

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D. C. 20330-5130

REPLY TO
ATTN OF: LEE

SUBJECT: Engineering Technical Letter (ETL) 87-9:
Prewiring

TO: ALMAJCOM/DEE/DEP/DEM	AFRCE-WR	AFRCE-CR	AFRCE-ER
AFRCE-BMS	AFRCE-SAC	AFIT/DET/DEM	HQ AFCC/DEM
HQ AFRES/DE	AAFES/ENC	ANGSC/DEE	HQ AFESC/DEM
NAVFAC Code 04/05	1100 ABG/DE	CEEC-ES	HQ USAFA/DEM

1. Purpose. This ETL:

a. Provides policy, programming, design and construction management guidance for the prewiring of facilities to support communications-computer systems (C-CS).

b. Supersedes messages referenced in para 4 below beginning with FY 90 projects. Prewiring policy as described in HQ USAF/SI/LE message, R262200Z Apr 84 (Ref 4c); HQ USAF/ACBI/LEEP/SIP message, R201630Z Mar 85 (Ref 4b); and AFR 86-1 (Ref 3b), para 2-3c(5), remains in effect for FY 86 thru FY 89 projects.

c. Does not apply to Military Family Housing and Non-Appropriated Funds facilities.

d. Is to be implemented in accordance with AFR 8-7 (Ref 3a). Waivers to design criteria will be processed in accordance with the procedures established by the Model Installation Program. See para 8 for additional requirements.

2. Effective Date. This guidance is effective beginning with FY 90 projects.

3. Referenced Publications.

- a. AFR 8-7, Air Force Engineering Technical Letters (ETL).
- b. AFR 86-1, Volume 1, Programming Civil Engineer Resources - Appropriated Fund Resources.
- c. AFR 88-15, Criteria and Standards for Air Force Construction.
- d. AFR 89-1, Design and Construction Management.
- e. AFR 172-1, Volume 1, USAF Budget Policies and Procedures.
- f. AFR 700-3, Information Systems Requirements Processing.

- g. AFR 700-4, Volume 1, Information Systems Program Management.
- h. ETL 86-12, Prewired Workstations and Systems Furniture.

Appropriate changes will be made to these regulations as necessary, based on the requirements of this ETL.

4. Other References.

- a. HQ USAF/LEE Message, R151945Z Dec 86, Prewiring Policy, AFR 88-15 (Criteria and Standards for Air Force Construction).
- b. HQ USAF/ACBI/LEEP/SIP Message, R201630Z Mar 85, USAF Policy on Prewiring of Buildings to Support Information Systems/Services.
- c. HQ USAF/SI/LE Message, R262200Z Apr 84, USAF Policy on Prewiring of Buildings to Support Information Systems/Services.

5. Policy Description.

a. General. Prewiring is the procurement and installation of C-CS wiring as an integral part of major facility construction and alteration contracts. Specific requirements are contained in para 5b. The intent of prewiring is as follows:

(1) Provide a more complete and usable facility upon completion of the construction/alteration contract. This minimizes user occupancy delays, fixes responsibility for the condition of the facility solely on the construction contractor, and prevents defacement of the facility which could result from a follow-on C-CS wiring effort.

(2) Provide flexibility and standardization in the design and installation of common C-CS wiring requirements. This reduces the need and cost of future modifications which would otherwise result from changes in facility occupancy or user reorganization.

Prewiring does not result in the classification of C-CS wiring systems as Real Property (RP) or Real Property Installed Equipment (RPIE). Subsequent maintenance, repair and modification (other than warranty items) are not the responsibility of the Base Civil Engineer (BCE). They are the responsibility of the base C-CS activity or using agency depending on the C-CS system involved and method of acquisition. Funding for the life cycle maintenance of C-CS building wiring (other than for special systems described in para 5b(1)(e)) is the responsibility of the host MAJCOM and will be programmed for by the C-CS activity in the base operations support program element (xxx95) during construction planning. Repair and modification of existing wiring due to major alterations is a Civil Engineering responsibility (See para 5c). See para 6d for turn-over and warranty requirements. Note that since systems will be acquired with Military Construction appropriations, the intent of AFR 86-1, para 5-6, restricting significant alterations to the systems within one year of beneficial occupancy is applicable.

b. Specific Requirements.

