

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE _____ PAGE _____ OF _____ PAGES

2. AMENDMENT/MODIFICATION NO.		3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. <i>(If applicable)</i>
6. ISSUED BY	CODE	7. ADMINISTERED BY <i>(If other than Item 6)</i>		CODE

8. NAME AND ADDRESS OF CONTRACTOR <i>(No., street, county, State and ZIP Code)</i>	(X)	9A. AMENDMENT OF SOLICITATION NO.
		9B. DATED <i>(SEE ITEM 11)</i>
		10A. MODIFICATION OF CONTRACT/ORDER NO.
		10B. DATED <i>(SEE ITEM 11)</i>
CODE	FACILITY CODE	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

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

12. ACCOUNTING AND APPROPRIATION DATA *(If required)***13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

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

E. IMPORTANT: Contractor is not, is required to sign this document and return _____ copies to the issuing office.14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

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

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

Item 14. Continued.

CHANGES TO VOLUME I – PROJECT INFORMATION, BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT

1. **Standard Form 1442, Item 13.A.** – The date for Receipt of Phase II Design Proposals is hereby established to be “4 pm local time 17 June 2002”

A revised Standard Form 1442 is attached showing the phase II Proposal Receipt Date.

2. Table of Contents - Replace the Project Table of Contents with the attached new Project Table of Contents, bearing the notation “ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. DACA63-02-R-0009.”

3. Replacement Sections - Replace the following Sections with the attached new Sections of the same number and title, each bearing the notation “ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. DACA63-02-R-0009.”

SECTION 00102 PRE-PROPOSAL CONFERENCE/SITE VISITATION

CHANGES TO VOLUME II – DESIGN AND PERFORMANCE REQUIREMENTS

Introductory Information

4. Replacement Chapters – Replace the following chapters, with the attached new chapters, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. DACA63-02-R-0009:"

CHAPTER 00005 PROJECT INFORMATION

Contracting Documents

5. Replacement Chapters - Replace the following chapters, with the attached new chapters, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. DACA63-02-R-0009:"

CHAPTER 00570 CONTRACT DEFINITIONS
CHAPTER 00830 DESIGN AND CONSTRUCTION PROCEDURES

Program Requirements

6. Replacement Chapters - Replace the following chapters, with the attached new chapters, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. DACA63-02-R-0009:"

CHAPTER 1 - PROGRAM SUMMARY

7. New Chapters - Add the following accompanying new chapters, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. DACA63-02-R-0009:"

CHAPTER 1.1 - PROJECT PROGRAM
CHAPTER 1.1.1 - FACILITY PERFORMANCE

Performance Requirements

8. New Chapters - Add the following accompanying new chapters, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. DACA63-02-R-0009:"

CHAPTER A – SUBSTRUCTURE
CHAPTER A1 – FOUNDATIONS
CHAPTER A1.3 – FLOORS ON GRADE

CHAPTER B – SHELL
CHAPTER B1 – SUPERSTRUCTURE
CHAPTER B1.2 – ROOFS
CHAPTER B2 – EXTERIOR ENCLOSURE
CHAPTER B2.1 – EXTERIOR WALLS
CHAPTER B2.2 – EXTERIOR WINDOWS AND OTHER OPENINGS
CHAPTER B2.3 – EXTERIOR DOORS
CHAPTER B2.4 – EXTERIOR WALL FIXTURES

CHAPTER C – INTERIORS
CHAPTER C1 – INTERIOR CONSTRUCTION
CHAPTER C1.1 – PARTITIONS
CHAPTER C1.2 – INTERIOR DOORS
CHAPTER C1.5 – STAIRS
CHAPTER C1.6 – INTERIOR FINISHES
CHAPTER C2 – INTERIOR FIXTURES
CHAPTER C2.3 – WINDOW TREATMENT
CHAPTER C2.4 – ACCESSORY FIXTURES

CHAPTER D – SERVICES
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CHAPTER D2.4 – SANITARY WASTE
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CHAPTER D4.1 – FIRE SPRINKLER AND EXTINGUISHING SYSTEM
CHAPTER D4.2 – STANDPIPE AND HOSE SYSTEMS
CHAPTER D4.3 – FIRE DETECTION AND ALARM
CHAPTER D4.5 – FIRE PROTECTION SPECIALTIES
CHAPTER D5 – ELECTRICAL POWER
CHAPTER D5.2 – SERVICE AND DISTRIBUTION
CHAPTER D5.3 – BRANCH CIRCUITS
CHAPTER D6 – ARTIFICIAL LIGHTING
CHAPTER D6.2 – EXTERIOR AREA LIGHTING
CHAPTER D7 – TELECOMMUNICATIONS
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CHAPTER D7.3 – TELEVISION
CHAPTER D9 – OTHER SERVICES

CHAPTER D9.4 – CATHODIC PROTECTION

CHAPTER E – EQUIPMENT AND FURNISHINGS

CHAPTER F – DEMOLITION

CHAPTER G – SITEWORK

CHAPTER G1 – SITE PREPARATION

CHAPTER G2 – SITE IMPROVEMENTS

CHAPTER G2.1 – PAVEMENTS AND SURFACING

CHAPTER G2.2 – SITE FIXTURES AND EQUIPMENT

CHAPTER G3 – SITE SERVICES

CHAPTER G3.4 – ELECTRICAL POWER

CHANGES TO VOLUME III – SPECIFICATIONS

9. Replacement Sections - Replace the following Sections with the attached new Sections of the same number and title, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. DACA63-02-R-0009."

SECTION 01000 DESIGN AND CONSTRUCTION SCHEDULE

SECTION 01015 DESIGN REQUIREMENTS AFTER AWARD

SECTION 01016 DESIGN DOCUMENT REQUIREMENTS

CHANGES TO VOLUME IV – ATTACHMENTS

10. New Attachments – Add the following accompanying new attachments:

- B. AETC STANDARDS FOR INSTALLATION EXCELLENCE
- C. DD FORM 1354, SAMPLE, AND CATEGORY CODES
- D. SWD ARCHITECTURAL AND ENGINEERING INSTRUCTIONS MANUAL (AEIM)
- E. GEOTECHNICAL REPORT
- F. EC 1110-1-94 CLASS OF TYPE OF CONSTRUCTION
- I. DORMITORY DESIGN GUIDE
- J. LACKLAND AFB SOIL & WATER MANAGEMENT PLAN
- K. DoD ANTI-TERRORISM/FORCE PROTECTION MEASURES
- L. DRAWINGS

11. Replacement Drawings.- Replace the drawing listed below with the attached new drawing of the same number, bearing the notation "AM #0004":

g00.cal	G0.0	COVER & Index of Drawings
g11.cal	G1.1	LOCATION MAPS
c01.cal	C0.1	OVERALL EXISTING SITE AND UTILITY PLAN PER PREVIOUS DESIGN TO MATCH FY-1999

END OF AMENDMENT

SOLICITATION, OFFER, AND AWARD <i>(Construction, Alteration, or Repair)</i>	1. SOLICITATION NUMBER	2. TYPE OF SOLICITATION <input type="checkbox"/> SEALED BID (IFB) <input type="checkbox"/> NEGOTIATED (RFP)	3. DATE ISSUED	PAGE OF PAGES
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IMPORTANT - The "offer" section on the reverse must be fully completed by the offeror.

4. CONTRACT NUMBER	5. REQUISITION/PURCHASE REQUEST NUMBER	6. PROJECT NUMBER
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7. ISSUED BY	CODE	8. ADDRESS OFFER TO
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9. FOR INFORMATION CALL	A. NAME	B. TELEPHONE NUMBER (Include area code) (NO COLLECT CALLS)
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SOLICITATION

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS (Title, identifying number, date):

11. The Contractor shall begin performance within _____ calendar days and complete it within _____ calendar days after receiving
 award, notice to proceed. This performance period is mandatory, negotiable. (See _____.)

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE PAYMENT BONDS? <i>(If "YES," indicate within how many calendar days after award in Item 12B.)</i> <input type="checkbox"/> YES <input type="checkbox"/> NO	12B. CALENDAR DAYS
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13. ADDITIONAL SOLICITATION REQUIREMENTS:

- A. Sealed offers in original and _____ copies to perform the work required are due at the place specified in Item 8 by _____ (hour) local time _____ (date). If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.
- B. An offer guarantee is, is not required.
- C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.
- D. Offers providing less than _____ calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

OFFER (Must be fully completed by offeror)

14. NAME AND ADDRESS OF OFFEROR (Include ZIP Code)		15. TELEPHONE NUMBER (Include area code)
		16. REMITTANCE ADDRESS (Include only if different than Item 14)
CODE	FACILITY CODE	

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within _____ calendar days after the date offers are due. (Insert any number equal or greater than the minimum requirement stated in 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.)

AMOUNTS 

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGEMENT OF AMENDMENTS
(The offeror acknowledges receipt of amendments to the solicitation - give number and date of each)

AMENDMENT NO.										
DATE										

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)	20B. SIGNATURE	20C. OFFER DATE
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AWARD (To be completed by Government)

21. ITEMS ACCEPTED

22. AMOUNT	23. ACCOUNTING AND APPROPRIATION DATA
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24. SUBMIT INVOICES TO ADDRESS SHOWN IN  (4 copies unless otherwise specified)	ITEM	25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO <input type="checkbox"/> 10 U.S.C. 2304(c) () <input type="checkbox"/> 41 U.S.C. 253(c) ()
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26. ADMINISTERED BY CODE	27. PAYMENT WILL BE MADE BY
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CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

<input type="checkbox"/> 28. NEGOTIATED AGREEMENT (Contractor is required to sign this document and return _____ copies to the issuing office.) Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications incorporated by reference in or attached to this contract.	<input type="checkbox"/> 29. AWARD. (Contractor is not required to sign this document.) Your offer on this solicitation is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.
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30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN (Type or print)	31A. NAME OF CONTRACTING OFFICER (Type or print)		
30B. SIGNATURE	30C. DATE	31B. UNITED STATES OF AMERICA BY	31C. AWARD DATE

00001

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SECTION 00102

PRE-PROPOSAL CONFERENCE/SITE VISITATION

02/2001

AMENDMENT NO. 0004

PART 1 GENERAL

1.1 PRE-PROPOSAL CONFERENCE/SITE VISITATION

Invitation is extended to all prospective offerors to attend a pre-proposal conference and site visitation for the Design-Build FY 00/01/02 Dormitories, Lackland Air Force Base, San Antonio, Texas. (AM#2) The pre-proposal conference has been scheduled for 9:00 a.m. on Wednesday, May 15, 2002 at Lackland Air Force Base. Please plan to attend, this will be an opportunity to ask any question about the proposed dormitories. During the conference, a court reporter documents everything that is said. The conference will be located at:

Building 7360
2501 Carswell Ave.
Lackland AFB, TX 78236 (AM#4)

37th CES Prime Beef Assembly Area
Located on the first floor of building 7360, classroom #4 (last room on left, east side of building). (AM#2)

The people entering the base need to bring their drivers license (photo ID, all persons) and proof of automobile insurance. If they enter at the Valley-hi gate they need to get their temporary pass at that visitors center. Building 7360 if your coming from the Valley-hi gate, go down Truemper St and make a right on Carswell Ave. Building 7360 faces Carswell. (AM#4)

A site visit will immediately follow the conference.

At the pre-proposal conference, Government representatives will highlight specific design/build contract requirements not typically encountered in conventional construction procurements. The objective is to provide an information exchange between potential offerors and the Government to avoid the possibility of misinterpretation of the contract requirements. Accordingly, it is highly recommended that prospective offerors attend the pre-proposal conference and, in the interest of making the conference more meaningful, prospective offerors are urged to present any written questions concerning the project proposal documents, bidding, design and construction requirements or other related matters prior to the conference to the address shown in Block 7 of Standard Form 1442 contained in Section 00010, "Solicitation, Offer, And Award (Standard Form 1442)," ATTN: Ms. Lisa Yale. Questions may also be sent via facsimile transmission prior to the conference to Ms. Lisa Yale at 817-886-6407 or by e-mail at Lisa.K.Yale@swf02.usace.army.mil. Written questions may be submitted at the beginning of the conference and oral questions may be submitted from the floor, but answers will be limited to the time available. Written queries need not be signed if anonymity is desired. Answers, interpretations and decisions made at the conference will not become

official unless and until verified by an amendment to the contract issued prior to the receipt of proposals.

Following the conference and pursuant to Contract Clause "FAR 52.236-3, Site Investigation and Conditions Affecting the Work," and the Site Visit Clause in Section 00100 INSTRUCTIONS, CONDITIONS, AND NOTICES TO BIDDERS, prospective offerors will be permitted to inspect the site where services are to be performed and to satisfy themselves as to all general and local conditions that may affect the cost of performance of the contract to the extent such information is reasonably obtainable. In no event will a failure to inspect the site constitute grounds for withdrawal of a proposal after receipt of proposal or for a claim after award of the contract.

Potential offerors are requested to advise as to their intent to attend the pre-proposal conference and site visitation by e-mail or facsimile transmission to address or fax telephone number listed above at their earliest convenience.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

CHAPTER 00005

PROJECT INFORMATION

REQUEST FOR PROPOSALS

- A. These documents constitute a Request for Proposals for the design and construction of the project described below.
- B. Project Name: Lackland AFB FY00/01/02 Dormitories.
- C. Project Number: MPLS003292, MPLS023293, and MPLS033294.
- D. Owner: U.S. Army Corps of Engineers.
 - 1. Engineering Manager: Ben Case.
 - 2. Phone/Fax: 817-886-1849 / 817-886-6485.
 - 3. E-mail: ben.l.case@swf02.usace.army.mil.

PROJECT DESCRIPTION

- A. Summary Project Description: This project consists of three new Permanent Party Dormitory facilities for the Air Education and Training Command (AETC) at Lackland Air Force Base, Texas. The dormitories are designated individually as FY 2000 Dormitory, FY 2001 Dormitory and FY 2002 Dormitory (Chiller Plant expansion is included with FY 2002 Dormitory), and are designated jointly as FY00/01/02 Dormitories. Using a two-phase, competitive negotiation procurement process, the Department of the Army desires to obtain Design and Construction of the project. If awarded the contract, the successful offeror shall complete the design and construction documents and shall construct the new facilities. This facility shall be designed and constructed for handicap accessibility to the building entrance, Great Room, Office and adjacent toilet rooms in accordance with the Uniform Federal Accessibility Standards and to the extent greater accessibility is provided, the American with Disabilities Act Accessibility Guidelines (ADAAG). Handicap accessibility is not required to personnel billeting areas of the building. Site work shall include utilities, landscaping, irrigation, sidewalks, paving, parking lots, service roads and other amenities. See Chapter 1 - Program Summary.
- B. Contract Scope: Design and construction.
- C. Anticipated Construction Start: 10 calendar days after notice to proceed.
- D. Required Design and Construction Completion: See Section 01000 DESIGN AND CONSTRUCTION SCHEDULE.

SELECTION PROCESS

- A. The selection process will be a two-phase best value procurement process. Refer to Sections 00120 PROPOSAL SUBMISSION REQUIREMENTS and 00150 PROPOSAL EVALUATION AND CONTRACT AWARD for proposal submittal requirements and the evaluation criteria. Selection (Phase I) of a "short list" of qualified offerors will be made first, followed by evaluation of a technical proposal (Phase II) from each of the pre-qualified offerors.
- B. Phase I Qualification Process: By Government 's jury, based on submitted qualification and management proposal. See Section 01015 and 01016 for detailed explanation.
 - 1. No compensation will be made for submission of Phase I qualification and management proposal.
- C. Phase II Technical Proposal Selection Process: Open, by Government 's jury, based on proposal submitted and "Fixed Price/Best Design" evaluation.
 - 1. Proposal Due Date: Will be sent, by U.S. Post Office mail or e-mail, to the pre-qualified proposers upon notification of selection.

2. Honorarium: No compensation will be made for submission of Phase II Technical Proposal.
3. See Section 00150 PROPOSAL EVALUATION AND CONTRACT AWARD for more information.

PERTINENT INFORMATION

- A. Availability of Documents: Complete sets of Request for Proposal documents will be made available by the Owner on the Internet (<http://www.swf.usace.army.mil/>) and on CD-ROM disk. The CD-ROM disk will be furnished to those offerors who register with the Owner. See registering instructions on the above web page.

END OF CHAPTER 00005

CHAPTER 00570

CONTRACT DEFINITIONS

APPLICABILITY: THESE DEFINITIONS ARE INTEGRAL TO THE CONTRACT.

DOCUMENTS

- A. Contract Documents: Those documents identified in the Contract Form SF 1442 SOLICITATION, OFFER, AND AWARD, and Section 01015 DESIGN REQUIREMENTS AFTER AWARD.
- B. Conceptual Documents: The following documents:
 - 1. The Project Program.
 - 2. The Performance Requirements.
 - 3. The Preliminary Product Specifications.
 - 4. The Design and Construction Procedures.
- C. Project Program: The Government's requirements for size, arrangement, organization, and location of functional spaces, description of space functions, identification of fittings, equipment, and furnishings, description of the physical and environmental requirements for each space, together with a description of the image, goals, or "mission" of the project.
- D. Proposal: The Proposal Form and Exhibits, which comprise the information prepared by the prospective Contractor to show their method of complying with the Conceptual Documents.
 - 1. The Proposal period is the time frame during which prospective Proposers prepare their Proposals.
 - 2. The Proposal period ends on the date specified for submission of Proposals.

DESIGN AND CONSTRUCTION PHASES OR STAGES

- A. Design Development: The process of determining the form, arrangement, size, and materials of the work or a portion of the work, as described in the Contract. In Division 1 Sections 01015 DESIGN REQUIREMENTS AFTER AWARD and 01016 DESIGN DOCUMENT REQUIREMENTS this phase is also called "60 Percent Preliminary Design."
 - 1. The end of Design Development is the time at which the Design Development documents are complete.
 - 2. The end of Design Development for the project as a whole is a Milestone.
- B. Construction Documents: The process of preparing working drawings, specifications, and other documents describing the work or a portion of the work in sufficient detail to allow accurate and complete construction. In Division 1 Sections 01015 DESIGN REQUIREMENTS AFTER AWARD and 01016 DESIGN DOCUMENT REQUIREMENTS this phase is also called "100 Percent Final Design."
 - 1. The end of Construction Documents for the project as a whole is a Milestone.
 - 2. The end of Construction Documents is the time at which all portions of the Construction Documents are complete.
- C. Construction:
 - 1. The Construction period is the time from the acknowledge of the Notice to Proceed until substantial completion .
 - 2. The end of the Construction period is a Milestone.
- D. Substantial Completion: As defined in the Contract; prerequisites are:

1. Contractor's complete punchlist of items to be completed.
 2. Government's complete punchlist of items to be completed.
 3. Compliance with requirements of governing authorities, for submittals, inspections, and permits.
 4. Compliance with Government's requirements for access to areas occupied by the Government.
 5. Final cleaning.
 6. Maintenance manuals.
 7. Warranties.
 8. Spare parts and extra materials.
 9. Maintenance supplies and tools.
 10. Project record documents.
 11. Final site survey.
 12. Training of Government's personnel.
 13. Maintenance plan.
- E. Closeout: The process of completing all details of both construction and commissioning.
1. The Closeout period is the time from the Date of Substantial Completion until final payment, both as defined by the Contract.
- F. Occupancy: The period during which the project is occupied for its intended purpose.
1. The Occupancy period begins at the Date of Substantial Completion, as defined by the Conditions of the Contract.
 2. Move-in will occur before the end of Closeout.
- G. Warranty Period: Function and time frame as defined by the Warranty of Construction Work clause in Section 00800 SPECIAL CONTRACT REQUIREMENTS and Division 1 Section 01770 CONTRACT CLOSEOUT.

END OF CHAPTER 00570

CHAPTER 00830

DESIGN AND CONSTRUCTION PROCEDURES

MANAGEMENT AND COORDINATION

- A. Access to and Use of Site: See Section 01310 PROJECT MEETINGS.
- B. Coordination with Occupants:
 - 1. Adjacent Buildings: Adjacent buildings will be occupied during the construction period.
 - 2. Existing Utility, Life Safety, and Fire Safety System Elements:
 - a. No disruption of services to areas that continue to be occupied during hours during which they are occupied; all disruptions arranged 14 days in advance with Government. See Section 01000 DESIGN AND CONSTRUCTION SCHEDULE.
 - b. Prevent accidental disruptions to facilities outside the project limits by investigation of existing utilities and protection during construction; remedy accidental disruptions at no cost to Government.
- C. Changes In The Work:
 - 1. See Contract Clauses for procedures.
- D. Progress Schedule: As specified in the Contract Clauses and Section 01320 PROJECT SCHEDULE.

QUALITY REQUIREMENTS

- A. Proposal: See Sections 00120 PROPOSAL SUBMISSION REQUIREMENTS and 00150 EVALUATION FACTORS FOR AWARD
- B. Design Criteria: During Design Development, the design and performance criteria must be refined, finalized, and documented. See Division 1 sections.
 - 1. Design Documentation: See Section 01016 - DESIGN DOCUMENT REQUIREMENTS.
- C. Substantiation Requirements: See Chapter 111 for definitions and basic requirements; see other chapters for specific items of substantiation required; see Chapter 00570 - Contract Definitions for time periods relating to submission times.
- D. Substantiation Submittal Procedures:
 - 1. For time periods that constitute Milestones, all substantiation submittals required during that period must be complete and accepted before the Milestone can be considered achieved.
 - 2. Submit complete sets of documents containing all substantiation at end of the following periods:
 - a. Design Development period.
 - b. Construction Documents period.
 - 3. Resubmissions: Clearly identified as such, with all changes made since the original submittal clearly marked. See Division 1 Section 01015 DESIGN REQUIREMENTS AFTER AWARD.
- E. Government's Review of Substantiation: Unless otherwise indicated, Government will make formal acceptance of substantiation submittals. See Division 1 Section 01015 DESIGN REQUIREMENTS AFTER AWARD.
 - 1. If a submittal is not acceptable Government will notify Contractor promptly.
- F. Substantiation Scheduling: Incorporate the submittal of substantiation items in the Project Schedule, showing:
 - 1. Contents, for each item:
 - a. Anticipated and actual item, with Chapter and paragraph number and drawing identification, if any.

