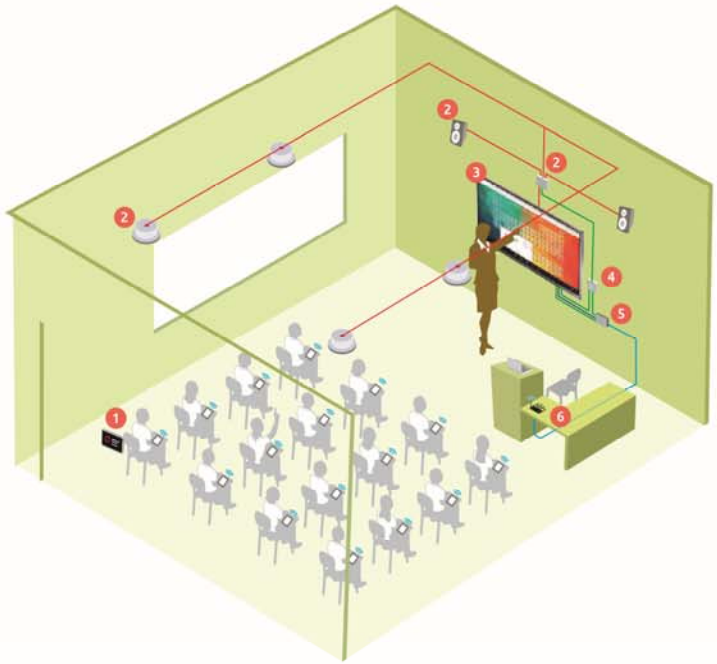
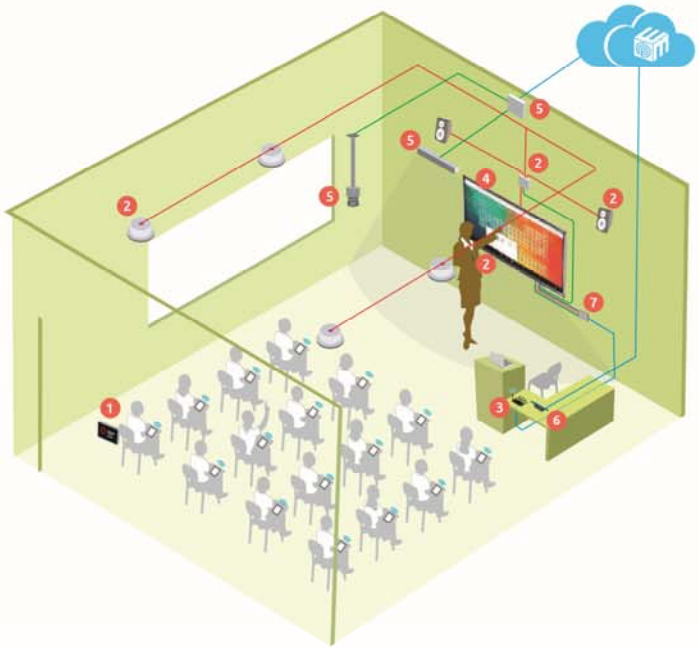
PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE ADMIN AREAS
LARGE CONFRENCE ROOM

SKETCH No:	TA 012
DATE:	09/08/2017
REVISION:	V 1.0
SCALE:	NTS





STANDARDIZED COMPONENTS - SIMPLE ROOM

1 - Room Scheduler
2 - Loudspeakers and Audio Modules
3 - Interactive Video Display
4 - Control Interface - Button Panel
5 - Consolidation / Control Hardware
6 - Sources / Media Gateway, wired and wireless

STANDARDIZED COMPONENTS - ADVANCED ROOM, CLOUD-ENABLED

1 - Room Scheduler
2 - Loudspeakers and Audio Modules
3 - Sources / Media Gateway, wired and wireless
4 - Interactive Video Display
5 - Capture System / Video Modules
6 - Control Interface - Touch Panel
7 - Consolidation / Control Hardware

TEECOM
1333 Broadway
Suite 601
Oakland, CA 94612
510 337 2800
www.teecom.com

PROJECT NAME: PERALTA COMMUNITY COLLEGE DISTRICT
PROJECT No: 17026

DESCRIPTION:
TECHNOLOGY IN THE CLASSROOM
STANDARIZED SOLUTIONS - DRAFT 1

SKETCH No:	
DATE:	09/08/2017
REVISION:	V 1.0
SCALE:	NTS

9. References

9.1 Codes, Standards and Best Practices

Observe the following codes and standards. In locations outside of the United States, observe the governing standards and practices of the Authority having jurisdiction (AHJ):

- ANSI/INFOCOMM 1M-2009: Audio Coverage Uniformity in Enclosed Listener Areas
- ANSI/INFOCOMM 2M-2010, Standard Guide for Audiovisual Systems Design and Coordination Processes
- ANSI/INFOCOMM 3M-2011: Projected Image System Contrast Ratio
- ANSI/INFOCOMM 4:2012, Audiovisual Systems Energy Management
- NFPA 262: Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces
- UL 813: Commercial Audio Equipment
- UL 1419: Professional use Video and Audio Equipment
- UL 1480: Speakers for Fire Alarm, Emergency, and Commercial and Professional Use
- UL 1492: Audio-Video Products and Accessories
- UL 60065-1: Audio, Video and Similar Electronic Apparatus
- ISO 9000: Quality Management
- ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- ASTM E336 - Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings
- ASTM E557 - Standard Guide for Architectural Design and Installation Practices for Sound Isolation between Spaces Separated by Operable Partitions
- ASTM E989 - Standard Classification for Determination of Impact Insulation Class (IIC)

- ASTM E1130 – Standard Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Index
- ANSI S1.13 - Measurement of Sound Pressure Levels in Air
- ISO 3382, Acoustics – Measurement of Room Acoustics Parameters

Peralta Community College District

Telecommunications Infrastructure Standards

Information Technologies
333 East 8th Street
Oakland, CA 94606

Table Of Contents

1.0 INTRODUCTION

1.1 Purpose

This purpose of this document is to describe the minimum requirements and establish the design guidelines for telecom infrastructure that will support information systems.

This document is not intended to replace a Designer. Rather, the requirements and criteria of this document shall guide the Designer and the other Design Team members (electrical, mechanical, and other disciplines) to provide the minimum infrastructure and support for information systems.

1.2 Scope

The scope of this document includes the following:

- Telecom Room build-out/fit-up, including power and cooling requirements
- Outside Plant Underground Pathways and Building Pathway Service
- Building Pathways
- Backbone Cabling
- Horizontal Cabling
- Administration / Labeling

1.3 Application

The requirements and criteria herein apply to the District Office complex and each campus within the District – Berkeley City College, College of Alameda (including Avaiation Facility), Laney College and Merritt College.

All construction projects – both renovation and new construction – shall follow the guidelines of this standard.

1.4 Systems Supported

The telecom infrastructure is intended to support data network communications from the equipment in the telecom room (e.g., switch) to the work area equipment (e.g., desktop computer) and between equipment in telecom rooms (e.g., edge switch to core switch).

The data network will support, at a minimum, IP-based host-client protocols and voice-over-IP (VoIP) protocols.

The telecom infrastructure, particularly the fiber optic backbone, can support additional building systems such as security systems, building control systems, fire alarm systems, etc.

1.5 Terminology

Passive network equipment generally refers to physical layer (OSI Layer 1) network hardware and standards such as cables, jacks, signal testing, etc. and related hardware, such as racks, patch panels, junction boxes, labeling, etc. Passive network equipment also does not, in and of itself, require electrical power. Passive network equipment shall be furnished, installed and tested by the Contractor. Refer to Appendix 1 for a list of parts. Submit cutsheets and a parts list for review to District IT.

Active network equipment generally refers to network devices such as switches, routers, wireless access points, UPS, etc. Active network equipment usually requires electrical power to operate. Active equipment is supplied, installed and configured by Peralta IT or its designated 3rd Party, unless

specifically stated otherwise, in which case, the Peralta IT liaison shall approve the device and its application.

2.0 PROCEDURES

2.1 Designer Qualifications

The telecom infrastructure shall be designed by an IT Design Professional.

The IT Design Professional:

- Shall be thoroughly familiar with PCCD's Telecommunications Infrastructure Standards.
- Shall be thoroughly familiar with referenced codes and standards.
- Shall be an accredited Registered Communications Distribution Designer (RCDD).
- Should be a professional electrical engineer licensed in the state of California.
- Should be authorized by Panduit in the Certified Design Program.

2.2 Design Approvals

The Designer shall be responsible for ensuring that all District standards are met. If variances to District standards are necessary, the Designer shall obtain written approval from the District IT Project Liaison in writing for such variances.

The Designer or Design Team Lead shall issue contract documents to District IT Project Liaison for review, comment, and approval prior to completion of 50% CD, if not before.

2.3 Contractor/Installer Qualifications

The structured cabling system installer shall have a current and active contractor's license, either C7 or C10 level, in the state of California.

The structured cabling system installer shall be a current and active Panduit ONE Partner.

The structured cabling system installer shall be certified by Panduit and can offer the Panduit Certification Plus system warranty.

2.4 Construction Approvals

The design and installation shall comply with local and state building codes and with national standards, including but not limited to the following.

