

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>			1. CONTRACT ID CODE	PAGE 1 OF 24 PAGES
2. AMENDMENT/MODIFICATION NO. AMENDMENT NO. 0002	3. EFFECTIVE DATE 9/14/11	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable) 11-0117	
6. ISSUED BY CODE	jsy	7. ADMINISTERED BY (If other than Item 6) CODE See Item 6		
Officer in Charge of Construction MCI-East 1005 Michael Road Camp Lejeune, NC 28547-2521				
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)		(X)	9A. AMENDMENT OF SOLICITATION NO. N40085-11-R-0117	
		X	9B. DATED (SEE ITEM 11) 9/9/11	
			10A. MODIFICATION OF CONTRACT/ORDER NO.	
			10B. DATED (SEE ITEM 11)	
CODE	FACILITY CODE			

**11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS**

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers  is extended,  is not extended.  
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:  
(a) By completing items 8 and 15, and returning \_\_\_\_\_ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted;  
or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment your desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

**13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS.  
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor  is not,  is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

11-0117, Repair Applied Instruction Building, BB-50

SEE CONTINUATION SHEET

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR		16B. UNITED STATES OF AMERICA	
15C. DATE SIGNED		16C. DATE SIGNED	
(Signature of person authorized to sign)		(Signature of Contracting Officer)	

### CONTINUATION SHEET

- 1. Question:** The drawings are missing 3 sheets, LS-1, FP-1 AND FA-1.
- 1. Answer:** Drawings LS-1, FP-1, and FA-1 are attached and hereby incorporated into the RFP (Request for Proposals) dated 9 September 2011.
- 2.** Contractor shall install 13 additional telecommunication outlets per the attached sketch. Remove 1 telecommunications outlet in office 107 per the attached sketch.
- 3.** Contractor shall demolish the existing telecommunications data equipment that is currently on wall in office 107. Coordinate with the contracting officer to determine if the old data equipment remains government property. Contractor shall install a new telecommunications rack on wall in office 108 per the attached sketch and supporting details and specifications. Contractor shall provide submittal of rack to the contracting officer for approval, post contract award.
- 4.** Contractor shall intercept telecomm cabling to support additional outlets from the Blue Box Facility Entrance, as shown on attached sketch.
- 5.** Contractor shall follow the attached 27 10 00 STRUCTURED TELECOMMUNICATIONS CABLING AND PATHWAY SYSTEM specification for telecommunications installation. Also find the Quad Faceplate, Typical Backboard, and Typical Rack Elevation details attached.

SYM	REVISIONS	DATE APPROVED

**CODE ANALYSIS - INTERNATIONAL BUILDING CODE**

**OCCUPANCY CLASSIFICATION**  
 1. BUSINESS GROUP OCCUPANCY (B)  
 IBC 2009, 304.1 - EDUCATION ABOVE 12TH GRADE  
 NFPA 101 2009 - CHAPTER 36 EXISTING BUSINESS OCCUPANCIES

**TYPE OF CONSTRUCTION**  
 1. TYPE V-A, PROTECTED  
**ALLOWABLE HEIGHT CALCULATION (TYPE V-A CONSTRUCTION)**

**GROUP B**

1.1 ALLOWABLE HEIGHT CALCULATION-STORIES  
 1.1.1 ALLOWABLE TABULAR HEIGHT:  
 3 STORY (TABLE 603)  
 1.1.2 HEIGHT INCREASE-SPRINKLER:  
 1 STORY (SECTION 804.2)  
 1.1.3 TOTAL ALLOWABLE HEIGHT:  
 4 STORY

1.2 ALLOWABLE HEIGHT CALCULATION-HEIGHT  
 1.2.1 ALLOWABLE TABULAR HEIGHT:  
 80 FEET (TABLE 603)  
 1.2.2 HEIGHT INCREASE-SPRINKLER:  
 20 FT (SECTION 804.2)  
 1.2.3 TOTAL ALLOWABLE HEIGHT:  
 70 FEET

**ALLOWABLE AREA CALCULATION (TYPE V-A CONSTRUCTION)**

**GROUP B**

1.1 ALLOWABLE AREA CALCULATION  
 1.1.1 TABULAR AREA PER FLOOR:  
 18,000 SF (TABLE 603)  
 1.1.2 AREA INCREASE-SPRINKLER:  
 84,000 SF (SECT. 606.3)  
 1.1.3 AREA INCREASE-FRONTAGE:  
 80%, 27,000 SF (SECT. 606.2)  
 1.1.4 TOTAL ALLOWABLE AREA:  
 98,000 SF (SECT. 606.1)

**DETAILED ALLOWABLE AREA CALCULATION**

1.  $A_a = A_i + (A_i \times B) / 100 + (A_i \times W) / 100$   
 2.  $A_i =$  ALLOWABLE TABULAR AREA PER FLOOR (SF)  
 3.  $B =$  AREA INCREASE DUE TO FRONTAGE  
 4.  $W =$  AREA INCREASE DUE TO SPRINKLER PROTECTION  
 5.  $W = 100(F / P - 0.25) \times W / 30$   
 WHERE:  
 6.  $B =$  AREA INCREASE DUE TO FRONTAGE  
 7.  $F =$  BUILDING PERIMETER WHICH FRONTS ON A PUBLIC WAY OR OPEN SPACE HAVING 20 FEET OPEN MINIMUM (FT)  
 8.  $P =$  PERIMETER OF ENTIRE BUILDING (FT)  
 9.  $W =$  WIDTH OF PUBLIC WAY OR OPEN SPACE (FT)

**BUILDING AREA CALCULATION (GROUP B)**

1.  $A_i = 18,000$  SF (TYPE V-A CONSTRUCTION)  
 2.  $B = 50\%$  (ASSUMED TO BE PROVIDED WITH 27' OPEN FRONTAGE ON ALL SIDES)  
 3.  $W = 300\%$  (ASSUMED TO BE PROTECTED THROUGHOUT BY AN AUTOMATIC FIRE SPRINKLER SYSTEM PER NFPA 13)  
 4.  $A_a = 18,000 + [(18,000 \times .50) \times 1] + [(18,000 \times 300) / 100] = 81,000$  SF (SECTION 606.1)

**BUILDING FRONTAGE CALCULATION**

1.  $F = 200$  FT  
 2.  $P = 820$  FT  
 3.  $W = 300\%$   
 4.  $W = 100 [200 / 820 - 0.25] \times 30 / 30 = 13.4\%$

**SUM OF RATIOS OF EACH OCCUPANCY**

GROUP B = 12,000 SF ACTUAL AREA  
 GROUP B = 98,000 SF ALLOWABLE AREA  
 RATIO = 12,000 / 98,000 = 0.12  
 TOTAL = 0.12 < 1.0  
 COMPLIANT = YES

**STRUCTURAL FIRE RESISTANCE RATINGS**

- BEARING AND NONBEARING EXTERIOR WALLS WITH LESS THAN 5' FIRE SEPARATION DISTANCE:  
 1-HOUR (TABLE 601 / TABLE 602)
- BEARING AND NONBEARING EXTERIOR WALLS WITH 5' AND GREATER AND LESS THAN 10' FIRE SEPARATION DISTANCE:  
 1-HOUR (TABLE 602/TABLE 601)
- BEARING AND NONBEARING EXTERIOR WALLS WITH 10' OR MORE FIRE SEPARATION DISTANCE:  
 1-HOUR (TABLE 601 / TABLE 602)
- BEARING WALLS - INTERIOR:  
 1-HOUR (TABLE 601)
- NONBEARING WALLS - INTERIOR:  
 0-HOUR (TABLE 601)
- STRUCTURAL FRAME:  
 1-HOUR (TABLE 601)
- FLOOR CONSTRUCTION:  
 1-HOUR (TABLE 601)
- ROOF CONSTRUCTION:  
 1-HOUR (TABLE 601)

**CODE ANALYSIS - GENERAL**

**BASIC BUILDING DESCRIPTION**

- FIRST FLOOR - (OCCUPIED) 12,000 SF HEATED
- BUILDING HEIGHT - APPROX. 16'-0"

**APPLICATION CODES**

- 2009 EDITION OF THE INTERNATIONAL BUILDING CODE
- 2009 EDITION OF THE INTERNATIONAL FIRE CODE
- NFPA 13, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS - 2010 EDITION
- NFPA 70, NATIONAL ELECTRICAL CODE - 2008 EDITION
- NFPA 72, NATIONAL FIRE ALARM CODE - 2010 EDITION
- NFPA 101, LIFE SAFETY CODE - 2009 EDITION
- UNIFIED FACILITIES CRITERIA (UFC) 3-600-01, 3-600-10H

**OCCUPANT LOAD INFORMATION**

- BUSINESS: 100 GROSS SF PER PERSON
- FOR EXITING REQUIREMENTS OCCUPANT LOADS HAVE BEEN DETERMINED FOR EACH SPACE BY ACTUAL USE.

