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Section 1. WIRELESS GUIDELINES

1.01 Design wireless access for coverage and high density. High density wireless within any space is defined as the maximum occupancy of the space

1.02 Ubiquitous wireless coverage which supports SBAC testing, voice and video inside any building and places where people gather on campus. Use five (5) Mbps of symmetrical throughput per device as a minimum guideline

1.03 At least one (1) access point shall be installed within each classroom. Each classroom must provide wireless access whereas at least seventy-five percent (75%) of actual maximum access point performance is available anywhere within that space

1.04 All office spaces must provide wireless access whereas at least seventy-five percent (75%) of actual maximum access point performance is available anywhere within that space

1.05 At least two (2) access points shall be installed within each multipurpose room, library and gym. All multipurpose rooms, libraries and gyms must provide wireless access whereas at least sixty percent (60%) of actual maximum access point performance is available anywhere within that space

1.06 All other rooms not defined above where people gather within or about a building must provide wireless access whereas at least fifty percent (50%) of actual maximum access point performance is available anywhere within that space

1.07 The wireless user roaming experience within a building shall be seamless

1.08 All wireless access points shall be designed, installed and tuned to provide maximum performance within the space

1.09 All exception requests must be submitted in the form of a Request for Information (RFI) to the District

1.10 The responsibility to meet this section requirements are the sole responsibility of the contractor

1.10 **INSTALLATION**

(A) Wireless Access Point

(1) Indoor & Outdoor WAP endpoint termination, see section 9.05 & 9.06.
(2) As close to the users as possible, in most cases in the center of the room
(3) Horizontally installed. Mounted twelve to sixteen (12-16) feet high from finished floor
(4) A minimum of twelve (12) inches away from any electronic equipment
(5) Patch cable holes in ceiling tiles no greater than three (3) inches from Access Point
(6) Patch cable penetration from Access Point into ceiling tile no larger than US dime
(7) Service loops: See Cabling Guidelines, service loops section

Section 2. CABLING GUIDELINES

2.01 COPPER

(A) All terminations shall conform to TIA/EIA 568B
(B) Category 6A cable and connectors shall be Belden System 10GX or equivalent. Cable must be small OD. Please check section 9.05, for Access Point termination connection side.
(C) Cable performance warranties shall be no less than twenty years. Warranties must be manufacturer certified
(D) No new pathways, including conduits shall have greater than a 35% initial max calculated fill
(E) Cable management shall be utilized whereas no excessive cable is visible. New installations shall be planned for initial max calculated fill ratio of 35% and a maximum of 50% in existing installations. Cable management including waterfalls at all conduits and rack systems must be installed as part of scope
(F) Cables shall be tied with Velcro or to cable management manufacturers recommended solution
(G) New or existing cables shall be routed through cable management. Whereas cable management does not exit it shall be provided as part of the scope of work.
(H) All horizontal cable must be contiguous and terminate into workstation outlets or patch panels
(I) All workstation outlets must be secured to a surface as to not allow any movement
(J) Cross-connect jumpers, modular plug cords and connectors should be of the same category or higher as the category of the cabling to which they are connected

(K) CATEGORY COMPLIANCE
(1) Category 6, All horizontal cable, associated patch cables and jacks
(2) Category 6A, All Wireless access point ethernet ports, associated patch cables and jacks

(L) SERVICE LOOPS
(1) Service loops may be located on the MDF / IDF backboard or contained in pathways (including ceilings) or racking systems if done in a neat, workmanlike fashion
  (a) MDF or IDF: 3 meters, figure eight pattern
  (b) End Points or Equipment Outlets: 1 meter

(M) MINIMUM INSTALLATION QUANTITIES
(1) Wireless Access Points: 1 (one) Category 6A cable, 1 (one) Category 6 cable
(2) All teaching stations:
  (a) 2 (two) Category 6 cables in individual equipment outlets spaced for computer workstations
  (b) 3 (three) Category 6 cables in a single equipment outlet for teachers station
(3) All offices: 2 (two) Category 6 cables for each desk
(4) MDF and IDF interconnect shall be with 25 pair Category 5e cable, terminated to a rack patch panel

2.02 PATCH PANELS COPPER

(A) Angled, 19” rack mount, loadable, 48 port, keystone-style
(B) A non-angled, loadable panel may be utilized if an obstruction limits the installation
(C) A 24 port, loadable panel may be utilized if space limits the installation
(D) Blank fillers shall be inserted in any outlet (path panel or faceplate) that is not occupied by a modular plug
(E) Strain relief mechanism shall be provided and utilized as part of scope