A. Codes

The design and installation shall comply with local and state building codes, including but not limited to:

1. California Code of Regulations (CCR), Title 24, Part 3 "California Electric Code" (CEC)
2. California Code of Regulations (CCR), Title 24, Part 2 "California Building Code" (CBC)

B. Standards

The design and installation shall comply with national standards, including but not limited to:

1. Telecommunications Industry Association (TIA) – all the most current version and including related addenda:
   a) ANSI/TIA-568 "Generic Telecommunications Cabling for Customer Premises"
   b) ANSI/TIA-569 "Telecommunications Pathways and Spaces"
   c) ANSI/TIA-606 "Administration Standard for Telecommunications Infrastructure"
   d) ANSI/TIA-607 "Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises"
   e) ANSI/TIA-4966 "Telecommunications Infrastructure Standard for Educational Facilities"
2. Underwriter's Laboratories (UL) – all the most current version:
   a) UL 444, "Communications Cables"
   b) UL 497, "Protectors for Paired-Conductor Communication Circuits"
   c) UL 1651, "Optical Fiber Cable"
   d) UL 1690, "Data-Processing Cable"
   e) UL 1963, "Communications-Circuit Accessories"
   f) UL 2024A, "Optical Fiber Cable Routing Assemblies"
3. Insulated Cable Engineers Association (ICEA) – all the most current version:
   a) ANSI/ICEA S-83-596-, "Fiber Optic Premises Distribution Cable"
   b) ANSI/ICEA S-87-640-1999, "Fiber Optic Outside Plant Communications Cable"
   c) ANSI/ICEA S-90-661-2002, "Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cable for Use In General Purpose and LAN Communication Wiring Systems"
   d) ICEA S-104-696-2001, "Standard For Indoor-Outdoor Optical Cable"

C. Guidelines

The design shall comply with guidelines, including but not limited to:

1. Building Industry Construction Services International (BICSI) – all the most current version:
   a) "Telecommunications Distribution Methods Manual" (TDMM)
   b) "Outside Plant Design Reference Manual"
   c) NECA/BICSI 607, "Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings"
   d) ANSI/NECA/BICSI 568, "Standard for Installing Commercial Building Telecommunications Cabling"
   e) ANSI/BICSI 001, "Information and Communication Technology Systems Design and Implementation Best Practices for Educational Institutions and Facilities"
   f) ANSI/BICSI 005, "Electronic Safety and Security (ESS) System Design and Implementation Best Practices"
   g) ANSI/BICSI 006, "Distributed Antenna System (DAS) Design and Implementation Best Practices"
   h) ANSI/BICSI 007, "Information Communication Technology Design and Implementation Practices for Intelligent Buildings and Premises"

Versions of the aforementioned codes, standards, and guidelines shall be those versions enforced by aurhorities having jurisdiction or the the most current version available at the time of design.

2.5 Products and Materials

Passive network equipment shall be furnished, installed and tested by the Contractor. Refer to Appendix 1 for a list of parts.

The Contractor shall submit, prior to installation, a parts list and cutsheets to District IT (or the Enginer) for review and approval.

Cable runs and terminations shall be clean, organized/bundled and physically secured, using appropriate cable management hardware. All terminations shall be compliant with T568B wiring.

2.6 Schedule Considerations

Information Technology staff are responsible for installation and testing of active network components (routers, switches, etc), which cannot be performed until passive equipment (cables, patch panels, jacks, etc) is fully installed, labeled and tested by the Contractor. The Contractor shall complete the passive network equipment work reasonably in advance of the scheduled occupancy date, and no less than one week. The magnitude of the project scope dictates the minimum amount of advance notice needed for active component installation and testing.

The Construction Team's Project Manager shall notify both the District and College Information Technology Staff, with reasonable advance, of the anticipated completion of the Contractor's work and planned occupancy dates.

2.7 Owner-Provided Equipment

A. Network Equipment

PCCD District IT Department will design, procure, and install the network equipment (e.g., edge switches, core switches/routers, firewalls).

The racks within telecom rooms shall be designed to allow space for the network equipment and patch cords to be installed. Obtain from PCCD IT rack space requirements.

B. Telecom and VoIP Equipment

PCCD District IT Department will design, procure, and install the telecom equipment (e.g., IP telephones).

3.0 TELECOM ROOMS

3.1 Room Classifications

The telecom rooms shall fall into one of the following room classifications:

CLASSIFICATION NAME	CLASSIFICATION DESCRIPTION
Entrance Facility / EF (also, MPOE Room)	The EF shall be a room dedicated to telecom, and shall not be shared with other building services, unless authorized in writing by the District. Campus/interbuilding conduits should enter the building into the EF. Telecom or network equipment may or may not be deployed in the EF. If applicable, the telecom utility(ies) should demarcate/establish MPOE for their services in the EF.
Main Distribution Facility / MDF	The MDF shall be a room dedicated to telecom, and shall not be shared with other building services, unless authorized in writing by the District. The core network equipment serving data communications to the entire campus/complex should be deployed in the MDF. If applicable, the WAN interface to the District office should be deployed in the MDF, in direct connection to the network core. The MDF may also act as a BDF and/or an IDF.
Building Distribution Facility / BDF	The BDF shall be a room dedicated to telecom, and shall not be shared with other building services, unless authorized in writing by District. The distribution network equipment serving data communications within a single building should be deployed in the BDF. If there are/will be additional telecom rooms (IDFs) within the building, the backbone cabling shall originate in the BDF to each IDF. The BDF may also act as an IDF.
Intermediate Distribution Facility / IDF	The IDF shall be a room dedicated to telecom, and shall not be shared with other building services, unless authorized in writing by the District. The access network equipment serving data communications within a service area shall be deployed in the IDF. If applicable, the backbone cabling from the BDF will terminate in the IDF. UPSs will be deployed into the IDFs to support PoE applications such as VoIP (i.e., keep telephones powered).
Satellite Distribution Facility / SDF	The SDF shall be an equipment enclosure or cabinet dedicated to telecom, and shall not be shared with other building services, unless authorized in writing by the District. Where no room/space can be programmed and allocated as a dedicated telecom room **and** the quantity of links is 96 or less **and** the service area is 10,000 square feet or less, access network equipment and cable terminations may be located into a service cabinet.
Equipment Room / Server Room	The Equipment Room/Server Room shall be a room dedicated to telecom, and shall not be shared with other building services, unless authorized in writing by the District. The equipment/server room shall be fit up with equipment racks to house network equipment (switches, routers, etc.) and server cabinets to house processing systems (servers, storage systems, etc.). Each server room requires an approved program/set of criteria prior to design.

3.2 Room Sizes

A. New Construction:

Size the telecom rooms based on the following criteria:

Room	Sizing Criteria – Minimum Dimensions
EF	10'-0" W x 8'-6" D x 9'-0" H
MDF	10'-0" W x 16'-0" D x 9'-0" H
EF & MDF Combined	10'-0" W x 18'-6" D x 9'-0" H, or 16'-0" W x 11'-0" D x 9'-0" H
BDF	10'-0" W x 14'-6" D x 9'-0" H
IDF	10'-0" W x 11'-0" D x 9'-0" H
SDF	Not applicable
Equipment/Server Room	As required per project

B. Renovation:

This Document acknowledges that telecom rooms are often located within existing spaces and may not meet the aforementioned minimum sizing criteria. Under these circumstances, determine the feasibility of the space based on the following criteria:

Minimum size for telecom rooms shall be as follows.

1. Width: 8'-10", including equipment and working clearances.
2. Depth: 6'-0" (3'-0" for the rack with 3'-0" for end clearance) for the first rack plus 28 inches for each additional rack.

3.3 Room Adjacencies

A. New Construction:

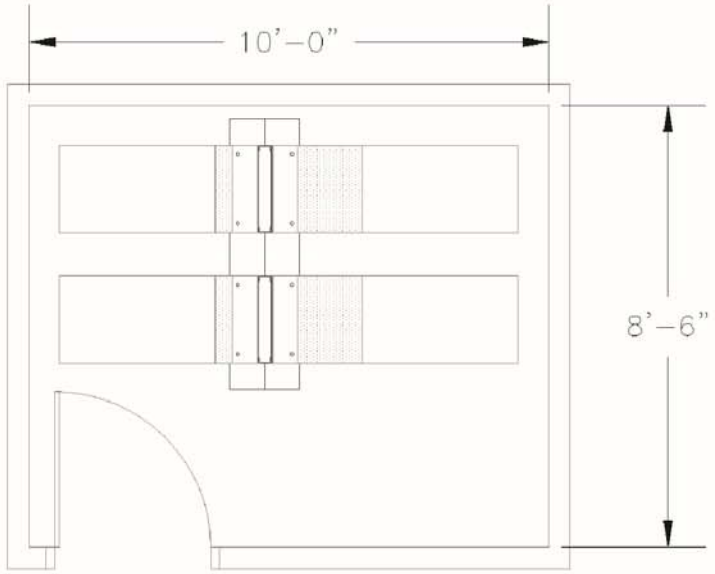
For new construction, the telecom rooms shall be vertically stacked, shall either encompass or be immediately adjacent to the vertical riser, and should be in close proximity to the electrical room.

B. Renovation:

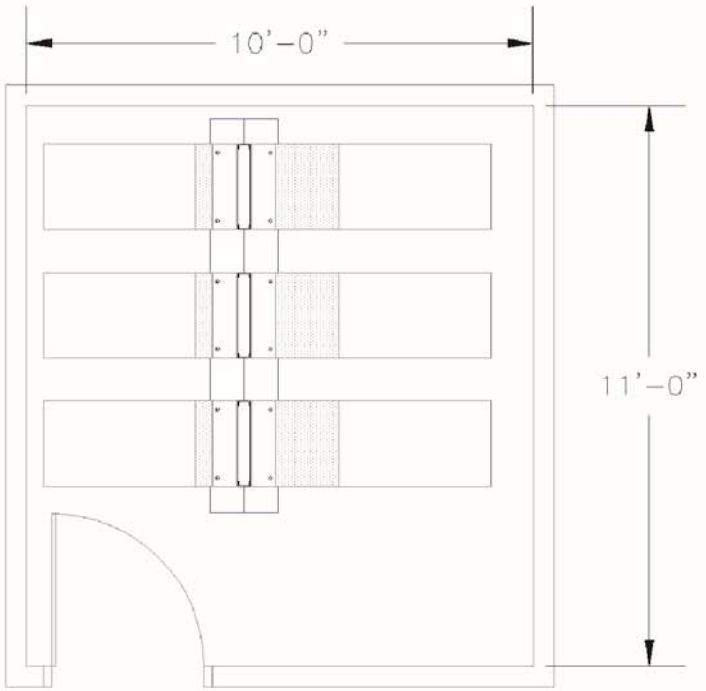
For renovation construction, the telecom rooms should be vertically stacked, shall either encompass or be immediately adjacent to the vertical riser, and should be in close proximity to the electrical room.

