MiraCosta College

Facilities Master Plan Update

Guidelines, Volume II

STEINBERG

Table of Contents

Guidelines, Volume II

5.0 Guidelines
Sustainability

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Sustainability
Goals

MiraCosta Community College has identified the following sustainability goals and strategies:

2016 Facilities Master Plan Sustainability Goals:

- Achieve 100% carbon neutrality by 2050;
- Achieve 50% or greater carbon neutrality by 2033; and
- All New Buildings Net Zero at time of design starting 2030.

2016 Sustainability Strategies:

- Use renewable sustainable energy sources to meet our carbon neutral goals;
- New buildings to be LEED Platinum or equivalent at the time of design; and
- Major renovations of existing buildings to be LEED Silver or equivalent at the time of design.

Sustainability Guidelines

Energy Efficiency Measures

Designing a building to achieve an energy reduction, as compared to an ASHRAE 90.1 baseline, may not always lead to exactly the same design as that which aims for absolute carbon emission reductions, in pursuit of carbon neutrality goals. For the most part, energy efficiency measures, such as optimized façade performance, will assist in meeting both goals. However, certain measures, such as occupancy based controls, are not fully credited in the LEED Performance Rating Method (PRM) modeling process but would save significant energy in practical application.

The measures described below are intended primarily to achieve the LEED goals described. However, as new building designs and renovation plans are developed, the inclusion of efficiency measures that reduce carbon but have less impact on LEED energy savings, should be explicitly considered.

In order to better identify measures that are likely to be central to achieving LEED goals, and those that are less critical, the following guidelines have been divided into two parts:

- Most effective strategies to achieve LEED platinum
- Less effective strategies to achieve LEED platinum

The most effective strategies should be prioritized for implementation. The less effective strategies can still have a positive impact but are either less cost-effective in terms of energy savings or garner fewer LEED points.

NEW CONSTRUCTION

In order to achieve platinum for LEED v4, it is recommended that new academic and laboratory buildings achieve a 40% reduction in annual energy cost, as compared to an ASHRAE 90.1 2010 baseline. Renewable energy attributed to buildings will utilize a campus approach – the onsite campus PV arrays will be attributed to individual buildings to meet their goals.

This target may be achieved by applying the measures listed below. These lists are guidelines and do not guarantee meeting the suggested 40% energy cost reduction. In most cases, singular measures could be removed but this would normally require an increase in the extent of application of other measures or the application of a new measure. For instance it is possible for energy performance to be maintained with the removal of enhanced daylighting from roof collectors if the façade glazing was sufficiently improved to allow additional daylight in without increasing solar gain. This type of trade-off can only begin to be explored at the schematic of design development stages, when full building energy models are developed.

New Academic Buildings

Most effective strategies to achieve LEED platinum:

- Optimized facade: To minimize heating and cooling loads and maximize daylighting. This must be determined with a detailed energy modelling that seeks the lowest energy solution through determining optimal values for façade and roof elements' U-values, window to wall ratio and SHGC, external shading and daylight enhancement through refractive films or light shelves. It is important to note that high performance could be achieved for lower cost with reduced window to wall ratios. Buildings striving for higher glazing ratios may need higher performance dynamic shading systems or fixed external shading.
- Effective HVAC zoning: It is essential to only serve groups of spaces, that have similar heating and cooling load profiles, with the same HVAC system.
- Operable windows in cellular offices, open-plan offices and break rooms: Natural ventilation must be employed for low energy office buildings, given MiraCosta's favorable climate. Relying on occupant manual operation is a possible low cost solution but must be accompanied by an awareness and behavior change program. For automated operation, see the lower priority list below.
- Exposed thermal mass or phase change material: To be applied in wall/ceiling elements to reduce internal temperature fluctuation. This would need to be coordinated with a natural or forced ventilation night flush program.
- Mechanical systems options:
  - » VAV with economizer (economizer required by code)
  - » VRF with simultaneous heating and cooling
  - » Radiant heating and cooling panels/slabs with dedicated outdoor air for ventilation
- Heat recovery on ventilation exhaust
- Low power lighting: Utilizing low ambient light levels with task lighting, daylight dimming and vacancy sensing. This is largely driven by Title 24 California Building Code requirements but is still important for low energy design.

Less effective strategies to achieve LEED platinum:

- Comprehensive sub-metering: Good practice but only yields 1 LEED point and not required by code
- Enhanced daylighting measures: Could include refractive films or light shelves, heliostats, lightwells, solar tubes or Parans-type collectors.
- Automated windows for natural ventilation: To be interlocked with building energy management system for automatic natural ventilation control
- East/west orientation of buildings with low WWRs on east and west facades: This is context dependent but north/south oriented buildings can mitigate the negative effects of solar gain through improved façade performance.
- Reduced equipment gains and low power work stations: Specification of low power equipment reduces direct electrical load and internal heat gains. This simultaneously reduces power and cooling load, while extending the period during which natural ventilation can effectively operate. However, a reduction in process load may not be credited under LEED. This reduces the benefit of this measure.
- Occupancy based control

New Laboratory Buildings

Most effective strategies to achieve LEED platinum:

- Optimized facade: To minimize heating and cooling loads and maximize daylighting. This must be determined with a detailed energy modelling that seeks the lowest energy solution through determining optimal values for façade and roof elements' U-values, window to wall ratio and SHGC, external shading and daylight enhancement through refractive films or light shelves. It is important to note that high performance could be achieved for lower cost with reduced window to wall ratios. Buildings striving for higher glazing ratios may need higher performance dynamic shading systems or fixed external shading.
- Effective HVAC zoning between wet labs, dry labs and office spaces: It is essential to only serve groups of spaces, that have similar heating and cooling load profiles, with the same HVAC system.
- Mechanical system options:
  - » Chilled beams: Where loads allow.
  - » AV w. economizer: Interlocked with fumehood exhaust for effective turndown of supply air.
  - » Office to lab air transfer: Supply are to offices first and then supplement lab supply for reduced total air requirement.
- Fumehood occupancy sensors: With reduction of air change rate down to minimum at night.
- Sash-interlocked, constant face velocity fumehood control.
- Low static pressure control valves.
- Heat recovery on exhaust.
- Low power lighting: Utilizing low ambient light levels with task lighting, daylight dimming and vacancy sensing. This is largely driven by Title 24 California Building Code requirements but is still important for low energy design.

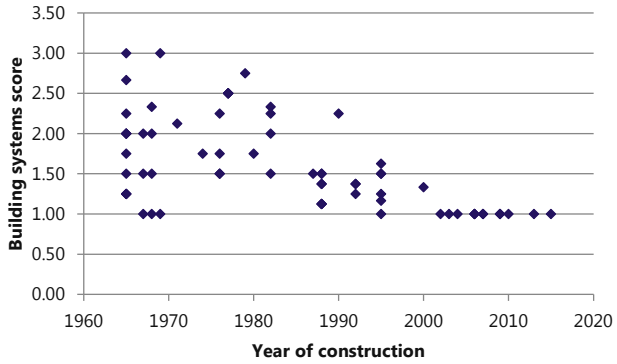
Less effective strategies to achieve LEED platinum:

- Specify low power equipment: Specification of low power equipment reduces direct electrical load and internal heat gains. This simultaneously reduces power and cooling load. However, a reduction in process load is not credited under LEED. This reduces the benefit of this measure.
- Enhanced daylighting measures: Could include refractive films or light shelves, heliostats, light-wells, solar tubes or Parans-type collectors.
- Comprehensive sub-metering: Good practice but only yields 1 LEED point and not required by code
- Wind velocity based exhaust exit velocity control.

MAJOR RENOVATION

Existing buildings should be retrofitted to achieve Silver for LEED v4 and it is recommended that in order to meet this goal, the buildings achieve a 16% reduction in energy use, as compared to an ASHRAE 90.1 2010 baseline. Renewable energy attributed to buildings will utilize a campus approach – the onsite campus PV arrays will be attributed to individual buildings to meet their goals.

It is important to note that this energy reduction is not in comparison to the current building performance, it is in comparison to a baseline which has a reasonably high energy performance. This makes the 16% target very challenging, particularly for the older buildings on campus. Newer buildings, and those with recent major renovations, will tend to be cheaper to retrofit to LEED Silver standard. Older buildings will tend to require more extensive measures. The graph below shows the tendency of older buildings to perform more poorly on a system level.



Graph displaying an amalgamated building systems (roofing, mechanical, electrical, plumbing) score against year of construction. A score of 1 indicates high performance in systems. A score of 3 indicates a low performance.

This is especially relevant since these are the buildings that the campus should be targeting first if it intends to reduce its energy costs and move towards it longer terms carbon goals. An alternative course of action could mean the college defers renovation of the worst performing buildings and targets those which are cheaper to renovate to LEED Silver standard. This would save capital costs in the short term and may be more cost-effective in the long term.

The lists of measures below are guidelines and do not guarantee meeting the suggested 16% energy cost reduction. As with new construction above, in most cases, singular measures could be removed but this would normally require an increase in the extent of application of other measures or the application of a new measure.

In general it is more cost-effective to targets controls, lighting and mechanical systems upgrades before more extensive fabric enhancements. The extent of renovation will need to be judged and modeled on a building by building basis.

Major Renovation of Academic Buildings

Most effective strategies* to achieve LEED Silver:

- Replace old/failing mechanical system elements: This may include:
  - » Conversion of CAV to VAV systems
  - » Creating and enabling economizer control
  - » Heat recovery on exhaust
  - » Re-zoning of mechanical systems, where appropriate, to reduce reheat requirements and improve thermal comfort
  - » Sealing leaking ductwork
  - » Insulating ductwork and shading rooftop ductwork where required
  - » Installing VFDs on all AHU fans, chilled water and heating hot water pumps
  - » Installation of a centralized building energy management system (for mechanical and lighting systems) with DDC controls or controls retro-commissioning for more recently retrofitted or constructed buildings
  - » Removal of any electric resistance heating
- Solar film: Where practical, application of low e solar film for reduced solar gain
- Roof reflectance: Increase the SRI of roofs through painting or application of reflective coating/layer.
- Thermal mass: Expose thermal mass or apply phase change material in wall/ceiling elements to reduce internal temperature fluctuation.
- Natural ventilation: Where practical, enable natural ventilation in cellular offices, open-plan offices and break rooms. Operation to be coordinated with systems control.

Less effective strategies* to achieve LEED Silver:

- Reduced equipment gains and low power work stations: Specification of low power equipment reduces direct electrical load and internal heat gains. This simultaneously reduces power and cooling load, while extending the period during which natural ventilation can effectively operate. However, a reduction in process load may not be credited under LEED. This reduces the benefit of this measure.
- External shading: Over poorly performing glazing that admits a high level of solar radiation.
- Replacement of all light fixtures with LEDs: Install lighting, daylight dimming and vacancy sensing controls.
- Wall insulation: Where practical, application of cavity insulation or furred out envelope constructions to decrease U-factor in poorly performing walls. Address any thermal bridging as part of this process.
- Roof insulation: Decrease U-factor of roof through application of insulation, preferably above deck.
- Enhanced daylighting measures: Could include refractive films or light shelves, heliostats, lightwells, solar tubes or Parans-type collectors.
- Replacement of high infiltration doors and windows: For reduced heating and cooling demand.
- Comprehensive sub-metering: Good practice but only yields 1 LEED point and not required by code

**Measures listed are options and not a full package that are applied in each case. Renovations are dealing with existing buildings, with each having varying solutions to meet the campus goals.*

Major Renovation of Laboratory Buildings

Most effective strategies* to achieve LEED Silver:

- Replace light fixtures: Replacement of all light fixtures with LEDs. Install lighting, daylight dimming and vacancy sensing controls.
- Solar film: Where practical, application of low e solar film for reduced solar gain
- Roof reflectance: Increase the SRI of roofs through painting or application of reflective coating/layer.
- Replace old/failing mechanical system elements: This may include:
  - » Conversion of CAV to VAV systems
  - » Creating and enabling economizer control
  - » Heat recovery on exhaust
  - » Re-zoning of mechanical systems, where appropriate, to reduce reheat requirements and improve thermal comfort
  - » Sealing leaking ductwork
  - » Insulating ductwork and shading rooftop ductwork where required
  - » Installing VFDs on all AHU fans, chilled water and heating hot water pumps
  - » Installation of a centralized building energy management system (for mechanical and lighting systems) with DDC controls or controls retro-commissioning for more recently retrofitted or constructed buildings
  - » Removal of any electric resistance heating
  - » Installation of fumehood occupancy sensors
  - » Enabling of sash-interlocked, constant face velocity fumehood control
  - » Installation of VAV interlocked with fumehood exhaust for effective turndown of supply air
  - » Low static pressure control valves
  - » Wind velocity based exhaust exit velocity control
  - » Optimized HVAC zoning between wet labs, dry labs and office spaces

Less effective strategies* to achieve LEED Silver:

- Replace equipment: Review and replacement of inefficient process equipment, for instance low efficiency refrigerators or autoclaves. This simultaneously reduces power and cooling load, while extending the period during which natural ventilation can effectively operate. However, a reduction in process load may not be credited under LEED. This reduces the benefit of this measure.
- External shading: Over poorly performing glazing that admits a high level of solar radiation.
- Replacement of all light fixtures with LEDs: Install lighting, daylight dimming and vacancy sensing controls.
- Wall insulation: Where practical, application of cavity insulation or furred out envelope constructions to decrease U-factor in poorly performing walls. Address any thermal bridging as part of this process.
- Roof insulation: Decrease U-factor of roof through application of insulation, preferably above deck.
- Enhanced daylighting measures: Could include refractive films or light shelves, heliostats, lightwells, solar tubes or Parans-type collectors.
- Replacement of high infiltration doors and windows: For reduced heating and cooling demand.

- Comprehensive sub-metering: Good practice but only yields 1 LEED point and not required by code

**Measures listed are options and not a full package that are applied in each case. Renovations are dealing with existing buildings, with each having varying solutions to meet the campus goals.*

CAMPUS-SPECIFIC MEASURES

The following guidelines are suggested to aid the college in meeting its carbon reduction goals. The measures listed do not he assist in reaching LEED goals, unless explicitly stated.

Parking:

- All parking lots should incorporate a photovoltaic canopy and electric vehicle (EV) charging stations. This strategy will help the campuses meet its carbon goals, while also providing shade for the cars below. It will also help any buildings achieve LEED points if explicitly designated.

Oceanside Campus:

- Convert existing air-cooled chillers to more efficient water cooled chillers at central plant. This will improve LEED energy performance.
- Retro-commission plant
- As per engineering assessment included in Section 9.0, replace transformers containing old /unreplaceable parts: buildings 5200, 4800, 4400, 4000, 3500, 3200, 2100, 2000 and tennis courts main electrical distribution. This will yield significant conversion efficiency savings.
- As per engineering assessment included in Section 9.0, fit all buildings with sub-meters to give direct feedback to occupants and operators on energy consumption. This will help drive down consumption when combined with incentive programs.
- On buildings with multiple rooftop packaged units, replace with VRF systems. This may improve LEED energy performance
- Add VFD to existing motors to take advantage of part-load efficiencies for existing pumps, fans etc. This will improve LEED energy performance.

San Elijo Campus:

- As per engineering assessment included in Section 9.0, fit all buildings with sub-meters to give direct feedback to occupants and operators on energy consumption. This will help drive down consumption when combined with incentive programs.
- As per engineering assessment included in Section 9.0, replace closed circuit cooler in building 100.
- Consider replacement of all gas boilers with heat pumps – prioritize original boilers that have not been replaced.
- As per engineering assessment included in Section 9.0, replace unit heaters and terminal heat pump in building 700. This may improve LEED energy performance.

Community Learning Center:

- As per engineering assessment included in Section 9.0, replace the main 120V/208V switchboard and associated panel boards.
- As per engineering assessment included in Section 9.0,fit all buildings with sub-meters to give direct feedback to occupants and operators on energy consumption. This will help drive down consumption when combined with incentive programs.
- As per engineering assessment included in Section 9.0,
  - » Replace rooftop package units on all buildings. Consider replacement of gas boiler with reversible heat pump for carbon savings.
  - » Replace exhaust fans on Building A. This may improve LEED energy performance.
  - » Replace existing control system with BACnet capable MSTP open protocol control system for internet access in Building A.
  - » Replace wall mounted heat pumps in building C. This may improve LEED energy performance.

Sustainability Guidelines

Water

NEW CONSTRUCTION & RENOVATIONS

All new construction and major renovations within the District should target a 40% reduction over the baselines for flush and flow fixtures. (See chart below). To achieve this threshold, ultra-low flow fixtures will need to be incorporated into project specifications, including dual flush or foam flush toilets, waterless urinals, 0.35 gpm lavatories, and 1.25 gpm (or lower) showerheads.

Signage and education around the impacts of water use are recommended in bathrooms and kitchens to raise awareness and lower use.

Building-level water metering to measure the total water use for the building and associated grounds is recommended to become a District standard. Consider water sub-metering for all new construction and major renovations to measure: irrigation, indoor plumbing fixtures and fittings, domestic hot water, boilers, reclaimed water, and other process water.

Fixture or fitting	Baseline
Toilet (water closet)	1.6 gpf
Urinal	1.0 gpf
Public lavatory (restroom) faucet	0.5 gpm at 60 psi all others except private applications
Private lavatory faucets	2.2 gpm at 60 psi
Kitchen faucet (excluding faucets used exclusively for filing operations)	2.2 gpm at 60 psi
Showerhead	2.5 gpm at 80 psi per shower stall

CAMPUS-WIDE MEASURES

An aggressive turf removal plan has been developed as a part of the Facilities Master Plan, which will go a long way to achieving the irrigation demand reduction targets set for the Oceanside Campus.

See water sub-metering information above, which includes irrigation sub-metering.

In addition, with new construction or infrastructure work throughout the campuses, plantings that are put in should be native / adapted plants that require minimal watering. Efficient and centralized irrigation equipment and controls should replace older irrigation infrastructure.

Stormwater collection and treatment can be done in specific areas on campus where there is an opportunity to integrate the necessary storage. Rainwater harvesting, similar to that happening at the Oceanside greenhouses, is also a great way to capture and reuse this previous resource. With the clay soil making infiltration more difficult, permeable paving is not recommended.

Bioswales should be integrated into islands of all parking areas throughout the campuses to help capture, treat and infiltrate stormwater.

Standalone graywater recycling systems for new construction are recommended to take daily shower, lavatory and kitchen sink water and use it for toilet flushing and irrigation at those buildings. Graywater would be a good fit for the new gymnasium being planned at the Oceanside campus. Condensate capture and cooling tower blow off are additional opportunities to capture and reuse water on campus.

Sustainability Guidelines

Waste

NEW CONSTRUCTION & RENOVATIONS

A campus policy around construction waste management to divert a minimum of 75% of C&D material should be put in place. By having a Construction Waste Management Plan in place, targets can be set, by weight or volume, to divert the maximum quantity from landfills and into recycling facilities.

CAMPUS-SPECIFIC MEASURES

BigBelly solar-powered trash and recycling compactors aid in efficient collection of waste and recycling. Opportunities for landscape waste to be chipped and used on campus should be maximized. Opportunities for pre-consumer and post-consumer composting could be used by Facilities and the Horticulture Department.

Education and outreach around waste and diversion programs play a key role in increasing campus diversion rates through behavior change.

Waste audits should be performed at a minimum of an annual basis. The results will provide a useful tool to drive waste diversion. Along with this, a close look at procurement data and what materials are coming into the campuses is highly recommended.