- b. Anticipated submittal date, or time period(s) during which submittal is required.
 - c. Actual submittal date.
 - d. Action taken or other status.
 - e. Identification of future re-submission requirement, if any.
 2. See Division 1 Section 01320 PROJECT SCHEDULE for additional information, including submission requirements.
- G. Field Testing and Inspection: Perform all testing, observation, and inspection as specified. See Division 1 Section 01451 CONTRACTOR QUALITY CONTROL.
1. Qualifications of Testing/Inspection Agencies:
 - a. Qualified and equipped to perform applicable tests/inspection.
 - b. Regularly engaged in testing and inspection activities on a commercial basis.
 - c. Independent of Contractor and his contractors' organizations.
 - d. Employed by Contractor directly.
 - e. Authorized to operate in the State in which the project is located.
 - f. Acceptable to Government.
 - g. Substantiation: Submittal of qualifications, based on ASTM E 329 and ASTM E 548.
 - h. In accordance with Division 1 Section 01451 CONTRACTOR QUALITY CONTROL.
 2. Reports: Written report of each test/inspection; including complete details of conditions, methods, and results, signed by responsible individual.
- H. Reference Standards: Where products or workmanship is specified by reference to a document not included in the Contract Documents, comply with the requirements of the document, except where more stringent requirements are specified.
1. Date of Issue: Latest edition published as of date of contract documents except where a specific date is specified herein or established by code.
 2. Copies on Site: Keep copies of referenced standards that prescribe installation or workmanship standards on site until completion.

TEMPORARY FACILITIES AND CONTROLS

- A. See Division 1 Sections 01000 DESIGN AND CONSTRUCTION SCHEDULE, 01410 ENVIRONMENT PROTECTION, and 01500 TEMPORARY CONSTRUCTION FACILITIES.
- B. Erosion and Sediment Control: See Division 1 Section 01410 ENVIRONMENT PROTECTION.
- C. Project Identification Sign: See Division 1 Section 01580 BULLETIN BOARD AND PROJECT SIGN.

PRODUCT REQUIREMENTS

- A. See Chapter 111 for general requirements for product options and substitutions.
- B. Government-Furnished Products: See Division 1 Section 01640 GOVERNMENT FURNISHED PROPERTY. Government will perform joint inspection after delivery, replace items damaged prior to delivery, replace defective items, and arrange for manufacturer inspections, service, and warranties, for any equipment listed in Section 01640 GOVERNMENT FURNISHED PROPERTY.

EXECUTION

- A. Health and Safety:
 1. Removal, abatement, handling, and disposal of hazardous materials will comply with 29 CFR 1926 and state and local regulations. See Sections 13280 ASBESTOS ABATEMENT and 13281 LEAD HAZARD CONTROL ACTIVITIES.
 2. See Division 1 Sections 01410 ENVIRONMENT PROTECTION, 01500 TEMPORARY CONSTRUCTION FACILITIES, 01560 TEMPORARY SAFETY CONTROLS, 01572 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT, and other Contract

requirements..

3. Substantiation:
 - a. Design Development: Identification of hazards on site, with preliminary plan for abatement in accordance with the Sections listed above in Health and Safety items 1 and 2.
 - b. Construction Documents: Detailed specifications for hazardous material removal, abatement, and disposal in accordance with the Sections listed above in Health and Safety items 1 and 2.

COMMISSIONING

- A. Commissioning: Placing the project into full and proper operation, including starting and adjusting equipment and systems, functional performance testing, otherwise demonstrating compliance with Contract Documents, correcting defects, and obtaining permits.
 1. Prerequisites: Design criteria documentation and recording of all changes to Contract Documents.
 2. Unless otherwise indicated, Contractor is responsible for all commissioning activities.
 3. Commissioning activities may take place at any time after completion of the element to be commissioned.
 4. All commissioning activities must be complete before the end of Closeout, unless specifically excepted.
 5. Maintenance Manuals: Ready for use during applicable commissioning activities.
- B. Functional Performance Testing: Test all functions of system, all components of system, and interfaces between systems, including all modes of operation, conditional controls, and reactions to emergency conditions.
 1. Description in Commissioning Plan: Each function to be tested described separately.
 2. Systems Composed of More Than One Item of Equipment: Individual components tested for proper operation and interconnection before beginning system testing (e.g. "point-to-point" testing).
 3. See substantiation requirements in other Chapters for specific items to be tested and tests required.
 4. Testing Agency Qualifications: As specified in this chapter under Quality Requirements.
 5. Government will witness tests and prepare defect reports.
 6. Detailed test reports are to be by Contractor, showing test criteria, methods, and results.
- C. Demonstration: For each equipment item or system for which functional performance testing by Contractor is not specified, demonstrate all operational modes to Government at time acceptable to Government; if defects occur during demonstration, demonstration must be rescheduled for a time acceptable to Government.
- D. Commissioning Plan: Prepare complete plan and schedule of all commissioning activities, including those by Government and code authorities; include all field tests and inspections, functional performance tests, demonstrations, and permit inspections and tests.
 1. Contents: For each commissioning activity indicate:
 - a. Entity performing activity.
 - b. Prerequisites, such as type of design information required, prior testing, etc.; identify in schedule as separate tasks.
 - c. Functions to be tested or inspected.
 - d. Methods of test or inspection, conditions required, and other procedures; if methods are not specified, identify methods that will demonstrate compliance with Contract Documents

- with satisfactory repeatability by others.
 - e. Equipment required.
 - f. Results required.
 - 2. Schedule commissioning activities at the optimum time, to avoid unnecessary uncovering of work, retesting due to inadequate preparation, and duplication of effort.
 - 3. If desired, schedule may be incorporated into overall progress schedule or substantiation schedule, provided commissioning tasks can be reported separately from other progress information.
 - 4. Submission: To Government; _____.
 - 5. Form: Computer database format for Government's use in tracking submittals; database structured so Government's added information will not be overwritten or deleted by incorporation of updated data from Contractor.
 - 6. Updates: To Government monthly in hard copy.
- E. Commissioning Reports: Submit a report for each commissioning activity that involves inspection, observation, or testing of construction, on a standard form that identifies the project.
- 1. Timing: Submitted within 7 calendar days after completion of the activity; for activities that are prerequisites for other activities to be witnessed by Government, satisfactory report submitted prior to start of witnessed activity.
 - 2. Contents:
 - a. Identification of activity, including element/system involved, date/time.
 - b. Entity performing activity; other persons present.
 - c. Prerequisites required and accomplished.
 - d. Procedures or methods of testing.
 - e. Results required and results achieved.
- F. Government-Conducted Commissioning Activities:
- 1. Government will assign a staff member to manage the commissioning process beginning during Design Development and to perform the following commissioning activities:
 - a. Review of design criteria documentation for completeness.
 - b. Review of Contractor's commissioning plan and specifications.
 - 2. Government, Government's staff, or consultants will perform the following commissioning activities:
 - a. Inspection just prior to Substantial Completion, including preparation of Government's punchlist.
 - b. Inspection prior to final payment.
 - 3. See Division 1 Sections 01016 DESIGN DOCUMENT REQUIREMENTS and 01451 CONTRACTOR QUALITY CONTROL for additional requirements.

CLOSEOUT SUBMITTALS

- A. See Division 1 Section 01770 CONTRACT CLOSEOUT for Operation and Maintenance Manuals, Warranties, Project Record Documents, Spare Parts and Extra Materials, Maintenance Supplies and Tools, and other closeout activities.

DEMONSTRATION AND TRAINING

- A. Training: Perform training of Government's personnel in operation and maintenance of equipment, consisting of:
- 1. Training is required for all software-operated systems, HVAC systems and equipment, plumbing equipment, electrical systems and equipment, conveying systems, and other electrically-operated equipment.

- a. Provide supplemental training within 6 months for operations that are seasonal in nature.
2. Instruction in operation, control, adjustment, shut-down, servicing, troubleshooting, and maintenance, for each equipment item for which training is specified.
3. Instruction in care, cleaning, maintenance, and repair of materials, for:
 - a. Each item for which training is specified.
 - b. Roofing, waterproofing,,other weather-exposed or moisture protection products.
 - c. Finishes, including flooring.
 - d. Fixtures and fittings.
 - e. Items as specified in other Chapters.
4. Major Software-Operated Systems: Training by software manufacturer at their facility for _____ Government staff members, with take-home training materials.
5. Training Location: If not otherwise specified, conduct training in a classroom on site, with videotapes made for future use.
6. Minimum Qualifications of Trainers: Knowledgeable about the project and the equipment and trained by the manufacturers.
7. Maintenance Manuals: Ready for use in training.
8. See Division 1 Section 01770 CONTRACT CLOSEOUT for additional requirements.

END OF CHAPTER 00830

CHAPTER 1 - PROGRAM SUMMARY

BASIC FUNCTION

- A. Project: This project consists of three new Permanent Party Dormitory facilities for the Air Education and Training Command (AETC) at Lackland Air Force Base, Texas. The dormitories are designated individually as FY 2000 Dormitory, FY 2001 Dormitory and FY 2002 Dormitory, and are designated jointly as FY 00/01/02 Dormitories. Using a two-step, competitive negotiation procurement process, the Department of the Army desires to obtain Design and Construction of the project. If awarded the contract, the successful offeror shall complete the design and construction documents and shall construct the new facilities.
- B. The work shall be located at Lackland Air Force Base, Texas. The project location is shown on the project location map in Volume IV – Attachments.
- C. Objective: AETC currently occupies numerous dormitories on the base to billet permanent and transient personnel. The majority of buildings being occupied do not meet current Air Force housing standards. It is not cost effective to renovate and install infrastructure upgrades (electrical, HVAC, structural, plumbing, ADA structures, safety equipment, etc.) to the existing buildings to meet current standards. The proposed project is to create three new dormitories.
- D. The FY 1999 Dormitory located near the site for this project is an example of a recently constructed 96-person dormitory. Design documents for the FY 1999 can be made available for review by Offerors on this project. It should be noted that the FY 99 Dormitory design might lead to construction costs that exceed available funds. Alternative design proposals are encouraged. Offerors may wish to consider:
1. Alternative building layout to the “V-shape” used in the 1999 Dormitory.
 2. Interior corridor or breezeway design in lieu of exterior balcony used in the 1999 Dormitory.
 3. Use of decorative concrete masonry, stucco or EIFS in lieu of all or part of the face brick used on the 1999 Dormitory, providing architectural compatibility is maintained.
 4. Elimination of structural attic floor used in the 1999 Dormitory.
 5. Alternative construction materials, unless specifically prohibited by building codes, referenced standards/criteria or other chapters of this solicitation.
- E. This facility shall be designed and constructed for handicap accessibility to the building entrance and common areas on the ground floor in accordance with the Uniform Federal Accessibility Standards and, to the extent greater accessibility is provided in the American with Disabilities Act Accessibility Guidelines (ADAAG). Handicap accessibility is not required to personnel billeting areas of the building.
- F. Site work shall include utilities, landscaping, irrigation, sidewalks, paving, parking lots, service roads and other amenities.
- G. The work of this project will require the successful Offeror to obtain all necessary surveys to accurately locate and quantify existing site conditions and utilities.
- H. The FY 2002 Dormitory shall be designed to meet the Interim Department of Defense Antiterrorism/Force Protection Standards dated December 16, 1999. Compliance with the standards is not required for the FY 2000 Dormitory or the FY 2001 Dormitory. Excerpts from the Standard are included in Volume IV – Attachments.
- I. An overall site masterplan including building locations, utility corridors and general parking layout has been prepared and approved by AETC and Lackland AFB. The Offeror’s design shall have buildings located within the building lines shown on the Drawings included in Volume IV of this solicitation. Utilities and parking shall be configured and located where shown on the Drawings included in Volume IV of this solicitation.

- J. Foundations for the buildings shall be designed in accordance with the Geotechnical Report for the building site by the US Army Corps of Engineers, included in Volume IV of this solicitation. Offeror may propose alternative foundation systems.
- K. Sustainable Project Rating Tool (SPiRiT): It is the desire of the Government to incorporate into the project elements that improve environmental and economic performance using established industry principals, practices, materials and standards. The U.S. Army Corps of Engineers has developed the SPiRiT program to encourage Green Building Concepts. SPiRiT Certification at the Bronze level will be required for this project; Silver or higher levels will be considered in the evaluation and selection criteria of the successful Offeror.

SCOPE

- A. The project shall provide minimum accommodations as follows:
 - FY 2000 Dormitory – 72 Rooms minimum; greater number of rooms up to 96 will be considered in the evaluation and selection of the successful Offeror.
 - FY 2001 Dormitory – 72 Rooms minimum; greater number of rooms up to 96 will be considered in the evaluation and selection of the successful Offeror.
 - FY 2002 Dormitory – 96 Rooms – Maximum Area 3,200 square meters.

PROGRAM

- A. Interior Spaces: The project requires interior spaces as shown in the program chart in Volume2, Chapter 11.
- B. All interior spaces shall comply with the Department of the Air Force Facility Design Guide for Enlisted Dormitories.
- C. Exterior Spaces: The project requires exterior spaces of the following types:
 - 1. Outdoor Occupant Services: Vehicle parking and pedestrian building access. Provide one parking space per two occupants.
 - 2. Outdoor Building Services: Spaces for trash collection, trash removal, and delivery and loading.
 - 3. Outdoor Utility Equipment: Dedicated spaces for outdoor elements of water and drainage, heating and cooling, fire protection, electrical power, and telecommunications services.
 - 4. Unused Outdoor Spaces: Spaces not primarily used for human activities, including undeveloped and/or landscaped areas.
- D. Exterior Spaces: The project may include the following spaces which will be considered as betterments in the evaluation and selection of the successful Offeror:
 - 1. Spaces for eating and sitting (with shade structure), and for outdoor recreation

EXISTING CONDITIONS

- A. The proposed project site is shown on a location map included with this solicitation.
- B. The project site is currently occupied by existing paved parking areas.
 - 1. Existing parking areas are to be removed to the extent required to complete this project.
- C. Trees and Vegetation:
 - 1. Government requires preservation of existing trees to the greatest extent possible. Removal and trimming of trees may be required to maintain a clear zone around the building to comply with Antiterrorism/Force Protection requirements.
 - 2. Any existing trees that require removal to complete this project will be required to be replaced.

Lackland AFB requires that removed trees be replaced with trees of equivalent caliper or multiple trees whose calipers total to equal the caliper of the removed tree with a minimum tree caliper of 100 mm. The large existing tree at the southwest corner of the site must be protected and preserved.

- D. Other site features that may affect the design or construction include existing buildings, sitework and utilities within or adjacent to the immediate project site. Existing abandoned underground foundations and/or utilities from previously demolished structures at the site may be encountered. Their removal will be required to the extent that they interfere with the completion of this project.

END OF CHAPTER 1

CHAPTER 1.1 - PROJECT PROGRAM

THE PROJECT PROGRAM CONSTITUTES ONE OF THE CONCEPTUAL DOCUMENTS AND CONSISTS OF THE FOLLOWING:

- A. Design Objective: Refer to Volume 2, Chapter 1.
- B. Functional and area requirements: Refer to Volume 2, Chapter 1 and chart below.

FUNCTIONAL SPACE	Minimum Net Area (Design Guide)	Maximum Net Area (Design Guide)	Recommended Net Area (Design Guide)	Location Specific Requirement
REQUIRED SPACES				
Living/bedroom, 2 per module	11 SM	11 SM	11 SM	
Bath Compartment, 1 per module (1 water closet & 1 tub or shower)	2.3 SM	None	Approx. 2.3 SM	
Private lavatory, 1 per living/bedroom	None	None	Approx. 1.86 SM	
Closet, 1 per living/bedroom	1.86 SM	None	Approx. 1.86 SM	
Kitchenette, 1 per module	None	None	Approx. 9.5 SM	
Laundry facilities, 1 appliance set per 12 persons	None	None	Approx. 2.3 SM per appliance	
Bulk Storage, 2/3 cubicle per person	None	None	2 SM per cubicle	
Utility Space	None	None	Per local conditions	As required for building utility systems design
Mail Service Area	None	None	Per local conditions	Not required at this facility
Circulation Space	None	None	7.4 SM per module, varies with layout	
OPTIONAL SPACES				
Multi-purpose Space (May be programmed as meeting/study rooms, television rooms, workout rooms, etc.)	13.9 SM for each multi-purpose area		0.19 SM per module for each multi-purpose area	
Game Room	28 SM		0.19 SM per module	
Vending Area	9.3 SM each		9.3 SM per floor	
Guest Toilets	9.3 SM per dormitory		9.3 SM per dormitory	
Supply Storage Room	9.3 SM per dormitory		23.2 SM	
Administration Area	12.4 SM per dormitory		12.4 SM per dormitory	
GROSS BUILDING AREA				
Gross Building Area per DD1391		3,200 SM		

- C. Site and Utility Requirements: Refer to Volume 4, Civil Drawings.
- D. Environmental Requirements: Refer to Volume 2, Chapter D.
- E. Space Finishes and Fittings: Refer to Volume 2, Chapter C

END OF CHAPTER 1.1

CHAPTER 1.1.1 - FACILITY PERFORMANCE

PERFORMANCE

A. Basic Function:

1. Provide built elements and site modifications as required to fulfill needs described in the project program.
2. Substructure: Elements below grade and in contact with the ground in connection with the new building entrance and new mechanical room.
3. Shell: New Building superstructure, exterior enclosure and the roofing and the new building entrance and new mechanical room.
4. Interiors: New interior construction, walls, doors, ceilings, finishes and fixtures.
5. Services: Mechanized, artificial, automatic, and unattended means of supply, distribution, transport, removal, disposal, protection, control, and communication.
6. Equipment and Furnishings: Fixed and movable elements operated or used by occupants in the functioning of the project.
7. Demolition: Removal of unneeded and undesirable existing elements above or below grade.
8. Sitework: Modifications to the site, site improvements, and utilities.
9. Code: Make all portions of the project comply with the code. The code referred to herein consists of all applicable local, State, and federal regulations, including those listed below:
 - a. Federal Regulatory Requirements:
 - 1) Americans with Disabilities Act of 1990, as a public accommodation, as implemented in:
 - a) 28 CFR 35, Department of Justice regulations relating to State and local governments, including ADAAG.
 - b) 28 CFR 36, Department of Justice regulations, including ADAAG; 1994.
 - 2) 29 CFR 1910; 1997, Occupational Safety and Health Standards, as a work place.
 - b. Federal regulatory requirements, which incorporate and/or amend the following:
 - 1) ICBO Uniform Building Code, 1997.
 - 2) NFPA 101, Safety to Life From Fire in Buildings and Structures, 1997.
 - 3) Uniform Plumbing Code, 2000 Edition.
 - 4) Uniform Mechanical Code, 2000 Edition.
 - 5) NFPA 70, National Electrical Code, 2002.
 - 6) NFPA 13, 1999 Edition
 - 7) CABO Model Energy Code, 1997.
 - 8) Erosion and sedimentation control regulations.
 - c. Non-Regulatory Criteria Documents: In addition to specific regulatory requirements, the following documents are also incorporated into the definition of "the code" for the purposes of this project, except for administrative provisions contained therein; where referenced, the role of the code official described in the document will be performed by Government.
10. 29 CFR 1910; Occupational Safety and Health Standards.
11. 29 CFR 1926; Safety and Health Regulations for Construction.
12. 40 CFR 61; National Emissions Standards for Hazardous Air Pollutants.
13. 40 CFR 261; Identification and Listing of Hazardous Waste.
14. 40 CFR 262; Standards Applicable to Generators of Hazardous Waste.
15. 40 CFR 265; Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Storage, and Disposal Facilities.