(1) Prewiring includes the following items:

(a) Generic intra-building (interior) communications wiring and duct for single-line administrative telephones. See para 7 for standard design criteria.

(b) Generic intra-building communications wiring and duct for data networks supporting office automation equipment. See para 7 for standard design criteria.

(c) Communication distribution frames and modular jacks/outlets for (a) and (b) above. Cross-connect wiring between the outside plant cable and intra-building wiring is not included.

(d) Intra-building communications wiring and duct for fire alarm and energy management and control systems (EMCS) from the building's main communications distribution frame to the alarm system control panel/transmitter or the EMCS Data Termination Cabinet/Field Interface Device (if included in the construction contract).

(e) Intra-building communications cabling and duct for special C-CS requirements if validated by the Major Command (MAJCOM). See para 6b for validation requirements. This includes systems such as local area networks, non-administrative telephones, video, teleconferencing, CATV, alarms (other than fire), as well as non-standard administrative telephone and office automation requirements. Integral parts of specialized wiring systems such as distribution frames/backboards, taps, splitters, outlets for connecting end instruments, and line amplifiers are included.

(f) Exterior duct system to support all valid C-CS requirements from the facility's communications equipment room (CER) to the base dial central office or nearest service connection point. Includes entrance ducts (including spares), duct and manhole systems in the immediate vicinity of the facility, and necessary provisions for crossing roads and other paved areas. Additional requirements must be validated by the MAJCOM.

(2) Prewiring does not include the following items. Refer to the appropriate regulations for their funding, procurement and installation.

(a) Power wiring (50/60/400 Hz or DC) for C-CS equipment. Such wiring may be provided in accordance with AFR 86-1, para 2c and AFR 172-1, para 4-44 and 4-45.

(b) C-CS equipment and end instruments such as PBXs/digital switches, telephones, workstations (terminals, personal computers, etc), multiplexers/concentrators, and gateways. Alarm equipment and sensors are also excluded.

(c) Cabling closer to the base cable distribution system than the main communications distribution frame inside the building.

(d) Communications wiring/cabling for the interconnection of central/main computer system components (mainframe or mini computers, disk drives, tape units, etc) which are normally purchased or leased on an installed basis and which are located in a common equipment area. Remote intra-building workstations, printers, etc. for such systems will be prewired in accordance with para 5b(1)(e) when not precluded by warranty conditions, technical considerations, or other provisions of the purchase/lease contract. This is applicable regardless of the method used to acquire the system.

c. Project Applicability and Funding. Prewiring will be included in all major and minor new facility construction, addition and alteration projects accomplished with 3300 funds (See Table 1 below). Application to projects involving leased systems (when the resulting wiring will not be government owned) and those on installations outside the United States will be as determined by the host MAJCOM.

(1) Military Construction Program (MCP) and Minor Construction Projects Funded with 3300 Funds. Prewiring is required except as noted in para 5c above and will be funded from the 3300 appropriation.

(2) Operations and Maintenance (O&M) Funded Projects Including O&M Projects Accomplished Under Minor Construction and Renovation Authority. Prewiring is not required. The decision whether or not to include prewiring in the construction contract will be coordinated with the base C-CS activity. When included, it will be funded from the O&M (3400) appropriation as an expense (non-construction). Acquiring necessary funding for the prewiring effort is the responsibility of the C-CS activity or using agency, as applicable.

(3) Modular/Movable Equipment and Construction Items. C-CS wiring in prewired workstations, portable walls, modular offices and other items which are easily moved will be funded as a part of the movable item if the wiring outlets are integrally mounted or the wiring is otherwise permanently installed. See para 7f for design requirements.

