

GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD) DATA & FIBER CABLING PROJECT NEW SCIENCE BUILDING (NSB)

Introduction

Glendale Community College District is seeking proposals from qualified firms interested in providing Structured fiber, Cat6A data cabling Services and Cat3 analog cabling Services.

Summary

GCCD is in the process of constructing a new building within the Glendale Community College, Verdugo Campus. GCCD will be accepting Requests for Proposal (RFP) for voice, data, and fiber optic cabling system in accordance with the instructions of this Request for Proposal (RFP) and included drawings and specifications. The cabling project will consist a structured data, voice, fiber and video infrastructure cabling system. The scope of work and drawings document pertains to a five-story building.

The first floor will have the main MDF/MPOE, the other four floors will each consist of one IDF, each connecting to the MDF with copper, multimode and single mode fiber links. Station wiring on each floor will consist of Cat6A data cable as described in this RFP. Quantity and location of station cabling are identified in this RFP and Drawings.

Project Definition

The information outlined in this RFP shall serve as the guideline by which the successful Vendor (Contractor) will build the voice, data and fiber cabling infrastructure for Glendale Community College's New Science Building. Glendale Community College expects the successful bidder to be responsible for the delivery of a fully documented, tested and complete working project.

Qualifications

- List of references for the projects listed
- Project Team: Principal, designer, etc.
- List of (3) similar project experience, with images, duration and budget completion
- Proof of Professional Liability Insurance (\$1,000,000 single occurrence) General Liability \$2,000,000 Aggregate) and competed W-9
- Submit proposal via email to <u>Rocio Maldonado</u>, <u>Purchasing Manager at rmaldonado@glendale.edu</u>; and <u>Silva Sorkazian</u>, <u>Facilities Project Manager at ssorkazian@glendale.edu</u>.

Deadline

Submit proposal questions **no later than Friday, February 17, 2023 at 12 PM**. Electronic RFP responses **due no later than Tuesday, February 28, 2023 at 2 PM**.

Specific Qualifications Requirements

The Proposer and its proposed Sub-Contractor(s) must have a minimum of five (5) years of experience in the installation of structured voice and data cabling systems on projects of the size and scope of this project, preferably Department of State Architect (DSA) Approved.

The bidding company must provide satisfactory evidence of having successfully completed similar projects on time and on schedule. List minimum (3) projects in the last (5) years with verifiable owner references.

The bidding company must provide satisfactory evidence of the availability of local qualified workers to perform the task.

The bidding company is subject to prevailing pay wages rates pursuant to California Labor Code §1773, and register with the Director of the Department of Industrial Relations of the State of California.

The bidding company must show proof of current licensing with CA State License Board (CSLB).

The bidding company will be responsible for materials and verifying cable distances as per the scope and drawing specs.

The bidding company to provide a baseline schedule overlaying the provided construction schedule to achieve a January 2024 target completion date.

The bidding company will be responsible for materials and verifying cable distances as per the scope and drawing specs.

The bidding company shall be accountable for estimating labor hours and materials in relation the requested scope and drawings specs to allow a fully completed project as per the RFP and drawings.

Glendale Community College requests the bidder to submit a detailed scope of work and list of materials in a chart or spreadsheet similar to the following spreadsheets to allow the Glendale Community College IT Department to go through the bids and compare the accuracy and cable counts as per the GCCD Scope of Work (RFP) and the estimated bill of materials.

i declare under penalty of perjury under t	he laws of the State of California that the fore	going is true and
correct. Executed at:	, in the State of California, on	, 2023.
		
(Signature)		
(Print Name)		
		
(Title)		
(Name of Contractor)		

Sample scope of work

CATEGORY 6A CABLE PLACEMENT COUNTS FOR WALL & FLOOR STATIONS PER EACH FLOOR.

- Place, terminate and test (131) category6A data cables within the SC bldg. 1st floor.
- Place, terminate and test (426) category6A data cables within the SC bldg. 2nd floor.
- Place, terminate and test (445) category6A data cables within the SC bldg. 3rd floor.
- Place, terminate and test (230) category6A data cables within the SC bldg. 4th floor.
- Place, terminate and test (424) category6A data cables within the SC bldg. 5th floor.
- Place, terminate and test (4) category6A data cables within the Elevator room on roof floor.

CATEGORY 6A CABLE PLACEMENT FOR WAPS & CAMERAS PER LOCATION CHART.

- Place, terminate and test (49) category6A data cables within the SC bldg. 1st floor.
- Place, terminate and test (41) category6A data cables within the SC bldg. 2nd floor.
- Place, terminate and test (37) category6A data cables within the SC bldg. 3rd floor.
- Place, terminate and test (36) category6A data cables within the SC bldg. 4th floor.
- Place, terminate and test (32) category6A data cables within the SC bldg. 5th floor.

One category6A, plenum rated data cable will be pulled for each location, each data cable will be terminated with one ICC category6A RJ45 data jack at both ends.

Bidding companies are to submit the bid with a similar format as the one shown in this RFP. Scope of work to have as much possible detail room per room. Materials to be itemized. This will allowed GCCD to compare proposals.

1st Floor Category 6A Cable Placement for Walls & Floor Locations per Room.

1ST FL	LOCATION	1 VOICE	1 DATA	2 CABLES	WALL 4	X6	X8	X10	X12	TOTAL
SC100	CORRIDOR						_			
SC100.2	COLLAB									
SC101	LECT HALL									
SC102	SCIENCE ACAD									
SC103	CHECK OUT									
SC104	SHARED STOR									
SC105	MECHANICAL									
SC106	SHARED WASTE									
SC107	GEOLOGY LAB									
SC107B										
SC108A	LAB TECH									
SC109	BAJA									
SC112	OCEANGRAPHY									
SC113	ELECTRICAL									
SC114	EMERG ELECT									
SC120	OUTDOOR MEC									
SC121										
SC122	CHEM STORAGE									
CB1	TWO WAY COM									
TOTAL	# CABLES									

2ND FL	LOCATION	1 VOICE	1 DATA	2 CABLES	WALL 4	X6	X8	X10	X12	TOTAL
SC200.1	COLLOB									
SC200.5										

GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)
DATA & FIBER CABLING PROJECT
NEW SCIENCE BUILDING (NSB)

2ND FL	LOCATION	1 VOICE	1 DATA	2 CABLES	WALL 4	X6	X8	X10	X12	TOTAL
SC201	BIOL/ANATOMY	1 VOICE	1 DATA	2 CADLLS	W/\LL I	Λ0	7.0	X10	X12	TOTAL
SC201A	PREP									
SC201/1	GEN BIO LAB									
SC202A	PREP									
SC203	GEN BIO LAB									
SC203A	PREP									
SC204	IDF									
SC205	BIO PREP STOR									
SC205A	LAB TECH									
SC206	OFFICE									
SC207	VIVARIUM									
SC208	OFFICE									
SC209	PRESERVE SPEC									
SC210	OFFICE									
SC212	OFFICE									
SC214	OFFICE									
SC215	ELEC RM									
SC216	OFFICE									
SC218	OFFICE									
SC220	OFFICE									
SC221	GEN BIO LAB									
SC221A	PREP									
SC222	GEN BIO LAB									
SC223	GEN BIO LAB									
SC224	OFFICE									
SC225	PREP									
SC226	OFFICE									
SC227	GEN BIO LAB									
SC227A	PREP									
SC228	OFFICE									
SC229	ADMIN SUPPOR									
SC230	MEDIUM MEET									
SC231	DEPT CHAIR OFF									
SC232	OFFICE									
SC233	ADJUNCT FACUL									
SC234	OFFICE									
SC235	OFFICE							_		
SC240										
SC243										
ST-1-2										
CB1	TWO WAY COM									
TOTAL	# CABLES									

I	GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)
I	DATA & FIBER CABLING PROJECT
I	NEW SCIENCE BUILDING (NSB)

3RD FL		1 VOICE	1 DATA	2 CABLES	WALL 4	Х6	X8	X10	X12	TOTAL
SC300	CORRIDOR	1 10102	1 5/(1/(Z G IDEES	VV/LL 1	7.0	7.0	7(10	7(12	101712
SC301	BOITECH LAB									
SC301A	PREP									
SC302	MICROBIO LAB									
SC302A	PREP									
SC303	MICROBIO LAB									
SC303A	PREP									
SC304	IDF									
SC305	BIO SUPPORT									
SC306	OFFICE									
SC307	AUTOCLAVE RM									
SC307A	LAB TECH									
SC308	OFFICE									
SC309	CHEM STORAGE									
SC310	OFFICE									
SC311	CADAVER RM									
SC312	OFFICE									
SC313										
SC314	OFFICE									
SC316	OFFICE									
SC318	OFFICE									
SC319	ELEC RM									
SC320	OFFICE									
SC322	OFFICE									
SC324	OFFICE									
SC325	ANATOMY									
SC325A	PREP									
SC326	OFFICE									
SC327	ANATOMY									
SC327A	PREP									
SC328	OFFICE									
SC329	ANATOMY									
SC329A	PREP									
SC330	MED MEETING									
SC332	ADMIN SUPP									
SC333	OFFICE									
SC334	DEPT CHAIR									
SC335	ADJUNCT FAC									
SC336	OFFICE									
SC337	OFFICE				1					
ST-1-3	STAIRS									
CB1	TWO WAY COM									
TOTAL	# CABLES									

GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)
DATA & FIBER CABLING PROJECT
NEW SCIENCE BUILDING (NSB)

4TH FL		1 VOICE	1 DATA	2 CABLES	WALL 4	Х6	X8	X10	X12	TOTAL
6C400	MAIN HALL									
SC401	GEN CHEMISTRY									
SC402	GEN CHEMISTRY									
SC403	ACTIVE LEARN									
SC405	CHEM PREP									
SC405A	LAB TECH									
SC405B	ORG CHEM STOR									
SC405C	ACIDS & CORR									
SC406	IDF									
SC408	ORG CHEMISTRY									
SC411	ELEC RM									
SC414	CHEM SUPPORT									
SC416	ORG CHEMISTRY									
SC417	INTRUMENT RM									
SC418	ORG CHEM STOR									
SC419	MEETING RM									
ST-1-4	STAIRS									
CB1	TWO WAY COM									
TOTAL	# CABLES									
TOTAL	" CABLES									
5TH FL		1 VOICE	1 DATA	2 CABLES	WALL 4	X6	X8	X10	X12	TOTAL
SC500	COLLOB				1	1		1 1111		1
SC501	GEN CHEMISTRY									
SC502	PHYSICS LAB									
SC503	ACTIVE LEARNING									
SC504	CHEM PREP									
SC505	GEN CHEMISTRY									
SC506	IDF									
SC507	PHYSICS LAB									
SC508	PHYSICS LAB				+	1				1
SC515	ELEC RM					1				
SC517	PHYSICS LAB			+	+					+
SC517	PHYSICS SUPP				+	1				1
SC519A	LAB TECH					1				
SC520	MECHANICAL RM				+	+				+
ST-1-5	STAIRS									
CB1	TWO WAY COM					+				
TOTAL	# CABLES									
	# CADLES									
TOTAL										
	6TH	1 VOICE	1 DATA	2 CARLES	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	¥6	VΩ	V10	¥12	
ROOF	6TH ELEVATOR RM	1 VOICE	1 DATA	2 CABLES	WALL 4	X6	X8	X10	X12	

GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)
DATA & FIBER CABLING PROJECT
NEW SCIENCE BUILDING (NSB)

TOTAL								
TOTAL	CABLE COUNT							
				TOTAL C	TOTAL CABLES			

CATEGORY 6A CABLES COUNT FOR WAPS & CAMERA PER ROOM.

1ST FL	ROOM NAME	WAPS	PROJ	CAM INT	CAM EXT	2D EXTERIOR	EMERG P	TOTAL
1ST EXT	EXTERIOR BLDG							
SC100	CORRIDOR							
SC100.2	COLLAB							
SC101	LECT HALL							
SC102	SCINCE ACAD							
SC103	CHECK OUT							
SC105	MECHANICAL							
SC107	GEOLOGY							
SC108	LAB SUPPORT							
SC109	BAJA							
SC112	OCEANAGRAPHY							
SC113	MAIN ELEC							
SC116	OUT MENS							
SC120	OUT MECH							
SC121	STORAGE							
SC122								
TOTAL	CABLES							

2ND FL	ROOM NAME	WAPS	PROJ	CAM INT	CAM EXT	2 DATA EXT	EMERG P	TOTAL
SC200.1	COLLOB							
SC201	BIO ANATOMY							
SC200.6	COLLAB DOOR							
SC202	GEN BIO LAB							
SC202A	HALLWAY							
SC203	GEN BIO LAB							
SC203A	PREP							
SC205	BIO PREP STO							
SC206	OFFICE							
SC207	VIVARIUM							
SC210	HALLWAY COLUM							
SC217	CUST HALL							
SC221	GEN BIO LAB							
SC221A	PREP							
SC223	GEN BIO LAB	_						_
SC227	GEN BIO LAB							
SC227A	PREP							

GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)	Page 7 of 54
DATA & FIBER CABLING PROJECT	
NEW SCIENCE BUILDING (NSB)	

SC230	MED MEETING				
SC231	DEPT CHAIR OFF				
SC233	ADJUNT FACULTY				
SC243	HALLWAY				
TOTAL	# CABLES				

3RD FL	ROOM NAME	WAPS	PROJ	CAM INT	CAM EXT	2 DATA EXT	EMERG P	TOTAL
SC300.1	LOBBY							
SC301	BIOTECH LAB							
SC301A	PREP							
SC302	MICROBIO LAB							
SC303	MICROBIOLOGY							
SC305	BIOL SUPPORT							
SC306	OFFICE							
SC309	CHEM STOR HALL							
SC310	HALLWAY COLUM							
SC311	CADAVER RM							
SC322	HALLWAY							
SC325	ANATOMY							
SC325A	PREP							
SC326	HALLWAY							
SC327	ANATOMY							
SC329	PREP							
SC330	MEET/HALLWAY							
SC334	DEPT CHAIR OFF							
SC335	ADJUNT FACULTY							
TOTAL	# CABLES							

4TH FL	LOCATION NAME	WAPS	PROJ	CAM INT	CAM EXT	2 DATA EXT	EMERG P	TOTAL
SC400-1	CORRIDOR 1							
SC400.2	CORRIDOR 2							
SC401	GEN CHEMISTRY							
SC402	GEN CHEMISTRY							
SC403	ACTIVE LEARN							
SC405	CHEM PREP							
SC405B	ORG CHEMISTRY							
SC405C	ACID & CORR							
SC408	ORG CHEMISTRY							
SC414	CHEM SUPPORT							
SC416	ORG CHEMISTRY							
SC417	STUDENT RM							
SC418	ORG CHEMISTRY							
SC419	MEETING RM							

GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)
DATA & FIBER CABLING PROJECT
NEW SCIENCE BUILDING (NSB)

SC412	MAIN HALLWAY				
TOTAL	# CABLES				

CATEGORY 6A CABLE PLACEMENT FOR WAPS & CAMERA LOCATIONS PER ROOM.