Hydration stations should be implemented throughout to provide students and staff easy access to water, while reducing or eliminating the need for bottled water.

District-wide goals should be set for a target to achieve net-zero waste (defined as a 95% diversion rate) or a target of waste/student metric.

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist - SILVER

Project Name: MiraCosta Community College District
Date: 5/13/2016

Highlighted credits will have a hard cost impact
Highlighted credits will have a soft cost impact

Y	?	N			
1			Credit	Integrative Process	1

1	10	5	**Location and Transportation**		**16**
			Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
	2		Credit	High Priority Site	2
		5	Credit	Surrounding Density and Diverse Uses	5
	5		Credit	Access to Quality Transit	5
	1		Credit	Bicycle Facilities	1
	1		Credit	Reduced Parking Footprint	1
	1		Credit	Green Vehicles	1

2	8	0	**Sustainable Sites**		**10**
Y			Prereq	Construction Activity Pollution Prevention	Required
	1		Credit	Site Assessment	1
	2		Credit	Site Development - Protect or Restore Habitat	2
	1		Credit	Open Space	1
	3		Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
	1		Credit	Light Pollution Reduction	1

4	7	0	**Water Efficiency**		**11**
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction	2
3	3		Credit	Indoor Water Use Reduction	6
	2		Credit	Cooling Tower Water Use	2
	1		Credit	Water Metering	1

15	18	0	**Energy and Atmosphere**		**33**
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
3	3		Credit	Enhanced Commissioning	6
8	10		Credit	Optimize Energy Performance	18
	1		Credit	Advanced Energy Metering	1
	2		Credit	Demand Response	2
2	1		Credit	Renewable Energy Production	3
	1		Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

5	8	0	**Materials and Resources**		**13**
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
	5		Credit	Building Life-Cycle Impact Reduction	5
1	1		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
1	1		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

8	8	0	**Indoor Environmental Quality**		**16**
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
3			Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
1	1		Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
	2		Credit	Interior Lighting	2
	3		Credit	Daylight	3
	1		Credit	Quality Views	1
	1		Credit	Acoustic Performance	1

3	3	0	**Innovation**		**6**
2	3		Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

0	4	0	**Regional Priority (for Oceanside and San Elijo Campuses)**		**4**
	1		Credit	Regional Priority: Access to Quality Transit (3 pt threshold)	1
	1		Credit	Regional Priority: Outdoor Water Use Reduction (2 pt threshold)	1
	1		Credit	Regional Priority: Indoor Water Use Reduction (4 pt threshold)	1
	1		Credit	Regional Priority: Renewable Energy Production (3 pt threshold)	1

39	66	5	**TOTALS**	Possible Points:	**110**

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist - PLATINUM

Project Name: MiraCosta Community College District
Date: 5/13/2016

Highlighted credits will have a hard cost impact
Highlighted credits will have a soft cost impact

Y	?	N			
1			Credit	Integrative Process	1

2	9	5	Location and Transportation	16
			Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
	2		Credit	High Priority Site	2
		5	Credit	Surrounding Density and Diverse Uses	5
	5		Credit	Access to Quality Transit	5
	1		Credit	Bicycle Facilities	1
	1		Credit	Reduced Parking Footprint	1
1			Credit	Green Vehicles	1

6	4	0	Sustainable Sites	10
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
	2		Credit	Site Development - Protect or Restore Habitat	2
	1		Credit	Open Space	1
3			Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
	1		Credit	Light Pollution Reduction	1

8	3	0	Water Efficiency	11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction	2
6			Credit	Indoor Water Use Reduction	6
	2		Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

27	6	0	Energy and Atmosphere	33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
6			Credit	Enhanced Commissioning	6
15	3		Credit	Optimize Energy Performance	18
1			Credit	Advanced Energy Metering	1
	2		Credit	Demand Response	2
3			Credit	Renewable Energy Production	3
	1		Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

5	8	0	Materials and Resources	13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
	5		Credit	Building Life-Cycle Impact Reduction	5
1	1		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
1	1		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

12	4	0	Indoor Environmental Quality	16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
3			Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
2			Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
2			Credit	Interior Lighting	2
	3		Credit	Daylight	3
	1		Credit	Quality Views	1
1			Credit	Acoustic Performance	1

3	3	0	Innovation	6
2	3		Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

2	2	0	Regional Priority (for Oceanside and San Elijo Campuses)	4
	1		Credit	Regional Priority: Access to Quality Transit (3 pt threshold)	1
	1		Credit	Regional Priority: Outdoor Water Use Reduction (2 pt threshold)	1
1			Credit	Regional Priority: Indoor Water Use Reduction (4 pt threshold)	1
1			Credit	Regional Priority: Renewable Energy Production (3 pt threshold)	1

66	39	5	TOTALS	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Guidelines

6.0 | Technology

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Technology Facilities Master Plan

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Technology Facilities Master Plan

Communications Systems Facilities Master Plan

Introduction

In this report, the voice and data infrastructure serving all campus buildings within the District is discussed as an integral part of the Facilities Master Plan (FMP). An overview of the existing campus technology infrastructure is presented with an evaluation of the existing as-built drawings and campus standards. The report identifies the critical areas of campus and building infrastructure that will have an impact on future installations of technology equipment and use. The goal of this report is to develop a structured, long-term view of the space and planning required for a comprehensive and flexible IT infrastructure. Through this process the College will ensure sufficient IT capacity to serve the technology build out of the campus while also effectively serving the needs of the master plan development.

The specific focus on supporting technology across the all campuses within the District is not for the sake of using technology. The effort is made to ensure that the District's technology infrastructure is adequate to allow new technologies to be used that will help the District address its ultimate needs and goals required to provide a quality education to its students.

The IT infrastructure incorporated into the master plan should address long and short term needs in a cost-effective manner and should address the following:

- Technology Changes – The infrastructure must support ongoing changes such as increased network speeds and capacities, expanded use of monitoring and control systems and personal communication services.
- Distribution – The infrastructure should enable access to every Campus building and every area of the Campus, providing redundant routing wherever practicable. This will also cover the extension to all satellite campuses within the District (with the exclusion of the latest 4th location that is separate from this scope for the FMP update).
- Adaptability – The infrastructure should be designed to allow a high degree of flexibility and adaptability.
- Standards Based – The infrastructure should adopt a standards based approach to provide the capability to utilize a wide range of alternative system designs without the need to reinvent the basic infrastructure.
- Fault Tolerance – The infrastructure should be designed to allow for the installation of a fault tolerant network configuration.

District facilities and technology support staff do have a base technology plan but is currently not documented for inclusion in official District goals. The intent of this document and the following section in the updated Facilities Master Plan and Technology Standards Documents will incorporate the preferences and plans as required. This assessment and following Facilities Master Plan update does not cover the Technology Career Institute that constitutes the newer fourth campus location that came on-line in the Spring of 2015.

Data Network

The campus data network operates on a Gigabit campus backbone running over 62.5 optical fiber cabling and Gigabit over copper cabling (CAT6) in the internal riser with 100Mbit/s Fast Ethernet horizontal distribution over copper cabling within each building. All new wireless access points being installed have moved over to CAT6A cabling to support newer equipment and bandwidth. The District utilizes air-blown fiber for the installation of all new fiber optic cabling through the campuses and to buildings. The incoming services share a common path onto the campus originating at the Glaser Drive point (Cox & AT&T) and then break out from there. There is currently no physical redundancy in the network, i.e. there is only a single network path between the network center in the Library and any individual building.

The network is connected to the buildings through a series of both above ground vaults for older buildings and below ground vaults for newer buildings. The above ground vaults were made into seating or used as murals for aesthetics and many seem to be unlocked and accessible. The San Elijo campus has a central spine running to a couple of vaults that feed all buildings. Conduits are currently at capacity but old services can be pulled back making space for new cables to come through.

The network provides wide area connectivity to the San Elijo and CLC campuses via service provider (Cox Communications) and is set up in a ring topology. Internet connection is made through the AT&T network.

The wireless network deployed on campuses use a 802.11b/g solution and the District does have a 4GB wireless mesh network set up for each. The wide usage of the wireless connections by staff, students and guests drive the need for good coverage in all areas. Currently, all buildings are outfitted with a good distribution of wireless network access points (WAP) providing even coverage but most of the external areas on the campuses are only covered by a hand-full of external WAPs leaving most of the outside area with inadequate with mostly only bleed-over from surrounding buildings. Wireless data coverage in parking area is very poor or does not exist. A district wide plan for the installation of external wireless networking for proper coverage should be established.

Telephone System

The campus upgraded the telephone system and transitioned to the use of a Cisco Voice over IP (VoIP) system. The Cisco system is the current standard telephone system service type deployed at all MCCCD locations.

The campus VoIP system currently supports all telephone users providing such services as audio conferencing and voicemail. Limited direct outside telephone lines are used for connections traditional telephone system connections and fax modem use. The use of the “red button” on the phone is for emergency use and connects to campus police dispatch. Phones are standard in every classroom near the main entry/exit door.

The migration to VoIP has been successfully completed and the system is considered reliable by campus faculty and staff. Supporting continued telephone connections during the event of an extended power failure is a concern with the VoIP system. The data network equipment which supports the telephone system function must be powered for continued telephone service. Currently modular UPS devices are used in the campus data center and in individual telecom equipment rooms to provide back-up system power. The UPS equipment provides back up power for a maximum of 1 hour. There is a backup generator out back of the Library building to support the main data center to for long term power outages.

SATV / CATV / Video Distribution

The College does not currently have SATV / CATV distribution at this campus. The Oceanside campus originally supported a television cable channel for campus information and had a small TV production studio set aside for this but is now unused. Adding SATV distribution within the buildings should be considered along with

individual building rooftop infrastructure and weather-head to support satellite dish service on an as-needed basis. Other college's use SATV/CATV programming to maintain world events and for entertainment but also for emergency news feeds. Other plans for bringing in news and information feeds may be by IP TV or just through streaming of live news stations from the network to computers or to digital signage players. A few buildings (Student Center, Library, etc.) on the Oceanside campus have Cox feeding coax to them for legacy TV support when this service was free to the District. Since the service provided by Time Warner is no longer free and had issues, this is being evaluated and justified. District is considering moving to Dish Network on all campuses and would be specific to each building as required.

The use of live and recorded video streaming over the data network should also be considered. Further discussion of the use of distance learning between the three (four) MiraCosta Community College District campuses is required. (Use and requirements of such functions will be discussed as part of Master Plan programming.

Technology Support Spaces

The District has two Data Centers – one located within the Library on the Oceanside campus along with technology support spaces and the other resides at the San Elijo campus off the hallway in room 100. The Oceanside Data Center is a good size and power load is current at 44% capacity. Racks have 50% space for expansion and as the campus is currently about 95% virtualized, the District plans to move more towards cloud-based systems and storage. This will yield yet more rack capacity in both Data Centers.

The San Elijo Data Center is the secondary server space and currently is the Disaster Recovery site. The room is too small and has no provisions for fire suppression. Both Data Centers do have good UPS back-up for power that were implemented within the last four years.

The technology support spaces in the older buildings either share space with mechanical and electrical services or were installed in the building in available space when the cabling system was pulled in (separate from the original building design). Because of this, older communications support spaces are not in ideal and easily serviceable locations. Some areas are exposed to mosture and leaks within the service spaces causing damage and oxidation to cabling and components. Newer buildings do have more appropriate spaces for communications equipment but are still not the ideal conditions outlined by industry standard practice. Technology guidelines for architectural building and renovation projects will assist in maintaining proper layouts and consistency.

The main District technology support spaces for staff, equipment storage and computer assembly and imaging is located currently at the Oceanside campus within the Library and is currently undersized for the current support levels. Other support staff, system analysts and programmers reside in separate buildings where office space is available for them so are separate from the central team. The helpdesk area is very cramped for staff and with technology needs growing each year, the current space cannot support any new resources. The preference would be to relocate the technology support staff and equipment (excluding the Data Center due to the cost of relocation) into a separate building and consolidate resources and support together. This new space would be provisioned for continued support staff growth over the next 5-10 years. A technology staffing flow chart exists but was not available for review during the assessment period. This chart will be used to determine the total count of existing staff and will be the base for calculating the department growth in both the 5 and 10 year models. Adjacencies for technology staff workflow and support spaces for both helpdesk and computer build stations & storage should be considered so that the equipment can be on the ground floor for easy transport or receiving (currently on the second floor and more difficult to manage).

Both the San Elijo and CLC campuses do have technology support areas that are adequate for their size and seem to be OK for staff and equipment storage and have capacity for limited growth for limited growth opportunities on each (based on total campus area).

Audiovisual Systems & Signage

The campus has made good strides in establishing a consistent model for typical classroom audiovisual systems and has moved over to a digital (HDMI-based) platform to be current with the newer display and source technologies being used in current and future classrooms. The District has a 4-5 year technology refresh model and attempts to maintain current and properly operating classrooms. The District has a plan to overhaul 80 of these classroom spaces over the 2015 winter holiday break and over both Spring and Summer 2016 session breaks.

What also needs more immediate focus is on the administrative and student support spaces and areas. These spaces would like to be slated for upgrades which may include provisions for wireless presentation and mirroring support as well as a solution for electronic room signage and scheduling to help staff and students secure meeting spaces easier through a master calendar system and/or local room scheduling panels showing area availability. The Administration building Boardroom is needing a technology refresh as this room is a multi-function space that is used for board meetings but also for other public and college staff / student events. Additional student gathering and collaboration spaces are being continually requested. These can be spaces both with and without technology for small groups to meet and study. There is a growing need for power for the charging of portable individual devices (such as tablets and laptops) in common gathering areas. This may be the dual output devices for standard power and USB outlets for common devices.

Typical classroom technologies also need to be ready to accommodate bring-your-own-device (BYOD) support for wireless presentation and mirroring of portable devices. This may be limited to instructor for mobile presentation support during class sessions but may expand to include support in student teaming spaces and interactive / dynamic group learning spaces.

American Disabilities Act (ADA) support is being reviewed by the FMP Architect in a separate study on the campus for compliancy issues. This will include the need for classroom support for things like Assisted Listening System (ALS) equipment and height-adjustable instructor podiums and desks in classrooms. Policies like Closed Captioning on any digital displays with content that supports it (digital signage video content, TV content, training videos, etc.) should be considered.

Networked remote audiovisual system management software should be implemented to assist with helpdesk requests. Even with the majority of projectors on the campuses connected to the data network, this only provides the media support staff limited ability to provide assistance. The networked projectors can help support staff to be proactive in making sure lamps are changed out before an issue may arise with lamps close to their expiration or to be notified when a device is disconnected from the network as a possible theft. With the remote system management software, helpdesk can truly access all AV system equipment in classrooms or other presentation-enabled spaces to help take control remotely and help to get the classroom space up and running faster than running across the campus to a separate building needing assistance. The software can also be used for asset tracking and reporting for device usage for further studies on what to include in upcoming technology refresh goals. The campus uses Extron Electronics equipment as a standard for their control and switching devices and has an unused license for the Global Viewer management software but currently does not have staff resources to get the application running and connected to all room systems.

Digital signage exists on the campuses and as this continues to evolve, a plan should be made available with administrative champions that will be responsible to ensure content is current and location specific as needed. The content should be reviewed regularly so that it is continually relevant and new to the students so that they continue to check for updates for upcoming events, programs, cafeteria specials, etc.

Distance education is currently done primarily by instructors without District controls. A recommendation would be to establish a District policy for the look and feel of the content, regulation on how it can be distributed and review/guidelines for the content to ensure materials are appropriate and in compliance with college policies. This should be reviewed in concert with the technology department for the management and storage of the content on the cloud or college networked servers. Content should be reviewed also for who can access and

who has rights to manage the materials. A standard should also establish standard equipment within the designated classrooms so consistency can be maintained for ease of support.

Athletic fields should be looked at for the addition of audio support and wireless networking support. Provisions for driving the audio speakers including amplification and microphone/audio inputs should be considered to accommodate not only sporting events but also other programs like graduation ceremonies.

Security Infrastructure and Systems

The District provides for emergency call boxes around the campus near buildings and in parking lots. There are currently no provisions for security cameras but the District has discussed the implementation once a plan can be established and appropriate budget allocated for the deployment. There are a couple locations on the Oceanside campus that have networked cameras but these are more for closed-circuit monitoring in testing labs. The San Elijo campus does have an IP-based camera monitoring the rear exit of the Library along with the RFID book alarms. The campus does have access control and doorway card readers deployed in most buildings.

The Oceanside Police Department building is to also be reviewed for growth to accommodate new services and staffing levels as is currently undersized.

See separate Security Facilities Master Plan document for additional information.

Distributed Antenna System

The growing need for the implementation of a Distributed Antenna System (DAS) on the campus to support cellular carrier signals evenly throughout the buildings, open areas, parking areas, athletic fields and other support spaces across the general campus is being driven by the ubiquitous cell phone for students and staff. The addition of facilities staff and emergency responders using these more now for maintenance rather than radios mean that good coverage needs to be ensured. Electric vehicle charging stations also require cellular signals for location identification and connection rather that wireless network access. It is anticipated that the college campuses will begin to include support for these in the future and provisions should be considered and looked at with the various carries or independent systems.

Technology Infrastructure, As-Built Drawings and Campus Standards

The District has a collection of building and campus project as-built drawings that have been compiled as well as some undocumented knowledge from IT and facilities staff. The majority of these historic drawings do not indicate locations of technology equipment rooms, communications pathways or communications cabling outlets in buildings. In older buildings, the majority of the technology equipment and communications cabling installations were completed after the buildings were constructed and have no formal record documentation. Many of these are newer buildings do have telcom space allocated but is still sometimes shared with other services such as electrical. Some drawings do exist to partially document the campus communications infrastructure duct-bank routing pathways. However, campus as-built drawings for the campus backbone optical fiber air-blown cable system or the campus copper cabling do not exist. The campus Technology Services department has created a drawing that details cable types and quantities for these installations. (This report includes drawings of the campus backbone cabling installations and campus technology infrastructure).

A complete gathering and evaluation of the existing documents was not available prior to the assessment but in reviewing requirements for long term goals, it is recommended to increase services conduits from the campus main point of entry (MPOE) to the Data Center locations on both the Oceanside and San Elijo campuses. Discussed with IT staff was the addition of a new 4” conduit through the central spine from the San Elijo MPOE to the vault and a new 4” from the vault to the Data Center to be added within the next 10 years. No immediate infrastructure is required to support the CLC campus for Buildings B & C (the temporary building is no longer being used) but budget permitting, infrastructure would like to be made more robust to accommodate future growth.

The campus did not originally have formal defined technology standards but did have specific manufacture preference for key technology elements and systems to help maintain some consistency. The District has

installed similar Cisco active networking and VoIP equipment and communications cabling types at each campus. All new renovation projects to be completed at the Oceanside campus and other District locations will benefit from the completed technology infrastructure, equipment and cabling standards documents.

The Technology standards (Audiovisual, Communications & Security) are included as an appendix to this FMP document.

Assessment

Main Equipment Rooms

Campus MPOE

The campus currently has hardwired incoming services connections provide by Sunesys and Cox Communications with AT&T as the service provider. The incoming services connection is made with optical fiber. The incoming service route runs from the south entrance at Glaser Drive to the Library building MPoE for both fiber and copper connections (sharing a common pathway) and then break out and are routed to the other buildings on the campus via a ring topography. The incoming service lines are used to distribute internet and telephone system connections.