**LEGEND**

- [F] FIRE ALARM PULL STATION
- [FE] FIRE EXTINGUISHER
- [FACP] FIRE ALARM CONTROL PANEL
- [X] LIGHTED EXIT SIGN
- EXISTING CMU WALLS TO DECK
- [•] FIRE SPRINKLER

EXIT NO.	(1)	(2)	(3)	(4)	(5)	(6)
EXIT NO. 1	68	68	0.2	0.2	340	10
EXIT NO. 2	68	68	0.2	0.2	340	10
EXIT NO. 3	68	68	0.2	0.2	340	10
EXIT NO. 4	68	68	0.2	0.2	340	10
EXIT NO. 5	68	68	0.2	0.2	340	10
EXIT NO. 6	68	68	0.2	0.2	340	10
EXIT NO. 7	68	68	0.2	0.2	340	10

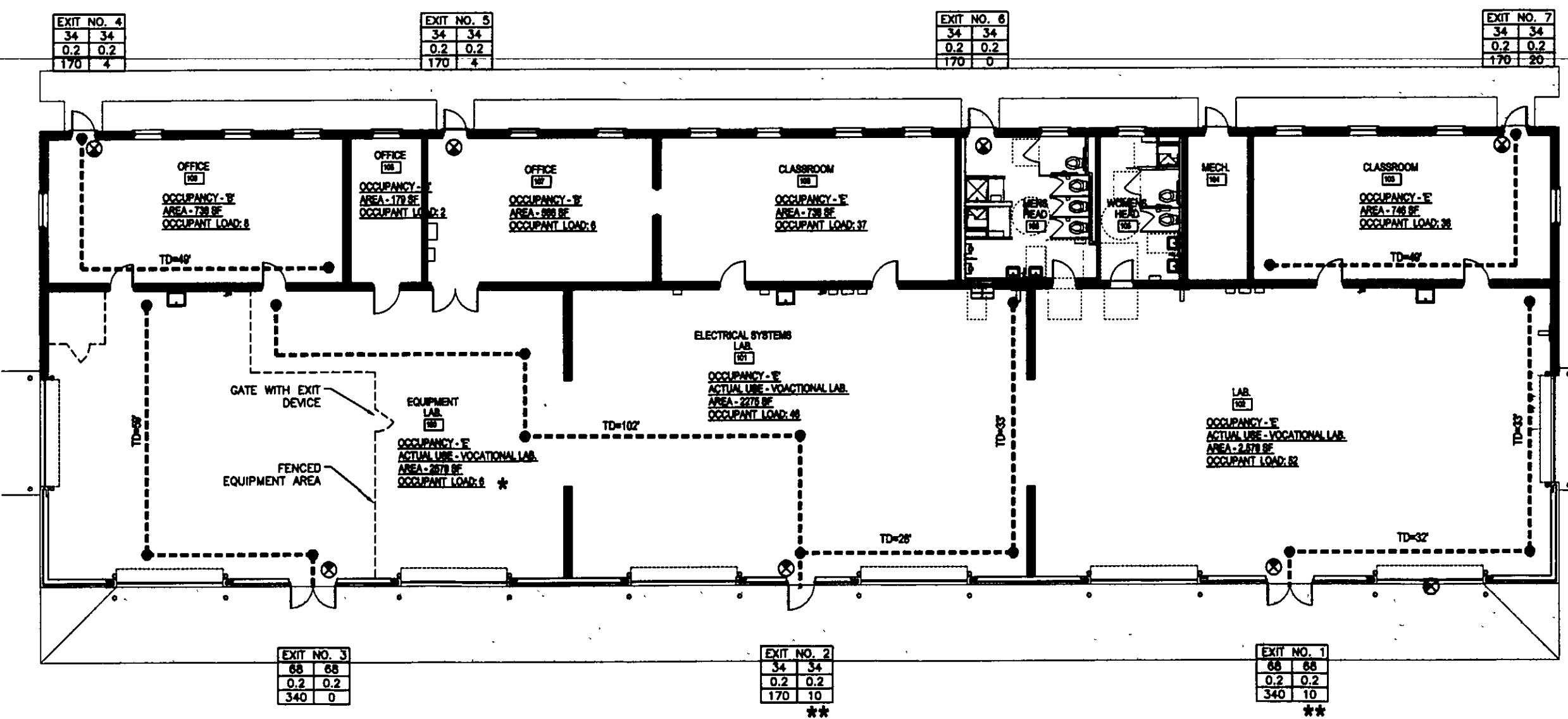
- TD = XX' TRAVEL DISTANCE TO NEXT INDICATED POINT
- CP = XX' COMMON PATH TO POINT WHERE TWO PATHS OF EGRESS AVAILABLE

**NUMBER AND ARRANGEMENT OF EXITS**

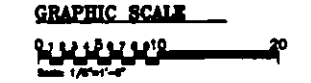
FLOOR, ROOM OR SPACE DESIGNATION	MINIMUM NUMBER OF EXITS		TRAVEL DISTANCE		ARRANGEMENT MEANS OF EGRESS	
	REQUIRED (LSC 39.2.4.1)	SHOWN ON PLAN	ALLOWABLE TRAVEL DISTANCE (LSC 39.2.6)	ACTUAL TRAVEL DISTANCE SHOWN ON PLANS	REQUIRED DISTANCE BETWEEN EXIT DOORS	ACTUAL DISTANCE SHOWN ON PLANS
BUSINESS (B)	2	4	308'-0"	48'	108'	138'
LAB/VOCATIONAL (E)	2	3	308'-0"	182'	36'	82'

**EXIT WIDTH**

USE GROUP OR SPACE DESCRIPTION	AREA <sup>1</sup> sq. ft.	AREA <sup>1</sup> PER OCCUPANT (LSC TBL 7.3.1.2)	CALCULATED OCCUPANT LOAD	EGRESS WIDTH PER OCCUPANT (LSC TBL 7.3.1.1)	EXIT WIDTH (in) 23.4.3.1		
					REQUIRED WIDTH (LSC SECTION 7.3.4.1) (a/b) x c	ACTUAL WIDTH SHOWN ON PLANS	
					STAIR LEVEL	STAIR LEVEL	STAIR LEVEL
BUSINESS (B)	3,480 SF	100 GROSS	120	0.2	36	36	138
LAB/VOCATIONAL (E)	7,960 SF	68 NET	190	0.2	30	30	170



\* OCCUPANT LOAD IN ROOM 100, EQUIPMENT LAB IS CALCULATED OUTSIDE FENCED EQUIPMENT AREA  
 \*\* DOOR ACTUAL LOAD FACTOR FOR ROOMS 101 AND 102 BASED ON EXISTING USE AND EQUIPMENT.



LS-1

The Walker Group Architecture, Inc. WALKER GROUP ARCHITECTURE  
 90 New 541 New Bern, NC 28582  
 252.335.2776 (PHONE)  
 252.335.2826 (FAX)

DEPARTMENT OF THE ARMY MARINE CORPS BASE  
 CAMP LEJEUNE, NORTH CAROLINA

APPLIED INSTRUCTION BUILDING  
 NO. BB-50, COURTHOUSE BAY  
 LIFE SAFETY PLAN & CODE ANALYSIS

DESIGN: C. WALKER  
 DR. C. WALKER  
 CHK. B. WALKER  
 SUBMITTED BY: J. WALKER  
 DESIGN: DR. B.R. MARSEBURN

APPROVED: PWD OR OCCC DATE: NAVFAC DRAWING NO. 60009301  
 CONST. CONTR. NO. N40085-11-R-0117

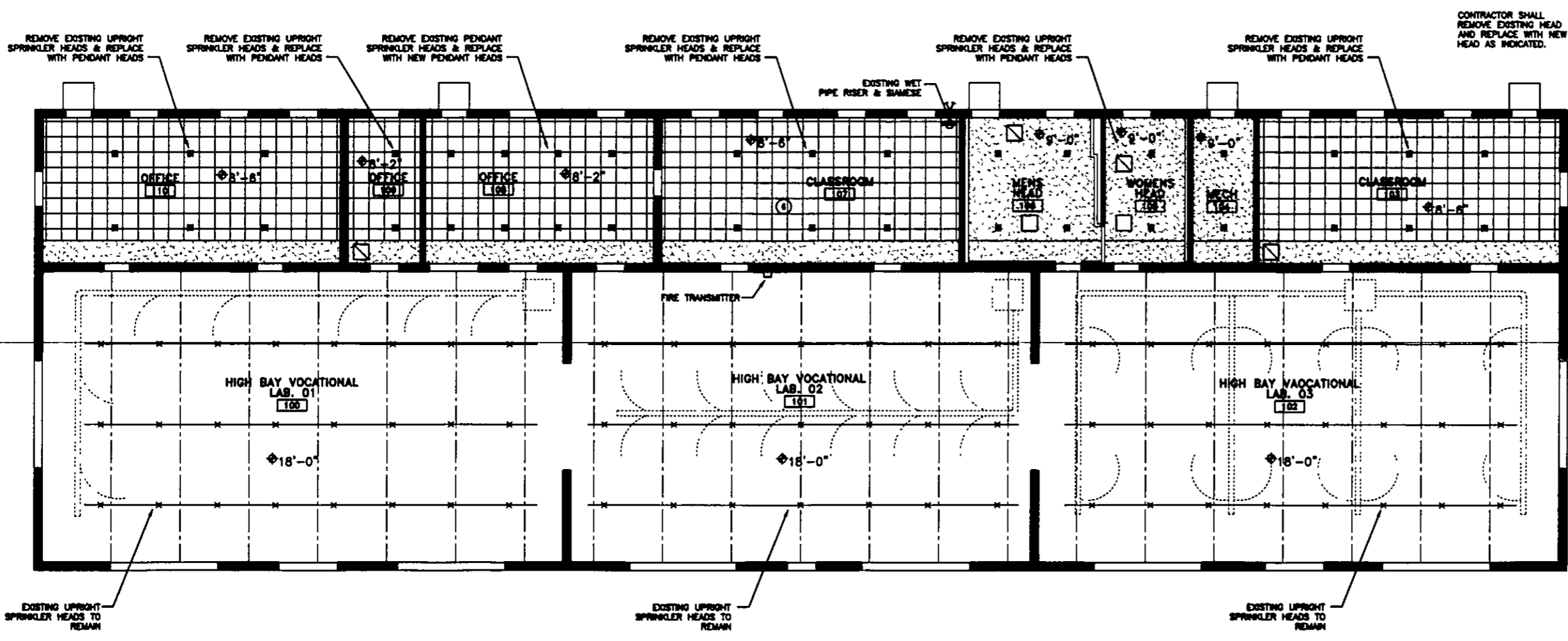
SATISFACTORY TO: DATE: SCALE: NOTED SPEC. 11-0117 SHEET 2 OF 28



