



**UNITED STATES MARINE CORPS**

MARINE CORPS BASE  
PSC BOX 20004  
CAMP LEJEUNE, NC 28542-0004

BO 2305.5M

S4/S6/BRQ

29 APR 2009

BASE ORDER 2305.5M

From: Commanding Officer  
To: Distribution List

Subj: MANAGEMENT, OPERATION, AND MAINTENANCE OF THE BASE  
TELEPHONE SYSTEM

Ref: (a) CJCSI 6215.01 (NOTAL)  
(b) OPNAVINST 2305.13A (NOTAL)  
(c) MCO P4400.150\_  
(d) MCO P2066.1  
(e) DOD 7000.14-R (NOTAL)  
(f) NAVCOMPTMAN, Vol VII (NOTAL)  
(g) BO P5560.2\_\_

Encl: (1) Telephone Service Request Format (MCBCL 2305/28)  
(2) Telephone Logbook Entry Instructions  
(3) Telecommunication Infrastructure Standards,  
Marine Corps Base, Camp Lejeune  
(4) Sample Request for Detailed Call Records

1. Situation. To issue guidance and instructions for the installation, operation, and maintenance of the Marine Corps Base (MCB), Camp Lejeune Telephone Switched Network per the references.

2. Cancellation. BO 2305.5L.

3. Mission

a. The Base Telephone Switched Network (BTSN) is a United States Government owned, maintained, and operated telephone system managed per references (a) through (g). The BTSN is an administrative telephone system providing official telephone service to all tenant commands, government agencies, and interservice subscribers. The BTSN provides unofficial (reimbursable) service to contractors, family quarters at Courthouse Bay, and slips at Gottschalk Marina. Commercial telephone service is provided to the Family Housing areas by the Local Exchange Carrier (LEC).

DISTRIBUTION STATEMENT A: Approved for public release;  
Distribution is unlimited.

29 APR 2009

b. Summary of Revision. Significant changes have been made to the Order. This Order has been revised and should be reviewed in its entirety.

#### 4. Execution

a. Responsibility. The Base Telephone Officer is responsible for administering the operation of the BTSN and controlling telephone service to include, but not limited to:

(1) Planning, programming, budgeting, and coordinating for BTSN maintenance and upgrades.

(2) Approving requests to install, move, and disconnect telephones and associated equipment.

(3) Ensuring official subscribers use government provided, commercial long distance, and Defense Switch Network (DSN) for official government business only.

(4) Ensuring proper maintenance of Inside Plant (Central Office) and Outside Plant (Cable and Premise Wiring Infrastructure, etc.) facilities.

(5) Processing official and unofficial telephone bills.

(6) Supervising, scheduling, and training of personnel.

(7) Management of all telecommunication circuitry (voice, video, and special circuits) both long haul and distribution aboard MCB Camp Lejeune.

#### b. Classes of Telephone Service

(1) Class DSN. Telephones authorized for transaction of official government business. This service provides access to the DSN network. This class of service can be tailored to meet subscriber/circuit requirements (CONUS only/World-Wide access).

(2) Class A (Official). Telephones authorized for the transaction of official government business. This class of service provides access to the commercial telephone system, and may be tailored to meet subscriber/circuit requirements (Long Distance/Long Distance with International Access) on a case-by-case basis. The acceptance of collect telephone calls is not authorized.

(3) Class A Restricted (Official). Telephones authorized for the transaction of official government business.

29 APR 2009

This class of service provides commercial telephone access and allows local area and 800 dialing only. Acceptance of collect calls is not authorized.

(4) Class B (Unofficial). Telephones provided for unofficial use. This class of service may be restricted to the base or have access to the commercial telephone system. Charges are paid from non-appropriated funds or by individual subscribers. The acceptance of collect telephone calls is not authorized. This class of service includes:

(a) Class B-1. Telephones installed in government-owned or leased quarters for use by the designated occupant. Access to the commercial system is authorized.

(b) Class B-2. Telephones installed for use of the American Red Cross and other Marine Corps Community Services (MCCS) activities and commercial concerns authorized to conduct business from a fixed location on the base as provided in references (e) and (f). This class of service may be restricted to the base or have access to the commercial telephone system. The authority for commercial concerns must be identified in a contract or permit issued by the Commanding Officer, MCB Camp Lejeune.

(5) Class C (Official Restricted). Telephones authorized for the transaction of official government business, but are restricted to the Base. Users cannot make long distance telephone calls on Class C telephones. Collect telephone calls are not authorized and are blocked.

c. Class A and DSN Telephone Allocation

(1) Due to limited DSN and commercial trunking, it is necessary to carefully manage access to the DSN and Class A telephone service at Camp Lejeune and New River. Granting access to more users than the available trunks can support may result in blocked calls in which the customer will receive an "all trunks busy" signal. No more than 40% of the numbers in any one billing account code will be allowed DSN access unless specifically authorized.

(2) All base and tenant organizations should limit the number of telephones with DSN/Class A service to that which is mission essential. The Base Telephone Officer will conduct periodic reviews of DSN/Class A access to ensure the optimum level of service is provided.

d. Defense Switch Network (DSN)

(1) The DSN is the primary long haul, voice communication network within the Defense Information Switched Network. DSN provides a worldwide, unsecured, direct-distance dialing service to authorized agencies. **The purpose of the DSN is to provide essential command and control, operations, intelligence, logistic, diplomatic and administrative voice traffic.**

(2) The DSN is limited to official communications and will be restricted to only essential calls requiring a timeliness that cannot be obtained by other means and that would stand the scrutiny afforded a commercial toll call.

(3) Use of the DSN vice commercial or government provided long distance is mandatory for calls to all locations serviced by DSN.

(4) The use of graphic, facsimile, or unsecured voice-data devices is authorized only when in compliance with the following:

(a) Facsimile. The DSN may be used to send facsimile traffic. Facsimile equipment may be connected directly to a DSN access line or indirectly through an acoustic device, Private Branch Exchange (PBX), or other means. The facsimile machine must be automatically disconnected within one minute after facsimile transmission ends or the circuit is preempted.

(b) Data Processing Equipment. The DSN is predominantly a voice network, and transmission of data via DSN must not be detrimental to voice users. Data processing equipment, including computer-controlled graphics (other than facsimile), word processors, mainframe and minicomputers, and similar equipment, may use DSN only when other transmission paths, either commercial or government-owned, do not exist or when required for emergencies or reasons of national security, and when authorized by the appropriate approving authority. Data processing equipment using the DSN must be capable of automatically disconnecting within one minute after transmission ends or the circuit is preempted.

(5) The DSN is not authorized for:

(a) Use directly or indirectly by a non-appropriated fund activity receiving telephone service on-base, except when supporting the management and operations of the MCCS activity.

29 APR 2009

(b) Calls within an installation, metropolitan area, or confined geographic areas where other existing government-provided local telephone services are adequate.

(c) Off-net extension calls to the Public Switched Telephone Network (PSTN) at a distant DSN exchange except where such extension has been previously approved.

(6) The DSN is not secure without the use of a secure STU-III/STE terminal. Users must remember to avoid divulging or alluding to classified or sensitive information.

(7) DSN calls should be limited to five minutes in length whenever possible. When justified by traffic conditions, the Base Operator may break into a call while in progress to advise a caller of this limitation and request that they end the call. After another minute, the operator may disconnect the call without further notice.

(8) DSN users can obtain call assistance, conference calls, and directory assistance from the information Operator by dialing extension 451-1113.

(9) When you have technical trouble while using a DSN trunk line, **DO NOT** hang up. Immediately notify Base Telephone Customer Service Desk (extension 451-1114, opt 1) via another telephone. This will allow the Customer Service Desk the capability to immediately repair the trouble on the DSN trunk line you are having problems with.

e. General Services Administration (GSA) Provided Long Distance Service. The GSA has contracted for a PSTN that provides commercial long distance services, dedicated long-haul direct dialing services, and advanced data transmission capabilities. This network is currently called FTS-2001 and provides high quality, data capable access to all military activities within CONUS, Hawaii, Virgin Islands, Alaska, Puerto Rico, Guam and possessions within those boundaries. There are no restrictions on the transmission of data and facsimile traffic on this network. The same network also provides commercial long distance calling, at reduced rates, to all U. S. locations.

f. Remote Access Service (REMAC)

(1) REMAC telephone service is a remote access service that provides a subscriber the ability to use DSN telephone service regardless of their location. The REMAC code enables a

telephone to simulate the subscriber's office telephone on any telephone that can call the Camp Lejeune REMAC number. REMAC codes are directly related to the existing official telephone number aboard Camp Lejeune. THIS SERVICE IS FOR OFFICIAL BUSINESS ONLY. Placement of unofficial calls using REMAC is not authorized. REMAC codes will be handled in a manner similar to a bankcard with a personal identification number (PIN).

(2) REMAC calls may originate from any telephone capable of calling Camp Lejeune. Calls may be placed to any CONUS or Overseas DSN number dependent on the access the subscriber has on their government provided service.

(3) REMAC codes will only be issued to commissioned officers, staff noncommissioned officers, and authorized civilian personnel. Codes will not be shared. Cards will be issued upon official justification.

(4) REMAC codes must be requested using a standard "Telephone Service Request" (TSR) provided in enclosure (1). The request must include the name, rank, and SSN (last four digits) of the individual to whom the code will be issued. Re-issue of REMAC codes is not authorized. REMAC codes are not transferable. Once compromised, cancelled, or at the end of the calendar year, a new code must be requested. Lost or stolen REMAC codes must be reported to the Base Telephone Officer as soon as possible to prevent personal liability for unauthorized calls. All REMAC codes will self-cancel at the end of each calendar year. Renewal of REMAC cards must be requested via TSR 30 days prior to the end of each calendar year.

g. Subscriber Activities

(1) Any unit, organization, agency, department, or office, receiving telephone service from MCB, is considered a subscriber activity. Included are the II Marine Expeditionary Force (II MEF) and its major subordinate commands, MCB commands, U. S. Marine Corps Forces Special Operations Command (MARSOC), and other tenant activities.

(2) As such, subscriber activities are responsible for the following:

(a) Safeguarding and restricting use of telephone equipment and services to official business only.

(b) Maintaining a record of all commercial toll calls made by the unit. Enclosure (2) provides an example

Telephone Log format.

(c) Certifying and verifying telephone bills.

(d) Informing the Base Telephone Officer of any planned changes that will impact on telephone support.

(e) Ensuring that all additional lines and circuits, temporary or long-term, established on the installation are approved by the Base Telephone Officer prior to installation.

h. Telephone Control Officer (TCO)

(1) At a minimum, the following units will appoint in writing a TCO:

(a) II Marine Expeditionary Force (II MEF)

(b) 2d Marine Division (2d MarDiv)

(c) 2d Marine Logistics Group (2d MLG)

(d) Marine Corps Air Station (MCAS) New River

(e) U.S. Marine Corps Forces Special Operations Command (MARSOC)

(f) Marine Corps Combat Service Support Schools (MCCSSS)

(g) Naval Hospital, Camp Lejeune

(h) School of Infantry East (SOI-E)

(i) Marine Corps Community Services (MCCS)

(j) Marine Corps Engineering School (MCES)

(k) Weapons Training Battalion (WTBN)

(2) The specific duties of the TCO are:

(a) Function as the single consolidation point and approving official for all TSRs submitted by the command.

(b) Review all TSRs for administrative correctness and accuracy.

(c) Function as the primary point of contact for TSR status on all TSRs submitted by the command.

(d) Notify Base Telephone at least 90 days in advance of any unit actions that may affect the administrative telephone system (relocations, expansions, reorganizations, etc).

(e) Verify the unit's monthly telephone bill.

(f) Train unit certifiers in the proper certification of phone bills.

(g) Investigate all unauthorized calls to ensure government reimbursement and the appropriate administrative or disciplinary action is taken against offenders.

(h) Train personnel in telephone control procedures.

(i) Investigate all unauthorized installs/end devices (i.e. cordless telephones) and take corrective action.

i. Telephone Bill Certification and Verification

(1) Certification

(a) Certification is the process of comparing the unit's itemized phone bill to the unit's logs. To certify calls, organizations should maintain a log of all long distance official calls. The log will include justification for the call, date, time, number called, and evidence of the approval of the TCO, refer to enclosure (2).

(b) Unlogged Calls. Calls, which are not logged, will be considered unofficial. If investigation by the unit determines the call was official and properly authorized, the call should be entered in the logbook as a late entry.

(c) Questions about itemized bills or certification procedures should be referred to the Telephone Billing and Accounts, extension 451-5521.

(d) Telephone bill certifications are due at Telephone Billing and Accounts every month within five working days of receipt. Failure to turn certifications in on time can result in the loss of telephone service. Notification of failure to comply with certification and verification procedures will be forwarded to the unit commander via the appropriate chain of command.

29 APR 2009

(e) Telephone certifications and logbooks are subject to random audits by the Base Telephone Officer to ensure compliance with this Order. Adverse audit results can result in the loss of long distance access.

(f) Units deploying before certification is completed will deliver their logbooks to the next senior command element's G-6 or S-6 prior to deployment for final phone bill certification.