3.4 Room Configurations

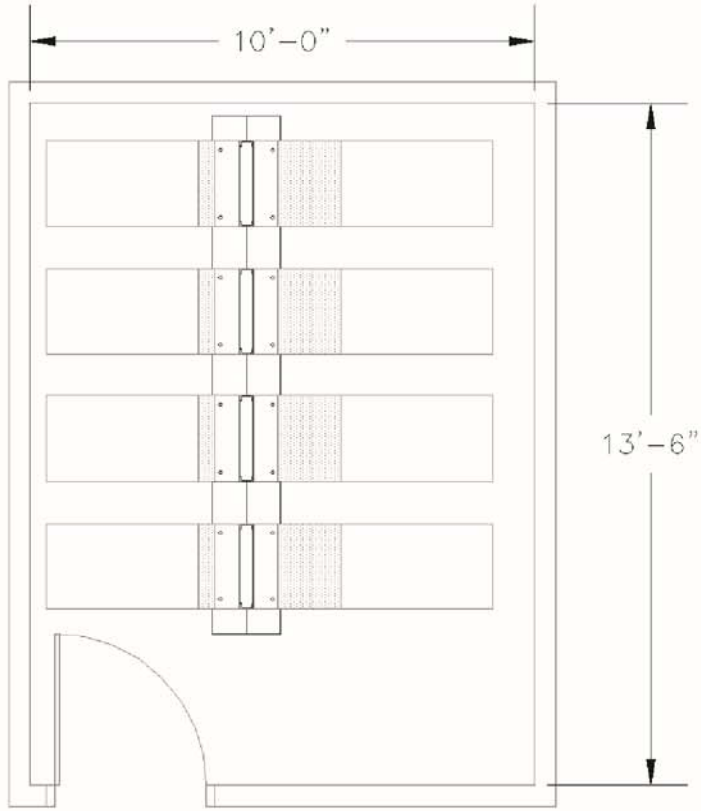
The following room configurations are examples of configurations based on rack quantity per room.



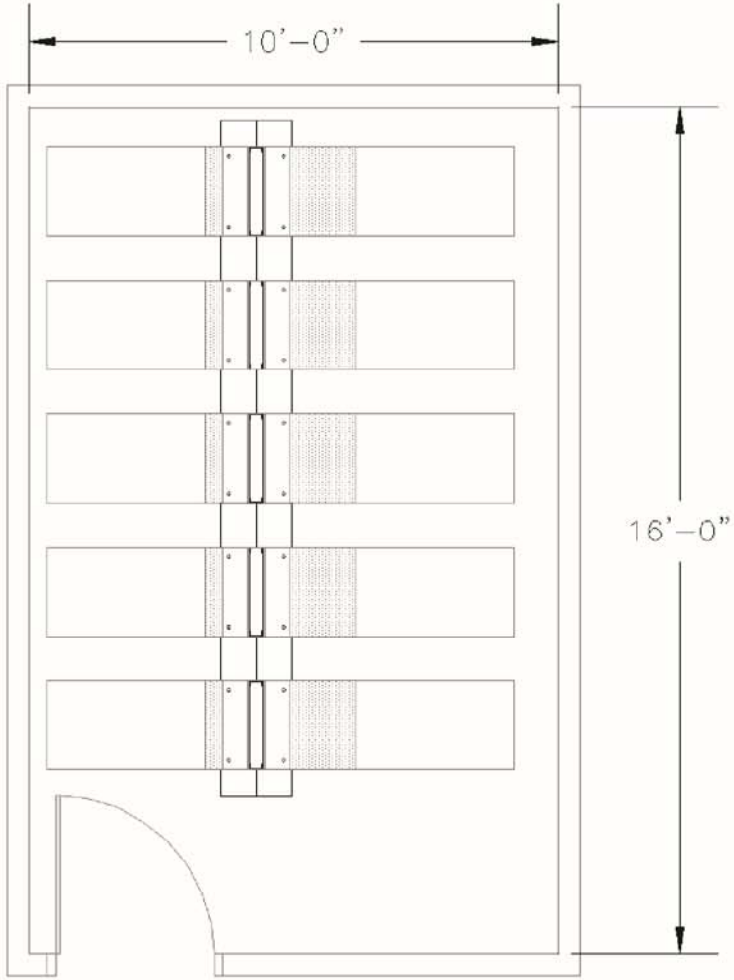
2-Rack Configuration



3-Rack Configuration



4-Rack Configuration



5-Rack Configuration

3.5 Architectural Finishes

The room finishes shall be as described in the following table:

Room	Floor	Wall	Ceiling
EF	Sealed concrete (or SD-VCT[1])	Plywood backboard[2], all walls	Open (i.e., no ceiling)
MDF	Sealed concrete (or SD-VCT[1])	Plywood backboard, all walls	Open (i.e., no ceiling)
BDF	Sealed concrete (or SD-VCT[1])	Plywood backboard, all walls	Open (i.e., no ceiling)
IDF	Sealed concrete (or SD-VCT[1])	Plywood backboard, all walls	Open (i.e., no ceiling)]
SDF	No applicable – as existing	No applicable	No applicable – as exist
Equipment/ Server Room	Sealed concrete (or SD-VCT[1]) – The flooring shall be determined per project. There may be instances where a raised floor would be required.	Wallboard – The wall finish should match typical building wall finishes (to control costs).	Lay-in acoustical tile – The ceiling shall be determined per project.

1 - SD-VCT = static-dissipating vinyl composition tile

2 - Plywood shall be ¾" thick and shall be fire treated. Plywood backboard shall be painted with white paint and shall have the fire rating stamp masked prior to painting.

3.6 Doors

The doors to telecom rooms shall be as described in the following table (minimum dimensions):

Room	Size	Quantity	Swing
EF	36"W x 7'H	1	Outward
MDF	36"W x 7'H	1	Outward
BDF	36"W x 7'H	1	Outward
IDF	36"W x 7'H	1	Outward
SDF	Not applicable	Not applicable	Not applicable
Equipment/ Server Room	72"W / double 36"W doors x 7'H	Door quantity will be defined per project.	Outward

3.7 Structural

A. Floor Loading

The floor loading shall be 150 pounds per square-foot, minimum, in all telecom rooms.

B. Floor Anchoring for Racks and Cabinets

Floor-standing racks and cabinets shall be anchored to the structural floor via devices pre-approved by DSA. Examples of such devices include Hilti Kwik-Bolt 3.

The structural engineer shall determine the applicability of the anchoring device set in the floor system, including minimum embedment depth.

C. Wall Anchoring for Racks and Cabinets

Wall-mounted racks and cabinets shall be anchored to the wall via fasteners pre-approved by DSA. Examples of such fasteners include woods screws into plywood backboard and expansion anchors into concrete wall.

The structural engineer shall determine the applicability of the fasteners depending upon the mounting substrate, including minimum embedment depth.

3.8 Electrical

A. Convenience Outlets

Convenience outlets shall be 120V. Convenience outlets shall be circuited from a normal power panel.

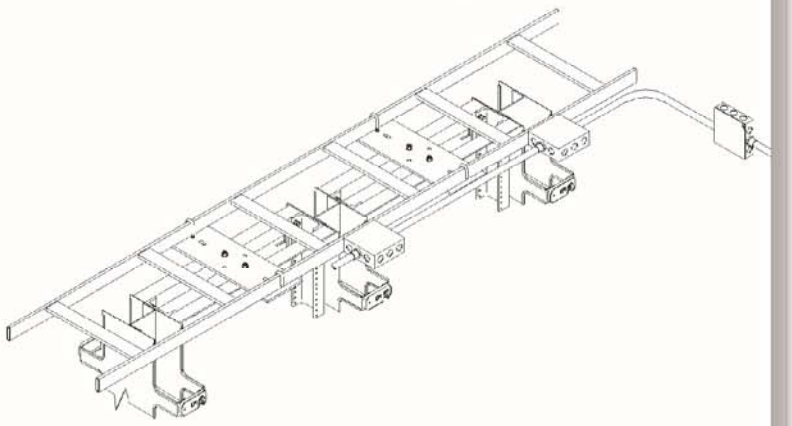
On walls adjacent to the rack bay (where the rack bay butts up against the wall), provide one duplex outlet in front of the rack bay and one duplex outlet behind the rack bay.

On the other walls, provide one duplex outlet per wall up to 15 feet. On walls longer than 15 feet, provide two duplex outlets.

B. Rack Bay Power Service

Each rack shall receive one duplex outlet. Each duplex outlet shall be circuited as 120V 20A separately breakered, or as required per project.

Each duplex outlet shall be installed between racks at the vertical management section facing down. Refer to the following figure for an example of the overhead power service at a rack bay.



Example Overhead Power Distribution at Rack Bay

C. Lighting

Lighting shall be overhead in front of and behind rack bay, and should be dual-lamp fluorescent type.

Luminance shall be 50 foot-candles measured at 3 feet above finished floor, minimum.

3.9 Mechanical

A. Cooling Criteria

For MDFs, BDFs, and IDFs, presume a load of 40 watts per square foot as a starting point.

For Equipment/Server Rooms, presume a load of 75 watts per square foot as a starting point.

The aforementioned criteria include the following sources: equipment, lighting, occupants, ambient.

B. Operation

The cooling shall operate 24 hours per day, 7 days per week.