SYM	REVISIONS	DATE APPROVED

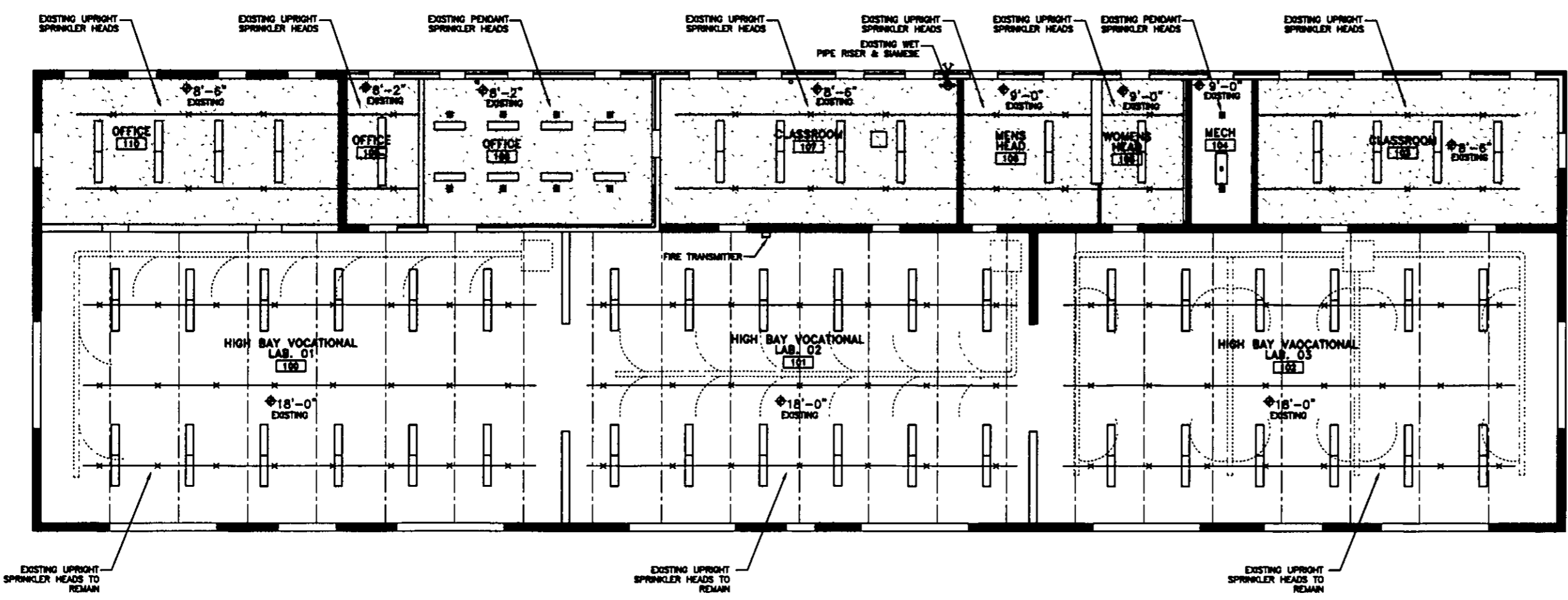
**GENERAL NOTES** (FOR THIS SHEET ONLY)

1. SPRINKLER SYSTEM SHOWN IS EXISTING. HEAD LOCATION AND PIPE ROUTING IS APPROXIMATE AND SHOULD BE VERIFIED. CONTRACTOR SHALL MODIFY EXISTING PIPING TO ACCOMMODATE NEW CEILING. REPLACE SPRINKLER HEAD WITH AN UPRIGHT OR PENDANT SPRINKLER TO MATCH EXISTING OR RENOVATED CEILING. DO NOT REUSE SPRINKLER HEADS. FOR BID PURPOSES, CONTRACTOR SHALL ASSUME (3) FEET OF NEW PIPING PER SPRINKLER HEAD.
2. EXISTING SPRINKLER SYSTEM, INCLUDING ANY NFPA 13, 2010 EDITION, UFC 3-800-01 AND 3-800-10N.
3. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS THAT MAY AFFECT THE SYSTEM INSTALLATION PRIOR TO BEGINNING WORK.
4. AN ACOUSTICAL GRID CEILING IS BEING INSTALLED AS INDICATED. PROVIDE NEW PENDANT SPRINKLERS AND ESCUTCHEONS WHERE NEW ACOUSTICAL GRID CEILINGS ARE INSTALLED.
5. NEW SPRINKLER HEADS SHALL BE COVERED/PROTECTED DURING RENOVATION INCLUDING PAINTING. COVER/PROTECTION SHALL BE REMOVED PRIOR TO COMPLETION OF RENOVATION.
6. EXISTING SPRINKLERS OBSTRUCTED BY LIGHTS, STRUCTURAL MEMBERS, STORAGE, ETC. SHALL BE CORRECTED.
7. THE NEW CEILING GRID CONFIGURATION, HEIGHT AND LOCATION LIGHTS AND HVAC GRILLS IS INDICATED AS SHOWN, SEE ELECTRICAL AND MECHANICAL FOR ADDITIONAL NOTES.
8. SPRINKLER HEAD DENSITIES SHALL BE IN ACCORDANCE WITH NFPA 13 FOR LIGHT HAZARD FOR OFFICES, CORRIDORS, TOILET ROOMS AND CLASSROOMS. MECHANICAL ROOMS AND SIMILAR SHALL BE IN ACCORDANCE WITH NFPA 13 FOR ORDINARY HAZARD.
9. SPRINKLER CONTRACTOR SHALL OBTAIN A HYDRANT FLOW TEST FOR HYDRAULIC CALCULATIONS. HYDRAULIC CALCULATIONS SHALL BE IN ACCORDANCE WITH UFC 3-800-01 THAT INCLUDES A DESIGN AREA OF 3000 S.F. WITH ALLOWANCES FOR SLOPED CEILINGS AND REDUCTIONS FOR QUICK RESPONSE SPRINKLERS. HOSE ALLOWANCES SHALL BE PER UFC 3-800-01.
10. SPRINKLER HEAD LOCATIONS SHALL BE LOCATED IN THE CENTER OF TILE, AND IN A CONSISTENT PATTERN.
11. ALL CALCULATIONS SHALL BE IN ACCORDANCE WITH UFC 3-800-01 AND UFC 3-800-10N. THE MINIMUM DESIGN AREA SHALL BE 3,000 SQUARE FEET. REDUCTIONS FOR THE USE OF QUICK RESPONSE SPRINKLERS SHALL APPLY PER NFPA 13, BUT IN NO CASE SHALL BE THE DESIGN AREA BE LESS THAN 1800 SQUARE FEET.



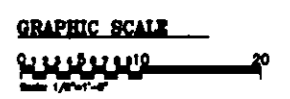
**B** RENOVATED SPRINKLER PLAN 1/8"=1'-0"

A SITE INVESTIGATION DID NOT LOCATE A BACKFLOW PREVENTER FOR THE EXISTING FIRE SUPPRESSION SYSTEM.



- LEGEND**
- ◁ 2-1/2" SIAMESE FIRE DEPARTMENT CONNECTION
  - + UPRIGHT SPRINKLER
  - PENDANT SPRINKLER
  - WET VALVE

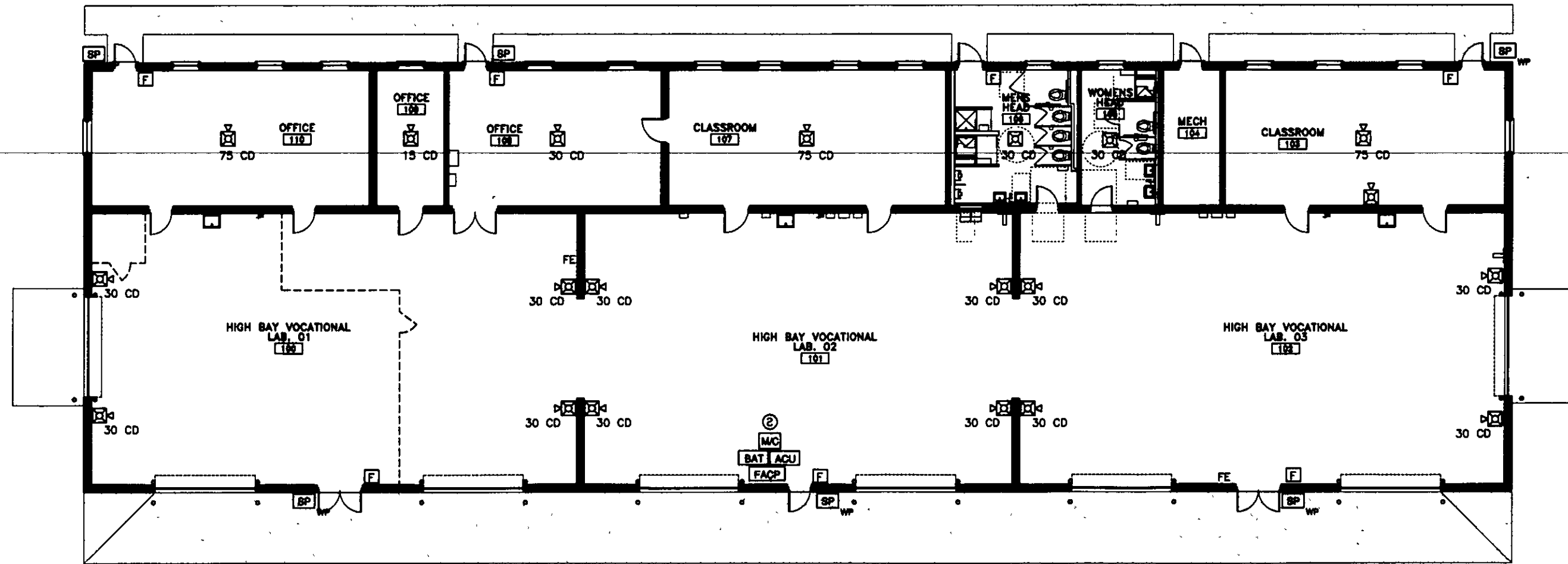
**A** EXISTING SPRINKLER PLAN 1/8"=1'-0"