Campus Data Center

The campus data center is currently housed on the second floor of the Library building. The room is approximately 600 square feet in size and consists of two rows of 7 racks in its current configuration including Power Distribution. The room currently has roughly 50% expansion capacity due to ongoing consolidation and virtualization. The one rack with capacity issues is the fiber rack and District IT is planning to relocate to a separate rack in close proximity to allow future growth. There is an existing AT&T rack that can now be removed to gain additional space.

The Data Center has in row cooling on either side supporting hot aisle containment on the rear side of both rows with the common cold aisle down the center of the room. The hot aisles are partially sealed off on the sides with hanging plastic strips for staff access. The room is cool but with additional rear blocking to the access ceiling, the room could be controlled more and allow less cooling to be used.

Back-up power in the data center is supported by Uninterruptible Power Supply (UPS) units with the battery storage located in another room. A generator exists to provide emergency power and is located out behind the Library building. Current power load in the Data Center is at 44% leaving room for expansion.

Overhead ladder rack provides good horizontal cable management to all racks within the Data Center.

Figure 1 – Main Point of Entry (MPOE) for Oceanside service providers.

Figure 2 – Data Center (primary) Room 1264 at Oceanside campus.

Building Dedicated Technology Equipment Rooms

Each main campus building has at least one dedicated telecom equipment space allowing for equipment installation for the provision of campus telephone and data services to outlet locations throughout the building.

Typical BDF/IDF Telecom Equipment Rooms

BDF (Building Distribution Facility) and IDF (Intermediate Distribution Facility) equipment rooms are used to house telecommunications equipment and for cabling distribution. BDF rooms are special-purpose rooms that provide space and maintain a suitable operating environment for the termination of backbone and campus cabling and house centralized communications and/ or computer equipment. The BDF is a buildings main communications equipment room where incoming campus services are connected. Backbone cabling extends from the BDF location to IDF equipment rooms for distribution of services throughout the building. IDF rooms provide an environmentally suitable and secure area for installing cables, cross-connects, rack- and wall- mounted hardware and technology equipment. These rooms are connection point between the backbone and horizontal pathways.
With few exception the BDF and IDF rooms across the campus are not purpose built rooms dedicated solely to telecommunication installations. Instead communications equipment is collocated in mechanical or electric rooms or located in cabinets or shelves in classroom locations. The existing campus buildings were not constructed with dedicated telecommunications rooms and do not provide equipment spaces that meet current industry standards.
These types of installations do not allow for technology equipment expansion or significant upgrades and should be replaced with purpose built equipment rooms.

Communications Equipment Room – Support Systems

Per industry standards communications rooms should have either dedicated HVAC equipment, or access to the main HVAC delivery system. The majority of communications equipment rooms at the College do not have dedicated or building HVAC distribution. It is recommended that the communications equipment rooms at new and renovated buildings be built to provide dedicated space, power, and HVAC support.

Figure 1 – Example of Communications equipment located in mechanical spaces.

Figure 2 – IDF in building 4600.

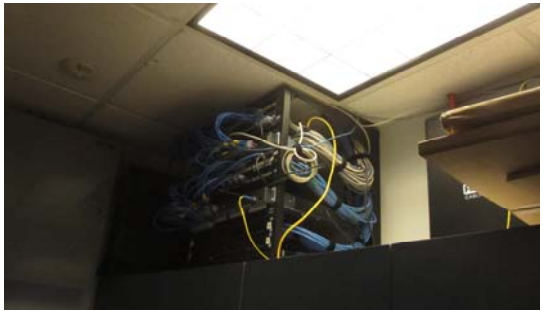

Figure 3 – Example of technology support installed after older building construction.

Figure 4 – Limited space for "Tech Pit" help desk and PC production area at main site.

Building Dedicated - Communications Riser and Horizontal Pathways

The horizontal communications cabling system infrastructure includes the pathway and support hardware which concentrates, supports and protects horizontal cable media between its origination point in the equipment room and the workstation outlet location. The riser pathway supports backbone cable distribution between stacked floors. Many of the existing campus buildings were not designed with horizontal or riser cabling pathways. As a result cabling is distributed using wall mounted hooks, wiremold cable containment or otherwise surface mounted. Newer building have accommodated this better.

Riser pathways at buildings with multiple floors have been cored where possible. However, there are few instances where communications equipment rooms stack on one another that allow the cored riser pathway to be most beneficial. Horizontal pathways have been created with the use of j-hooks in accessible ceiling spaces or placed above ceiling tiles with no containment method. This type of installation does not provide for cable protection and does not allow cable to be replaced efficiently.

It is recommended that new riser and horizontal pathways be installed as part of any new existing building renovations. New pathways should be based on a District standard for distribution requirements.

Building Cabling

Many telecommunication outlets throughout the College consist of enhanced Category 5 cabling and connectors but are in the process of being migrated over to Category 6 cabling. These outlets are used to connect computers, VoIP telephones and peripheral equipment to the campus data network. The cabling currently supports 100Mbit connection speeds to the data network. It has not yet been determined if these cable installations will support 1000Mbit speed connections.

It is recommended that new and renovated buildings include dedicated pathway infrastructure for the distribution of communications. The District is working to standardize on the installation of AMP Category 6 cabling and Category 6A for all wireless access point equipment. It is recommended that a standard cabling specification and installation design be developed for use by Architectural and engineering design teams working on new and renovated building projects.

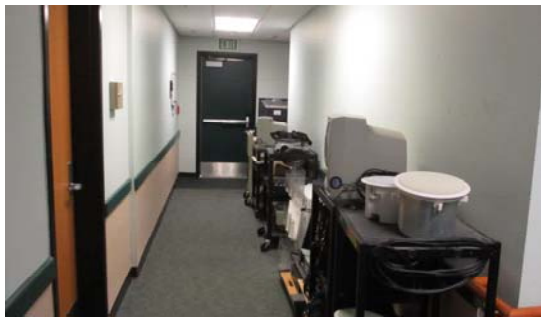

Figure 5 – Example of OS tech. staging.

Figure 6 – Example of Computer Lab.

Figure 7 – Oceanside Administrative Boardroom space needing tech refresh.

Figure 8 – Possible central location for external wireless access point.

Campus Communications Infrastructure

The existing campus communications cabling pathways consist of conduit duct banks, vaults and pull boxes. Access at infrastructure pathways is made at above ground and below ground vaults for cable servicing and installations. Duct banks consist of 4 inch trade size conduits running between backbone manhole and pull box/vault locations.

The original vaults are above ground systems that support both electrical and communications lines. These are pre-cast concrete and sized at approximately 8' in length and have locking rear access. They are generally in good condition but seem to remain unlocked in most locations. These were decorated to mask them as features or seating in many areas on the Oceanside campus.

The main campus duct bank consists of (4) 4" conduits encased in concrete. The conduits at the central spine area are in generally good condition but close to capacity with the current cabling installations. A portion of conduit pathways contain copper telephone cabling that has been abandoned. Removal of abandoned cable will help to provide usable conduits for future cabling installations.

It is recommended that as part of the campus master plan that additional campus main duct bank routes be added to increase capacity and provide for route redundancy for backbone cable distribution. This redundancy will help to eliminate any single point of failure location in the campus backbone which would leave a group of buildings without campus communications services in the event of a duct bank disruption.

Figure 9 – Above ground vault at Oceanside campus for electrical and

Figure 10 – Inside external vault.

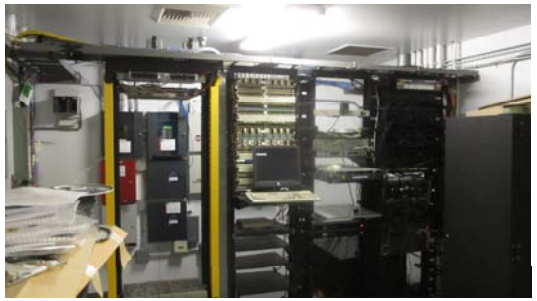

Figure 11 – Telcom room at CLC campus.

Figure 12 – Incoming services at San Elijo campus Data Center.

Campus Backbone Cabling

The College has an installation of air blown fiber pathways running throughout the campus infrastructure. The fiber pathway originates in the Library building and extends to each building on campus. The air blown fiber system is a series of tubes connected to allow for the installation of optical fiber. Fiber is placed in the tubes using a stream of compressed air. The use of this type of cabling system provides an infrastructure that can be used and reused for generations of cabling. When a fiber type requires replacement the existing fiber strands are removed and new fiber is installed in the same tube. The installation maximizes the infrastructure capacity.

The existing optical fiber installed consists of multimode 62.5 micron and is connected using Opti-jack connectors. Fiber strands are terminated in wall mounted or rack mounted termination panels at each building.

The backbone copper cabling installed across the campus is now in limited use as the majority of telephone signals are distributed over backbone fiber cabling using the new VoIP system. The copper cabling is still used to connect outside phone lines to fax modems and direct line phones.

Legacy copper air core cabling has been abandoned in place and limits conduit capacity at incoming service duct banks. Campus duct bank capacity will benefit from the removal of abandoned cabling.

It is recommended that the campus transition to and standardize on the use of 50 micron multimode optical fiber for campus backbone cabling as better solution for high speed systems. This would still be compatible with virtually every system that will runs on 62.5/125 fiber. This fiber will provide for increased bandwidth in the transition to a 10 Gigabit backbone. Single mode optical fiber should be installed to buildings that have a cable distance greater than 500 meters from the data center.

The technology requirements on Campus are continually evolving and an expected emphasis will be on

- An increasing number of computers on Campus typically concentrated in computer labs.
- Increasing demand for Internet access, especially via wireless support.
- Increasing demands for access to personal communication including telephone and intercom, including wireless access and Distributed Antenna Systems for cellular signal support.
- Increased use of remote monitoring and control systems.
- The potential for distribution of video across the network.

Wireless voice and data communications is likely to play a role in the future of the campus technology requirements, but in the near term strategy for a role-out of wireless networking has not been completed.

Key Aims and Assumptions for the Development of the Infrastructure plan

The following key points underscore the planning for the development of the IT Infrastructure on Campus.

- The plan should identify a backbone infrastructure route that serves, but is separate from, the current buildings and the sites of future buildings as identified in the Facilities Master Plan. This approach will facilitate the renovation and construction of campus buildings in any sequence without interruption to voice and data network services.
- The infrastructure should be designed for construction in stages to minimize initial cost. The infrastructure plan will ensure that the component constructed at each stage forms a viable part of the final campus wide infrastructure.
- The infrastructure will reflect the increasing operational dependence on the network and aim to provide physical and logical network redundancy.
- Existing infrastructure that is in good condition and with a long lifespan should be retained and incorporated into the long-term plan in order to reduce costs.

- The Oceanside Data Center will continue to occupy the current space in the Library. The secondary Data Center at the San Elijo campus will continue to remain in its current location however, this should be looked at for a better possible location in the future.

Refer to Figure 16 on the following page for the proposed infrastructure additions to the OC campus.

Audiovisual Systems Facilities Master Plan

Educational Technology

The College makes use of installed and portable audiovisual (AV) equipment in classrooms and conference rooms. New classrooms include a dedicated instructor station that houses a dedicated computer, document camera and source equipment. Video and computer Images are displayed to the student audience with the use of a single ceiling mounted projector and projection screen. The system has a push button control panel at the instructor station which allows for the selection of computer and video sources to be shown on the projection screen. The control panel also allows for volume control of audio distributed by wall mounted speakers.
Other classrooms make use of portable projection equipment for electronic image display. Portable slide projectors and overhead projectors are used for film projection.

It is recommended that the College and District work to standardize the AV requirements for typical classroom types. AV room standards would be used by design teams planning construction for renovated and new buildings. Standards should emphasize the use of conduit infrastructure that will be used to install cabling between day one and future equipment. System requirements such as controls and ALS equipment should also be standardized. The standards should include methods for centralized monitoring capabilities of AV systems that will allow for remote help and support for faculty.

Figure 17 – Example of newer classroom layout as part of a recent technology refresh.

Figure 18 – Current podium layout with computer.

Figure 19 – Example of student information carrels in Library.

Figure 20 – Current team room scheduling.

Figure 21 – Older classroom waiting for tech refresh.

The OC campus has specialty spaces such as a 3D modeling "maker space" in the Drafting classroom but other disciplines on the campuses may benefit from additional similar types of active learning spaces for hands-on interaction and creation.

Another example of interaction may be used for the Allied Health program where nursing students could interact with similar technologies found in hospitals such as nurse call systems and along with the use of the active mannequins, the interaction between the patient and caregiver can be monitors and recorded for in-class observation and discussion.

Active Learning Classrooms for team collaboration and roaming instructor participation are a growing trend in the current education model. This style of instruction may be worth the District in exploring and the recommendation to create an Instructor Learning Classroom at the main campus (initially and at minimum) that will allow instructors to come in and practice on a variety of different equipment and instruction software solutions to determine if and how best to integrate them into their pedagogy.

Instructional technologies to explore for this as well as other types of educational and administrative spaces may include:

- Interactive whiteboard projection (including extended-display spanning whiteboards) and;
- Interactive flat panel monitors
- Wireless collaboration devices and/or;
- Wireless desktop & tablet mirroring appliances
- Proctoring software for instructor-student bi-directional screen sharing and control
- Fixed and mobile monitor stations for team learning and collaboration
- Student team collaboration portals (outside of the classroom)
- Real-time distance education via remote collaborative web platforms

Figure 22 – Possible team collaboration concept for student huddle spaces.

Figure 23 – Current Drafting & 3D modeling "maker space" at Oceanside campus.

Figure 24 – Current example of Library congested open computer space. Some seating is too tight at carrels.

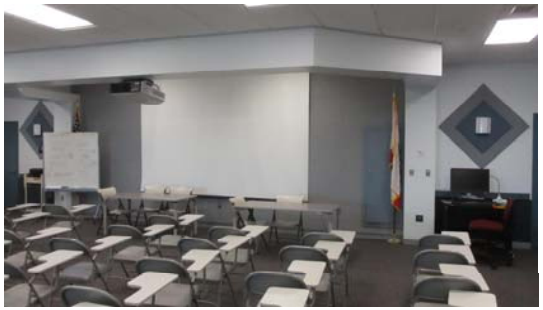

Figure 25 – Existing Multipurpose room at CLC campus.

The Administrative spaces also need to be considered for technology refresh plans to bring them to current technology levels including digital platforms for video switching, distribution and management (e.g. the support of newer tablets and laptops using HDMI or DisplayPort connections).

One immediate example of this is the Administrative Boardroom which gets used for a variety of functions as well as the normal board meetings. This space needs an update of the cabling, projection display and base switching hardware to allow the continued use for the multi-function space.

A separate side display is also desired for the use of showing secondary materials for reference such as agendas, etc. The wish to record audio as well as to capture and stream live video and presentation was also noted by stakeholders.

Figure 26 – Current Boardroom screen and dais.

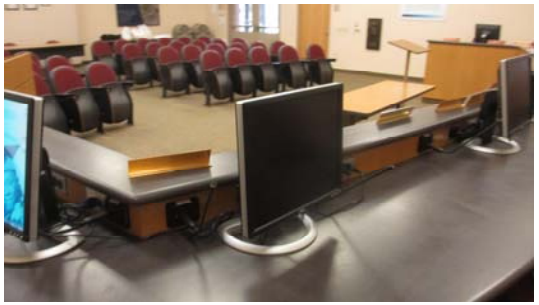

Figure 27 – Boardroom dais display monitors.

Figure 28 – Existing Boardroom equipment rack.

Networked electronic room signage for the scheduling and availability display of the various Administrative meeting spaces throughout the District's campuses is desired and would be connected back to the District's Exchange system for integration with staff calendar systems. Each room would be considered a schedulable resource for inclusion in meeting scheduling to reserved and secure that space for use.

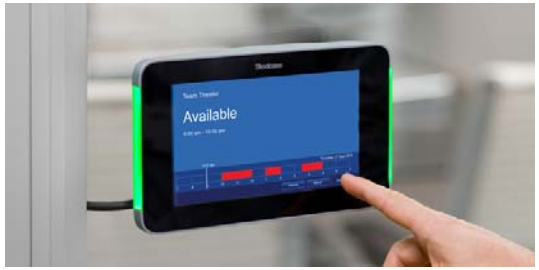

Figure 29 – Possible Room Signage concept.

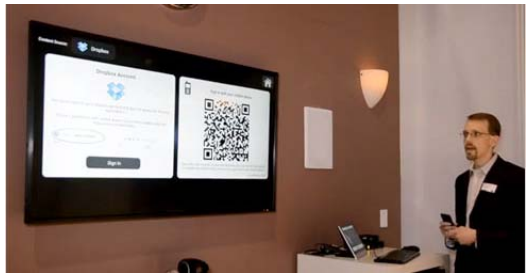

Figure 30 – Possible wireless collaboration and screen mirroring appliance.

Other Technology Examples for consideration:

Figure 31 – Student collaboration area concept

Figure 32 – Example of side-by-side interactive whiteboard display

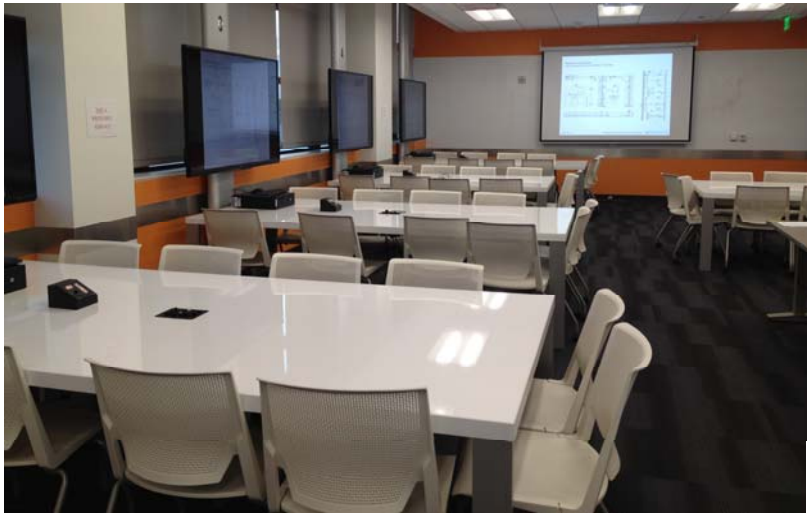

Figure 33 – Example of interactive learning classroom

Figure 32 – Example of Allied Health program & mannequin

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Technology Design Guidelines

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Design Guidelines

Technology Design Standards

These Technology Design Guidelines are intended for use by Architectural and Engineering design teams as they design new building projects for the District. The guidelines are produced in an effort to standardize Technology types and functions throughout the District. The guidelines provide parameters regarding the District's requirements for Audiovisual Systems, Telecommunications Systems and Electronic Surveillance & Security Systems.

As part of the Facilities Master Plan, this document is meant to be used for establishing consistency in all new construction and renovation projects that may occur on any of the campuses within the MCCCD purview. This is intended to be a dynamic document that accommodates changes in system technology throughout the years and should be revised and updated as required for each new milestone change. The general items such as infrastructure and concept should remain relatively static.

Audiovisual Design Standards – Typical Classroom

These classroom design guidelines are intended for use by Architectural and Engineering design teams as they design classrooms, meeting and conference rooms and other AV-equipped spaces for the District. The guidelines are produced in an effort to standardize Audiovisual Technology types and functions throughout the District. The guidelines provide parameters regarding the District's requirements for classrooms, but will require interpretation and adjustment to suit the specific situations presented by individual classroom design projects. General classroom types shall accommodate the instruction of a variety of different subjects and instructional styles while maintaining common technology types and standard interfaces to technology. The standardization of equipment and interfaces to technology will promote ease of use for faculty and staff as they transition to classrooms throughout the District.