C. Temperature Range

The rooms shall be controlled at 72 degrees Fahrenheit, +/- 5 degrees.

D. Dedicated Controls

Cooling controls (thermostat) shall be dedicated to the telecom room and shall not shared with any other space.

E. Humidity Control

For MDFs, BDFs, and IDFs, no humidity control is required.

For Equipment/Server Rooms, humidity control is required. Humidity shall be controlled between 10% and 55%, non-condensing within the specified temperature range.

F. Installation

For MDFs, BDFs, and IDFs, the cooling unit (fan coil unit or other) shall be installed either hung from the structure above or high on the wall.

For Equipment/Server Rooms, the cooling unit (CRAC, other) shall be coordinated throughout the Design Team. To minimize floor area, the cooling unit is suggested to be hung from the structure above.

The location of the cooling unit shall be coordinated with the equipment plan as not to have wet components above the equipment racks or other equipment that could be damaged by leaks. The piping to the cooling units shall be routed as not to pass over the rack bay and the equipment clearance of the rack bay. Piping connections shall not be installed over where equipment may be installed.

G. Ducting Through Telecom Rooms

Ducting unrelated to telecom shall not be routed through telecom rooms.

3.10 Plumbing

A. Piping Through Telecom Rooms

Piping and plumbing unrelated to telecom shall not be routed through telecom rooms.

3.11 Security

A. Access Control

Telecom rooms shall have access controlled, even if the room is shared with other services.

The access control should be a card reader, but shall be confirmed per instance.

B. Video Surveillance

Telecom rooms do not require video surveillance.

3.12 Racks and Rack Bays

Rack bays consist of multiple equipment racks, vertical management sections, and horizontal management.

A. Equipment Racks

Equipment racks shall be 7' high x 19" mounting (most often 20.25" wide.

B. Vertical Management Sections

Vertical management sections shall be double sided and 7' high x 6", 10", or 12" wide. Vertical management sections that will be to the right (as viewed from the front) of chassis-based network switches shall be 12" wide (this to accommodate the bulk of cords attached to the switch and routing rightward to avoid the fan tray on the left side of the switch).

4.0 OSP UNDERGROUND PATHWAYS

4.1 Underground Pathways Infrastructure

A. The following conduit types will be accepted for the different circumstances:

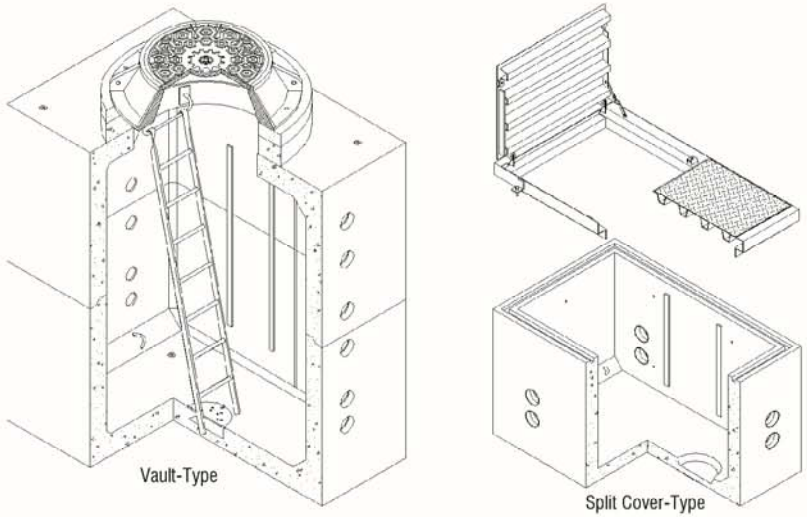
Circumstance	Acceptable Conduit Types
Straight Sections, no vehicular traffic	• Non-Metallic Schedule 40 PVC, concrete encasement not required • Non-Metallic Schedule 80 PVC, concrete encasement not required • Galvanized Rigid Steel / GRS
Straight Sections, under vehicular traffic	• Non-Metallic Schedule 40 PVC, with concrete encasement • Non-Metallic Schedule 80 PVC, with concrete encasement • Galvanized Rigid Steel / GRS
Sweeping Bends	• Non-Metallic Schedule 40 PVC, with concrete encasement • Non-Metallic Schedule 80 PVC, concrete encasement suggested • Galvanized Rigid Steel / GRS
Factory Bends/Elbows	• Non-Metallic Schedule 40 PVC, with concrete encasement • Non-Metallic Schedule 80 PVC, with concrete encasement • Galvanized Rigid Steel / GRS, with concrete encasement
Building Entrance (with	• Galvanized Rigid Steel / GRS, with concrete encasement

B. Split Cover-Type Maintenance Holes/Pull Boxes:

1. Size (minimum interior clearances): 36-inches wide by 48-inches deep by 60-inches long.
2. Split cover-type maintenance hole shall be equipped with corrosion-resistance pulling irons, corrosion-resistance cable racks, and grounding.

C. Vault-Type Maintenance Holes/Pull Boxes:

1. Size (minimum interior clearances): 48-inches wide by 84-inches deep by 60-inches long.
2. Vault-type maintenance holes shall be equipped with a sump, corrosion-resistance pulling irons, corrosion-resistance cable racks, and grounding.



Maintenance Holes Examples

D. The minimum burial depth for conduits / duct banks shall be 36 inches.

E. At buildings, install the conduit sloping toward away from the building with no less than 0.125 inches per linear foot of slope

F. Between maintenance holes, install the conduit sloping towards maintenance holes with no less than 0.125 inches per linear foot of slope.

4.2 Service Per Building

Each building shall receive two 4-inch trade size conduits, minimum, from the campus' telecommunications underground pathways infrastructure.

4.3 Building Connection

Within 15 feet of the point where the conduit enters the building, the conduit type shall be GRS. Non-metallic / PVC conduit will not be accepted.

4.4 Innerduct

At least one of the service conduits shall contain four 1-inch trade size innerducts. Each innerduct shall be uniquely colored. The innerducts should be corrugated type and should be extruded of high-density polyethylene.

4.5 Separation

Telecom conduits shall be separated from other underground structures as follows:

Structure	Separation
Power, concrete-encased	3 inches
Power, buried	12 inches
Power, on poles	Separate poles if possible; if not possible, 90 degrees, minimum

5.0 BUILDING PATHWAYS

5.1 Building Pathways

The building pathways design and installation shall be compliant to ANSI/TIA-569 standard and BICSI's TDMM.

5.2 Backbone Pathways

The building pathways for backbone cabling shall be either conduit or cable tray. The pathway component will depend on the project requirements, constraints, and coordination with the other building systems.

A. Conduit: If the backbone pathways will be conduit, then the conduit shall be 4 inch trade size. Presumable, the conduit type will be EMT, though building codes shall dictate the allowable conduit types.

B. Cable Tray: If the backbone pathways will be cable tray, then match the "Primary Pathway" guidelines below.

5.3 Horizontal Pathways

The horizontal pathways shall be defined as those pathway components that support horizontal cabling. These pathways are generally limited to a single floor from a telecom room or riser system.

A. Primary Pathways: The primary horizontal pathways shall be defined as those directly from the telecom room serving a section (a wing or side) of the building. The primary pathway components should cable tray – the tray can be wire mesh type or ladder type. If the total quantity of cables is less than approximately 50, or cable hangers can be used from the telecom rooms.

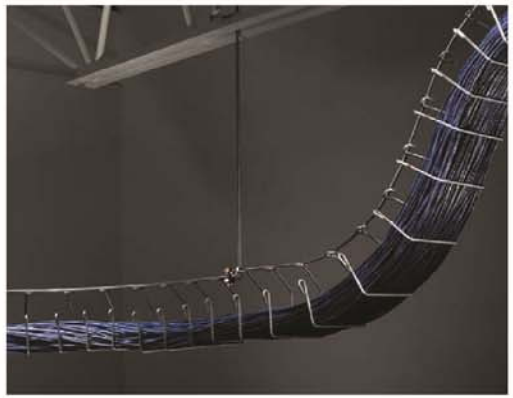
Primary Pathway Example – Cable Tray Wire Mesh Type

B. Secondary Pathways:

1. The secondary horizontal pathways shall be defined as those from the primary pathways serving an area of a section or to specific devices.
2. Secondary pathways support up to approximately 40 to 50 cables. The intent is for the primary pathway to support the bulk of the cables and the secondary pathways support those cables 'spurring off' toward their destination at work areas/outlets.
3. The secondary pathway components can be cable hangers (preferred). 'Make-shift' supports such as field-fabricated from leftover rough-in parts will not be acceptable

Preferred Secondary Pathway Example – Cable Hanger ("J-Hook")

4. As an alternative, "Snake Tray Series 201" may be used to support up to approximately 70 to 80 CAT5E cables and approximately 50 to 55 CAT6A cables.



Alternate Secondary Pathway Example – Snake Tray 201

5.4 Outlet Pathways

The outlet pathways shall be defined as the pathway supporting a single cabling complement at a work area.

A. Minimum conduit stub, or equivalent area, shall be 1-inch trade size.

B. Outlet box shall be 4 11/16" square, and "Deep" (no less than 2 1/8").

C. Framed Wall: For both new construction and renovation, the outlet pathway at framed walls shall be conduit stub from an accessible space (such as acoustical tile ceiling) to an outlet box within the wall interstitial. The outlet box should be installed at +18 inches for typical outlets or as approved per specific project requirements.

D. Concrete Wall:

1. New Construction: The outlet pathway at concrete walls shall be buried (cast within the forms) into the wall.

2. Renovation: The outlet pathway at concrete walls shall be either surface-mounted conduit and a surface-mounted back box, or shall be surface raceway and a compatible outlet box.

E. CMU Wall: For new construction and renovation, the device pathway at CMU walls shall be either surface-mounted conduit to a surface-mounted back box, or shall be surface raceway to a compatible outlet box.