FP-1

The Walker Group Architecture, Inc. WALKER GROUP ARCHITECTURE 100 West 9th, New York, NY 10011 212.252.2770 (phone) 212.252.2771 (fax)		DEPARTMENT OF THE NAVY MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA	
DES. C. WALKER CH. B. WALKER SUBMITTED BY: J. WALKER DESIGN: DR. B.R. MARSHBURN	APPLIED INSTRUCTION BUILDING NO. BB-50, COURTHOUSE BAY SPRINKLER PLAN	APPROVED: PWD OR CHC DATE: 8/2/2011 SIZE: F NAVTAC DRAWING NO. 60009302 CONST. CONTR. NO. R40085-11-B-0117	SCALE: NOTED SPEC. 11-0117 SHEET 3 OF 28

SYM	REVISIONS	DATE APPROVED



**GENERAL NOTES**

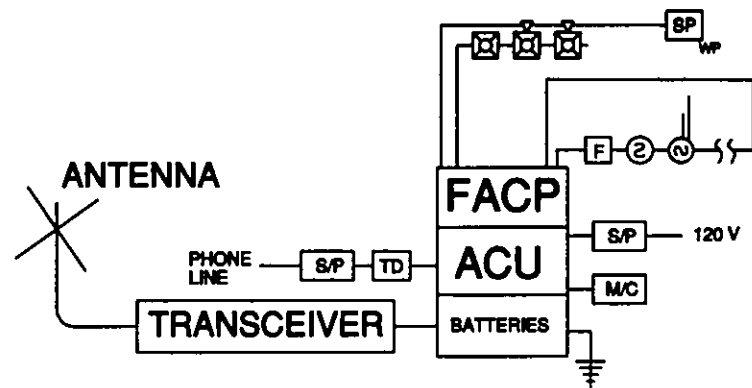
1. DEVICE LOCATIONS ARE FOR INFORMATION ONLY. LOCATIONS TO BE VERIFIED BY THE CONTRACTOR. FINAL INSTALLATION AND DESIGN SHALL BE IN ACCORDANCE WITH NFPA 72 AND UFC 3-800-01.
2. STROBE CANDELA RATING IS TO BE IN ACCORDANCE WITH NFPA 72.
3. ALL NEW CONDUIT, WIRE AND CABLES SHALL BE CONCEALED IN WALLS, CEILING SPACES, ELECTRICAL SHAFTS OR CLOSETS. NEW CONDUIT MAY BE EXPOSED IN UNFINISHED AREAS. PAINTED SURFACE WIRE MOLD MAY NOT BE USED IN FINISHED AREAS.
4. TRANSCEIVER TO BE PROVIDED BY OTHERS
5. SPEAKER/STROBE SHALL BE MARKED "ALERT", AND SHOULD BE CLEAR.

**LEGEND**

- [F] MANUAL FIRE ALARM STATION
- FE FIRE EXTINGUISHER
- [S] SPEAKER-STROBE
- [SD] STROBE
- [SD] SMOKE DETECTOR
- [SD] IN-DUCT SMOKE DETECTOR
- [SP] SPEAKER
- [SP WP] WEATHERPROOF SPEAKER
- [FACP] FIRE ALARM CONTROL PANEL
- [ACU] AUTONOMOUS CONTROL UNIT
- [TD] TELEPHONE DIALER
- [BAT] BATTERIES
- [M/C] MICROPHONE
- [S/P] SURGE PROTECTOR
- [EOL] END OF LINE RESISTOR

**A** FIRE ALARM FLOOR PLAN  
1/4"=1'-0"

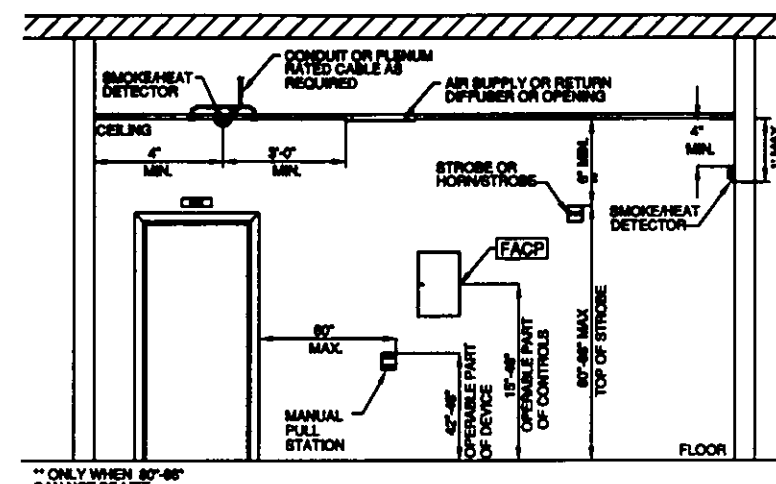
**1** FIRE ALARM FLOOR PLAN  
1/4"=1'-0"



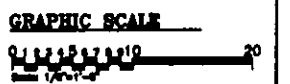
**2** RISER DIAGRAM  
SEE FLOOR PLAN FOR NUMBER AND LOCATION OF RISING AND NOTIFICATION DEVICES  
NTS

ACTION TO BE INITIATED	ACTION TO BE INITIATED											
	DISPLAY MESSAGE ON FACP/FAA DISPLAY	ACTUATE AUDIBLE NOTIFICATION DEVICES	ACTUATE VISUAL NOTIFICATION DEVICES	STOP AIR HANDLING UNITS	SEND ALARM SIGNAL TO MONITORING STATION	SEND TROUBLE SIGNAL TO MONITORING STATION	SEND SUPERVISORY SIGNAL TO MONITORING STATION	OVERRIDE FIRE ALARM MESSAGES				
MANUAL PULL STATION	X	X	X		X							
GENERAL SMOKE DETECTOR	X	X	X		X							
FACP TROUBLE	X					X						
IN-DUCT DETECTOR			X	X	X							
MASS NOTIFICATION SYSTEM	X	X	X								X	
LIVE VOICE MESSAGE	X	X	X								X	
TAMPER SWITCH						X						
SPRINKLER FLOW SWITCH					X							

**3** OPERATIONAL MATRIX  
NTS



**4** MOUNTING HEIGHT DETAIL  
NTS



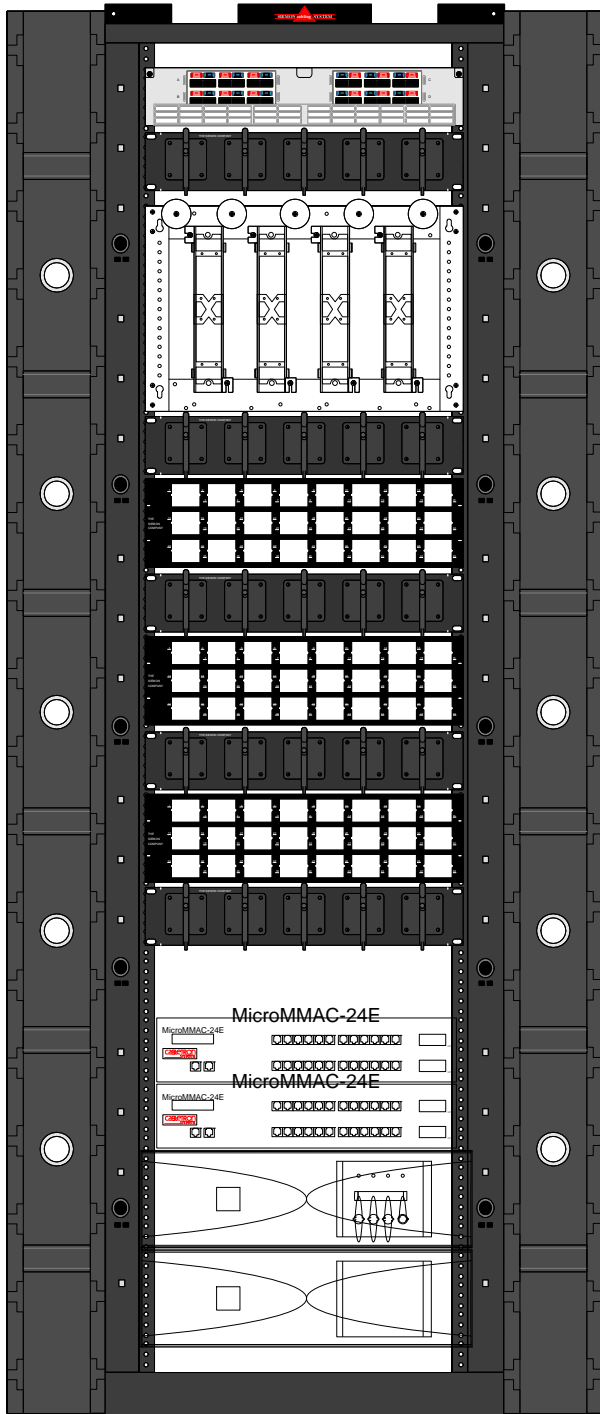
**FA-1**

The Walker Group Architecture, Inc. WALKER GROUP 302 SHELBY PHOTOS (919) 850-1700		MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA	
DES. C. WALKER CHK. B. WALKER SUBMITTED BY: J. WALKER DESIGN DR. B.R. MARSHBURN	APPLIED INSTRUCTION BUILDING NO. BB-50, COURTHOUSE BAY FIRE ALARM FLOOR PLAN	NAVFAC DRAWING NO. <b>80009303</b>	SHEET 4 OF 28
APPROVED: PWO OR OICC DATE: 8/8/2011	SIZE CODE IDENT. NO. F	CONST. CONTR. NO. N40085-11-B-0117	SCALE: NOTED SPEC. 11-0117