2.03 RACEWAY or CONDUIT

(A) Attach all raceway or conduit with screws placed no less than two (2) feet apart
(B) The use of raceway or conduit shall be limited only whereas an obstruction prevents access to walls or ceiling. All usage shall be confirmed with the District via a RFI form contained herein
(C) A plastic or nylon pull cord with a minimum test rating of 90kg (200 lb) shall be co-installed with the cable in conduit
(D) All penetrations through fire-rated structures shall be sealed with an appropriate fire stop system
(E) The design shall provide a suitable means for supporting cable from the telecommunications closet to the work areas to be served. Cable shall not be laid directly on ceiling tile or rails. A minimum of three (3) inches clear vertical space shall be available above the ceiling tiles for the horizontal cabling and pathway
(F) No electrical conduits or conductors shall be installed onto the ladder rack system where network cables are installed
(G) A suspended ceiling support rod or wire may be used to mount appropriate cable fasteners loaded

2.04 CABLE MANAGEMENT

(A) New or existing cables shall be routed through cable management. Whereas cable management does not exist it shall be provided as part of the scope. Two vertical cable managers shall be utilized for each rack
(B) Patch cables shall be installed to the length required for the application. Comply with ANSI/TIA/EIA-568-B; The cable geometry shall be maintained as close as possible to the connecting hardware and its cable termination points
(C) All cable management systems must be covered and closed during non-maintenance periods
(D) Where zone conduit or cable tray is not available in a suspended ceiling space and where telecommunications cables are allowed to be placed in the ceiling, adequate open-top cable support, located on forty-eight (48) to sixty (60) inch centers, shall be provided
(E) Ladder racks shall be installed to service all network racks. The installation shall conform to seismic safety standards as applied by the manufacturer

2.05 RACKS AND CABINETS

(A) All new installations of racks in MDF / IDF locations shall be nineteen (19) inch, four post, enclosed on all sides
(B) Conduit waterfalls shall be utilized as to maintain bend radius
(C) Ladder waterfalls shall be utilized to transition from ladder systems to racks
(D) Vertical and horizontal cable managers shall be utilized as to contain all excess cable within
(E) Electrical in MDF to each rack: One (1) L5-30R. All new electrical rack circuits shall be installed within rack twelve-fourteen (12-14) inches above finished floor. OR it can be mounted inside or above the rack within 8' to the floor.
(F) Electrical in IDF to each rack: One (1) L5-30R. All new electrical rack circuits shall be installed within rack twelve-fourteen (12-14) inches above finished floor. OR it can be mounted inside or above the rack within 8' to the floor.
(G) Installation shall comply with OSHA 1910.303(g)(1); Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment. Determination shall be at the sole discretion of the inspector of record
(H) All installed equipment shall utilize appropriate rails as to prevent sagging due to weight
(I) Grounding and bonding shall comply with ANSI J-STD-607-A. A contiguous cable must be installed from busbar to each rack utilizing an antioxidant compound to the connection point with two (2) hole compression lugs. A mechanical grounding connection is required at each joint of a ladder system
(J) New installations of patch panels and cabinets shall be planned for initial max calculated fill ratio of 75%

2.06 ABANDONED CABLES

(A) Comply with NEC 645(F); Abandoned cables must be removed unless they are contained in metal raceway

2.07 EQUIPMENT OUTLETS

(A) All cables not in a MDF / IDF shall terminate to a equipment outlet designed for the application

2.08 FIBER

(A) Able to support at least 10Gb up to 500 meters

(B) No new pathways, including conduits shall have greater than a 35% initial max calculated fill

(C) Cable management shall be utilized whereas no excessive cable is visible. New installations shall be planned for initial max calculated fill ratio of 30% and a maximum of 50% in existing installations

(D) Cables shall be tied with Velcro or to cable management manufacturers recommended solution

(E) New or existing cables shall be routed through cable management. Whereas cable management does not exit it shall be provided as part of the scope of work

(F) Cross-connect jumpers, modular plug cords and connectors should be of the same category or higher as the category of the cabling to which they are connected

(G) SERVICE LOOPS

(1) Service loops may be located on the MDF / IDF backboard or contained in pathways including ceilings.
   (a) MDF or IDF: 3 meters, circular pattern following manufacturers guideline
   (b) End Points or Equipment Outlets: 1 meter