5TH FL		WAPS	PROJ	CAM INT	CAM EXT	2 DATA EXT	EMERG P	TOTAL
SC500	HALLWAY							
SC500.2	HALLWAY							
SC501	GEN CHEMISTRY							
SC502	PHYSIC LAB							
SC503	ACTIVE LEAR							
SC505	GEN CHEMISTRY							
SC507	PHYSIC LAB							
SC508	PHYSIC LAB							
SC515	ELEC HALLWAY							
SC517	PHYSIC LAB							
SC519	PHYSI SUPPORT							
TOTAL	# CABLES							

Please provide your list of materials (this list is only an example) bidding company is responsible for all material to allow completion per the requested RFP drawings.

MDF SCOPE & LIST OF MATERIALS FOR FIRST FLOOR MDF SC119

- Provide and install (1) four-post, 19 1/884 1/330 "open bay rack
- Provide and install (2) two-post, 19 7x84 "open bay rack.
- Provide and install (4) 18 "ladder tray 6 "above the racks per drawing. Provide and install (4) 18 "wall support bracket for ladder tray.
- Provide and install (1) vertical ladder tray from floor to ladder tray above.
- Provide and install (1) adapter foot bracket for ladder tray.
- Provide and install (3) splice junction brackets.
- Provide and install (3) cable runway installation kit for rack & ladder tray
- Provide and install (3) 6 "two-sided vertical cable management
- Provide and install (1) 6 "vertical one-sided cable management.

 Provide and install (6) 2U two-sided horizontal cable management.
- Provide and install (1) 5U fiber patch panel
- Provide and install (1) 110/300 pair block
- Place customer PDU and UPS battery backup for this MDF.

SCOPE & LIST OF MATERIALS FOR THE SECOND FLOOR IDF SC204

- Provide and install ($\,2\,\,$) two post, 19 $\mbox{\%}84\,\mbox{"open bay rack.}$
- Provide and install (4) 18 "ladder tray 6" above the racks per drawing.
- Provide and install (4) 18 "wall support bracket for ladder tray.
- Provide and install ($\,^1$) vertical ladder tray from floor to ladder tray above. Provide and install ($\,^1$) adapter foot bracket for ladder tray.
- Provide and install (3) splice junction brackets.
- Provide and install (3) cable runway installation kit for rack & ladder tray
- Provide and install (3) 6 "two-sided vertical cable management
- Provide and install (13) 2U two-sided horizontal cable management.
- Provide and install (1) 5U fiber patch panel
- Provide and install (1) 110/100 pair block
- Place customer PDU and UPS battery backup.

GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)	Page 9 of 54
DATA & FIBER CABLING PROJECT	_
NEW SCIENCE BUILDING (NSB)	

SCOPE & LIST OF MATERIALS FOR THE THIRD FLOOR IDF SC304

- Provide and install (2) two post, 19 1/884 open bay rack.
- Provide and install (3) 18" ladder tray 6" above the racks per drawing.
- Provide and install (4) 18 "wall support bracket for ladder tray.
- Provide and install (1) vertical ladder tray from floor to ladder tray above.
- Provide and install (1) adapter floor bracket for ladder tray.
- Provide and install (2) splice junction brackets.
- Provide and install (1) vertical ladder tray wall brackets kit.

 Provide and install (2) cable runway installation kit for rack & ladder tray
- Provide and install (1) 2U fiber patch panel
- Provide and install (3) 6 ", two-sided vertical cable management
- Provide and install (13) 2U, two-sided horizontal cable management.
- Provide and install (1) 110/100 pair block
- Place customer PDU and UPS battery back.

SCOPE & LIST OF MATERIALS FOR THE FOURTH FLOOR IDF SC406

- Provide and install (2) two-post, 19 %84 "open bay rack.
- Provide and install (3) 18 "ladder tray 6 "above the racks per drawing.
- Provide and install (4) 18 "wall support bracket for ladder tray.
- Provide and install (1) vertical ladder tray from floor to ladder tray above.
- Provide and install (1) adapter floor bracket for ladder tray.
- Provide and install (2) splice junction brackets.
- Provide and install (1) vertical ladder tray wall brackets kit.

 Provide and install (2) cable runway installation kit for rack & ladder tray
- Provide and install (1) 2U fiber patch panel
 Provide and install (3) 6 ", two-sided vertical cable management
- Provide and install (7) 2U, two-sided horizontal cable management.
- Provide and install (1) 110/100 pair block
- Place customer PDU and UPS battery backup.

SCOPE & LIST OF MATERIALS FOR THE FIFTH FLOOR IDF SC506

- Provide and install (2) two post, 19 1/884 open bay rack.
- Provide and install (3) 18 "ladder tray 6" above the racks per drawing.
- Provide and install (4) 18 "wall support bracket for ladder tray.

 Provide and install (1) vertical ladder tray from floor to ladder tray above.
- Provide and install (1) adapter floor bracket for ladder tray.
- Provide and install (2) splice junction brackets.
- Provide and install (1) vertical ladder tray wall brackets kit.
- Provide and install (2) cable runway installation kit for ladder tray
- Provide and install (1) 2U fiber patch panel
- Provide and install (3) 6 ", two-sided vertical cable management Provide and install (10) 2U Panduit, two-sided horizontal cable management.
- Provide and install (1) 110/100 pair block
- Place customer PDU and UPS battery back.

VOICE RISER COPPER REQUIREMENTS (LINKS):

Bidding company is to provide (1) 25 pair cable from the MPOE MDF to each of four Riser floor IDF s. All cable pairs are to be terminated, labeled and tested.

- Provide and install (1) 25/24AWG Cat3, copper from MDF SC119 to 2nd floor IDF SC204.
- Provide and install (1) 25/24AWG Cat3, copper from MDF SC119 to 3rd floor IDF SC304.
- Provide and install (1) 25/24AWG Cat3, copper from MDF SC119 to 4th floor IDF SC406.
- Provide and install (1) 25/24AWG Cat3, copper from MDF SC119 to 5th floor IDF SC506.

DATA RISER CATEGORY6A REQUIREMENTS (LINKS):

Bidding company is to provide (6) Cat6A data links from the first floor MDF/MPOE to each of four Riser IDF s. Each cat6A data cable should be terminated on a Cat6A jack at both ends (MDF & IDFs) with a different color jack insert.

- Provide and install (6) category6A data cables from the 1st floor MDF to the 2nd floor IDF.
- Provide and install (6) category6A data cables from the 1st floor MDF to the 3rd floor IDF.
- Provide and install (6) category6A data cables from the 1st floor MDF to the 4th floor IDF.
- Provide and install (6) category6A data cables from the 1st floor MDF to the 5th floor IDF.
 Each category6A data cable will be terminated on ICC Category6A, RJ45 data jacks on both ends for all except for camera cables and all will be inserted on Patch panels.

RISER VOICE LINKS FROM 110 BLOCKS:

 Provide and install (2) analog Cat6A data cables from riser wall 110 blocks to the data rack/panel ports for voice links to all IDFs.

Each cable pair shall be terminate on its own RJ45 Cat6A jack and inserted on to a panel. There should be 8 voice jack insert links.

FIBER RISER CABLING (Single mode & Multimode OM4)

• Bidding company shall provide and install (1) 24 strand, single-mode & one 24 strand multimode OM4 fiber optic riser cable from MDF SC119 to each of the 4 floor IDFs.

Please provide your list of materials (this list is only an example) bidding company is responsible for all material to allow the requested per the RFP drawings.

Bidding company is to provide itemized list of materials and cost (This is an example only).

BILL OF MATERIALS

		DILL OF MATERIALS	
QTY	UOM	DESCRIPTION	SUB TOTAL
	Ft.	CAT6A 4PAIR PLENUM RATED CABLE	\$
	Ea.	ICC, RJ45 CAT6A, RED, JACK.	\$
	Ea.	ICC, RJ45 CAT6A, BLUE, JACK.	\$
	Ea.	ICC, RJ45 CAT6A, YELLOW, JACK.	\$ \$
	Ea.	ICC, RJ45 CAT6A, WHITE, JACK.	\$
	Ea.	ICC, 24 PORT CAT6A PANEL W/CABLE REAR SUPPORT	\$ \$
	Ea.	ICC, RJ45 CAT6A, VOICE GREEN, JACK.	
	Ea.	ICC, BISCUIT 1 PORT SURFACE	\$
	Ea.	ICC, PLATE, 6 PORT SURFACE BOX	\$ \$
	Ea.	ICC, FACEPLATE, 2 PORT FLUSH	\$
	Ea.	ICC, BISCUIT 2 PORT SURFACE	\$ \$
	Ea.	ICC, FACEPLATE, 1 PORT FLUSH	
	Ea.	ARLINGTON PLATE FUNNEL FEED	\$
	Ea.	ICC, FACEPLATE, 4 PORT FLUSH	\$
	Ea.	HORIZONTAL 2U CABLE MANGT	\$
	Ea.	CPI, VERTICAL TWO SIDED 6" MANGT	\$
	Ea.	CPI 19" X 84" OPEN BAY RACK	\$
	Ea.	CPI, RACK 4 POST OPEN BAY RACK	\$
	Ea.	CPI, VERTICAL ONE SIDED 6" MANGT	\$
	Ea.	LADDER TRAY 18" BLACK	\$
	Ea.	LADDER WALL BRACKET 18"	\$

GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)	Page 11 of 54
DATA & FIBER CABLING PROJECT	_
NEW SCIENCE BUILDING (NSB)	

Ea.	LADDER SPLICE JUNCTION KIT BLACK	\$
Ea.	LADDER J HOOKS BLACK	\$
Ea.	LADDER VERTICAL SUPPORT KIT	\$
Ea.	RACK TO RUNWAY BRACKET KIT	\$
Ea.	LADDER VERTICAL STRAP KIT	\$
Ea.	LADDER FOOT BRACKET KIT	\$
Ea.	J HOOK CABLE SUPPORT 3/4"	\$
Ea.	J HOOK CABLE SUPPORT 4"	\$
Ea.	J HOOK CABLE SUPPORT 2"	\$
Ea.	J HOOK CABLE SUPPORT 1"	\$
Ea.	CBL, 24AWG/25 PAIR RISER RATED,	\$
Ea.	110 BLOCK, 100 PAIR PUNCH BLOCK 5 PAIR	\$
Ea.	110 BLOCK, 300 PAIR PUNCH BLOCK, 5 PAIR	\$
Ft.	FIBER OM4, 24 STRAND ARMORED M/M PLENUM RATED	\$
Ea.	FIBER 24 STRAND ARMORED S/M PLENUM RATED	\$
Ea.	FIBER LC, S/M CONNECTORS	\$
Ea.	FIBER LC, M/M CONNECTOR	\$
Ea.	FIBER LC 24 PORT MULTIMODE MODULE	\$
Ea.	FIBER LC 24 PORT SINGLEMODE MUDULE	\$
Ea.	FIBER LC 2U PANEL, 4 SLOTS	\$
Ea.	FIBER PANEL 5U 6 SLOT	\$
	MATERIAL TOTAL	\$

TOTAL

LABOR \$
MATERIALS \$
SCISSOR LIFT RENTAL \$

TOTAL \$ (MUST FOLLOW CALIFORNIA PREVAILING WAGE RATE PAY)

SECTION 27 1013

DATA/TELEPHONE STRUCTURED CABLING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.2 CODES AND STANDARDS COMPLIANCE

- A. The system design described in this document and depicted in the attached drawing package is derived in part from the recommendations made in industry standard documents. The list of documents below are incorporated by reference:
 - 1. TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises.
 - 2. TIA-568-C.1 Commercial Building Telecommunications Cabling Standard.
 - 3. TIA-568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
 - 4. TIA-568-C.3 Optical Fiber Cabling Component Standard.
 - 5. ANSI/TIA/EIA-569-C-201 2 Commercial Building Standard for Telecommunications Pathways and Spaces.
 - ANSI/TIA/EIA-570C-2012, Residential and Light Commercial Telecommunications Wiring Standard.
 - 7. ANSIITIA/EIA-606B-201 2, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 - 8. ANSIIT1A/EIA-607B-201 1 Commercial Building Grounding and Bonding Requirements for Telecommunications.
 - 9. ANSI/11A-942 Telecommunications Infrastructure Standard for Data Centers.
 - 10. Building Industries Consulting Services, International (BICSI) Telecommunications Distribution Methods Manual (TDMM)—12th Edition.
 - 11. FCC Part 68.
 - 12. National Fire Protection Agency (NFPA) 70, National Electrical Code (NEC) 2011.
- B. If a conflict exists between applicable documents then the order in the list above shall dictate the order of precedence in resolving conflicts. This order of precedence shall be maintained unless a lesser order document has been adopted as code by a local, state or federal entity, and is therefore enforceable as law by a local, state, or federal inspection agency.
- C. If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents, the vendor is responsible to determine and adhere to the most recent release when developing the proposal for installation.
- D. Installers shall have read the above documents and shall be familiar with the requirements that pertain to this installation.

- E. The documents may be obtained from:
 - Global Engineering Documents, 15 Inverness Way East, Englewood, C), 80112-5776, 800-854-7179, fax: 303-397-2740, http://global.ihs.com/.
 - IEEE-Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY, 10017-2394, 800-678-IEEE, fax: 732-981-9667, http://standards.ieee.org/.

1.3 ASSOCIATED REFERENCES

- This document describes a system to be installed in accordance with recognized telecommunications industry cabling standards. Although the intent of the standard is to provide an application independent cable system, one or more of the following documents, describing specific network types and topologies, may be pertinent, the overall operation of the system and should be considered associated reference materials.
- B. ISO/IEC 8802-3 (IEEE 802.3).
- C. ISO/IEC 8802-5 (IEEE 802.5).
- D. ANSI X3T9.5 Fiber Distributed Data Interface (FDDI) Physical Medium Dependent (PMD).
- E. ANSI X3T9.5 Twisted Pair Physical Medium Dependent (TP-PMD).

1.4 SYSTEM DESCRIPTION

- Backbone Pathway: Conform to EIA/TIA, using conduit as indicated. A.
- В. Horizontal Pathway: Conform to EIA/TIA, using raceway and cabinets as indicated.
- Horizontal Distribution Cabling: Terminate using 568-B single-user enhanced Category 6A, 4- pair UTP cables complete from each jack (there are multiple jacks per outlet) to the associated intermediate distribution frame. Unless indicated otherwise on Drawings, Each outlet will have a minimum of 3 ea. Cat 6A cables with RJ45 connectors at the IDF. All cables
- D. Distribution Frames: Provide Chatsworth Adjustable Rail Server Rack square-punched 45U 84x23.62x23.62 P/N 15253-X03 4-post frame floor standing IDF rack.
- E. ICC P/N ICCMSCMRH7 7' Hybrid Cable Mgt. Rack, 12-24 screws, 19" Rack, 24" base, 2post Active Devices: Provided and installed by Owner.