(g) Units standing down will likewise deliver their logbooks to the next senior command element's G-6 or S-6 for certification of the final phone bill.

(2) Verification

(a) Verification of the monthly phone bill is performed by the unit TCO or the Base Telephone Officer in the event the unit or organization does not have an appointed TCO.

(b) Verification is the process of reviewing the unit's itemized phone bills and logbooks after certification to ensure that the certification process was properly completed, and that all unlogged calls have been properly investigated and action taken per paragraph 12b(7).

j. Telephone Control Procedures. Each subscriber activity will establish telephone control procedures to ensure:

(1) A telephone log in the format shown in enclosure (2) is maintained for each telephone assigned long distance capability.

(2) All toll calls are entered in the telephone log.

(3) Authorization is given prior to initiating a long distance call.

(4) The DSN is used instead of long distance to all numbers that are available through DSN.

(5) Personal use of government phones is not allowed except for the types of calls identified in paragraph 16 below.

(6) All unofficial calls are investigated and paid for by the caller. Payment process will begin in person at the Telephone Billing and Accounts in Building 1105 (call 451-5521

for an appointment). Payments will be made by check or by money order, payable to the Disbursing Officer, Department Finance and Accounting Service (DFAS) Cleveland. A 3% Federal Excise tax will be added to the total telephone charges when calculating the payment. Note that payment of the toll charges does not absolve the caller from any disciplinary action that the command may impose.

k. Telephone Fraud

(1) Telephone fraud is any use of an official telephone for unofficial purposes that causes a charge to the United States Government. All fraudulent and unauthorized long distance telephone calls will be promptly and properly investigated by the TCO or the Base Telephone Officer. Persons identified as using official telephone service for unofficial purposes that causes a charge to the United States Government will be required to report, in person, to Telephone Billing and Accounts, Building 1105, to reimburse the United States Government for any charges incurred that are \$25.00 or greater. This includes any combination of charges incurred from previous months. If a pattern of toll fraud is discovered, units must monitor their phones and review their monthly telephone services bill to track and eliminate violations of this policy.

(2) Base Telephone will monitor phone bills and activity in an attempt to identify fraudulent telephone calls. If misuse or abuse is suspected, Base Telephone will notify the unit TCO. The unit TCO must respond to Base Telephone within five working days to report whether these calls were authorized or fraudulent. Response may be via e-mail, phone call, or any other means acceptable to both parties.

l. Personal use of Government Phones

(1) A modest amount of personal use of government telephones is allowed for such purposes as:

- (a) Checking on a family member.
- (b) Making or canceling personal appointments.
- (c) Checking on the status of home or auto repairs.
- (d) Notifying a family member of overtime requirements or other changes in schedules.

(2) Personal local and long distance calls from

9 APR 2009

government telephones are allowed if certain criteria are met. These are:

(a) The calls do not adversely affect performance of the employee's official duties or the mission of the employee's organization.

(b) Are of reasonable duration and frequency.

(c) Cannot be made at another time.

(d) Personal calls must not result in a charge to the Government even if the employee intends to reimburse the Government. Personal long distance calls must be to a toll-free number; charged to an employee's home phone number or another non-government number; charged to the called party if a non-government number; or charged to a personal telephone credit card. Calls for information assistance may not be made if a charge results to the government. Use of Department of Defense (DoD) telephones to place calls to 1-900 numbers and similar toll calls is strictly prohibited. Every effort should be made to block or prevent such calls.

m. Telephone Charges (Official)

(1) Long distance, officially approved, telephone calls will be billed only to Class A telephones.

(2) Official international commercial calls are paid for by the using unit tenant commands.

(3) Collect calls/3<sup>rd</sup> party billing are not authorized on government telephones unless the Telephone Officer has given prior approval. As a general rule, approval will only be given to Battalion/Squadron Officers of the Day and Chaplains. Should such calls occur, the unit will be provided a copy of the telephone bill and be required to investigate the charges, certify to the billing department that the calls were official, reimburse MCB Disbursing Office and take steps to prevent future occurrences.

(4) International Maritime Satellite (INMARSAT) calls will not be billed to government telephones.

(5) It is the responsibility of the Base Telephone Officer to provide connectivity to the DSN, official long distance capability, on-base calling capability, and provision for telephone instruments within the supply system; and other

29 APR 2009

routine services within the purview of current operations, directives, and policies. It is the responsibility of the receiver of the service to pay for any relocation within office spaces that is not command directed by the Commanding Officer, MCB Camp Lejeune, or any non-standard telephone equipment.

n. Charges and Reimbursements for Class B Telephone Service

(1) MCCS activities and private parties will reimburse the MCB for telephone service according to reference (f). Where applicable, reimbursement will include basic service charges, installation, relocation, reconnection, and toll charges incurred by the use of telephone service according to reference (b). DFAS will bill monthly for services rendered. Checks or money orders will be made payable to the Disbursing Officer, DFAS-Cleveland and will be for the exact amount of the telephone bill.

(2) Contractors, concessionaires, etc., requiring telephone service will report to the Telephone Billing and Accounts, building 1105 for preparation of a TSR. To qualify for telephone service, the applicant must be authorized to conduct business from a fixed location aboard the Base. This authority must be a contract or agreement issued by the Commanding Officer, MCB Camp Lejeune or another U.S. Government office. The effective billing period is considered to be from the date of installation until receipt of a request for termination of service. Requests for termination will be made in person at Base Telephone by completing a TSR or in writing with appropriate company letterhead.

(3) Unofficial Telephone Subscribers

(a) Unofficial telephone subscribers are billed monthly by DFAS. Unofficial telephone subscribers requiring credit adjustments on long distance calls should contact the Telephone Billing and Accounts at 451-5521.

(b) Telephone bills will be paid by check or money order and mailed to DFAS-Cleveland, P. O. Box 99557, 1240 East Ninth Street, Cleveland, OH. 44199. Make the check or money order payable to the Treasurer of the United States.

(c) Telephone bills not paid in a timely manner consistent with the standards of DFAS will result in termination of telephone service.

(d) Subscribers who are delinquent on payment of monthly telephone bills will receive a letter from the

Commanding Officer or DFAS stating the intent to terminate service within a specific time due to the non-payment.

(e) To re-establish service, customers must submit a official correspondence clearly explaining the reason for late payment in order to effect reactivation of service. This letter should be addressed to the Commanding Officer, MCB Camp Lejeune (Attn: Base Telephone Officer) via your appropriate chain of command. If approved, the subscriber will be required to pay all indebtedness plus a reconnection charge. Customers that have service re-established following suspension due to nonpayment will be required to pay all future telephone bills before the 15th of the month due or their telephone service will be promptly terminated.

(4) Private subscribers temporarily absent from the base during a billing period will arrange for payment with DFAS at (216)204-2798. (Subscribers may request temporary suspension of service without removal of the telephone by contacting Base Telephone at 451-5521). Charges for this service will be comparable to the rates established by the North Carolina Public Service Commission as are other related charges.

(5) Unofficial telephone subscribers will have their telephone accounts cleared before dispossession of quarters or departing the base. Requests for termination of service will be made in person by submitting a TSR at Telephone Billing and Accounts located in building 1105 a minimum of ten days before the desired termination date. If a disconnect TSR is not submitted, the customer will continue to incur charges.

(6) Unofficial telephone service is provided by MCB Camp Lejeune without guarantee of quantity or quality of service. The base will not be held liable for any discontinuance or failure in service.

(7) MCCS activities will be provided one Class C telephone without charge per building for command supervision unless justification for additional service is provided.

o. Monitoring Conversations

(1) Unless authorized by statute, regulation, or other lawful authority, the use of electronic and mechanical recording devices to intercept telephone conversations are forbidden and will not be connected to telecommunications equipment or facilities that are part of the BTSN.

(2) Unless authorized by statute, regulation, or other lawful authority, monitoring of telephone conversations by secretaries or other personnel for recording appointments, making arrangements, helping with commitments, or assuring adequate follow-up is permitted only after callers have been notified and have given their approval.

p. Requests for Telephone Service

(1) Requests to move, add, or change (MAC) service will be submitted on Form MCBCL 2305/28, Telephone Service Request (TSR). See enclosure (1) for format. Requests will be completed and forwarded to the Commanding Officer, MCB (Attn: Base Telephone Officer) via appropriate G-6/S-6. MCB units do not require G-6/S-6 endorsement. The request must be endorsed (signed) by the unit requiring the telephone service. A TSR must be submitted a minimum of 45 days in advance of the date service is required. This advance submission is necessary in order to investigate the request, order and receive materials, prioritize, and schedule work. TSRs will be processed in the following order:

(a) Forced moves: condemned buildings, renovations, etc.

(b) Unit deployments/returns

(c) Field Exercises

(d) New circuit installations

(e) All others not listed above

(2) Points of contact (POC) listed on the TSR will be notified on all disapproved or changed telephone service

requests. The POC listed on the TSR must be sufficiently knowledgeable of the request to discuss it in detail and walk through the affected spaces with the telephone investigator. When possible, the point of contact should work in the same building in which work is requested.

(3) Internal LAN/WAN cabling, installed by private contractor, will comply with industry standards outlined in American National Standards Institute (ANSI) and Telecommunications Industry Association/ Electronics Industry Alliance (TIA/EIA) 568B, 569B, and 607. Telecommunications

29 APR 2009

installations will follow current MCB Camp Lejeune Infrastructure Standards provided in enclosure (3). All such installations require approval of project from Base Telephone prior to installation.

(4) Base Maintenance or MCCS Maintenance is responsible for all conduit installation. Requests for conduit installation must be submitted to Base Maintenance or MCCS Maintenance in addition to a TSR. If the conduit installation is not associated with a facility renovation (M2R2/M1R1) or new facility build (MILCON), the work will be charged to requesting units account.

(5) Requests for unofficial (Class B) telephone service will be made to the Telephone Billing and Accounts, building 1105, extension 451-5521.

q. Requests for Telephone Call Records

(1) Due to the sensitive nature of telephone call records, "Detailed Call Records" will only be provided to official and unofficial customers for the purpose of billing and validation of accounts or for the purpose of official investigations.

(2) Requests by official and unofficial customers for "Detailed Call Records" will be made directly to the Telephone Billing and Accounts through official correspondence.

(3) Requests for "Detailed Call Records" in support of official investigations must be initiated by the Investigating Officer (IO). All requests for call records must be submitted by official correspondence with original signature to the Base Telephone Officer via an official military investigative service such as Criminal Investigation Division (CID), Naval Criminal Investigation Service (NCIS), etc. The request will include the calling number(s), called number(s), date(s), time(s), and the IO appointment letter as an enclosure. An example letter is provided as enclosure (4).

r. Overseas DSN Calls

(1) Overseas DSN calls can be placed from telephone numbers with DSN OCONUS/Overseas access without prior approval by direct dialing.

(2) Individuals making calls will limit all calls to five minutes or be as brief as possible.

29 APR 2009

s. Precedence Calls

(1) The Joint Uniform Telephone Communications Precedence System is for use by all authorized users of voice communication facilities within the DoD. Since the effectiveness of the system depends on the cooperation of the people authorized to use it, users must be familiar with the purpose of each level of precedence category and the types of calls that may be assigned precedence.

(2) Precedence calls can only be made from telephones with the appropriate level of precedence and DSN access.

t. Telephone Service in Support of Deployed Units

(1) Telephone Billing and Accounts is prepared to issue both CONUS and international telephone calling cards to deploying units. To obtain CONUS and/or international credit cards, forward a written request, including appropriation data required for all cards, to the Director, S4/S6/BPO, Marine Corps Base (Attn: Base Telephone Officer). Cards will be available ten working days after the date of receipt of the request.

(2) Telephone calling cards may be issued to Key Volunteers on the same basis. The cost of toll calls in support of the Key Volunteer program is the responsibility of the supported unit.

(3) DSN may be used to place Health, Morale, and Welfare (HMW) calls from or to OCONUS isolated or remote geographic locations because of nonavailability of acceptable commercial services.

(4) Use of DSN for off-net HMW calls is governed by reference (a) and must be approved by the appropriate Combatant Commander. DSN may be used to place HMW calls from deployed locations by dialing DSN 312-751-6262 (MAMA). Calls should be limited to 15 minutes. No HMW calls will incur a toll charge to the government even if the intent is to reimburse the government.

(5) Key Volunteer (KV) access to DSN from home phone numbers must be coordinated prior to deployment and requested by official correspondence to the Base Telephone Officer identifying the KV, the phone number the calls are to be made from, and the start/stop date of the deployment. Access must be requested for each deployment. Only one KV can be identified

29 APR 2009

for this service for each deploying command of battalion size or larger.

u. Telephone Service in Support of Exercises/Operations

(1) An emergency line that is restricted to dialing 911 is installed in the vicinity of each Tactical Landing Zone (TLZ) and range. These lines are limited to 911 calling until a TSR is submitted requesting temporary activation for field service. It is the using unit's responsibility to extend service from the telephone pedestal protector to the site where the service is to be used. It is recommended that units perform an operational check on the line a minimum of two duty days before intended use. Troubles on these lines should be reported to the Telephone Customer Service Desk at extension 451-1114, option 1.