(H) MINIMUM INSTALLATION QUANTITIES

(1) Backbone: Contiguous, single mode, 12 (twelve) pairs, distribution cable
(2) Equipment Outlets: Contiguous, single mode, 2 (two) pairs, distribution cable

(I) PATCH PANELS

(1) 19” enclosed rack mount, LC duplex termination
   (a) All breakout cables must be enclosed and secured within panel
   (b) Only outer jacket shall be visible from outside of enclosure
   (c) A cable manager shall be provided as to contain all cables within

(J) INSTALLATION

(1) LC duplex connections
(2) All terminations shall be completed by fusion method with a maximum insertion loss of 0.25dB
(3) Attach all raceway or conduit with screws placed no less than two (2) feet apart
(4) All pathway fiber must be clearly identified in MDF / IDF as such and contained within protective orange tube manufactured for the intended purpose

Section 3. LABEL STANDARDS

3.01 GENERAL GUIDELINES

(A) A list of all District Properties and their site names may be obtained from Section 1.
(B) All clarifications, must be submitted on RFI form 11.05
(C) Identifiers are required to distinguish the component within the space in which it is located
(D) Each cable and pathway must be labeled on both ends
(E) The marking shall be of sufficient durability to withstand the environment involved
(F) The identifiers design life shall be equal to or greater than that of the labeled component
(G) All external labels shall be legible and easily viewable during normal maintenance without ladders
(H) The text on labels shall be machine generated Times New Roman at least sixteen (16) point
(I) All labels shall meet at minimum UL969 legibility, defacement and adhesion requirements
(J) All labels must be traceable, permanent identifier; each cable and pathway must be labeled on both ends
(K) Use manufacturer provided labels and mounting surfaces if available
(L) Equipment Outlet (EO) / Station connections may be labeled on the face plate; and all jack, connector and block hardware can be labeled on the outlet or panel
(M) Cable shall be marked by manufacturer with segment-length indicators, category and fire rating

3.02 HORIZONTAL AND VERTICAL CABLE LABELS

(A) All cabling systems shall comply with a Class 4 installation per TIA-606-B
(B) Compliance with labeling conventions in this section are required

3.03 EQUIPMENT LABELS

Naming convention

Site (3-5) characters	Example MAD for Madera, MIR for Mira Vista
Building (2-3) characters	Example ADM for administration, MUS for Music, etc.
Room (1-3) characters	Example 05B, 015, LIB, IDF
MDF/IDF (3-4) characters	Example A122, IDF4, 0006
Port (3) characters	Example 002,023,012
Rack (3) characters	Example 001, 002, 003

(A) INTERNAL LABELS (description field within network equipment)

This section is for items such as switches, routers, etc. Any network device which accepts a description field. Examples are Cisco 4500X switches, Cisco 3702 series Wireless Access Points, etc.

(01) Host name field: SITE.BUILDING.ROOM-MDF or IDF-MODEL
(a) Example: MAD.ADM.LIB-MDF1-4500X
(b) Example: JFKHS.200.205-205-3702i
(c) Example: COR.CLC.014-013-3702i

(02) Active network ports: SITE.BUILDING.ROOM-MDF or IDF-MODEL
(a) Example: MAD.ADM.LIB-MDF1-3702i
(b) Example: LDJMS.00D.105-IDFD-DELLT3610
(c) Example:JFKHS.800.803-805-3702i
(a) Example: COR.CLD.029-028-3702i

(03) Non-active network ports: Shall be labeled "NONE"

(B) EXTERNAL LABELS (applied to the physical device)

(01) END POINT DEVICES / EQUIPMENT OUTLETS

All end point devices shall be labeled. These are generally defined as devices which are connected to the end of the network cable. Examples of such devices are printers, wireless access points, etc.

(a) NOT installed in MDF or IDF
ROOM.PORT
(01) Example: MAD.ADM.LIB/MDF1.002
(02) Example: MIR.0C1.006/IDFC.043

(b) Installed in MDF or IDF, Labeling of network devices (Switches / Routers)
(01) Front: Internal Host Name Field Label (see section 6.03(A)(01))
(02) Back: IP address of device

(02) RACKS AND CABINETS

(a) Label required on front and back on permanent part of the cabinet or rack
(b) If not labeled, provide label as follows:
ROOM.RACK or MDF/IDF.RACK
(001) Example: 244.001, 244.002, 244.003, 244.004, etc.
(002) Example: 002.001, 002.002, 002.003, etc.
(003) Example: IDF3.001, MDF.001, 236A.003, etc.