1.5 SUBMITTALS

Shop Drawings: Include outlet and cabling labeling and identification scheme (Conforming to TIA/EIA-606A), floor plans indicating all outlets, racks and other and numbers; rack elevations showing all patch panels, wire management devices and space for all Owner supplied active devices: and all warranties.

54

B. Test Documentation:

- 1. Test documentation shall also be presented in electronic format, PDF file preferred. The test equipment by name, manufacturer, model number and last calibration date will also be provided at the end of the document. Unless a more frequent calibration cycle is specified by the manufacturer, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test. Testing submittals for manufacturer's warranty shall comply with manufacturer's requirements.
- 2. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.
- C. Provide detailed documents indicating the proposed grounding scheme.

1.6 PROJECT RECORD DOCUMENTS

- A. Record actual locations and sizes of pathways and outlets.
- B. Mark Project Record Documents daily to indicate all changes made in the field.
 - In addition to general requirements of Project Record Drawings, indicate on drawings, changes of equipment locations, alterations in raceway runs and sizes, changes in installation details, etc.
 - 2. Use red to indicate deletions and green to indicate additions.
 - 3. Use the same symbols and follow, as much as possible, the same drafting procedures used on the Contract Drawings.
- C. The installation contractor will obtain drawings at the start of the project. Anticipated variations from the building drawings may be for such things as cable routing and actual outlet placement. No variations will be allowed to the planned termination positions of horizontal and backbone cables, and grounding conductors unless approved in writing by the Owner. Contractor shall also redraw the site and floor plans showing all fiber, copper, racks, and information outlets as well as the labeling scheme for all items. These drawings shall be created using current versions of AutoCAD. A computer CD and the paper copies shall be turned over to the owner with the O&M manuals.

1.7 QUALIFICATIONS

- A. The Telecommunications Contractor shall be an approved ICC Installer for at least 90 days prior to project.
- B. The owner reserves the right to require the Contractor to remove from the project any such employee the Owner deems to be incompetent, careless or insubordinate.
- C. All clean up activity related to work performed will be the responsibility of the Low Voltage Contractor and must be completed daily before leaving the site.

1.8 PRE-INSTALLATION CONFERENCE

- A. Schedule a conference a minimum of five calendar days prior to beginning work of this section.
- B. Agenda: Clarify questions related to work to be performed, materials to be used, scheduling, coordination, etc.
- C. Attendance: Communications System installer, General Contractor, Architect, Owner's representatives, and other parties affected by work of this section.

1.9 W ARRANTY

A. Installation Warranty:

- Provide ICC system warranty covering the cabling system against defects in workmanship, components, and performance for "Lifetime" from the date of system acceptance. The warranty shall cover all labor and materials necessary to correct a failed portion of the system and to demonstrate performance within the original installation specifications after repairs are accomplished. This warranty shall be provided at no additional cost to the Owner.
- System shall be installed by an Authorized ICC Installer with greater than 6 months of
 experience installing the system. The ICC Authorized Installer must provide certificates
 of completion of the ICC Certification Course for technicians who will be installing the
 system.

B. Cable System Warranty:

- 1. A Lifetime Performance Warranty covering all components, equipment and workmanship shall be submitted in writing with the system documentation. The warranty period shall begin on the system's first use by the owner.
- 2. The project must be pre-registered with ICC before installation has begun and final testing submitted per ICC in original tester format.
- Should the cabling system fail to perform to its expected operation within this warranty
 period due to inferior or faulty material and/or workmanship, the contractor shall promptly
 make all required corrections without cost to the owner.

1.10 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish Products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.11 MAINTENANCE SERVICE

- A. Furnish service and maintenance of premises wiring for one year from Date of Substantial Completion.
- B. Installer will be notified of any defects in labeling and installation and a resolution to the problem is expected within 7 working days.

2.1 MANUFACTURERS

A. Manufacturer shall be ICC or ICC approved partner.

2.2 OUTLETS

- A. Telecommunications and Data Outlet Connector Module: Jacks: Eight-wire, eight-position, modular, Termination of all connectors shall be 110-type insulation displacement connectors (IDC). The connector shall provide a ledge directly adjacent to the 110-style termination against which the wires can be terminated and cut in one action by the installation craftsperson. Connector wiring is universal and will accommodate installation color codes for T568A and T568B wiring schemes. ICC module, cat6A, HD, red Ethernet jack p/n IC1078GARD. Match jacks to Category rating of attached horizontal distribution cable. Each jack shall be fed by a separate four pair cable sheath. All four pairs shall be wired to the jack.
- B. Faceplates: Icon-able 110 connect faceplates. Color White. Provide a minimum of four ports.
 Use duplex mounting straps as required in floor box or surface raceway applications. All modular jacks shall be oriented with the locking tab slot towards the floor.
 - 1. Faceplate: ICC faceplate, flat, 1 gang, 4 port, white p/n IC107F04WH.
 - 2. Blank Inserts: Provide blank inserts in all unused ports. ICC module, blank, 10 pack, white p/n IC107BN0WH.
- C. Faceplates for modular furniture to be supplied by installer and coordinated with district for install during/after furniture install.
 - 1. Exact part # to be coordinated with district.

2.3 DATA/TELEPHONE CABLES

A. Use:

- 1. CMP plenum rated cables in all air plenum spaces.
- 2. Use gel-filled type cable for exterior backbone, white, solid polyester rip cord, plenum rated. General cable 50-pair, 24 AW G, PE-86-AL, black, low density polyethylene, aluminum shield, etpr filling compound, alpeth telephone cable p/n 2036321.
- 3. Riser cables, Comtran 25-pair, 24 AW G, copper covered with an overall aluminum shield and tinned 24 AW G drain wire, copper, p/n 32670.
- 4. Fiber riser and outside plant cables as described on attached.

B. Data Cable:

- 1. Manufactured in compliance with TIA/EIA-568-A as applicable.
- 2. ICC cat6A, unshielded twisted pair (utp), solid cable, 23 AW G, 4 pair, 600mHz, plenumrated, blue p/n ICCABP6ABL.
- 3. Provide cable in full, factory packaged reels marked with the respective cable part number and lot number by the manufacturer.
- 4. Outdoor data cable to be used to all outdoor locations such as emergency phones, patio and courtyard data drops. Category 6A outdoor cable, General Cable Genspeed 6A Cat6A Outside plant cable, enhanced outdoor performance U/UTP, black, gel-filled p/n 8136100.

2.4 CROSS-CONNECT TERMINATION HARDW ARE

A. Category 6A Patch

- 1. Minimum Size: 24 port.
- 2. Wiring Pattern: T568B
- 3. Complete with label spaces, all modular jacks shall be oriented with the locking tab slot towards the floor.
- 4. Provide quantity of patch panels as required to accommodate all Category 6A UTP cables entering rack. Number of ports in panels to exceed required number of used ports by 20%
- Blank panel for 19" rack required HD jacks. ICC p/m IC107BP482 or IC107BP241 blank panel.
- B. Patch Cables: Single-Mode and Multi-Mode (OM4) Optical Fiber Duplex Patch Cords. Provide dual-fiber patch cables with LC type connectors on one end and LC connector on the other 3 meters in length for all new installations and LC type connectors on one end and LC connector on the other 3 meters in length for all new to existing installations, for each pair of single mode fiber installed. Provide10% spare cables to Owner.
 - 1. Category 6A patch cables: Provide one 5-foot and one 10-foot, unshielded cable blue in color, for each workstation jack.

PART 3 - EXECUTION

3.1 FIELD OUALITY CONTROL

A. All cables shall be furnished by the contractor in full, factory packaged reels. The reels shall be marked with the respective cable part number and lot number by the manufacturer. Upon request by the Owner, the contractor shall provide manufacturer's proof of compliance with the required manufacturing guidelines presented in the aforementioned standards. Each reel shall be visually inspected upon receipt and prior to installation to ensure that no damage was incurred during shipment. Any damaged cable shall be returned to the vendor/manufacturer for replacement. The cost for replacement cable shall be borne by the contractor. Any residual cable, in lengths greater than 500 feet, shall be delivered to the Owner and the Owner shall decide the disposition of the cable.

3.2 INSTALLATION

A. Horizontal Distribution Cabling:

- Install horizontal distribution cables from the MDF and IDF to all workstation data outlets
 as indicated on plans. Install one continuous horizontal cable from each data jack back
 to the associated MDF or IDF. If a data outlet has more than one jack, install one cable
 for each jack. Unless indicated otherwise on Drawings, install a minimum of 3 cables
 (Cat 6+) for each outlet indicated on the plans. Provide additional cables where
 specifically indicated on the plans.
- 2. Install all cable in conduit in in-accessible space. Otherwise, cable can be suspended without conduit in accessible ceiling space with J-hooks spaced no greater than 4' apart.
- Install cable in accordance with manufacturer's recommendations and best industry practices.

- 4. Do not fill cable raceways greater than the NEC maximum fill for the particular raceway type.
- 5. Conduit sizing:
 - Minimum of 1 inch conduit for each outlet. Each outlet shall be fed by a single home run conduit to accessible ceiling space or home run to communications closet.
 Daisy Chaining of outlets is not acceptable.
 - b. For conduits feeding a multiple outlet surface raceway the sizing shall be as follows:
 - 1) 1" for raceways 6' long and under.
 - 2) 1 1/2" for raceways 6' to 18' long.
 - 3) Multiple conduits to meet this pattern for lengths greater than 18'.
 - c. These specifications shall take precedence over conduit routing shown on the plans that deviate from this method. The data contractor shall bring any discrepancies to the attention of the owner before bid time.
- 6. Cables shall be installed in continuous lengths from origin to destination (no splices) unless specifically addressed in this document.
- 7. Where cable splices are allowed, they shall be in accessible locations and housed in an enclosure intended and suitable for the purpose.
- 8. Do not exceed the cable's minimum bend radius and maximum pulling tension.
- 9. Cable Not Installed In Conduit:
 - a. Cable may be installed exposed (not in conduit) only in readily accessible areas and only where indicated on the plans or in this specification.
 - b. When not installed in conduit, (per the plans and electrical specifications requirements), support all horizontal cables at a maximum of four-foot intervals.
 - c. At no point shall cable(s) rest on acoustic ceiling grids or panels, nor shall they be attached to ceiling grid wires.
 - d. Horizontal distribution cables shall be bundled in groups not greater than 40 cables. Bundles shall be supported by cable tray, conduit, trapezes, or multiple support straps.
 - e. Cable shall be installed above fire-sprinkler and systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
 - f. Under no circumstances shall cable be installed exposed (not in conduit) above enclosed (hard lid) ceilings, the use of access doors is not acceptable.
 - g. Cables shall not be attached to ceiling grid or lighting support wires. Where light support style wires for drop cable legs are required, the contractor shall install clips to support the cabling.
- Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.
- 11. Cables shall be identified by a self-adhesive label in accordance with TIA/EIA 606-A. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.
- 12. Unshielded twisted pair cable shall be installed so that there are no bends less than four times the cables outside diameter (4 X cable O.D) at any point in the run and at the termination field.
- 13. Pulling tension on 4-pair UTP cables shall not exceed 25-pounds for a single cable or cable bundle.
- 14. A minimum 6 inches of slack shall be left in the outlet box to allow at least one retermination.
- 15. All cables and their termination on each end shall be labeled per TIA/EIA. All labeling schemes and label designations shall be reflected on the CAD drawings at the end of the project and in the submittals. A bound copy of the cable designations showing the termination point by floor, room number and where in the room each patch panel jack is assigned shall be attached to the rack in each MDF & IDE.
- 16. CableTerminations:

- Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA document, manufacturer's recommendations and/or best industry practices.
- b. Pair untwist at the termination shall be per manufactures recommendation.
- c. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable. Conduits elbows must employ wide sweeps.
- d. The cable jacket shall be maintained as close as possible to the termination point.
- e. All modular jacks shall be oriented with the locking tab slot towards the floor.
- f. Data jacks that are in surface raceway shall be mounted in the proper termination plate by the manufacturer of the raceway to ensure that the customer gets a professional end product. These termination plates and trim are to be provided by the electrical contractor installing the raceway and power outlets to ensure that all outlets and trim will match.
- g. Each jack shall be fed by a separate four pair cable sheath. All four pairs shall be wiredto the jack using TIA/EIA-568-B wiring scheme.
- 17. Data cabling shall not occupy the same conduits as other low-voltage systems to ensure

the data network can be up-graded and expanded in the future without disturbing the other critical communications systems.

B. Data Outlets:

- 1. This section only applies to outlets not installed in surface raceway.
- 2. The outlet plate shall be affixed to an in-wall or surface mount box with two screws, which match the color of the outlet plate.
- 3. Wall mount boxes shall be attached to box eliminators, 4"X4" boxes, or old work boxes.
- 4. Install faceplates in a horizontal or vertical orientation as required.
- 5. Any unused faceplate positions shall be covered/filled with a blank insert made of the same or compatible material as the faceplate and shall be molded in the same color. Blank spaces shall be incorporated between populated positions on the faceplate.
- 6. Cables shall be coiled in the in-wall or surface-mount boxes. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. A minimum of 6 inches of slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack for these situations shall be neatly coiled in the ceiling above the drop location.

C. Labeling and Identification:

- All cables and their termination on each end shall be labeled per TIA/EIA. All labeling schemes and label designations shall be reflected on the CAD drawings at the end of the project and in the submittals. A bound copy of the cable designations showing the termination point by floor, room number and where in the room each patch panel jack is assigned shall be attached to the rack in each MDF & IDF.
- 2. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
- 3. All label printing will be machine generated using indelible ink ribbons or cartridges. Self- laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet labels will be the manufacturer's label provided with the outlet assembly.
- 4. Labeling at the workstation end will consist of destination of cable, rack number, patch panel number, port number. I.E. MDF-1-1-45.

D. Grounding and Bonding

1. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the

GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)	
DATA & FIBER CABLING PROJECT	
NEW SCIENCE BUILDING (NSB)	Data

- potential for acting as a current carrying conductor. The TBB shall be installed independent of the buildings electrical and building ground and shall be designed in accordance with the recommendations contained in the TIA/EIA 607 Telecommunications Bonding and Grounding Standard.
- 2. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the TC or ER shall be grounded to the respective TGB or TMGB using a minimum #6 AW G stranded copper bonding conductor and compression connectors. W here metallic panels attached to the rack to not have sufficient metal to metal contact to provide an adequate path to ground, they shall be bonded to the rack using a minimum #14 AW G copper conductor. The copper conductor size shall be upgraded based on the largest power conductor feeding any rack mount equipment. The conductor shall be continuous; attaching all isolated components in a daisy chain fashion from top to bottom and bonded to the rack using the appropriate compression connector.
- 3. The electrical contractor shall provide a #6 building ground wire to each data rack from the corresponding building grounding electrode system. This ground will be connected to the MDF or IDE grounding bus for the grounding of all the telecommunications equipment.
- 4. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and buss-bars shall be identified and labeled in accordance with the System Documentation Section of this specification.
- 5. The TBB shall be designed and/or approved by a qualified PE, licensed (actual or reciprocal) in the state that the work is to be performed. The TBB shall adhere to the recommendations of the TIAIEIA-607 standard, and shall be installed in accordance with best industry practices. Installation and termination of the main bonding conductor to the building service entrance ground, at a minimum, shall be performed by a licensed ClO electrical contractor.