(2) Commands desiring additional telephone services at any TLZ or ranges should submit a TSR to the Base Telephone office, building 1105. A minimum of 15 working days is required to ensure proper processing of TSRs and funding transfer to the MCB Comptroller. TSRs and funding transfers received less than 15 working days prior may result in delayed service. Funding should be sufficient to cover an installation fee and toll charges on each line requested. Estimated fees/charges can be provided by the Telephone Billing and Accounts upon request by calling 451-5521.

v. Directory Information. Commands/office supervisors are responsible for the accuracy of telephone directory information. Changes to the organizational listings will be submitted as they occur. The Base Telephone directory will be incorporated into the Embargo Telephone directory normally published in March and distributed in April of each year. Any changes to be reflected in the new directory must be received by 15 January before the year of publication. Changes should also be forwarded to Base Telephone by telephone service request. It is imperative that Base Telephone receives all changes in a timely manner as telephone records directly interface with the E911 system.

w. Leased Telephone Service

(1) Telephone service (paid from appropriated funds) for military activities operating outside the boundaries of Camp Lejeune are leased from the local exchange carrier serving the area.

(2) Any changes to leased service must be accomplished by separate contract. The Base Telephone Officer is the

coordinator for telephone contracts. All changes will be requested by submitting Form MCBCL 2305/28, enclosure (1).

(3) Circuits for special purposes, such as private or commercial networks, will be leased or rented to "private interests" in accordance with currently authorized rates established by the North Carolina Utility Commission.

x. Field Telephone Restrictions

(1) Field wire or any other type of data or voice communications cable will not be placed on utility poles, on any building (except as stated below) or in the way of vehicular or pedestrian traffic. In emergency situations, the Commanding Officer, MCB Camp Lejeune will allow temporary installation of field wire systems not to exceed the duration of the emergency. Requests for temporary installation will be addressed to the Commanding Officer, MCB (Attn: Base Telephone Officer) in duplicate with enclosures showing complete design to include route, buildings, type of cable, and number of pairs. The duplicate copy will be endorsed and returned. If approved, the completed installation must be inspected by a representative of the Base Telephone office.

(2) Stringing of communication wire/cable from a tree to a building, from building to building, on trees, or within 50 feet of an electric or existing communication lines is prohibited.

(3) Any type of wire or cable suspended more than three feet above the ground and crossing under an electric or telephone line will be secured to a steel messenger cable.

(4) Wire will not be suspended over or across electrical or telephone lines.

(5) The minimum distance from any fixed electric or telephone line to communication lines will be six feet.

(6) The use of overhead steam lines or fences to support wire is prohibited.

(7) The use or climbing of telephone or utility poles for any purpose is restricted to Base Telephone or Base Maintenance personnel. The Base Telephone Officer will make inspections for violations and direct immediate removal of hazardous conditions. Violations will be reported to the Commanding Officer (Attn: Base Telephone Officer). Climbing

29 APR 2009

poles installed and maintained exclusively as training aids are accepted.

(8) The installation of field type wire, barbwire, and polyethylene covered cable or any temporary wire system on utility poles is prohibited except as provided for in paragraph 4x(1) above.

(9) All wire placed along paved roads adjacent to approved training areas will be installed on the back slope of the ditch and will be removed immediately after completion of the exercise.

(10) Telephone service is provided in close proximity of most tactical landing zones/training areas. It is the using unit's responsibility to establish connectivity between Base Telephone's point of demarcation and the field command post.

y. Maintenance and Preservation of Telephone Equipment

(1) The BTSN is maintained and operated by the Telephone Branch, Communications Services Division, S4/S6/BPO, MCB Camp Lejeune. All equipment and devices connected to the BTSN is the property of the Commanding Officer, MCB Camp Lejeune to include unit funded purchases of equipment and devices. Only authorized personnel of the Telephone Branch will service, install, move, remove, or interfere with any component or facility of the BTSN.

(2) Detection of illegally installed, relocated, or tampered-with telephone instruments or equipment will result in immediate termination of service. Service will only be restored upon receipt of official correspondence submitted to the Base Telephone Officer via the appropriate chain of command requesting restoration of service, and explaining circumstances and corrective action taken by the offending unit or organization.

(3) Only Base Telephone provided and approved telephone instruments and/or equipment will be connected or attached to any portion of the BTSN. Cordless phones are not authorized aboard MCB Camp Lejeune and outlying camps. Telephone instruments/equipment, other than those provided/approved by Base Telephone, found connected/attached to official subscriber lines/circuits, will be disconnected and turned over to the Telephone Officer. Requests for return of equipment will be by official correspondence to the Base Telephone Officer (via the chain of command), explaining the circumstances and corrective action taken. Approved waivers to use other than Base Telephone

29 APR 2009

approved equipment will be available for viewing by Base Telephone personnel.

(4) Digging, excavating, driving posts or pilings along roads or within inhabited areas near pole lines or underground cables is prohibited without prior approval of the Base Telephone Officer.

(5) It is the policy of Base Telephone, to maintain acceptable service, to limit the number of instruments having access to any telephone number, except on Key System Units.

(6) Telephone extensions will only be installed near the main station telephone and within the same building.

(7) Report telephone trouble to the Base Telephone trouble desk, extension 451-1114, option 1.

(8) Administrative intercommunication systems will not parallel the local administrative telephone system unless:

(a) A requirement exists that can only be satisfied by an intercommunication system.

(b) A provision of facilities and equipment from the local telephone system is proved to be comparatively uneconomical.

(c) The requesting command provides funding for all parts and materials.

z. Telecommunications pathways, spaces, and cabling

(1) In an effort to ensure standardization and quality of materials, all parts and materials will be approved for use by the Base Telephone Officer prior to installation aboard Camp Lejeune. Substitute parts are not approved and will not be supported by Base Telephone.

(2) The "Telecommunications Infrastructure Standards, Marine Corps Base, Camp Lejeune" and applicable references provided as enclosure (2) will be adhered to for all telecommunications installations, upgrades, and repairs conducted aboard MCB Camp Lejeune and MCAS New River.

aa. Conservation of Telephone Service. The following policies for conservation of phone service have been developed

to ensure adequate telephone service is available for assignment to requesting units.

(1) Commanding officers (CO) or officers-in-charge (OIC) should ensure that only the minimum number of telephones consistent with the mission of the organization are installed.

(2) CO or OIC will request removal of infrequently used telephones. Particular attention will be given to removal of telephones left in vacated buildings.

(3) Requests for service, i.e., relocates, extensions, etc., should be based on mission essential requirements. Movement or realignment of existing service, which is not directed by higher authority, will be funded by the requesting command. It is important that the initial TSR accurately reflect the service the command needs, as any changes made after installation begins will require an additional TSR funded by the requesting command.

(4) Deploying units are required to submit a TSR requesting suspension of official telephone service for all telephone lines that will not be in use during the period of the deployment. As a result, all telephone devices and equipment will be secured by the deploying unit prior to deployment. Deploying units will be charged for the cost of missing or destroyed equipment that cannot be recovered upon return of deployment. Telephone service will be reactivated to returning units upon receipt of the applicable TSR at the completion of the deployment. Procedures for STU-III/STE will be per Communications Security Material System (CMS) instructions.

bb. Pay Station Telephones

(1) Pay station telephones are owned, operated and maintained by a contracted exchange carrier and are, by permission of the Commanding Officer, MCB Camp Lejeune, installed on the base for convenience of the public. Misuse or abuse of these telephones will tend to restrict and deprive many people of their use.

(2) MCCS is responsible for the coordination of all pay station telephone service on the Base, preparation of individual agreement, NAVMC 1088-SD, and collection and deposit of commissions, installation, relocation, and removal of all pay station telephones aboard the Base.

29 APR 2009

(3) Area commanders are responsible for the security of pay station telephones in their areas. Requests for installations, relocations or removals will be made to the Commanding Officer, MCB (Attn: Director, MCCS).

(4) Only current contract exchange carrier employees will make coin collections.

cc. STU-III/STE (Secure Telephone Units)

(1) These units are unclassified cryptographically controlled items (CCI).

(2) The Base Electronic Key Management System (EKMS) Custodian is the STU-III/STE COMSEC Custodian for terminals assigned to MCB Camp Lejeune. Upon initial receipt of terminals, users will be required to sign a SF 153 and a Comsec Acknowledgment Card.

(3) STU-III/STE belonging to II MEF and MARSOC commands are under cognizance of the command EKMS Custodian. The Command EKMS Custodian will order, account for, evacuate for maintenance, and replace II MEF STU-III/STE. Base Telephone's only involvement with STU-III/STE is to provide telecommunications service to the device requested by TSR and to maintain such service. If the Base Telephone technician determines that the circuit is operational to the jack, the user must contact their respective EKMS Custodian for replacement. The Unit EKMS Custodian will also arrange storage for STU-III/STE that are not deploying with a command.

(4) Base STU-III/STE will be evacuated and/or replaced by Base EKMS Custodian. Base EKMS Custodian personnel will provide Base users with a receipt for Base STU-III/STE that is evacuated.

(5) Command EKMS Custodians are responsible for ordering and maintaining keys for their STU-III/STE. The Base EKMS Custodian handles keys for Base STU-III/STE.

(6) Requests to relocate phone lines utilized with STU-III/STE will be submitted to Base Telephone via TSR.

dd. Telephone Operators. The telephone system has an operator on duty 24 hours per day. Operators are instructed to be courteous and respectful. Similar action on the part of the subscriber is requested. Operators are prohibited from entering

into anything other than conversations of an official nature. The operators do not provide time checks, wake-up service, etc.

ee. Obscene/Abusive/Threatening Telephone Calls. Obscene/abusive/threatening phone calls are illegal and should be reported to the Provost Marshal. The Provost Marshal must be contacted before the Base Telephone Officer can take any action.

ff. Physical Security

(1) Physical security is the action taken to protect information technology resources (e.g., installations, personnel, equipment, electronic media, documents, etc.) from damage, loss, theft, or unauthorized physical access. The effectiveness of all technical security safeguards is based on the assumption, either explicit or implicit, that the BTSN has adequate physical security protection. Specific security measures should be implemented to prevent or minimize the effects of any accidental or malicious attack on information systems.

(2) Telecommunications Infrastructure

(a) The MCB/MCAS cable infrastructure is the responsibility of the Telephone Branch, Communications Services Division, S4/S6/BPO, MCB Camp Lejeune.

(b) Modifications to the external cable plant and internal building wiring may compromise system integrity and must be authorized by the Base Telephone Officer. Consequently, the following guidelines will be adhered to:

1. Access to the telecommunications duct and manhole system is limited to Base Telephone personnel unless specifically authorized by the Base Telephone Officer.

2. Access to telecommunication rooms and terminals is limited to Base Telephone personnel and authorized NMCI personnel unless specifically authorized by the Base Telephone Officer.

3. Equipment will not be placed in telecommunication rooms unless authorized by the Base Telephone Officer.

4. Telecommunication room door locks will not be changed unless authorized by the Base Telephone Officer.

29 APR 2009

5. Unless authorized by the Base Telephone Officer, building wiring, to include patch panels and punch blocks, will be wired by Base Telephone personnel only. In all cases, they will adhere to American National Standards Institute (ANSI), Telecommunications Industry Association/Electronics Industry Alliance (TIA/EIA) standards and use cable management techniques as prescribed by Building Industry Consulting Services International (BICSI). All installations and upgrades to the BTSN and associated infrastructure will be in accordance with the "Camp Lejeune Base Telephone Telecommunications Infrastructure Standards" provided in enclosure (2).

gg. Telephone Restoration Priorities. In the event of disruption of telephone service, telecommunications circuits aboard Camp Lejeune will be restored in the following order:

(1) Emergency telephone; fire, police, etc. (maintained 24 hours a day)

(2) Critical circuits; DSN, Federal Telecommunications System (FTS), Global Command and Control System (GCCS), NIPRNET, SIPRNET, commercial trunking, etc.

(3) Duty watch numbers (maintained 24 hours a day)

(4) Leased telecommunication circuits

(5) Building-wide outages

(6) Official telephone numbers

(7) All other outages not listed above

hh. Complaints. Complaints regarding telephone service, the function of the BTSN, or specific policies concerning the same, should be referred to the Base Telephone Officer at 451-9292 or the Telephone Operations Supervisor at 451-9441.

ii. Parking for Base Telephone Vehicles. As per reference (g), Base Telephone vehicles are allowed to park on the grass when other parking is not available or feasible in performance of their duties. Careful consideration is given prior to vehicles traveling or parking in any non-hardened areas.

## 5. Administration and Logistics

a. Administration. Base Telephone is responsible for administering the operation of the BTSN and controlling

telephone service aboard MCB Camp Lejeune, MCAS New River, and all outlying camps.

b. Logistics. Not applicable to this order.

6. Command and Signal

a. Command

(1) Applicability. This Order is applicable to MCB Camp Lejeune, MCAS New River, and all tenant commands.