16. 40 CFR 763; Asbestos.
 17. 42 CFR 84; Approval of Respiratory Protective Devices.
 18. 49 CFR 107; Hazardous Materials Program Procedures.
 19. 49 CFR 171; General Information, Regulations and Definitions.
 21. 49 CFR 172; Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements.
 22. 49 CFR 173; Shippers - General Requirements for Shipments and Packagings.
 23. USAF Base Architectural Standards for Excellence
 24. AETC Facility Design Guide for Enlisted Dormitories
 25. In addition to the requirements of this chapter, comply with requirements of Chapter 1 - Program Summary and Chapter 00830 - Design and Construction Procedures.
 26. US Army Corps of Engineers SWD – Architecture and Engineering Instruction Manual (AEIM), October 2000.
 27. Lackland AFB O&M Manual.
 28. Lackland AFB Communication Standards.
 29. 10 CFR 434 and 435 Energy Code for New Federal Commercial Buildings.
 30. ETL 97-13 Dormitory Ventilation and Exhaust System Design Criteria.
 31. ASHRAE Handbook of Fundamentals, 2001 Edition.
 32. ASHRAE Handbook HVAC Applications, 1999 Edition.
 33. ASHRAE Handbook HVAC Systems and Equipment, 2000 Edition.
 34. Lackland AFB Grounding Program.
 35. Lackland AFB Lightning Protection Program.
 36. TM 5-811-1.
- B. Amenity and Comfort:
1. Thermal Performance: Refer to Chapter D3.
- C. Health and Safety:
1. Fire Resistance: Provide Non-combustible construction in accordance with 1997 Uniform Building Code.
 2. Prevention of Accidental Injury: As required by code and as follows:
 - a. Safety Glazing: As defined by 16 CFR 1201; provide in locations required by code, glazed areas subject to human impact, glazed areas at grade, and doors.
 3. Lightning Hazard: Design to prevent damage to occupants, structure, services, and contents due to lightning strikes.
 - a. Provide protection equivalent to that specified in NFPA 780-1997; supplementary strike termination devices, ground conductors, and grounding electrodes are required only where the integral portions of the structure cannot perform those functions.
 - b. Ground Resistance Measurement Methods: As described in NFPA 780-1997, Appendix I, or IEEE 81-1983.
 - c. Substantiation:
 - 1) Design Development: If methods prescribed by NFPA 780-1997 are not used, description of engineering basis of design, including grounding terminal design.
 - 2) Design Development: If grounding in very shallow or dry soil, or in rock, is required,

- ground resistance measurements and engineering analysis of ground terminal design.
 - 3) Design Development: Diagrams showing locations of strike (air) terminals and zones of protection; identification of internal components that require bonding to equalize potential.
 - 4) Construction Documents: Engineering analysis of equalization of potential to metal bodies within the structure.
 - 5) Construction Documents: Drawings showing locations and sizes of conductors, bonding of metal bodies, and components; detailed installation specifications.
 - 6) Commissioning: Continuity tests for grounding conductors, equipotential bonding of other systems, and ground terminals; ground resistance test for each ground terminal, or equivalent taking into account related grounding systems.
 - 7) Commissioning: Certification of system complying with UL Master Label or Lightning Protection Institute Certified System requirements.
 - 8) Closeout: Maintenance and inspection procedures.
 - 9) Closeout: Project record data; location of ground terminals, ground resistance and soil conditions at time of test.
- 4. Health Hazards:
 - a. Design to prevent growth of fungus, mold, and bacteria on all surfaces.
 - b. Hazardous Construction Materials: Design and construct to comply with the requirements of the code.
 - c. Indoor Air Quality: Design and construct to comply with the code and the following:
 - 1) Acceptable air quality as defined by ANSI/ASHRAE 62-1999.
- 5. Physical Security: In addition to any provisions that may be required by law or code, design and construct both exterior and interior spaces to incorporate accepted principles of crime prevention through environmental design (CPTED), using natural (as opposed to technological) methods of providing surveillance, access control, and territorial reinforcement wherever possible.
- 6. Electrically Operated Equipment and Appliances: UL listed for application or purpose to which they are put; suitable for wet locations listing for exterior use.
- 7. Explosion Hazards: The following hazards will exist in the building:
 - a. External Hazards: Natural gas service and equipment.
 - b. Internal Hazards: Natural gas service and equipment.
- D. Structure:
 - 1. Provide protective measures and structural systems in accordance with the Department of Defense Antiterrorism/Force Protection Standards.
- E. Loads: Accommodate loads as prescribe by code, ANSI/ASCE 7, and USACE TI 809-04.
 - 1. Earthquake Loads: Accommodate loads as prescribed by ASCE 7-1998 (pub. 2000).
 - 2. Wind Loads: Accommodate loads as prescribed by ASCE 7-1998 (pub 2000).
 - 3. Dead Loads: Actual weights of building elements.
 - 4. Live Loads: Accommodate loads as prescribed by ASCE 7-1998 (pub 2000) and the building code.
- F. Durability:
 - 1. Expected Service Life Span: Expected functional service life of the built portions of this project is 25 years.
 - a. Service life spans of individual elements that differ from the overall project life span are defined in other Chapters.
 - 2. Animals: Do not use materials that are attractive to or edible by animals or birds.

3. Insects: Do not use materials that are edible by insects, unless access by insects is prevented.

G. Operation and Maintenance:

1. Space Efficiency: Minimize floor area required while providing specified spaces and space relationships, plus circulation and services areas required for functions.
2. Energy Efficiency: Minimize energy consumption while providing function, amenity, and comfort specified.
 - a. Provide energy efficient design using procedures and values specified in ASHRAE 90.1-1999.
3. Water Consumption: Minimize water consumption.
4. Waste (Trash/Rubbish) Removal: As described in the project program.
5. Ease of Operation: Provide facility, equipment, and systems that are easily operated by personnel with a reasonable level of training for similar activities.
6. Ease of Maintenance: Minimize the amount of maintenance required.
7. Ease of Repair: Elements that do not meet the specified requirements for ease of repair may be used, provided they meet the specified requirements for ease of replacement of elements not required to have service life span equal to that specified for the project as a whole; the service life expectancy analysis and life cycle cost substantiation specified for service life are provided; and Government' acceptance is granted.
8. Ease of Replacement:
 - a. Elements Not Required to have the Expected Service Life Span Equal to that Specified for the Project as a Whole: Make provisions for replacement without undue disruption of building operation.

ELEMENTS AND PRODUCTS

- A. In addition to requirements specified in other chapters, provide products and elements that comply with the following.
- B. Elements Made Up of More Than One Product:
 1. Where an element is specified by performance criteria, use construction either proven-in-use or proven-by-mock-up, unless otherwise indicated.
 - a. Proven-In-Use: Proven to comply by having actually been built to the same or very similar design with the same materials as proposed and functioning as specified.
 - b. Proven-by-Mock-Up: Compliance reasonably predictable by having been tested in full-scale mock-up using the same materials and design as proposed and functioning as specified. Testing need not have been accomplished specifically for this project; when published listings of independent agencies include details of testing and results, citation of test by listing number is sufficient (submittal of all test details is not required).
 - c. The Contractor may choose whether to use elements proven-in-use or proven-by-mock-up, unless either option is indicated as specifically required.
 - d. Where test methods accompany performance requirements, use those test methods to test the mock-up.
 2. Where a type of product is specified, without performance criteria specifically applicable to the element, use the type of product specified.
 3. Where more than one type of product is specified, without performance criteria specifically applicable to the element, use one of the types of products specified.
 4. Where a type of product is specified, with applicable performance criteria, use either the type of product specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.

5. Where more than one type of product is specified, with applicable performance criteria, use either one of the types of products specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.
6. Where neither types of products nor performance criteria are specified, use products that will perform well within the specified life span of the building.

C. Products:

1. Where the properties of a product are specified by description and/or with performance criteria, use products that comply with the description and/or performance criteria.

END OF CHAPTER 1.1.1

CHAPTER A - SUBSTRUCTURE

PERFORMANCE

- A. Basic Function:
 - 1. Provide substructure as required to support the completed and occupied building safely and without uncontrolled subsidence or other movement.
 - 2. Substructure comprises the following elements:
 - a. Foundations: Structures responsible for transferring dead loads, live loads, and environmental loads of completed building to the earth in such a way that the building is supported evenly and without movement. Foundations shall be constructed of reinforced concrete. The foundation design shall be in accordance with geotechnical recommendations including excavation and backfill requirements.
 - b. Other Substructure Elements.
- B. Amenity and Comfort:
 - 1. Water Penetration: Prevent ground water penetration into the interior of the building, under any circumstances.
 - 2. Water Accumulation: Prevent accumulation of water in crawl spaces or open areas adjacent to substructure.
- C. Health and Safety:
 - 1. Substance Exclusion: Prevent accumulation of harmful chemicals and gases such as radon and methane in spaces below substructure and subsequent penetration into occupied spaces.
 - 2. Vermin Protection: Provide permanent protection against infestation of construction by ground dwelling termites and other vermin.
- D. Structure:
 - 1. Capacity: Provide load bearing substructure members as required by code and designed to distribute dead loads, live loads, and environmental loads so that bearing capacity of soil is not exceeded.
 - a. Extend bearing portions of substructure to levels below grade as recommended by Geotechnical Report.
 - b. Provide foundations that do not exceed the allowable soil bearing capacity or other foundation systems acceptable to governing authorities.
- E. Durability:
 - 1. Corrosion Prevention: Provide supplementary protection for underground metal elements, sufficient to prevent corrosion completely for the service life of the element without maintenance.
 - a. 3 inches of concrete cover is considered permanent protection.

END OF CHAPTER A

CHAPTER A1 - FOUNDATIONS

PRODUCTS

- A. Do not use any of the following:
1. Masonry footings
 2. Driven piles
 3. Concrete slab on grade.
 4. Foam plastic insulation below grade.
 5. Corrugated paper carton void forms

END OF CHAPTER A1

CHAPTER A1.3 - FLOORS

PERFORMANCE

A. Basic Function:

1. Provide floors as required to enclose habitable spaces and support interior functions without subsidence, structural cracking, or other uncontrolled movement.
2. Floors comprise structural concrete slabs that are installed above grade, including all depressions in the floor, such as trenches, pits, and sumps. Floors also include equipment bases, under floor and perimeter drainage, thermal insulation at floor edge, and moisture barriers installed integrally with floor system.
3. Ground floor slabs shall be constructed as structural slabs supported above grade in accordance with the requirements of the Geotechnical Report.

B. Amenity and Comfort:

1. Waterproofing: Provide permanent waterproofing for floors that could potentially be exposed to ground water. Acceptable method:
 - a. Permanent, waterproof barrier beneath floor construction, protected against damage from floor installation.

PRODUCTS

A. Do not use the following:

1. Wood
2. Corrugated paper carton void forms

END OF CHAPTER A1.3

CHAPTER B - SHELL

PERFORMANCE

A. Basic Function:

1. Provide permanently enclosed spaces for all functional areas shown in the project program, unless otherwise indicated. Provide a physical enclosure that keeps out weather, unwelcome people, animals, and insects without requiring specific action by occupants, while providing convenient movement of occupants between inside and outside, desirable natural light, and views from inside to outside. Provide level floor areas, comfortable ceiling heights, and essentially vertical walls.
2. The elements forming usable enclosed space and separating that space from the external environment comprise the shell and consist of:
 - a. Superstructure: All elements forming floors and roofs above grade and within basements, and the elements required for their support, insulation, fireproofing, and firestopping.
 - b. Exterior Enclosure: All essentially vertical elements forming the separation between exterior and interior conditioned space, including exterior skin, components supporting weather barriers, and jointing and interfacing components; not including the interior skin unless an integral part of the enclosure.
 - c. Roofing: All elements forming weather and thermal barriers at horizontal and sloped roofs and decks, and roof fixtures.

B. Amenity and Comfort:

1. Thermal Performance: Provide construction that will have thermal resistance as necessary to maintain interior comfort levels specified and in accordance with code and the following:
 - a. Energy Efficiency: As specified in Chapter 111.
 - b. Condensation: None on interior surfaces under normal interior temperature and relative humidity conditions, during 98 percent of the days in the coldest 3 months of the year.
 - c. Components That Have Surfaces Facing Both Interior and Exterior Environment: Condensation Resistance Factor (CRF) as required to meet requirement above, when tested in accordance with AAMA 1503.1-1998.
 - d. Minimum thermal performance values for individual shell elements are also specified in other chapters.
2. Air Infiltration: Maximum of 0.06 cfm per square foot of exterior surface area, measured in accordance with ASTM E 283-1991 at differential pressure of 6.24 psf.
 - a. Use supplementary air barrier if necessary to maintain performance over entire shell.
 - b. Use method of sealing joints between elements that will be effective given available construction practices.
3. Water Penetration: Design and select materials to prevent water penetration into the interior of the building, under conditions of rain driven by 50 mph wind.
4. Natural Light: Provide fenestration in shell as required to replicate prototype and to meet requirements for natural light as specified in Chapter C and in accordance with code.
5. Acoustical Performance: Design and construct the shell to limit sound transmission as follows:
 - a. Ambient Sound Level: Maintain ambient sound levels in perimeter spaces within Noise Criteria (NC) ranges specified in Chapter C - Interiors during normal hours of occupancy.
 - b. Vibration Control: Use shell elements that will not resonate at frequencies that are characteristic of ambient exterior sound sources at the project site.
 - c. Minimum performance values for individual shell elements are also specified in other chapters.
6. Cleanliness of Exterior Surfaces: Design and select materials to replicate prototype and to:
 - a. Prevent attraction and adherence of dust and air-borne dirt and soot, and minimize appearance of settled dust and dirt.

- b. Be washed reasonably clean by normal precipitation.
 - c. Prevent precipitation from washing settled dust and dirt over surfaces exposed to view.
7. Appearance: Design and select materials to provide exterior appearance with characteristics as follows:
- a. Replicate prototype.
 - b. Concealing mechanical equipment, plumbing equipment, electrical equipment, and piping, conduit, and ducts from view from the street.
- C. Health and Safety:
- 1. Fire Resistance: Design and select materials to provide fire resistance in accordance with code.
 - a. For all elements required to have a fire resistive rating and which are not made of materials and systems specified as acceptable by the code, use proven-by-mock-up construction.
 - b. For proven-by-mock-up construction, acceptable testing agencies are Underwriters Laboratories Inc., Underwriters' Laboratories of Canada, Inchcape Testing Services (Warnock-Hersey), and Factory Mutual
 - c. Minimum performance values for individual shell elements are also specified in other chapters.
 - 2. Physical Security: Design and construct to provide protection in accordance Department of Defense Antiterrorism/Force Protection Construction Standards.
- D. Structure:
- 1. Structural Performance: Design and select materials to support all loads without damage due to loads, in accordance with code.
- E. Durability:
- 1. Service Life Span: Same as building service life, except as follows:
 - a. Load-Bearing Structural Members: Minimum of 100 years.
 - 1) No anticipated deterioration when protected as specified.
 - 2) Protective Elements: Minimum 25 years.
 - b. Wall Primary Weather-Barrier Elements: Minimum 50 years functional service life, excluding joint sealers.
 - c. Transparent Elements (Glazing): Same as other wall primary weather-barrier elements, except accidental breakage is considered normal wear-and-tear.
 - d. Joint Sealers: Minimum 20 years before replacement.
 - e. Surfaces Exposed to View: Minimum 20 years aesthetic service life; in addition, deterioration includes color fading, crazing, and delamination of applied coatings.
 - f. Roof Covering Weather-Barriers: Minimum 20 years, fully functional.
 - 2. Water Penetration: Design and select materials to prevent water penetration into the interior of shell assemblies, under conditions of rain driven by 50 mph wind.
 - a. Exception: Controlled water penetration is allowed if materials will not be damaged by presence of water or freezing and thawing, if continuous drainage paths to the exterior are provided, and water passage to the building interior is prevented.
 - 3. Weather Resistance: Design and select materials to minimize deterioration due to precipitation, sunlight, ozone, normal temperature changes, salt air, and atmospheric pollutants.
 - a. Deterioration includes corrosion, shrinking, cracking, spalling, delamination, abnormal oxidation, decay and rot.
 - b. Surfaces Exposed to View: Deterioration adversely affecting aesthetic life span includes color fading, crazing, and delamination of applied coatings.
 - c. Joint Components and Penetration Seals: Capable of resisting expected thermal expansion and contraction; use overlapping joints that shed water wherever possible.
 - d. Transparent Elements (Glazing): No haze, loss of light transmission, or color change, during entire expected service life.
 - e. Freeze-Thaw Resistance: Adequate for climate of project.
 - f. Corrosion Resistance: In locations exposed to the outdoor air or in potential contact with

moisture inside shell assemblies, use only corrosion-resistant metals as defined in this Chapter.

- g. Ozone Resistance: Do not use materials that are adversely affected by ozone.

PRODUCTS

A. Corrosion-Resistant Metals:

1. Hot-dipped galvanized steel, with minimum zinc coating of 0.90 oz/sq ft total both sides.
2. Stainless steel, Type 304 or 316.
3. Cadmium-plated steel, with minimum coating of 12 micrometers.
4. Aluminum.

B. Coated Finishes:

1. Use one of the following:
 - a. Fluoropolymer coating (70 percent Kynar 500 (tm) or Hylar 5000(tm)), minimum two coats.
 - b. Siliconized polyester coating.

C. Construct the shell using products architecturally compatible with adjacent buildings (1999 Dorm).

D. Do not use:

1. Different metals subject to galvanic action in direct contact with each other.
2. Materials and products that require field finishing on surfaces exposed to the weather.
3. Wood trim.

METHODS OF CONSTRUCTION

A. Do not use:

1. Roofs with slopes less than 1/2:12 slope.
2. Wood framing.

END OF CHAPTER B

CHAPTER B1 - SUPERSTRUCTURE

PERFORMANCE

A. Basic Function:

1. Provide structural elements, above grade and within basements, capable of supporting all anticipated loads without failure or damage.
2. Do not use any electrically-operated or fuel-powered construction for support of floor or roof members.
3. The superstructure comprises:
 - a. Elevated Floors: Floor construction above grade and within basements, including balcony, mezzanine, and ramp floors, floors elevated for access, stair construction if part of the structure, and roof decks intended for occupant live load; and the elements required for their support, insulation, fireproofing, and firestopping.
 - b. Roofs: Roof construction, including canopies, and elements required for their support, insulation, fireproofing, and firestopping.
4. Where superstructure elements also must function as elements defined within another element group, meet requirements of both element groups.
5. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter 111 - Facility Performance and Chapter B - Shell.

B. Amenity and Comfort:

1. Water Penetration: Where roof coverings as specified in Chapter B3 are not used over roofs provide supplementary waterproof construction providing equivalent protection.
2. Vibration: Isolate structure from sources of vibration.
 - a. Internal Sources: Refrigeration equipment, HVAC equipment, electrical equipment, etc..

C. Health and Safety:

1. Fire: Provide members with combustibility, flame spread, and smoke generation characteristics not greater than allowed by code.
2. Fire Resistance: Design and select materials to provide fire resistance in accordance with code and the following:
 - a. Determine fire resistance rating by testing in accordance with ASTM E 119-2000.
 - b. Determine flame spread index by testing in accordance with ASTM E 84-1999.
 - c. Determine smoke developed index by testing in accordance with ASTM E 84-1999.
 - d. Where fire resistance integrity of superstructure assemblies is impaired by subsequent installation of other construction elements, restore fire resistance using identical materials or other materials tested under ASTM E 814-1997.
 - e. Provide firestopping at openings in fire-rated superstructure elements that is rated at not less than the required fire resistance of the penetrated element.
 - f. Minimum performance values for individual superstructure elements are specified in other chapters.
 - g. Substantiation:
 - 1) Preliminary Design: Identification of major fire resistive materials and systems.
 - 2) Design Development: List of laboratory tested fire resistive assemblies to be used.
 - 3) Construction Documents: Identification of laboratory test numbers on the construction drawings for fire resistive assemblies to be used.
3. Grounding: When grounding of electrical systems is accomplished using structural members, design to prevent shock to occupants.

D. Durability:

1. Moisture Resistance of Load-Bearing Members: Use materials that are not damaged by contact with water or moisture vapor.
 - a. Materials that will corrode in the presence of water may be used if protected from water.
 - b. Materials that will rot or be damaged by fungus may not be used.
2. Impact Resistance of Load-Bearing Members: Use materials that are not easily damaged by common hand tools.
3. Portions of Superstructure Exposed on Exterior: Comply with requirements of Chapter B for water penetration, weather resistance, impact resistance, and wear resistance.

PRODUCTS

- A. Use one or more of the following:
 1. Structural steel frame, concrete-filled steel deck for floors, and unfilled steel deck for roofs.
 2. Structural, cold-formed steel framing.
 3. Cast-in-place reinforced concrete frame and slabs.
- B. Firestopping:
 1. Use one or more of the following:
 - a. Firestopping penetrations through fire-rated floor slabs, both empty holes and holes accommodating cables, pipes, ducts and conduit.
 - b. Firestopping penetrations through fire-rated walls and partitions.
 - c. Firestopping openings between tops of fire-rated masonry walls and floor or roof slabs.

END OF CHAPTER B1

CHAPTER B1.2 - ROOFS

PERFORMANCE

- A. Basic Function:
1. Provide all roof construction, including canopies, and elements required for their support, insulation, fireproofing, and firestopping.
 2. Where roof elements also must function as elements defined within another element group, meet requirements of both element groups.
 3. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter 111 - Facility Performance, Chapter B - Shell, and Chapter B1 - Superstructure.
 4. The metal roofing shall be designed and constructed in accordance with the Corps of Engineers Technical Instructions TI 809-29 "Structural Considerations for Metal Roofing and Guide Specification UFGS-07416 STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM."
 5. Structural Standing Seam Metal Roofing: comply with the requirements, standards, and recommendations of the Metal Roofing Systems Design Manual - First Edition, Metal Building Manufacturers Association, Inc., Cleveland, OH, 2000.
 6. Warranties: Furnish the following:
 - a. 5-year Warranty for Structural Standing Seam Metal Roof (SSSMR) System.
 - b. 20-year Manufacturer's material Warranties (roofing components and factory finished color), full replacement without exclusion.
 - c. Manufacturer's 20-year system weathertightness warranty.
- B. Operation and Maintenance:
1. Water Conductor Capacity: As required by code or SMACNA Architectural Sheet Metal Manual (ASMM), 1993, whichever is greater, based on 10 year 5 minute intensity.

PRODUCTS

- A. Structure Supporting Roofs:
1. Do not use:
 - a. Wood structural members.
 - b. Non-reinforced load-bearing masonry.
- B. Roof Decks:
1. Use one or more of the following:
 - a. Steel deck without concrete fill.
 - b. Concrete-filled steel deck.
- C. Canopy Decks:
1. Use one or more of the following:
 - a. Steel deck without concrete fill.
 - b. Concrete-filled steel deck.
- D. Insulation Over Roof Superstructure:
1. Use the following:
 - a. Mineral fiber batt or blanket.
- E. Water Collectors and Conductors:
1. Use one of the following:
 - a. Factory-finished galvanized steel sheet metal to match roofing system.