(4) Flooring Systems. Although flooring systems such as infinite access/raised floors and cellular floors may function as part of the wiring distribution system, installation and alteration of raised floors in multiple-use areas such as administrative areas and cellular floors in all areas are facility construction (funded cost) items in all projects. Raised flooring in equipment rooms, where administrative and other tasks are incidental to the equipment operation, will continue to be funded in accordance with AFR 86-1, Fig 2-2 and AFR 172-1, para 4-44 and 4-45.

TABLE 1. Applicability of Prewiring to Facility Projects

TYPE PROJECT	IS PREWIRING INCLUDED AS PART OF PROJECT CONSTRUCTION COST?
MILITARY CONSTRUCTION 3300 FUNDED	YES
MINOR CONSTRUCTION 3300 FUNDED	YES
MINOR CONSTRUCTION O&M FUNDED	NO*
MAINTENANCE & REPAIR O&M FUNDED	NO*
RENOVATION AUTHORITY O&M FUNDED	NO*

*If included, prewiring will be funded as an expense with O&M funds.

6. Responsibilities.

a. General. C-CS equipment can be acquired by various methods. Most common requirements such as administrative telephones, word processing, Phase IV and other general purpose computers are acquired by a process described in the Air Force 700 series regulations. This ETL deals primarily with prewiring for these systems. Other special purpose systems, such as those totally dedicated to weapons systems, may be obtained through the weapons system acquisition or Research and Development process and are normally the responsibility of the using/acquiring agency. The paperwork chain for these systems varies but the general principles and intent of the requirements described below are still applicable. Basically, prewiring requires close coordination between the Civil Engineering, C-CS, and using activities, regardless of the method used to acquire the equipment. Planning, programming, design and construction all require joint or parallel actions and mutual cooperation. Developing or modifying procedures to accomplish the responsibilities identified below must, therefore, be a joint Civil Engineering and C-CS activity effort at both the base and MAJCOM level.

b. Programming. Programming for C-CS equipment is still the responsibility of the C-CS activities; programming for prewiring is a Civil Engineering responsibility. The C-CS process, like facility programming, is governed by the overall Planning, Programming and Budgeting System and, therefore, has similar timelines and validation/approval procedures. Identification, validation and approval of C-CS requirements are normally documented on a Communications - Computer Systems Requirement Document (CSR), AF Form 3215. It is prepared jointly by the user (customer) and C-CS activities. Validation (verification of need only) and approval of the technical solution are responsibilities of the Communication-Computer Systems

Requirements Board (CSRB) at base and MAJCOM levels. Requirements which are validated by the MAJCOM CSRB are incorporated as necessary into the MAJCOM Program Objective Memorandum (POM) for budgeting purposes. Note that the C-CS and facility programming processes are interrelated. The C-CS process determines which equipment will be used in the facility. This, in turn, drives the rewiring requirements and other basic facility characteristics (size of the CER and communications closets, types of wiring systems, extent of exterior duct system, etc). The necessary linkage between the two processes is established by the following requirements to provide a copy of the validated CSRD with the DD Form 1391 and to incorporate the cost of rewiring into the total MCP project cost.

(1) Base-Level (BCE) Responsibilities.

(a) Notify using activities that they must submit their C-CS requirements to the base C-CS activity. Normally, this notification need not be made until the facility programming is relatively firm (i.e., Base Facilities Board approval to include a project in a given fiscal year program). However, earlier notification may be necessary based on a number of factors such as complexity of the requirements, schedule for approval boards, and projected availability of Engineering Installation (EI) activity support (See para 6c below).

(b) Notify base C-CS activity of any change in project status such as change in fiscal year, project approval/dissapproval, etc.

(c) Identify cost of rewiring on the DD Form 1391 in accordance with the annual MCP guidance letter and/or AFR 86-1. Normally, this will be done by including a "Communications-Computer Rewiring" subentry (line item) under the primary facility item.