(2) Concurrence. This Order has been coordinated and concurred with by the Commanding Generals, II MEF, 2d MarDiv, 2d MLG, MARSOC; and Commanding Officers, MCB Camp Lejeune, MCAS New River, and Naval Hospital Camp Lejeune.

b. Signal. This Order is effective the date signed.

  
W. A. MEIER  
By direction

DISTRIBUTION: A

### TELEPHONE SERVICE REQUEST (TSR)

DATE SUBMITTED	DATE TO BE COMPLETED BY	PRIORITY <input type="checkbox"/> YES <input type="checkbox"/> NO	PRIORITY JUSTIFICATION (IF YES)					
UNIT NAME		NAME AND TELEPHONE NUMBER OF REQUESTOR						
VIA:		1. Detailed instructions for completing a TSR can be found at the Base Telephone website: <a href="https://clbmcwww1.lejeune.usmc.mil/basetel/tsr.htm">https://clbmcwww1.lejeune.usmc.mil/basetel/tsr.htm</a> or by calling the Customer Support Section at 451-2531/3100						
To: COMMANDING OFFICER MARINE CORPS BASE CAMP LEJEUNE, NC 28542		2. Service requests submitted to Move, Add, or change (MAC) service must include a building diagram that clearly identifies the location of the service requested to include jack numbers.						
ATTN: BASE TELEPHONE OFFICER		3. The TSR must be submitted 45 days prior to the required service activation date, except for urgent mission driven command and control requirements.						
TELEPHONE WORK DETAILS AND COMPLETE JUSTIFICATION:								
USER INFO (NAME)			PHONE#		E-MAIL			
PRESENT LOCATION OF EQUIPMENT (BLDG#/RM#/PORT#)			PRESENT DIRECTORY LISTING (UNIT/ BILLET TITLE)					
PROPOSED LOCATION OF EQUIPMENT (BLDG#/RM#/PORT#)			PROPOSED DIRECTORY LISTING (UNIT/ BILLET TITLE)					
AUTHORIZING SIGNATURE				DATE SIGNED				
DO NOT WRITE-----BASE TELEPHONE OFFICIAL USE ONLY-----BELOW THIS LINE								
TSR#	BAC	WORK ORDER #						
REQUEST APPROVED BY		INVESTIGATIVE TIME	DATE INVESTIGATED	CAT	DUE DATE <input type="checkbox"/> ON <input type="checkbox"/> BY			
FOR INVESTIGATOR USE ONLY								
	TERMINAL	LOCATION	CA	PAIR	LUG	X-CONN	BLDG	CKT-DESIG
IN								
OUT								

Reset Form

29 APR 2009

TELEPHONE LOGBOOK ENTRY INSTRUCTIONS

1. Unit/Section: The unit and section this phone belongs to.
2. Month/Year: The month and year this log sheet is for.
3. Phone Number: The phone number this log is maintained on.
4. Date: Date call is made.
5. Time: Time call is made.
6. Name of Caller: Your name and rank.
7. Person Called: The name and rank of the person you are calling. If you are calling an organization and don't know who you will be talking to, write in the name after the call.
8. Location Called: The geographical location, city and state.
9. Reason for Call: A short statement of the reason for the call. Only official calls can be made at government expense. The statement should be clear enough to remind you, and the authorizer of the call, why the call was made.
10. Number Called: Area Code and Seven-Digit Number.
11. Authorized by: The name of the individual who authorized this call. Must be your Telephone Control Officer or another individual appointed by the Command to authorize long distance phone calls.

GENERAL INSTRUCTIONS

1. All long distance commercial calls must be logged in.
2. DSN calls do not need to be logged in.
3. All long distance calls must be authorized prior to calling.



29 APR 2009

**Telecommunications Infrastructure Standards  
Marine Corps Base, Camp Lejeune**

Telecommunications Outside Plant (OSP)

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.

ASTM INTERNATIONAL (ASTM)

ASTM B 1	(2001) Hard-Drawn Copper Wire
ASTM B 8	(2004) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM D 1557	(2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 709	(2001) Laminated Thermosetting Materials

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA TIA/EIA-455-107A	(1999) Component Reflectance or Link/System Return Loss using a Loss Test Set
EIA TIA/EIA-455-204	(2000) FOTP-204 Measurement of Bandwidth on Multimode Fiber
EIA TIA/EIA-455-46A	(1990) FOTP-46 Spectral Attenuation Measurement for Long-Length, Graded-Index Optical Fibers
EIA TIA/EIA-455-59A	(2000) FOTP-59 Measurement of Fiber Point Discontinuities Using an OTDR
EIA TIA/EIA-455-61A	(2000) FOTP-61 Measurement of Fiber or Cable Attenuation Using an OTDR
EIA TIA/EIA-455-B	(1998) Test Procedures for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and other Fiber Optic Components (ANSI)
EIA TIA/EIA-472D000-A	(1993) Fiber Optic Communications Cable for Outside Plant Use
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)

EIA TIA/EIA-492AAAB (1998; R2002) 50-Um Core Diameter/125-Um Cladding Diameter Class IA Graded-Index Multimode Optical Fibers

EIA TIA/EIA-492CAA (1998; R 2002) Class IVA Dispersion-Unshifted Single-Mode Optical Fibers

EIA TIA/EIA-492E000 (1998; R 2002) Class IVd Nonzero-Dispersion Single- Mode Optical Fibers for the 1550 nm Window (ANSI/TIA/EIA-492E000)

EIA TIA/EIA-526-14A (1998) OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant (ANSI/TIA/EIA-526-14A)

EIA TIA/EIA-526-7 (1998) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant (ANSI/TIA/EIA-526-7)

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

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

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

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

EIA TIA/EIA-590-A (1997) Standard for Physical Location and Protection of Below Ground Fiber Optic Cable Plant

EIA TIA/EIA-598-B (2001) Optical Fiber Cable Color Coding

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

EIA TIA/EIA-758 (1999; Addendum 1999) Customer-Owned Outside Plant Telecommunications Cabling Standard (ANSI/TIA/EIA-758)

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

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2002) National Electrical Safety Code

29 APR 2009

IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms

## INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-87-640 (1999) Fiber Optic Outside Plant Communications Cable

ICEA S-98-688 (1997) Broadband Twisted Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors

ICEA S-99-689 (1997) Broadband Twisted Pair Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors

## NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C62.61 (1993) Gas Tube Surge Arresters on Wire Line Telephone Circuits

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2005) National Electrical Code

## THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 6 (2000) Commercial Blast Cleaning

## U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS 1755 Telecommunications Standards and Specifications for Materials, Equipment and Construction

RUS Bul 1751F-630 (2002) Underground Plant Design

RUS Bul 1751F-640 (1995) Design of Buried Plant, Physical Considerations

RUS Bul 1751F-643 (1996) Design of Aerial Plant

RUS Bul 1751F-815 (1979) Electrical Protection of Outside Plant

RUS Bul 1753F-201 (1997) Acceptance Tests of Telecommunications Plant (PC-4)

RUS Bul 1753F-401 (1995) Splicing Copper and Fiber Optic Cables (PC-2)

RUS Bul 345-50 (1979) Trunk Carrier Systems (PE-60)

RUS Bul 345-65 (1985) Shield Bonding Connectors (PE-65)

RUS Bul 345-72 (1985) Filled Splice Closures (PE-74)

29 APR 2009

RUS Bul 345-83

(1979; Rev Oct 1982) Gas Tube Surge Arrestors  
(PE-80)

## UNDERWRITERS LABORATORIES (UL)

UL 497 (2001) Protectors for Paired Conductor  
Communication Circuits

UL 510 (2005) Polyvinyl Chloride, Polyethylene, and  
Rubber Insulating Tape

UL 83 (2003; Rev thru Mar 2004) Thermoplastic-  
Insulated Wires and Cables

## 1.2 RELATED REQUIREMENTS

Section 27 10 00, "Structured Telecommunications Cabling and Pathway System"; Section 33 71 01, "Overhead Transmission and Distribution"; Section 33 71 02, "Underground Transmission and Distribution"; Section 33 70 01.00 10, "Electrical Distribution System, Aerial"; and Section 33 70 02.00 10, "Electrical Distribution System, Underground" apply to this section with additions and modifications specified herein.

## 1.3 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in this specification shall be as defined in TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3, TIA/EIA-569-A, TIA/EIA-606-A, and IEEE Std 100 and herein.

## 1.3.1 Campus Distributor (CD)

A distributor from which the campus backbone cabling emanates.  
International expression for main cross-connect - (MC).

## 1.3.2 Entrance Facility (EF)

An entrance to the building for both private and public network service cables (including antennae) including the entrance point at the building wall and continuing to the entrance room or space.

## 1.3.3 Entrance Room (ER)

A centralized space for telecommunications equipment that serves the occupants of a building. Equipment housed therein is considered distinct from a telecommunications room because of the nature of its complexity.

## 1.3.4 Building Distributor (BD)

A distributor in which the building backbone cables terminate and at which connections to the campus backbone cables may be made. International expression for intermediate cross-connect - (IC).

## 1.3.5 Pathway

A physical infrastructure utilized for the placement and routing of telecommunications cable.

29 APR 2009

#### 1.4 SYSTEM DESCRIPTION

The telecommunications outside plant consists of cable, conduit, manholes, poles, etc. required to provide signal paths from the closest point of presence to the new facility, including free standing frames or backboards, interconnecting hardware, terminating cables, lightning and surge protection modules at the entrance facility. The work consists of providing, testing and making operational cabling, interconnecting hardware and lightning and surge protection necessary to form a complete outside plant telecommunications system for continuous use. The telecommunications contractor must coordinate with Base Telephone concerning layout and configuration of the EF telecommunications and OSP. The telecommunications contractor may be required to coordinate work effort for access to the EF telecommunications and OSP with Base Telephone.

#### 1.5 SUBMITTALS

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

- a. Submittals shall include the manufacturer's name, trade name, place of manufacture, and catalog model or number. Submittals shall also include applicable federal, military, industry, and technical society publication references. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified in paragraph "Regulatory Requirements" and as required for certificates in Section 01 33 00 "Submittal Procedures".
- b. Commercial off-the-shelf manuals shall be provided for operation, installation, configuration, and maintenance of products provided as a part of the telecommunications outside plant (OSP). Submit operations and maintenance data in accordance with Section 01 78 23, "Operation and Maintenance Data" and as specified herein not later than 2 months prior to the date of beneficial occupancy. In addition to requirements of Data package 5, include the requirements of paragraphs "Telecommunications Outside Plant Shop Drawings" and "Telecommunications Entrance Facility Drawings".

##### SD-02 Shop Drawings

Telecommunications Outside Plant

Telecommunications Entrance Facility Drawings

##### SD-03 Product Data

Wire and cable

Cable splices, and connectors

Closures

Building protector assemblies

Protector modules

29 APR 2009

Cross-connect terminal cabinets

Spare Parts

SD-06 Test Reports

Pre-installation tests

Acceptance tests

Outside Plant Test Plan

SD-07 Certificates

Telecommunications Contractor Qualifications

Key Personnel Qualifications

Minimum Manufacturer's Qualifications

SD-08 Manufacturer's Instructions

Building protector assembly installation

Cable tensions

Fiber Optic Splices

Submit instructions prior to installation.

SD-09 Manufacturer's Field Reports

Factory Reel Test Data

SD-10 Operation and Maintenance Data

Telecommunications outside plant (OSP), Data Package 5

SD-11 Closeout Submittals

Record Documentation

In addition to other requirements, provide in accordance with paragraph "Record Documentation".

1.6 QUALITY ASSURANCE

1.6.1 Shop Drawings

Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. Submittals shall include the nameplate data, size, and capacity. Submittals

29 APR 2009

shall also include applicable federal, military, industry, and technical society publication references.

#### 1.6.1.1 Telecommunications Outside Plant Shop Drawings

Provide Outside Plant Design in accordance with TIA/EIA-758, RUS Bul 1751F-630 for aerial system design, RUS Bul 1751F-643 for underground duct system design and for direct buried system design. Provide T0 shop drawings that show the physical and logical connections from the perspective of an entire campus, such as actual building locations, exterior pathways and campus backbone cabling on plan view drawings, major system nodes, and related connections on the logical system drawings in accordance with TIA/EIA-606-A. Drawings shall include wiring and schematic diagrams for fiber optic and copper cabling and splices, copper conductor gauge and pair count, fiber pair count and type, pathway duct and innerduct arrangement, associated construction materials, and any details required to demonstrate that cable system has been coordinated and will properly support the switching and transmission system identified in specification and drawings. Provide Registered Communications Distribution Designer (RCDD) approved drawings of the telecommunications outside plant. Update existing telecommunication Outside Plant T0 drawings to include information modified, deleted or added as a result of this installation in accordance with TIA/EIA-606-A. The telecommunications outside plant (OSP) shop drawings shall be included in the operation and maintenance manuals.