F. Flashing, Trim, and Accessories: Sheet metal.

1. Use one of the following:
 - a. Factory-finished galvanized sheet metal to match roofing system.

END OF CHAPTER B1.2

CHAPTER B2 - EXTERIOR ENCLOSURE

PERFORMANCE

A. Basic Function:

1. Provide an essentially vertical separation between exterior and interior conditioned space, that keeps out weather, uninvited people, and animals and insects, without unusual action by occupants, while providing convenient movement of occupants between inside and outside, desirable natural light, and views from inside to outside.
2. The elements forming the vertical separation comprise the exterior enclosure and consist of:
 - a. Exterior Walls.
 - b. Exterior Windows and Other Openings.
 - c. Exterior Doors.
 - d. Exterior Wall Fixtures.
3. Where exterior enclosure elements also must function as elements defined within another element group, meet requirements of both element groups.
4. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter 111 - Facility Performance and Chapter B - Shell.

B. Health and Safety:

1. Safety Glazing: Do not use fully tempered glass more than 25 feet above grade.
2. Fire Resistance:
 - a. All Materials of Exterior Enclosure: Non-combustible, no exceptions.

PRODUCTS

- A. Construct the exterior enclosure using exterior finish materials to replicate prototype.

END OF CHAPTER B2

CHAPTER B2.1 - EXTERIOR WALLS

PERFORMANCE

- A. Basic Function:
1. Provide physical separation between exterior and interior conditioned space, that keeps out weather, uninvited people, and animals and insects.
 2. The elements forming the physical separation comprise the exterior walls and consist of the supporting structure, the exterior skin, vapor retarders, air barriers, and insulation, the interior skin if an integral part of the wall, exterior screens and railings, balcony walls and parapets, exterior soffits unless they do not form a weather barrier, firestopping and draftstopping within wall and between wall and floors, and other exterior wall elements.
- B. Amenity and Comfort:
1. Thermal Performance:
 - a. Average Thermal Transmittance of Vertical Walls: U-value of .118 IP, maximum.
 - b. Exterior Soffits and Ceilings: Same requirements as exterior walls.
 - 1) Exception: If the space between soffit and floor/roof above is not required to be conditioned space, thermal performance requirements do not apply.
 2. Appearance:
 - a. Architecturally compatible with adjacent 1999 Dormitory.
- C. Durability:
1. Impact resistance:
 - a. EIFS – Class PB: Hemispherical Head Test:
 - 1) For wall areas within 2400 mm above any occupied surface (floor, sidewalk, ground, balcony, etc.) System must be capable of withstanding an impact of 10 – 17 N-m when tested in accordance with EIMA TM 101.86. (High impact resistance)
 - 2) For wall areas greater than 2400 mm above any occupied surface (floor, sidewalk, ground, balcony, etc.) System must be capable of withstanding an impact of 3 – 6 N-m when tested in accordance with EIMA TM 101.86. (Standard impact resistance)
 - b. EIFS – Class PM: Impact Mass Test: System must show no cracking or denting after twelve impacts by a 13.6 kg lead shot mass from 150 to 1800 mm drop heights in 150 mm intervals when tested in accordance with ASTM E 695.
 2. Moisture penetration:
 - a. EIFS – Must be designed as a “drainable” system.

PRODUCTS

- A. Supporting Structure of Walls:
1. Do not use any of the of the following for the supporting structure of walls:
 - a. Non-load-bearing unit masonry assemblies.
 - b. Wood stud framing.
- B. Exterior Ceilings and Soffits:
1. Metal soffit to match existing
- C. Glazing: Glass and plastic.
1. Do not use:
 - a. Spandrel glass.
 - b. Patterned glass.
 - c. Ceramic glass.

- d. Polycarbonate sheet.
- e. Acrylic sheet,
- f. Reflective plastic films.
- g. Heat absorbing coatings.

END OF CHAPTER B2.1

CHAPTER B2.2 - EXTERIOR WINDOWS AND OTHER OPENINGS

PERFORMANCE

- A. Basic Function:
1. Fill, cover, close, or otherwise protect all openings in the exterior walls (other than doors) so that the entire exterior enclosure functions as specified, using windows and other opening elements as specified, without using components that must be installed at changes of season.
 2. The elements comprising exterior windows and other openings include windows, fixed glazing other than glazed walls, ventilation openings, protection devices for openings, and elements that form or complete the openings, unless an integral part of another element.
 3. Comply with Antiterrorism and Force Protection requirements.
- B. Health and Safety:
1. Operable Openings and Ventilation Openings: Equipped with means of keeping insects, birds, and animals out.
- C. Structure:
1. Lintels: Constructed to span openings and support loads imposed by exterior wall; maximum deflection of 1/360 of span, vertically and horizontally.
- D. Durability:
1. Air Intake and Exhaust Openings: Minimize rainwater penetration and protect adjacent interior spaces from damage from water.
 - a. Maximum Water Leakage: 0.01 oz/sf under most extreme conditions.
 - b. Test Air Velocity: For exhaust openings: 0; for intake openings: normal operational velocity.
 - c. Identify air velocity; show AMCA 511-1999 certified water penetration ratings.
 2. Water Penetration: Design openings and components of openings to positively drain water to exterior of the building.
 - a. Top of Openings: If wall construction does not provide its own methods of drainage, use separate flashing to prevent water from entering opening components or the interior of the building.
 - b. Bottom of Openings: Integral or separate sill or flashing to prevent water running over or draining out of opening components from entering the wall construction below or the interior of the building.
- E. Operation and Maintenance:
1. Operating Components: Remaining operable for 10 years under normal exposure conditions for the project site
 2. Mechanical Ventilation Openings: No moving parts on exterior of building or where accessible to occupants

PRODUCTS

- A. Windows (Operable and Fixed):
1. Operating window units architecturally compatible with adjacent buildings (1999 Dormitory)
- B. Fixed Glazing:
1. Glazing: Double pane insulated units
- C. Glazing:
1. Do not use:
 - a. Spandrel glass

- b. Patterned glass
- c. Ceramic glass
- d. Polycarbonate sheet.
- e. Acrylic sheet.

D. Other Exterior Opening Elements: All components required to complete the opening.

END OF CHAPTER B2.2

CHAPTER B2.3 - EXTERIOR DOORS

PERFORMANCE

- A. Basic Function:
1. Secure all openings in the exterior wall that function to allow the entrance and exit of people, vehicles, and goods, so that the entire exterior enclosure functions as specified, using doors as specified, without using components that must be installed at changes of season.
 2. The elements comprising exterior doors include doors of all sizes and uses, gates, and elements that form or complete the openings, unless an integral part of another element.
- B. Amenity and Comfort:
1. Thermal Performance:
 - a. Maximum Thermal Transmittance of Any Individual Component: U-value of 0.30 Btu/sq ft/hr/deg F when tested in accordance with ASTM C 236-1989(R93).
 - b. Exception to Condensation Resistance Requirement: Minimum CRF of 35 of when measured in accordance with AAMA 1503.1-1998.
 2. Air Infiltration: Maximum of 1.25 cfm/ft of crack length, measured in accordance with ASTM E 283-1991 at differential pressure of 1.57 psf.
 3. Water Penetration: If so desired, provide justification for exemption of door openings from water penetration requirements of Chapter B and B2.
- C. Health and Safety:
1. Emergency Egress:
 - a. Provide exit doors minimum 36 inches wide.
 2. Physical Security:
 - a. Doors non-removable from outside without use of key.
 - b. At Locations Not Facing a Street: No glazing.
 - c. Secure each exterior door using a "fail-secure" method that allows entrance plus exit from inside using only one motion.
 - 1) Keys: Type as required to minimize unauthorized entry.
 - a) Keying: Key to the existing keying system which is Best 7-pin core system.
 - 2) Lock Functions: Appropriate to the location and function and as follows:
 - 3) Lock Function Definitions: As described in ANSI/BHMA A156.2-1996 to replicate prototype function.
 - d. Forced Entry: Provide doors capable of resisting forced entry equivalent to:
 - 1) Swinging and Sliding Doors: Forced entry resistance of Class I in accordance with ASTM F 1233-1998, minimum.
 - 2) Locks and Lock Cylinders: ANSI/BHMA A156.5-1992 Security Grade 1.
 - 3) Exception for "Supervised" Doors: No forced entry requirement.
 - a) "Supervised" Doors include: Main entrance doors.
- D. Durability:
1. Water Penetration: Design openings and components of openings to positively drain water to exterior of the building.
 - a. Top of Openings: If wall construction does not provide its own methods of drainage, use separate flashing to prevent water from entering opening components or the interior of the building.
 - b. Bottom of Openings: Integral or separate sill or flashing to prevent water running over or draining out of opening components from entering the wall construction below or the interior of the building.
 2. Physical Endurance:
 - a. Doors: ANSI A250.4-1994 Level A using hardware specified.

- b. Door, Frame, and Anchors: ANSI A250.5-1994 Level A using hardware specified.
 - c. Door, Frame, and Anchors: NAAMM HMMA 862-1987 endurance test requirements.
3. Swinging Doors: Control door swing to prevent damage due to impact, to either door or element impacted.

E. Operation and Maintenance:

- 1. Service Life Span of Operating Components: Remaining operable for 10 years under normal exposure conditions for the project site.

PRODUCTS

A. Pedestrian Doors:

- 1. All Doors to be hollow metal.

B. Glazing in Doors: Glass.

- 1. Type: Double pane insulated glass units in accordance with building codes and Antiterrorism / Force Protection requirements

C. Hardware for Swinging Doors:

- 1. Use finish to be compatible with the adjacent 1999 Dormitory.
- 2. Hinges: Heavy duty, ball-bearing butt hinges.
- 3. Exit Devices: Rim type, Grade 1.
- 4. Locksets: Bored (cylindrical) interconnected lockset, Grade 1.
- 5. Door Closers: Unless specifically indicated as one type, surface overhead frame-mounted type, surface overhead door-mounted type, in-the-floor mounted type, concealed overhead frame-mounted type, or concealed overhead door-mounted type, Grade 1.
- 6. Door Stops: Floor-mounted type, wall-mounted type, or overhead door/frame mounted type.
- 7. Door Hold-Opens: Wall-mounted type or overhead door/frame mounted type at mechanical and electrical rooms.

D. Do not use:

- 1. Different metals subject to galvanic action in direct contact with each other.
- 2. Aluminum in direct contact with concrete or cementitious materials.

END OF CHAPTER B2.3

CHAPTER B2.4 - EXTERIOR WALL FIXTURES

PERFORMANCE

- A. Basic Function:
 - 1. Exterior wall fixtures include all elements attached to the outside of the exterior walls, unless consisting of equipment or services fixtures. Fixtures required are those made necessary by the design
 - a. Main Building Identification Sign: Mounted as high as possible, for visibility from a great distance; provide one per AETC Standards.
- B. Amenity and Comfort
 - 1. Appearance:
 - a. Signs: Legible during daylight and nighttime hours by pedestrians, and motorists.
 - b. Conceal ballasts and wiring from view.
- C. Operation and Maintenance:
 - 1. Sign Lamps: Minimum rated service life of 20,000 hours.

PRODUCTS

- A. Signs:
 - 1. Per Lackland AFB Standards.

END OF CHAPTER B2.4

CHAPTER C - INTERIORS

PERFORMANCE

- A. Basic Function:
1. Provide finished interiors for all spaces indicated in the program, equipped with interior fixtures as required to function properly for specific occupancies.
 2. Interiors comprise the following assemblies:
 - a. Interior Construction: All elements necessary to subdivide and finish space enclosed within the shell, including applied interior surfaces of the exterior enclosure.
 - b. Interior Fixtures: All elements attached to interior construction that add functionality to enclosed spaces, except for elements classified as equipment or services fixtures.
 3. Provide physical separation between spaces, constructed to achieve fire ratings required by code, appropriate security between adjacent spaces, and visual, acoustical, odor, and atmospheric isolation as necessary to maintain desirable conditions in each space to replicate the prototype.
 4. Provide finishes for interior surfaces to replicate the prototype.
 5. Provide interior fixtures to replicate the prototype.
- B. Amenity and Comfort:
1. Acoustical Performance:
 - a. Sound Transmission: Provide interiors that maintain sound transmission between primary spaces within the following STC ranges when adjacent spaces are occupied and are being used normally:
 - 1) Sleeping rooms: Minimum 55.
 - 2) Other rooms: Minimum 45.
 2. Odor Control: Prevent unpleasant odors generated within a space from affecting occupants of adjacent spaces, by providing physical isolation of the spaces, separate ventilation, or a combination of isolation and ventilation.
 - a. Control odors from spaces of the following types:
 - 1) Toilet rooms/kitchens
 - 2) Trash collection.
 - 3) Trash removal or incineration.
- C. Structure:
1. Structural Performance: Provide interior construction and fixtures to support without damage all loads required by code.
- D. Durability:
1. Service Life Span: Same as building service life, except as follows:
 - a. Interior Ceiling Finishes: Minimum 15 years functional and aesthetic service life; including suspended ceilings.
 - b. Interior Wall and Floor Finishes: Minimum 7 years functional and aesthetic service life.
 - c. Other Interior Construction: Minimum 15 years functional and aesthetic service life.

END OF CHAPTER C

CHAPTER C1 - INTERIOR CONSTRUCTION

PERFORMANCE

A. Basic Function:

1. Provide physical separation between spaces required by the program, constructed to achieve fire ratings required by code, appropriate security between adjacent spaces, and visual, acoustical, odor, and atmospheric isolation as necessary to maintain desirable conditions in each space.
2. Provide interiors finished in accordance with the finish chart in Chapter C1.6 for all spaces required by the program.
3. Interior construction comprises the following elements:
 - a. Partitions: All types of space dividers, including demountable and operable partitions.
 - b. Interior Doors: All interior doors, including hardware and frames.
 - c. Interior Windows: All interior fixed and operable windows, including frames and casings.
 - d. Other Interior Openings: Interior utility openings such as hatches and access panels, louvers and vents.
 - e. Stairs and Ramps: Those interior and exterior stair and ramp elements not a part of superstructure or exterior enclosure.
 - f. Interior Finishes: All functional and decorative applied interior finishes, including secondary support structures.

END OF CHAPTER C1

CHAPTER C1.1 - PARTITIONS

PERFORMANCE

- A. Basic Function:
 - 1. Provide physical separation between spaces included in the program, constructed to achieve fire ratings required by code, appropriate security between adjacent spaces, and visual, acoustical, olfactory, and atmospheric isolation as necessary to maintain desirable conditions in each space.
 - 2. Partitions comprise the following elements:
 - a. Fixed Partitions: Solid, stationary space dividers that are opaque and extend full height.
 - b. Partial Height Partitions: Fixed, solid, opaque visual barriers, including toilet compartments.

PRODUCTS

- A. Fixed Partitions:
 - 1. Do not use:
 - a. Gypsum board on wood framing and furring.
 - b. Wood paneling on wood framing and furring.
- B. Railings:
 - 1. Use the following:
 - a. Anodized aluminum.

END OF CHAPTER C1.1

CHAPTER C1.2 - INTERIOR DOORS

PERFORMANCE

- A. Basic Function:
 - 1. Equip all openings in partitions that function to allow passage of people, vehicles, and goods, so that openings can be closed and secured when not in use, using components as specified.
 - 2. The elements comprising interior doors include doors of all sizes and uses, gates, and elements that form or complete the openings, unless an integral part of another element.
 - 3. Where interior door elements also must function as elements defined within another element group, meet requirements of both element groups; interior doors function as partition elements when doors are closed.
- B. Health and Safety:
 - 1. Builders' Hardware:
 - a. All hardware, including hinges, closers, locksets, door hold open devices, and door stops, shall be grade 1.
- C. Durability:
 - 1. Life Span of Operating Components: Remaining operable for 10 years under normal exposure conditions for the project site.

PRODUCTS

- A. Hardware for Swinging Doors:
 - 1. Use finish architecturally compatible with adjacent buildings (1999 Dormitory).
 - 2. Hinges: Ball-bearing butt hinges.
 - 3. Locksets: Bored (cylindrical), Grade 1.
 - 4. Door Stops: Unless specifically indicated as one type, floor-mounted type, wall-mounted type, or overhead door/frame mounted type.

END OF CHAPTER C1.2

CHAPTER C1.5 - STAIRS

PERFORMANCE

A. Basic Function:

1. Provide stairs, and ramps as necessary for access to and egress from all occupied spaces required by the program, in compliance with code and as follows:
2. Stairs comprise the following elements:
 - a. Structure supporting stairs, unless an integral part of superstructure.
 - b. Tread and riser construction, unless an integral part of superstructure.
 - c. Railings for interior stairs.
 - d. Integral stair finishes.

B. Amenity and Comfort:

1. Appearance of Exterior Stairs: Constructed to present a moderately finished appearance and to replicate the prototype.

C. Health and Safety:

1. Safety of Stairs:
 - a. Slip Resistance: Design and construct exterior stairs so that treads have a minimum static coefficient of friction of 0.60, measured in accordance with ASTM D 2047-1993.
 - b. Risers: Design and construct stairs with closed risers.
 - c. Treads: Design and construct stairs with treads that have a maximum bevel or radius on leading edge of 1/2 inch.

END OF CHAPTER C1.5

CHAPTER C1.6 - INTERIOR FINISHES

PERFORMANCE

- A. Basic Function: Provide appropriately finished interiors for all spaces required by the program in accordance with the following finish schedule:

FUNCTIONAL SPACE	Floor	Walls	Ceilings
Living/bedroom Entry	QT, CT, SV, VT	WC, P	P, AP, AT
Living/bedroom	C, CS	WC, P	P, AP, AT
Bath Compartment	CT	CT, SS, P*	P
Private Lavatory (vanity)	CT, VT, SV	CT, WC, P	P, AP, AT
Closet	C, CS	P	P
Kitchenette	CT, VT, SV	WC, P	P, AP, AT
Building Entries	QT, CT, SV, RT, VT	WC, P, CT	P, AP, AT
Multi-purpose Space (May be programmed as meeting/study rooms, television rooms, workout rooms, etc.)	C, CS, VT, SV, QT	WC, P	P, AP, AT
Administration Area	C, CS	WC, P	P, AP, AT
Corridors	C, CS	WC, P	P, AP, AT
Laundry	QT, VT, CT, RT, SV	P, LA	P, AP, AT
Storage	VT, SC	P	P
Utility Space	SC	P	P
Game Room	C, CS, VT, SV, QT	WC, P	P, AP, AT
Guest Toilets	CT, VT, SV	WC, CT, P	P
Supply Storage Room	VT, SV, SC	P	P

*Painted walls only above wainscot of CT or SS (1829 mm high wainscot at tub/shower surround, 1220 high wainscot elsewhere in bath compartment)

LEGEND					
Floors		Walls:		Ceiling	
VT	Vinyl Composition Tile	WC	Vinyl Wall Covering	AP	Suspended Acoustical Panels
SV	Sheet Vinyl	CT	Ceramic Tile	AT	Acoustic Tile
CT	Ceramic Tile	LA	Liquid Applied Coating	P	Painted Drywall or Plaster
C	Carpet	P	Painted Drywall or Plaster		
CS	Carpet Tile	SS	Solid Surface Polymer		
SC	Sealed Concrete				
RT	Rubber Tile				
QT	Quarry Tile				

- B. Health and Safety:

1. Slip Resistance: At stairs and corridors, provide floor finishes with minimum static coefficient of friction of 0.60, measured in accordance with ASTM D 2047-1993.
2. Slip Resistance: At ramps, showers, and sloped floor surfaces, provide floor finishes with minimum static coefficient of friction of 0.80, measured in accordance with ASTM D 2047-1993.

END OF CHAPTER C1.6

CHAPTER C2 - INTERIOR FIXTURES

PERFORMANCE

- A. Basic Function:
1. Provide elements fixed to interior construction that are necessary for complete and proper functioning of spaces required by the program and to replicate the prototype.
 2. Interior fixtures are functional items that are permanently attached to interior walls, ceilings, and floors, except for equipment items and items that are integral components of service systems, and comprise the following elements:
 - a. Identifying Devices: Informational accessories, including room numbers, signage, and directories.
 - b. Storage Fixtures: Non-furniture items intended primarily for storing or securing objects, materials, and supplies, including cabinets, casework, wardrobes, closet fixtures, lockers, and shelving.
 - c. Window Treatment: Non-furnishing accessories for control of light, solar heat gain, privacy, and view at interior and exterior windows, including blinds, shades, shutters, and curtain tracks.
 - d. Accessory Fixtures: Specialty items intended to provide service or amenity to building interiors, including toilet and bath accessories, postal fixtures, visual display surfaces, and telecommunications fixtures.
 - e. Other Interior Fixtures: Other items fixed to interior construction that enhance comfort or amenity in building spaces, including service wall systems, planters, and fixed ladders.
- B. Amenity and Comfort:
1. Accessibility: In common areas only, provide interior fixtures that are easily usable by disabled persons without outside assistance.
 - a. Provide interior fixtures that comply with ADAAG-1994.
 2. Light and Glare: Provide interior fixtures that are not a source of direct or reflected glare.
 - a. Written and Graphic Information on Interior Fixtures: Clearly legible from typical viewing distances by occupants with normal eyesight.
 - b. Surfaces Containing Written or Graphic Information: Matte finished to reduce the incidence of veiling reflections.
 - c. Trans-Illuminated Surfaces: Luminance that is not more than 10 times brighter than surrounding surfaces under ambient lighting conditions for the space.
 3. Convenience: Provide interior fixtures with fittings and controls that are manageable without special instruction or the need for excessive force.
- C. Health and Safety:
1. Flammability: Provide interior fixtures made of materials with flame spread index of 25 or less and smoke developed index of 450 or less when tested in accordance with ASTM E 84-1999 at all locations throughout the project.