E. Firestop Systems:

- 1. A firestop system is comprised of: the item or items penetrating the fire rated structure; the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise an effective block for fire, heat, vapor and pressurized water stream.
- 2. All penetrations through fire rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating items i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.
- 3. Firestop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE), licensed (actual or reciprocal) in the state where the work is to be performed. A drawing showing the proposed firestopped system, stamped/embossed by the cognizant PE shall be provided to the Owner's Technical Representative prior to installing the firestop system.
- 4. All firestop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the District inspector prior to cable system acceptance.

3.3 TESTING

A. All cables and termination hardware shall be 100% tested for defects in installation to verify cable performance under installed conditions. All conductors of each installed cable shall be verified useable by the contractor prior to system acceptance. Any defect in the cable system installation including but not limited to cable, connectors, feedthrough couplers, patch panels,

and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

- B. Category 6A cables shall be certified to meet or exceed the Category 6A specifications set forth in TIA/EIA-568-C Certifications shall include the following parameters for each pair of cable
 - 1. W ire map (pin to pin connectivity)
 - 2. Length (in feet)
 - 3. Attenuation
 - 4. NearEndCrosstalk(NEXT)
 - 5. Far End Crosstalk (FEXT)
 - 6. ELFEXT
 - 7. Attenuation/Crosstalk Ratio (ACR)
 - 8. Return Loss
 - Propagation Delay
 - 10. Delay Skew

C. Copper.

- 1. Each cable shall be tested for continuity on all pairs and/or conductors. Coaxial cables shall be tested for continuity, opens shorts and resistance using a volt/ohm meter (VOM) and installed length using a Time Domain Reflectometer (TDR). Twisted-pair voice cables shall be tested for continuity, pair reversals, shorts, and opens using a "green light" type test set. Twisted-pair data cables shall be tested for the all of the above requirements, plus tests that indicate installed cable performance. All category 6A cables shall be tested to ensure the category 6A standard performance is complied with. All tests shall be printed out in hard copy in the quantity called out in the general specifications for O&M turn over documents as well as one disc copy for the owners use. These data cables shall be tested using a (Class VI) cable analyzer.
- 2. Continuity
 - a. Each pair of each installed cable shall be tested using a "green light" test set that shows opens, shorts, polarity and pair-reversals. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test set in accordance with the manufacturers recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
- 3. Length:
 - a. Each installed cable shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the TIA/EIA-568-A Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the longest pair length shall be recorded as the length for the cable.
- 4. Performance Verification:
 - a. High speed unshielded twisted pair (UTP) data cable shall be performance verified using an automated test set. This test set shall be capable of testing for the continuity and length parameters defined above, and provide results for the following tests:
 - 1) Near End Cross-Talk (NEXT)
 - 2) Attenuation
 - 3) Ambient Noise
 - 4) Attenuation to Cross-Talk Ratio (ACR)
 - b. Test results shall be automatically evaluated by the equipment, using the most upto-date criteria from the TIAIEIA Standard, and the result shown as pass/fail. Test

results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed test results shall include all tests performed, the expected test result and the actual test result achieved.

D. Fiber Testing – TBD.

3.4 CABLE SYSTEM ACCEPTANCE

- A. The Owner's Technical Representative will make periodic reviews of the project in progress. One review will be performed at the conclusion of cable pulling, prior to closing of the false ceiling, to verify the method of cable routing and support, and the firestopping of penetrations. A second review will be performed at completion of cable termination to validate that cables were dressed and terminated in accordance with TIA/EIA specifications for jacket removal and pair untwist, compliance with manufacturer's minimum bend radius, and that cable ends are dressed neatly and orderly.
- B. Final Review: Upon completion of the project, the Owner's Technical Representative will perform a final review of the installed cable system with the Contractor's Project Foreman. The final review will be performed to verify that all horizontal and backbone cables were installed as defined in the drawing package, and that the installation meets the aesthetic expectations of the Owner.

3.5 TEST VERIFICATION

A. Upon receipt of the test documentation, the Owner reserves the right to perform spot testing of a representative sample of the cabling system to validate test results provided in the test document. Owner testing will use the same method employed by the contractor, and minor variations will be allowed to account for differences in test equipment. If significant discrepancies are found the Contractor will be notified for resolution.

3.6 SYSTEM PERFORMANCE

A. During the four week period between final inspection and delivery of the test and as-built documentation, the Owner will activate the cabling system. The Owner will verify operation of the cabling system during this period. Attach to substrates as required to support applied loads.

3.7 GENERAL DATA REQUIREMENTS

- A. Data Wiring Closet Requirements:
 - 1. Size of Wiring Closets (minimum size closet for a single rack is 8'x10', closets with more racks would require larger space). See TIA-569-C Standard.
 - 2. Power available in Wiring Closets. Two separate 120V 20A circuits, each with wall quad outlets near the edge of the racks. Typically at 72" above floor.

- Racks in Wiring Closets (grounded) with cable ladders overhead and on walls as necessary and adequate clearance
- 4. Dedicated Air Conditioning (24hour) in wiring Closets
- 5. Fire rated Backboards (8' tall) on all walls in Wiring Closets painted white (do not paint over fire rating sticker or stamp).
- 6. Grounding Bus Bar in Wiring Closets exclusively for Data purposes.
- 7. No overhead plumbing, ducting, etc in Wiring Closets. Open Ceiling OK in Wiring Closet (no dropped ceiling or T-Bar required). See TIA-569-C Standard.
- 8. Lockable fire rated doors in Wiring Closets (no closets with flimsy cabinetry style doors)
- 9. Minimum 2 each 4" Conduits between main Wiring Closet and each sub-Wiring Closet
- 10. All end stations served by a wiring closet should be within 200' of wiring Closet
- 11. Dedicated Wiring Closets, none shared with electrical closets (fire alarm/life safety equipment OK). See TIA-569-C Standard.
- 12. Separate dedicated conduits for fire alarm/life safety
- 13. Main Closet provided with a minimum of 2 each 4" conduits to outside connections (manholes).
- 14. Uninterruptible Power Systems provided in wiring closets. Unless expressly deleted.
- 15. Data/Signal Conduits to enter closet next to walls, not in center of room or under racks.
- 16. Adequate lighting to be provided on all sides of racks (front and back in particular).
- 17. Electrical convenience outlets on wall in front, behind and next to racks.
- 18. MDF and IDFs on each floor should be stacked directly above each other if possible.
- Provide adequate size and number of sleeves into ceiling space for workstation wiring to enter wiring closet.
- 20. Minimum one wiring closet per floor.
- 21. Provide six (6) Cat 6A riser cables between main IDF and each sub-IDF. Terminated in Cat 6A patch panels.
- 22. Copper cable entering the building to be protected by Entrance Enclosure and Protectors.
- 23. Twenty-four (24) strand single mode fiber at entry point building closet to Campus Core using Sumitomo Future Flex Airblown System.
- 24. Twenty-four (24) strand single mode fiber between main IDF and sub-IDF's (riser fiber).
- Twenty-four (24) strand multi-mode fiber between main IDF and sub-IDF's (riser fiber)
 OM4.
- 26. Twenty-four (24) strands multi-mode OM4 fiber at entry point building closet to Campus Core using Sumitomo Future Flex Airblown System.
- 27. Sumitomo Airblown Fiber for fiber entering building. Two (2) two-cell tube cables at building entrance to Campus Core in Library Building.

B. Office Requirements

- 1. Two Data Jacks on one wall plate on each of three wall outlets in each one-person office (total6 jacks) minimum.
- 2. Three data Jacks per outlet preferred (for a total of 9 jacks per office).

C. Classroom Requirements:

- 1. Total of 15 data drops in each classroom:
 - a. Two in ceiling for Wireless Access Point.
 - b. One in ceiling for Projector.
 - c. Two to server instructor lectern.
 - d. One for Audio/Video Controller in wall near lectern.
 - e. One for Classroom Telephone on wall near lectern.
 - f. Two behind each wall mounted TV, for a total of 8 data drops for 4 TVs. See below.
- 2. Quad J-Box attached to main beam in center of classroom above dropped ceiling for Wireless Access Point Mounting. Avoid locating J-Box near ducting and other obstructions that could interfere with radio signals from the Wireless Access Point.
- 3. All 4 walls of the classroom to be reinforced for mounting large flat screen TVs. Provide Power near TV mount locations. Provide Data J-Box (large Hubbell type HBL263).

Provide 2" conduit to ceiling space above TV to Hubbell J-Box, and continuing down to an additional HBL263 J-Box at 18" above floor under TV. Continue 2" conduit to under floor if using a raised floor. Provide Power at 18".

4. Fixed seating lecture halls, amphitheaters to be wired with 120v outlets for charging devices.

D. Other:

- 1. Emergency Phones (wall mount and towers).
- 2. Elevator Phones.
- 3. AccessControlPanels.
- 4. Security Cameras.
- 5. Emergency Speaker System.
- 6. Fire Alarm Data drop(s).
- 7. Building Mgt. System data drop(s).
- 8. Lighting Systems data drops(s).
- 9. Outdoor Data Cable to be used for all data connections outside of the building, such as emergency phone towers, etc.

3.8 PARTNUMBERS AND SPECIFICATIONS

A. Communication Rooms:

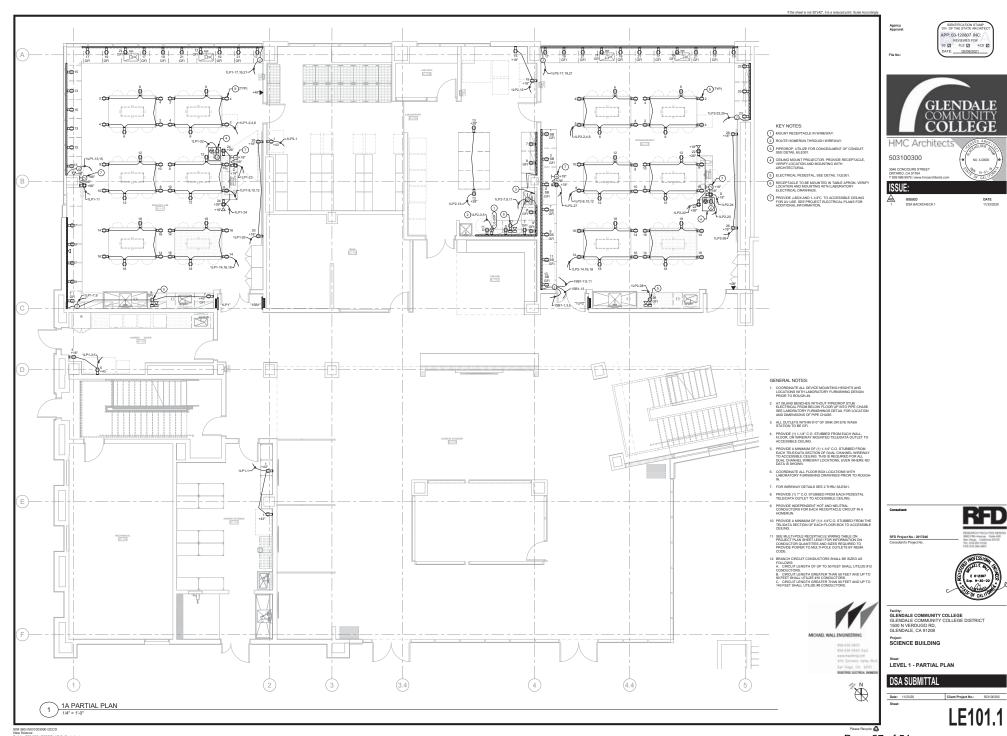
- 1. Racks:
 - a. ICC P/N ICCMSCMRH7 7' Hybrid Cable Mgt. Rack, 12-24 screws, 19" Rack, 24" wide base, 2- post.
- 2. Ladders and Rack Accessories:
 - a. ICC P/N ICCMSLST10 Ladder Rack Runway, 10', 12"x10', Black
 - b. ICC P/N ICCMSLPECK Runway End Caps (2 ea.).
 - c. ICC P/N ICCMSLEBSK Runway Butt Splice Kit.
 - d. ICC P/N ICCMSLAWSK Runway W all Support Angled Kit.
 - e. ICC P/N ICCMSLRRBK Runway Relay Rack Bracket Kit.
 - f. ICC P/N ICCMSLVWBK Runway W all Bracket (2 ea.).
 - g. ICC P/N ICCMSLTJSK Runway Tee-Junction Splice Kit (2 ea.).
 - h. ICC P/N ICCMSLTWSK Runway W all Support Triangle Kit.
 - i. ICC P/N ICACSGKS00 Grounding Kit.
- 3. Fiber Optic Enclosures:
 - a. ICC P/N ICFODE41WM 4-Panel Fiber Optic W all Mount Enclosure.
 - b. ICC P/N ICFORET4RM 12-Panel Fiber Optic Rack Enclosure, 4 Rack Units.
 - c. ICC P/N ICFORE31RM 3-Panel Fiber Optic Rack Enclosure, 1 Rack Unit.
- 4. Fiber Optic Adapter Panels for Enclosures:
 - a. ICC P/N ICFOPL161G Multi-mode LC Fiber Adapter Panels loaded with 12-duplex Ceramic Sleeve Adapters, Supports up to 24 Fibers, Aqua 10G.
 - b. ICC P/N ICFOPL16BK Single-mode LC Fiber Adapter Panels Loaded with 6-duplex Ceramic Sleeve Adapters, Supports up to 12 Fibers, Blue SMF/MMF.
- 5. Category 6A Patch
 - a. ICC P/N IC107BP482 48-port Cat 6A Blank Patch Panel for 19" Rack, 2 Rack Unit, (requires HD Jacks).
 - ICC P/N IC107BP241 24-port Cat 6A Blank Patch Panel for 19" Rack, 1 Rack Unit (requires HD Jacks).