Communications System Requirements

Each AV-equipped room will provide for connectivity to the District's data network. Both wired and wireless connections will be accommodated. Communications outlets are to be installed in the following classroom locations:

a) Front Wall/Teaching Wall – provide a minimum of (2) communications outlet

b) Side Walls – provide a minimum of (2) communications outlets at each side wall

c) Rear Wall – provide a minimum of (2) communications outlets

d) Side Wall adjacent to Instructor Station - provide a minimum of (2) communications outlets at wall.

e) Instructor Station floor box - provide a minimum of (4) communications outlets at floor box.

f) Ceiling mounted projector – provide (2) communications outlet

g) AV Equipment Cabinet – provide a minimum of (6) communications outlet (in rooms with dedicated AV equipment cabinet locations). Provide (4) if in a space with videoconferencing.

h) Wireless Access Point outlet – provide minimum of (2) communications outlet located above an accessible ceiling location within the classroom. Depending on the size of the classroom (number of potential wireless users, multiple access points may be justified.

Note: Rooms to be used as computer labs require additional communications outlets at student seating locations. Computer labs shall be designed to provide the distribution of power and communications to each student seat.

Architectural and Engineering teams should also view the following AHC standards and design guidelines that refer to communications requirements:

a) Communications Cabling, AHC Standard Specification

b) Technology Room Design Requirements, Guidelines

General Room Audiovisual System Requirements

Audiovisual (AV) capabilities will support the use of integrated audio, video and computer based media for group instruction. The audiovisual system will support the display of images with the use of a ceiling mounted projector and projection screen. Voice reinforcement, where required, and audio reproduction will be provided using sound distribution through ceiling recessed loud speakers. The audiovisual system will be operated from the front of the room by the instructor. Media source and monitoring equipment will be located in the instructor station. Processing and control electronics will be located in the instructor station or in a separate equipment cabinet. A room dedicated computer will be located at the instructor station.

Specific AV system examples for typical rooms found across the campus are shown in figures within this document.

Typical audiovisual system and equipment details are as follows:

Video/Computer Display:

A ceiling-mounted video projector will be used to display video and computer images on a motorized roll-down projection screen. Video

projector requirements are as follows:

a) Minimum light output requirements for projectors in classrooms are 4,000 ANSI lumens. (Large rooms and rooms with high ambient light may require a video projector with higher light output such as 6,500+ lumens.)

b) Data network connection for network control and future media display transport

c) Minimum resolution: WXGA (1280 x 800 pixels)

d) Preferred resolution: WUXGA (1920 x 1200 pixels) to support 1080p video formats and higher computer resolutions

e) Projector security (Peerless PSMU-PRS, Chief RPMC, or suitable for projector)

f) Projector mount: Ceiling panel mount. The Ceiling Panel shall feature two knockout panels for electrical and audio video boxes and shall contain a 1 1/2" NPS lock nut welded in place. It shall include a 1 1/2" x 3" NPS threaded pipe. BMS LCD LOCII or equivalent

g) Source connection types to include a high-definition input such as DVI-D or HDMI, and to include VGA inputs for legacy computing equipment for the short-term.

h) Projection equipment is to support wired data networking and is being limited to two manufacturers to control consumables and to provide consistency in support. Currently Epson and Panasonic are being considered but all brands to be confirmed with the District before ordering for ensuring compliance.

Ceiling Media/Voice Playback Speakers:

A 70V ceiling-recess mounted speaker system will be deployed within spaces requiring audio support. Coverage will be dependent on ceiling height and audience locations and will drive the number of speakers to be deployed accordingly. Speaker requirements are as follows:

a) 70 volt system for even monaural playback

b) Minimum 4" diameter cone

c) Frequency range (-10bd): 75 Hz – 20 kHz

d) Nominal sensitivity level 89dB SPL, 1W @ 1m (3.3 ft)

e) Include plenum back can, speaker and grill

f) Manufacturer to by JBL, Model #CT-26

g) Minimum of two speakers

Projection Screens:

Rooms shall be designed to accommodate a minimum of one projection screen. Screen requirements are as follows:

a) Size – screens shall be sized to accommodate good viewing at student seat locations. Minimum screen image height is 50" with a student seat location 25' from screen. (standard rule is 1' of screen image height for every 6' of distance from screen.) Bottom of screen image shall be no less than 4' above the finished floor.

b) Aspect Ratio – typical aspect ratio shall be 16:10 (widescreen format) for computer content and video content viewing.

c) Screen location – screen shall be located at front wall at an off-center position. Screen location shall accommodate a minimum 6' width of writing board surface adjacent to screen. This design is intended to allow an instructor to use the writing board while a projected image is being shown.

d) Screen material – screen material shall be a matte white with a black border. Screen material shall have a gain of approximately 1.0. Screen material shall have a solid black backing to prevent rear light sources (windows, etc.) to pass through.

e) Installation – manual screens shall be ceiling or wall mounted per the room conditions. Typical classroom and meeting/conference space screens shall be manual with a Controlled Spring Return (CSR) for smooth screen retraction. Where required on larger (auditoria) image sizes, motorized ceiling recessed projection screens with a manual switch located near the instructor station and a low voltage parallel interface for AV system connection can be used. In either case, screen should be pushed away from the wall where required to accommodate whiteboard trays and other wall mounted equipment that may reside behind the screen.

f) Manual screen manufacturer to be Da-Lite wall mounted type and should be the Model-C with CRS. Wall mount spacer brackets to be used as required.

g) Motorized screens shall be recessed ceiling mounted type manufacturer to be Da-Lite and should be the Tensioned Advantage Electrol series (Matte White) or equivalent from Stewart Filmscreen or Draper, Inc..

AV Source Equipment:

Displayed computer images will be generated from a room dedicated computer or a laptop computer connected at the instructor station. Standard video playback equipment will include a DVD player. Detailed requirements for source equipment are as follows:

a) Room dedicated computer – the classroom dedicated computer shall be installed at the instructor station. The computer shall be controlled from a wired keyboard and mouse. Wireless devices may be coordinated with the Campus IT Department for their use. A USB extension cable shall be provide from the computer to provide the ability to connect USB keys at the instructor desktop.

b) Blu-ray DVD Player – This source equipment shall be installed in the instructor station. Instructor will load media manually and select the source from the push button control panel.

c) Auxiliary audio/video input – Auxiliary audio/video inputs will be located at the instructor station desktop and will include a VGA HD-15 and 3.5mm audio connection for a portable laptop computer and HDMI connections for digital video. Power and data local to the connection points should be included.

d) An WXGA or 1080p resolution document camera will be a common auxiliary equipment type required in classrooms. (Note: Where required, instructor stations shall include a lockable drawer also accommodating the permanent and secure installation of a document camera.) See Instructor Station requirements for additional details of auxiliary AV input connection types.

e) Auxiliary equipment will be selected from the push button control panel for display on the projection screen and distribution through speakers.

Audio Reproduction:

Audio will be reproduced with the installation of a 70V distributed system as part of the classrooms dedicated AV equipment. Loudspeakers shall be recessed in the ceiling of the classroom reproducing sound from computer, audio and video playback sources. Audio distribution to the ceiling speakers is monaural. Audio source equipment may be connected to the system temporarily through the auxiliary audio/video input connector panel at the instructor station. Larger rooms, such as Lecture Halls or Auditoriums, will also require voice reinforcement as well as wall mounted speakers for more advanced stereo or surround sound source playback. Wireless microphones will be used by instructors in rooms requiring voice reinforcement. Assistive Listening Systems (ALS) will be included in all buildings. At least one portable will be required per building to support ADA requirements in spaces with less than 50 occupants. In presentation/instruction rooms with 50+ occupants, and integrated ALS system will be required in that space. For both portable and installed ALS systems a minimum amount of headsets to accommodate of 4% of the total room occupants (but no less than 2) will be required per location. The ALS system will be RF based and will be 72mHz.

AV System Control:

Media source selection, volume control, screen functions and other control options will be selected and controlled using a push button panel control panel located at the instructor station. The mka e and model of the control panel should be coordinated with the Campus' Media Services Department before implementing and control panel button layouts are to be submitted to the College for review and comment to help maintain consistency. The buttons on the control panel shall include (but not be limited to):

a) System On/Off

b) Screen Up/Down

c) Source selection (PC, Laptop, DVD, Aux., Doc Cam, etc.)

d) Program Volume Up/Down/Mute

e) Microphone Mute (if space allows, Vol Up/Down)

f) Image Mute (to hide projector image if only audio is required)

g) Source control (space permitting)

Control panel should have provisions for Ethernet connection for future IP-based system control or remote management system implementation.

Secondary control of the projector will be available through built-in user interface pages within the projector that can be accessed (permissions granted by the IT department) via a web page from a standard PC.

Specialty AV Equipment:

The classroom AV system shall be designed to allow for the connection of specialty equipment. The specialty equipment items currently identified include the following:

a) Assistive Listening Equipment (ALS) - Portable ALS equipment shall be connected at the Instructor Station or AV equipment cabinet.

b) Wireless laptop or tablet mirroring – in certain spaces, the instructor may prefer wireless collaboration and presentation capabilities to support a more dynamic classroom with interactive instruction. The use of AppleTV™ or other wireless collaborative tools from Extron such as ShareLink shall be used and configured on the IT network and shall comply with the District network security protocols.

c) Interactive whiteboard projectors – these shall be either wall or ceiling mounted and projecting on a fixed ceramic or solid surface whiteboard surface (preferably a matt or semi-gloss surface). These shall be WXGA resolution or higher and a minimum of 3,200 ANSI lumens in brightness. To include annotation pens and touch module. Epson 1430wi or approved equivalent.

d) Annotation tablet – the AV system shall be design such that an annotation tablet, capable of providing electronic whiteboard functions from a tablet located at the instructor station, may be permanently connected.

AV Cabling

To support digital transports for extending HDMI signals, shielded Category 6 cabling will be used. This should be per the manufacturer's standards to ensure compliancy but many other solutions are available and acceptable upon review. Current manufacturer preference is Extron.

AV Equipment

The following details specific furniture used for or housing the AV Equipment:

Instructor Station Requirements:

A common instructor station will be used in each of the typical classroom types described in this document. The instructor station will be semi-permanent furniture that will provide desktop space and work area that supports both installed and portable audiovisual equipment. The instructor station should be located adjacent to a side wall for distribution and connectivity from the side wall to instructor station or if centered in the front of the classroom, an adequate floor box should be provided to facilitate conduit and AV/data/power connections. It is a requirement that the station have lockable storage and equipment space. For ADA compliancy, a side fold-down surface will facilitate a shorter work surface. The following list of equipment will be used at the Instructor station:

a) Visual Presenter/Document Camera (dedicated tabletop space or locking equipment drawer required)

b) CPU (to be located within station)

c) AV source equipment (to be located within station)

d) PC Monitor (to be located at desktop or on articulating arm)

e) AV Control panel (to be located at desktop)

f) Internal multi-outlet power strip with surge protection and power switch

g) Laptop and portable equipment area (required at desktop)

h) Keyboard drawer (lockable) for wired keyboard and mouse

i) Ventilation on both PC and AV compartments

j) Connections located at the desktop shall include the following :

- Power – duplex power outlet
- Audiovisual – (2) VGA connections, (1) USB connection from room dedicated computer, (1) Composite Video/Audio connections, (1) HDMI connection, (1) blank plates for future AV connections

k) Connections located on the side near the fold-down shelf shall include the following :

- Power – duplex power outlet
- AV and data cabling can be extended down from the desktop to facilitate connections if used as a work table

Instructor presentation system consoles manufacturers to be: Design Media Presentation cart, Spectrum Industries Computer Security Station, or equivalent from DWI Enterprises, etc.

Refer to Figure 1.

Equipment Cabinet Requirements:

In meeting and conference rooms not requiring a presenter/instructor location but still having the need to house AV equipment, a locking portable enclosure will be included. The following list of equipment will be used at the equipment rack:

a) Front locking door

b) Minimum of 12 rack units (RUs) of 19" wide equipment space

c) CPU (to be located within station on rack shelf)

d) AV source equipment (to be located within rack)

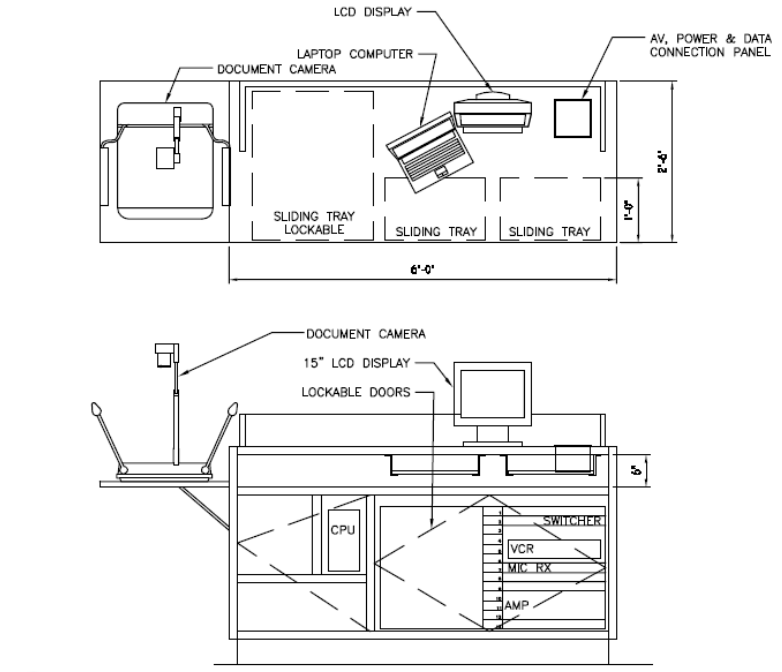
e) Internal multi-outlet power strip with surge protection and power switch

f) Ventilation on both PC and AV compartments

g) Pass-through wire-way to accommodate AV, power and voice/data cabling to wall or floor for remote devices.

If custom millwork or cabinetry is made specific to a building project, the same guidelines as above can be followed but a separate equipment mounting frame will be required. This would be a pull-out-and-pivot style for easier support access. Refer to Middle Atlantic model #SRSR style units or equivalent.

Rolling equipment cabinet manufacturers to be: VFI, Middle Atlantic, or equivalent from DWI Enterprises, etc.



01 – TYPICAL INSTRUCTOR'S STATION
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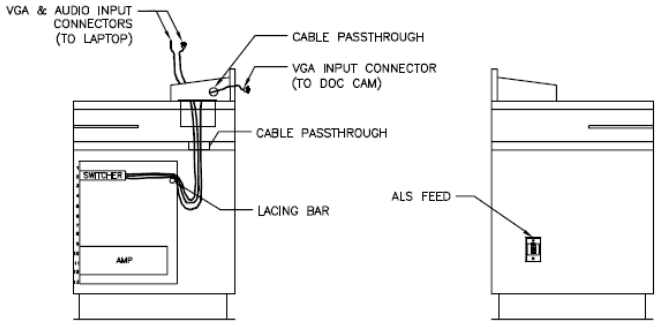

02 – TYPICAL INSTRUCTOR'S STATION
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Systems Furniture Equipment

Typical AV systems furniture will include the following:

a) AV Equipment Cabinet - Lecture halls and typical classrooms that do not have an instructor station at an adjacent wall shall have an AV equipment cabinet used for storage of processing and switching equipment. Use of the AV cabinet will help to minimize conduit pathways to the instructor station. All AV system dedicated conduit will terminate in a pull box location behind the AV equipment cabinet. The cabinet will be used to house room dedicated processing and control electronics. A room dedicated computer and other portable equipment may be secured in this lockable space if necessary.

Helpdesk / Remote Network Management Software

Remote network management system software is required to control, manage and support all attached AV control systems and their related networked AV peripheral devices. This should support to tie into any Owner building management systems. This application must also be able to accommodate other Owner existing or future AV systems or components integrated with a compatible control system. Please note that this service is provided as part of the control system master quote and to coordinate with the manufacturer. The current standard for the District is Extron's Global Viewer.

This system shall be configured to monitor and manage (but not limited to):

a) System or individual peripheral status including power on/off state, network status (disconnected)

b) Projector lamp hours remaining vs. total estimated lamp life. Must be configured to notify by email the appropriate Campus staff or service technician when to order spare lamps (at 75% of lamp life is spent at each projector), to change lamp at 95% or use or when a lamp has blown.

c) System or peripheral temperature. An email notification will also be sent to the appropriate Campus staff or service technician when critical limits are triggered.

d) Archival system storage capacity notification. Where applicable, provide an email notification will also be sent to the appropriate Campus staff or service technician and Campus IT department when the storage capacity of the archival server is near maximum limits. This is different from and not including the Campus content server but rather the individual room or portable video servers tied to the network or integrated in the room AV system(s).

e) Other key elements included within each room that are tied to the AV system and can be controlled or monitored.

AV Related Lighting and Low Voltage Interfacing

Lighting:

a) Lighting switches shall be located adjacent to the instructor station.

b) Lighting shall be circuited to allow a reduction of overall room light levels during allowing dimming during use of projector. Light levels dimmed through switching should still maintain enough light to allow students to take notes or work from documents located at their desktop.

c) Higher level functioning rooms (typically Lecture Halls/Auditoriums) that require dimming capabilities should have lighting control connections to the AV control system.

d) Lights in AV rooms should be circuited to allow fixtures adjacent to projection screens to be turned off during projection. Fixtures at writing board spaces and instructor stations should remain on during projection.

e) 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.

Lighting Control:

a) Where lighting is controllable through the AV control system, redundant wall-mounted controls shall also be provided per Architect's specification.

b) Where designated, provide a Low Voltage Interface for remote switching of lights from the AV system in designated AV facilities. (See Low Voltage Remote Control Interfacing)

Day light control:

a) Where window glazing allows exterior daylight or lighting from adjacent interior spaces into an AV space, window coverings should be provided to control the visual display environments. This can include manual or motorized shades (i.e. Mecco Shade) for scrim or blackout materials.

b) Where shades and drapes are controllable through the AV control system, redundant wall-mounted controls shall also be provided per Architect's specification.

c) Where designated, provide a Low Voltage Interface for remote switching of shades from the AV system in designated AV facilities. (See Low Voltage Remote Control Interfacing)

Low Voltage Cabling:

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

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

c) 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.

Low Voltage Remote Control Interfacing:

a) Where required as part of the AV system integration into the room, lighting and shade/drape system low voltage interfacing will be included. This may include relay interface for motor control or RS232 conversion equipment.