**On Backboard – PROTECTOR / BUILDING ENTRANCE (BEP), TMGB,  
Proper Bonding & Grounding, Cable Management and Slack on Ladder Rack.  
Ladder rack should be from comm rack to at lease two walls.**

**Rack or  
Cabinet if in unsecure area**



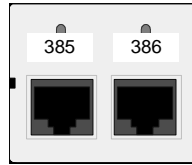
**FIBER  
Distribution**

**ST connectors  
CABLE MANAGER**

**COPPER**

**Connecting BLOCKS**

**CABLE MANAGER**



**Panel Dual  
Port Label**

**Bottom 15 RU is  
reserved for DATA  
equipment**

**Number of  
telecommunications work  
outlets in building determine  
number of patch panels and  
need for additional racks**

**If 3 or more racks are used:  
place the fiber and copper  
cable terminations in center  
racking to reduce patch cord  
length**



**Work Area  
Outlet**

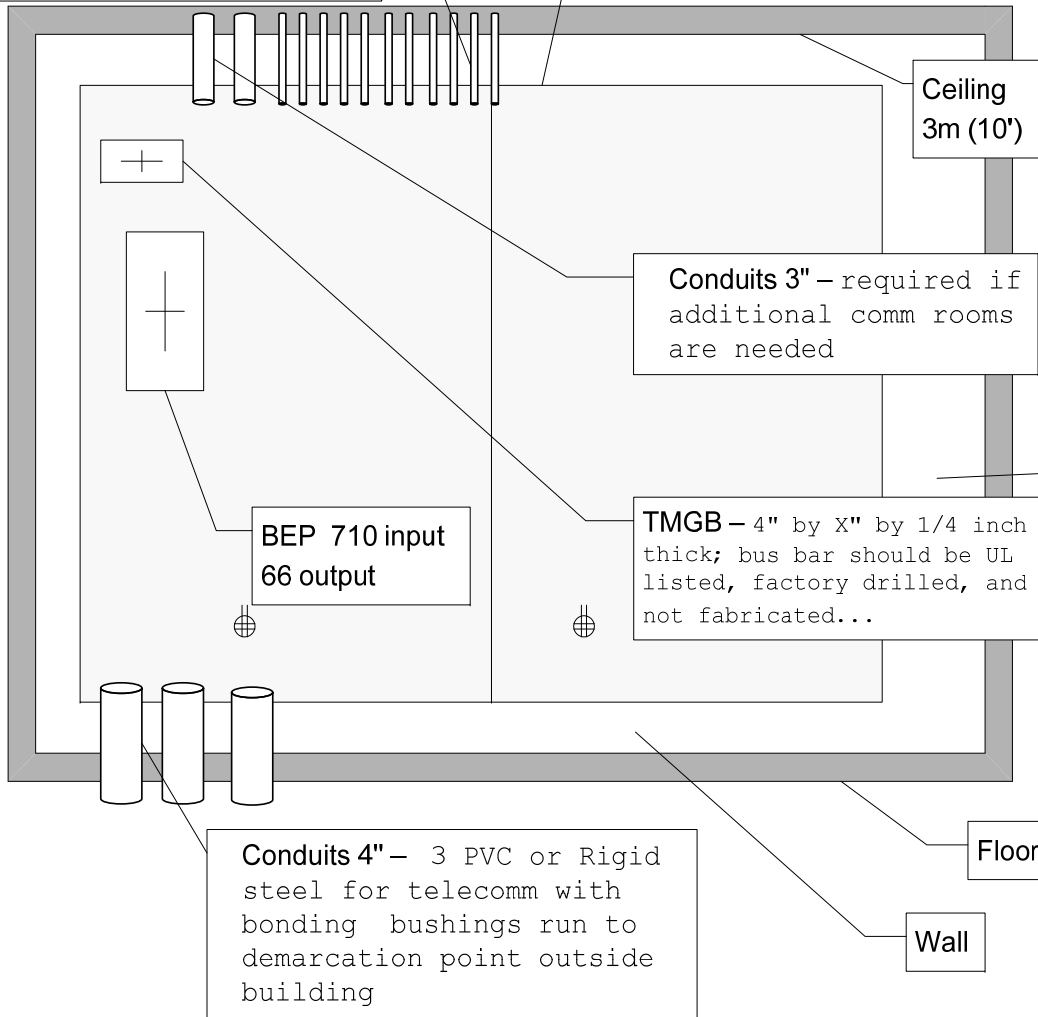
**TELECOMMUNICATIONS  
INFRASTRUCTURE  
STANDARDS  
MARINE CORPS BASE  
CAMP LEJEUNE**

**SECTION 27 10 00  
Encl A  
RACK ELEVATION  
EXAMPLE**

**TELECOMMUNICATIONS INFRASTRUCTURE STANDARDS**  
**MARINE CORPS BASE CAMP LEJEUNE**  
 SECTION 27 10 00 Encl B  
**BACK BOARD EXAMPLE**

Conduits 1¼" – with plastic / bonding bushings - home run to work area outlet or cable tray.

Telephone backboard - 4'x8' Provide min 2 void-free, interior grade plywood 19 mm (3/4 inch) thick as indicated. Backboards shall be fire rated, with the fire stamp visible or covered with two coats of gray or a lighter color nonconductive fire-retardant paint on all sides. Boards should be installed 4' Width x 8' Height securely fastened to the wall anywhere equipment is to be mounted.



Conduits 3" – required if additional comm rooms are needed

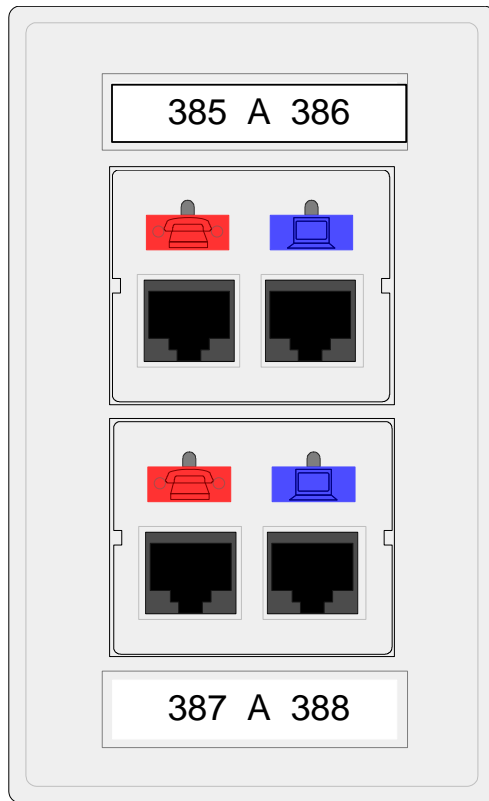
TMGB – 4" by X" by 1/4 inch thick; bus bar should be UL listed, factory drilled, and not fabricated...

Conduits 4" – 3 PVC or Rigid steel for telecomm with bonding bushings run to demarcation point outside building

**General notes**

- all metallic conduit and equipment must be bonded to the TMGB and building ground per TIA J-STD-607-A with min #6AWG stranded green sheath conductor.
- all conduits need to be securely mounted, fire stopped, and over lap the back board by 3-6".
- 1 dedicated 20 amp dual power is required per comm. rack/cabinet.
- If wired by base telephone; contractor should install all except the below and add pull strings in conduits.
- if wired by contractor; install four CAT6 cables in each 1¼" conduit to typical work area outlet; also install all ladder racks, patch panels, cabinets, building protectors, OSP PE-39 cable, fiber optic cable, riser cable, and equipment IAW Base Tele 27 10 00 .