6.0 BACKBONE CABLING

6.1 Backbone Fiber Optic Cabling

A. Cable Type

1. Outdoor Cables

Backbone fiber optic cables installed outdoors shall be loose buffered – either multitube or core tube type.

Backbone fiber optic cables installed outdoors should have a sheath consisting of a polyethylene jacket over the inner cable components (buffer(s), strength element, etc.).

2. Indoor Cables

Backbone fiber optic cables installed indoors shall meet the rating required by the authority having jurisdiction.

Backbone fiber optic cables installed indoors shall be tight buffered.

Backbone fiber optic cables installed indoors should have a sheath consisting of a thermoplastic jacket over the inner cable components (buffered fibers, strength element, . . etc.), an interlocking armor, and overall thermoplastic jacket. This cable does not require to be installed in innerduct.

B. Fiber Type

1. Singlemode

Singlemode fibers shall be 8.3/125µm, with a maximum dispersion of 3.5 ps/nm•km at 1285-1330 nm, and a cutoff wavelength of 1260 nm.

2. Multimode

Multimode fibers shall be 50/125µm laser-grade, with a minimum bandwidth of 500/1000 MHz-km at 850/1300 nm.

C. Cable Capacity / Conductor Count

1. Interbuilding Cabling

Interbuilding cabling links should contain 12 singlemode strands and 12 multimode strands.

2. Intrabuilding Cabling

Intrabuilding cabling links should contain 12 singlemode strands.

D. Termination

1. Connectors

Singlemode fibers shall be terminated via singlemode SC connectors. SC connectors shall be 568SC type, and shall meet all requirements of TIA/EIA-568-B.3, section 5.0 including references. The connector housing and the boot shall be blue in color.

Multimode fibers shall be terminated via multimode SC connectors. SC connectors shall be 568SC type, and shall meet all requirements of TIA/EIA-568-B.3, section 5.0 including references. The connector housing and the boot shall be beige in color.

2. Patch Panel

The patch panels shall be rack-mount type and shall be installed into an equipment rack.

3. Adapters

Adapters within the patch panels shall meet the requirements of TIA's 568 series of standards.

Singlemode adapter housing shall be blue in color.

Multimode adapter housing shall be beige in color and shall be duplex.

E. Testing

Inspection: Each fiber shall be inspected per IEC 61300-3-35.

Loss: Each fiber shall be tested as follows:

	Tier 1	Tier 2
Singlemode	Uni-directional, 1310nm and 1550nm	Bi-directional, 1310nm and 1550nm
Multimode	Uni-directional, 850nm and 1300nm	Bi-directional, 850nm and 1300nm

Passive Link Insertion Loss testing for singlemode fibers shall comply with TIA-526-7 ("OFSTP-7") "Test Method A.1: One Jumper Measurement".

Passive Link Insertion Loss testing for multimode fibers shall comply with TIA-526-14A ("OFSTP-14") "Test Method B: One Jumper Reference".

6.2 Backbone Twisted Pair Cabling

A. Cable Type

1. Outdoor Cables

Backbone twisted pair cables installed outdoors shall be gel-filled and should be AMNW type.

2. Indoor Cables

   Backbone twisted pair cables installed indoors should be ARMM type though must meet the rating required by the authority having jurisdiction.

B. Cable Capacity / Conductor Count

1. Interbuilding Cabling

   Interbuilding twisted pair cabling links should contain 100 pairs. The project scope and the building size and function will affect the final number of pairs.

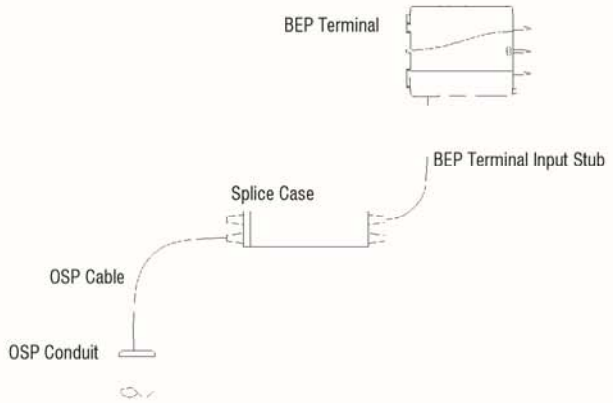
2. Intrabuilding Cabling

   Intrabuilding twisted pair cabling links should contain 25 or 50 pairs. Here again, the project scope and the building size and function will affect the final number of pairs.

C. Termination

1. Interbuilding Cabling

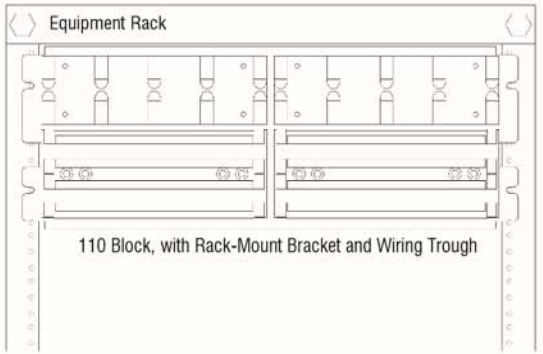
   Interbuilding twisted pair cabling links shall be terminated to building entrance protection terminals, generally wall-mounted. The OSP cable should be spliced to the BEP's input stub. See following common example.



Backbone OSP Twisted Pair Cable Termination Example

2. Intrabuilding Cabling

   Intrabuilding twisted pair cabling links should be terminated onto 110 blocks on rack-mount bracket.



Backbone OSP Twisted Pair Cable Termination Example

D. Testing

   Backbone twisted pair cabling links shall have 100% of the pairs tested for wire map and one pair from each 25-pair binder group tested for length.

7.0 HORIZONTAL CABLING

7.1 Code Compliance

Cabling and the installation shall be compliance with applicable building codes.

For example, cables installed within spaces deemed an air plenum (such as return air above an suspected ceiling system) shall be plenum rated.

7.2 Link (Definition)

A link (or permanent link) consists of a single cable, terminated in the network room to rack-mounted patch panels and terminated in the work area to an outlet (such as a faceplate, surface mounted outlet, surface back box, etc.).

7.3 Link Performance

Link performance shall be Category 6A, as defined by ANSi/TIA-568 standards.

Deviations for specific applications may be considered. However, for general purpose network connectivity, the standard performance shall be Category 6A.

A. Testing

   Horizontal twisted pair cabling links shall have 100% of the links tested per ANSI/TIA-568 standards under a permanent link configuration.

7.4 Cable

General: Cables shall be compliant with ANSI-TIA-568 standards.

Construction: Cables shall be 4-pair unshielded twisted pair (U/UTP). The jacket shall be green, unless otherwise approved to meet specific project requirements.

A. UL "LP" Rating

The cables shall be "LP" rated, regardless of the flamability/smoke rating.

7.5 Telecom Room Termination

In the telecom rooms, links shall be terminated via rack-mounted modular patch panels. The patch panels shall be either discrete port type (snap-in modular connectors) or pre-assembled 110 termination type. If discrete port type, also refer to "Modular Jacks" following.

Modular patch panels shall feature labeling per individual ports.

Avoid high-density patch panels.

7.6 Workstation Termination

Links shall be terminated via modular jacks – refer to "Modular Jacks" following.

Faceplates shall feature labeling to properly identify the outlet and the individual ports.

7.7 Modular Jacks

Construction: Modular jacks shall be 8-position 8-conductor type connectors, with an insulation displacement contact type wire termination.

Wiring: Modular jacks shall be wired to T568B configuration.

A. TIA Compliance

The modular jacks shall be compliant to the ANSI/TIA-568 suite of standards for compatibility and performance to CAT6A.

B. IEC "Connectors for Electronic Equipment" Compliance

The modular jacks shall be compliant to the IEC 60512-5-2 standard and the IEC 60512-99-001 standard as it applies to operating Power-over-Ethernet (PoE) Type 1, Type 2, Type 3 and Type 4 over the cabling plant.

7.8 Service, Per Work Area

A standard cabling complement, or "drop", shall consist of 2 links per outlet.

A. Offices: Generally, open offices shall receive 1 standard cabling complement per workstation and fixed offices shall receive at least 2 standard cabling complements. Offices which can accommodate more than one employee shall receive service consistent with the maximum number of workers the space might accommodate. Outlets should be installed on a separate wall (preferably adjacent before opposite).

1. Example: Cubicle for 1 employee shall receive 1 standard cabling complement.
2. Example: Corral for 3 employees shall receive 3 standard cabling complements.
3. Example: Large Office, which could hold 2 staff but is currently occupied by 1 person shall receive 2 standard cabling complements.

B. Executive Offices: Unless otherwise specified, "Executive" offices, which can additionally accommodate conference or work tables, shall receive 1 standard cabling complement on each wall.

C. Classrooms: Generally, classrooms shall receive 2 standard cabling complements – 1 at the front of the room and 1 at the back of the room.

D. WLAN Access Points: Access points shall receive 2 links. The deployment shall be determined per project as the coverage area is building-specific. Also, the installation shall very per instance (wall mount, ceiling mount, etc.).

8.0 ADMINISTRATION / LABELING

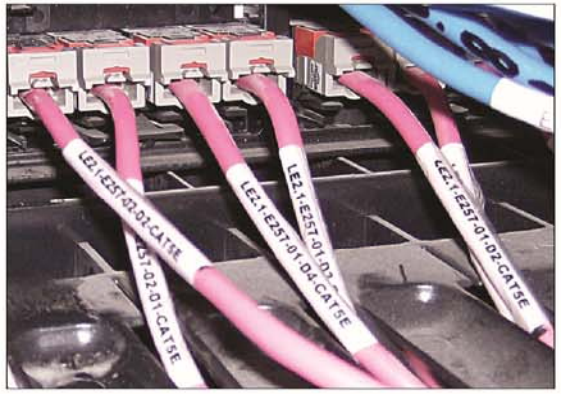
Telecom infrastructure requires clear, legible labeling using printed (not hand-written) labels according to District Standards. The Contractor shall review the labeling standard and select labeling products that are compatible, in the opinion of District IT, with the equipment receiving the labels.