(d) Obtain and attach a copy of the base-validated CSRD to Volume 1 of the initial and final DD Form 1391 submittal package. Refer to the annual MCP guidance letter.

(2) MAJCOM Responsibilities.

(a) Notify MAJCOM C-CS activity (MAJCOM/SC) of changes in MCP program status (additions, deletions, etc) and impact on MCP due to C-CS program changes.

(b) Ensure MAJCOM engineering project manager is notified of any change in status of C-CS requirements.

(c) Ensure rewiring is properly identified on the DD Form 1391.

(d) Obtain and attach a copy of the MAJCOM-validated CSRD to Volume 1 of the initial and final DD Form 1391 submittal package. Verify this is identical to the base-validated version. If not, ensure necessary changes are made to the project cost.

c. Design. Using the information contained in the base-validated CSR, the applicable C-CS activity with the support, if necessary, from the appropriate Engineering Installation (EI) activity (Atch 1) or contractor/vendor will develop preliminary technical solutions to satisfy the current, programmed and future C-CS requirements of the facility. This includes identifying basic C-CS equipment, exterior (outside plant or black cable) requirements, and types of interior wiring systems. This information will be used for project book development and for design of C-CS related aspects of the facility. The EI activity will also provide engineering support for technical review of prewiring and other C-CS related aspects of the design.

(1) Base-Level (BCE) Responsibilities.

(a) Obtain a copy of the MAJCOM-validated CSR and the preliminary technical information from the base C-CS activity.

(b) Develop and incorporate design and cost information for MAJCOM-validated prewiring requirements in the project book. Atch 2 contains a copy of the project book TAB K format for C-CS requirements. Refer to the Construction Technical Letter (CTL) on Project Book Format published by AF/LEEC for any changes. Recommend a current copy of the CTL TAB K be kept with this ETL in the future. Prewiring costs, broken-out as a minimum into interior and exterior line items, will be included in the "Supporting Facilities" section of the AF Form 1178, Project Cost Estimate Worksheet.

(c) Notify base C-CS activity of significant changes during project design (changes in scope, siting, schedule, etc).

(d) Notify base C-CS activity when design submittals are available for review.

(2) MAJCOM Responsibilities.

(a) Ensure project book information is consistent with MAJCOM-validated CSR and DD Form 1391.

(b) Notify MAJCOM/SC of significant project changes during design (scope, schedule, etc).

(c) Notify Design Manager (DM) and BCE of significant changes in C-CS requirements when informed by the MAJCOM/SC.

(3) Design Manager (DM) Responsibilities.

(a) Ensure design adheres to prewiring policy and criteria contained in this ETL.

(b) Ensure a copy of design submittals are provided to the EI activity and host/requiring MAJCOM/SC (supporting AFCC division/DE) for review.

(c) Ensure design agent notifies the EI, base and MAJCOM C-CS activities of significant project design events (pre-design and review conferences, issue of Invitation for Bids, etc).

d. Construction.

(1) Base-Level (BCE) Responsibilities.

(a) Notify base C-CS activity of significant changes during construction.

(b) Ensure proper turn-over of C-CS wiring systems.

(c) Warranty Claims Processing. The BCE is responsible for processing warranty claims. Contact the base C-CS activity for an initial technical evaluation of any problems to determine the validity of any C-CS related warranty claims.

(2) MAJCOM Responsibilities.

(a) Notify MAJCOM/SC of construction schedule and significant project changes.

(b) Notify Construction Manager (CM) and BCE of significant changes in C-CS requirements when informed by the MAJCOM/SC.

(3) Construction Manager (CM) Responsibilities.

(a) Ensure EI and base C-CS activities and MAJCOM/SC (supporting AFCC division/DE) are notified of significant construction events (pre-construction conference, preliminary and final inspections, etc).