#### 1.6.1.2 Telecommunications Entrance Facility Drawings

Provide T3 drawings for EF Telecommunications in accordance with TIA/EIA-606-A that include telecommunications entrance facility plan views, pathway layout (cable tray, racks, ladder-racks, etc.), mechanical/electrical layout, and cabinet, rack, backboard, and wall elevations. Drawings shall show layout of applicable equipment including building protector assembly, incoming cable connector blocks, patch panels and equipment spaces, and cabinet/racks. Drawings shall include a complete list of equipment and material, equipment rack details, proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearance for maintenance and operation. Drawings may also be an enlargement of a congested area of T1 or T2 drawings. Provide T3 drawings for EF Telecommunications as specified in the paragraph "Telecommunication Space Drawings" of Section 27 10 00, "Structured Telecommunications Cabling and Pathway Systems". The telecommunications entrance facility shop drawings shall be included in the operation and maintenance manuals.

#### 1.6.2 Telecommunications Qualifications

Work under this section shall be performed by and the equipment shall be provided by the approved telecommunications contractor and key personnel. Qualifications shall be provided for: the telecommunications system contractor, the telecommunications system installer, the supervisor (if different from the installer), and the cable splicing and terminating personnel. A minimum of 30 days prior to installation, submit documentation of the experience of the telecommunications contractor and of the key personnel.

##### 1.6.2.1 Telecommunications Contractor Qualifications

The telecommunications contractor shall be a firm which is regularly and professionally engaged in the business of the applications, installation, and testing of the specified telecommunications systems and equipment. The telecommunications contractor shall demonstrate experience in providing successful telecommunications systems that include outside plant and broadband cabling within the past 3 years. Submit documentation for a minimum of three and a maximum of five successful telecommunication system installations for the telecommunications contractor. Each of the key personnel shall demonstrate experience in providing successful telecommunications systems in accordance with TIA/EIA-758 within the past 3 years.

#### 1.6.2.2 Key Personnel Qualifications

Provide key personnel who are regularly and professionally engaged in the business of the application, installation and testing of the specified telecommunications systems and equipment. There may be one key person or more key persons proposed for this solicitation depending upon how many of the key roles each has successfully provided. Each of the key personnel shall demonstrate experience in providing successful telecommunications systems within the past 3 years.

Cable splicing and terminating personnel assigned to the installation of this system or any of its components shall have training in the proper techniques and have a minimum of 3 years experience in splicing and terminating the specified cables. Modular splices shall be performed by factory certified personnel or under direct supervision of factory trained personnel for products used.

Supervisors and installers assigned to the installation of this system or any of its components shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products.

Submit documentation for a minimum of three and a maximum of five successful telecommunication system installations for each of the key personnel. Documentation for each key person shall include at least two successful system installations provided that are equivalent in system size and in construction complexity to the telecommunications system proposed for this solicitation. Include specific experience in installing and testing telecommunications outside plant systems, including broadband cabling, and provide the names and locations of at least two project installations successfully completed using optical fiber and copper telecommunications cabling systems. All of the existing telecommunications system installations offered by the key persons as successful experience shall have been in successful full-time service for at least 18 months prior to the issuance date for this solicitation. Provide the name and role of the key person, the title, location, and completed installation date of the referenced project, the referenced project owner point of contact information including name, organization, title, and telephone number, and generally, the referenced project description including system size and construction complexity.

Indicate that all key persons are currently employed by the telecommunications contractor, or have a commitment to the telecommunications contractor to work on this project. All key persons shall be employed by the telecommunications contractor at the date of

issuance of this solicitation, or if not, have a commitment to the telecommunications contractor to work on this project by the date that the bid was due to the Contracting Officer.

Note that only the key personnel approved by the Contracting Officer in the successful proposal shall do work on this solicitation's telecommunications system. Key personnel shall function in the same roles in this contract, as they functioned in the offered successful experience. Any substitution for the telecommunications contractor's key personnel requires approval from the Contracting Officer.

#### 1.6.2.3 Minimum Manufacturer Qualifications

Cabling, equipment and hardware manufacturers shall have a minimum of 3 years experience in the manufacturing, assembly, and factory testing of components which comply with, TIA/EIA-568-B.1, TIA/EIA-568-B.2 and TIA/EIA-568-B.3. In addition, cabling manufacturers shall have a minimum of 3 years experience in the manufacturing and factory testing of cabling which comply with ICEA S-87-640, ICEA S-98-688, and ICEA S-99-689.

#### 1.6.3 Outside Plant Test Plan

Prepare and provide a complete and detailed test plan for field tests of the outside plant including a complete list of test equipment for the copper conductor and optical fiber cables, components, and accessories for approval by the Contracting Officer. Include a cut-over plan with procedures and schedules for relocation of facility station numbers without interrupting service to any active location. Submit the plan at least 30 days prior to tests for Contracting Officer approval. Provide outside plant testing and performance measurement criteria in accordance with TIA/EIA-568-B.1 and RUS Bul 1753F-201. Include procedures for certification, validation, and testing that includes fiber optic link performance criteria.

#### 1.6.4 Standard Products

Provide materials and equipment that are standard products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship and shall be the manufacturer's latest standard design that has been in satisfactory commercial or industrial use for at least 2 years prior to bid opening. The 2 year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturer's catalogs, or brochures during the 2 year period. Products supplied shall be specifically designed and manufactured for use with outside plant telecommunications systems. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

##### 1.6.4.1 Alternative Qualifications

Products having less than a 2 year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturer's factory or laboratory tests, is provided.

29 APR 2009

#### 1.6.4.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

#### 1.6.5 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

#### 1.6.5.1 Independent Testing Organization Certificate

In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

Ship cable on reels in 5000 foot lengths for 25, 50 or 100 pair configuration and 1250 feet length for larger cables. Radius of the reel drum shall not be smaller than the minimum bend radius of the cable. Wind cable on the reel so that unwinding can be done without kinking the cable. Two meters of cable at both ends of the cable shall be accessible for testing. Attach permanent label on each reel showing length, cable identification number, cable size, cable type, and date of manufacture. Provide water resistant label and the indelible writing on the labels. Apply end seals to each end of the cables to prevent moisture from entering the cable. Reels with cable shall be suitable for outside storage conditions when temperature ranges from minus 40 degrees C to plus 65 degrees C, with relative humidity from 0 to 100 percent. Equipment, other than cable, delivered and placed in storage shall be stored with protection from weather, humidity and temperature variation, dirt and dust, or other contaminants in accordance with manufacturer's requirements.

#### 1.8 MAINTENANCE

##### 1.8.1 Record Documentation

Provide the activity responsible for telecommunications system maintenance and administration a single complete and accurate set of record documentation for the entire telecommunications system with respect to this project.

Provide record documentation as specified in Section 27 10 00, "Structured Telecommunications Cabling and Pathway Systems".

Provide T5 drawings including documentation on cables and termination hardware in accordance with TIA/EIA-606-A. T5 drawings shall include schedules to show information for cut-over and cable plant management, patch

APR 2009

panel layouts, cross-connect information and connecting terminal layout as a minimum. T5 drawings shall be provided in both hard copy format and on electronic media using Windows based computer cable management software. A licensed copy of the cable management software including documentation shall be provided. Update existing record documentation to reflect campus distribution T0 drawings and T3 drawing schedule information modified, deleted or added as a result of this installation. Provide the following T5 drawing documentation as a minimum:

a. Cables - A record of installed cable shall be provided in accordance with TIA/EIA-606-A. The cable records shall include only the required data fields on the hard copy and the required data fields for each cable and complete end-to-end circuit report for each complete circuit from the assigned outlet to the entry facility for the soft copy in accordance with TIA/EIA-606-A. Include manufacture date of cable with submittal.

b. Termination Hardware - Provide a record of installed patch panels, cross-connect points, campus distributor and terminating block arrangements and type in accordance with TIA/EIA-606-A. Documentation shall include the required data fields in accordance with TIA/EIA-606-A.

#### 1.8.2 Spare Parts

In addition to the requirements of Section 01 78 23, "Operation and Maintenance Data", provide a complete list of parts and supplies, with current unit prices and source of supply, and a list of spare parts recommended for stocking. Spare parts shall be provided no later than the start of field testing.

#### 1.9 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

### PART 2 PRODUCTS

#### 2.1 MATERIALS AND EQUIPMENT

Products supplied shall be specifically designed and manufactured for use with outside plant telecommunications systems.

#### 2.2 TELECOMMUNICATIONS ENTRANCE FACILITY

##### 2.2.1 Building Protector Assemblies

Building protector assembly shall be self-contained and have interconnecting hardware for connection to exterior cabling at full capacity. Provide manufacturers instructions for building protector assembly installation. Provide copper cable interconnecting hardware as specified in Section 27 10 00, "Structured Telecommunications Cabling and Pathway System".

##### 2.2.2 Protector Modules

29 APR 2009

Provide in accordance with UL 497 3-electrode gas tube or solid state type 5 pin rated for the application. Provide gas tube protection modules in accordance with RUS Bul 345-83 and shall be heavy duty, 400 volt where A is the maximum single impulse discharge current, B is the impulse life and C is the AC discharge current in accordance with NEMA C62.61. The gas modules shall shunt high voltage to ground, fail short, and be equipped with an external spark gap and heat coils in accordance with UL 497. Provide the number of surge protection modules equal to the number of pairs of exterior cable of the building protector assembly.

### 2.2.3 Fiber Optic Terminations

Provide fiber optic cable terminations as specified in Section 27 10 00, "Structured Telecommunications Cabling and Pathway System".

### 2.2.4 Pathways

For underground applications, provide a minimum of two (2) four inch ducts, one of which contains four (4) one (1) inch inner ducts, concrete encased, 24 inches below grade minimum, 36" for fiber, from the Telecommunications Entrance Facility to the maintenance hole that will be providing service to the building. The ducts will be plugged at both ends.

For direct buried applications, provide a minimum of two (2) four inch ducts from the Telecommunications Entrance Facility to five feet outside the bldg, 24 inches below grade. The ducts will be plugged at both ends.

## 2.3 CLOSURES

### 2.3.1 Copper Conductor Closures

#### 2.3.1.1 Aerial Cable Closures

Provide cable closure assembly consisting of a frame with clamps, a lift-off polyethylene cover, cable nozzles, and drop wire rings. Closure shall be suitable for use on Figure 8 cables. Closures shall be free breathing and suitable for housing either straight-through type or the branch type splices of non-pressurized communications cables and shall be sized as indicated. The closure shall be constructed with ultraviolet resistant PVC.

NOTE: The installation of aerial cabling aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.

#### 2.3.1.2 Underground Cable Closures

a. Aboveground. Provide aboveground closures constructed of not less than 14 gauge steel and acceptable pole or stake mounting in accordance with RUS 1755.910. Closures shall be sized and contain a marker as indicated. Covers shall be secured to prevent unauthorized entry. PVC type closures are to be used in beach areas. All pedestals shall contain a minimum 4 foot x 3/8 inch pigtailed ground rod.

b. Direct burial. Provide buried closure suitable for enclosing a straight, butt, and branch splice in a container into which can be poured an encapsulating compound. Closure shall have adequate strength to protect the splice and maintain cable shield electrical

continuity in the buried environment. Encapsulating compound shall be re-enterable and shall not alter the chemical stability of the closure. Provide filled splice cases in accordance with RUS Bul 345-72.

c. In vault or manhole. Provide underground closure suitable to house a straight, butt, and branch splice in a protective housing into which can be poured an encapsulating compound. Closure shall be of suitable thermoplastic, thermoset, or stainless steel material supplying structural strength necessary to pass the mechanical and electrical requirements in a vault or manhole environment. Encapsulating compound shall be re-enterable and shall not alter the chemical stability of the closure. Provide filled splice cases in accordance with RUS Bul 345-72.

### 2.3.2 Fiber Optic Closures

#### 2.3.2.1 Aerial

Provide aerial closure that is free breathing and suitable for housing splice organizer of non-pressurized cables. Closure shall be constructed from heavy PVC with ultraviolet resistance.

NOTE: The installation of aerial cabling aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.

#### 2.3.2.2 Direct Burial

Provide buried closure suitable to house splice organizer in protective housing into which can be poured an encapsulating compound. Closure shall have adequate strength to protect the splice and maintain cable shield electrical continuity, when metallic, in buried environment. Encapsulating compound shall be re-enterable and shall not alter chemical stability of the closure.

#### 2.3.2.3 Vaults or Manholes

Provide underground closure suitable to house splice organizer in a protective housing into which can be poured an encapsulating compound. Closure shall be of thermoplastic, thermoset, or stainless steel material supplying structural strength necessary to pass the mechanical and electrical requirements in a vault or manhole environment. Encapsulating compound shall be re-enterable and shall not alter the chemical stability of the closure.

### 2.4 PAD MOUNTED CROSS-CONNECT TERMINAL CABINETS

Provide in accordance with RUS 1755.910 and the following:

a. Constructed of 14 gauge steel.

b. Equipped with a double set of hinged doors with closed-cell foam weather-stripping. Doors shall be locked and contain a marker as indicated.

c. Equipped with spool spindle bracket, mounting frames, binding post log, jumper instruction label and load coil mounting provisions.

d. Complete with cross connect modules to terminate number of pairs as indicated.

e. Sized as indicated.