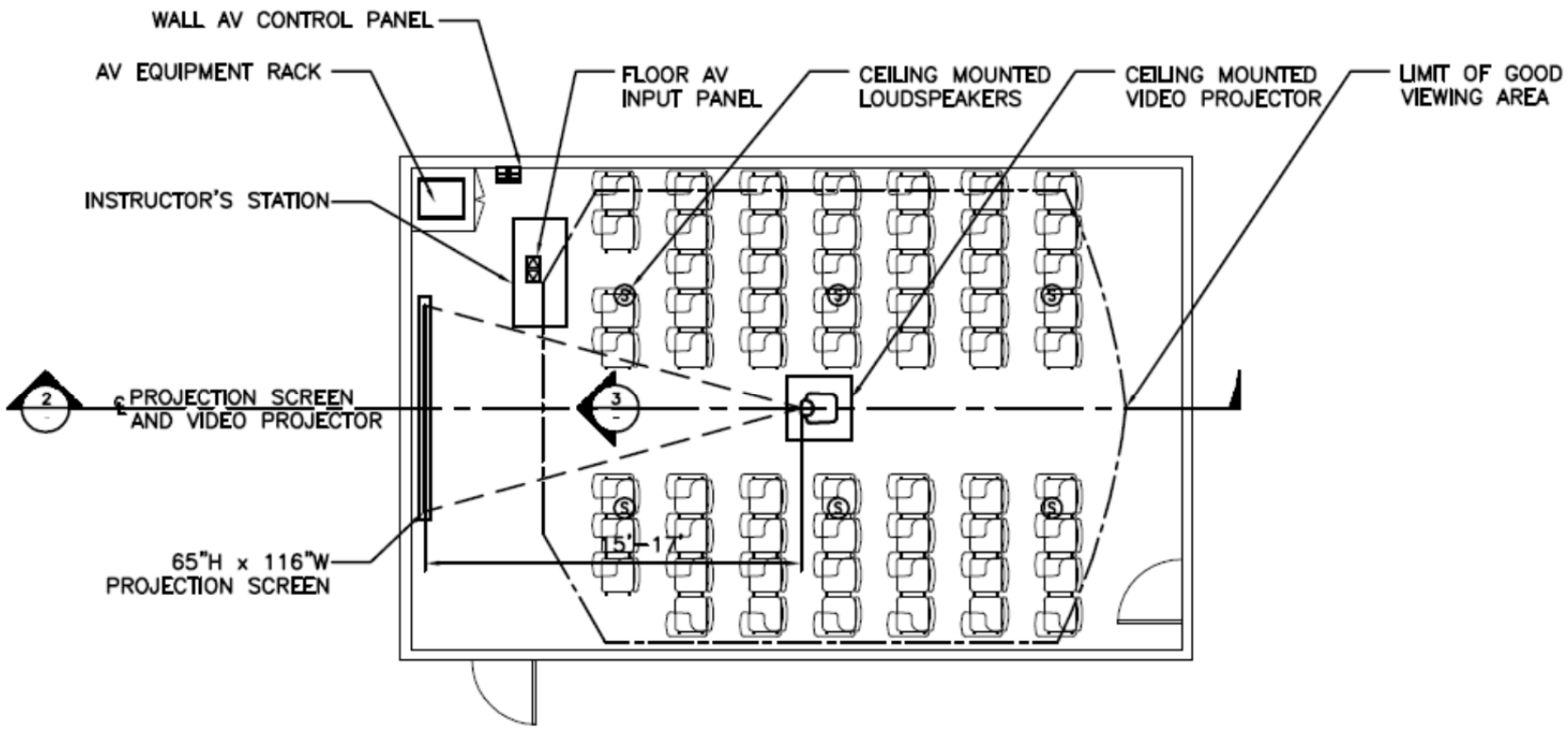
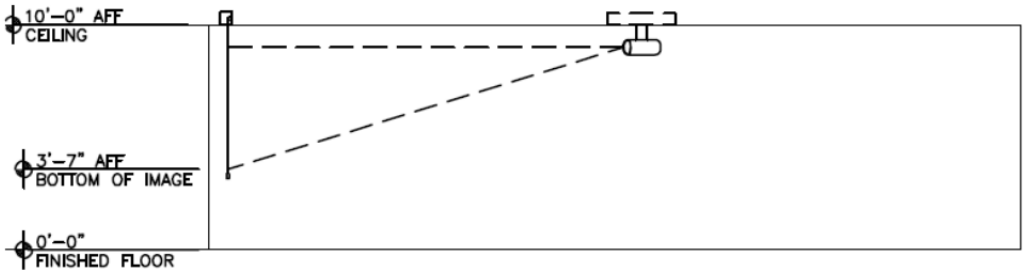


Figure 2 – Medium Single Screen Classroom



02 SECTION – MEDIUM CLASSROOM
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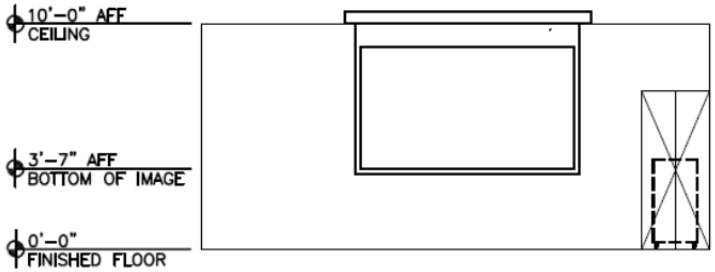

3 ELEVATION – MEDIUM CLASSROOM
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Figure 3 – Medium Single Screen Classroom

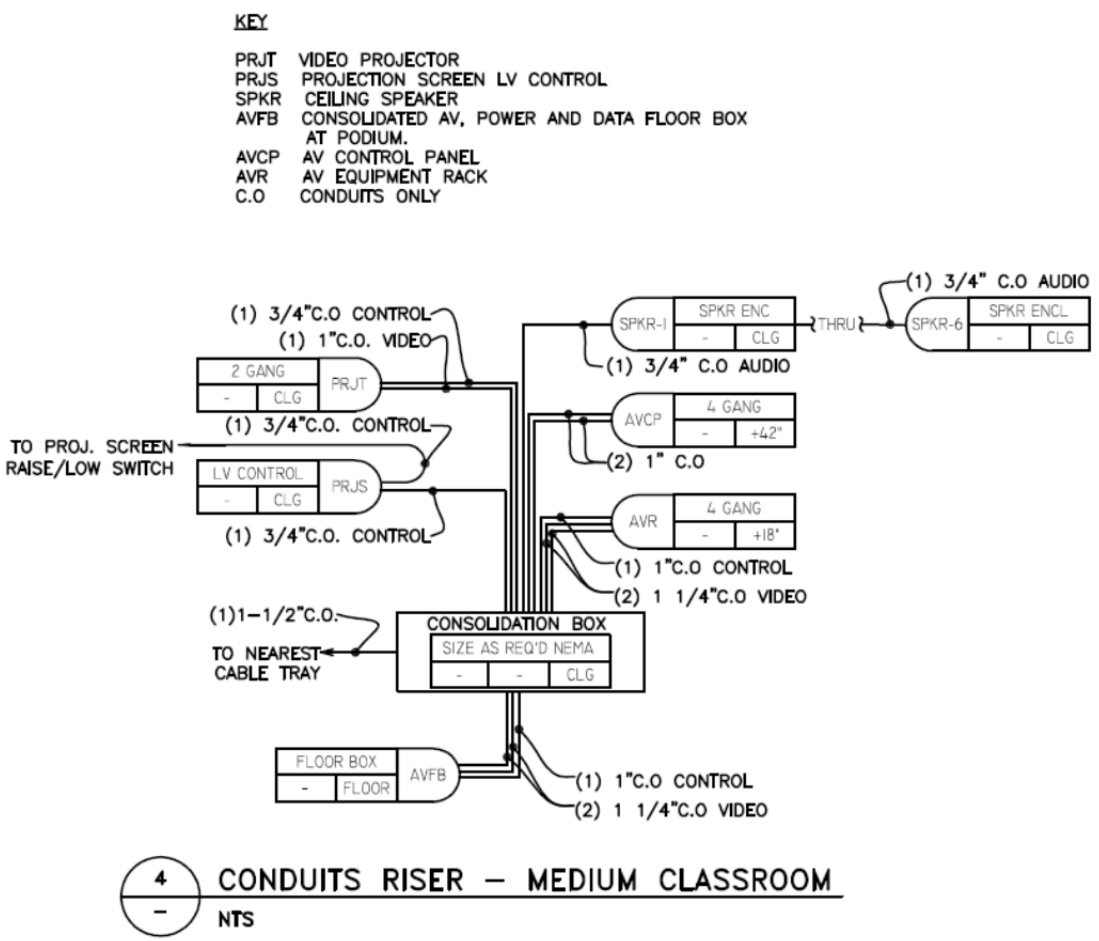


Figure 4 – Medium Single Screen Classroom

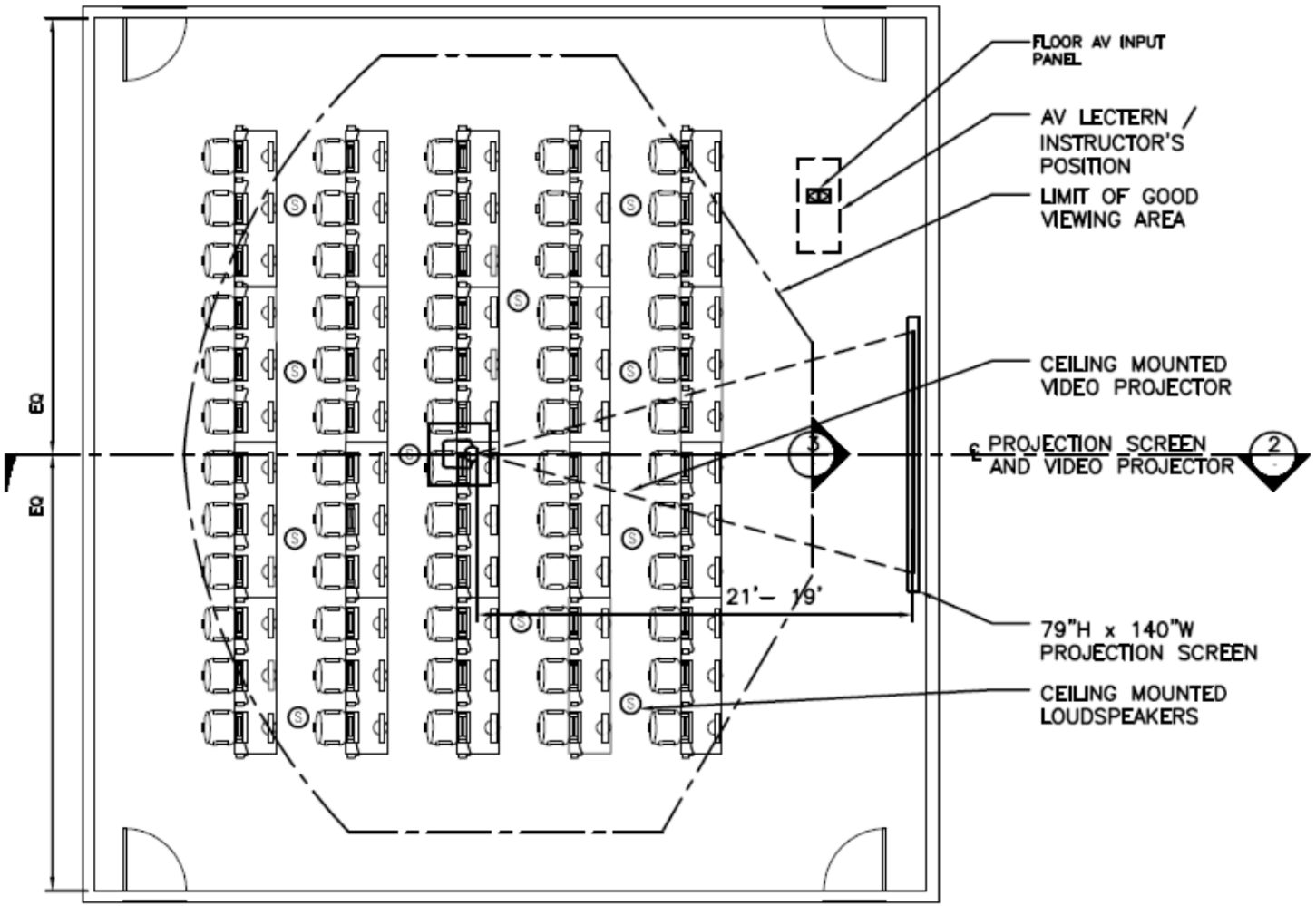


Figure 5 – Large Single Screen Classroom

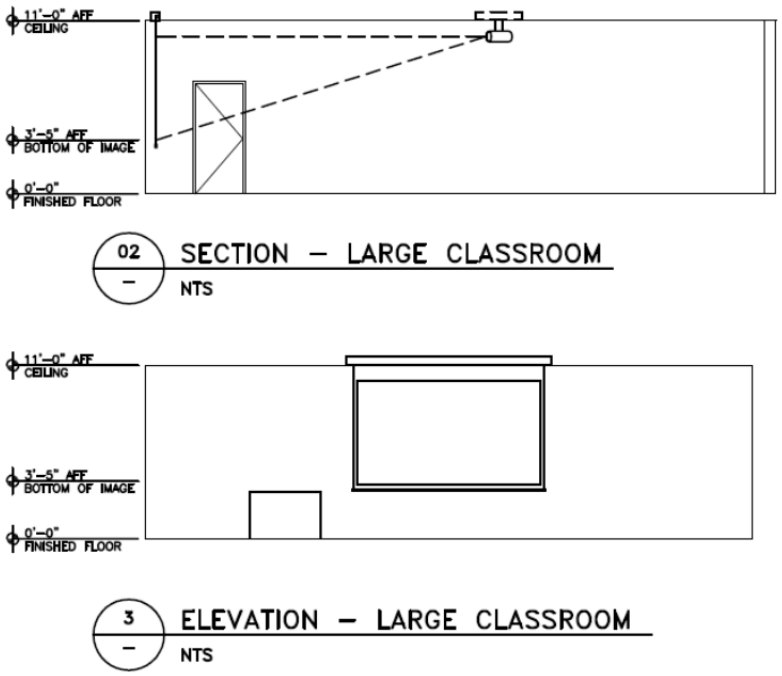


Figure 6 – Large Single Screen Classroom

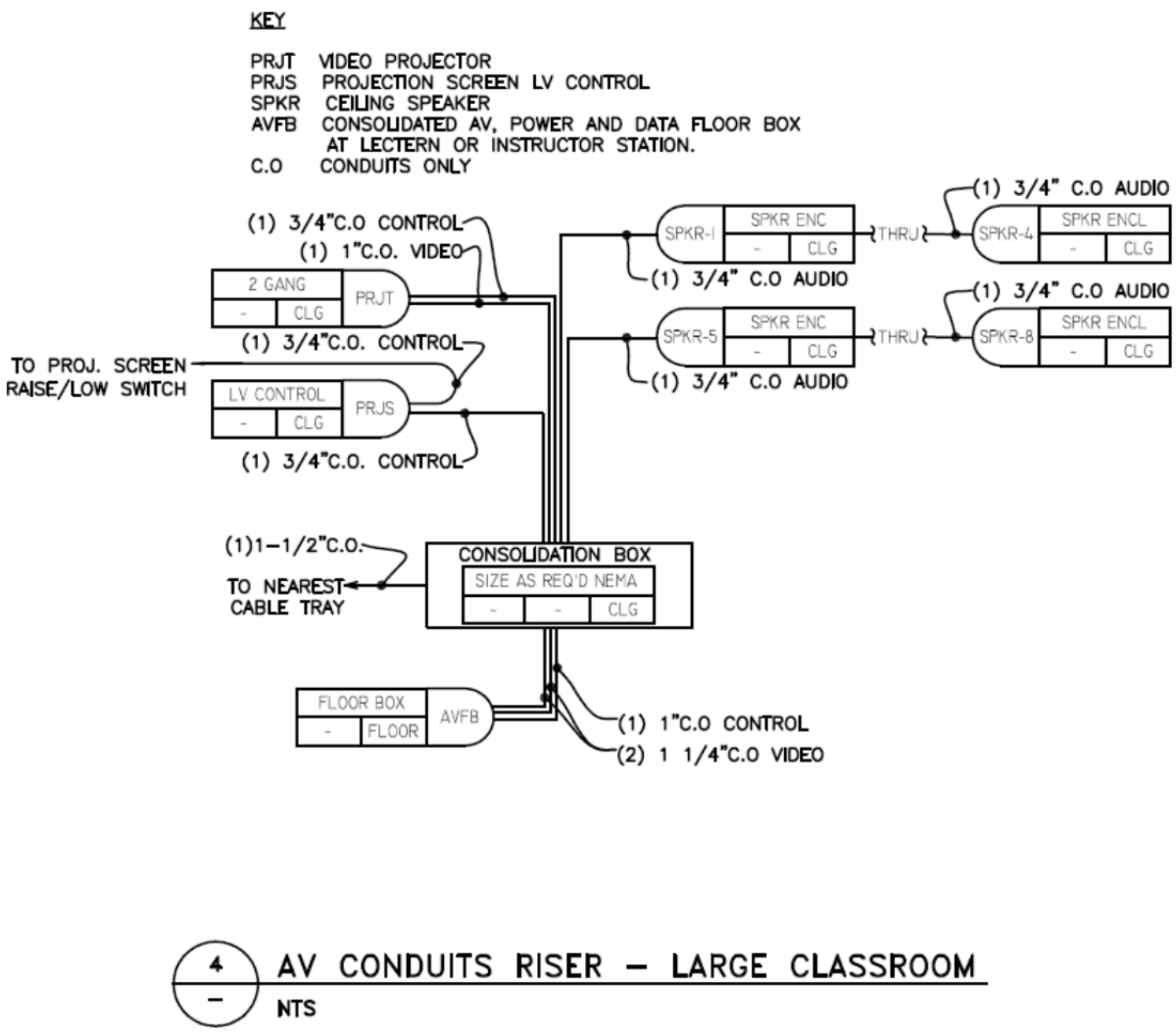


Figure 7 – Large Single Screen Classroom

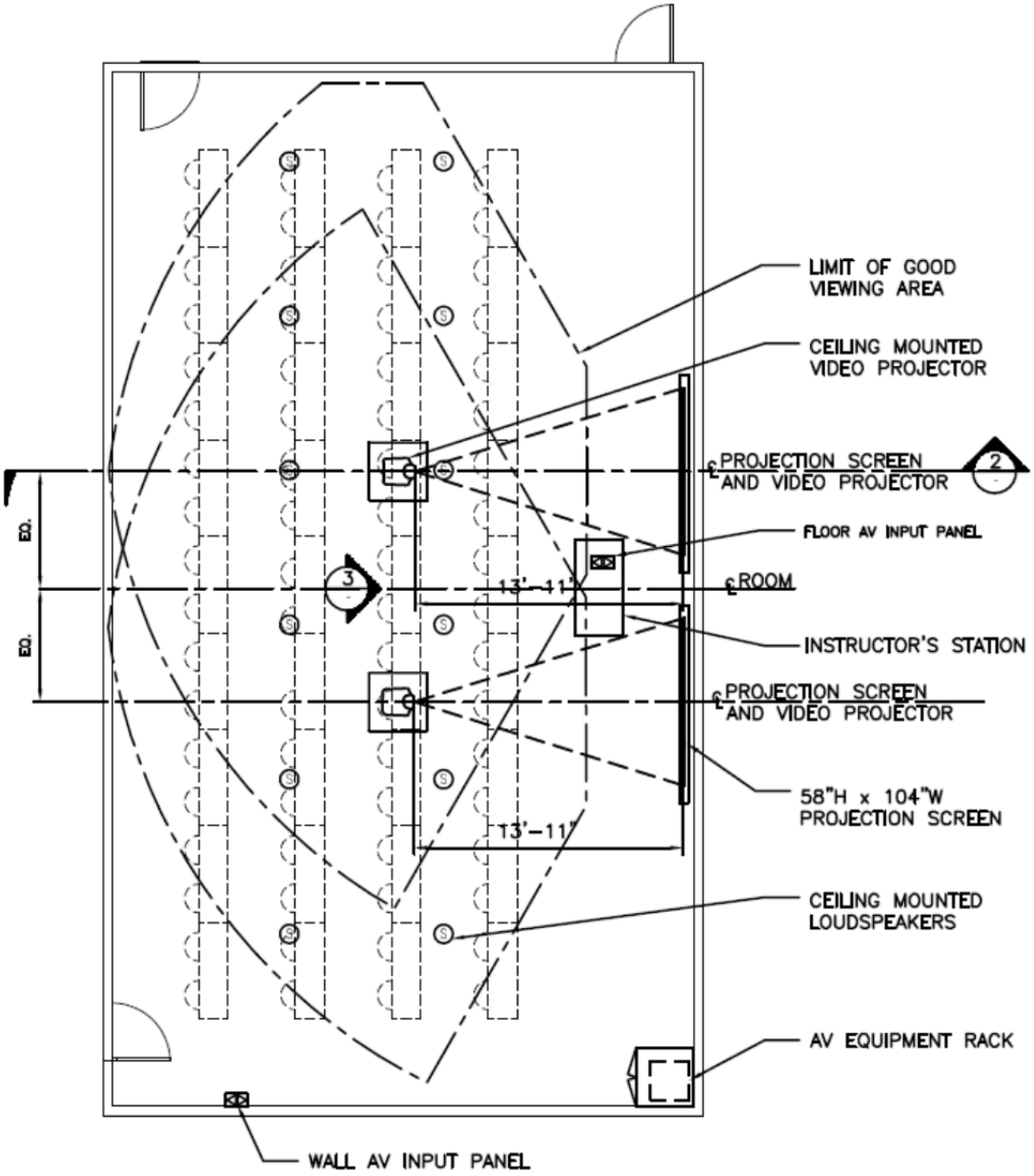
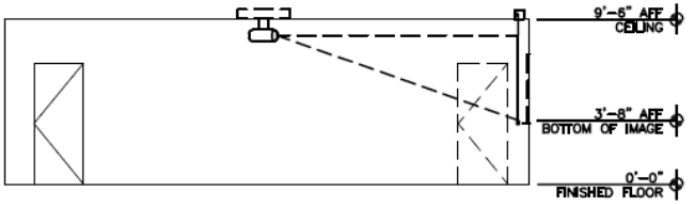