(b) Ensure a separate document is prepared for turnover of interior C-CS wiring systems (excluding duct) as described in para 5b(1)(a) thru 5b(1)(e). They will not be included on the DD Form 1354, Transfer and Acceptance of Military Real Property. Turnover will be to the base C-CS activity who is responsible for final disposition (i.e., assumes responsibility for O&M or transfers to the using or other activity). The document will be in letter form and will describe the systems involved. Signatures of the construction agent and base C-CS activity commander or authorized representative are required.

(c) Ensure two copies of C-CS "as-built" cable records are turned over to the base C-CS activity at the time of facility turnover. (The base C-CS activity will forward one copy to the appropriate EI activity). See para 7g.

7. Design Criteria for Prewiring and Other C-CS Requirements.

a. General. The facility design will provide concealment of the wiring/cabling systems, adequate space for installation and maintenance of C-CS equipment and wiring, flexibility of office

layout in administrative areas, and standardization of common user requirements. The DM is responsible for ensuring that the most economical cable/wire distribution system is selected, consistent with facility size and function, current and projected C-CS requirements, the Comprehensive Interior Design (CID) concept, and the need for flexibility to accommodate future additions or rearrangement. The selection should consider not only the C-CS wiring systems, but also wiring to accommodate electrical convenience outlets. Consideration will be given to overhead and in-floor systems including infinite access/raised floors. On-floor (under-carpet) systems may be considered only in facility alteration projects and will not be used in new facility construction.

b. Administrative Telephone and Office Automation Requirements. Wiring for administrative telephones and data networks for office automation equipment including word processing will be individually shielded twisted pair, Integrated Services Digital Network (ISDN) compatible. Administrative telephone wiring will be based on the single-line instrument concept. Key system features will be provided via digital switch equipment and CER features such as space, power, and environmental control will be provided to accommodate local equipment when the base dial central office is inadequate. Use of multi-line telephone and/or key system wiring (25 pair) will only be installed under special exception, justified in the CSRD, and approved by the MAJCOM CSRB. Outlets for single-line telephone and office automation networks shall be modular type. Each outlet jack shall be numbered and shall be wired with 4 pairs (8 conductors). Circuit connectivity will be provided from each jack to the main communications distribution frame in the CER. Outlets shall be provided as required, except in administrative areas exceeding 1,000 square feet (SF) of contiguous net office area (usable office space excluding administrative support space). In such areas, an outlet with two jacks (one for telephone and one for data service) will be provided for approximately every 48 SF of net floor area (usable office space including administrative support space) or as specified in the MAJCOM-validated CSRD.

c. Local Area Network (LAN) Cable Systems. When required by the project book (and the MAJCOM-validated CSRD), a LAN cable system will be provided in accordance with Unified Local Area Network Architecture (ULANA) standards. Generally, these standards require compliance with Institute of Electrical and Electronic Engineers (IEEE) Standard 802.3 for baseband systems (single coaxial cable or twisted pair) and IEEE Standard 802.7 for broadband systems (dual coaxial cable). Additional information may be obtained from the base C-CS activity or the applicable EI activity.

d. Communications Equipment Room (CER). A CER will be provided as necessary for C-CS switching and transmission equipment (PBXs, gateways, power supplies, etc), main distribution frame(s), and other equipment needed for termination of the building's interior wiring systems and to interface them with the exterior (outside plant) cable system. Adequate installation and maintenance space, environmental control and power will be included to support this equipment and any necessary cable entry requirements.

e. Communications Closets. Cross-connect closets will be provided as required, generally to serve approximately every 10,000 SF of usable floor space. They will serve as an interconnection point between the C-CS service outlets and the main communications frame in the CER. Wall and floor space will be provided for installation and maintenance of C-CS equipment such as frames/back-boards, line amplifiers for LANs, and concentrators. Such equipment will not be installed in common use areas.

f. Modular/Movable Equipment and Construction Items. C-CS wiring systems in areas with equipment or construction items which can be easily moved, such as prewired workstations, systems furniture and modular walls/offices, will provide sufficient flexibility and connectivity to enable rearrangement without modifications to the permanent C-CS wiring system in the facility. Suitable connectors shall be provided; permanent splices/connections will not be made. C-CS wiring in prewired workstations, portable walls and offices where the outlets are integrally mounted or the wiring is permanently installed shall be funded as a part of the workstation, wall or office.

g. C-CS Cable Records. Design drawings and schedules which will form the basis of "as built" cable records will be provided. They will show cross-connect and termination points for each cable pair, location and identification number for each modular outlet, and the location and value of each line amplifier and multipoint device in the LAN cable system. Approximate cable routing will also be shown. Two copies of these drawings will be updated to "as-built" conditions by the construction contractor and turned over to the base C-CS activity at the time of facility turn-over.