## 2.5 CABLE SPLICES, AND CONNECTORS

### 2.5.1 Copper Cable Splices

Provide multi-pair, in-line fold back or single pair, in-line splices of a moisture resistant, three-wire [insulation displacement connector held rigidly in place to assure maximum continuity in accordance with RUS Bul 1753F-401. Cables greater than 25 pairs shall be spliced using multi-pair splicing connectors, which accommodate 25 pairs of conductors at a time. Provide correct connector size to accommodate the cable gauge of the supplied cable. Provide enough cable slack suitable for splicing operations.

### 2.5.2 Copper Cable Splice Connector

Provide splice connectors with a polycarbonate body and cap and a tin-plated brass contact element. Connector shall accommodate 19 to 26 AWG solid wire with a maximum insulation diameter of 1.65 mm (0.065 inch). Fill connector with sealant grease to make a moisture resistant connection, in accordance with RUS Bul 1753F-401.

### 2.5.3 Fiber Optic Cable Splices

Provide fiber optic cable splices and splicing materials for fusion methods at locations shown on the construction drawings. The splice insertion loss shall be 0.3 dB maximum when measured in accordance with TIA/EIA-455-59A using an Optical Time Domain Reflectometer (OTDR). Splices shall be designed for a return loss of 40.0 db max for single mode fiber when tested in accordance with TIA/EIA-455-107A. Physically protect each fiber optic splice by a splice kit specially designed for the splice. Provide enough cable slack suitable for splicing operations.

### 2.5.4 Fiber Optic Splice Organizer

Provide splice organizer suitable for housing fiber optic splices in a neat and orderly fashion. Splice organizer shall allow for a minimum of 1 m (3 feet) of fiber for each fiber within the cable to be neatly stored without kinks or twists. Splice organizer shall accommodate individual strain relief for each splice and allow for future maintenance or modification, without damage to the cable or splices. Provide splice organizer hardware, such as splice trays, protective glass shelves, and shield bond connectors in a splice organizer kit.

### 2.5.5 Shield Connectors

Provide connectors with a stable, low-impedance electrical connection between the cable shield and the bonding conductor in accordance with RUS Bul 345-65.

29 APR 2009

## 2.6 CONDUIT

Provide conduit as specified in Section 33 71 01, "Underground Transmission and Distribution" and Section 33 70 02.00 10, "Electrical Distribution System, Underground".

## 2.7 PLASTIC INSULATING TAPE

UL 510.

## 2.8 WIRE AND CABLE

### 2.8.1 Copper Conductor Cable

Solid copper conductors, covered with an extruded solid insulating compound. Insulated conductors shall be twisted into pairs which are then stranded or oscillated to form a cylindrical core. For special high frequency applications, the cable core shall be separated into compartments. Cable shall be completed by the application of a suitable core wrapping material, a corrugated copper or plastic coated aluminum shield, and an overall extruded jacket. Telecommunications contractor shall verify distances between splice points prior to ordering cable in specific cut lengths. Gauge of conductor shall determine the range of numbers of pairs specified; 19 gauge (6 to 400 pairs), 22 gauge (6 to 1200 pairs), 24 gauge (6 to 2100 pairs), and 26 gauge (6 to 3000 pairs). Copper conductors shall conform to the following: All copper conductor cable from 6 to 1800 pair shall be PE-39 type.

#### 2.8.1.1 Underground

Provide filled cable (type PE-39) meeting the requirements of ICEA S-99-689 and RUS 1755.390. Provide enough cable slack suitable for splicing operations.

#### 2.8.1.2 Aerial

Provide filled cable meeting the requirements of ICEA S-99-689, ICEA S-98-688, and RUS 1755.390 except that it shall be suitable for aerial installation and shall be Figure 8 distribution wire with 26,700 N (6,000 pound) Class A galvanized steel or 26,700 N (6,000 pound) aluminum-clad steel strand.

NOTE: The installation of aerial cabling aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.

#### 2.8.1.3 Screen

Provide screen-compartmental core cable filled cable meeting the requirements of ICEA S-99-689 and RUS 1755.390.

### 2.8.2 Fiber Optic Cable

Provide single-mode, 8/125-um, 0.10 aperture 1310 & 1550 nm fiber optic cable in accordance with TIA/EIA-492CAAA, TIA/EIA-472D000-A, and ICEA S-87-640 including any special requirements made necessary by a specialized design. Provide 12 optical fibers as indicated. Fiber optic cable shall be

specifically designed for outside use with loose tubed buffer construction. Provide fiber optic color code in accordance with TIA/EIA-598-B

#### 2.8.2.1 Strength Members

Provide central/non-central, and non-metallic/metallic strength members with sufficient tensile strength for installation and residual rated loads to meet the applicable performance requirements in accordance with ICEA S-87-640. The strength member is included to serve as a cable core foundation to reduce strain on the fibers, and shall not serve as a pulling strength member.

#### 2.8.2.2 Shielding or Other Metallic Covering

Provide bare aluminum or coated aluminum single tape covering or shield in accordance with ICEA S-87-640.

#### 2.8.2.3 Performance Requirements

Provide fiber optic cable with optical and mechanical performance requirements in accordance with ICEA S-87-640.

#### 2.8.3 Grounding and Bonding Conductors

Provide grounding and bonding conductors in accordance with RUS 1755.200, TIA J-STD-607-A, IEEE C2, and NFPA 70. Solid bare copper wire meeting the requirements of ASTM B 1 for sizes number 8 AWG and smaller and stranded bare copper wire meeting the requirements of ASTM B 8, for sizes number 6 AWG and larger. Insulated conductors shall have 600-volt, Type TW insulation meeting the requirements of UL 83.

#### 2.9 T-SPAN LINE TREATMENT REPEATERS

Provide as indicated. Repeaters shall be pedestal mounted with pressurized housings, sized as indicated and shall meet the requirements of RUS Bul 345-50.

#### 2.10 POLES AND HARDWARE

Provide poles and hardware as specified in Section 33 71 01, "Overhead Transmission and Distribution" and Section 33 70 01.00 10, "Electrical Distribution System, Aerial".

#### 2.11 CABLE TAGS IN MANHOLES, HANDHOLES, AND VAULTS

Provide tags for each telecommunications cable or wire located in manholes, hand holes, and vaults. Cable tags shall be stainless steel or polyethylene and labeled in accordance with TIA/EIA-606-A. Handwritten labeling is unacceptable.

##### 2.11.1 Stainless Steel

Provide stainless steel, cable tags 41.25 mm (1 5/8 inches) in diameter 1.58 mm (1/16 inch) thick minimum, and circular in shape. Tags shall be die stamped with numbers, letters, and symbols not less than 6.35 mm (0.25 inch) high and approximately 0.38 mm (0.015 inch) deep in normal block style.

29 APR 2009

### 2.11.2 Polyethylene Cable Tags

Provide tags of polyethylene that have an average tensile strength of 22.4 MPa (3250 pounds per square inch); and that are two millimeter (0.08 inch) thick minimum, non-corrosive non-conductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 77 degrees C (170 degrees F). Provide 1.3 mm (0.05 inch) minimum thick black polyethylene tag holder. Provide a one-piece nylon, self-locking tie at each end of the cable tag. Ties shall have a minimum loop tensile strength of 778.75 N (175 pounds). The cable tags shall have black block letters, numbers, and symbols 25 mm (one inch) high on a yellow background. Letters, numbers, and symbols shall not fall off or change positions regardless of cable tag orientation.

### 2.12 BURIED WARNING AND IDENTIFICATION TAPE

Provide fiber optic media marking and protection in accordance with TIA/EIA-590-A. Provide color, type and depth of tape as specified in paragraph "Buried Warning and Identification Tape" in Section 31 00 00, "Earthwork".

### 2.13 GROUNDING BRAID

Provide grounding braid that provides low electrical impedance connections for dependable shield bonding in accordance with RUS 1755.200. Braid shall be made from flat tin-plated copper.

### 2.14 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

### 2.15 FIELD FABRICATED NAMEPLATES

Provide laminated plastic nameplates in accordance with ASTM D 709 for each patch panel, protector assembly, rack, cabinet and other equipment or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 3 mm (0.125 inch) thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 25 by 65 mm (one by 2.5 inches). Lettering shall be a minimum of 6.35 mm (0.25 inch) high, and of normal block style.

### 2.16 TESTS, INSPECTIONS, AND VERIFICATIONS

#### 2.16.1 Factory Reel Test Data

Test 100 percent OTDR test of FO media at the factory in accordance with TIA/EIA-568-B.1 and TIA/EIA-568-B.3. Use TIA/EIA-526-7 for single mode optic fiber and TIA/EIA-526-14A Method B for multi mode optic fiber measurements. Calibrate OTDR to show anomalies of 0.2 dB minimum. Enhanced performance filled OSP copper cables, referred to as Broadband Outside Plant (BBOSP), shall meet the requirements of ICEA S-99-689. Enhanced performance air core OSP copper cables shall meet the requirements of ICEA S-98-688.

29 APR 2009

Submit test reports, including manufacture date for each cable reel and receive approval before delivery of cable to the project site.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Install all system components and appurtenances in accordance with manufacturer's instructions IEEE C2, NFPA 70, and as indicated. Provide all necessary interconnections, services, and adjustments required for a complete and operable telecommunications system.

##### 3.1.1 Contractor Damage

Promptly repair indicated utility lines or systems damaged during site preparation and construction. Damages to lines or systems not indicated, which are caused by Contractor operations, shall be treated as "Changes" under the terms of the Contract Clauses. When Contractor is advised in writing of the location of a non-indicated line or system, such notice shall provide that portion of the line or system with "indicated" status in determining liability for damages. In every event, immediately notify the Contracting Officer of damage.

##### 3.1.2 Cable Inspection and Repair

Handle cable and wire provided in the construction of this project with care. Inspect cable reels for cuts, nicks or other damage. Damaged cable shall be replaced or repaired to the satisfaction of the Contracting Officer. Reel wraps shall remain intact on the reel until the cable is ready for placement.

##### 3.1.3 Direct Burial System

Installation shall be in accordance with RUS Bul 1751F-640. Under railroad tracks, paved areas, and roadways install cable in conduit encased in concrete. Slope ducts to drain. Excavate trenches by hand or mechanical trenching equipment. Provide a minimum cable cover of 610 mm (24 inches) below finished grade (36" for fiber). Trenches shall be not less than 155 mm (6 inches) wide and in straight lines between cable markers. Do not use cable plows. Bends in trenches shall have a radius of not less than 915 mm (36 inches). Where two or more cables are laid parallel in the same trench, space laterally at least 78 mm (3 inches) apart. When rock is encountered, remove it to a depth of at least 78 mm (3 inches) below the cable and fill the space with sand or clean earth, free from particles larger than 6 mm (1/4 inch). Do not unreel and pull cables into the trench from one end. Cable may be unreel on grade and lifted into position. Provide color, type and depth of warning tape as specified in paragraph "Buried Warning and Identification Tape" in Section 31 00 00, "Earthwork".

##### 3.1.3.1 Cable Placement

a. Prior to design and installation of any copper or optical fiber cable systems, cable routes and pathways must be approved by the Base Telephone Officer.

b. Separate cables crossing other cables or metal piping from the other cables or pipe by not less than 78 mm (3 inches) of well

tamped earth. Do not install circuits for communications under or above traffic signal loops.

c. Cables shall be in one piece without splices between connections except where the distance exceeds the lengths in which the cable is furnished.

d. Avoid bends in cables of small radii and twists that might cause damage. Do not bend cable and wire in a radius less than 10 times the outside diameter of the cable or wire.

e. Leave a horizontal slack of approximately 915 mm (3 feet) in the ground on each end of cable runs, on each side of connection boxes, and at points where connections are brought aboveground. Where cable is brought above ground, leave additional slack to make necessary connections.

#### 3.1.3.2 Identification Markers

Provide a marker at each change of direction of the cable, over the ends of ducts or conduits which are installed under paved areas and roadways and over each splice. Identification markers shall be of concrete, approximately 508 mm (20 inches) square by 155 mm (6 inches) thick.

#### 3.1.3.3 Backfill for Rocky Soil

When placing cable in a trench in rocky soil, the cable shall be cushioned by a fill of sand or selected soil at least 53 mm (2 inches) thick on the floor of the trench before placing the cable or wire. The backfill for at least 103 mm (4 inches) above the wire or cable shall be free from stones, rocks, or other hard or sharp materials which might damage the cable or wire. If the buried cable is placed less than 610 mm (24 inches) in depth, a protective cover of concrete shall be used.

#### 3.1.4 Cable Protection

Provide direct burial cable protection in accordance with NFPA 70 and as specified in Section 33 71 02, "Understand Transmission and Distribution" and Section 33 70 02.00 10, "Electrical Distribution System, Underground". Galvanized conduits which penetrate concrete (slabs, pavement, and walls) shall be PVC coated and shall extend from the first coupling or fitting outside either side of the concrete minimum of 155 mm per 305 mm (6 inches per 12 inches) burial depth beyond the edge of the surface where cable protection is required; all conduits shall be sealed on each end. Where additional protection is required, cable may be placed in galvanized iron pipe (GIP) sized on a maximum fill of 40% of cross-sectional area, or in concrete encased 103 mm (4 inches) PVC pipe. Conduit may be installed by jacking or trenching. Trenches shall be backfilled with earth and mechanically tamped at 155 mm (6 inches) lift so that the earth is restored to the same density, grade and vegetation as adjacent undisturbed material.