Figure 8 – Dual Screen Classroom



02 – SECTION – DUAL SCREEN CLASSROOM
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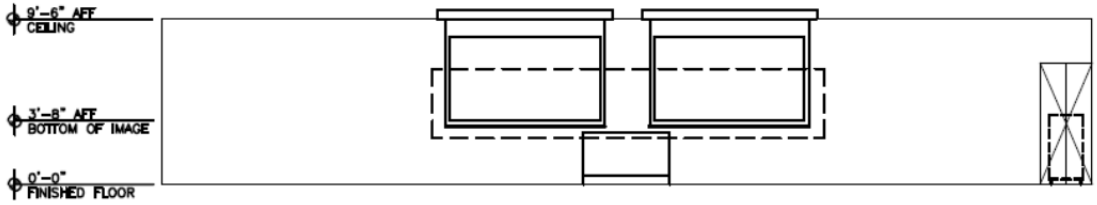

3 – ELEVATION – DUAL SCREEN CLASSROOM
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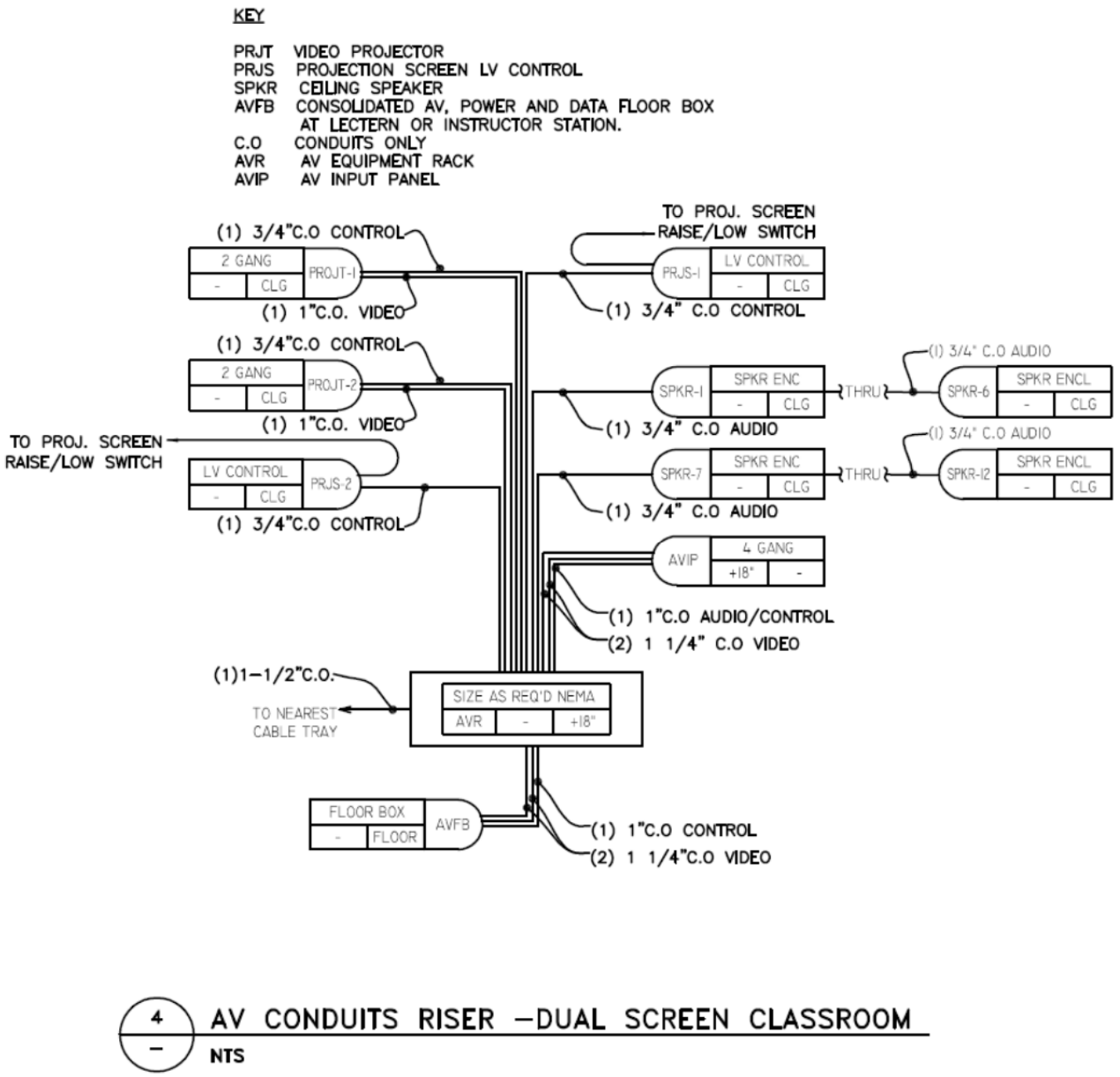
Figure 9 – Dual Screen Classroom



4 — AV CONDUITS RISER –DUAL SCREEN CLASSROOM

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Figure 10 – Dual Screen Classroom

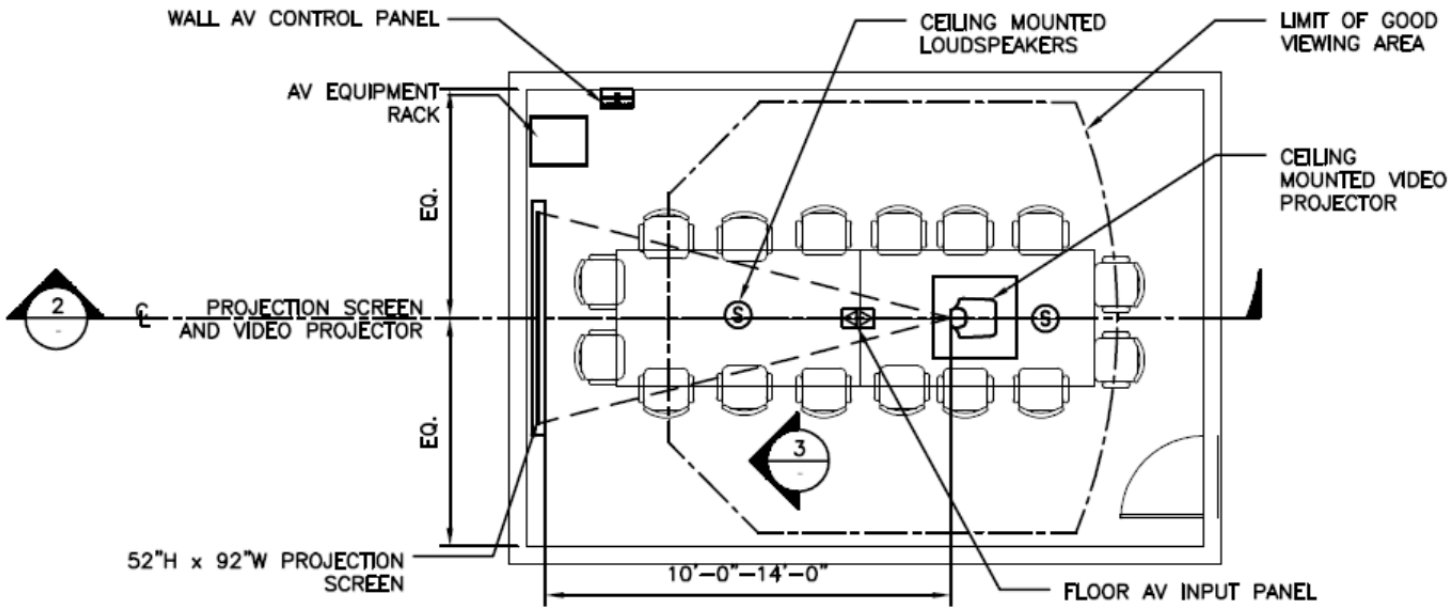


Figure 11 – Meeting Room

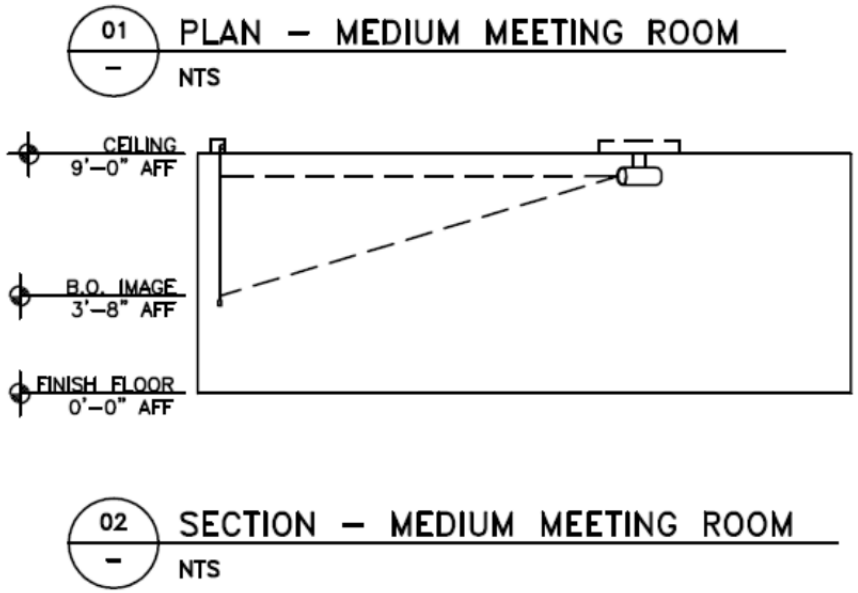


Figure 12 – Meeting Room

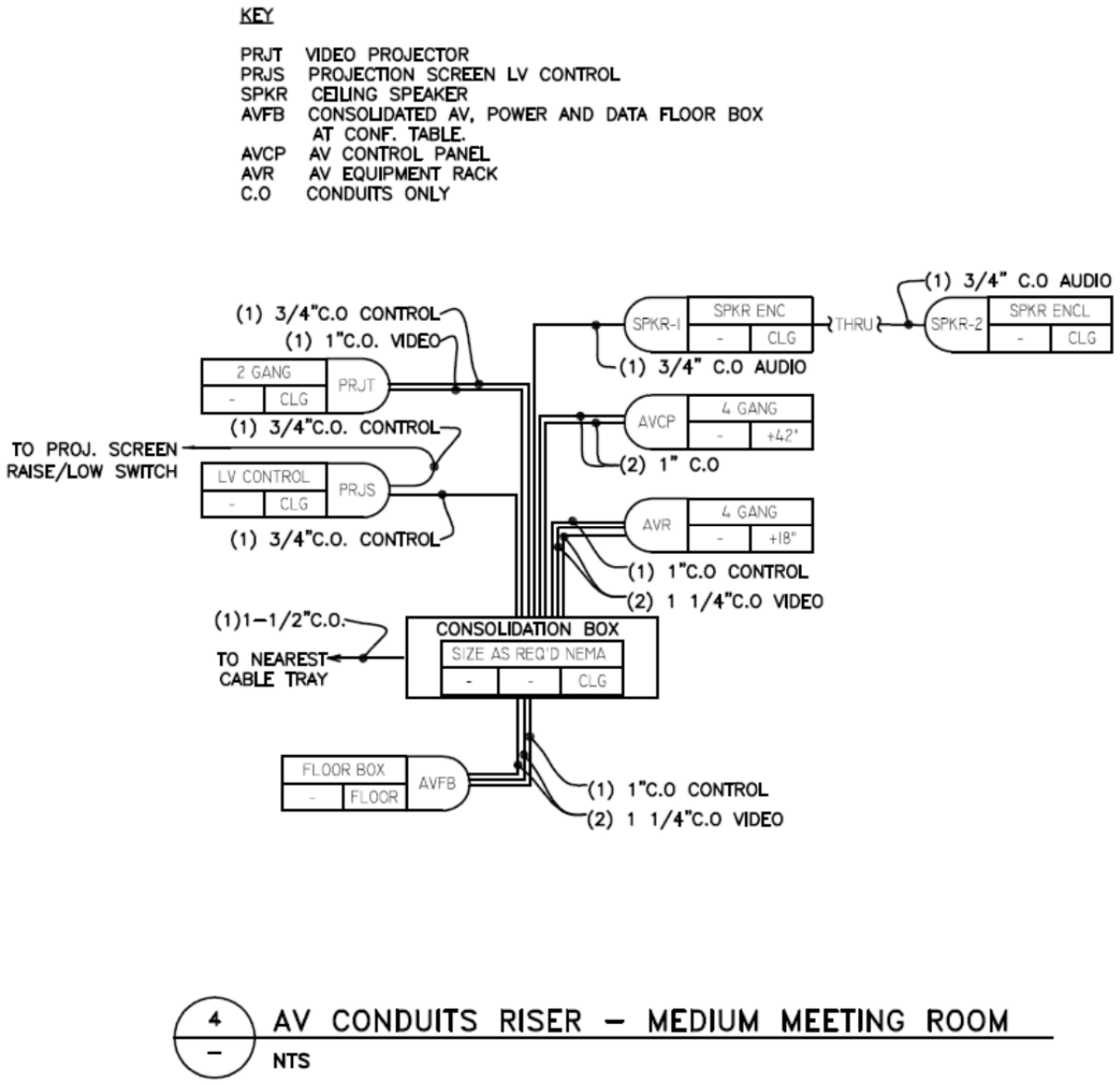


Figure 13 – Meeting Room

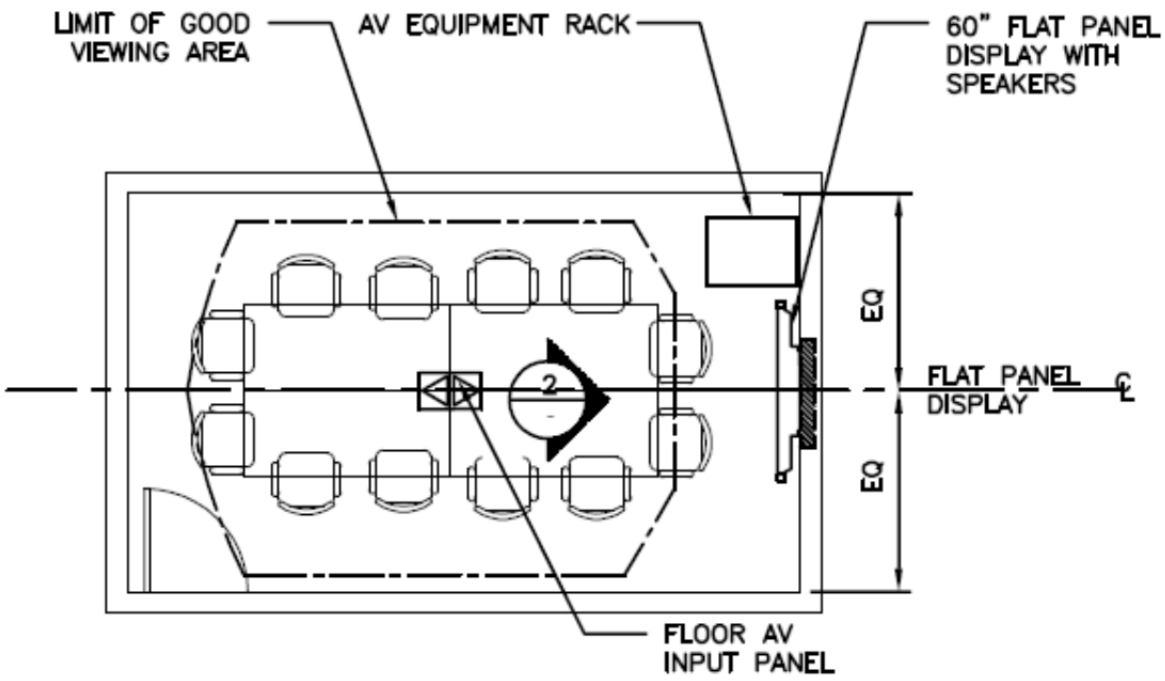
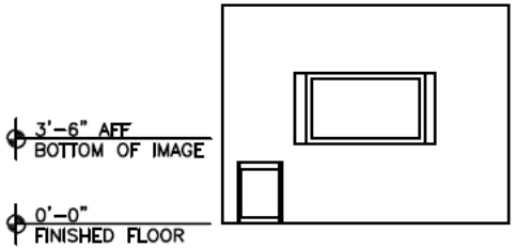


Figure 14 – Small Meeting Room



02 – SECTION – SMALL MEETING ROOM
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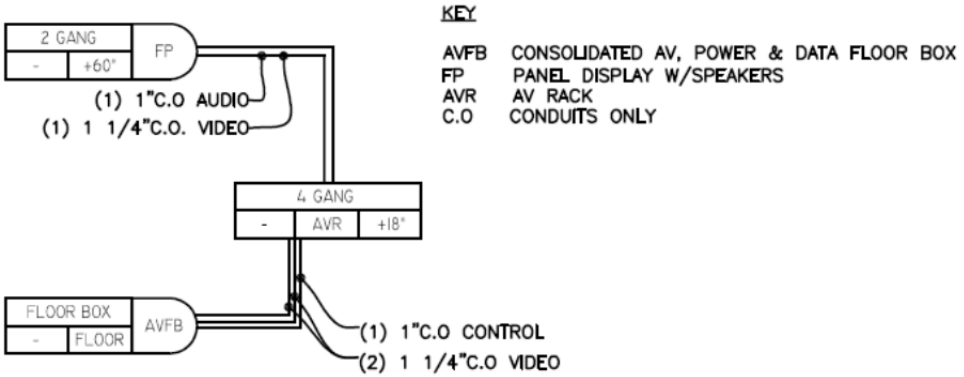