8. Additional Waiver Requirements. The Model Installation Program requirements are applicable for waiver of design criteria contained in para 7 of this ETL. In addition to those requirements, a copy of the proposed waiver will be submitted to the applicable EI activity and MAJCOM/SC for comment prior to submission to the MAJCOM/DE review board. Notify the EI activity and MAJCOM/SC of approval/dissapproval. Submit requests for waiver to other requirements of this ETL to HQ USAF/LEEE for approval.

FOR THE CHIEF OF STAFF

JOSEPH A. AHEARN, Brig Gen, USAF
Deputy Director
Directorate of Engineering & Services

3 Atch
1. EI Activity List
2. Project Book, Tab K
3. ETL Index

cc: OASD (A&L)C
AF/LEEC/LEEP
AF/SCP/SCT/SCM

ENGINEERING INSTALLATION ACTIVITY SERVICE AREAS

Listed below are the service areas supported by each of the AFCC Engineering Installation activities.

485 EIG/EIEWX, Griffiss AFB NY 13441-6348

- | | |
|--|-------------------|
| 1. All Bases in Europe | 18. Missouri |
| 2. Azores | 19. Montana |
| 3. Bahamas | 20. Nebraska |
| 4. California (only Beale AFB, Mather AFB, McClellan AFB and Travis AFB) | 21. New Hampshire |
| 5. Colorado (except Falcon AFS) | 22. New Jersey |
| 6. Connecticut | 23. New York |
| 7. Delaware | 24. North Dakota |
| 8. Idaho (except Mt Home AFB) | 25. Ohio |
| 9. Illinois | 26. Oregon |
| 10. Indiana | 27. Pennsylvania |
| 11. Iowa | 28. Puerto Rico |
| 12. Kansas | 29. Rhode Island |
| 13. Maine | 30. South Dakota |
| 14. Maryland | 31. Vermont |
| 15. Massachusetts | 32. Washington |
| 16. Michigan | 33. Washington DC |
| 17. Minnesota | 34. Wisconsin |
| | 35. Wyoming |

HQ EID/EIER, Bldg. 4025, Tinker AFB OK 73145-6343

- | | |
|--|-------------------------|
| 1. Alabama | 12. Louisiana |
| 2. Alaska | 13. Mississippi |
| 3. Arizona | 14. Nevada |
| 4. Arkansas | 15. New Mexico |
| 5. California (only Castle AFB, Edwards AFB, George AFB, Los Angeles AFS, March AFB, Norton AFB, & Vandenberg AFB) | 16. North Carolina |
| 6. Colorado (only Falcon AFS) | 17. Oklahoma |
| 7. Eastern Test Range | 18. Panama - Howard AFB |
| 8. Florida | 19. South America |
| 9. Georgia | 20. South Carolina |
| 10. Idaho | 21. Tennessee |
| 11. Kentucky | 22. Texas |
| | 23. Utah |
| | 24. Virgin Islands |
| | 25. West Virginia |

1843 EIG/EIEWS, Wheeler AFB HI 96854-6343

- | | |
|-----------------------------|-----------------------|
| 1. All Pacific Requirements | 3. Western Test Range |
| 2. Hawaii | |