**NOT to Scale for reference only**



**CT-FP-LBL-104**

**CT4-FP-20**

**CT-F-CX-CX-20**

**CT-F-CX-CX-20**

**FOR COPPER  
ONLY  
TO THE  
FACEPLATE**

**TELECOMMUNICATIONS  
INFRASTRUCTURE STANDARDS  
MARINE CORPS BASE CAMP  
LEJEUNE**

SECTION 27 10 00  
Encl C  
**FACEPLATE EXAMPLE**

SECTION 27 10 00

BUILDING TELECOMMUNICATIONS CABLING SYSTEM

06/09

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA/EIA-606-A (2002) Administration Standard for the Telecommunications Infrastructure

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

TIA/EIA-492AAAA-A (1998) 62.5-um Core Diameter/125-um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers (ANSI/TIA/EIA-492AAAA-A)

TIA/EIA-526-7 (1988) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant (ANSI/TIA/EIA-526-7)

TIA/EIA-568-B.1 (2001; Addendum 2001) Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements (ANSI/TIA/EIA-568-B.1)

TIA/EIA-568-B.2 (2001) Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components (ANSI/TIA/EIA-568-B.2)

TIA/EIA-568-B.3 (2000; Addendum 2002) Optical Fiber Cabling Components Standard (ANSI/TIA/EIA-568-B.3)

TIA/EIA-569-A (1998; Addenda 2000, 2001) Commercial Building Standards for Telecommunications Pathways and Spaces (ANSI/TIA/EIA-569-A)

TIA J-STD-607-A (2002) Commercial Building Grounding (Earthen) and Bonding Requirements for Telecommunications

EIA/TIA TSB-75 (1996) Additional Horizontal Cabling Practices for Open Offices

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-80-576 Standards Publication for Communications  
Wire and Cable for Wiring of Premises

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA WC 63.1 (2000) Twisted Pair Premise Voice and Data  
Communications Cables

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2007; AMD 1 2008) National Electrical  
Code - 2008 Edition

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS TECM 823 (1980) Electrical Protection by Use of Gas  
Tube Connectors

UNDERWRITERS LABORATORIES (UL)

UL 1666 (2000; Rev thru Jul 2002) Test for Flame  
Propagation Height of Electrical and  
Optical-Fiber Cables Installed Vertically  
in Shafts

UL 1863 (2000) Communication Circuit Accessories

UL 444 (2002; Rev thru Aug 2002) Communications  
Cables

UL 467 (2007) Standard for Grounding and Bonding  
Equipment

UL 497 (2001) Protectors for Paired Conductor  
Communication Circuits

UL 1286 (1993; Bul. 1998, R 1998) Office  
Furnishings

UL 514C (1996; R 2002) Nonmetallic Outlet Boxes,  
Flush-Device Boxes, and Covers

UL 969 (1995; Rev thru Nov 2001) Marking and  
Labeling Systems

1.2 RELATED REQUIREMENTS

Section 26 00 00, "Basic Electrical Materials and Methods"; Section 26 20 00, "Interior Distribution System" and Section 33 82 00 "Telecommunications Outside Plant (OSP) apply to this section with additions and modifications specified herein.

1.3 DEFINITIONS

1.3.1 Main Distribution Frame (MDF)

A physical structure at a central location for terminating permanent

backbone cables to interconnect with service provider (SP) equipment at the activity minimum point of presence. The MDF generally includes vendor specific components to support voice and data circuits, building surge protector assemblies, main cross connect blocks, equipment support frames, and wood backboard (if MDF is wall mounted). Depending upon local site conditions, the MDF and BDF may be identical.

#### 1.3.2 Building Distribution Frame (BDF)

A structure with terminations for connecting backbone, campus, and horizontal cabling. The BDF generally includes a cross connect, equipment support frame, and wooden backboard or terminal cabinet. The BDF shall include building protector assemblies when used for campus backbone or SP cabling.

#### 1.3.3 Intermediate Distribution Frame (IDF)

An intermediate termination point for horizontal wiring and cross-connections within telecommunications rooms or wiring closets.

#### 1.3.4 Telecommunications Room

An enclosed space for telecommunications equipment, terminations, and cross-connect wiring for horizontal cabling, minimum size shall be 8' x 10'. Telecommunications Rooms should be centrally located unless multiple rooms are used. Access to Telecommunications Rooms should be from a common area such as a hallway and the door should swing out. Multiple Telecommunications Rooms are required if the usable floor space to be served exceeds 10,000 square feet, or the cable length between the horizontal cross-connect and the telecommunications outlet, including slack, exceeds 295 feet. Multiple telecommunications rooms will be connected by a minimum of two 75mm (3 inch) conduits. The minimum ceiling height will be eight and one half feet. The flooring shall be bare concrete instead of carpet or tile to reduce dust and static electricity. Two separately dedicated 20 amp double gang electrical outlets will be installed on the same wall as the backboard. There should not be an electrical panel within the telecommunications room. The lock on the door shall be keyed to a P4 key.

### 1.4 ENVIRONMENTAL REQUIREMENTS

Connecting hardware shall be rated for operation under ambient conditions of 0 to 60 degrees C (32 to 140 degrees F) and in the range of 0 to 95 percent relative humidity, non-condensing. Provide HVAC that will maintain continuous and dedicated environmental control (24 hours per day, 365 days per year). If emergency power is available, consider connecting it to the HVAC system.

### 1.5 SYSTEM DESCRIPTION

The structured telecommunications pathway system shall include permanently installed horizontal and backbone pathways, service entrance facilities, work area pathways, telecommunications outlet assemblies, conduit, and raceway, and hardware for splicing, terminating, and interconnecting. The horizontal system includes the pathway between the telecommunications room and the work area telecommunications outlet. The horizontal system shall be suitable for star topology with the IDF at the center or hub of the star. The backbone pathway system includes intrabuilding and interbuilding inter-connecting pathway to provide connectivity between the MDF's, BDF's,

and IDF's. The backbone system shall be suitable for star topology with the MDF at the center or hub of the star.

#### 1.6 SUBMITTALS

The following shall be submitted in accordance with Section 01 33 00 "Submittal Procedures":

##### SD-02 Shop Drawings

Telecommunications drawings

Distribution frames

##### SD-03 Product Data

Telecommunications cabling (backbone and horizontal)

Patch panels

Telecommunications outlet/connector assemblies

Equipment support frame

Building protector assemblies

Connector blocks

Protector modules

##### SD-06 Test Reports

Telecommunications cabling testing

Factory reel tests

Furnish factory reel tests for optical fiber cables.

##### SD-07 Certificates

Contractor Qualifications

Manufacturer Qualifications

Test plan

##### SD-10 Operation and Maintenance Data

Telecommunications cabling and pathway system Data Package 5

Submit operations and maintenance data in accordance with Section 01 78 23, Operation and Maintenance Data and as specified herein.

#### 1.7 ADDITIONAL SUBMITTAL REQUIREMENTS

##### 1.7.1 Telecommunications Drawings

Provide registered communications distribution designer (RCDD) approved drawings complete with wiring diagrams and details required to prove that

the distribution system shall properly support connectivity from the telecommunications equipment room to telecommunications work area outlets. Show the entrance facility and layout of cabling and pathway runs, cross connect points, MDF, BDF, IDF, grounding system, terminating block arrangements and type. Drawings shall depict final telecommunications cabling configuration, including location, color coding, gage, pair assignment, polarization, and terminating blocks layout at cross connect points and patch panels after telecommunications cable installation. Provide a plastic laminated schematic of the as-installed telecommunications cable system showing cabling, MDF's, BDF's, IDF's, and equipment rooms keyed to floor plans by room number. Mount the laminated schematic near the MDF as directed by the Contracting Officer. The Telecommunications Contractor will receive design approval from the Base Telephone Officer prior to installation.

#### 1.7.2 Distribution Frames

Provide shop drawing showing layout of applicable equipment including incoming cable stub or connector blocks, building protector assembly, outgoing cable connector blocks and equipment spaces and racks.

#### 1.7.3 Qualifications

##### 1.7.3.1 Minimum Contractor Qualifications

Prior to installation, submit data of provider's experience and qualifications. All work under this section shall be performed by and all equipment shall be provided by a certified Telecommunications Contractor, hereinafter referred to as the Contractor. The Contractor shall have the following qualifications in Telecommunications Systems installation:

- a. Contractor shall have a minimum of 3 years experience in the application, installation and testing of the specified systems and equipment.
- b. All supervisors and installers assigned to the installation of this system or any of its components shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products.
- c. All installers assigned to the installation of this system or any of its components shall be Building Industry Consulting Services International (BICSI) Certified Cabling Installation Technicians, Installer Level 2, or have a minimum of 3 years experience in the installation of the specified copper and fiber optic cable and components. Include names and locations of two projects successfully completed using optical fiber and copper communications cabling systems. Include written certification from users that systems have performed satisfactorily for not less than 18 months. Include specific experience in installing and testing structured telecommunications distribution systems using optical fiber and Category 5e cabling systems.

##### 1.7.3.2 Minimum Manufacturer Qualifications

The equipment and hardware provided under this contract will be from manufacturers that have a minimum of 3 years experience in producing the types of systems and equipment specified.

#### 1.7.4 Test Plan

Provide a complete and detailed test plan for the telecommunications cabling system including a complete list of test equipment for the UTP and optical fiber components and accessories 60 days prior to the proposed test date. Include procedures for certification, validation, and testing.

#### 1.7.5 Additions to Operation and Maintenance Manuals

In addition to requirements of Data package 5 for the telecommunications cabling and pathway system, include the requirements of paragraph entitled "Telecommunications Drawings."

### 1.8 DELIVERY AND STORAGE

Provide protection from weather, moisture, dirt, dust, and other contaminants for telecommunications cabling and pathway equipment placed in storage.

## PART 2 PRODUCTS

### 2.1 PATHWAYS (BACKBONE AND HORIZONTAL)

**TIA/EIA-569-A**. Pathway shall be conduit, cable tray, under floor duct, access floor, and wireway, installations. Provide grounding and bonding as required by **TIA J-STD-607-A**. Cable tray wiring shall comply with **NFPA 70**. All conduits entering the Telecommunications Room will be home run conduits and shall either extend up from the floor 3 to 4 inches or down from the ceiling 3 to 4 inches and will be bonded to the TMGB or TGB by a minimum number 6 green sheathed conductor. All penetrations will be sealed in accordance with code (fire-stopping). A minimum of two 3 inch conduits will be installed between the Main Telecommunications Room and any sub closets.

#### 2.1.1 Work area Pathways

Comply with **TIA/EIA-569-A**, except 1-inch diameter conduit. System furniture pathways shall comply with **UL 1286**. Horizontal cabling for open offices shall comply with **EIA/TIA TSB-75**.