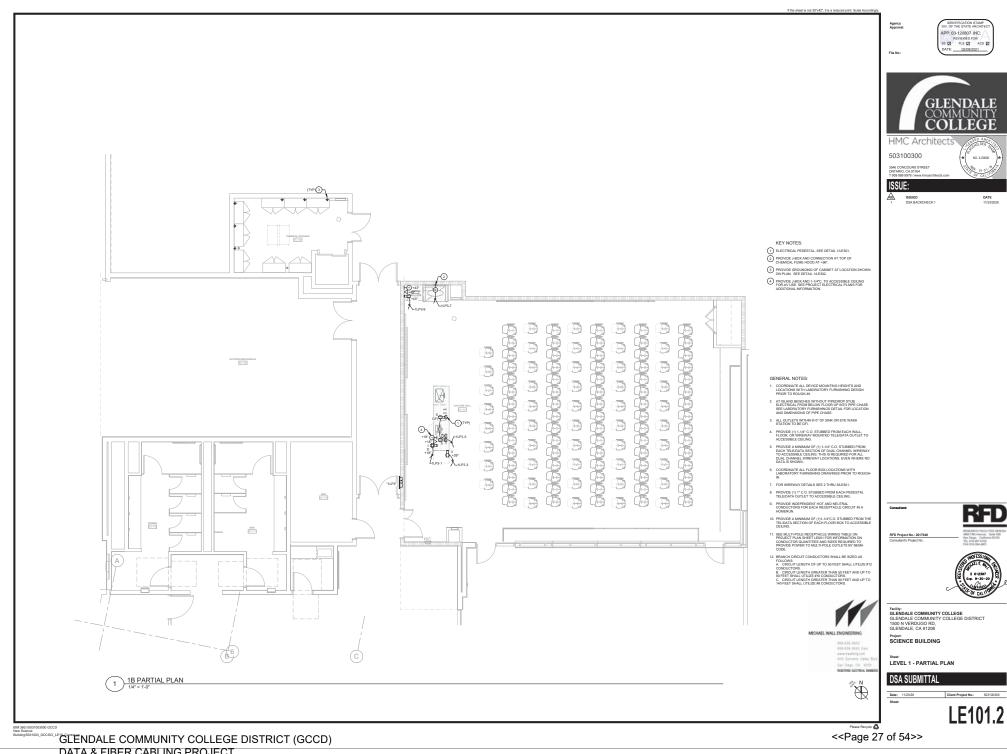
B. Station Wiring and Modules:

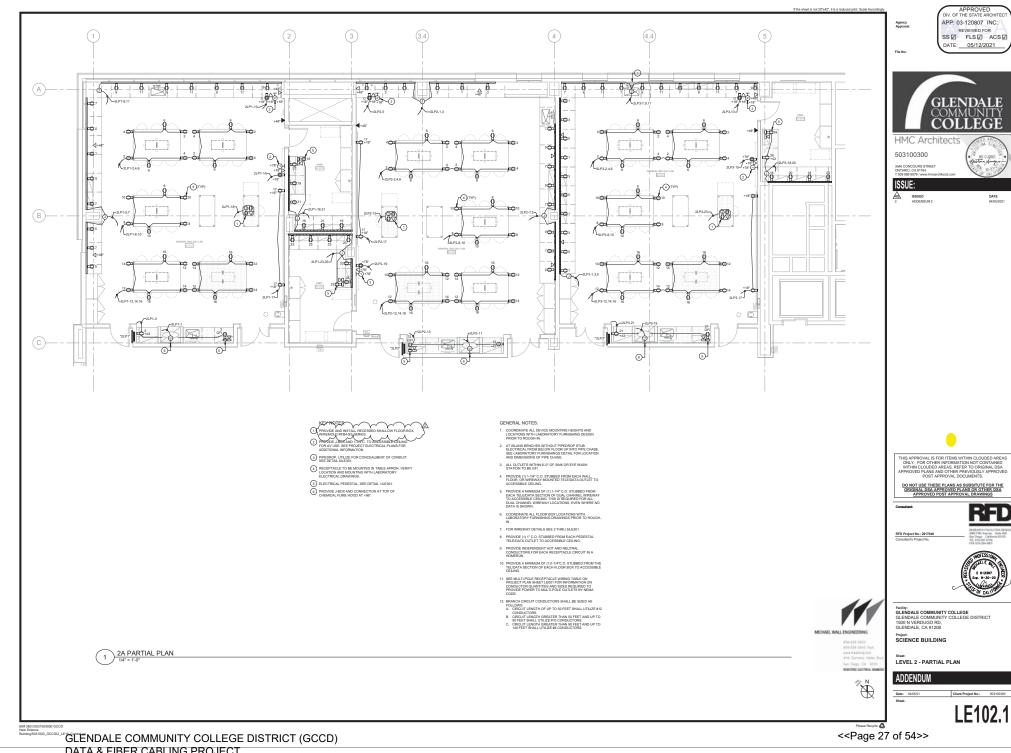
- Category 6A Cable, Faceplates and
 - a. ICC P/N IC107F02WH Faceplate, Flat, 1-gang, 2-port, White (accommodates two Cat 6A receptacle modules).
 - b. ICC P/N IC107F04WH Faceplate, Flat, 1-gang, 4-port, White (accommodates four Cat 6A receptacle modules).
 - c. ICC P/N IC107BNWH Module, Blank, 10 PK, White.

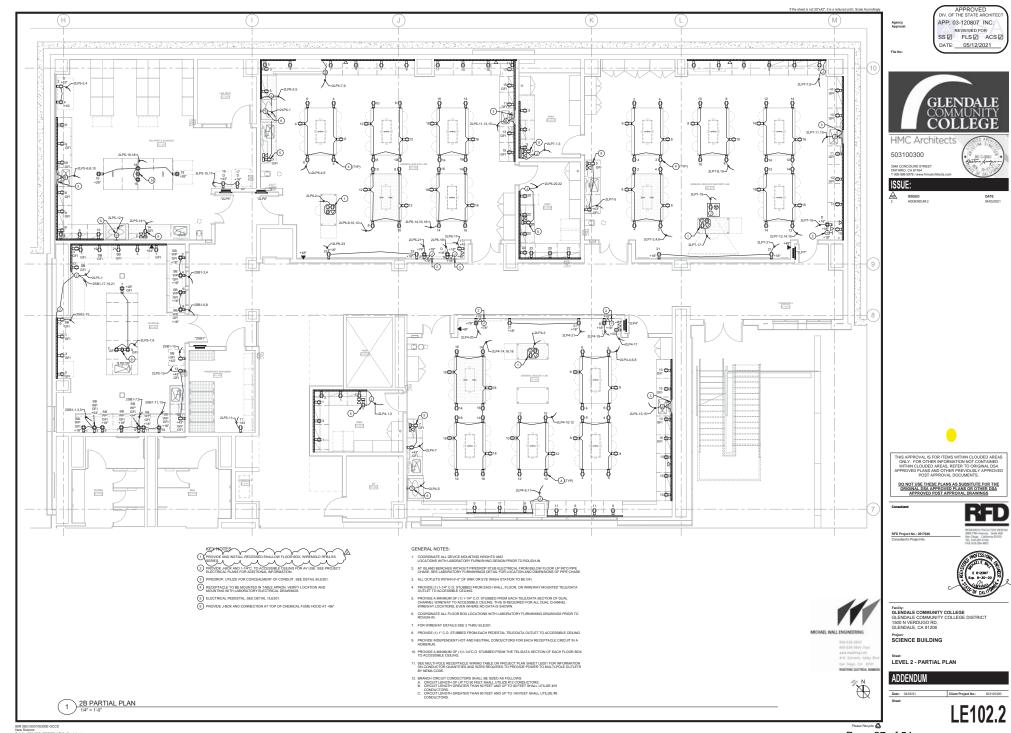
- d. ICC P/N IC1078GARD Module, Cat 6A, HD, Red Ethernet Jack.
- e. ICC P/N ICCABP6ABL Cat 6A, Unshielded Twisted Pair (UTP), Solid Cable, 23 AW G, 4 pair, 600 MHz. Plenum Rated, Blue.
- C. Copper Riser Cable and Outside Plant Cable and Accessories
 - 1. Copper Riser Cable:
 - a. COMTRAN P/N 32670 25-pair, 24 AW G, White, Solid bare copper, pairs cabled with an overall Aluminum/Polyester shield and a 24 AWG Solid Tinned Copper Drain W ire, Rip Cord, Plenum Rated.
 - 2. Copper Outside Plant Cable:
 - a. General Cable P/N 2036321 50-pair, 24 AW G, PE-89-AL, Black, low density Polyethylene, Aluminum Shield, ETPR Filling Compound, Alpeth Telephone Cable 3M P/N 4460-D Scotchlok Grounding Clamp (up to 100 pair), for 50-pair Alpeth Cable, Shield Bond Connector.
- D. Copper Building Entrance Enclosures and Protectors:
 - CIRCA P/N 1880ECA1-50SS2 Building Entrance Terminal with Cover populated with standard 5-pin 4B1S-300 Digital 300V Protector Modules for standard POTS lines. Includes 50 modules.
- E. 110 Wiring Blocks and Accessories:
 - 1. ICC P/N IC110W F100 W all mount with feet, 100-pair, 110-type wiring block.
 - 2. ICC P/N IC110LHLDR Label Holders for 110-type Wiring Block (6 pcs.).
 - 3. ICC P/N IC110CB4PC 4-pair Connecting Block for 110-type wiring block (pack of 100).
 - 4. ICC P/N IC110CB5PC 5-pair Connecting Block for 110-type wiring block (pack of 100).
- F. Fiber Optic Cable:
 - 1. Riser Fiber Optic Cable:
 - AFL P/N CP0249841001-AIAP 24 Strand, Single Mode OS2, Armored Tight Buffered.
 - b. AFL P/N CP024L841001-AIAP 24 Strand, Multi Mode OM3 Armored Tight Buffered.
 - 2. Outside Plant Fiber Optic Cable Bundles and Accessories:
 - a. Sumitomo P/N TC02TOX FutureFlex Airblown 2-Tube Cable.
 - b. Sumitomo P/N FB24G55 50/125, OM4, 550 Meter Multi-mode, 24-fiber FutureFlex Optical Cable.
 - c. Sumitomo P/N FB24SX OS2, Single-mode, 24-fiber FutureFlex Optical Cable.
 - d. Sumitomo P/N FT01RU3P 1U Termination Unit Holds 1 Splice Tray and 3 Adapter Panels (1-36 cap).
- G. Miscellaneous:
 - 1. Innerduct Tubing (Orange), 1.5 inch corrugated for fiber in risers
 - 2. Necessary Fiber Breakout Kits and splice boxes as required.
- H. ManufacturerContacts:
 - 1. 3M: 3M, http://www.3m.com
 - 2. CIRCA: CIRCA Enterprises Inc., http://www.circaent.com
 - 3. Comtran: Comtran Cable, http://comtrancorp.com/
 - 4. AFL: AFL Global, http://www.AFLglobal.com
 - 5. Corning: Corning Cable Systems, http://www.corning.com/cablesystems.
 - 6. General Cable: General Cable Technologies Corp., http://www.generalcable.com
 - 7. ICC: ICC Corporation, http://www.icc.com
 - 8. Sumitomo: Sumitomo Electric Lightwave Corp., http://www.futureflex.com/

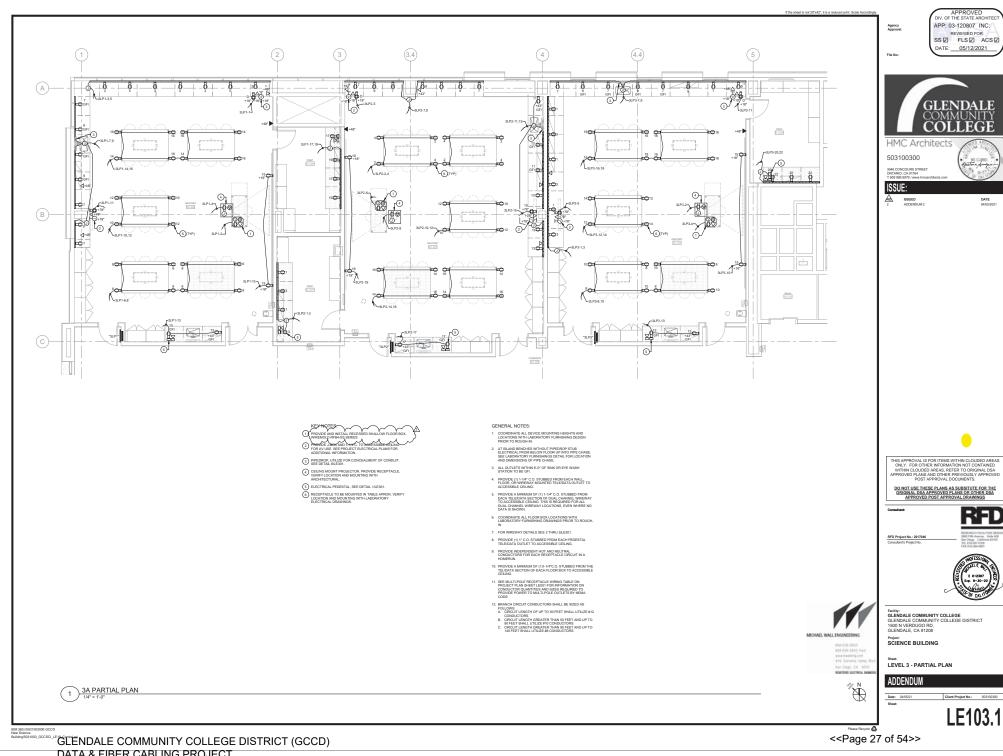
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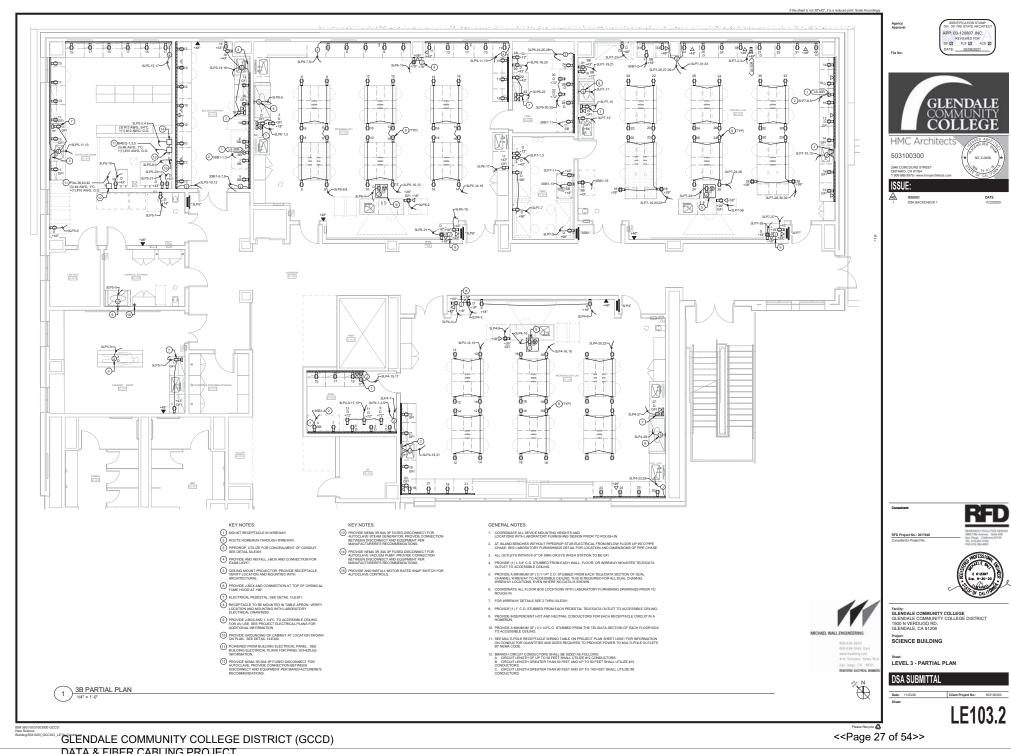