Identifiers for patch panel ports and faceplate ports shall be no longer than 10 characters in length using 7-point Arial font.

8.1 Labeling Requirements

A. Horizontal Cabling: Provide labels on the following:

1. Cable: 1 label on each end, installed within 4 inches of the termination point and positioned to be visible – see example below:



2. Patch panel port (in the telecom room): 1 label per outlet and 1 label per port.
3. Outlet/faceplate (at the work area): 1 label per faceplate and 1 label per port.

B. Backbone Fiber Optic Cabling: Provide labels on the following:

1. Cable – 1 label on each end
2. Label on the card on the inside of the patch panel cover/door
3. Patch panel port (in the destination telecom room)

C. Backbone Twisted Pair Cabling: Provide labels on the following:

1. Cable – 1 label on each end
2. Patch panel port (in the origination telecom room)

3. Patch panel port (in the destination telecom room)

D. Equipment Racks: Provide 1 label plate on the top angle at both the front and the back – see the example below:

8.2 Identifier Assignment

A. General: Separate fields of the identifier with a hyphen.

B. Telecom Rooms:

1. Telecom room identifiers shall be based on the campus (C), building (B), floor (F), and unique sequential number (N).
2. Format: CBF.N
3. Example telecom room ID: "LE2.1" (Laney campus, bldg E, floor 2, 1st telecom room on this floor)
   a) Campus codes: Berkeley City College = "B", College of Alameda = "A", Laney College = "L", Merritt College = "M"

C. Equipment Racks:

1. First field: the telecom room ID; for example: "LE2.1".
2. Second field: the sequential rack number within the room; for example: "R01" (1st rack in the room), "R02" (2nd rack in the room), etc.
3. Example equipment rack ID:

LE2.1-R05

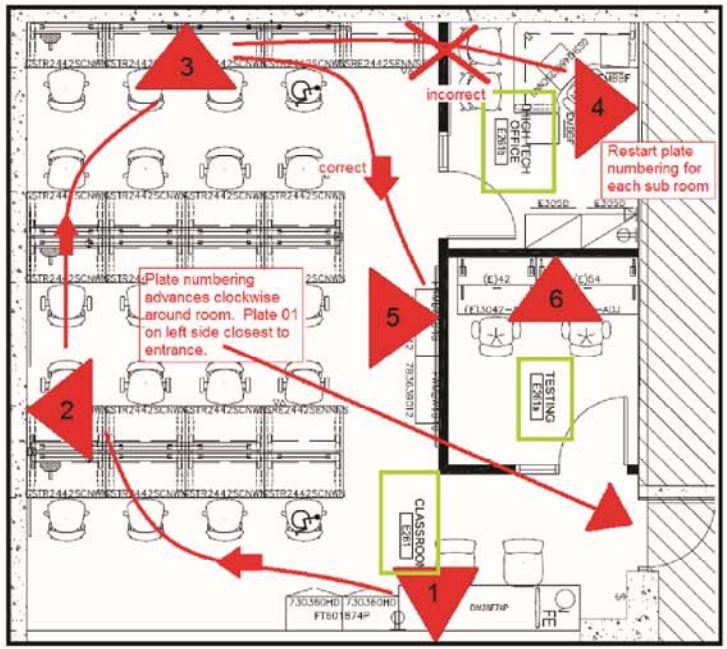
D. Outlets / Faceplates:

1. First field: the telecom room ID; for example: "LE2.1".
2. Second field: the work area room number; for example: "E261".
3. Third field: outlet/faceplate number (a unique sequential outlet number – also see "Multiple Outlets within a Room" below); for example: "01" (1st outlet in the room).
4. Example outlet/faceplate ID:

LE2.1-E261-01

E. Multiple Outlets within a Room:

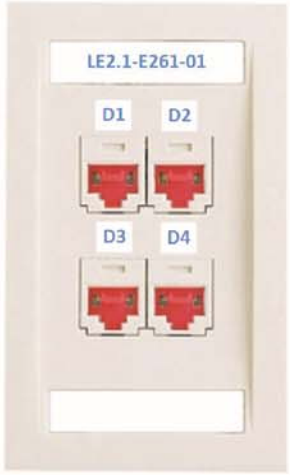
1. When multiple outlets occur in a given room, assign a unique attribute to each outlet starting on the left side of the room when entering the room and proceed clockwise (in plan view) – see the example below:



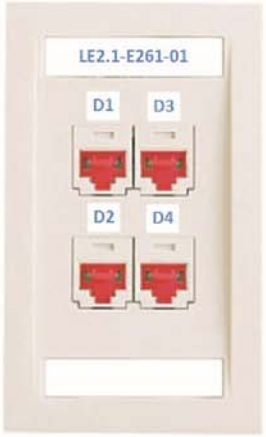
F. Individual Ports at Outlets/Faceplates:

1. First field: the cable's intended service type followed by a unique sequential number per outlet.
   a) Port numbers progress across rows.
   b) Port numbers restart per outlet/faceplate.
2. Example: "D1" (data service, 1st port of the outlet)

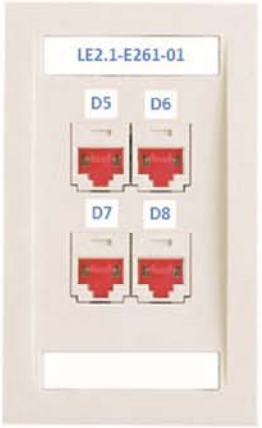
3. Example of a faceplate with the outlet label and port labels:



Correct Faceplate Labeling



Incorrect Faceplate Labeling



Incorrect Faceplate Labeling

Acceptable Alternate Faceplate Labeling

G. Horizontal Cables:

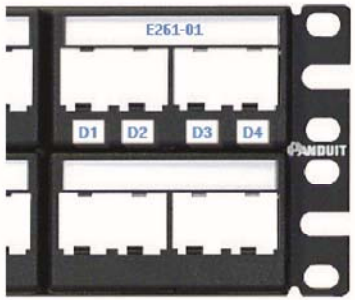
1. First field: the telecom room ID; for example: "LE2.1".
2. Second field: the work area room number; for example: "E261".
3. Third field: outlet/faceplate ID; for example: "01".
4. Fourth field: port ID (a unique letter); for example: "D1" ("D" for data service, 1st port of the outlet).
5. Fifth field: the cable type; for example: "CAT6A".
6. Example horizontal cable ID:

LE2.1-E261A-01-D1-CAT6A

H. Individual Ports at the Modular Patch Panels:

1. Top row, First field: the work area room number; for example: "E261".
2. Top row, Second field: outlet/faceplate ID; for example: "01".
3. Bottom row: outlet port number; for example: "D1".
4. Example patch panel port ID:

E261-01 D1



I. Backbone Cables:

1. First field: the originating room ID; for example: "AD1.1".
2. Second field: the destination room ID; for example: "AD3.1".
3. Third field: the cable type; for example: "FS" (fiber optic, 62.5/125 multimode).
   a) Type codes: "F" = fiber optic, "T" = twisted pair
   b) Type codes: "S" = singlemode, "5" = 50/125 multimode, "6" = 62.5/125 multimode
4. Fourth field: beginning strand count served from originating room; for example: "01".
5. Fifth field: ending strand count served from originating room; for example: "12".
6. Example backbone cable ID:

AD1.1-AD3.1-F6-01-12

APPENDIX 1: PRODUCTS LIST

LINE #	DESCRIPTION	MANUFACTURER	MNFR PRODUCT NO.	STATUS
01	**DATACOM ROOM FIT-UP**			
02	Equipment Rack, 7' H, "Standard" ("Universal" also acceptable)	CPI	55053-503	Normative
03	Vertical Management Section, 7' H by 6" W, double sided	CPI	11729-503	Normative
04	Horizontal Management Panel, 2U, double sided	Panduit	NCMH2	Normative
05	Cable Runway, 12" W, "Universal"	CPI	10250-112	Normative
06	Cable Runway, 18" W, "Universal"	CPI	10250-118	Normative
07	Cable Runway, 24" W, "Universal"	CPI	10250-124	Normative
08	Power Strip, horizontal / rack-mount, 10-outlet, 20A	Geist	SP104-1020	Normative
09				
10	**BUILDING PATHWAYS**			
11	Primary Pathway | Cable Tray, wire mesh type	B-Line (by Eaton)	Flextray Series	Normative
12	Secondary Pathway | Cable Hanger, up to ~12 CAT5E cables or ~8 CAT6A cables (note: the actual part number may vary to meet the installation configuration / condition)	B-Line	BCH12	Normative
13	Secondary Pathway | Cable Hanger, up to ~40 CAT5E cables or ~28 CAT6A cables (note: the actual part number may vary to meet the installation configuration / condition)	B-Line	BCH21	Normative
14	Secondary Pathway | Linear Ring system, 4" x 2" rings ("Snake Tray Series 201")	CMS	CM-201-24-8	Normative
15				
16	**BACKBONE FIBER OPTIC CABLING**			
17	OSP Fiber Optic Cable, dielectric, 12-strand singlemode	Corning	012EU4-T4100D20	Normative
18	ISP Fiber Cable, interlock armor, 12-strand singlemode	Corning	012E81-33131-A1	Normative
19	ISP Fiber Cable, interlock armor, 12-strand multimode	Corning	012T81-33180-A1	Normative
20	Rack-mount Fiber Enclosure, 2RU	Panduit	FRME2	Normative
21	Adapter plate, with 3 SC\duplex multimode adapters	Panduit	FAP3WEIDSC	Normative
22	Adapter plate, with 6 SC simplex singlemode adapters	Panduit	FAP6WBUSCZ	Normative
23	SC connector, multimode, beige	Panduit	FSCM5BL	Normative
24	SC connector, singlemode, blue	Panduit	FSCSBU or FSCSCBU	Normative
25				
26	**BACKBONE TWISTED PAIR CABLING**			
27	ISP Twisted Pair Cable, ARMM type, 25-pair	Superior Essex	02-097-03	Normative
28	ISP Twisted Pair Cable, ARMM type, 50-pair	Superior Essex	02-100-03	Normative
29	ISP Twisted Pair Cable, ARMM type, 100-pair	Superior Essex	02-104-03	Normative
30	110 Block, rack-mount kit (consists of: 2 100-pair blocks, 2 wire troughs, 1 bracket)	Panduit	P110B1005R4WJ	Normative
31	OSP Twisted Pair Cable, filled ASP (ANMW Bell type), 50-pair	Superior Essex	22-100-83	Normative