PROJECT BOOK CHECKLIST

	INC.	NOT INC.
K. COMMUNICATIONS-COMPUTER SYSTEMS		
1. General		
a. Type of building and location	()	()
b. Number of people	()	()
c. Telephone system switching equipment space, power, and HVAC requirements (electronic key system, PABX, RLCM, T-carrier, modems, multiplexers, etc.).	()	()
d. Data requirements	()	()
e. Red/black requirements	()	()
f. Number of phones	()	()
g. Number of computer terminals	()	()
h. Telephone/data outlet density/locations	()	()
i. Engineering/administrative considerations (EID, Telecom or LEC)	()	()
j. Communications requirements documentation (AF Form 3215 according to AFR 700-3)	()	()
k. Incremental construction (required BOD)	()	()
l. Other MCP construction and adjacent area requirements	()	()
m. Future expansion capability of the facility	()	()
n. Communications-Computer facility records - location for review	()	()
o. Outside plant cable distribution (direct burial, underground, or aerial)	()	()
p. Cable fire protection requirements	()	()
2. Information Systems	()	()
a. LAN	()	()
b. Secure voice	()	()
c. Crew alert circuits	()	()
d. Public address system	()	()
e. Phase IV computer or other mainframes	()	()

	INC.	NOT INC.
f. Pay phones/unofficial (contracted phones - AAFES)	()	()
g. In-house cable distribution	()	()
h. Network services (private lines)	()	()
i. Base cable plant (commercial lease or government owned)	()	()
j. DCS circuits	()	()
k. Commercial telephone company interface	()	()
l. Other communication-computer system requirements	()	()
m. Command post (what is included)	()	()
n. Contingency space/support shelters	()	()
o. Entry control systems	()	()
p. Hot lines - special security	()	()
3. Miscellaneous Systems		
a. Master antenna (MATV), CATV, CCTV	()	()
b. Duress alarms	()	()
c. Security alarms	()	()
d. Fire alarms	()	()
e. Fire detection/suppression systems	()	()
f. EMCS system	()	()
4. Electronic/Electrical Support	()	()
a. PABX, RLCM, key system	()	()
b. Filtering (EMP, RFI/EMC, TEMPEST)	()	()
c. Mainframe computer connectivity	()	()
d. Shielding - security - TEMPEST	()	()
e. Grounding	()	()
f. Circuit protection	()	()

	INC.	NOT INC.
g. Power (primary, backup), Power Conditioning and Continuation Interfacing Equipment (PCCIE), battery	()	()
h. Redundancy - diverse cable routing	()	()
i. Demarcation point	()	()
j. Protected distribution system (PDS)	()	()
5. Building Support	()	()
a. Communications equipment room (CER) size	()	()
b. Equipment/cross-connect closet size, density (location)	()	()
c. Cable riser system	()	()
d. Equipment access doors	()	()
e. Cable distribution system type (raised floor, ducts, overhead, under carpet, etc.)	()	()
f. Cable entranceways	()	()
g. Equipment room/cross-connect closet wall requirements (3/4 inch plywood mounted on 2 inch by 4 inch vertical furring)	()	()
h. HVAC	()	()
i. Outside plant manhole/duct systems	()	()
j. Cable vault	()	()
k. Electrical outlets (configuration, location, rating)	()	()
l. Structure for SATCOM, microwave or other radio antennas	()	()
m. EMP protection	()	()
n. Nuclear/biological/chemical (NBC) protection	()	()
o. Systems furniture	()	()
p. Explosive environment	()	()
q. Corrosive environment	()	()
r. Lighting levels in equipment rooms and cross-connect closets	()	()

	INC.	NOT INC.
6. Administrative Planning	()	()
a. LAN - user requirements/operations concept	()	()
b. Environmental impact statement - outside plant	()	()
103, c. Base Civil Engineering Work Clearance Request, AF Form requirements	()	()
d. Teleco lease of right-of-ways/easements/building space	()	()
e. Revocable license agreements	()	()
f. Engineering transmission traffic analysis	()	()
facilities g. Relocation of existing communications cables or	()	()
h. Communications-computer facility records	()	()
i. Layout plans and specifications	()	()