3 – AV CONDUITS RISER – SMALL MEETING ROOM
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Figure 15 – Small Meeting Room

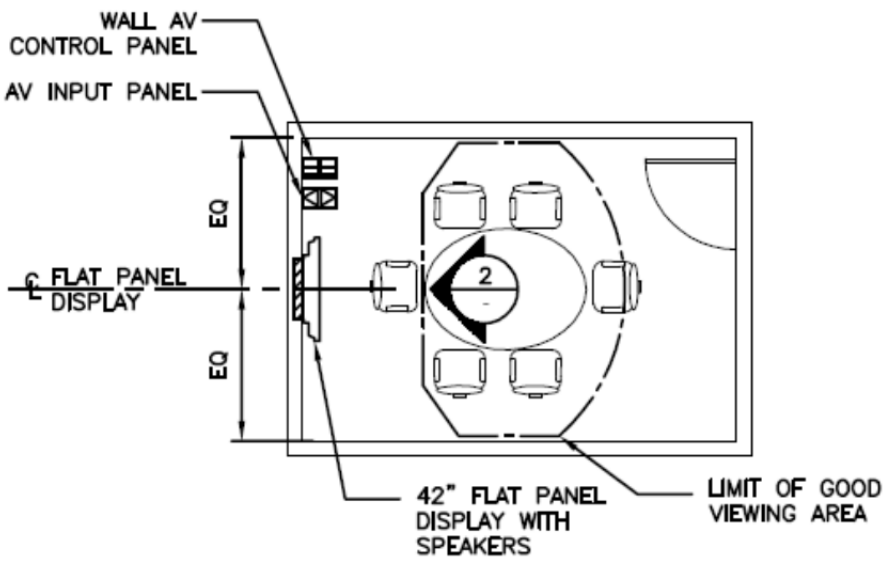

Figure 16 – Study Room

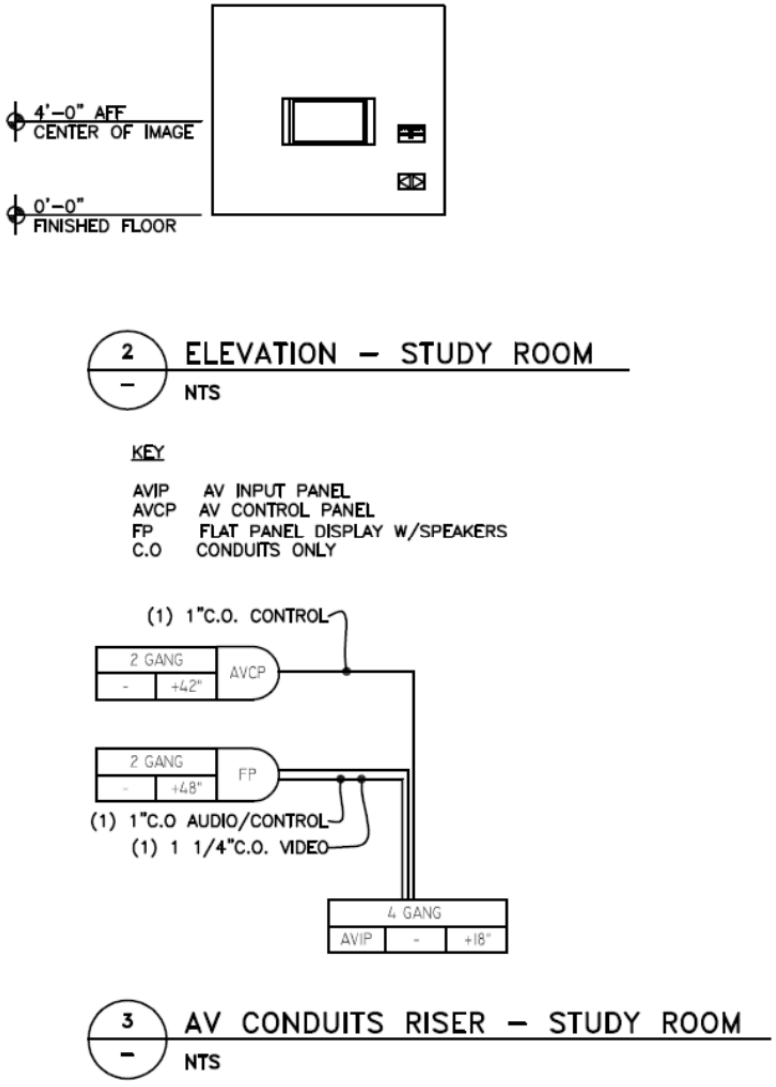

Figure 17 – Study Room

Audiovisual Equipment Standards

The District has determined specific equipment and manufacturer to be deployed throughout the campus to help ensure some consistency.

Control System Equipment:

Extron Electronics will be used for all base level and advanced AV control systems. Use Extron Media Link® series (MLC104 IP Plus, etc.) control wall plates (note: match infrastructure requirements if other plates are used) with built-in controller for typical/small-medium spaces and Extron IPL 250 control processor and TouchLinkTM touch control panels for larger classrooms or conference spaces with extended control requirements such as distance learning or videoconferencing.

System Switching and Processing:

Extron Electronics will be used for all presentation switchers and digital matrix / cross-point switching. Switchers shall be connected via the network and controlled via RS232 or by network/IP control.

Interfacing / Connection Plates:

Extron Electronics will be used for standard connection plates at walls, etc. Minimum connections will include HD15-F VGA and stereo 3.5mm audio jacks, composite video and stereo audio RCA-F jacks and HDMI (for computer, use the 3.5mm jack with the VGA for audio connection). The HDMI will support DVI and DisplayPort connections with appropriate adapter cables. Reference Extron AAP-104 or RGB478xi with appropriate connection plates (note: match infrastructure requirements if other plates are used). At tables, a flip-up plate can b e used with the connection cables housed within that can be pulled out for peripheral connectivity. Reference Extron CableCubbyTM series (i.e. Cable Cubby 600).

Remote Management Software:

Extron Global Configurator® is deployed on the campus and all AV systems or lone networked AV peripheral devices can be added for remote monitoring and control (including automatic system shutdown timers, remove device control, error/status alerts, etc.).

Floor Box/Poke-Throughs:

FSR, Inc. FL-500P-6 or units with equivalent capacity will be used for combining audiovisual, power and data within one combined unit under Instructor Stations and Conference Room table legs on the ground floor. On other higher floors (if a floor box type cannot be used), a higher capacity poke-through will be used such as the Wiremold Evolution 6 or 8 (depending on the capacity required). In some cases, a Wiremold AV3 or other type poke-through can be used if cabling (data/AV) is to just pass-through into the furniture (like a desk or table).

Structured Cabling and Telecommunications Room Design Standards

The MiraCosta Community College District is looking to standardize all future new construction and renovation projects with consistency in the data networking support infrastructure. This includes the structured cabling system and the telecommunications support spaces. The current District Data Center / Server Room is located on the Oceanside (OS) campus within the Library. The Secondary Data Center is located at the San Elijo (SE) campus.

All new or renovated building's technology infrastructure will be designed to support access to technology systems by providing defined spaces for equipment rooms, cable pathways. The following section describes the infrastructure spaces in terms of their purpose and use for supporting the technology systems to be installed.

Building Distribution Frame (BDF)

BDF Room will house core network equipment for the building's distribution, local area network equipment, back up telephone system equipment, security equipment, etc. for the building. The BDF room will be environmentally controlled and provide power and UPS backup systems to support all mission-critical technology equipment.

Vantage recommends the following design requirements for BDF Rooms:

c) The room size should be 585 sq. ft. Provide 4 feet wide lockable door. Provide accessible drop ceiling in the room. Provide sealed concrete floor. Provide 8' x 4' x ¾", fire-retardant plywood backboard around the perimeter of the room to support wall mounted equipment. UPS, batteries and AC units will be located in separate room outside Core Network Room

d) Provide (15) 19" wide two-post racks.

e) Core Network Room will be supported by redundant UPS equipment (A & B systems) with (2) StarLine track power busways (one connected to each UPS) above each row of rack per the County's standard. Each cabinet will have (2) 120V/208V 30A 3 phase circuits(L21-30R) and (2) 120V/20A circuits : one from StarLine track A and one from StarLine track B. StarLine power busway provides flexibility to make changes in the power provisions to each rack and cabinet without requiring electrical re-wiring. This system enables replacing one receptacle type with another without an electrician or permit required, which drastically reduces the time required to incorporate changes.

f) Provide duplex 120V AC convenience outlets (NEMA 5-15R or 5-20R) located (18" in.) above the finished floor, placed (6 ft.) intervals around perimeter walls.

g) Provide a signal ground bus bar in Core Network Room.

h) Provide adequate and uniform lighting that provides a minimum equivalent of 50 foot-candles when measured 3 ft. above the finished floor level. Locate light fixtures a minimum of 9 ft. above the finished floor. Locate light switches near the room entrance. Emergency lighting systems which operate on trickle-charge storage batteries are desirable as a safety precaution in the event of an inadvertent power outage. Power for the lighting should not come from the same circuits as power for the telecommunications equipment.

i) Provide industry standard power load of 6kW per rack bringing total power required to 90kW.

j) Dry-Bulb Temperature (°F) per ASHRAE Thermal Guidelines:

   a. 65 °F to 80 °F recommended

   b. 59 °F to 90 °F allowable

k) Humidity Range (non-condensing) per ASHRAE Thermal Guidelines:

l) 42 °F DP to 60% and 59 °F DP recommended

m) 20% to 80% allowable

n) Provide pre-action fire protection system in the Core Network Room.

o) Provide surveillance cameras in Core Network Room for room monitoring from Network Operation Center.

p) See Figure 1 for proposed BDF Room equipment layout.

Intermediate Distribution Frame (IDF)

IDF Rooms will be located on the other floor to support the maximum cable run distance for 90m (295ft) from closet to furthest outlet. IDF Room will house voice, data and other in-house technology system equipment. The closets will stack on top of Core Network Room. The

IDF room will be environmentally controlled and provide power and UPS backup systems to support all mission-critical technology equipment.

Vantage recommends the following design requirements for IDF Rooms:

a) The room size should be 125sq ft. Provide 3 feet wide lockable door. Do not provide drop ceiling, ensure a minimum clearance of 8'-6" below light fixtures and other ceiling mounted fixtures. Provide sealed concrete floor. Provide 8' x 4' x ¾", fire-retardant plywood backboard around the perimeter of the room to support wall mounted equipment.

b) Provide non-switched (1)208V/20A (L6-20R) and (1) 120V/20A for equipment power at each equipment rack (three equipment racks total in the IDF Room). Each circuit shall be on separate branch circuits and supported from a centralized UPS. Provide duplex 120V AC convenience outlets (NEMA 5-15R or 5-20R) located (18" in.) above the finished floor, placed (6 ft.) intervals around perimeter walls. Provide a signal ground bus bar in the IDF Room.

c) Provide adequate and uniform lighting that provides a minimum equivalent of 50 foot-candles when measured 3 ft. above the finished floor level. Locate light fixtures a minimum of 8.5 ft. above the finished floor. Locate light switches near the room entrance. Emergency lighting systems which operate on trickle-charge storage batteries are desirable as a safety precaution in the event of an inadvertent power outage. Power for the lighting should not come from the same circuits as power for the telecommunications equipment.

d) Provide (3) 19" wide two post racks for equipment.

e) Provide industry standard power load of 3kW per rack bringing total power required to 9kW.

f) Dry-Bulb Temperature (°F) per ASHRAE Thermal Guidelines:

   a. 65 °F to 80 °F (recommended)

   b. 59 °F to 90 °F (allowable)

g) Provide wet fire sprinkler with protective cage.

h) Provide surveillance cameras in IDF room for monitoring from Network Operation Center.

i) See Figure 2 for typical IDF Room equipment layout.

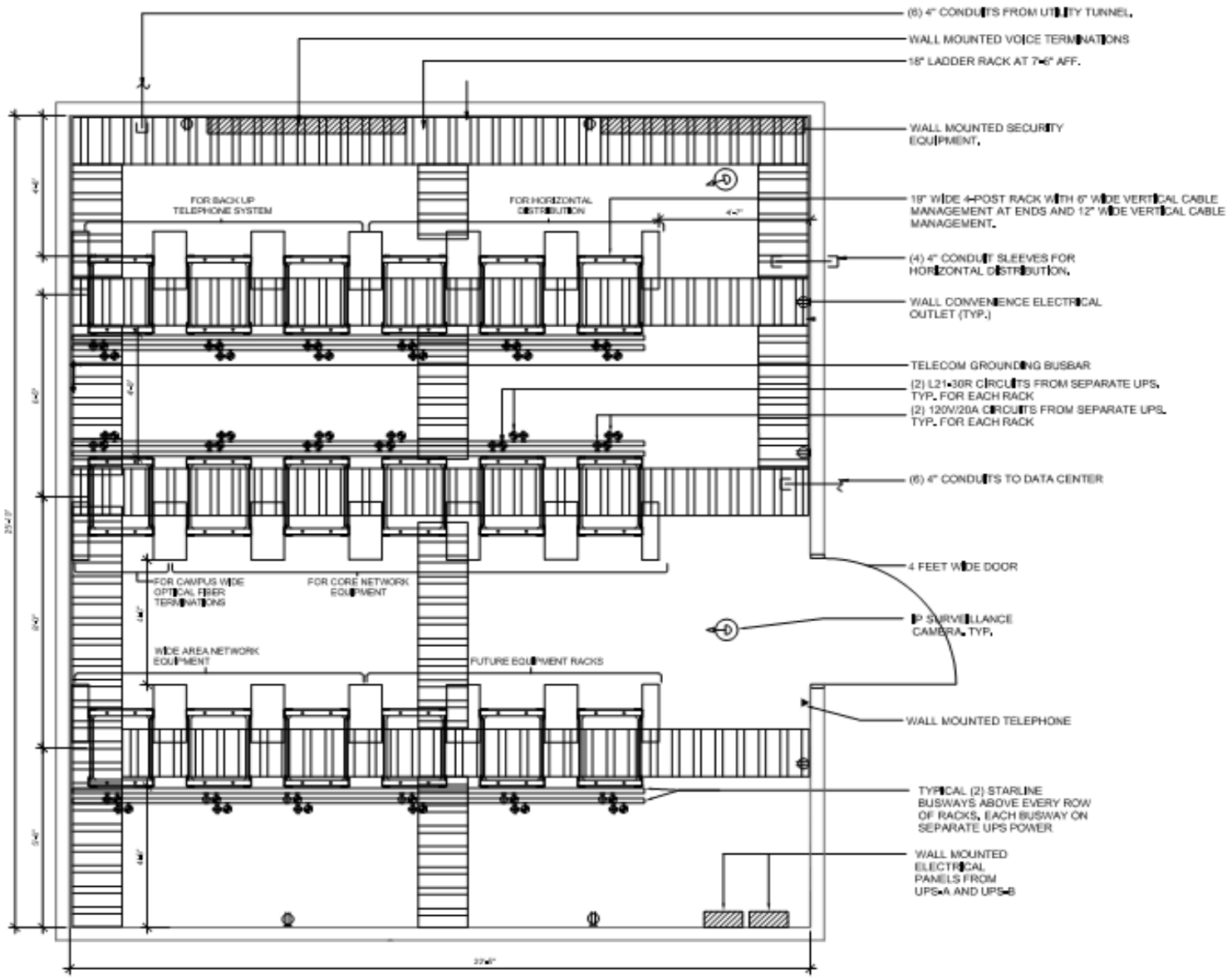

Figure 18 – Typical BDF Room

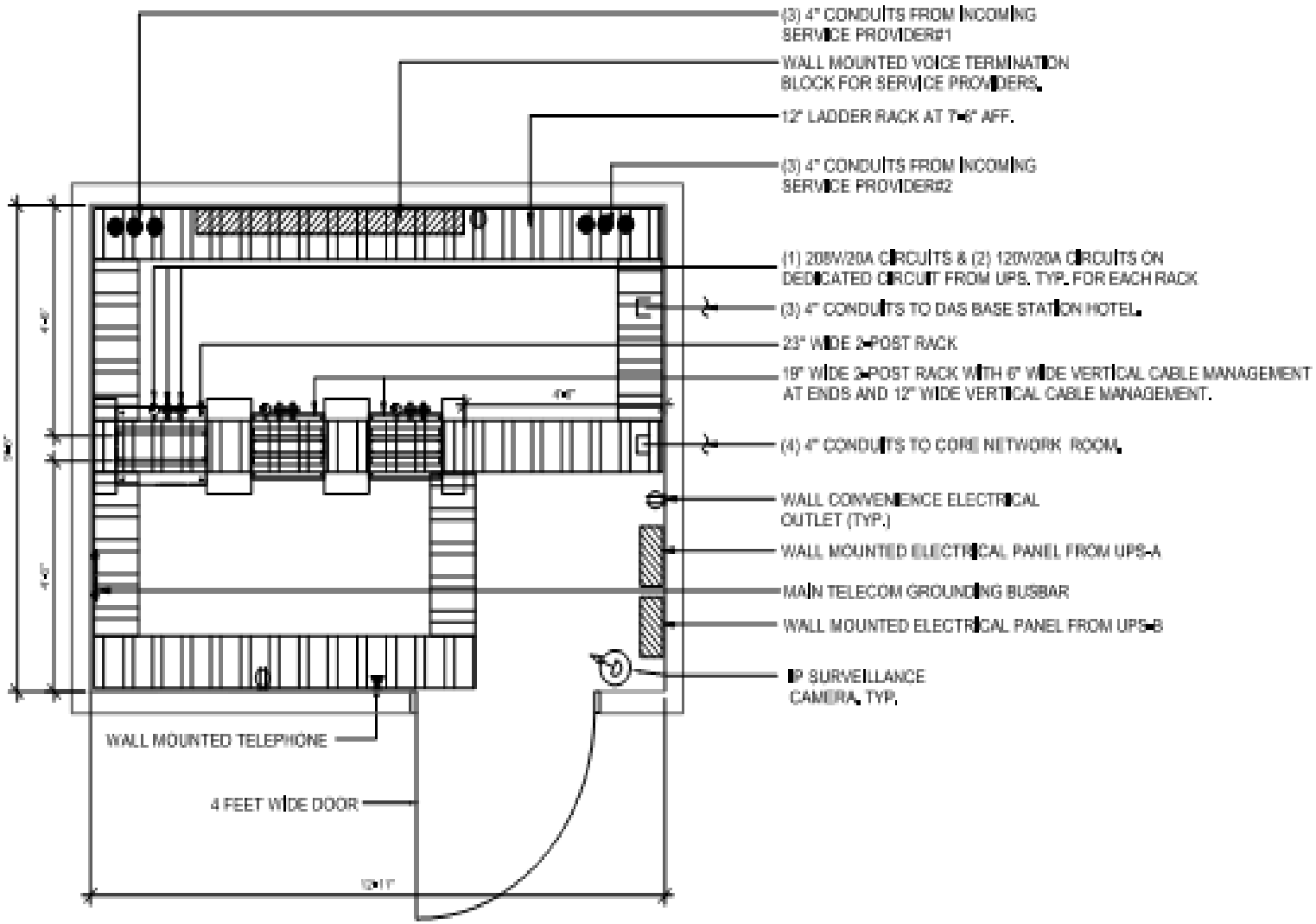

Figure 19 – Typical IDF Room

Main Point of Entry (MPOE)

The MPOE Room acts as the termination point for the external service providers (AT&T and Cox) copper and optical fiber cables as they enter the building (or the campus). This room houses splice cases, terminal protectors and other associated carrier equipment.