APPENDIX 1: PRODUCTS LIST

LINE #	DESCRIPTION	MANUFACTURER	MNFR PRODUCT NO.	STATUS
32	OSP Twisted Pair Cable, filled ASP (ANMW Bell type), 100-pair	Superior Essex	22-104-83	Normative
33	OSP Twisted Pair Cable, filled ASP (ANMW Bell type), 200-pair	Superior Essex	22-108-83	Normative
34	OSP Twisted Pair Cable, filled ASP (ANMW Bell type), 400-pair	Superior Essex	22-112-83	Normative
35	Splice Case, indoor (K&B type)	3M	R-3	Normative
36	Splice module, 710-type, 25-pair, non-filled/dry	3M	3M710-SD1-25	Normative
37	Splice module, 710-type, 25-pair, filled	3M	3M710-SC1-25 S	Normative
38	BEP Terminal, 100-pair, input = stub, output = 110	Circa Telecom	1880ECA1-100	Normative
39	BEP Module, 5-pin type, solid state, black (240V)	Circa Telecom	3B1FS-240	Normative
40	BEP Module, 5-pin type, solid state, red (75V)	Circa Telecom	4B3S-75	Normative
41				
42	**HORIZONTAL CABLING**			
43	Category 6A Cable, 4-pair, plenum, green	Panduit	PUP6XC04GR-UG	Normative
44	Modular Patch Panel, discrete port type, 24 ports, 2U	Panduit	CPPL24WBLY	Mandatory
45	Modular Patch Panel, discrete port type, 48 ports, 2U	Panduit	CPPL48WBLY	Mandatory
46	Faceplate, 2-port, electrical ivory	Panduit	CFPE2EIY	Mandatory
47	Faceplate, 4-port, electrical ivory	Panduit	CFPE4EIY	Mandatory
48	Faceplate, 6-port, electrical ivory	Panduit	CFPE6EIY	Mandatory
49	Faceplate - wall phone type, 1-port, stainless steel	Panduit	KWP6PY	Normative
50	Modular Jack, CAT6A rated, 8-position T568B wired	Panduit	CJ6X88TGWH	Mandatory
51				
52	**NETWORK MONITORING And ALERTING**			
53	Chassis based Layer 3 switches at Core	Cisco	Catalyst 6800 series	
54	Chassis based Layer 3 switches at Core (alternative)	Cisco	Catalyst 4500 series	
55	Stackable Layer 3 swtiches at Access layer\	Cisco	WS-C3850-48P	
56	Controller based WAPs supporting 802.11 abgn, AC wave 2	Cisco		
57	Campus housed Wireless Lan Controller (WLC)	Cisco		
58	Centralized Internet firewall	Cisco		
59				
60	WAN/MAN	CENIC	10 Gbps GigaMAN	
61	Network monitoring and alerting	Solarwinds	Solarwinds	
62	Maintenance on unique and core equipment	Cisco	Smartnet	
63				

Peralta Community College District

Network and Wi-Fi Standards

Information Technologies
333 East 8th Street
Oakland, CA 94606

Table of Contents

I. INTRODUCTION

A. Purpose

This purpose of this document is to describe the minimum requirements and establish the design guidelines for Information Technology systems that will support network and Wi-Fi connectivity.

This document is not intended to replace a Designer. Rather, the requirements and criteria of this document shall guide the Designer and the other Design Team members (electrical, mechanical, and other disciplines) to provide the minimum infrastructure and support for information systems.

B. Scope

The scope of this document includes the following:

- Wired Ethernet network connectivity
- Wireless / Wi-Fi connectivity
- Administration / Labeling

C. Application

The requirements and criteria herein apply to the District Office complex and each campus within the District – Berkeley City College, College of Alameda (including Aviation Facility), Laney College and Merritt College.

All construction projects – both renovation and new construction – shall follow the guidelines of this standard.

D. Systems Supported

The telecom infrastructure is intended to support data network communications from the equipment in the telecom room (e.g., switch) to the work area equipment (e.g., desktop computer) and between equipment in telecom rooms (e.g., edge switch to core switch).

The data network will support, at a minimum, IP-based host-client protocols and voice-over-IP (VoIP) protocols.

The telecom infrastructure, particularly the fiber optic backbone, can support additional building systems such as security systems, building control systems, fire alarm systems, etc.

E. Terminology

Active network equipment generally refers to network devices such as switches, routers, wireless access points, UPS, etc. Active network equipment usually requires electrical power to operate. Active equipment is supplied, installed and configured by Peralta IT or its designated 3rd Party, unless specifically stated otherwise, in which case, the Peralta IT liaison shall approve the device and its application.

Passive network equipment generally refers to physical layer (OSI Layer 1) network hardware and standards such as cables, jacks, signal testing, etc. and related hardware, such as racks, patch panels, junction boxes, labeling, etc. Passive network equipment also does not, in and of itself, require electrical power. Passive network equipment is described within the Telecommunications Infrastructure Standards document issued to District IT.

II. PROCEDURES

A. Designer Qualifications

The Wi-Fi and network shall be designed by an IT Design Professional.

The IT Design Professional:

- Shall be thoroughly familiar with PCCD's Telecommunications Infrastructure, Wi-Fi and network standards.
- Shall be thoroughly familiar with referenced codes and standards.
- Shall be an accredited Wi-Fi and network designer.
- Should be authorized by Cisco as a design and engineer

B. Design Approvals

The Designer shall be responsible for ensuring that all District standards are met. If variances to District standards are necessary, the Designer shall obtain written approval from the District IT Project Liaison in writing for such variances.

The Designer or Design Team Lead shall issue contract documents to District IT Project Liaison for review, comment, and approval prior to completion of 50% CD, if not before.

C. Contractor/Installer Qualifications

The network installer shall have a Cisco certification aligned with the equipment being installed. At a minimum, the installer shall possess Cisco's CCNA.

The Wi-Fi installer shall have a Cisco certification aligned with the equipment being installed. In addition, the installer shall possess at Wi-Fi survey too certification such as AirMagnet, Ekahau or equivalent.

D. Construction Coordination and Approvals

The design and installation shall comply owner and general contractor as follows:

1. Owner
    a) Comply with owner standards and direction
    b) Comply with manufacture standards and best practice guidelines
    c) Coordinate activation and integration with district and college IT teams
2. Construction
    a) Comply with general contractor standards and direction
    b) Coordinate access to required project spaces
    c) Coordinate equipment shipping, receiving, storage and mounting
    d) Review and approve equipment room readiness
        (1) Clean
        (2) Cool
        (3) Power energized
        (4) Physically secure

(5) Room construction complete

3. Standards

The design and installation shall comply manufacture, owner and construction standards

4. Guidelines

The design and installation shall comply with manufacturer, owner and construction guidelines.

E. Products and Materials

Active network equipment shall be furnished, installed and tested by the Contractor. Refer to Appendix 1 for a list of parts.

The Contractor shall submit, prior to installation, a parts list and cutsheets to District IT (or the Engineer) for review and approval.

Patch cord installation shall be clean, organized/bundled and physically secured, using appropriate cable management hardware. All equipment labeling shall be compliant with project labeling standards.

F. Schedule Considerations

1. Network

Information Technology staff are responsible for oversite of installation and testing of active network components (routers, switches, etc.), which cannot be performed until passive equipment (cables, patch panels, jacks, etc.) is fully installed, labeled and tested. The Contractor shall complete the network equipment work reasonably in advance of the first required network connection within the building and no less than one week prior to occupancy. The first required wired network connection will probably be physical security cameras, access control, BMS or other base building system prior to their commissioning. The magnitude of the project scope dictates the minimum amount of notice needed for active component installation and testing.

2. Wi-Fi

Information Technology staff are responsible for oversite of installation and testing of Wi-Fi components (WAPs, controllers, etc.), which cannot be performed until passive equipment (cables, patch panels, jacks, etc.) is fully installed, labeled and tested. The Contractor shall complete the Wi-Fi equipment work reasonably in advance of the first required Wi-Fi connection within the building and no less than one week prior to occupancy. The first required Wi-Fi connection will probably be the building occupants. But there may be other systems being installed requiring Wi-Fi connectivity prior to commissioning. The magnitude of the project scope dictates the minimum amount of advance notice needed for active component installation and testing.

The Construction Team's Project Manager shall notify both the District and College Information Technology Staff, with reasonable advance, of the anticipated completion of the Contractor's work and planned occupancy dates.

G. Owner-Provided Equipment and Functions

1. Network Equipment

PCCD District IT Department will have oversight in the design, procurement, and installation of the network equipment (e.g., edge switches, core switches/routers, firewalls).

The racks within telecom rooms will be provided for the network equipment to be installed. Obtain from PCCD IT rack space location for intended equipment

Power service with appropriate receptacles will be provided by PCCD District IT Department or construction project. Contractor should verify power receptacles are of correct type and energized.