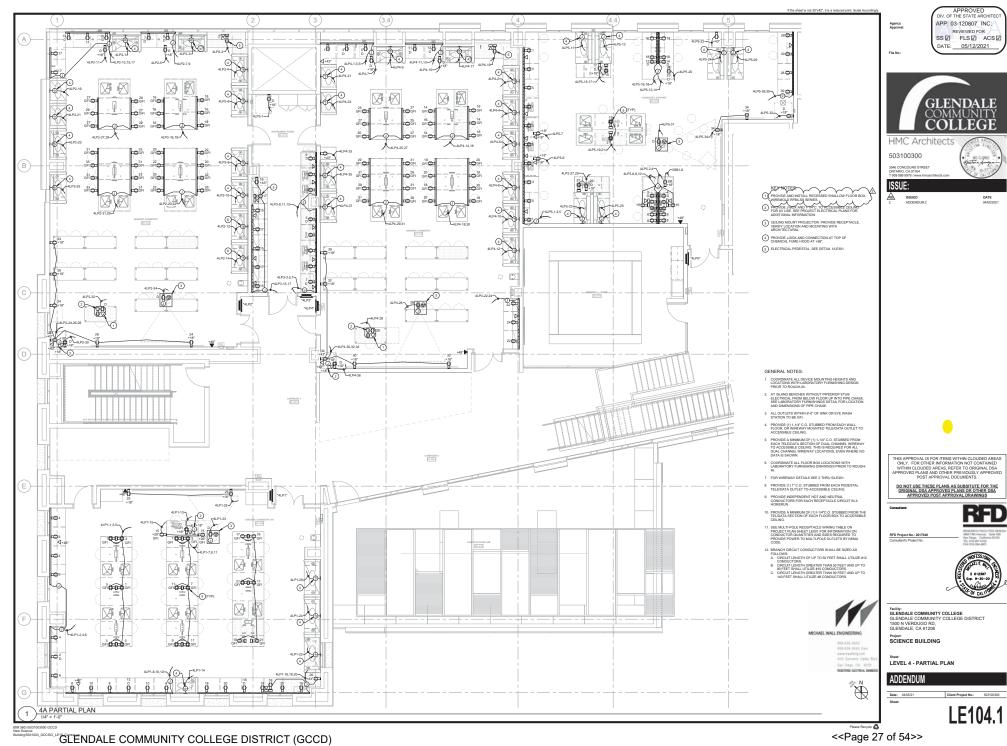


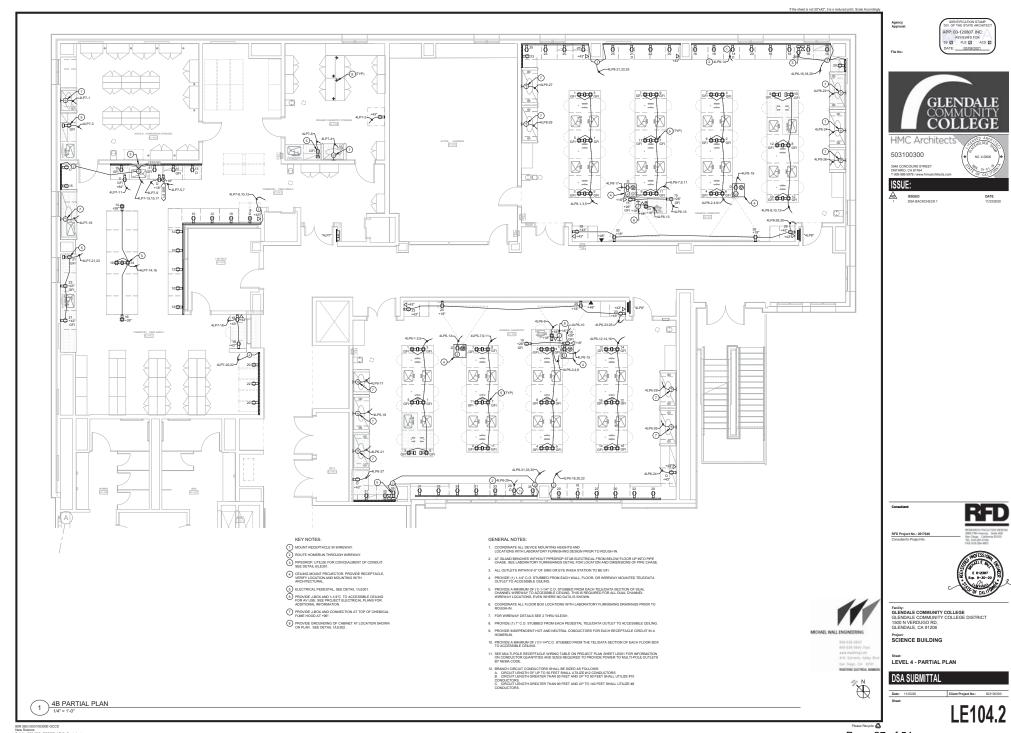


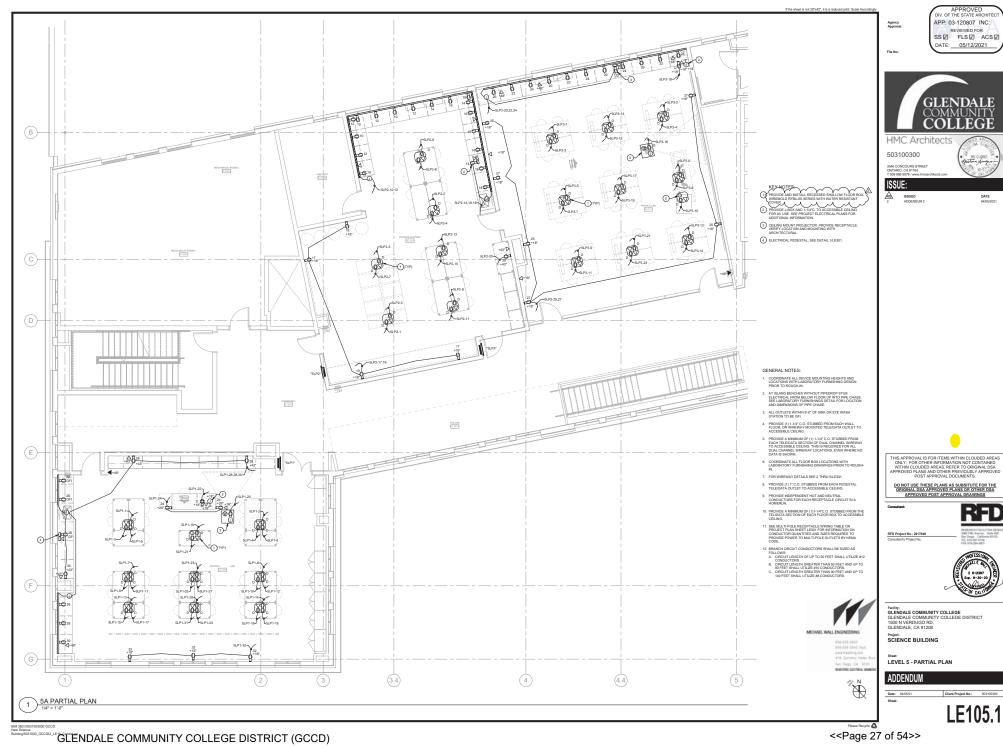


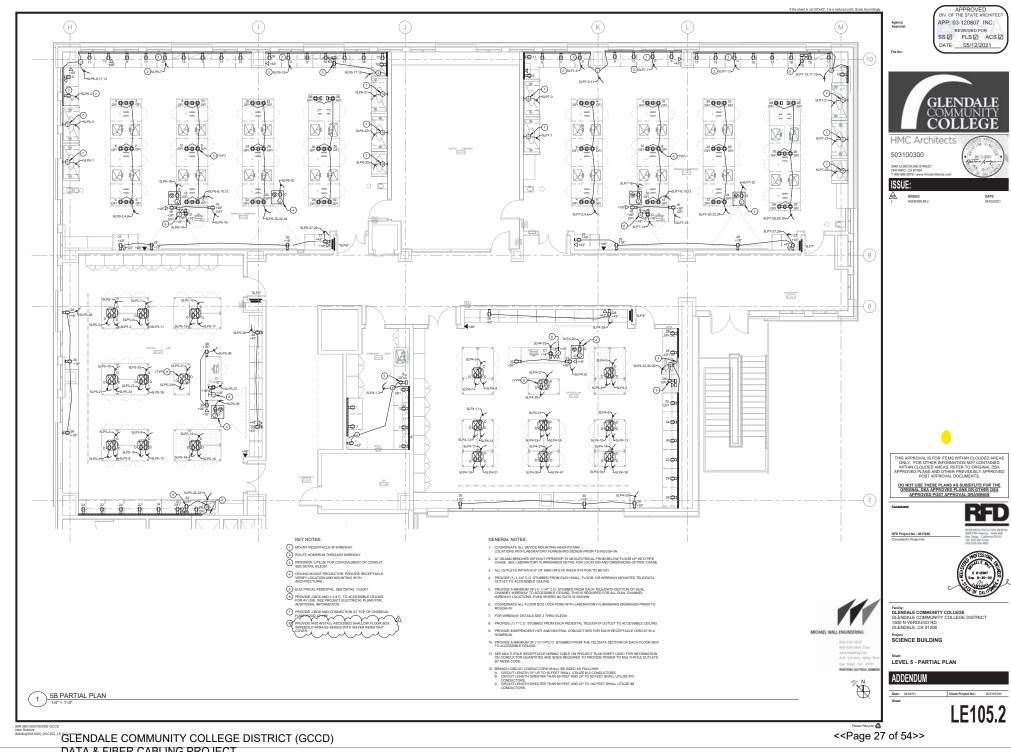












- D. THERE SHALL BE NO MORE THAN EQUIVALENT OF TWO 90 IN CONTINUOUS CONDUIT RUN.

- ALL PULLBOXES SHALL HAVE TRAFFIC RATED COVER TO READ "COMMUNICATIONS" AND MUST BE MOUNTED FLUSH TO AVOID TRIPPING HAZARD.

SHEET NOTES

- ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (4) 4" CONDUITS.
- ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (1) 1-1/2" CONDUIT FOR EMERGENCY BLUE PHONE.
- 3. CONTRACTOR TO PROVIDE WEATHER PROOF OUTLET