Two incoming service connections from AT&T and Cox will terminate in MPOE. For resilience purposes, Vantage recommends two entrance routes from manholes are provided coming into the MPOE Room. This allows multiple entrance points to the building and prevents a single event from cutting off the systems from the outside world. Vantage also recommends that a secondary MPOE Room be constructed elsewhere on the campus for redundancy.

Vantage recommends the following design requirements for MPOE Room.

a) The room size should be 125sq ft. Provide 4 feet wide lockable door. Do not provide drop ceiling, ensure a minimum clearance of 8'-6" below light fixtures and other ceiling mounted fixtures. Provide sealed concrete floor. Provide 8' x 4' x ¾", fire-retardant plywood backboard around the perimeter of the room to support wall mounted equipment.

b) Provide non-switched (1)208V/20A (L6-20R) and (2) 120V/20A for equipment power at each equipment rack (three equipment racks total in the MPOE Room). Each circuit shall be on separate branch circuits and supported from a centralized UPS. Provide duplex 120V AC convenience outlets (NEMA 5-15R or 5-20R) located (18" in.) above the finished floor, placed (6 ft.) intervals around perimeter walls. Provide a main signal ground bus bar in the MPOE Room.

c) Provide adequate and uniform lighting that provides a minimum equivalent of 50 foot-candles when measured 3 ft. above the finished floor level. Locate light fixtures a minimum of 8.5 ft. above the finished floor. Locate light switches near the room entrance. Emergency lighting systems which operate on trickle-charge storage batteries are desirable as a safety precaution in the event of an inadvertent power outage. Power for the lighting should not come from the same circuits as power for the telecommunications equipment.

d) Provide (1) 23" wide two post rack and (2) 19" wide two post racks for service provider equipment.

e) Provide industry standard power load of 1kW per rack bringing total power required to 3kW.

f) Dry-Bulb Temperature (°F) per ASHRAE Thermal Guidelines:

   65 °F to 80 °F (recommended)

   59 °F to 90 °F (allowable)

g) Provide wet fire sprinkler with protective cage.

h) Provide surveillance cameras in MPOE for room monitoring from Network Operation Center.

Distribution and Containment Systems

The Technology Cabling Systems will be distributed throughout Central Plant and Central IT building via series of cable tray and conduits. Typical wall tele/data outlets shall consist of a double-gang back box (with single-gang mud-ring) with a 1-1/4" diameter solid metal conduit running from the outlet to nearest cable tray. A pull-wire shall be provided in each conduit to assist with the installation of cabling.

Structured Cabling System

The structured cabling system will be based on the following design guidelines and comply with the MiraCosta CCD's cabling standards:

a) The cabling system will be standards compliant (EIA/TIA 568A).

b) The system will provide universal access throughout the facility.

c) The cabling system will provide a high level of flexibility and resilience.

Horizontal Cable

Horizontal cable consisting of high performance (Category 6-small diameter) cabling will run from the MDF or IDF to each outlet. Two Cat 6 cables will be provided per typical tele/data outlet with each cable capable of supporting bandwidths of up to 1Gbps.

Wireless Access Point Cable

Wireless access point cable consisting of high performance (Category 6A) cabling will run from the MDF or IDF to each wireless access point. Two Cat 6A cables will be provided per typical wireless access point with each cable capable of supporting bandwidths of up to 10Gbps.

Backbone Cable

Backbone cabling between the Network Core Room and the IDF Rooms will consist of 25 pair Cat 5E copper cabling (for traditional voice and 'out-of-band' data) and a combination of 24 multimode (OM3) and 12 singlemode (OS1) optical fiber cable strands (for data).

Security Systems Equipment Design Standards

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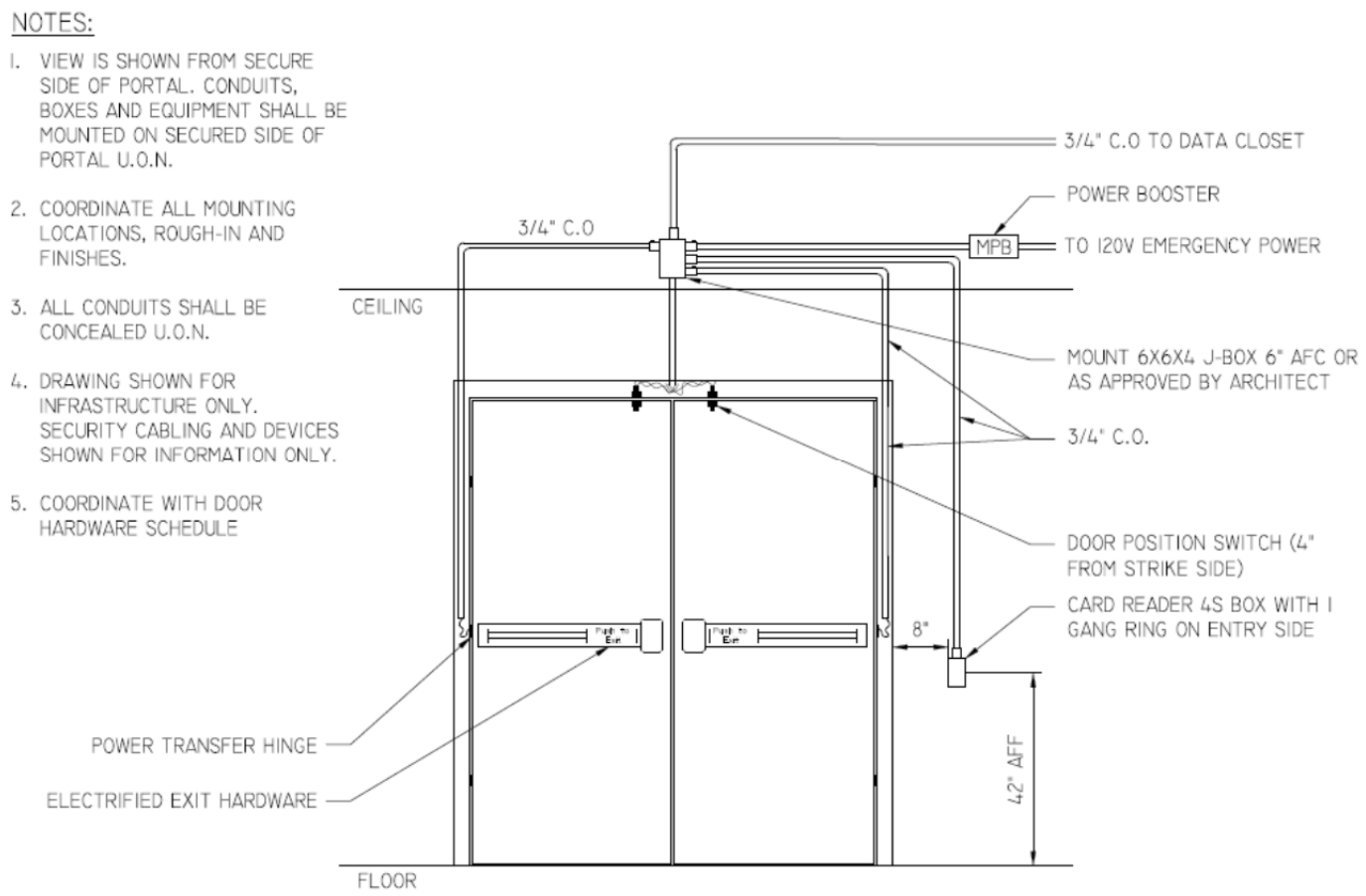

Figure 20 – Double Door Card Reader

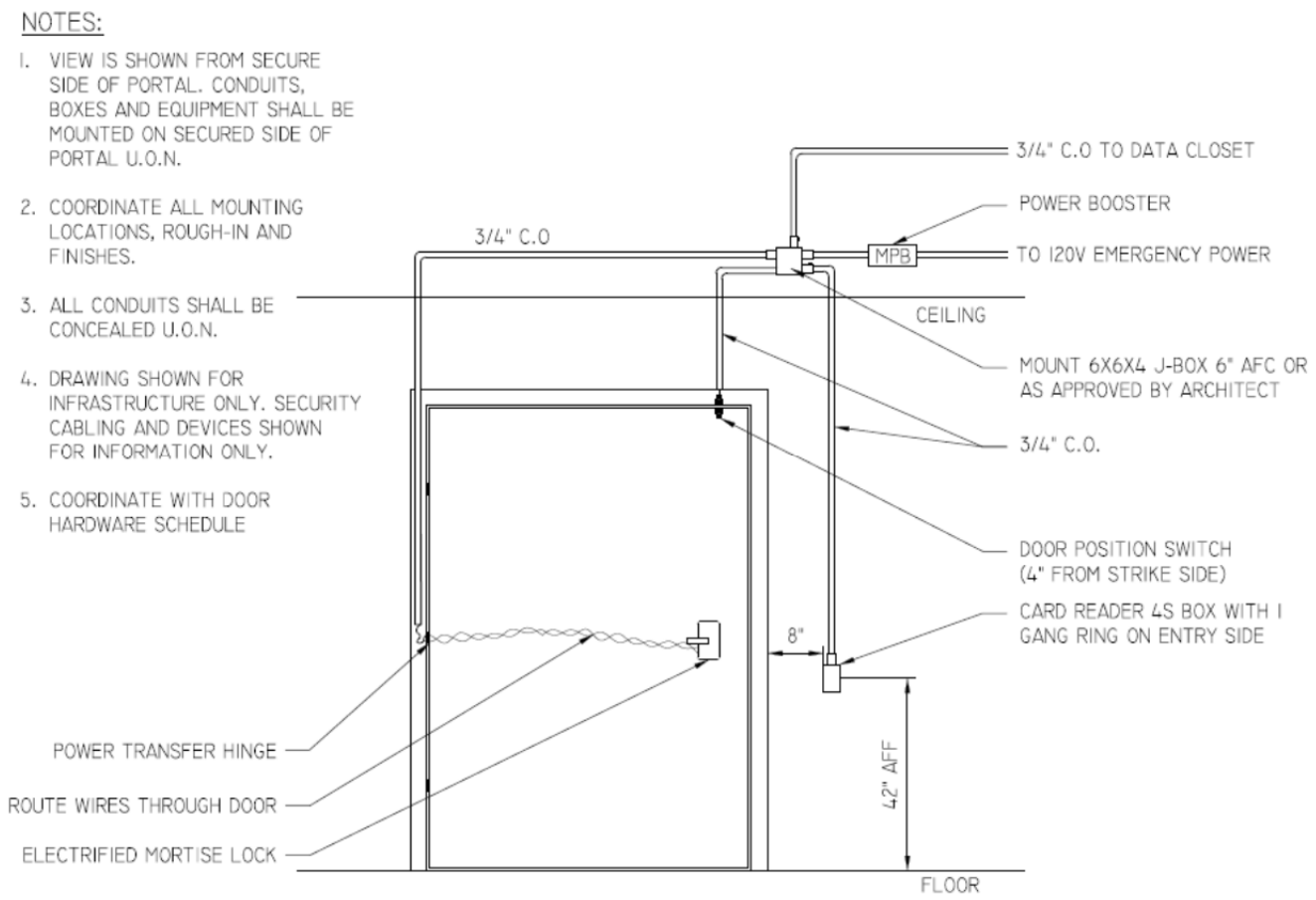

Figure 21 – Single Door Card Reader

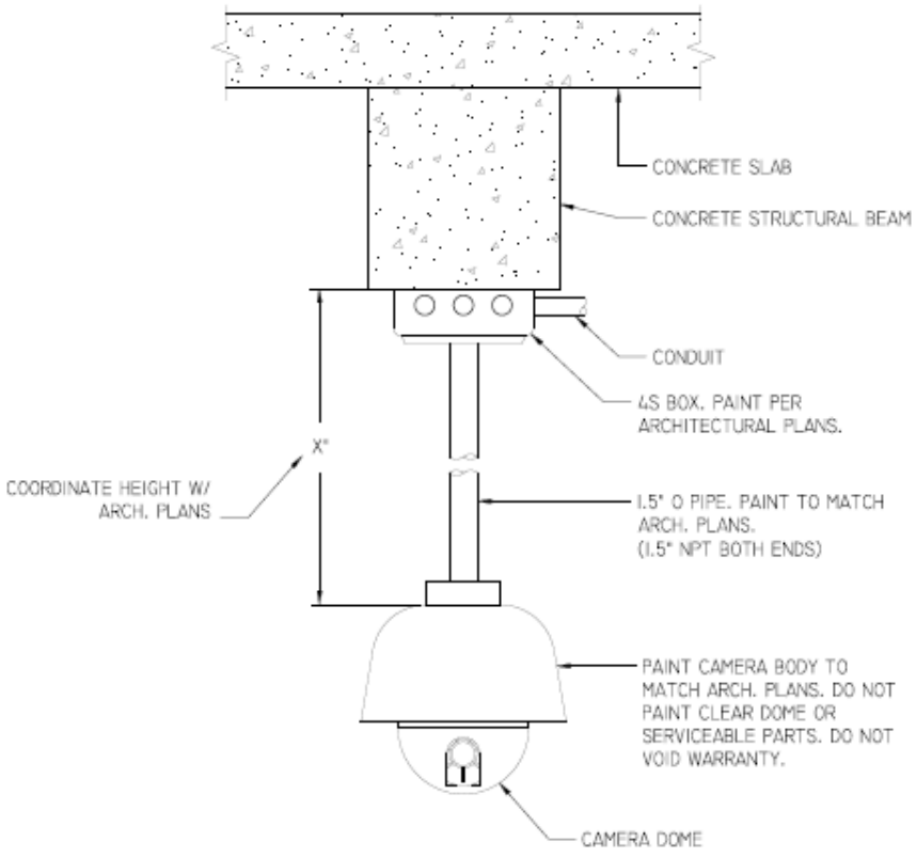

Figure 22 – Security Camera to Exposed Ceiling

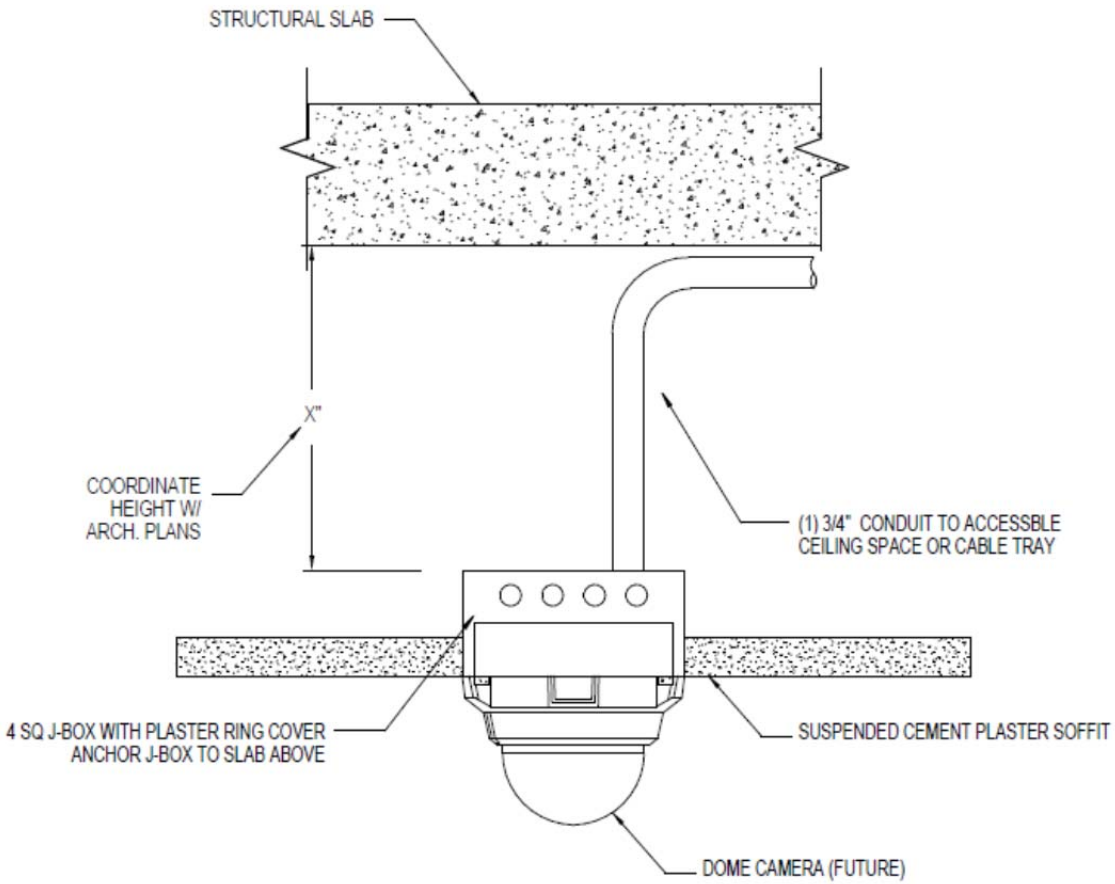

Figure 23 – Ceiling Mounted Security Camera

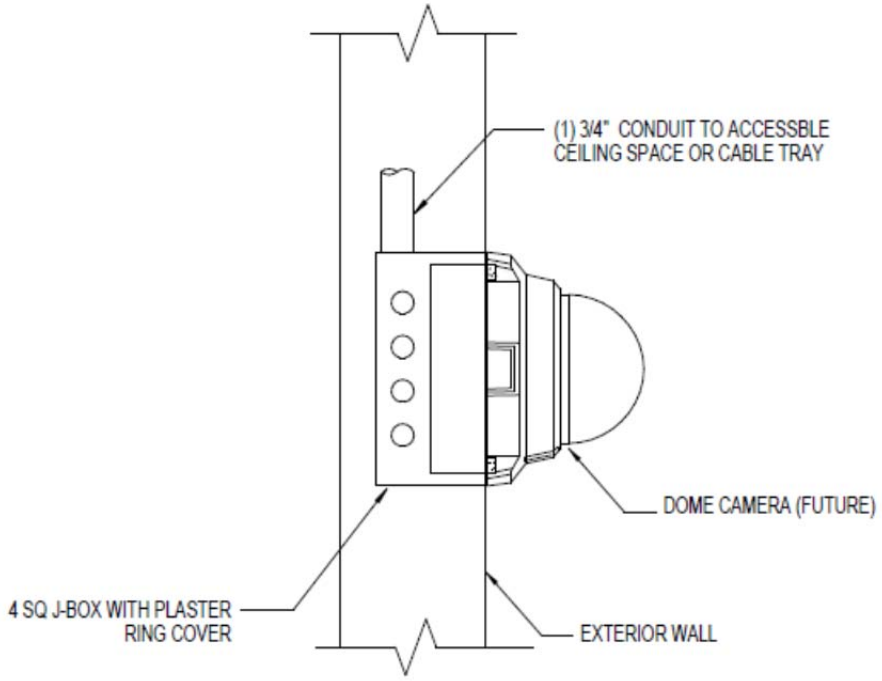

Figure 24 – Wall Mounted Security Camera