#### 2.1.2 Pull Boxes

Construct of galvanized sheet steel with screw-fastened covers. Minimum size of boxes shall be not less than 4-inches wide by 4-inches in length by 3-inches deep for individual 1-inch diameter conduit; minimum size of boxes shall be not less than 12-inches wide by 60-inches long by 12-inches deep for 4-inch conduit. Provide pull boxes where length of conduit exceeds 100 feet or where there are more than two 90 degree bends, or equivalent. Align conduit ends on opposite side of pull boxes. Provide pull boxes in straight lengths of conduit; neither pull boxes nor conduit bodies shall be permitted in lieu of bends.

### 2.2 BENDS

Inside radius of conduit bend shall be at least 6 times the internal diameter of conduit.

### 2.3 TELECOMMUNICATIONS OUTLET BOXES

Telecommunications outlet boxes should be placed 6" to the left or right of

every electrical outlet box in workable office areas or any area that could be converted into workable office area such as storage closet; also any conference room should have one floor and one ceiling box. Boxes shall be standard type 4 inches square by 2 1/8 inches deep with 1-inch diameter side knock-outs, with a single gang plaster ring. Mount flush in finished walls at height indicated. Outlet boxes for wall-mounted telephones shall be 2 by 4 2 1/8 inches deep with 1 CAT5E/6 cable terminated in a standard wall phone plate; mounted at 54 inches above finished floor for classrooms or open spaces shall be telecommunications floor boxes large enough to support a surge of users with proper cable management. Floor boxes should not be used in wet areas. Tele electric poles or furniture managed pathways fed from above the wet area should be used. Multi-user Telecommunications Outlet Assembly i.e. Multimedia Outlet Assemblies (MUTOA) should be placed where best suited for the furniture used in the room.

### 2.3.1 Telecommunications Cabling

Cabling shall be UL listed for the application and shall comply with [TIA/EIA-568-B.1](#), [TIA/EIA-568-B.2](#), [TIA/EIA-568-B.3](#) and [NFPA 70](#). Provide a labeling system for cabling as required by [TIA/EIA-606-A](#) and [UL 969](#). Cabling manufactured more than 12 months prior to date of installation shall not be used.

#### 2.3.1.1 Backbone Copper

[ICEA S-80-576](#), [TIA/EIA-568-B.1](#), [TIA/EIA-568-B.2](#) and [UL 444](#), copper backbone cable shall be solid conductor, 24 AWG, 100 ohm, 25-pair UTP (Unshielded twisted pair), [NFPA 70](#) CMR rated formed into 25 pair binder groups covered with a thermoplastic jacket. [NFPA 70](#) type CMP may be substituted for type CMR. Pair twist-lengths and frequency per unit length shall be determined by the manufacturer. A minimum of two conductor twists per foot is required. Color coding shall comply with industry standards for 25 pair cables. Cable shall be third party verified to comply with EIA/TIA Category 5e requirements. Two 4 pair 24 AWG Category 5e/6 riser (CMR) rated cable will be installed between the MDF and each of the IDF's and terminated in the patch panel.

#### 2.3.1.2 Backbone Optical Fiber

[TIA/EIA-492AAAA-A](#), [TIA/EIA-568-B.3](#), [UL 1666](#), [NFPA 70](#). Optical fiber cable shall be 62.5/125-um, 12-fiber multimode, terminated on ST type connectors, with a non-conductive optical fiber riser cable (OFNR) rating. Nonconductive optical fiber Plenum (OFNP) cable may be substituted for type nonconductive optical fiber riser cable (OFNR). The cable jacket shall be orange.

### 2.3.2 Horizontal Cabling

Comply with [NFPA 70](#), [NEMA WC 63.1](#), [ICEA S-80-576](#) and performance characteristics in [TIA/EIA-568-B.1](#).

#### 2.3.2.1 Horizontal Copper

[TIA/EIA-568-B.2](#), [NFPA 70](#), UTP (unshielded twisted pair), 100 ohm. Provide four each individually twisted pair, 24 AWG conductors, Category 5e/6 general purpose cable, with a white or gray PVC jacket for jack one and a blue PVC jacket for jack two. Plenum (CMP) or riser (CMR) cable may be substituted for general purpose cable. If the cabling passes thru a plenum air space then plenum (CMP) rated cable is required.

#### 2.3.2.2 Horizontal Optical Fiber

TIA/EIA-492AAAA-A, TIA/EIA-568-B.3, NFPA 70. Optical fiber cable shall be 62.5/125-um, 2-fiber multimode, rated nonconductive optical fiber cable (OFN). Plenum (OFNP) or riser (OFNR) cable may be substituted for general purpose cable. The cable jacket shall be orange and be of single jacket construction.

#### 2.4 DISTRIBUTION FRAMES

Provide building distribution frames (BDF's), intermediate distribution frames (IDF's), and main distribution frames (MDF's) as shown on design drawings for terminating and cross connecting permanent cabling.

##### 2.4.1 Equipment Support Frame

EIA-310-D.

- a. Bracket, wall mounted, 8 gauge aluminum. Provide hinged bracket compatible with 482.6 mm panel mounting.
- b. Rack, wall mounted, 16 gauge steel construction treated to resist corrosion. Shall be CPI 15320-724 or equivalent.
- c. Racks, floor mounted modular type, 16 gauge steel construction treated to resist corrosion. Provide rack with vertical and horizontal cable management channels, top cable troughs and grounding lug. Rack shall be compatible with 482.6 mm panel mounting.

##### 2.4.2 Building Protector Assemblies

Building protector assembly shall have connector blocks for connection to the exterior cable at full capacity.

###### 2.4.2.1 Protector Modules

UL 497, RUS TECM 823, three-electrode gas tube or solid state type rated for the application. Provide the number of surge protection modules equal to the number of pairs of exterior cable of the building protector assembly.

###### 2.4.3 Connector Blocks

Insulation displacement type, Krone' 6652-1-880-10, for Category 5e and higher systems. Provide blocks for the number of backbone cables terminated on the block plus 25 percent spare.

###### 2.4.4 Patch Panels

Provide ports for the number of horizontal cables terminated on the panel plus 25 percent spare. Provide pre-connectorized Optical fiber and copper patch cords for patch panels. Provide patch cords with connectors specified. Patch cords shall meet minimum performance requirements specified in TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3 for cables and hardware specified.

#### 2.4.4.1 Modular to Patch Panel

TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3. Panels shall be third party verified and shall comply with EIA/TIA Category 5e/6 requirements. Panel shall be constructed of 2.2 mm minimum aluminum and shall be compatible with an EIA 482.6 mm equipment rack. Panel shall provide 48 non-keyed, RJ-45 ports. Patch panels shall terminate the building cabling on 110-style insulation displacement connectors and shall utilize a printed circuit board interface. The rear of each panel shall have incoming cable strain-relief and routing guides. Panels shall have each port factory numbered and be equipped with laminated plastic nameplates above each port.

#### 2.4.4.2 Fiber Optic Patch Panel

Provide panel for maintenance and cross-connecting of optical fiber cables. Panel shall be constructed of 2.2 mm minimum aluminum and shall be compatible with EIA 482.6 mm equipment racks. Each panel terminating backbone fiber optic cable shall provide either 6 or 12 ST multimode adapters. Each panel terminating horizontal multi-mode fiber optic cable shall provide 6 multi-mode MTRJ type adapters. Adapters shall utilize metallic alignment sleeves. Provide dust cover for all unused adapters. The rear of each panel shall have a cable management tray a minimum of 203 mm deep with removable cover, incoming cable strain-relief and routing guides. Panels shall have each adapter factory numbered and be equipped with laminated plastic nameplates above each adapter.

### 2.5 TELECOMMUNICATIONS OUTLET BOXES

Standard type 100 mm square by 54 mm deep with a single gang plaster ring. Mount flush in finished walls at height indicated. Depth of boxes shall be large enough to allow manufacturer's recommended conductor bend radii for fiber.

### 2.6 TELECOMMUNICATIONS OUTLET/CONNECTOR ASSEMBLIES

#### 2.6.1 Outlet/Connector Copper

Outlet/connectors shall comply with FCC Part 68.5, TIA/EIA-568-B.1, and TIA/EIA-568-B.2. UTP Outlet/connectors shall be UL 1863 listed, non-keyed, 4-pair, constructed of high impact rated thermoplastic housing and shall be third party verified and shall comply with EIA/TIA Category 5e/6 requirements. Outlet/connectors provided for Category 5e/6 UTP cabling shall meet or exceed the requirements for the cable provided. Outlet/connectors shall be terminated using a 110-style PC board connector, color-coded for both T568A and T568B wiring. Each jack shall be wired T568A as indicated. UTP outlet/connectors shall comply with TIA-455-21-A for 500 mating cycles.

#### 2.6.2 Cover Plates

Telecommunications cover plates shall comply with UL 514C, and TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3; flush or oversized design constructed of high impact thermoplastic. Stenciled lettering for voice and data circuits shall be provided using thermal ink transfer process.

#### 2.6.3 Optical Fiber Distribution Panel

Wall or rack mounted optical fiber distribution panel (OFDP) shall be

constructed of 2.2 mm minimum anodized aluminum. Panel shall be divided into two sections, distribution and user. Distribution section shall have strain relief, routing guides and shall be lockable, user section shall have a cover for patch cord protection. Each distribution panel shall provide 6 or 12 ST adapters. Adapters shall utilize metallic alignment sleeves. Provide dust covers for all adapters. User panels shall have MTRJ type connectors with dust covers.

## 2.7 BACKBOARDS

Provide void-free, interior grade plywood 19 mm (3/4 inch) thick as indicated. Backboards shall be fire rated, with the fire stamp visible, or covered with two coats of gray or a lighter color, nonconductive, fire-retardant paint. Boards should be installed 4' width by 8' height and cover at least one wall in the telecommunications room.