END OF CHAPTER C2

CHAPTER C2.3 - WINDOW TREATMENT

PERFORMANCE

A. Basic Function:

1. Provide window treatments attached to interior construction architecturally compatible with the adjacent 1999 Dormitory.
2. Provide window treatments of the following elements:
 - a. Window blinds.
 - b. Curtain tracks.

B. Durability:

1. Colorfastness: Provide window treatment throughout project that is resistant to degradation from exposure to ultraviolet light.

END OF CHAPTER C2.3

CHAPTER C2.4 - ACCESSORY FIXTURES

PERFORMANCE

A. Basic Function:

1. Provide accessory fixtures as required to accomplish the design as required by code and as indicated in the project program.

B. Structure:

1. Grab Bars: Strength, design, anchorage, and support as required to withstand 250 pounds-force applied vertically at the center between supports and 250 pounds-force tension applied at any support; supports of sufficient rigidity to prevent rotation of bars under load.

END OF CHAPTER C2.4

CHAPTER D - SERVICES

PERFORMANCE

- A. Basic Function:
1. Provide the following services:
 - a. Water and Drainage: Means of delivery of water to points of utilization; automatic heating and conditioning of domestic water; and unattended removal of water, rainwater, and liquid waste.
 - b. HVAC: Artificial means of maintaining interior space comfort and air quality, including heating, cooling, ventilation, and energy supply.
 - c. Electrical Power: Energy to operate all electrically-operated devices, including those included under other services and those provided separately by the Government.
 - d. Artificial Lighting: Means of illuminating spaces and tasks, both interior and exterior, independent of reliance on natural light.
 2. Maintenance Access:
 - a. Provide service and maintenance access in accordance with the manufacturers requirements for all equipment.
 - b. If the manufacturer's requirements are less than 36", a minimum 36" shall be provided.
 - c. No equipment shall be ground mounted.

END OF CHAPTER D

CHAPTER D2 - WATER AND DRAINAGE

PERFORMANCE

- A. Basic Function:
1. Provide delivery of hot and cold domestic water to points of utilization and the removal of water, rainwater, and liquid waste.
 2. Water and drainage elements comprise the following:
 - a. Water Supply: Water sources and storage.
 - b. Domestic Water: All elements required to distribute water to fixtures, including piping and equipment for water cooling, heating and storage.
 - c. Sanitary Waste: All elements required for removal of sanitary waste, including piping, venting, discharge and disposal, and equipment designed and installed to comply with local codes.
 - d. Rain Water Drainage: All elements required for drainage of rain water from building areas in which it may accumulate and drainage of clear wastes from building services; not including gutters and downspouts (B31) or subdrainage (A).
 - e. Plumbing Fixtures: All fixtures necessary for sanitation, occupancy, and use that are connected to water supply and drainage; not including water heating or conditioning equipment, or kitchen equipment
- B. Amenity and Comfort:
1. Hot Water Supply and Hot Water Recirculation:
 2. Noise:
 - a. Design to prevent noise due to air trapped in piping systems or excessive water velocities.
 - b. Locate risers in dedicated and sound attenuated chases.
 - c. Minimize noise produced by fixtures.
 - d. Provide water hammer arrestors.
 3. Convenience:
 - a. Water Connections: Hot water on the left side of fixtures and cold water on the right side of fixtures.
 4. Odors:
 - a. Locate odor producing elements in areas separate from human occupancy in dedicated equipment rooms.
 - b. Do not locate sanitary waste vent openings where odors are noticeable by occupants or by occupants of adjacent properties or where odor-bearing air may enter building spaces.
 - c. Connect fixtures to prevent entry of sewer gases into occupied spaces.
 5. Appearance:
 - a. Vents: Conceal vents from view.
- C. Health and Safety:
1. Pressure Control: Control pressures to protect the building, fixtures, equipment, and occupants from harm.
 - a. Minimum Water Distribution Working Pressure: 50 psi.
 - b. Pressure Reduction: Use pressure reducing valves or regulators.
 - c. Air Removal: Remove air trapped in water distribution system by means of manual air vent valve at the highest point in the system.
 2. Prevention of Sewer Gas Leaks:
 - a. Provide waste system vents as required by code to avoid trap siphonage or compression.
 - b. Prevent entry of sewer gases from the sanitary sewer into building's sewer system.
 3. Protection of Potable Water Supply: As required by code.

4. Waste Drainage: Provide air conditioning equipment with indirect waste pipe for drainage.
 5. Burn Hazards:
 - a. Maximum Fixture Discharge Temperature: 120 degrees F.
 - b. Maximum Exposed Surface Temperature: 105 deg F.
- D. Durability:
1. Joint Durability: Provide watertight joints.
 2. Electrical Component Protection:
 - a. Do not route piping through electrical rooms, communication rooms, switchgear rooms, transformer vaults, and elevator equipment rooms.
 3. Equipment Protection:
 - a. Domestic Water Distribution System: Provide a strainer on the domestic cold water line entering the building.
- E. Operation and Maintenance:
1. Capacity of Water Service: Provide adequate water flow and pressure to supply peak demand requirements. Comply with requirements specified in the code.
 - a. Water Delivery: If the water source has insufficient flow or pressure, provide means of increasing to required level by means of a water pressure booster system.
 - 1) Substantiation:
 - a) Design Development: Identification of pressure and flow requirements (design conditions) for the building; verification of source availability at design conditions.
 - b) Construction Documents: Equipment to be used to deliver water at design conditions; submit pump curves.
 - c) Construction: Test of system flow and pressure; submit report verifying performance.
 - b. Water Flow:
 - 1) Maximum Velocity: 6 fps at the design flow rate.
 - c. Water Supply Pressures:
 - 1) Service Main Working Pressure: 100 psi at 75 deg F.
 - 2) Water Distribution Working Pressure: Maximum 70 psi at 75 deg F, minimum 50 psi at 75 deg F.
 2. Waste Pipe Sizing:
 - a. Building Drain: 4 inches diameter, minimum.
 - b. Buried Piping Below Slabs: 3 inches diameter, minimum.
 - c. Pipes 3 inches in Diameter: Sloped at 1/4 inch per foot, minimum, downward in the direction of flow.
 - d. Pipes 4 inches in Diameter and Larger: Sloped at 1/8 inch per foot, minimum, downward in the direction of flow.
 3. Rain Water Drainage Capacity: As specified in the code.
 - a. Design Rainfall: Short storm intensity of 6 inches in any 1 hour period.
 - b. Secondary Drainage: Required for roofs and exterior structural decks that do not drain naturally. Provide secondary roof drains connected to a secondary drainage system.
 4. Ease of Maintenance and Repair:
 - a. Provide devices at each branch take-off which allow insertion of measurement devices to monitor flow and pressure levels in the water distribution system.
 - b. Isolation of Piping Segments and Equipment: Provide a means of isolating the following:
 - 1) Each building from main water service. Provide a shut-off valve located inside a valve box whose removable access cover is at grade level.
 - 2) Each water branch from main service.
 - 3) Each vertical riser from piping below.
 - 4) Each water branch to fixtures or equipment from main vertical riser.

- 5) Piping lower than the supply, to prevent unnecessary draining in the case of disconnection.
 - 6) Each plumbing fixture, storage tank, and item of equipment, so that removal of one will not necessitate shutdown of others.
 - 7) Individual fixtures and equipment. Provide an isolation device within 3 feet of pipe connection to item.
- c. Provision for Drainage of Water Distribution Piping:
- 1) Slope Piping Toward Drain: 1/4 inch per 10 feet minimum.
 - 2) Provide a system drain at the lowest point in the system.
 - 3) Provide an adequately sized drain for the volume of water inside the distribution system.
 - 4) Drain valve (or fixture shut-off valve) located at each low point.
- d. Provision for Cleaning of Drainage Piping: Provide a cleanout as required by code and as follows:
- 1) At the upstream end of each horizontal sanitary drainage pipe, for cleaning in direction of flow.
 - 2) At the dead end of each dead-end pipe.
 - 3) Pipe 3 inches and Smaller: At intervals of 50 foot, maximum.
 - 4) Pipe 4 inches to 6 inches: At intervals of 80 foot, maximum.
 - 5) Pipe 8 inches and Larger: At intervals of 100 foot, maximum.
 - 6) Clearance: As required by code to allow for cleaning and rodding of pipe.

PRODUCTS

- A. Do not use:
1. Steel piping, for any purpose.

METHODS OF CONSTRUCTION

- A. The following existing water and drainage elements must be preserved:
1. Existing water supply to the building and drainage from the building.

END OF CHAPTER D2

CHAPTER D2.1 - WATER SUPPLY

PERFORMANCE

- A. Basic Function:
 - 1. Connect to existing domestic water supply necessary for building occupancy and use.
 - 2. Capacity: Size the water supply to exceed code by 10 percent.
- B. Health and Safety:
 - 1. Fire Prevention: Provide new water supply for fire sprinkler system and standpipes.
- C. Durability:
 - 1. Designed Service Life Span: 30 years.
 - 2. Wear Resistance: Provide shutoff valves that are resistant to corrosion, breakage, and scratching due to continual contact with water, human usage, and cleaning with abrasive materials.
 - 3. Freeze Protection: Protect piping from freezing with heat tracing.
- D. Operation and Maintenance:
 - 1. Water Pressure: 60 psi, minimum, except as otherwise required by code.
 - 2. Ease of Service: Provide a shutoff valve at the utility service main and the service entry point.
 - 3. Ease of Repair: Do not locate underground piping beneath electrical service, equipment, or footings.
 - 4. No backflow prevention devices shall be installed below grade.

PRODUCTS

- A. Pipe:
 - 1. Use the following:
 - a. Ductile iron.
 - b. Polyvinyl chloride (PVC).
- B. Fittings:
 - 1. All fittings shall be compatible with piping system.

METHODS OF CONSTRUCTION

- A. The following existing water supply elements must be preserved:
 - 1. Domestic water supply service.

END OF CHAPTER D2.1

CHAPTER D2.2 - PLUMBING FIXTURES

PERFORMANCE

- A. Basic Function:
1. Provide plumbing fixtures necessary for occupancy, use, sanitation and comply with ADA requirements.
 2. All vitreous china fixtures shall be white.
 3. Fixtures Required: As specified by code.
 - a. Lavatories: At public and private restrooms and bathrooms.
 - 1) Group lavatories may be used wherever 4 or more lavatories would be required in a single room; 18 inches of group lavatory perimeter qualifies as a substitute for one lavatory.
 - b. Kitchen Sinks: Single compartment; one in each kitchen.
 - c. Drinking Fountains: Minimum of one on each floor and within 10 feet of each restroom.
- B. Amenity and Comfort:
1. Convenience:
 - a. Faucets: Single action operation in the following locations.
 - 1) Lobby restrooms.
 - 2) Kitchen.
 - 3) Restrooms.
 - 4) Laundry sink.
- C. Structure:
1. Anchor fixtures to support weight of fixtures and a minimum of 400 pounds without failure or stress on the connecting pipes.
 2. Wall Mounted Fixtures: Carriers concealed inside fixture and in wall or floor.
- D. Durability:
1. Expected Service Life Span of Faucet Valves: 20 years.
 - a. Substantiation: Manufacturer's unconditional warranty.
 2. Expected Service Life Span of Flushing Mechanisms: 20 years.
 - a. Substantiation: Manufacturer's unconditional warranty.
- E. Operation and Maintenance:
1. Fixture Functions:
 - a. Lavatories: Standard spout, with integral overflow.
 - b. Urinals: Siphon jet flushing action.
 - c. Kitchen Sinks: Swivel spout, water spray nozzle.
 - d. Drinking Fountains: With hand operation, chilled water service.
 - e. Utility (Mop or Janitor's) Sinks: Spout shall have threaded faucet. Filling of standard rolling mop bucket required; spout designed to support full bucket of water.
 2. Water Pressure/Flow At Fixtures: 10psi, minimum, except as otherwise required by code.
 - a. Flush Valves at Water Closets and Urinals: 25 psi, minimum.
 3. Water Consumption:
 - a. Water Closets: 1.6 gallons per flush, maximum, with complete waste removal in one flush.
 - b. Urinals: 1.0 gallon per flush, maximum, with complete waste removal in one flush.
 - c. Lavatory Faucets in Public Restrooms: 0.25 gallon per use.
 - d. Lavatory Faucets in Other Areas: 0.25 gallon per use.
 - e. Drinking Fountains: 2.5 gallons per minute.
 - f. Shower: 2.5 gallons per minute

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4. Maintenance Service:
 - a. Electrically-Powered Fixtures: Battery-power operation not allowed.
5. Ease of Cleaning:
 - a. Use wall-mounted fixtures in public restrooms, for ease of cleaning floors.
 - b. Provide adequate access for cleaning each fixture and the areas around it.
6. Ease of Repair:
 - a. Faucet valves easily removable and replaceable as a single unit.
 - b. Each pipe connection to each fixture provided with a stop valve, for easy disconnection from water service.
 - c. Provide access to all concealed connections, such as floor and wall cleanouts and slip-joint connections.

PRODUCTS

A. Water Closets:

1. Use one or more of the following:
 - a. Elongated bowl.
 - b. Vitreous china.
 - c. Floor-mounted tank type.
 - d. Open seat, less cover.

B. Lavatories:

1. Use one or more of the following:
 - a. Vitreous china.
 - b. Ceramic, non-vitreous china.
 - c. Countertop-mounted fixtures.
 - d. Wall-hung fixtures.

C. Kitchen Sinks:

1. Use one or more of the following:
 - a. Stainless steel.
 - b. Countertop-mounted fixtures.

D. Faucets and Trim:

1. Use one or more of the following:
 - a. Polished chrome-plated finish – brass.

E. Drinking Fountains:

1. Use one or more of the following:
 - a. Electric water coolers.
 - b. Stainless steel finished units.

F. Utility (Mop or Janitor's) Sinks:

1. Use one or more of the following:
 - a. Precast terrazzo.
 - b. Floor-mounted fixtures.

G. Laundry Sink

- a. Fiberglass.
- b. Stainless steel ledge.
- c. Chrome plated steel legs.

- H. Shower
 - a. Thermostatic mixing with metal cartridges.
 - b. Shower head shall be 6'-8" above shower finished floor.
 - c. Shower head shall not be directed outside stall.

END OF CHAPTER D2.2

CHAPTER D2.3 - DOMESTIC WATER

PERFORMANCE

- A. Basic Function:
1. Provide hot and cold domestic water to plumbing fixtures as required. Also provide hot water recirculation system for the facility.
 2. Domestic water elements comprise the following:
 - a. Water Distribution: Piping within the building, serving fixtures and equipment.
- B. Amenity and Comfort:
1. Location:
 - a. Locate all water heaters in utility room or under counter near sink for remote fixtures only.
 - b. Do not locate water heaters above ceilings or where the public has access to them.
 2. Noise:
 - a. Design to prevent noise due to water hammer.
 - b. Provide water hammer arrestors on each fixture branch to eliminate noise produced by the domestic water fixtures.
- C. Durability:
1. Shock Resistance: Do not use cast iron components where thermal or mechanical shock is expected.
 2. Moisture: Do not locate water heaters where leakage would cause damage to surrounding building materials, under counters, or inside cabinets, unless drip pans piped to floor drains are provided.
 3. Temperature Changes: Provide method of allowing thermal expansion of domestic water in the hot water system.
 - a. Provide expansion tanks with bladders.
- D. Operation and Maintenance:
1. Pressure Classification: Provide pipe, pipe components, and equipment with a pressure classification of 125 psi.
 2. Energy Efficiency:
 - a. Temperature Loss: Provide insulation to limit heat loss of domestic hot water to a maximum of 2 degrees F in any 100 feet of pipe, when water is running, and maximum of 2 degrees F per hour, when water is standing.
 - b. Equipment Heat Loss: Provide insulation on the following equipment to limit domestic hot water heat loss to maximum of 2 deg F per hour, without energy input:
 - 1) Water heaters.
 - 2) Hot water expansion tanks.
 3. Method of Removing Air:
 - a. Use one of the following:
 - 1) Automatic air vents.
 - 2) Manual air vents.
 4. Water Heating Method:
 - a. Use one of the following:
 - 1) Gas-fired water heaters as specified in Chapter D3.2.
 5. Ease of Service and Maintenance:
 - a. Fixture Shut-Off: As specified in Chapter D2.2.
 - b. Equipment Isolation: Valves on both supply and discharge sides.

PRODUCTS

- A. Water Piping, Not Buried:
 - 1. Use the following:
 - a. Copper tube, cast copper, wrought copper, or bronze fittings, and soldered joints for HW or CW
 - b. PVC may be used for CW only.
- B. Valves For Shut-Off or Isolation of Equipment, Fixtures, and Parts of Systems:
 - 1. Use one of the following:
 - a. Ball valves.
 - b. Gate valves.
- C. Valves For Flow Control, Throttling, or Bypass:
 - 1. Use one of the following:
 - a. Globe valves.
 - b. Plug valves.

END OF CHAPTER D2.3

CHAPTER D2.4 - SANITARY WASTE

PERFORMANCE

A. Basic Function:

1. Provide drainage for disposal of waste as required by the code and for the following:
 - a. Fixtures and equipment which have a waste connection or a domestic water connection.
 - 1) Waste connections are not required on exterior hose bibbs and coffee makers.
 - b. Cleaning Drainage: Floor drains located as indicated in program.
 - 1) Kitchens.
 - 2) Hose-down areas.
 - 3) Public toilets.
 - c. Indirect Drainage: Floor drains to receive piping from:
 - 1) Equipment drain pans.
 - 2) Condensate drains.
 - 3) Other equipment that produces clear wastes.
 - 4) Other equipment specified to have indirect drain.

B. Amenity and Comfort:

1. Convenience:
 - a. Do not locate floor drains and floor cleanouts in doorways or directly in traffic paths.
2. Odors:
 - a. Do not terminate vents within 10 feet horizontally of doors, windows, air intake or exhaust openings, or other openings in the exterior enclosure, unless vent termination is at least 3 feet above the top of the opening.
 - b. Do not locate vent openings under overhangs.
 - c. Do not locate vent openings closer than 10 feet to lot line.
 - d. Extend vent pipes at least 12 inches above the surface of roofs.
 - e. Extend vent pipes at least 12 inches above overflow level of the highest fixture served by the vent.
 - f. Provide an automatic means of priming traps on all floor drains.

C. Structure:

1. Hub-and-Spigot Joint Support: Support joints so they do not separate under weight of pipe or live loads.

D. Operation and Maintenance:

1. Maintenance of Drainage:
 - a. Fittings, Joints, and Offsets: As required to ensure optimal flow through horizontal and vertical piping and at changes of direction.
 - b. Transitions Between Horizontal Piping and Vertical Risers:
 - 1) Sanitary Waste: Sanitary tees, wyes, or wyes and eighth bends.
 - 2) Vents: Wyes, wyes and eighth bends, and short radius fittings.
2. Ease of Cleaning:
 - a. Floor Drains: At low points in floor and flush with finish floor surface.
 - b. Cleanout Plugs: Flush with floor surface.
 - c. Drain equipment which produces or collects clear waste, such as condensation from cooling coils. Provide piping for the clear waste to the nearest floor drain.
 - d. Indirect Waste Pipes Over 1 inch Diameter: Provide a means to catch and remove solid materials 1/2 inch and larger, such as a strainer.

PRODUCTS

A. Sanitary Waste and Vent Piping, Not Buried:

1. Use one or more of the following:
 - a. Cast iron pipe and fittings, hub-and-spigot, with neoprene joint seals.
 - b. Cast iron pipe and fittings, hubless, with neoprene gaskets and 4 stainless steel clamps.
 - c. PVC.

B. Cleanout Plugs:

1. Use one or more of the following:
 - a. Brass.
 - b. Stainless steel.
 - c. PVC.

C. Cleanout Caps:

1. Use one or more of the following:
 - a. Cast iron.
 - b. PVC.

D. Floor Drains:

1. Use one of the following:
 - a. Cast iron.

END OF CHAPTER D2.4

CHAPTER D3 - HVAC - HEATING, VENTILATING, AND AIR CONDITIONING

PERFORMANCE

A. Basic Function:

1. Provide artificial means of controlling temperature, relative humidity, velocity, and direction of air motion in the interior spaces enclosed by the shell, and reduction of airborne odors, particulates, and contaminant gases. Contractor to refer to three types of systems studied in the life cycle cost analysis referenced in volume 4. Responsibility of the contractor to design system appropriate for the building with initial cost, life cycle cost, functionality and ease of maintenance in consideration.
2. The HVAC system consists of the following elements:
 - a. Energy Supply: Elements which provide energy used to maintain building comfort.
 - b. Heat Generation: Elements required to heat building to maintain space comfort.
 - c. Refrigeration: Elements necessary to generate the cooling required to maintain building comfort.
 - d. Air Distribution: Elements required to distribute air to maintain building comfort.
 - e. Hydronic Distribution: Elements required to distribute chilled and/or hot water to maintain building comfort.
 - f. HVAC Controls: Elements required to control equipment which maintains building comfort.
 - g. Other HVAC Elements: Other elements required to maintain building comfort.
3. Gas clothes dryer:
 - a. The gas clothes dryer will be residential type. The dryers shall be manifolded into a single, cleanable duct extended to a single removable wall louver installed 4'-0" above grade with a down-discharge hood.