Patch cords will be provided by PCCD District or project low voltage contractor. Obtain patch cords from appropriate source

2. Wi-Fi Equipment

PCCD District IT Department will have oversight in the design, procurement, and installation of the Wi-Fi equipment (e.g., WAPs, controllers).

The racks within telecom rooms will be provided for the Wi-Fi equipment to be installed. Obtain from PCCD IT rack space location for intended equipment

Patch cords will be provided by PCCD District or project low voltage contractor. Obtain patch cords from appropriate source

3. Telecom and VoIP Equipment

PCCD District IT Department will design, procure, and install the telecom equipment and services (e.g., IP telephones, CENIC, Gigaman, PRI's…etc.).

4. Telecommunication services

PCCD District IT Department will provide 1 or 10 gigabit per second services between PCCD campuses and district office via the Corporation of Education Network Initiatives in California (CENIC). Each campus and the District offices will leverage CENIC for network connectivity.

III. NETWORK EQUIPMENT DEPLOYMENT LOCATIONS

A. Equipment Deployment Locations

The network equipment shall be installed in one of the following telecom spaces:

Telecom Space Name	Network Equipment
Entrance Facility / EF	Location of telco demarcation services and equipment
(also, MPOE Room)	Network edge equipment may or may not be deployed in the EF.
Main Distribution Facility / MDF	The core network equipment serving data communications to the entire campus/complex should be deployed in the MDF.
	If applicable, the WAN interface to the District office should be deployed in the MDF, in direct connection to the network core.
	The MDF may also act as a BDF and/or an IDF.
Building Distribution Facility / BDF	No inbuilding network distribution equipment should be deployed. All access layer network equipment will home-run to campus core.
	The distribution spaces will function as passive connectivity for patching access-layer network equipment to core network equipment via backbone fiber.
	The BDF space may also support access layer network equipment.
Intermediate Distribution Facility / IDF	The access layer network equipment serving data communications within a service area shall be deployed in the IDF.

	UPSs will be deployed into the IDFs to support PoE applications such as VoIP (i.e., keep telephones powered).
Satellite Distribution Facility / SDF	A small enclosure supporting access layer network equipment and less than 96 connections remote to an IDF.
Equipment Room / Server Room	Network access layer equipment connecting servers, storage systems. Often the Equipment Room / Server room functions as an MDF supporting core network equipment (switches, routers, etc.)

IV. NETWORK EQUIPMENT

A. Core

The network core interconnects building networks within a PCCD campus. PCCD's network core routes TCP/IP Ethernet packets between buildings, WAN and local server resources.

The follow are functional requirements of the network core equipment

1. Redundant Cores
    a) Cisco 3800 series stackable switches where less than 200 ports are required
    b) Cisco 6800 or Cisco 4500 chassis based hardware where more than 200 ports are required. Note that the manufacturer will be replacing these models with Nexus 9000 series.
2. TCP/IP (layer 3) routing is enabled
3. VLAN support within a single VTP domain
4. LACP or EtherChannel support
5. Quality of Service (QoS) support
6. Uplinks are sized that is appropriate for redundant interbuilding 1Gbps / 10 Gbps interbuilding connectivity using either single mode fiber. Some older structures may be restricted to multimode fiber
7. Support Single mode and Multimode fiber
8. 2N redundant power supplies
9. Rack mounted
10. Backup power needs to be provide via a centralized or localized UPS with a minimum of 30 minutes run-time
11. Cisco 8x5xNBD Smartnet maintenance

B. Distribution

No inbuilding network distribution equipment should be deployed. All access layer network equipment will home-run to campus core.

The distribution spaces will function as passive connectivity for patching access-layer network equipment to core network equipment via backbone fiber

C. Access

The network access layer interconnects end devices (workstations, WAPs, VoIP phones…) to the Ethernet network within a building. Access switches are stackable to aggregate uplinks to PCCD's network cores.

The follow are functional requirements of the network access equipment

1. Cisco 4000 series stackable hardware
2. TCP/IP (layer 3) routing is available but not enabled
3. VLAN support within a single VTP domain
4. LACP or EtherChannel support
5. Uplinks are sized that is appropriate for redundant interbuilding 1Gbps / 10 Gbps interbuilding connectivity using either single mode fiber. Some older structures may be restricted to multimode fiber
6. Copper Ethernet ports are sized appropriately to support all active connections plus 20% growth
7. Power over Ethernet (PoE+) support
8. Support single mode and Multimode fiber
9. N+1 redundant power supplies
10. Rack mounted
11. Backup power needs to be provide via a centralized or localized UPS with a minimum of 30 minutes run-time
12. Available spares for self-maintenance support. Leverage manufacturer warranties for repairs.

D. Edge

The network edge interconnects CCD's distributed egresses to the internet. Each campus and the district office house edge firewalls. The CENIC network is leveraged for individual college access the centralized egress located at the district office.

The follow are functional requirements of the edge equipment

1. Cisco or Fortinet hardware
2. Redundant High Availability (HA)
3. LACP support
4. Sized appropriately for available bandwidth utilization
5. 2N redundant power supplies
6. Rack mounted within PCCD District office data center

7. Minimum of four 10 Gbps ethernet interfaces housed at the campus facility MPOE or MDF
8. Cisco 8x5xNBD Smartnet (or equivalent) maintenance

E. Wi-Fi

The Wi-Fi system interconnects 802.11 end devices (workstations, tablets, laptops, VoIP phones, SmartLocks…) to the Ethernet access network switches. A redundant Wireless Lan Controller (WLC) is deployed at each campus and district office. The controller manages the Wireless Access Points (WAPs) configuration and provides SSID separation.

The follow are functional requirements of the Wi-Fi equipment

1. Cisco hardware
2. Multiple SSID supported
3. 802.11 a,d, n and ac Wave 2
4. LACP or EtherChannel support
5. WAP density will align with device density such that a maximum of 25 active Wi-Fi devices will associate with a single WAP
6. 802.11 throughput shall be at a minimum of 24 mbps for each end device
7. 802.11 overlap shall be at a minimum of 20% for roaming support
8. WAP power setting shall not exceed 50% within a non-failed environment
9. WAP placement shall require a predictive survey to optimize mounting location to support end device density, overlap and anticipated throughput
10. Radio Resource Management (RRM) support
11. WAP Uplinks single 1Gbps with expansion to two
12. WLC interfaces are support multiple 10 Gbps
13. Power over Ethernet (PoE+) support
14. WAPs are ceiling mounted
15. WLC's are rack mounted
16. WLC's have 2N redundant power supplies
17. Backup power needs to be provide via a centralized or localized UPS with a minimum of 30 minutes run-time
18. WAPs have available spares for self-maintenance support. Leverage manufacturer warranties for repairs
19. WLC's have Cisco 8x5xNBD Smartnet maintenance

V. ADMINISTRATION AND LABELING

A. Administration Requirements

1. Shipping and receiving

The network contractor is responsible for shipping and coordination of receiving of network equipment. The equipment shall be stored in a clean secure location until commissioned.

2. Segmentation and Address Space Coordination

Active network equipment shall be configured to support VLAN segmentation. Coordination of the VLANs and address spaces must be coordinated by contractor with PCCD IT. Documentation of equipment VLANs and address spaces shall be recorded by contractor and shall include a patching matrix.

3. Wi-Fi segmentation

The contractor shall coordinate SSID and associated VLANs with PCCD IT. Documentation of Wi-Fi SSID VLANs and address spaces shall be recorded by contractor.

4. Management Addresses

Network Equipment management addresses must be coordinated by contractor with PCCD IT. Each manageable equipment shall be assigned a unique address for remote management. Equipment management address must be recorded within patching matrix.

5. Management Accounts

Active network equipment deployed throughout the district has local and centralized access used to administer the equipment. These accounts have various privilege levels. Upon deployment of active network equipment, the management accounts must be secured by contractor to restrict unauthorized access. At a minimum, the management account passwords must be changed during commissioning. Password length and complexity must meet the districts password policies.

6. Equipment Inventory

The network equipment inventory must be gathered by contractor at time of installation. The inventory information must include model number, serial number and deployed location. The inventory must be presented to the district within a spreadsheet and cross-checked with packing lists and purchase order.

7. Topology Sketch

An as-built topology sketch showing network equipment interconnectivity, model numbers and location shall be developed by contractor and delivered to PCCD IT upon completion of installation

8. Testing and Acceptance

The contractor shall develop and provide system testing details. Testing details and their results shall be provided to PCCD IT during equipment deployment.

9. Packing Material Disposal

The contractor shall remove equipment packing material from project site. Coordinate disposal of material with PCCD IT and/or General Contractor.

10. Maintenance and Support

The contractor shall coordinate maintenance contract requirements with PCCD IT. The contractor shall include required maintenance within Bill of Materials.

B. Monitoring Requirements

Active network equipment administration for and monitors active network equipment. Network equipment must be integrated within the district monitor systems. Active network equipment includes but not limited to routers, switches, firewalls, and controllers used to transport network packets throughout the campuses and district.

Network monitoring will leverage SNMP architectures provided by enterprise grade equipment. The SNMP information will be collected by one or more existing monitoring engines such as SolarWinds or equivalent systems. Monitoring of equipment shall include the following at a minimum:

a) Status up/down

b) Environmental parameters such as temperature and power sources (if available)

c) Component functionality such as blades, fans, supervisors

d) Uplink interface status

e) Uplink bandwidth utilization

f) CPU utilization

g) SNMP traps

h) Syslog messages

C. Labeling Requirements

Network equipment requires clear, legible labeling using printed (not hand-written) labels according to District Standards. The Contractor shall review the labeling standard and select labeling products that are compatible, in the opinion of District IT, with the equipment receiving the labels.

Identifiers for active network equipment and WAPs shall be no longer than 10 characters in length using 7-point Arial font.