(03) CABLE PATCH PANELS

(a) Comply with Patch Panel Identifier as required by TIA-606-B
(b) If not labeled, provide label to TIA-606-B

(02) PATCH PANELS

(a) MDF/IDF.RACK
(001) Example: 002.001, 002.002, MDF.001, MDF.002, IDFA.001, IDFA.002

(03) PATCH PANEL PORT LABELS

(a) Wireless
fromROOM:CableID
(001) Example: 021:A, 021:B, 234:A, 234:B, 126:A, etc.
(b) Data
fromROOM:CableID
(001) Example: 021:001, 021:002, 021:003, 021:004

(04) ANTENNA LABELS

(a) All external antenna cables shall be labeled on both ends with a colored label
(01) Black 2.4Ghz, Blue 5Ghz, Orange dual band 2.4Ghz and 5Ghz

3.04 DEFINITIONS FOR THIS SECTION

(A) Site: A collection of buildings and grounds having legal contiguous interconnection
(B) Building: Individual structures within a Site
(C) Room: Location where equipment is installed
(D) MDF/IDF: Location where individual cable from equipment is terminated
(E) Port: Port number where cable is terminated onto patch panel
(F) Model: Manufacturer's model number
(G) End Point: Device physically attached to cable infrastructure

Section 4. COLOR STANDARDS

4.01 GENERAL GUIDELINES

Colors are used to indicate different applications
All surface mount conduits or raceways which are visible to the public must be painted to match the surface to which they are attached

4.02 HORIZONTAL AND VERTICAL CABLE

(A) Blue: Horizontal copper cable
(B) Black: Horizontal fiber cable

4.03 PATCH PANEL AND END POINT TERMINATION PORTS

(A) Blue: All network data ports
(B) White: Wireless Access Points (network ports)
(C) Green: Wireless Access Points (configuration port)

4.04 PATCH CABLES

(A) White: Wireless Access Point (network port)
(B) Green: Wireless Access Point (configuration port)
(C) Blue: Network data including telephone
(D) Red: Servers or any critical interface
(E) Black: HVAC, Signage, Lighting control or other specialized function
(F) Orange: Fiber

4.05 RACEWAY AND CONDUIT

(A) Color should match the surface to which it is attached
(B) Painting the raceway or conduit is an approved method to meet this standard.

4.06 ANTENNAS

(A) All external antennas shall be labeled with a colored dot or stripe near the base
(01) Black 2.4Ghz, Blue 5Ghz, Orange dual band 2.4Ghz and 5Ghz

4.07 SITE LABLE

Site #	Label	ELEMENTARY
	ALV	ALVARADO
104	BAY	BAYVIEW
108	CAM	CAMERON
105	CHA	CHAVEZ
110	COL	COLLINS
112	COR	CORONADO
115	DOV	DOVER
116	DOW	DOWNER
117	ELL	ELLERHORST
123	FAIR	FAIRMONT
124	FOR	FORD
125	GRA	GRANT
128	HAN	HANNA RANCH
127	HAR	HARDING
126	LUP	LUPINE HILLS
122	HIG	HIGHLAND
130	KEN	KENSINGTON
132	KIN	KING
134	LAK	LAKE
135	LIN	LINCOLN
137	MAD	MADERA
139	MIR	MIRA VISTA
140	MON	MONTALVIN
142	MUR	MURPHY
144	NYS	NYSTROM
145	OLI	OLINDA
146	OHL	OHLONE
147	PER	PERES
150	RIV	RIVERSIDE
	SER	SERRA
154	SHA	SHANNON
155	SHL	SHELDON
157	STG	STEGE
158	STW	STEWART
159	TAR	TARA HILLS
160	VAL	VALLEY VIEW
162	VER	VERDE
164	WAS	WASHINGTON
165	WIL	WILSON

Site #	Label	MIDDLE SCHOOLS
206	JCMS	CRESPI
208	LDJMS	LOVONYA DEJEAN
210	HMS	HELMS
211	HMH	HERCULES MIDDLE
214	KMS	KOREMATSU
212	PJHS	PINOLE MIDDLE