TECHNOLOGY SITE PLAN



503100300







Facility: GLENDALE COMMUNITY COLLEGE GLENDALE COMMUNITY COLLEGE DISTRICT 1500 N VERDUGO RD, GLENDALE, CA 91208

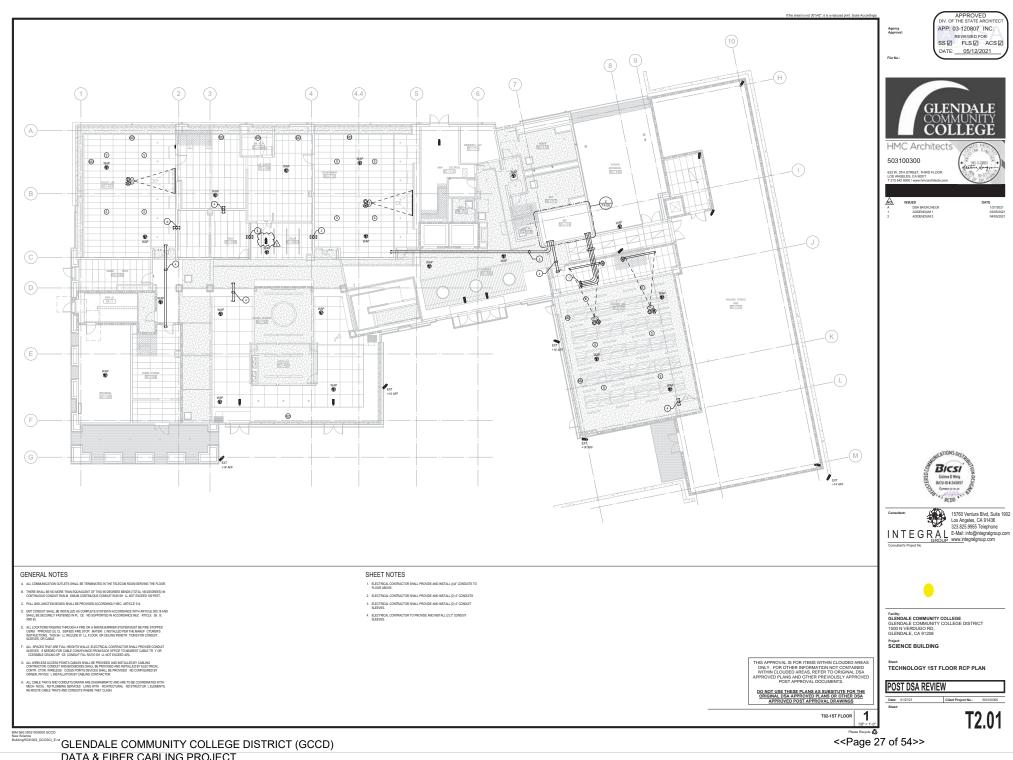
Project: SCIENCE BUILDING

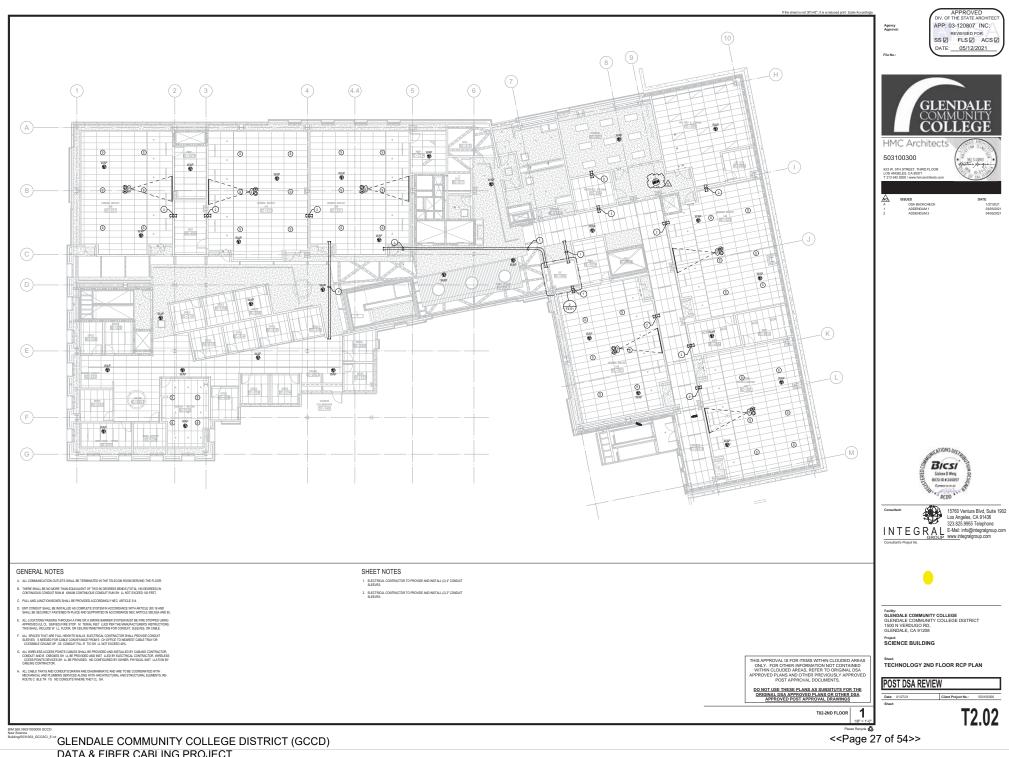
TECHNOLOGY SITE PLAN

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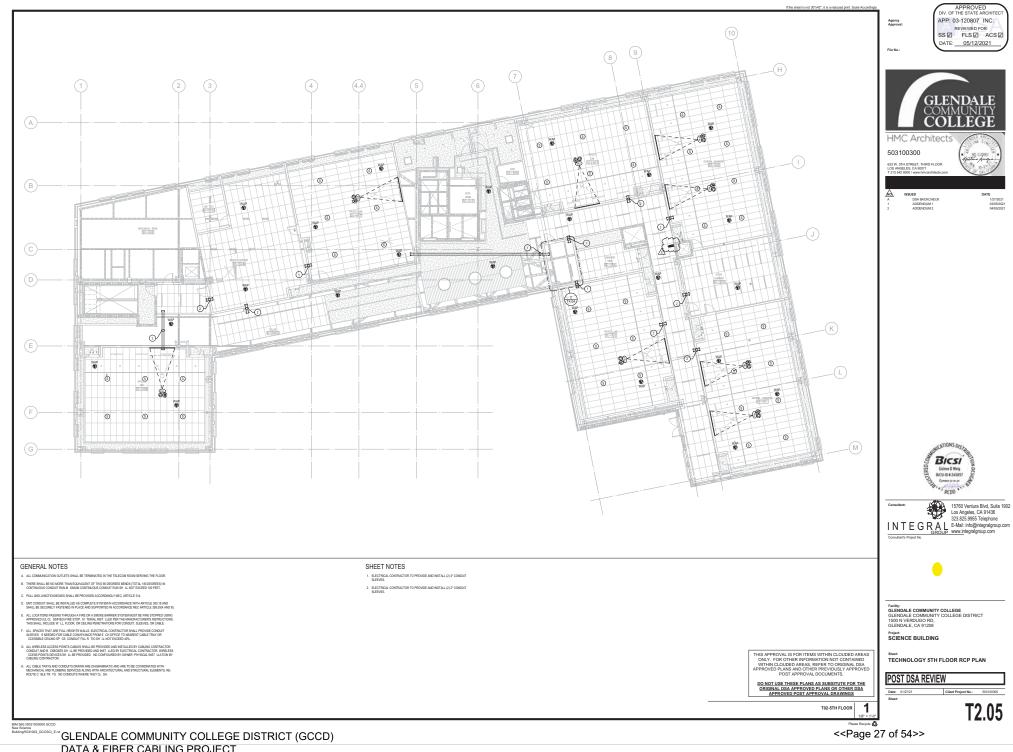
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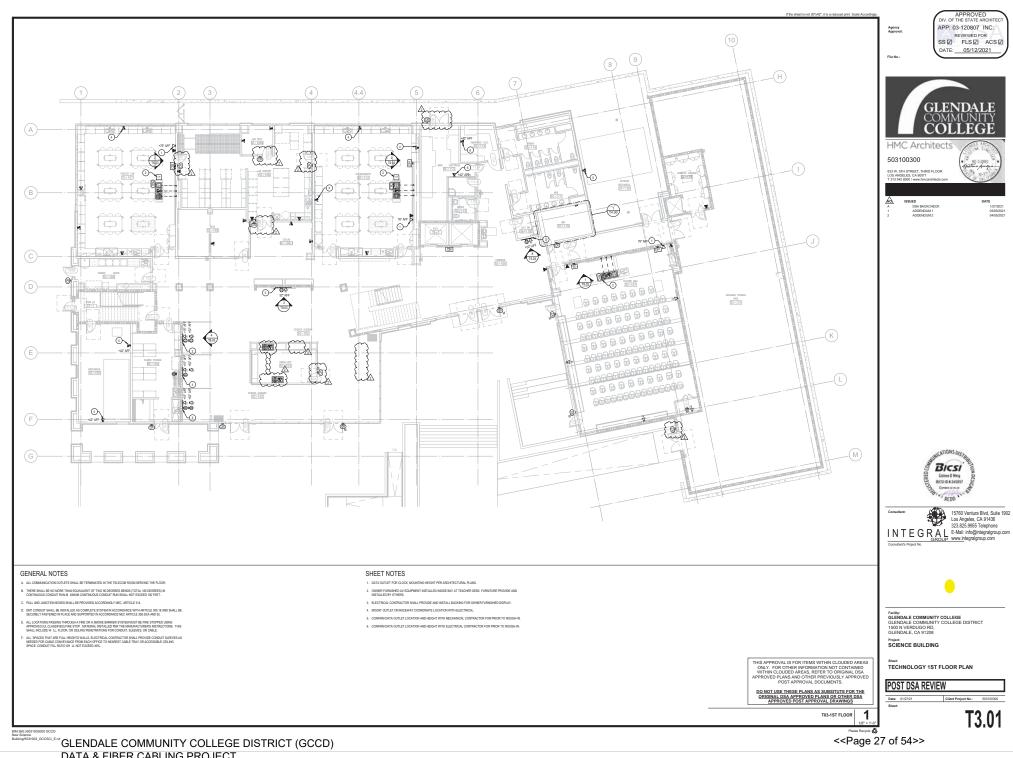