##### 3.1.4.1 Cable End Caps

Cable ends shall be sealed at all times with coated heat shrinkable end caps. Cables ends shall be sealed when the cable is delivered to the job site, while the cable is stored and during installation of the cable. The caps shall remain in place until the cable is spliced or terminated.

29 APR 2009

Sealing compounds and tape are not acceptable substitutes for heat shrinkable end caps. Cable which is not sealed in the specified manner at all times will be rejected.

#### 3.1.5 Underground Duct

Provide underground duct and connections to existing manholes or handholes as specified in Section 33 71 02, "Understand Transmission and Distribution" and Section 33 70 02.00 10, "Electrical Distribution System, Underground" with any additional requirements as specified herein. Minimum size of ducts shall be 103mm (4 inch) and minimum number will be two (2).

#### 3.1.6 Reconditioning of Surfaces

Provide reconditioning of surfaces as specified in Section 33 71 02, "Understand Transmission and Distribution" and Section 33 70 02.00 10, "Electrical Distribution System, Underground"

#### 3.1.7 Penetrations

Caulk and seal cable access penetrations in walls, ceilings and other parts of the building. Seal openings around electrical penetrations through fire resistance-rated wall, partitions, floors, or ceilings in accordance with Section 07 84 00, "Firestopping".

#### 3.1.8 Cable Pulling

Test duct lines with a mandrel and swab out to remove foreign material before the pulling of cables. Avoid damage to cables in setting up pulling apparatus or in placing tools or hardware. Do not step on cables when entering or leaving the manhole. Do not place cables in ducts other than those shown without prior written approval of the Contracting Officer or Base Telephone Officer. Roll cable reels in the direction indicated by the arrows painted on the reel flanges. Set up cable reels on the same side of the manhole as the conduit section in which the cable is to be placed. Level the reel and bring into proper alignment with the conduit section so that the cable pays off from the top of the reel in a long smooth bend into the duct without twisting. Under no circumstances shall the cable be paid off from the bottom of a reel. Check the equipment set up prior to beginning the cable pulling to avoid an interruption once pulling has started. Use a cable feeder guide of suitable dimensions between cable reel and face of duct to protect cable and guide cable into the duct as it is paid off the reel. As cable is paid off the reel, lubricate and inspect cable for sheath defects. When defects are noticed, stop pulling operations and notify the Contracting Officer to determine required corrective action. Cable pulling shall also be stopped when reel binds or does not pay off freely. Rectify cause of binding before resuming pulling operations. Provide cable lubricants recommended by the cable manufacturer. Avoid bends in cables of small radii and twists that might cause damage. Do not bend cable and wire in a radius less than 10 times the outside diameter of the cable or wire.

##### 3.1.8.1 Cable Tensions

Obtain from the cable manufacturer and provide to the Contracting Officer, the maximum allowable pulling tension. This tension shall not be exceeded.

29 APR 2009

### 3.1.8.2 Pulling Eyes

Equip cables 32 mm (1.25 inches) in diameter and larger with cable manufacturer's factory installed pulling-in eyes. Provide cables with diameter smaller than 32 mm (1.25 inches) with heat shrinkable type end caps or seals on cable ends when using cable pulling grips. Rings to prevent grip from slipping shall not be beaten into the cable sheath. Use a swivel of 19 mm (3/4 inch) links between pulling-in eyes or grips and pulling strand.

### 3.1.8.3 Installation of Cables in Manholes, Handholes, and Vaults

Do not install cables utilizing the shortest route, but route along those walls providing the longest route and the maximum spare cable lengths. Form cables to closely parallel walls, not to interfere with duct entrances, and support cables on brackets and cable insulators at a maximum of 1220 mm (4 feet). Install cable or cables in corresponding ducts entering and exiting the manholes. In existing manholes, handholes, and vaults where new ducts are to be terminated, or where new cables are to be installed, modify the existing installation of cables, cable supports, and grounding as required with cables arranged and supported as specified for new cables. Identify each cable with corrosion-resistant embossed metal tags.

### 3.1.9 Aerial Cable Installation

Pole installation shall be as specified in Section 33 71 01, "Overhead Transmission and Distribution" and Section 33 70 01.00 10, "Electrical Distribution System, Aerial". Where physical obstructions make it necessary to pull distribution wire along the line from a stationary reel, use cable stringing blocks to support wire during placing and tensioning operations. Do not place ladders, cable coils, and other equipment on or against the distribution wire. Wire shall be sagged in accordance with the data shown. Protect cable installed outside of building less than 2.5 meters (8 feet) above finished grade against physical damage.

**NOTE: The installation of aerial cabling aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.**

#### 3.1.9.1 Figure 8 Distribution Wire

Perform spiraling of the wire within 24 hours of the tensioning operation. Perform spiraling operations at alternate poles with the approximate length of the spiral being 4575 mm (15 feet). Do not remove insulation from support members except at bonding and grounding points and at points where ends of support members are terminated in splicing and dead-end devices. Ground the support wire at poles to the pole ground.

#### 3.1.9.2 Suspension Strand

Place suspension strand as indicated. Tension in accordance with the data indicated. When tensioning strand, loosen cable suspension clamps enough to allow free movement of the strand. Place suspension strand on the road side of the pole line. In tangent construction, point the lip of the suspension strand clamp toward the pole. At angles in the line, point the suspension strand clamp lip away from the load. In level construction place the suspension strand clamp in such a manner that it will hold the strand below the through-bolt. At points where there is an up-pull on the strand, place clamp so that it will support strand above the through-bolt. Make

29 APR 2009

suspension strand electrically continuous throughout its entire length, bond to other bare cables suspension strands and connect to pole ground at each pole.

### 3.1.9.3 Aerial Cable

Keep cable ends sealed at all times using cable end caps. Take cable from reel only as it is placed. During placing operations, do not bend cables in a radius less than 10 times the outside diameter of cable. Place temporary supports sufficiently close together and properly tension the cable where necessary to prevent excessive bending. In those instances where spiraling of cabling is involved, accomplish mounting of enclosures for purposes of loading, splicing, and distribution after the spiraling operation has been completed.

NOTE: The installation of aerial cabling aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.

### 3.1.10 Cable Splicing

#### 3.1.10.1 Copper Conductor Splices

Perform splicing in accordance with requirements of RUS Bul 1753F-401 except that direct buried splices and twisted and soldered splices are not allowed. Exception does not apply for pairs assigned for carrier application.

#### 3.1.10.2 Fiber Optic Splices

Fiber optic splicing shall be in accordance with manufacturer's recommendation and shall exhibit an insertion loss not greater than 0.3 dB for fusion splices.

#### 3.1.11 Surge Protection

All cables and conductors, except fiber optic cable, which serve as communication lines through off-premise lines, shall have surge protection installed at each end which meets the requirements of RUS Bul 1751F-815.

### 3.1.12 Grounding

Provide grounding and bonding in accordance with RUS 1755.200, TIA J-STD-607-A, IEEE C2, and NFPA 70. Ground exposed non-current carrying metallic parts of telephone equipment, cable sheaths, cable splices, and terminals.

#### 3.1.12.1 Telecommunications Main Ground Bar (TMGB)

The TMGB is the hub of the basic telecommunications grounding system providing a common point of connection for ground from outside cable, CD, and equipment. Establish a TMGB for connection point for cable stub shields to connector blocks and CD protector assemblies as specified in Section 26 51 00 "Interior Distribution Systems". The TMGB will at a minimum be 4 inches by 10 inches by 1/4 inch.

#### 3.1.12.2 Incoming Cable Shields

Shields shall not be bonded across the splice to the cable stubs. Ground shields of incoming cables in the EF Telecommunications to the TMGB.

29 APR 2008

### 3.1.12.3 Campus Distributor Grounding

- a. Protection assemblies: Mount CD protector assemblies directly on the telecommunications backboard. Connect assemblies mounted on each vertical frame with number 6 AWG copper conductor to provide a low resistance path to TMGB.
- b. TMGB connection: Connect TMGB to TGB with copper conductor with a total resistance of less than 0.01 ohms.

### 3.1.13 Cut-Over

All necessary transfers and cut-overs shall be accomplished by the telecommunications contractor.

## 3.2 LABELING

### 3.2.1 Labels

Provide labeling for new cabling and termination hardware located within the facility in accordance with TIA/EIA-606-A. Handwritten labeling is unacceptable. Stenciled lettering for cable and termination hardware shall be provided using either thermal ink transfer process or laser printer.

### 3.2.2 Cable Tag Installation

Install cable tags for each telecommunications cable or wire located in manholes, handholes, and vaults including each splice. Tag only new wire and cable provided by this contract. Tag new wire and cable provided under this contract and existing wire and cable which are indicated to have splices and terminations provided by this contract. The labeling of telecommunications cable tag identifiers shall be in accordance with TIA/EIA-606-A. Tag legend shall be as indicated. Do not provide handwritten letters. Install cable tags so that they are clearly visible without disturbing any cabling or wiring in the manholes, handholes, and vaults.

### 3.2.3 Termination Hardware

Label patch panels, distribution panels, connector blocks and protection modules using color coded labels with identifiers in accordance with TIA/EIA-606-A.

## 3.3 FIELD APPLIED PAINTING

Provide ferrous metallic enclosure finishes in accordance with the following procedures. Ensure that surfaces are dry and clean when the coating is applied. Coat joints and crevices. Prior to assembly, paint surfaces which will be concealed or inaccessible after assembly. Apply primer and finish coat in accordance with the manufacturer's recommendations. Provide ferrous metallic enclosure finishes as specified in Section 09 90 00, "Paints and Coatings"

### 3.3.1 Cleaning

Clean surfaces in accordance with SSPC SP 6.

29 APR 2009

### 3.3.2 Priming

Prime with a two component polyamide epoxy primer which has a bisphenol-A base, a minimum of 60 percent solids by volume, and an ability to build up a minimum dry film thickness on a vertical surface of 0.127 mm (5.0 mils). Apply in two coats to a total dry film thickness of 0.127 to 0.2 mm (5 to 8 mils).

### 3.3.3 Finish Coat

Finish with a two component urethane consisting of saturated polyester polyol resin mixed with aliphatic isocyanate which has a minimum of 50 percent solids by volume. Apply to a minimum dry film thickness of 0.05 to 0.076 mm (2 to 3 mils). Color shall be the manufacturer's standard.

### 3.4 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

### 3.5 FIELD QUALITY CONTROL

Provide the Contracting Officer 10 working days notice prior to each test. Provide labor, equipment, and incidentals required for testing. Correct defective material and workmanship disclosed as the results of the tests. Furnish a signed copy of the test results to the Contracting Officer within 3 working days after the tests for each segment of construction are completed. Perform testing as construction progresses and do not wait until all construction is complete before starting field tests.

#### 3.5.1 Pre-Installation Tests

Perform the following tests on cable at the job site before it is removed from the cable reel. For cables with factory installed pulling eyes, these tests shall be performed at the factory and certified test results shall accompany the cable.

##### 3.5.1.1 Cable Capacitance

Perform capacitance tests on all pairs within a cable to determine if cable capacitance is within the limits specified.

##### 3.5.1.2 Loop Resistance

Perform DC-loop resistance on all of the pairs within a cable to determine if DC-loop resistance is within the manufacturer's calculated resistance.

##### 3.5.1.3 Pre-Installation Test Results

Provide results of pre-installation tests to the Contracting Officer at least 5 working days before installation is to start. Results shall indicate reel number of the cable, manufacturer, size of cable, pairs tested, and recorded readings. When pre-installation tests indicate that cable does not meet specifications, remove cable from the job site.

29 APR 2009

### 3.5.2 Acceptance Tests

Perform acceptance testing in accordance with RUS Bul 1753F-201 and as further specified in this section. Provide personnel, equipment, instrumentation, and supplies necessary to perform required testing. Notification of any planned testing shall be given to the Contracting Officer at least 14 days prior to any test unless specified otherwise. Testing shall not proceed until after the Contractor has received written Contracting Officer's approval of the test plans as specified. Test plans shall define the tests required to ensure that the system meets technical, operational, and performance specifications. The test plans shall define milestones for the tests, equipment, personnel, facilities, and supplies required. The test plans shall identify the capabilities and functions to be tested. Provide test reports in booklet form showing all field tests performed, upon completion and testing of the installed system. Measurements shall be tabulated on a pair by pair or strand by strand basis.

#### 3.5.2.1 Copper Conductor Cable

Perform the following acceptance tests in accordance with TIA/EIA-758:

- a. Wire map (pin to pin continuity)
- b. Continuity to remote end
- c. Crossed pairs
- d. Reversed pairs
- e. Split pairs
- f. Shorts between two or more conductors
- g. Grounded pairs.