Site #	Label	HIGH SCHOOLS
352	DAHS	DE ANZA
354	ECHS	EL CERRITO
356	HHS	HERCULES H
360	JFKHS	J F KENNEDY
362	PVHS	PINOLE VALLEY
364	RHS	RICHMOND HIGH
369	MCHS	MIDDLE COLLEGE
358	GCHS	GOMPERS
373	VISTA	VISTA HILLS
374	NCCHS	NORTH CAMPUS

Site #	Label	ALT / CONTINUING
191	HAB	HARBOUR WAY
168	TRA	TRANSITION CCC
342	SHT	HOME TEACHING
785	NPS	NON PUBLIC
156	SPS	STATE PRESCHOOL

Site #	Label	OTHER
	FOC	FACILITIES
	ITC	INFORMATION TECH
	M&O	MAINTENANCE / OPER
	FSR	NUTRITION/ FOOD SRV
	STO	STORES WHEREHOUSE

Section 5. DESIGN GUIDELINES

5.01 **SNMP** (Simple Network Management Protocol) worksheet

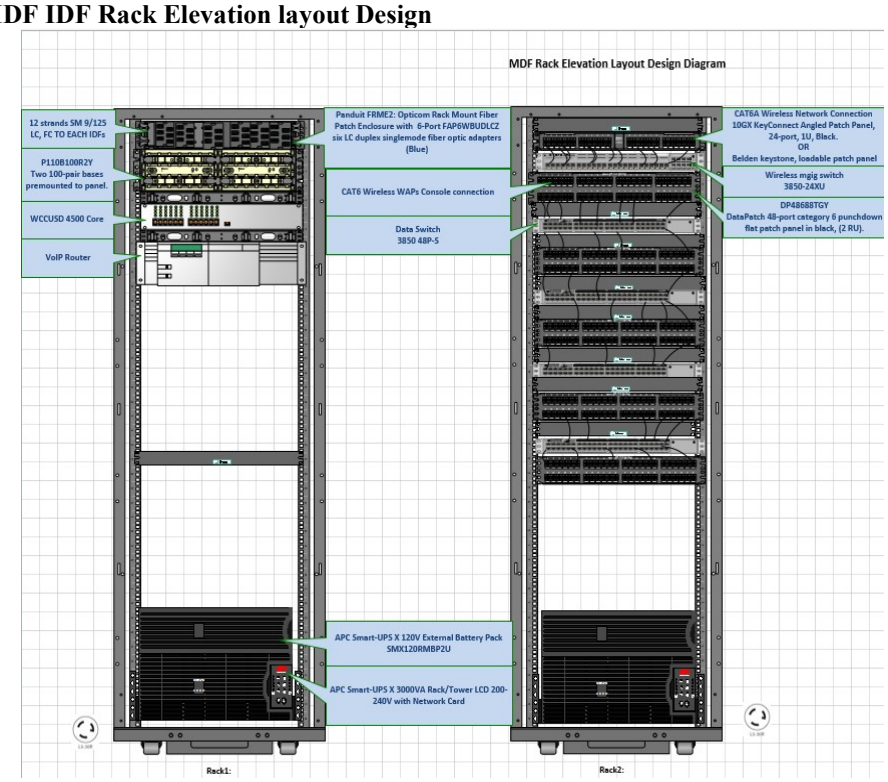
logging history errors
logging trap warnings
logging buffered 8192
logging host 10.57.1.190
access-list 97 permit 10.57.1.0 0.0.0.255
snmp-server community WCCD-SNMP RO 97
snmp-server community ( ) rw 97
snmp-server informs retries 10 timeout 30 pending 100
snmp-server enable traps
snmp-server system-shutdown
snmp-server tftp-server-list 97
snmp-server contact ITS@wccusd.net
snmp-server locaton (See(A) Site List – Label shall only include Site, Building, Room), Example: MAD.ADM.LIB,
Chassis-id: (Serial number of the device)
snmp-server enable traps snmp authentication linkdown linkup coldstart warmstart
snmp-server enable traps cpu threshold
snmp-server enable traps tty
snmp-server enable traps vtp
snmp-server enable traps flash
snmp-server enable traps vlancreate
snmp-server enable traps vlandelete
snmp-server enable traps envmon fan shutdown supply temperature status
snmp-server enable traps port-security
snmp-server enable traps entity
snmp-server enable traps config
snmp-server enable traps config-copy
snmp-server enable traps bridge newroot topologychange
snmp-server enable traps stpx inconsistency root-inconsistency loop-inconsistency
snmp-server enable traps syslog
snmp-server enable traps mac-notification change move threshold
snmp-server enable traps vlan-membership
snmp-server host 10.57.1.190 WCCD-SNMP !New Prime
snmp-server host 10.57.1.250 WCCD-SNMP !New Live Action
snmp ifmib ifindex persist