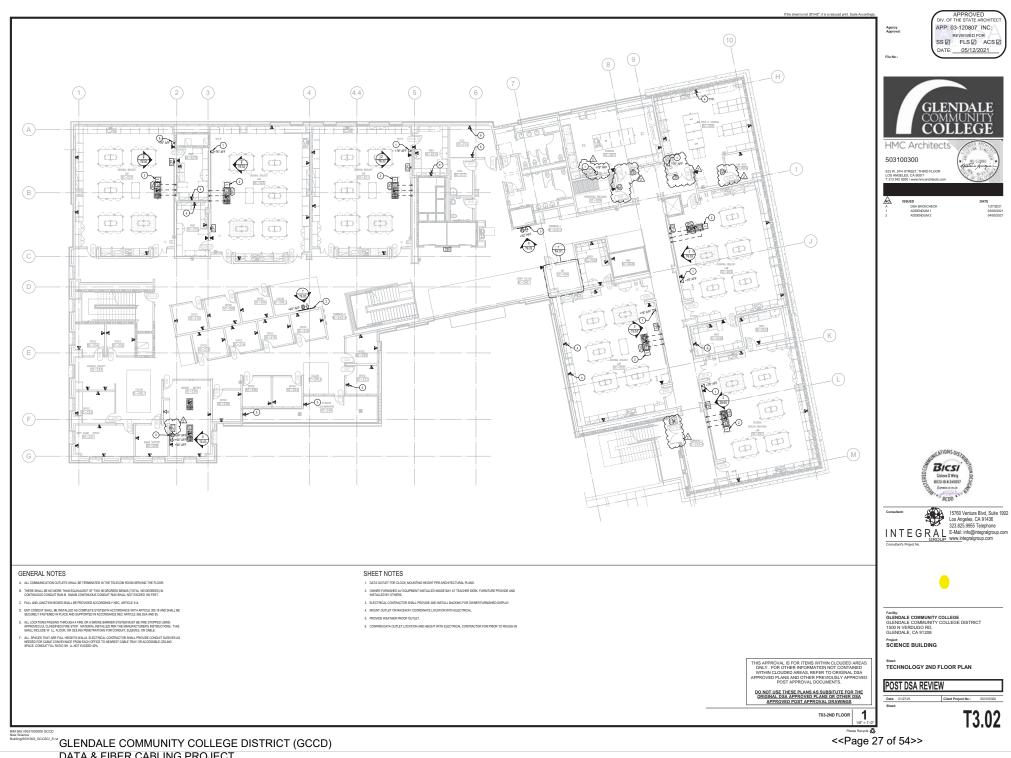


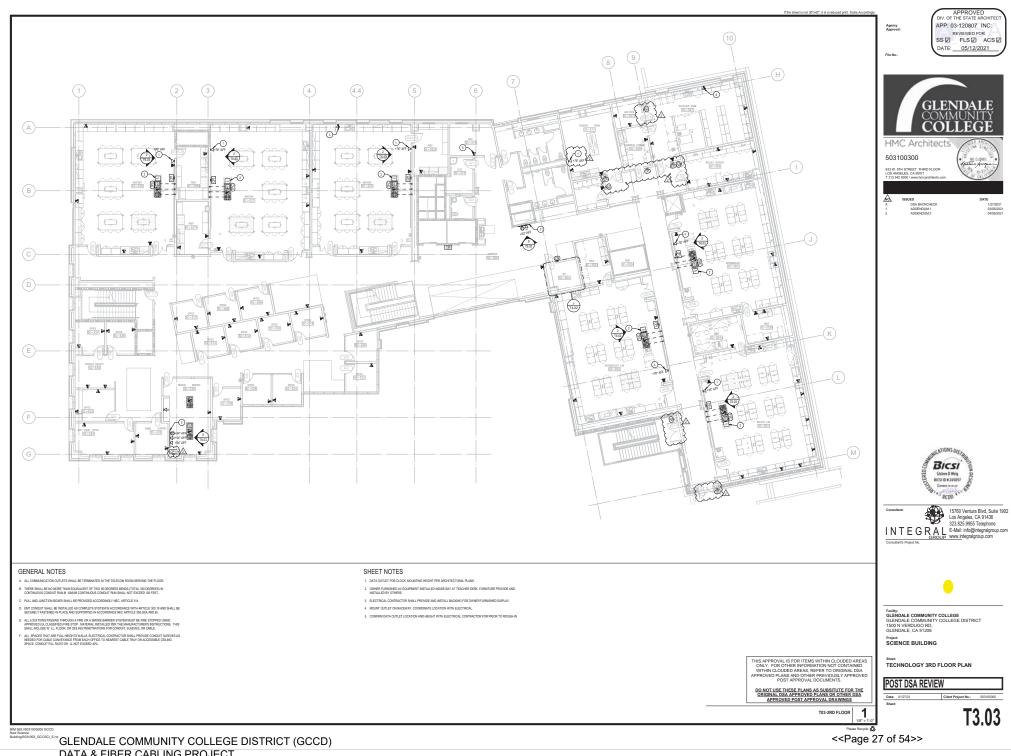


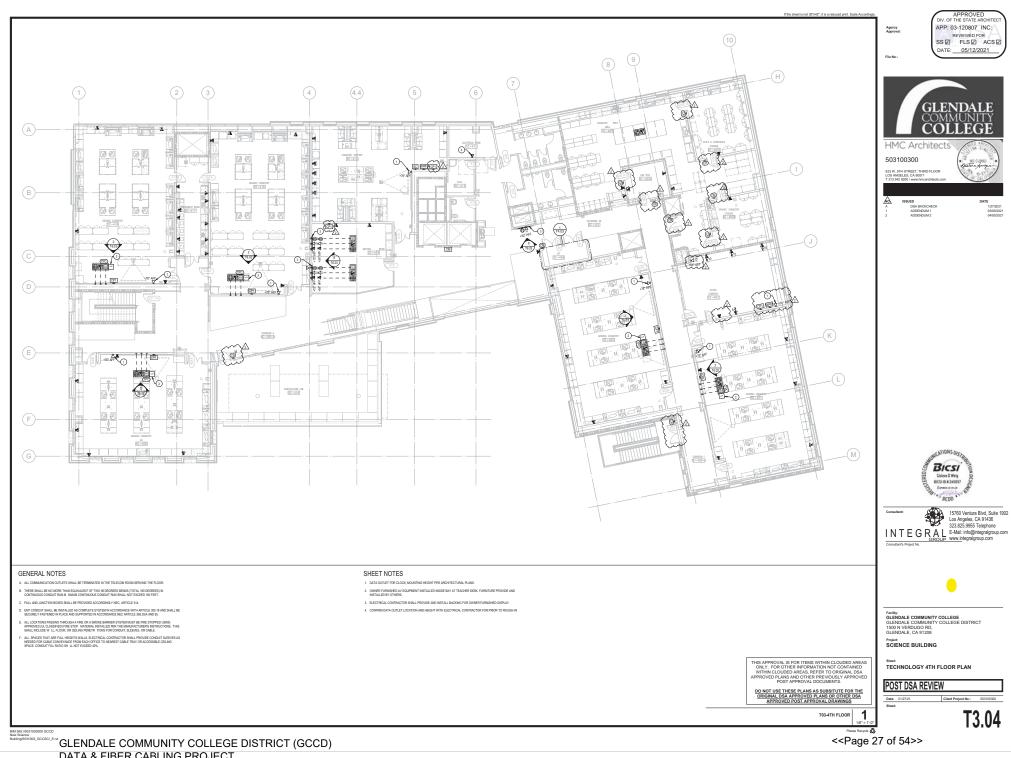


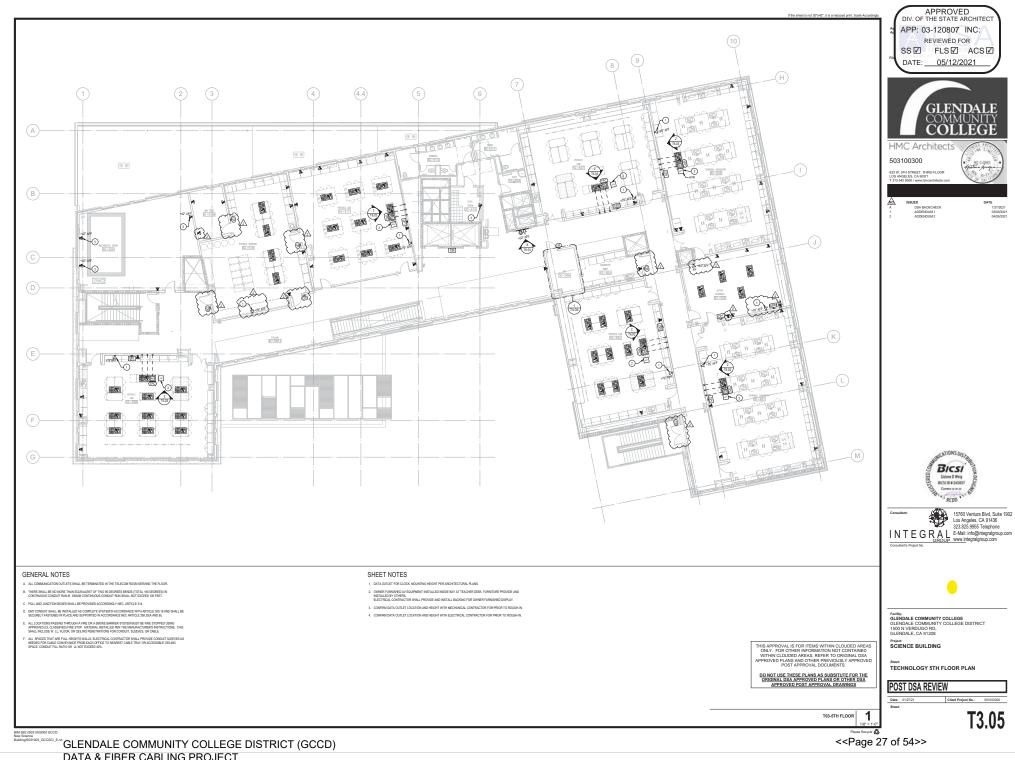


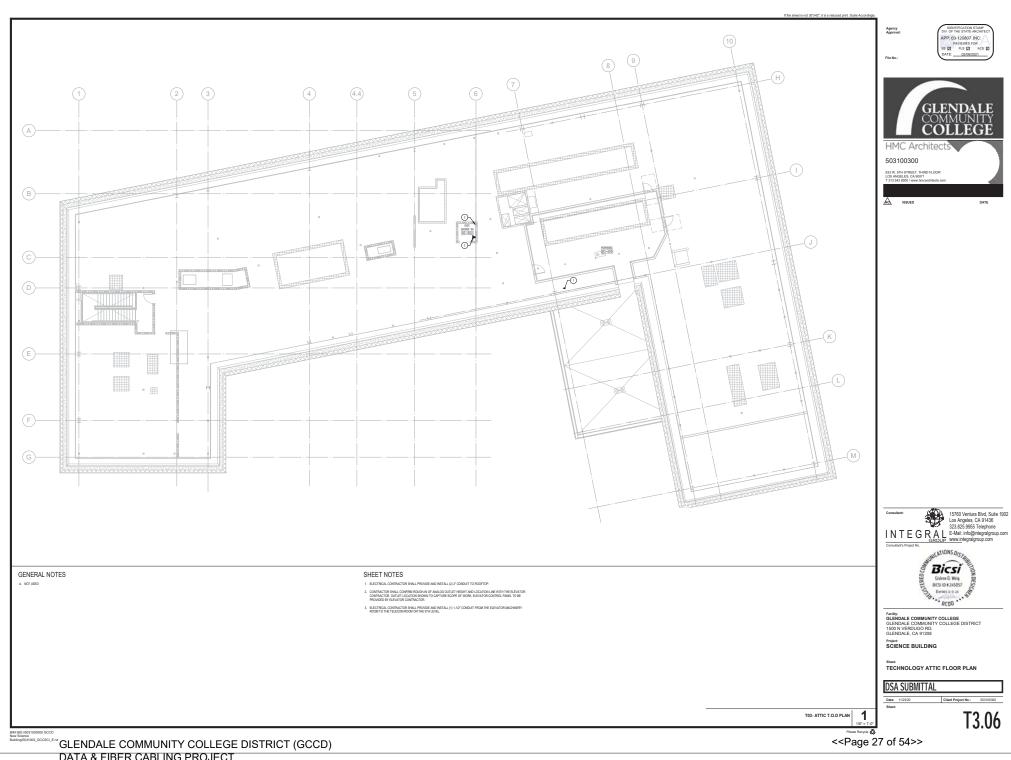














- D. ALL WALL OUTLETS WITHIN THE TELECOM ROOM SHALL BE FLUSH MOUNT, NOT SURFACE MOUNT.



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SHEET NOTES

- GENERAL CONTRACTOR SHALL PROVIDE AND INSTALL N° AIC GRADE FIRE RATED PL LEAVE THE FIRE STAMP EXPOSED AND PAINT THE REST OF PLYMODD TO MATCH. PL BE 8' LONG WITH BOTTOM MOUNTED AT 24' ABOVE FINISHED FLOOR.

- 7. SPACE ALLOCATED FOR SWITCH PROVIDED AND INSTALLED BY OWNER.
- ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (1) L6-30R MOUNTED ONTO THE SIDE OF CABLE RUNAWAY.

- 17. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (1) 1-1/2" CONDUITS (REFER TO T1.00
- 18. PDU OWNER PROVIDED AND CONTRACTOR INSTALLED.
- 20. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL TELECOMMUNICATION GROUND BUS BAR 6" ABOVE LADDER RACK.



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Project: SCIENCE BUILDING

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SC-119

ENLARGED MDF ROOM - SC-119 - RCP

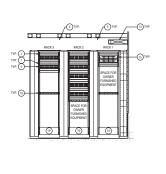
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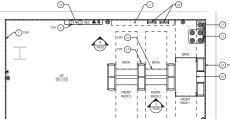
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WALL ELEVATION





RACK ELEVATION 3



ENLARGED MDF ROOM - SC-119 - FLOOR PLAN

TELECOM ROOM ENLARGED PLAN



- D. ALL WALL OUTLETS WITHIN THE TELECOM ROOM SHALL BE FLUSH MOUNT, NOT SURFACE MOUNT.



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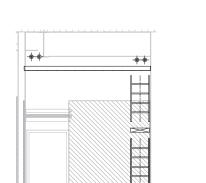


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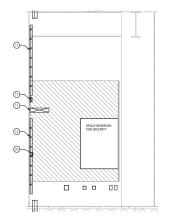
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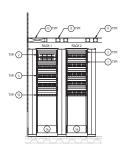
ENLARGED IDF ROOM - SC-204 - RCP



WALL ELEVATION 2 5

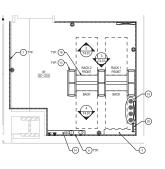


WALL ELEVATION 4



RACK ELEVATION





ENLARGED IDF ROOM - SC-204 - FLOOR PLAN 1/2" = 1'-0"

SHEET NOTES

- GENERAL CONTRACTOR SHALL PROVIDE AND INSTALL N° A'C GRADE FIRE RATED PL LEAVE THE FIRE STAMP EXPOSED AND PAINT THE REST OF PLYMODO TO MATCH. PL BE 8' LONG WITH BOTTOM MOUNTED AT 24" ABOVE FINISHED FLOOR.
- 2. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 2RU FIBER PATCH PANEL

- 7. SPACE ALLOCATED FOR SWITCH PROVIDED AND INSTALLED BY OWNER.

- 18. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 2-POST 19"X" EQUIPMENT RACK. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (4)4" CONDUIT SLEEVES FLOOR ABOVE AND BELOW.



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TELECOM ROOM ENLARGED PLAN

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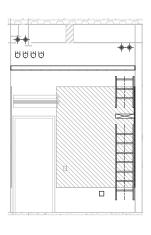


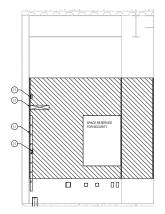
- D. ALL WALL OUTLETS WITHIN THE TELECOM ROOM SHALL BE FLUSH MOUNT, NOT SURFACE MOUNT

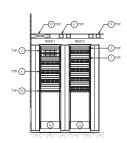


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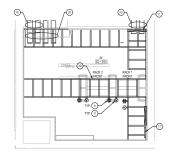




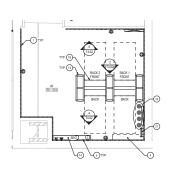
WALL ELEVATION 2 5

WALL ELEVATION 4

RACK ELEVATION 3



ENLARGED IDF ROOM - SC-304 - RCP



SHEET NOTES

- GENERAL CONTRACTOR SHALL PROVIDE AND INSTALL N: AIC GRADE FIRE RATED F LEAVE THE FIRE STAMP EXPOSED AND PAINT THE REST OF PLYMOOD TO MATCH. 8 BE 8' LONG WITH BOTTOM MOUNTED AT 24' ABOVE FINISHED PLOOR.
- 2. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 2RU FIBER PATCH PANEL

- 7. SPACE ALLOCATED FOR SWITCH PROVIDED AND INSTALLED BY OWNER.

- 12. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 18' LADDER RACK 6' ABOVE EQUIPMENT RACK.

- 18. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 2-POST 19"X" EQUIPMENT RACK. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (4)4" CONDUIT SLEEVES FROM FLOOR BELOW.



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Project: SCIENCE BUILDING

TELECOM ROOM ENLARGED PLAN

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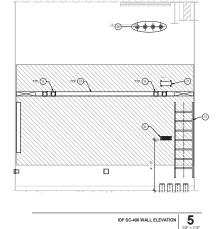
- D. ALL WALL OUTLETS WITHIN THE TELECOM ROOM SHALL BE FLUSH MOUNT, NOT SURFACE MOUNT.

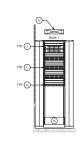
HMC Architects

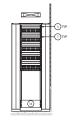
APP: 03-120807 INC:

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RACK 1 ELEVATION 4

RACK 2 ELEVATION 3

SHEET NOTES

- GENERAL CONTRACTOR SHALL PROVIDE AND INSTALL N° AIC GRADE FIRE RATED F LEAVE THE FIRE STAMP EXPOSED AND PAINT THE REST OF PLYWOOD TO MATCH. 8 BE 8' LONG WITH BOTTOM MOUNTED AT 24' ABOVE FINISHED FLOOR.
- 2. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 2RU FIBER PATCH PANEL

- 7. SPACE ALLOCATED FOR SWITCH PROVIDED AND INSTALLED BY OWNER.

- 12. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 18' LADDER RACK 6' ABOVE EQUIPMENT RACK.

- 18. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 2-POST 19"X" EQUIPMENT RACK. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (4)4" CONDUIT SLEEVES FROM FLOOR BELOW.





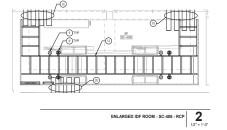
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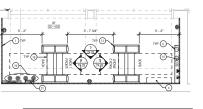
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TELECOM ROOM ENLARGED PLAN

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ENLARGED IDF ROOM - SC-406 - FLOOR PLAN 1/2" = 1'-0"

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- D. ALL WALL OUTLETS WITHIN THE TELECOM ROOM SHALL BE FLUSH MOUNT, NOT SURFACE MOUNT.
- F. COMMUNICATION CONTRACTOR SHALL PROVIDE WORKSTATION AND TELECOM ROOM PATCH CORDS. INSTALL PATCH CORDS UP. TO SWITCH PORTS.



A ISSUED

SHEET NOTES

- GENERAL CONTRACTOR SHALL PROVIDE AND INSTALL N° A/C GRADE FIRE RATED PL LEAVE THE FIRE STAMP EXPOSED AND PAINT THE REST OF PLYMODD TO MATCH. PL BE 8' LONG WITH BOTTOM MOUNTED AT 24' ABOVE FINISHED FLOOR.
- 2. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 2RU FIBER PATCH PANEL

- 7. SPACE ALL OCATED FOR SWITCH PROVIDED AND INSTALLED BY OWNER

- 16. UPS OWNER PROVIDED AND CONTRACTOR INSTALLED.
- 18. COMMUNICATION CONTRACTOR SHALL PROVIDE AND INSTALL 2-POST 19"X" EQUIPMENT RACK.
- 19. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (4)4" CONDUIT SLEEVES FLOOR BELOW. 20. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (2) 2" CONDUIT WITH WEATHER CAP TO ROOFTOP.





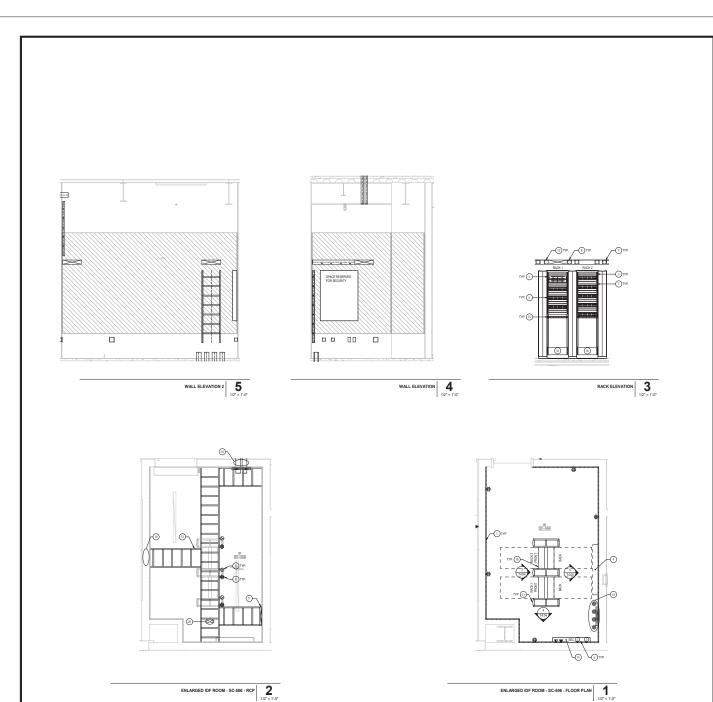
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TELECOM ROOM ENLARGED PLAN

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- B. CONDUIT SHALL RUN IN THE MOST DIRECT ROUTE POSSIBLE WITH NO MORE THAN TWO 50 DEGREE BENDS AT ANY DIMENSIONAL PLANE BETWEEN PULL POINTS OR PULL BOXES (PB).

- G. GENERAL CONTRACTOR SHALL PROVIDE ALL CONDUITS WITH A PLASTIC OR NYLON LINE (ALSO CALLED A PULL STRING OR PULL CORD) WITH A MINIMUM TEST RATING OF 200 LB.
- L ENT CONDUIT SHALL BE INSTALLED AS COMPLETE SYSTEM IN ACCORDANCE WITH ARTICLE 800.18
 AND SHALL BE SECURELY FASTENED IN PLACE AND SUPPORTED IN ACCORDANCE MED ARTICLE
 353.30(A AND B).

APP: 03-120807 INC:
REVIEWED FOR
SS Ø FLS Ø ACS Ø
DATE: 02/08/2021



HMC Architects

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- ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL (4) 4" CONDUITS BETWEEN TELECOM ROOMS.



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SCIENCE BUILDING

TECHNOLOGY RISER DIAGRAM

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THE MAD PROFESSION DOCOSOL EAST GLENDALE COMMUNITY COLLEGE DISTRICT (GCCD)

NEW SCIENCE BUILDING (NSB)

COPPER AND FIBER RISER DIAGRAM