#### 3.5.2.2 Fiber Optic Cable

Test fiber optic cable in accordance with TIA/EIA-455-B and as further specified in this section. Two optical tests shall be performed on all optical fibers: Optical Time Domain Reflectometry (OTDR) Test, and Attenuation Test. In addition, a Bandwidth Test shall be performed on all multimode optical fibers. These tests shall be performed on the completed end-to-end spans which include the near-end pre-connectorized single fiber cable assembly, outside plant as specified, and the far-end pre-connectorized single fiber cable assembly.

- a. OTDR Test: The OTDR test shall be used to determine the adequacy of the cable installations by showing any irregularities, such as discontinuities, micro-bendings or improper splices for the cable span under test. Hard copy fiber signature records shall be obtained from the OTDR for each fiber in each span and shall be included in the test results. The OTDR test shall be measured in both directions. A reference length of fiber, 1000 feet minimum, used as the delay line shall be placed before the new end connector and after the far end patch panel connectors for inspection of connector signature. Conduct OTDR test and provide calculation or interpretation of results in accordance with TIA/EIA-526-7 for

single-mode fiber and TIA/EIA-526-14A for multimode fiber. Splice losses shall not exceed 0.3 db.

b. Attenuation Test: End-to-end attenuation measurements shall be made on all fibers, in both directions, using a 850 & 1300 for 62.5 multi-mode fiber and 1310 & 1550 for single mode nanometer light source at one end and the optical power meter on the other end to verify that the cable system attenuation requirements are met in accordance with [TIA/EIA-455-46A for multimode] and [TIA/EIA-526-7 for single-mode] fiber optic cables. The measurement method shall be in accordance with TIA/EIA-455-61A. Attenuation losses shall not exceed 0.5 db/km at 1310 nm and 1550 nm for single-mode fiber. Attenuation losses shall not exceed 5.0 db/km at 850 nm and 1.5 db/km at 1300 nm for multimode fiber.

c. Bandwidth Test: The end-to-end bandwidth of all multimode fiber span links shall be measured by the frequency domain method. The bandwidth shall be measured in both directions on all fibers. The bandwidth measurements shall be in accordance with TIA/EIA-455-204.

### 3.5.3 Soil Density Tests

a. Determine soil-density relationships for compaction of backfill material in accordance with ASTM D 1557, Method D.

b. Determine soil-density relationships as specified for soil tests in Section 31 00 00, "Earthwork".

-- End of Section --

29 APR 2009

## STRUCTURED TELECOMMUNICATIONS CABLING AND PATHWAY SYSTEM

## 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.

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

## NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA WC 63.1	(2000) Twisted Pair Premise Voice and Data Communications Cables
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## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code
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## UNDERWRITERS LABORATORIES (UL)

29 APR 2009

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	(1993; Rev thru Apr 1999) 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 51 00, "Interior Distribution System"; and Section 33 82 00, "Telephone Distribution System, Outside Plant," 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' but could be much larger. Telecommunications rooms should be centrally located unless multiple rooms are used. Access to Telecommunications Rooms normally is 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 sealed concrete to reduce dust and static electricity; no carpet or tile. A separate dedicated 20 amp electrical outlet will be installed for each communications equipment rack needed. Outlets should be installed on the same wall as the conduits or communications backboard if in a lockable communications room. If floor mount cabinets are used, outlets must be in the cabinet to prevent use by others. There should not be an electrical panel within the telecommunications room. The lock on the door shall be keyed to a P4 key. At least one wall, where the point of presence is, should be covered with plywood backboard for mounting equipment, additional boards may be needed for mounting equipment (see 2.7 BACKBOARDS below).

#### 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 tied into building system that will maintain continuous cooling 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 interconnecting 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

All submittals of material, equipment and design must be approved by the Base Telephone Office.

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 in each

telecommunications room 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.

#### 1.7.2 Qualifications

##### 1.7.2.1 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 to be installed.

b. All supervisors and 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 current consecutive years experience in the installation of the specified copper and fiber optic cable and components.

c. Contractor shall include names and locations of two projects successfully completed using optical fiber and copper communications cabling systems. Include specific experience in installing and testing structured telecommunications distribution systems using optical fiber and Category 5E/6 cabling systems. Include written correspondence from users that systems have performed satisfactorily for not less than 18 months.

##### 1.7.2.2 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.

#### 1.7.3 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.

#### 1.7.4 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, should be grouped and consolidated, will be home run conduits with a grounding bushing with plastic insert, and shall either extend up from the floor 3 to 4 inches onto the backboard or down from the ceiling 3 to 4 inches onto the backboard, 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 a 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

29 APR 2009

at height indicated. Outlet boxes for wall-mounted telephones shall be 2 by 4 by 2 1/8 inches deep with 1 CAT5E/6 cable terminated in a standard wall phone plate; mounted at 54 inches above finished floor. Outlet boxes for handicapped telephone station shall be mounted at a height 48 inches above finished floor. Outlet boxes installed in 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 ANSI/TIA/EIA-606-A and UL 969. Cable specifications must be provided in submittal and approved by base telephone before installation. 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, 100-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. 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 in the last position.

#### 2.3.1.2 Backbone Optical Fiber between closets

TIA/EIA-492AAAA-A, TIA/EIA-568-B.3, UL 1666, NFPA 70. Optical fiber cable shall be 12-fiber multimode 62.5/125-um and 12-fiber single mode 8/125-um, 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 & yellow.

### 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 (USA Manufactured), with a white or gray PVC jacket for odd numbered jacks, and a blue PVC jacket for even numbered jacks (unclassified service). 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. If the cabling passes thru a plenum air space then plenum (CMP) rated cable is required.

#### 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 (for buildings with very low jack count), 8 gauge aluminum. Provide hinged bracket compatible with 482.6 mm panel mounting. Must be in secured telephone room.

b. Rack, wall mounted (for buildings with low jack count), 16 gauge steel construction treated to resist corrosion. Shall be CPI 15320-724 or equivalent. Must be in secured Telephone room or a lockable cabinet CPI 11996-748.

c. Racks, floor mounted modular type, 16 gauge steel construction treated to resist corrosion. Shall be Siemon's RS3-07-S or equivalent approved by base telephone. 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.

d. Cabinets should be used in areas that are not secured with a P4 key. Cabinets shall be no smaller than 24W"X48H"X30D but can be as large as 7'H X 19"W X 30". All cabinets should be lockable and large enough to support all telephone / data equipment required in the building. Dedicated electrical outlets should be installed within the cabinet. A backboard for mounting equipment is still needed when a cabinet is installed (see 2.7 BACKBOARDS below).

##### 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/6 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 ST type 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. Shall be Siemon's type CT patch panels, CT-PNL-XX. 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 ## 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, Siemon's CT Couplers, CT-F-CX-CX-XX. The rear of each panel shall have incoming cable strain-relief, routing guides, or rear cable management. 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 ST 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, Siemon's CT couplers, CT-F-Cx-Cx-xx, of indicated color. 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, Siemon's CT4-FP-xx, of indicated color, factory numbered and be equipped with laminated plastic nameplates.

#### 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. 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.

#### 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, on all sides. Boards should be installed 4'Width x 8'Height and cover at least one wall in the telecomm room. Additional boards may be needed anywhere equipment is to be mounted.

#### 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 ANSI/TIA/EIA-606-A. Ground rods shall be in accordance with Section 26 51 00, "Interior Distribution System." The preferred ground for the Telephone Main Grounding Bus (TMGB) bar will be to the Main electrical Distribution Panel (MDP) bus bar, building steel, or the grounding electrode conductor. In most cases; a #6 AWG bonding conductor is recommended for telecommunications. All grounding and bonding conductors within the Telecommunications room will be green sheathed copper conductor, stranded, 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; bus bar should be factory made -not fabricated.

#### 2.9 FIRESTOPPING MATERIAL

Provide in accordance with Section 07 84 00, "Fire stopping". 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.

29 APR 2009

## 2.10 NAMEPLATES

Provide nameplates for equipment rooms and telecommunications rooms doors in accordance with schedule provided on drawings; Telephone rooms should not be labeled NMCI. 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. 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, 150mm in the work area outlet for UTP. Do not exceed manufacturers' cable pull tensions for copper. 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/6 cable and optical fiber cable. 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 in this spec and 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 in this spec and 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 radians (90 degree) bends for a single horizontal cable run. All bends/turns in conduits will be in straight runs of conduit; a pull box shall be installed after every 180 degrees of bends; 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. All conduits should contain a bushing at the end to protect the cable from damage and a bonding.

#### 3.1.2.1 Under Floor Duct Pathway Systems

Install cabling and under floor duct in accordance with manufacturers' recommendations.

#### 3.1.2.2 Conduit Installed Under Floor Slabs

Conduit shall be located a minimum of 300 mm (12 inches) below the vapor barrier. Seal all conduit connections and at penetrations through vapor barrier.

#### 3.1.2.3 Service Entrance Conduit, Overhead

Galvanized rigid steel or IMC from service entrance to service entrance fitting or weather head outside of building.

#### 3.1.2.4 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.

#### 3.1.2.5 Cable Tray Installation

Install cable tray components in accordance with TIA/EIA-569-B. Only CMP and OFNP type cable shall be installed in a plenum.

#### 3.1.2.6 Work Area Outlets

All work areas will contain at least two face plates. Any work area larger than 80 sq feet will require additional face plates to service any work location in the room within 6 feet of a faceplate. This also applies to any area that could be converted to work space in the future. Recommend a

29 APR 2009

Telecommunications outlet box 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 a storage closet"; All work area faceplates will contain four category 5E/6 jacks, Siemon's CT-F-Cx-Cx-xx or equivalent approved by base telephone.

#### 3.1.2.7 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.

#### 3.1.2.8 Faceplates

As a minimum, each jack shall be factory numbered and be equipped with laminated plastic cover over label. Also it shall be labeled as to its function with an icon.

#### 3.1.3 Cables

Unshielded twisted pair shall have a minimum of 152 mm (6 inch) 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. A single punch insulation displacement tool shall be used for terminating copper cable to insulation displacement connectors (no multi punch tools).

#### 3.1.4 Equipment Support Frame

Install in accordance with TIA/EIA-569-A:

a. Bracket / lockable cabinet, wall mounted approved by base telephone. Mount to plywood backboard per manufacturer's recommendations. Mount so height of highest panel does not exceed 1980 mm (76 inches) above floor. Mount so there is sufficient space remaining on back board to mount lightning protection, bonding, and cable managers, or install additional backboard.

b. Racks / lockable cabinet, floor mounted modular type, Siemon's RS3-07-S / CPI T1030-712 or equivalent approved by base telephone. Permanently anchor rack to the floor per manufacturer's recommendations. Mount so there is sufficient space remaining on back board to mount lightning protection, bonding, and cable managers, or install additional backboard.

#### 3.1.5 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated wall, partitions, floors, or ceilings in accordance with Section 07 84 00, "Fire Stopping."

### 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 ANSI/TIA/EIA-606-A. The jacks will be numbered in a logical, sequential, clockwise numbering system from 1 to X with a closet designator. Example would be 145C, which is the 145<sup>th</sup> jack in the C closet. All labels should be factory numbered and be equipped with laminated plastic cover.

### 3.2.2 Cable

All cables shall be labeled using color labels on both ends with encoded identifiers per ANSI/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 ANSI/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/6 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/6 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 perm. 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. Provide results to base telephone office.

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 shall be provided to base telephone.

#### 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. The final QC and certification of installation will be performed by Base Telephone after the contractor has provided As built drawings showing all telecommunications outlets and their numbers; test results with both a hard copy of summary and soft copy of detailed 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 --

BO 2305.5M  
29 APR 2009



UNITED STATES MARINE CORPS  
 MARINE CORPS BASE  
 PSC BOX 20004  
 CAMP LEJEUNE, NC 28542-0004

IN REPLY REFER TO:  
 2305  
 CSD  
 XX XXX XX

From: Title, Unit  
 To: Telephone Officer, Telephone Branch, Communications  
 Services Division  
 Via: Officer In-Charge, Criminal Investigative Division  
 Subj: REQUEST FOR DETAILED CALL RECORDS IN THE CASE OF UNITED  
 STATES VERSUS LANCE CORPORAL JOHN A. DOE

Ref: (a) BO 2305.5M

Encl: (1) Investigating Officer Appointment Letter

1. Per the reference, request call records in support of the subject case or investigation.
2. Enclosure (1) contains the appointment letter appointing myself as the Investigating Officer in the subject case or investigation.
3. Detailed call records are required for the following telephone numbers:

<u>CALLING</u>	<u>CALLED</u>	<u>DATE (S)</u>	<u>TIME (S)</u>
<u>NUMBER (S)</u>	<u>NUMBER (S)</u>		
NNX-XXXX	(NPA) NNX-XXXX	DD MMM YY-DD	MMM YY 0000-0000
NNX-XXXX	(NPA) NNX-XXXX	DD MMM YY-DD	MMM YY 0000-0000

4. If there are any questions or concerns regarding this request, please contact me at Tel: XXX-XXXX or E-mail: iomarine@usmc.mil.

I. O. MARINE