B. Amenity and Comfort:

1. Thermal Performance: Design and construct to provide comfortable interior environment in accordance with the code and the following:
 - a. Summer Interior Design Conditions:
 - 1) Daytime Setpoint: 74 deg F, plus or minus 2 deg F except as specified in the project program or in Chapter D3.
 - 2) Night Setback: 78 deg F.
 - 3) Interior Relative Humidity: 50 percent, maximum.
 - b. Winter Interior Design Conditions:
 - 1) Daytime Setpoint: 68 deg F, plus or minus 2 deg F except as specified in the project program or in Chapter D3.
 - 2) Night Setback: 60 deg F.
 - 4) Interior Relative Humidity: 50 percent, maximum.
 - c. Outside Air Design Conditions:
 - 1) Summer Outside Air Design Temperature: 1 percent cooling design condition listed in the ASHRAE Fundamentals Handbook.
 - 2) Winter Outside Air Design Temperature: 99.6 percent heating design condition listed in the ASHRAE Fundamentals Handbook.
 - d. Energy Design Wind Speed: 15 mph.
2. Space Temperature Setpoint:
 - a. Communication Room: 72 deg F, plus or minus 2 deg F.
3. Relative Humidity Range:
 - a. All Areas: Maximum 50 percent.
4. Ventilation Unit:
 - a. Minimum 15 cfm per person.
 - b. Dehumidify to 55 deg F.
 - c. Reheat to 74 deg F, plus or minus 2 deg F daytime, 78 deg F night.

C. Operation and Maintenance:

1. Design Criteria:
 - a. Entering Chilled Water Temperature: 45 degrees F.
 - b. Leaving Chilled Water Temperature: 57 deg F.
 - c. Entering Hot Water Temperature: 180 deg. F.
 - d. Leaving Hot Water Temperature: 160 deg F.
 - e. Cooling Leaving Air Temperature: 55 degrees F.
 - f. Heating Leaving Air Temperature: 95 degrees F.

D. Health and Safety:

1. Electrical Shock Prevention:
 - a. Provide a means of disconnecting power at each piece of equipment

PRODUCTS

A. HVAC System Type:

1. Use one or more of the following:
 - a. HVAC Systems:
 - 1) Central chilled and hot water systems with 4 pipe fan coil corner or ceiling type units.
- 2) Separate air handlers with central chilled and hot water coils shall be provided for the ventilation system in accordance with ETL 97-13.

B. Controls:

1. Controls shall be Johnson Metasys to monitor and reset the following:
 - a. Boiler status, remote on/off.
 - b. HW pumps status, remote on/off.
 - c. Hot water temperature for supply and return.
 - d. Domestic recirculating pump status, remote on/off.
 - e. Domestic HW supply temperature.

END OF CHAPTER D3

CHAPTER D3.1 - ENERGY SUPPLY

PERFORMANCE

- A. Basic Function:
 - 1. Provide natural gas for use by plumbing equipment in accordance with code and as follows:
 - 2. Comply with ICC International Fuel Gas Code-2000.
 - 3. Comply with ICC International Mechanical Code-2000.
- C. Health and Safety:
 - 1. System Design Pressure: 125 psig, minimum.
 - 2. Natural Gas System Working Pressure: 3 psig, maximum.
 - 3. Natural Gas Entrance into Facility: Locate the service meter at least 3 feet from ignition sources.
- D. Durability:
 - 1. Expected Service Life Span: Provide a system which will last a minimum of 10 years in service without major repairs or operating expense.
 - 2. Vandalism: Protect the service meter from unauthorized access.
 - 3. Accidental Damage: Protect service meter from accidental damage by installing bollards to stop vehicles.
- E. Operation and Maintenance:
 - 1. System Capacity: Provide a fuel supply line (pipe) with capacity to serve the facility plus 20 percent reserve capacity.
 - 2. Ease of Use:
 - a. Locate fuel piping system mains in dedicated piping chases.

PRODUCTS

- A. Pipe:
 - 1. Use one or more of the following:
 - a. Steel pipe with threaded or welded joints inside the building.
 - b. PE pipe with solvent joints below grade.
 - c. Install an anode-less riser at entry into building.

END OF CHAPTER D3.1

CHAPTER D3.2 - HEAT GENERATION

PERFORMANCE

- A. Basic Function:
 - 1. Provide the necessary equipment and infrastructure to deliver heat to the conditioned spaces.
- B. Durability:
 - 1. Temperature Endurance: Provide equipment designed for ambient temperatures ranging from 50 degrees F to 122 degrees F (10 degrees C to 50 degrees C).
- C. Operation and Maintenance:
 - 1. Ease of Use: Design access to and working clearances around heating equipment as recommended by the manufacturer.

PRODUCTS

- A. Domestic Water Heating:
 - 1. Use the following:
 - a. Multiple commercial forced draft heaters with integral storage.
 - b. Equipment fueled by natural gas.
 - c. Water supply shall be minimum 2300 GPH.
 - d. Storage capacity shall be minimum 400 gallons
- B. Boilers:
 - 1. Use the following:
 - a. Tube-type boilers fueled by natural gas.
- C. Chimneys and Flues:
 - 1. Use the following:
 - a. Double-walled; stainless steel inner and aluminum coated steel outer duct with 1 inch (2.5 cm) thick insulation between inner and outer walls.
- D. Water Softner:
 - 1. Use the following:
 - a. Make-up water shall be treated by a water softener.
- E. Chemical Treatment:
 - 1. Use the following:
 - a. Two chemical injection system with controller.

END OF CHAPTER D3.2

CHAPTER D3.3 - REFRIGERATION

PERFORMANCE

- A. Basic Function:
 - 1. Provide the necessary equipment to generate the cooling required to maintain building comfort.
 - 2. Refrigeration elements comprise electric water chillers and condensing units using R-22 as the refrigerant.
 - 3. Include with FY02 Dorm a chiller to be added to the central plant (coordinate with FY99 Dorm drawings. The new chiller shall have valved and capped chws and chwr connections for extension to a portable chiller.
- B. Health and Safety:
 - 1. Construct condensing units to ASHRAE 15-1994, Safety Code for Mechanical Refrigeration.
 - 2. Construct chiller pressure vessels to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels, 1998, including both coolers and condensers.
- C. Durability:
 - 1. Temperature Endurance: Provide equipment designed for temperatures ranging from 50 degrees F to 122 degrees F (10 degrees C to 50 degrees C).
- D. Operation and Maintenance:
 - 1. Design Criteria:
 - a. Tonnage: As calculated.
 - b. Chilled Water Flow: As calculated.
 - c. Evaporator Pressure Drop: 20 feet of water.
 - d. Evaporator Fouling Factor: 0.00025 sq ft deg F hr/Btu.
 - 2. Energy Efficiency:
 - a. Chillers:
 - 1) Energy Efficiency Ratio (EER): 8, calculated as specified in ARI 550/590-1998(Ad.99).
 - 2) Integrated Part Load Value (IPLV): 13, calculated as specified in ARI 550/590-1998(Ad.99).

PRODUCTS

- A. Central Plant (02 Dorm)
 - 1. Chiller:
 - a. Type: Compatible with central plant.
 - b. Capacity: 200 tons.
 - c. CHW Flow: 400 GPM.
 - d. Evap. LWT: 42° F.
 - e. Max. Evap. Pd: 10 ft. head.
 - f. Fouling Factor: 0.00025/2 pass.
 - g. Cond. Water Flow: 600 GPM.
 - h. Cond. EWT: 85° F.
 - i. Max. Cond. PD: 12 ft. head.
 - j. Cop Minimum: 5.35
 - k. NPLV Minimum: 0.66.
 - l. Cond. Fouling factor: 0.00025/2 pass.
 - m. Electrical: 460V/3ph/60hz.
 - n. Remarks: IAW ARI 550/590-95 Standard Conditions.

2. Chilled Water Pump
 - a. Flow: 400 GPM.
 - b. Head: 100 ft.
 - c. Electrical: 20 HP, 460V/3ph/60hz.
 - d. Provide VF.D.
3. Cooling Tower:
 - a. Ambient wb: 79° F.
 - b. Water: 95° F entering/ 85° F leaving
 - c. Flow: 600 GPM.
 - d. Electrical: 15 HP/460V/3ph/60hz.
 - e. Provide vibration limit switch and tower bypass.
 - f. Connection for each cell.
 - g. Provide variable frequency drive for each tower fan.
 - h. Provide basin, heaters, and controllers for freeze protection, 8kw, 460V, 3ph.
4. Condensing Water Pump:
 - a. Flow: 600 GPM.
 - b. Head: 65 ft.
 - c. Electrical: 15 hp/460V/3ph/60hz.
5. Controls:
 - a. Controls shall be Johnson Metasys to match existing and shall be the same as existing.

END OF CHAPTER D3.3

CHAPTER D3.4 - AIR DISTRIBUTION

PERFORMANCE

- A. Basic Function:
 - 1. Distribute air to maintain the required space conditions.
- B. Amenity and Comfort:
 - 1. Air Movement:
 - a. Provide an air distribution system that limits the air velocity to 50 fpm, maximum.
 - b. Adjustments: Provide an air distribution system which allows relocating supply diffusers, adjusting direction of airflow from supply diffusers, adjusting dampers, and changing the thermostat setpoint.
 - 2. Acoustical Performance:
 - a. Air Distribution Background Noise: Provide systems which comply with the acoustical requirements of Chapter C - Interiors and the following RC Levels as defined in ASHRAE HVAC Applications Handbook, 1999. Do not exceed the sound pressure level for any octave band at the specified RC.
 - 1) Halls, Corridors, and Lobbies: 35-45, neutral.
 - 2) Executive and Private Offices: 25-35, neutral.
 - 3) Conference Rooms: 25-35, neutral.
 - 4) Bedrooms: 25, maximum, neutral.
 - 5) Open Plan Offices: 30-40, neutral.
 - 6) Classrooms: 40, maximum, neutral.
 - 3. Provide equipment with sound ratings which comply with testing and rating requirements of ARI 880-1998.
 - 4. Cleanliness: Provide filtration of the air distributed to the occupied spaces.
 - a. Filter Efficiency: 65 percent arrestance per ASHRAE Standard 52.1-1992.
 - b. Filter Efficiency: 30 percent atmospheric dust-spot efficiency per ASHRAE Standard 52.1-1992.
 - 5. Odor: Provide exhaust to remove odors.
 - a. Toilet Room Exhaust: 2 cfm per sq. ft..
 - b. Janitors Closet Exhaust: 2 cfm per sq. ft..
 - c. Locker Room Exhaust: 2 cfm per sq. ft..
 - d. Break Room Exhaust: 2 cfm per sq. ft..
 - 6. Appearance:
 - a. Diffuser Shape: Provide square diffusers.
 - b. Diffuser Face: Provide louvered face diffusers.
 - c. Diffuser Color: Provide diffusers with ceiling matching color.
- C. Health and Safety:
 - 1. Electrical Shock Prevention:
 - a. Provide a means of disconnecting power at each piece of equipment.
 - 2. Fire Spread: Provide interlocks to prevent operation or start-up of air distribution elements when fire or smoke detection systems are in alarm condition.
 - 3. Upon detection of smoke, shut down system.
- D. Durability:
 - 1. Expected Service Life Span: Provide a system which will last a minimum of 15 years in service without major repairs or operating expense.

2. Aesthetic Life Span: Provide units exposed within the occupied space which will not fade, chip, or peel for a minimum of 10 years.
 3. Exposed Units within Occupied Spaces: Heavy gage, galvanized sheet steel, painted casing.
 4. Accidental Damage: Protection of ductwork, air handlers, fans, condensing units, and chillers from accidental damage.
- E. Operation and Maintenance:
1. Operating Parameters:
 - a. Duct Construction: In accordance with SMACNA HVAC Duct Construction Standards-1995 with Addendum No. 1.
 - b. Maximum Air Velocity:
 - 1) For 2 Inches W.G. Duct Pressure Class: 1500 feet per minute.
 - 2) For 1 Inch W.G. Duct Pressure Class: 1500 feet per minute.
 - 3) For 0.5 Inches W.G. Duct Pressure Class: 1000 feet per minute.
 - c. Fans: Match fan pressure characteristics to the air distribution system pressure characteristics including the system effect factors; pressure characteristics based on ANSI/AMCA Standard 210-1999 fan ratings and system characteristics based on engineering calculations.
 2. Ease of Use: Provide units with individual controls coordinated with controls specified in Chapter D36.
 3. Ease of Cleaning: Provide units with removable access panels to allow cleaning.
 4. Ease of Maintenance: Provide units which are modular in design.

PRODUCTS

- A. Ductwork:
1. Use one or more of the following:
 - a. Galvanized sheet metal duct.
 - b. Flexible double wall insulated duct (at diffuser connections only, 5' maximum length).
- B. Diffusers, Registers, and Grilles:
1. Use one or more of the following:
 - a. Aluminum diffusers.
 - b. Aluminum registers.
 - c. Aluminum grilles
- C. Fans:
1. Use one or more of the following:
 - a. Steel fan housing with an aluminum centrifugal wheel.
 - b. Steel fan housing with a steel centrifugal wheel.
- D. Air Filters:
1. Use one or more of the following:
 - a. Pleated panel filters.
 - b. Extended surface filters.
 - c. Cartridge filters.
 - d. Bag-type filters.
 - e. HEPA filters.

END OF CHAPTER D3.4

CHAPTER D3.5 – CHILLED AND HEATING WATER DISTRIBUTION

PERFORMANCE

- A. Basic Function:
 - 1. Distribute cooling and heating water to maintain the required space conditions.
 - 2. System(s) required include chilled water system and heating water system.
 - 3. Configuration - Chilled Water: Reverse return; Hot Water: Reverse return.
- B. Amenity and Comfort:
 - 1. Space Temperature Control: Coordination of HVAC distribution system's design and installation with zoning and space temperature requirements specified in Chapter D36 - Controls and Instrumentation.
- C. Health and Safety:
 - 1. Accidental Explosion: Provide pressure relief valves to prevent overpressurizing the systems set at maximum 125% of design pressure.
- D. Durability:
 - 1. Expected Service Life Span: Provide a chilled and hot water system which will last a minimum of 20 years in service without major repairs or operating expense.
 - 2. Pressure Ratings: Provide air coils with pressure ratings of 450 psig and which exceed the pressure rating of the system in which they are installed.
 - 3. Erosion Control: Provide a means of removing air from water distribution systems to prevent erosion. Design systems in a manner to prevent cavitation.
 - 4. Corrosion Control: Drain condensate from cooling coils to prevent corrosion of associated equipment.
 - 5. Underground Piping Corrosion Control: Wrap buried piping in a sealed bituminous jacket.
 - 6. Pipe Stress and Strain Control: Provide pipe loops, bends, expansion joints, and flexible pipe connectors to reduce stress and strain due to expansion and contraction.
- E. Operation and Maintenance:
 - 1. Operating Parameters:
 - a. Building Systems:
 - 1) Chilled Water and Hot Water System Pressure: 125 psig, maximum.
 - 2) Water Velocity: 8 feet per second, maximum.
 - b. Pumps: Match pump pressure and flow characteristics with the pressure and flow characteristics of the distribution system.
 - 2. Ease of Maintenance: Provide manholes and valves at all branch take offs to a group of major equipment.

PRODUCTS

- A. Chilled Water Distribution Piping:
 - 1. Use one or more of the following interior to the building:
 - a. Pipes 2 Inches in Diameter and Smaller:
 - 1) Hard copper, Type L with brazed or silver soldered wrought copper fittings.
 - 2) Schedule 40 steel with screwed fittings.
 - 3) "Victaulic" grooved pipe mechanical couplings with gaskets.
 - b. Pipes Larger than 2 Inches in Diameter:
 - 1) Schedule 40 steel

- a) Joints and Fittings:
 - (1) Welded Standard Class wrought steel fittings.
 - (2) Flanged Class 150 wrought steel fittings.
 - (3) "Victaulic" grooved pipe mechanical couplings with gaskets.
 - 2. Exterior Distribution:
 - a. Steel with PVC jacket:
 - b. PVC Schedule 80 with PVC jacket.
- B. Hot Water Distribution Piping
- 1. Use one or more of the following interior to the building:
 - a. Pipes 2 Inches in Diameter and Smaller:
 - 1) Hard copper, Type L with brazed or silver soldered wrought copper fittings.
 - 2) Schedule 40 steel with screwed fittings.
 - 3) "Victaulic" grooved pipe mechanical couplings with gaskets.
 - b. Pipes Larger than 2 Inches in Diameter:
 - 1) Schedule 40 steel
 - a) Joints and Fittings:
 - (1) Welded Standard Class wrought steel fittings.
 - (2) Flanged Class 150 wrought steel fittings.
 - (3) "Victaulic" grooved pipe mechanical couplings with gaskets.
 - 2. Exterior Distribution:
 - c. Steel with PVC jacket:
 - d. PVC Schedule 80 with PVC jacket.

END OF CHAPTER D3.5

CHAPTER D4 - FIRE PROTECTION

PERFORMANCE

- A. Basic Function:
1. Provide fire sprinkler or fire extinguishing systems for all interior spaces designed by a fire protection engineer; refer to Section 01015 for designer qualifications. All fire protection systems to be designed around MIL-HNBK-1008C standards and NFPA13, whichever is more stringent.
 2. Provide services systems to protect life and property.
 3. Fire protection comprises the following elements:
 - a. Fire Sprinkler and Extinguishing Systems: Elements which automatically extinguish fires.
 - b. Standpipe and Hose Systems: Elements that deliver adequate supplies of water to locations in the building for manual fire-fighting.
 - c. Fire Detection and Alarm: Elements required to detect fires and communicate fire location to building occupants, building management, and public fire fighting agencies.
 - d. Fire Protection Specialties: Elements required for manual fire-fighting by occupants.
 4. Provide automatic fire suppression for the entire building.
 5. Water Use:
 - a. Provide a water supply to sprinkler systems that is sufficient to extinguish fires inside the structure.
- B. Structural:
1. Seismic Design: Provide support systems which sustain static (dead) loads twice the wet weight of the system.
- C. Durability:
1. Vandalism: Provide systems which are tamper-resistant.
- D. Operation and Maintenance:
1. Ease of Use: Provide easy access to and working clearances around system components.
 2. Unauthorized Use: Provide systems which minimize activation and use by unauthorized persons.

PRODUCTS

- A. Use all of the following:
1. Wet pipe sprinkler system.
 2. Standpipe and hose system.
 3. Fire detection and alarm system.
 4. Any piping systems and materials permitted by NFPA 13.

END OF CHAPTER D4

CHAPTER D4.1 - FIRE SPRINKLER AND EXTINGUISHING SYSTEMS

PERFORMANCE

A. Basic Function:

1. Provide fire sprinkler or fire extinguishing systems for all interior spaces designed by a registered fire protection engineer; refer to Section 01015 for designer qualifications. All fire protection systems to be designed around MIL-HNBK-1008C standards and NFPA13, whichever is more stringent.
2. Provide wet pipe sprinkler systems for the entire building.
3. Spaces and Areas with Fire Sprinklers:
 - a. General Use (Not Indicated As Another Type):
 - 1) System Type: Wet Pipe.
 - 2) Occupancy: Light Hazard.
 - 3) Density/Area: 0.1 gpm per sq ft over 3000 sq ft.
 - 4) Hose: 250 gpm
 - b. Dormitory Rooms
 - 1) System Type: Wet pipe.
 - 2) Occupancy: Light Hazard.
 - 3) Density/Area: 0.1 gpm per sq ft over 3000 sq ft.
 - 4) Hose: 250 gpm
 - c. Corridors:
 - 1) System Type: Wet pipe.
 - 2) Occupancy: Light Hazard.
 - 3) Density/Area: 0.1 gpm per sq ft over 3000 sq ft.
 - 4) Hose: 250 gpm
 - d. Storage:
 - 1) System Type: Wet pipe.
 - 2) Occupancy: Ordinary (Group 1) Hazard.
 - 3) Density/Area: 0.15 gpm per sq ft over 3000 sq ft.
 - 4) Hose: 500 gpm
 - e. Mechanical Room:
 - 1) System Type: Wet pipe.
 - 2) Occupancy: Ordinary (Group 1) Hazard
 - 3) Density/Area: 0.15 gpm per sq ft over 3000 sq ft.
 - 4) Hose: 500 gpm
4. Provide code-required coverage if the coverage specified above is less than required by code.
5. Fire Sprinklers: Design and construction in accordance with code and NFPA 13-1999 or MIL-HNBK-1008C which ever is more stringent.
6. Standpipes and Hoses: Design and construction in accordance with code and NFPA 14-2000.

B. Amenity and Comfort:

1. Appearance:
 - a. Provide spaces with the following types of sprinkler heads:
 - 1) General Use: Recessed sprinklers.
 - 2) Lobby: Recessed sprinklers.
 - 3) Corridor: Recessed sprinklers.
 - 4) Dormitory Room: Recessed and/or sidewall sprinklers.
 - 5) Storage: Recessed or upright sprinklers.
 - 6) Mechanical: Recessed or upright sprinklers.
 - b. Provide hose cabinets with solid metal door panel.
 - c. Provide fire department connections with bright-chrome finish.

C. Health and Safety:

1. Nozzle Performance: As required by code and NFPA 17-1998.
2. Water Demand Requirements:
 - a. Determine minimum water supply requirements for each sprinkler system using the hydraulic calculation method defined by NFPA 13-1999.
3. Water Source:
 - a. Provide fire pump designed in accordance with NFPA 20-1999.
 - b. Provide water from Lackland water distribution system.

D. Structural:

1. Seismic Design:
 - a. Provide a sprinkler system which allows movement where differential movement is anticipated.
 - b. Provide sprinkler system supports capable of supporting twice its installed wet weight.
2. Structural verification: Structural Engineer shall verify structural capacity of existing structure to support fire sprinkler lines.