## 2.8 GROUNDING AND BONDING PRODUCTS

Comply with [UL 467](#), [TIA J-STD-607-A](#), and [NFPA 70](#). Components shall be identified as required by [TIA/EIA-606-A](#). Ground rods shall be in accordance with Section 16402N, "Interior Distribution System." The preferred ground for the Telephone Main Grounding Bus (TMGB) bar will be to the Main Distribution Panel (MDP). All grounding and bonding conductors within the Telecommunications room will be green sheathed copper conductor, either stranded or solid, and labeled as suitable for use as such and tagged "DO NOT REMOVE". The minimum size of the TMGB shall be no smaller than 4" by 10" by 1/4 inch thick.

## 2.9 FIRESTOPPING MATERIAL

Provide asbestos free fire stopping system capable of maintaining an effective barrier against flame and gases. System shall be UL listed and comply with ASTM E 814. Include UL system number UL listed print from manufacturer for each type of floor, wall, and ceiling penetration.

## 2.10 NAMEPLATES

Provide nameplates for equipment rooms and telecommunications rooms doors in accordance with schedule provided on drawings. Provide equipment nameplates in accordance with Section 26 00 00, "Basic Electrical Materials and Methods".

# PART 3 EXECUTION

## 3.1 INSTALLATION

Telecommunications pathway systems, including the horizontal and backbone pathway systems, telecommunications outlet/connector assemblies, and associated hardware shall be installed in accordance with [TIA/EIA-568-A](#), [TIA/EIA-569-A](#), [NFPA 70](#), and UL standards as applicable. Metal raceway bases, covers, and dividers shall be bonded and grounded in accordance with [TIA J-STD-607-A](#). Pathways shall be installed in accordance with the following minimum clearance distances of 1.2 meters (4 feet) from motors, generators, frequency converters, transformers, x-ray equipment or uninterruptible power system, 300 mm (12 in) from power conduits and cable systems, 125 mm (5 inches) from fluorescent or high frequency lighting system fixtures.

### 3.1.1 Cabling

Install Category 5e/6 UTP and optical fiber telecommunications cabling and pathway system as detailed in TIA/EIA-568-B.1, TIA/EIA-568-B.2, and TIA/EIA-568-B.3. Screw terminals shall not be used except where specifically indicated on plans. Use an approved insulation displacement connection (IDC) tool kit for copper cable terminations. Do not untwist Category 5e/6 UTP cables more than 12 mm from the point of termination to maintain cable geometry. Provide service loop on each end of the cable, 3 meters in the telecommunications closet, 1 meter in the work area outlet for optical fiber and 150 mm (6 inch) for UTP. Do not exceed manufacturers' cable pull tensions for copper and optical fiber cables. Provide a device to monitor cable pull tensions. Do not exceed 110 Newton pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples. Only Velcro type cable straps are allowed on Category 5e cable and optical fiber cable. For UTP cable bend radii shall not be less than four times the cable diameter.

#### 3.1.1.1 Backbone Cable

- a. Copper Backbone Cable. Install backbone copper cable between MDF, BDF, and IDF equipment as indicated on drawings.
- b. Optical fiber Backbone Cable. Install backbone optical fiber in indicated pathways. Do not exceed manufacturer's recommended bending radii and pull tension. Prepare cable for pulling by cutting outer jacket 250 mm leaving strength members exposed for approximately 250 mm. Twist strength members together and attach to pulling eye. Vertical cable support intervals shall be in accordance with Manufacturer's recommendations.

#### 3.1.1.2 Horizontal Cabling

Install horizontal cabling and pathway as indicated on drawings between MDF, BDF, IDF, and telecommunications outlet assemblies at workstations.

#### 3.1.2 Pathway Installations

Comply with TIA/EIA-569-A, except 1-inch diameter conduit to each outlet from telecommunication room backboard. Conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 150 mm (6 inches) away from parallel runs of electrical power equipment, flues, steam, and hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit is visible after completion of project. Run conduits in crawl spaces and under floor slabs as if exposed. Install no more than two 1.57 radii (90 degree) bends for a single horizontal cable run. All bends/turns in conduits will be in straight runs of conduit; in no case will a turn be made within a pull box. The minimum size for a pull box in a one inch home run conduit will be 4" long by 4" wide by 3" deep, and for a four inch conduit 60" long by 12" wide by 12" deep.

##### 3.1.2.1 Service Entrance Conduit, Underground

PVC Type EPC-40, galvanized rigid steel, or steel IMC. Underground portion shall be encased in minimum of 75 mm (3 inches) of concrete extending from the building entrance to 1500 mm (5 feet) out from the building and shall

be a minimum of 450 mm (18 inches) below slab or grade.

#### 3.1.2.2 Work Area Outlets

All work area faceplates will contain either four category 5e/6 jacks, or two category 5e/6 jacks.

#### 3.1.2.3 Terminations

Terminate UTP cable in accordance with [TIA/EIA-568-B.1](#), [TIA/EIA-568-B.2](#), [TIA/EIA-568-B.3](#) and wiring configuration as specified, T568A.

#### 3.1.2.4 Faceplates

As a minimum, each jack shall be labeled as to its function and a unique number to identify cable link.

#### 3.1.3 Cables

Unshielded twisted pair shall have a minimum of 152 mm (6 inch) slack cable and fiber optic cables shall have a minimum of 1 m of slack cable loosely coiled into the telecommunications outlet boxes. Minimum manufacturer's bend radius for each type of cable shall not be exceeded.

##### 3.1.3.1 Pull Cords

Pull cords shall be installed in all conduit serving telecommunications outlets which do not initially have cable installed.

##### 3.1.3.2 Telecommunications Room Termination

Install termination hardware required for Category 5e/6 and optical fiber system. An insulation displacement tool shall be used for terminating copper cable to insulation displacement connectors.

#### 3.1.4 Equipment Support Frame

Install in accordance with [TIA/EIA-569-A](#):

- a. Bracket, wall mounted. Mount bracket to plywood backboard per manufacturer's recommendations. Mount rack so height of highest panel does not exceed 1980 mm (76 inches) above floor.
- b. Racks, floor mounted modular type. Permanently anchor rack to the floor per manufacturer's recommendations.

#### 3.1.5 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated wall, partitions, floors, or ceilings.

#### 3.1.6 Grounding and Bonding

Will be conducted in accordance with [TIA J-STD-607-A](#), and [NFPA 70](#).

#### 3.1.7 Fire Stopping

Seal openings around raceway penetrations through fire resistance rated walls, partitions, floors and ceiling utilizing proper fire stopping

materials to maintain fire resistive integrity.

### 3.2 LABELING

#### 3.2.1 Labels

All labels shall be in accordance with TIA/EIA-606-A. The jacks will be numbered in a logical, sequential, clockwise numbering system.

#### 3.2.2 Cable

All cables shall be labeled using color labels on both ends with encoded identifiers per TIA/EIA-606-A.

#### 3.2.3 Termination Hardware

All workstation outlets and patch panel connections shall be labeled using color coded labels with encoded identifiers as per TIA/EIA-606-A.

### 3.3 TESTING

#### 3.3.1 Telecommunications Cabling Testing

Perform telecommunications cabling inspection, verification, and performance tests in accordance with TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3.

##### 3.3.1.1 Inspection

Visually inspect cabling jacket materials for UL or third party certification markings. Visually inspect UTP and optical fiber jacket materials for UL or third party certification markings. Inspect cabling terminations in telecommunications rooms and at workstations to confirm color code for tip and ring pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1, TIA/EIA-568-B.2, and TIA/EIA-568-B.3. Visually confirm Category 5e marking of outlets, wallplates, outlet/ connectors, and patch panels.

##### 3.3.1.2 Verification Tests

UTP backbone copper cabling shall be tested for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has overall shield. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connected. Perform 100 MHz near-end-cross-talk (NEXT) and attenuation tests for Category 5e systems installations. Perform optical fiber end to end attenuation tests using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures.

Perform tests in accordance with TIA/EIA-526-14-A, Method B for horizontal, multimode optical fiber and TIA/EIA-526-7, Method B for backbone, single mode optical fiber. Perform verification acceptance tests and factory reel tests.

##### 3.3.1.3 Performance Tests

- a. Category 5e/6 Links. Perform UTP link tests in accordance with TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3. Tests shall include wire map, length, attenuation, NEXT, and propagation delay.

- b. Optical Fiber Links. Perform optical fiber end-to-end attenuation tests and reel tests at jobsite.
- c. As built drawings showing all telecommunications outlets and their numbers.

3.3.1.4 Final Verification Tests

Perform verification tests for UTP and optical fiber systems after the complete telecommunications cabling and workstation outlet/connectors are installed. These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and DSN telephone call. The final QC and certification of installation will be performed by Base Telephone after the contractor has provided the test results to the government contract representative.

3.3.1.5 Records

- a. Records to be provided for copper shall include the cable specification sheets from the manufacturer, the cable routing and locations, all splice point locations, patch panel and jack locations, cable length, cable reel numbers and installation location, the test results in both hard copy and electronic version.
- b. Records to be provided for fiber shall include the cable specification sheets from the manufacturer, the cable routing and locations, all splice point locations, patch panel and jack locations, cable length, cable reel numbers and installation location, the test results in both hard copy and electronic version.
- c. As built drawings showing all telecommunications outlets and their numbers.

3.4 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of inch-pound measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The inch-pound and metric measurements are as follows:

PRODUCTS	INCH- POUND	METRIC
Outlet Boxes		
1. Standard		
- Length/width	4 inches (square)	100 mm (square)
- Depth	2 1/8 inches	55 mm
2. Telephone Outlet		
- Length	4 inches	100 mm
- Width	2 inches	50 mm
- Depth	2 1/8 inches	55 mm
- Depth	1 1/2 inches	38 mm

-- End of Section --