5.02 GENERAL NETWORK PARAMETERS WORKSHEET

DNS: 10.57.1.84, 10.57.1.85
Domain: wccusd.net
Clock: PST -8
NTP: 10.57.1.84
SMTP: mail.wccusd.net
SMTP port: 25
Contact name: helpdesk@wccusd.net 510-231-1125

banner motd ^c
****
*
* Access to this computer system is restricted to *
* official use by users authorized by the West Contra *
* Unified Costa School District. Unauthorized access *
* is strictly prohibited and can and will be prosecuted*
* to the fullest extent of the law. *
*
* West Contra Costa Unified School District may monitor *
* and disclose information on or about this system, *
* and you should have no expectation of privacy using *
* it. *
*
* Your continued use of the system constitutes *
* agreement to these terms. If you do not agree, *
* please disconnect immediately. *
*
****
^c

5.03 MDF IDF Rack Elevation layout Design



5.04 3800 WAP Plug

Terminate indoor 3800's access point as follow,

A- Network cable Cat6a

1. AP end (Connector A) 10GX REVConnect Modular Plug (RJ45) Part# RVAFPUBK.
2. Panel end (Connector B) 10GX REVConnect Jack - White Part# RVAMJKUEW.

B- Management cable Cat6

1. AP end (Connector A) Leviton Modular Plug, EZ-RJ45, 8P8P, Cat 6, Unshielded Part#47613-EZ6
2. Panel end (Connector B) REVConnect Jack - Green Part# RVAMJKUGN

5.05 Outdoor WAP Plug

Terminate outdoor 1560's access point as follow,

A- Network cable Cat6a

1. AP end (Connector A) L-COM 6A RJ45 Plug Small OD Conductors Part# TSP6188S
2. Panel end (Connector B) 10GX REVConnect Jack - White Part# RV6MJKSME

B- Management cable Cat6

1. AP end (Connector A) L-COM Cat6 STP RJ45 Plug Part# TSP8048C5S
2. Panel end (Connector B) Keystone Cat 6 RJ45 STP Jack Part# 1017-sf-09

Outdoor WAP OSP Cables Network and Console running from the wall to the WAP

1. Covered on the wall with Gang 4-Outlets 1/2 in. Threaded Weatherproof box
2. The cover Gang on the wall must be secured with Gang blank plastic cover
3. Must run in 1/2 in Non-Metallic liquid conduit from the Gang cover to the WAP using 1/2 in. Non-Metallic liquid tight push-on connector

Section 6. FORMS

This section contains forms which are to be used as needed.

6.01 BUILDING, ROOM, MDF / IDF LABELING WORKSHEET

The intent of this document is to provide contractor with naming conventions used to comply with Label Standards.

Site (3-5) characters
Building (2-3) characters
Room (1-3) characters
MDF/IDF (3-4) characters
Port (3) characters
Rack (3) characters

Site	Building	Room	MDF/IDF	Rack	Port	Notes
GRA	ADM	010	IDF3	002	16	GRA.ADM.010/IDF3.016 – End Point / Equipment Outlet

☐Authorized ☐Denied by_____on_____,District PM

☐Authorized ☐Denied by_____on_____,Contractor PM

Document Control #

6.02 INSTALLED CABLE CERTIFICATION

Brief description of project:

Contact information for person providing certification (print):

Full Name		PO#	
Phone		eMail	
Date		Company	

I hereby certify that this project meets the following cabling compliance standards:	
☐ Copper EIA/TIA 568B	☐ Exception authorized through document control #
☐ Category 6	☐ Exception authorized through document control #
☐ Category 6A	☐ Exception authorized through document control #
☐ Fiber Optic EIA/TIA 568C	☐ Exception authorized through document control #
☐ Plenum cable	☐ Exception authorized through document control #
☐ EIA/TIA-606-B labeling	☐ Exception authorized through document control #
☐ Twenty year performance warranty	☐ Exception authorized through document control #

Notes: Cable certification reports are still a deliverable. Notes:

Authorized Signature
Date

District use only: Assessment of the potential risk of non-compliance

☐ Authorized ☐ Denied by_____on_____, District PM

Document Control #