E. Durability:

1. Expected Service Life Span: Provide a sprinkler system which will be viable for the life of building when maintained as specified in NFPA 25-1998.

F. Operation and Maintenance:

1. Provide sprinkler system maintenance in accordance with NFPA 25.
2. Ease of Service:
 - a. Spare Sprinkler Heads: Provide additional sprinkler heads in accordance with code requirements.

PRODUCTS

A. Pipe:

1. Use one or more of the following:
 - a. Copper pipe with soldered joints.
 - b. Steel pipe with grooved joints with seals and couplings or threaded joints.

B. Fittings:

1. Use one or more of the following:
 - a. Copper.
 - b. Steel.
 - c. Cast iron.

C. Fire Pumps:

1. Use the following:
 - a. Electric fire pumps.

END OF CHAPTER D4.1

CHAPTER D4.2 - STANDPIPE AND HOSE SYSTEMS

PERFORMANCE

- A. Basic Function:
 - 1. Provide a standpipe system to protect life and property on buildings of three or more stories.
 - 2. System Class and Type: Provide a Class I, automatic-wet standpipe system.
 - 3. Standpipe Design and Installation: Provide a standpipe system as required by code and NFPA 14-2000.
- B. Amenity and Comfort:
 - 1. Accessibility:
 - a. Provide fire department connections as required by code and to comply with the requirements of the Lackland Fire Marshall.
 - 2. Appearance:
 - a. Hose Cabinets: Painted finish.
 - b. Valves: Brass finish.
 - c. Fire Department Connections: Bright finish.
- C. Health and Safety:
 - 1. Fire Spread: Provide a standpipe system to assist firefighters in preventing the spread of fire.
 - 2. Water Source: Provide water supply as required by NFPA 14-2000.
- D. Durability:
 - 1. Expected Service Life Span: Provide standpipes which will be viable for the life of building.
- E. Operation and Maintenance:
 - 1. Provide standpipe maintenance in accordance with NFPA 25-1998.
 - 2. Ease of Use: Provide standpipes which comply with the acceptance requirements of NFPA 14-2000.

PRODUCTS

- A. Pipe:
 - 1. Use one or more of the following:
 - a. Copper pipe.
 - b. Steel pipe.
- B. Fittings:
 - 1. Use one or more of the following:
 - a. Copper.
 - b. Steel.

END OF CHAPTER D4.2

CHAPTER D4.3 - FIRE DETECTION AND ALARM

PERFORMANCE

- A. Basic Function:
 - 1. Provide automatic fire detection and automatic alarm systems as required by code and as follows:
 - 2. Integrated systems performing all functions are preferred, subject to requirements of code for separated, independent systems.
 - 3. Provide radio alarm transmitter.
- B. Health and Safety:
 - 1. Detection, Alarm, Notification Methods: In accordance with NFPA 72-1999.
 - 2. Detection:
 - a. Air Handling Units Over 2,000 cfm: Minimum of one detector in both supply and return.
 - 3. Alarms:
 - a. Manual stations at minimum of 150 feet intervals along means of egress paths.
 - b. Audible Alarms: Minimum of 15 dB over ambient noise, audible throughout common areas and means of egress.

PRODUCTS

- A. Control Systems for All Applications:
 - 1. Use the following:
 - a. Microprocessor-based hardware.
 - b. The system shall be addressable.
- B. Fire/Smoke Detectors:
 - 1. Use the following:
 - a. Combination Ionization/Photoelectric smoke detectors.
 - b. Rate compensated heat detectors.
- C. Warning Devices:
 - 1. Use the following:
 - a. Horns.
 - b. ADA Strobes.
 - c. Combination horn/strobes.
- D. Radio Transmitter:
 - 1. Use the following:
 - a. Monaco BT2-8 to match existing Base Monaco system. Request system frequency from Lackland AFB Fire Marshal

END OF CHAPTER D4.3

CHAPTER D4.5 - FIRE PROTECTION SPECIALTIES

PERFORMANCE

- A. Basic Function:
1. Provide equipment and fixtures to facilitate manual fire-fighting in accordance with the code.
 2. Fire protection specialties comprise the following elements:
 - a. Fire extinguishers.
 - b. Cabinets for storage.
 3. Provide portable fire extinguishers throughout the facility, of the type and size and in the locations required by NFPA 10-1998 and the code.
 4. Where fire protection specialty elements also must function as elements defined within another element group, meet the requirements of both element groups.
 - a. Cabinets may be used in conjunction with standpipes, for storage of hoses.

END OF CHAPTER D4.5

CHAPTER D5 - ELECTRICAL POWER

PERFORMANCE

A. Basic Function:

1. Provide electrical power with the appropriate characteristics to operate all electrically operated devices, including those in other services.
2. The electrical system comprises the following elements:
 - a. Electrical Energy Generation: Utility power sources and battery power systems.
 - b. Service and Distribution: Service entrance equipment, distribution equipment, transformers, motor control equipment, service and feeder wiring (conductors and raceways), monitoring, safety and control equipment, and other elements required for a complete functional system (including modification of existing electrical power duct bank system).
 - c. Branch Circuits: Branch circuit wiring and receptacles and other branch circuit wiring systems.

B. Amenity and Comfort:

1. Convenience:
 - a. Locate metering and monitoring facilities in a single location not in a mechanical equipment room.
 - b. Provide means of reading power meters and demand meters from inside the building.
 - c. Provide an interface between the electrical monitoring and the building automation system including the following:
 - 1) Switchboard Monitoring:
 - a) Power Analysis Values:
 - (1) Output voltage of each phase; Phase-to-phase and phase-to-neutral.
 - (2) Output current; each phase and ground.
 - (3) Real power; per phase.
 - (4) Reactive power; per phase.
 - (5) Apparent power; per phase.
 - (6) Power factor; per phase.
 - (7) Frequency.
 - 2) Energy Readings of:
 - a) Real accumulated energy.
 - 3) Demand Readings:
 - a) Demand current; per phase and peak.
 - b) Average power factor; 3-phase total.
 - c) Demand real power; 3-phase total.
 - d) Demand apparent power; 3-phase total.
 - e) Demand reactive power; 3-phase total.

C. Operation and Maintenance:

1. Load Characteristics:
 - a. Maximum Harmonic Current Distortion: Plus or minus 2 percent of design current.
2. Protection Against Disturbances:
 - a. Surge Protection: Voltage excursion limit of 2 times design voltage for the entire building.

END OF CHAPTER D5

CHAPTER D5.2 - SERVICE AND DISTRIBUTION

PERFORMANCE

- A. Basic Function:
1. Distribute electric power for equipment circuits, lighting circuits, receptacle circuits, electrical utilization devices.
 2. Main Electrical Service: Contractor shall provide a service transformer to convert its distribution voltage to the building's utilization voltage. Connection to Lackland electric utility must be coordinated with the Contracting Officer. The design of the distribution system shall meet the requirements of TM 5-811-1, Chapter 7
 3. Calculate the new service entrance capacity and provide the new service transformer for the capacity required. Confirm existing primary conductor capacity is adequate and replace if required.
 4. Switchgear Location: Locate the main switchboard in the main electrical room. Provide ground fault protection in the main switchboard as required by code.
 5. Provide surge arrester at the main electrical service entrance as required for lightning protection master label.
- B. Operation and Maintenance:
1. Capacity:
 - a. Service Transformers: In accordance with code plus 10 percent spare capacity.
 - b. Main Switchboards: In accordance with code plus 10 percent spare capacity.
 - c. Branch Circuit Panelboards: In accordance with code plus 25 percent spare capacity.

PRODUCTS

- A. Transformers:
1. Use one of the following:
 - a. Liquid filled (exterior only) type.
 - b. Pad-mounted.
- B. Secondary Service and Distribution Feeders:
1. Conductors
 - a. Do not use:
 - 1) Aluminum.

END OF CHAPTER D5.2

CHAPTER D5.3 - BRANCH CIRCUITS

PERFORMANCE

A. Basic Function:

1. Power: Provide adequate electrical power and safe and efficient distribution from panelboards to lighting, wiring devices, equipment, and appliances, based on the project program, and as follows.
2. Branch circuits comprise the following elements:
 - a. Branch circuit breakers.
 - b. Conductors and cable from panelboards to fixtures, wiring devices, and mechanical equipment.
 - c. Raceways and boxes.
 - d. Wiring devices, including, but not limited to, receptacles, floor boxes and plates, wall switches, and wall plates.

END OF CHAPTER D5.3

CHAPTER D6 - ARTIFICIAL LIGHTING

PERFORMANCE

- A. Basic Function:
1. Provide artificial means of lighting interior and exterior spaces.
 2. Artificial lighting comprises the following elements:
 - a. Interior Lighting: General room lighting, emergency lighting, and accent lighting.
 - b. Exterior Area Lighting: General lighting of exterior spaces including driveways, walkways, parking areas.
 - c. Other Artificial Lighting Elements including security lighting around the building.
 3. Design lighting in accordance with recommendations of the following: The Illuminating Engineering Society of North America (IESNA)
 4. Fluorescent fixtures shall be served by electronic ballasts.
 5. Exit lights shall be LED.
 6. Interior room lighting shall be compact fluorescent in lieu of incandescent.

END OF CHAPTER D6

CHAPTER D6.2 - EXTERIOR AREA LIGHTING

PERFORMANCE

A. Basic Function:

1. Provide artificial lighting for exterior spaces, as required by the project program, that is adequate in quantity, quality, and distribution for the performance of tasks typical for the type of outdoor space and the characteristics of the intended user population and compatible with the type of exterior lighting used at Lackland AFB.
2. Provide artificial lighting for Force Protection requirements.
3. Exterior area lighting comprises the following elements: Exterior luminaires, poles, standards, or other means of mounting the luminaires, power supply, and controls.

B. Amenity and Comfort:

1. Light Levels: Provide maintained average illuminance values for exterior spaces that are based on the primary visual tasks to be accommodated and are not less than the following, when measured at grade:
 - a. Parking Lots, High Activity: 1.5 fc, maximum uniformity ratio (average to minimum) of 4:1.
 - b. Building Entrance Areas: 4 fc, maximum uniformity ratio (average to minimum) of 4:1.
 - c. Pedestrian Areas:
 - 1) Sidewalks in Intermediate Areas: 0.75 fc, maximum uniformity ratio (average to minimum) of 4:1.
 - 2) Walkways in Landscaped Areas: 0.75 fc, maximum uniformity ratio (average to minimum) of 10:1.
 - 3) Stairways: 0.75 fc, maximum uniformity ratio (average to minimum) of 10:1.
2. Appearance of Lighting Installation:
 - a. Provide exterior area lighting that is compatible with overall project appearance and coordinated with site layout and building organization.
 - 1) Luminaire Mounting:
 - a) Installation on poles, wall mounting brackets, or architectural fixtures:
 - b) Maximum height of 30 ft.
 - c) Style compatible with building design.
 - d) Material and finish compatible with exterior building elements.
 - 2) Luminaire Design:
 - a) Light distribution by direct methods.
 - b) Optical control by reflectors or refractors.
 - c) Material and finish of housing compatible with mounting.
3. Lighting Cutoff:
 - a. Configure exterior area lighting to avoid spill light on adjacent property and streets.
 - b. Configure exterior area lighting to minimize illumination of building facade and building windows, in particular.

C. Structure:

1. Provide mounting system for exterior area lighting that is capable of withstanding 3-second wind gusts in excess of 90 mph.

D. Durability:

1. Vandal Resistance:
 - a. Parts not easily removed without the use of special tools.
 - b. Luminaires mounted at minimum height of 12 ft above grade.
 - c. Lenses of tempered glass, high impact acrylic, polyacrylate, or polycarbonate.

E. Operation and Maintenance:

1. Minimum Outdoor Operating Temperature: Provide lighting systems that operate at temperatures as low as 0 deg F.
2. Ease of Relamping: Provide luminaires designed for easy relamping without special tools.

END OF CHAPTER D6.2

CHAPTER D7 - TELECOMMUNICATIONS

PERFORMANCE

- A. Basic Function:
 - 1. Provide the following telecommunications services:
 - a. Voice and Data: Infrastructure for voice and data transmission and telephone equipment.
 - b. Television: Television distribution, reception, and equipment.
- B. Amenity and Comfort:
 - 1. Convenience:
 - a. One telephone/data outlet in each room unit.
 - b. Telephone/data outlets as required in Great Room, TV room, and office.
- C. Operation and Maintenance:
 - 1. Allowance for Change and Expansion:
 - a. Spare Distribution Capacity: 10 percent, minimum.

END OF CHAPTER D7

CHAPTER D7.1 - VOICE AND DATA

PERFORMANCE

A. Basic Function:

1. Provide means of conveying voice communication between rooms and spaces in the building and between the building and the Government's telephone network provider as specified in the program and as follows.
 - a. Point-to-Point Voice Communications For:
 - 1) Private two-way verbal communication.
 - c. Connection between internal communications and public telephone system.
2. Provide means of conveying telephone/data within the building as specified in the program and as follows.
 - a. Connection between Internet and internal network will be via modem over normal telephone lines.
 - 1) The installation of all cable shall meet the physical and electrical requirements of EIA/TIA 568B and 569 standards. Horizontal cabling from the telephone equipment room to all combination outlets shall be category five (CAT5e), 4-pair, 24 American Wire Gauge (AWG), 100 ohm, solid, unshielded twisted pair (UTD) cable. All voice and data cables shall not exceed 295 ft. and will be continuous without splices from termination board to outlet termination. Cabling shall be neatly bundled, properly tagged and labeled.
 - 2) Size electrical metallic tubing (EMT) conduit and outlet boxes as required by cabling to be installed. Minimum size for EMT conduit shall be 1 inch.
 - 3) Telephone Equipment Room: Two, 4 ft. by 8 ft. by 3/4 " plywood backboards. Provide at least one wall telephone outlet, a minimum of two dedicated 20 amp, 110 volt AC outlets, and a No. 6 copper ground wire in conduit to building ground. Show location of communications equipment backboards on the floor plans and on other drawings as necessary for clarity. Copper horizontal distribution cabling shall be terminated on wall mounted 110 blocks for voice.
 - 4) Comply with Lackland AFB Communications Standards.
 - b. Telephone/data outlets are required in the following spaces:
 - 1) Each interior room, minimum of one telephone/data each room.
 - 2) Each office.
 - 3) Each other location indicated as "telephone/data" on project program.
3. Provide manhole and duct system to meet Lackland AFB Communications Standards and project program. Connect to the existing manhole and duct system indicated on drawings included in Volume IV. Service cable will be provided by Lackland AFB.

B. Operation and Maintenance:

1. Transmission Capacity:
 - a. Sound Communication Cabling: 10 megabits per second; RJ45 connectors.
 - b. Data Communication Cabling: 10 megabits per second; RJ45 connectors.

PRODUCTS

A. Communication Cabling:

1. Use one of the following:
 - a. Copper cable.
 - b. Wiring troughs.

END OF CHAPTER D7.1

CHAPTER D7.3 - TELEVISION

PERFORMANCE

A. Basic Function:

1. Provide the following television reception and distribution functions:
 - a. Cable television reception, via provider hard connection.
 - 1) Provide and install a complete, concealed, wired cable television (CATV) system inside the building. It will consist of RG-59 coax CATV cable, installed in a 3/4" EMT conduit, connected to an F-connector, mounted in a steel junction box with a faceplate.
 - 2) Coordinate with the local CATV provider to install service to the building. Provide and install a 2" conduit to a point 5 ft. from the building for the CATV provider to install the cable to the building.
 - b. CATV Outlets: One in each living/bedroom, and one in each TV room.

B. Operation and Maintenance:

1. Transmission Capacity:
 - a. Video/Audio Cabling: Coaxial 75 ohm, plus 2 dB, 100 percent shielded.

END OF CHAPTER D7.3

CHAPTER D9 - OTHER SERVICES

PERFORMANCE

A. Basic Function:

1. Other services include:
 - a. Special Grounding Systems: Elements for lightning protection per IEEE 142-1991 and IEEE 1100-1999.
 - b. Lightning protection system shall be "Master Label" certified.
 - c. Cathodic Protection: Elements for supplementary corrosion prevention using cathodic protection.
 - d. All underground piping test stations shall be #10 trace wire accessible at valves and building riser.

END OF CHAPTER D9

CHAPTER D9.4 - CATHODIC PROTECTION

PERFORMANCE

A. Basic Function:

1. Cathodic protection is required for the following elements:
 - a. Submerged metallic items such as pipes, ducts, conduits, fire hydrants, valves, fittings, and structural elements. This includes gas, water, HVAC system, fire protection, etc.
 - b. Buried metal piping carrying petroleum products or other hazardous or toxic materials, where installed without means of visual observation of entire exterior surface of piping.
 - c. Buried metal tanks holding petroleum products or other hazardous or toxic materials, where installed without means of visual observation of entire exterior surface of tank.
 - d. Other buried metal pipes, ducts, conduits, tanks, and structural elements outside the building.
 - e. Other buried metal elements, if post-occupancy tests determine AC or DC electrical currents to be present in the ground.

B. Durability:

1. Corrosion Prevention by Cathodic Protection: Designed and constructed in accordance with NACE RP0169-1996 and NACE RP0285-1995; either galvanic anode or impressed current system.
 - a. Design of Protected Elements: In addition to requirements specified elsewhere, as specified in NACE RP0169-1996 and NACE RP0285-1995, including coatings.
 - b. Measurement Techniques: As specified in NACE TM0497-1997.

END OF CHAPTER D9.4

CHAPTER E - EQUIPMENT AND FURNISHINGS

PERFORMANCE

A. Basic Function:

1. Design the facility to accommodate the equipment and furnishings required by the Government, which are specified in the project program.
2. Equipment and furnishings comprise the following elements:
 - a. Equipment: Mechanized, plumbed, and electrical devices, other than equipment that is part of a service system (HVAC, electrical, etc.), and permanently installed fixtures not covered by another chapter.
 - b. Furnishings: Movable (loose) furniture and fittings, without electrical or plumbing connections.
 - c. Built-in two-burner non-induction ceramic glass range top. Conventional oven is not required.
3. All specified equipment and furnishings except items listed below as GFGL are to be provided by the Contractor.
4. The following equipment and furnishings are to be provided by the Government:
 - a. Washers.
 - b. Dryers.
 - c. Laundry folding tables.
 - d. Office furnishings.
 - e. Guest room furnishings (TV, tables, chairs, game tables).
 - f. Modular furnishings (beds, chairs, tables, dressers).
 - g. Refrigerator/freezer.
7. Government-Furnished Items: Performance requirements that specify characteristics of equipment or furnishings items do not apply; requirements for accommodating items to the project do apply.
8. Where equipment or furnishings elements also must function as elements defined within another element group, meet requirements of both element groups.
9. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter 111 - Facility Performance.

B. Amenity and Comfort:

1. Appearance:
 - a. Services Connections to Equipment: Concealed behind or under items or their housings.
 - b. Power supply cords: To be strapped or bound together and concealed at unit.

C. Health and Safety:

1. Accident Prevention:
 - a. Comply with the requirements of 29 CFR 1910, regulations of Occupational Safety and Health Administration.

D. Durability:

1. Service Life Span: Same as for building.
2. Weather Resistance: Items located outdoors must comply with requirements of Chapter B.
3. Vandal Resistance: Parts not easily removed without the use of tools.

E. Operation and Maintenance:

1. Ease of Maintenance: Not requiring any routine measures to maintain operation or finishes, other than washing with soap and water.

2. Ease of Repair: Serviceable parts and access panels easily removable with common tools.
3. Ease of Equipment Service: As specified in Chapter 111 and the following:
 - a. Parts Having Service Life Less Than That Specified for Element: Easily replaceable, without de-installation or de-mounting of the entire element, component, or equipment item.
 - b. Valves: Easily replaceable internal parts, eliminating necessity of removal of entire valve for repair.
 - c. Parts: Readily available from stocking distributors within 50 miles of project location.

END OF CHAPTER E

CHAPTER F - DEMOLITION

PERFORMANCE

- A. Scope of Work:
1. Remove all existing construction and utilities that effect the design and construction of this project.
 - a. See other chapters for existing elements that must be preserved.
 - b. See Chapter G for existing site elements that must be salvaged for the Government.
 - c. See Chapter 00830 for elements to be removed prior to start of construction.
 - d. The following existing elements must be removed even if removal is not actually necessary for the design:
 - 1) All abandoned foundations, paving, walks, curbs, pipes, ducts, and conduits, whether above or below ground, within the construction area.
 - e. The following existing elements may remain in place provided they are concealed in the final work:
 - 1) Foundation walls and footings located inside the building footprint.
 2. Relocate existing construction and utilities as required for the design.
 - a. Reference Chapter G34 for new underground service where required.
 3. Where requirements of another element group also apply to demolition or relocation operations, meet the requirements of that element group as well.
 4. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter 111 - Facility Performance, Chapter G - Sitework, and Chapter G1 - Site Preparation.
- B. Amenity and Comfort:
1. See Chapter 00830 for noise control and dust control.
 2. Public Amenity: Conduct operations so as to cause minimum annoyance of the public and adjacent property owners and tenants.
- C. Health and Safety: See Chapter 00830 for additional requirements.
1. Health Hazards:
 - a. Whenever construction operations could result in worker contact with hazardous materials, follow recommendations of an American Board of Industrial Hygiene Certified Industrial Hygienist (CIH) employed by Contractor.
 - b. Existing Asbestos and Asbestos-Containing Materials: Comply with 29 CFR 1926.1101 and applicable state and local regulations; complete removal is required.
 - 1) Substantiation:
 - a) Design: Project survey and chemical analysis to determine presence or confirm absence of asbestos and asbestos-containing materials.
 - b) Construction Documents: Detailed plan for compliance.
 - c. Existing Lead-Based Paint: Comply with 29 CFR 1926.62 and applicable state and local regulations; either removal or recoating is acceptable.
- D. Structure:
1. Prevent movement or settlement of structures that are to remain.
 2. Cease operations immediately if structures that are to remain appear to be in danger; do not resume operations until danger has been removed or remedied.
 3. Coordinate demolition with grading so that final grades do not subside within one year after completion.

E. Durability:

1. Maintain temporary and permanent erosion and sediment controls during demolition and relocation operations or replace as soon as demolition or relocation is complete.

F. Operation and Maintenance:

1. Comply with requirements of utility providers.
2. Locations of Existing and Abandoned Utilities: Recorded or marked in such a manner that they can be easily located during and after completion of construction.

METHODS OF CONSTRUCTION

A. Use one or more of the following methods:

1. Hand cutting.
2. Machine cutting.

B. Do not use any of the following methods:

1. Explosive demolition.

END OF CHAPTER F

CHAPTER G - SITEWORK

PERFORMANCE

A. Basic Function:

1. Provide all modifications to the site and site improvements and utilities required for proper functioning of the project, as indicated in the project program, and in accordance with the Foundation and Pavement Design Analysis provided by the US Army Corps of Engineers, Fort Worth District.
2. Sitework comprises the following elements:
 - a. Site Preparation: All modifications to the site and grades required for construction of new work and for proper functioning of the project.
 - b. Site Improvements: All elements required to provide finished and durable site surfaces, indoor plantings, and outdoor improvements described in the project program and site master plan.
 - c. Site Services: All outdoor and underground elements required to complete the design of services defined in Chapter D - Services.

B. Health and Safety:

1. Safety:
 - a. Inhibit:
 - 1) The intentional passage of people across controlled access highways, except at intended roadway crossings.
 - 2) The intentional driving of vehicles from adjacent public rights-of-way onto the site, except at intended roadway accesses.
 - 3) The building and site shall comply with the Department of Defense Antiterrorism/Force Protection Construction Standards.
 - b. Prevent:
 - 1) The passage of people and dogs from the site onto the public right-of-way.
 - 2) The accidental crossing of vehicles between driving lanes moving in opposite directions, except for roadways on which the intended speed limit is less than 40 mph.
 - 3) Access by unauthorized persons to outdoor areas containing electrical equipment that has exposed powered components.
2. Fire Sources: Design to minimize the danger of wildfires spreading to the site, by complying with NFPA 299-1997.

C. Durability:

1. Weather Resistance of Plants and Turf: Use plants that will withstand extremes of weather likely to occur in any 5 years without supplementary irrigation and without seasonal protection other than mulch.
 - a. Government agrees that maintenance to the level specified by the Contractor will be necessary to assure survival of the plants.
 - b. Exception: Supplementary irrigation is expected during new plant establishment period.
2. Traffic Resistance: Provide finished site surfaces that are permanently resistant to the type of traffic to be expected, under all weather conditions.
3. Vehicular Collision: Design to minimize the probability of vehicular impact on site fixtures and accidental driving on lawns and landscaped areas.

END OF CHAPTER G

CHAPTER G1 - SITE PREPARATION

PERFORMANCE

A. Basic Function:

1. Provide all modifications to the site required for proper functioning of the project and as indicated in the program.
2. Site preparation is comprised of the following elements:
 - a. Clearing: Removal of trash, existing built elements, and vegetation that is not needed, and temporary erosion control.
 - b. Earthwork: Changing of grade levels, removal of soil and rock, modifying existing soils in preparation for construction, and temporary and permanent erosion and sediment control structures made of soil or rock. Dispose of excess excavated soil and rock materials on Lackland AFB as directed by the Contracting Officer's Representative.
 - c. Removal: The Contractor may encounter six (6) 5'x5'x2' old concrete foundations below grade at each building site to be removed and disposed of prior to site preparation. Dispose of removed concrete materials on Lackland AFB as directed by the Contracting Officer's Representative.

END OF CHAPTER G1

CHAPTER G2 - SITE IMPROVEMENTS

PERFORMANCE

A. Basic Function:

1. Provide all elements required for finished and durable site surfaces, and outdoor improvements described in the project program.
2. Site improvements comprise the following elements:
 - a. Pavements and Surfacing: Finished surfaces for vehicular, and pedestrian, other than turf. Refer to the following reference standards for design guidance: Geometric Features - TM5-803-5, TM5-822-2, AEIM, Uniform Federal Accessibility Standards.
 - b. Site Fixtures and Equipment: Fixtures, equipment, and miscellaneous structures located out-of-doors, except those located on the roof or mounted on walls of buildings.
 - c. Landscaping: Outdoor plants and elements supporting plants.

B. Durability:

1. Weather Resistance of Plants: Provide a concealed irrigation system for all plantings that are not required to survive normal weather extremes without supplementary irrigation.

END OF CHAPTER G2

CHAPTER G2.1 - PAVEMENTS AND SURFACING

PERFORMANCE

A. Basic Function:

1. Provide exterior pavements and surfacing, as required by the project program and by code, that are adequate in extent and sufficiently durable to accommodate without damage the types of traffic that can be reasonably anticipated for the facility type and intended user population.
2. Pavements and surfacing comprise the following elements:
 - a. Exterior paved or surfaced areas such as driveways, parking lots, and walkways.
 - b. Exterior steps and ramps not connected to buildings, including handrails and stair nosings.
 - c. Appurtenances for roadways and driveways, including curbs, gutters, guardrails, pavement markings, and parking bumpers.
 - d. Signs, including traffic signals, "stop," "yield", and directional signs, and parking space marking and identification.
3. Roadways and Driveways: Provide paved surfaces as required for vehicular access to the project site and to various functional areas requiring vehicular access, including parking areas, and loading and unloading zones.

B. Health and Safety:

1. Safety of Pedestrian Surfaces:
 - a. Slip Resistance: Provide walking surfaces of exterior stairs, ramps, and walkways with a minimum coefficient of friction of 0.80, measured in accordance with ASTM D 2047-1996.
2. Safety of Vehicular Areas:
 - a. Traffic Signs and Signals: Provide highly visible signs and signals as required to regulate traffic for safety and convenience.
 - 1) Comply with requirements of Lackland Air Force Base and referenced USAF Base Architectural Standards for Excellence for placement and design.

C. Durability:

1. Service Life Span of Paved Surfaces: 20 years, under normally anticipated usage.

END OF CHAPTER G2.1

CHAPTER G2.2 - SITE FIXTURES AND EQUIPMENT

PERFORMANCE

A. Basic Function:

1. Provide all fixtures, equipment (other than that associated with services), and miscellaneous structures located out-of-doors that are required by the project program and that are required as a result of these and other requirements.
2. Site fixtures and equipment that are required include:
 - a. Site furnishings, as required by building program.
 - b. Outdoor signs, other than roadway and parking lot signs, as required by building program.

C. Durability:

1. Service Life: 15 years under normal use and weather.

PRODUCTS

B. Signs:

1. Match existing signs on Lackland AFB.

END OF CHAPTER G2.2

CHAPTER G3 - SITE SERVICES

PERFORMANCE

A. Basic Function:

1. See Chapter D for basic requirements for services.
2. Provide the following site services:
 - a. Electrical Power: Adequate supply of power for project functions. See Chapter D5 for additional requirements.
 - 1) Provide underground electrical service for the new building.
 - b. Site Elements of Artificial Lighting: See Chapter D6.
 - c. Site Elements of Telecommunications: See Chapter D7, D71, D72, and D73.
3. Where site services elements must also function as elements defined within another element group, meet requirements of both element groups.
4. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter 111 - Facility Performance, Chapter D - Services, and Chapter G - Site Work.

B. Amenity and Comfort:

1. Accessibility: Provide clearances around components that are adequate for service and use.

C. Health and Safety:

1. Safety Hazards: Avoid safety hazards wherever possible; where services must involve flammable materials or hazardous operations, comply with code.
2. Electrical Shock: Isolate electrical conductors from personnel.

D. Durability:

1. Service Life Span: Same as the service life of the building.
 - a. Electrical Equipment: Minimum of 10 years without failure.
2. Weather Resistance:
 - a. Electrical Equipment: Provide equipment which is waterproof.
3. Corrosion Resistance: Prevent corrosion by using corrosion-resistant materials, by preventing galvanic action, by preventing contact between metals and concrete and masonry, and by preventing condensation on metals.
 - a. Metals Considered Corrosion-Resistant: Aluminum, stainless steel, brass, bronze, cast iron, ductile iron, malleable iron, hot-dipped galvanized steel, chrome-plated steel, cadmium-plated steel, and steel coated with high-build epoxy or coal tar-based paint.
 - b. Underground Elements: Provide supplementary protection for underground metal conduits, sufficient to prevent corrosion completely, for the service life of the element without maintenance.
 - 1) 3 inches of concrete cover is considered to be permanent protection.
 - 2) See Chapter D94 for cathodic protection requirements.
4. Resistance to Accidental Damage and Abuse:
 - a. Provide barriers or protected locations for services, to prevent damage due to vehicular traffic.
 - b. Buried Components: Minimum of 12 inches below surface of ground.

E. Operation and Maintenance:

1. Ease of Use: Provide easy access to and working clearances around system components.

2. Provision for Change and Future Capacity:
 - a. Provide electrical equipment which can be modified to increase service capacity in the future.

END OF CHAPTER G3

CHAPTER G34 - ELECTRICAL POWER

PERFORMANCE

- A. Basic Function:
 - 1. Provide electrical power supply and distribution elements.
 - 2. Provide new underground service at the location of the building.
 - 3. Where site electrical power elements must also function as elements defined within another element group, meet requirements of both element groups.
 - 4. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter 111 - Facility Performance, Chapter G - Sitework, and Chapter G3 - Site Services.
- B. Amenity and Comfort:
 - 1. Appearance:
 - a. Provide underground electrical power distribution with pad mounted transformers.
 - b. Utility Pole Height for Electrical Distribution: As required by Lackland AFB Utility Group.
- C. Health and Safety:
 - 1. Electrical Shock Prevention:
 - a. Provide a means of disconnecting power at each piece of equipment.
- D. Durability:
 - 1. Life Span: Provide a system which will last a minimum of 10 years in service without major repairs or operating expense.
 - 2. Corrosion: Provide buried conduits which are resistant to corrosion.
- E. Operation and Maintenance:
 - 1. Capacity: As required by code.
 - 2. Transformer Ratings:
 - a. Primary Voltage/Phase/Frequency: Confirm base voltage.
 - b. Secondary Voltage/Phase/Frequency: 208 volt/3 phase/60 Hz.
 - c. Capacity: As required
 - 3. Ease of Cleaning: Provide electrical distribution elements with removable access panels to allow cleaning.
 - 4. Ease of Maintenance: Provide electrical distribution elements which are modular in design.

END OF CHAPTER G34

SECTION 01000

DESIGN AND CONSTRUCTION SCHEDULE

03/2001

AMENDMENT NO. 0004

PART 1 GENERAL

1.1 SCHEDULE

Commence, prosecute, and complete the work under this contract in accordance with the following schedule and Section 00700 CONTRACT CLAUSES clauses COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK and LIQUIDATED DAMAGES:

Item of Work	Commencement of Work (calendar days)	Completion of Work (calendar days)	Liquidated Damages per calendar day[¹] <u> </u> <u> </u> <u> </u>
(1) Completion of all design and construction work except Establishment of Turf and Landscaping	Within 10 calendar days after receipt of Notice of Proceed	730	\$1300.00
(2) Establishment of Turf	**	**	---
(3) Landscaping	***	***	---

¹NOTES:

a. The Contract duration stated above for Work Item 1 is the maximum duration. Upon Contract Award, the Contractor's proposed duration as stated on the Price Proposal Schedule shall become the contract duration for this Work Item. The liquidated damages stated above will be applied for each calendar day the Contractor exceeds the Contract duration schedule.

b. See Section 01015 DESIGN REQUIREMENTS AFTER AWARD, paragraph "SUBMISSION OF CONSTRUCTION DRAWINGS, SPECIFICATIONS, AND DESIGN ANALYSES," concerning submission of construction documents and Section 01000 paragraph, "SEQUENCE OF DESIGN/CONSTRUCTION," concerning start of construction.

c. For construction planning purposes Government review time for review submittals is specified in 01015 DESIGN REQUIREMENTS AFTER AWARD.

d. Delay in completion of design will not be considered as a valid reason to delay completion of entire work.

*Establishment of Turf

Planting and maintenance for turfing shall be in accordance with Contractor's Section for TURFING . No payment will be made for establishment of turf until all requirements of the section are adequately performed and accepted, as determined by the Contracting Officer.

**Landscaping

Planting and maintenance for landscaping shall be in accordance with Contractor's Section for LANDSCAPING. No payment will be made for landscaping until all requirements of the section are adequately performed and accepted, as determined by the Contracting Officer.

1.1.1 Testing of Heating and Air-Conditioning Systems

The times stated for completion of this project includes all required testing specified in appropriate specification sections of heating, air conditioning and ventilation systems including HVAC Commissioning. Exception: boiler combustion efficiency test, boiler full load tests, cooling tower performance tests, and refrigeration equipment full load tests, when specified in the applicable specifications, shall be performed in the appropriate heating/cooling season as determined by the Contracting Officer.

1.2 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (OCT 1989)
(ER 415-1-15)(52.0001-4038 1/96)

a. This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the contract clause entitled "Default: (Fixed Price Construction)." In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

(2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

b. The following schedule of monthly anticipated adverse weather delays due to precipitation and temperature is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities. Wind is not considered in the Monthly Anticipated Adverse Weather Calendar Day Schedule.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY

WORK DAYS BASED ON (5) DAY WORK WEEK

SAN ANTONIO, TX AREA (FORT SAM HOUSTON, KELLY, LACKLAND,
BROOKS, AND RANDOLPH AFB'S AND RESERVE CTRS AT SAN ANTONIO)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4	3	3	2	4	4	1	1	3	2	2	3

c. Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the contractor's scheduled work day.

The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph "b", above, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the contract clause entitled "Default (Fixed Price Construction)."

1.3 WORK RESTRICTIONS

1.3.1 Working Hours

Normal working hours are Monday through Friday, 0730 to 1630 hours. Contractor may request through the Contracting Officer's representative for other work hours to meet project needs.

1.3.2 Security Requirements

For the duration of this Contract, access to the Installation may be delayed between 30 minutes to an hour or more due to security precautions, including the checking of vehicle occupants' IDs, vehicle manifests, and the searching of all vehicles.

1.4 UTILITIES

1.4.1 Payment for Utility Services (FAR 36.303(C)(6))

In accordance with Contract Clause 52.236.14 AVAILABILITY AND USE OF UTILITY SERVICES, water, gas, sewer, and electricity are not available from Government-owned and operated systems. The Contractor shall make arrangements for use and payment of utilities with the City utility company. An advance deposit for utility connection may be required.

1.4.2 Coordination

a. The Contractor shall coordinate with utility companies on the design and construction of gas, water, electricity, and sewer systems, including the meter. Contractor is responsible for design and construction from within the building up to the meter. All fees and costs for the work by the utility companies will be paid by the Contractor.

b. The Contractor shall coordinate with San Antonio Water and Sewer (SAWS) for connecting the irrigation system into the San Antonio Reuse Water

Distribution System. Use of the reuse water distribution system is required for all irrigation systems. All fees and costs associated with connecting into the system will be paid by the Contractor.

1.4.3 Outages

The Contractor shall coordinated all requests for utility outages with the Contracting Officer in writing 14 days prior to date of requested outage:

- a. Water, gas, steam, and sewer outages shall be held to a maximum duration of 4 hours unless otherwise approved in writing.
- b. Electrical outages shall have a maximum duration of 4 hours.
- c. All utility outages shall be scheduled only on Saturdays, Sundays, or holidays unless specific approval is otherwise received.

1.5 STREET CLOSINGS

The Contractor shall coordinate all requests for street closings with the Contracting Officer in writing 14 days prior to date of requested outage:

- a. One lane traffic shall be maintained at all times (except that a total closing may be allowed for specific 8-hour periods).
- b. The final street repair shall be completed within 14 days after the start of any street crossing. Any part of the street returned to service prior to final repair shall be maintained smooth with hot-mix cold-lay surface course.

1.6 SEQUENCE OF DESIGN/CONSTRUCTION

(a) After receipt of the Contract Notice to Proceed (NTP) the Contractor shall initiate design, comply with all design submission requirements as covered under Division 01 General Requirements, and obtain Government review of each submission. No construction may be started **(AM#4)** _____ until the Government reviews the Final Design submission and determines it satisfactory for purposes of beginning construction. The Contracting Officer will notify the Contractor when the design is cleared for construction. The Government will not grant any time extension for any design resubmittal required when, in the opinion of the Contracting Officer, the initial submission failed to meet the minimum quality requirements as set forth in the Contract.

(b) If the Government allows the Contractor to proceed with limited construction based on pending minor revisions to the reviewed Final Design submission, no payment will be made for any in-place construction related to the pending revisions until they are completed, resubmitted and are satisfactory to the Government.

(c) No payment will be made for any in-place construction until all required submittals have been made, reviewed and are satisfactory to the Government.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

SECTION 01015

DESIGN REQUIREMENTS AFTER AWARD

12/2000

AMENDMENTS NO. 0003 & 0004

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Section Includes

This section includes requirements for developing and submitting a design including preparation of drawings, specifications and design analyses conforming to the requirements contained in this section.

1.1.2 Section Excludes

This section does not include requirements for construction submittals which are specified in Section 01330 SUBMITTAL PROCEDURES.

1.2 DESIGN COMPLETION SCHEDULE

See paragraph COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK in Section 01000 DESIGN AND CONSTRUCTION SCHEDULE for the Completion Schedule of the entire work.

1.3 REFERENCES

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

CONSTRUCTION SPECIFICATIONS INSTITUTE (CSI)

CSI MasterFormat (1995) MasterFormat

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 763 Asbestos

1.4 METRIC REQUIREMENTS

The Contractor has the option of providing the design in either English or Metric dimensions. Once the dimensional standard (English or Metric) is selected, the Contractor needs to remain consistent in using the same standard for the entire project. See Section 01016 DESIGN DOCUMENT REQUIREMENTS for additional requirements.

1.4.1 Definitions

Definitions of hard and soft metric are specified in Section 01415 METRIC MEASUREMENTS.

1.4.2 Project Documents

Wherever possible, the project documents shall be accomplished using "hard" metric measurements; drawings, narratives, calculations, dimensions, capacities, and similar expressions of measurement shall be expressed in "hard" metric units.

1.4.3 SI Units of Measure

Products and building components furnished in "hard" metric units are those manufactured using SI units of measure. SI units of measure shall be stated in metric only; do not repeat their English equivalency in parentheses following the metric unit.

1.4.4 Modular Construction Products

Soft metric conversions from their English units are permitted for modular construction products, unless the application of the product requires it to dimensionally coordinate into the 100 millimeter building module. Modular construction products are brick, concrete block, wallboard, plywood, suspended ceiling systems, recessed lighting, raised access flooring and other manufactured components with dimensions based upon a four (4) inch building module. Coordinate finishes available in metric with those available in non-metric.

1.4.5 Metric Design Guide

The designer shall obtain a copy of and follow the requirements in the "Metric Design Guide" (PBS-PQ260), May 1994, U.S. General Services Administration Public Buildings Service. A copy will be furnished after award of the contract.

1.5 DEFINITIONS

1.5.1 Acceptance

This is the Government's review of the design submittals, construction submittals, and record drawings for conformance to the Contract requirements. Acceptance shall not be construed to be an endorsement of the accuracy or completeness of the design. The Contractor is ultimately responsible for the contract design and construction. Design deficiencies or omissions in the accepted design shall be the responsibility of the Contractor and the Designer of Record.

1.5.2 Approve, Approved and Approval

As these words are used throughout the documents, they shall mean "as approved by the Designer of Record unless otherwise expressly stated." See Section 01330 CONSTRUCTION SUBMITTAL PROCEDURES.

1.5.3 Complete Specification Section

A Complete Specification Section is one that follows the Construction Specifications Institute's (CSI) 16-Division, 3-Part Section format, including the required submittal register and testing requirements.

1.5.4 Contractor

Firm or company to whom award is made to design and construct the project.

1.5.5 Contract Documents

Contract Documents, in addition to the signed Contract Form and the Contract Clauses, include the Request for Proposal, all amendments, the Contractor's proposal as accepted, and the Contractor approved, Government accepted 100% final construction documents.

1.5.6 Construction Documents

Documents provided by the Contractor and accepted by the Government for use in constructing the project, including but not limited to final design drawings and specifications, schedules, submittal registers, and color boards.

1.5.7 Design Documents

Documents which include design drawings, project specifications, and design analyses (basis of design and calculations) prepared by or under the direct supervision of registered professional architects and engineers and proposed by the Contractor to meet the requirements of this Contract.

1.5.8 Design Drawings

Documentation showing in graphic and quantitative form the extent, design, location, relationships, and dimensions of the construction to be provided by the Contractor. (Note: Shop Drawings, as defined in Section 01330 CONSTRUCTION SUBMITTAL PROCEDURES, are not to be provided until after design drawings are approved for construction.)

1.5.9 Designer

Architects and Engineers (A/E) associated with the Contractor who are responsible for the design and have the qualifications and experience specified.

1.5.10 Designer of Record

The Contractor's Architect/Engineer (A/E) is the "Designer of Record" and officially approves the design submittals, construction submittals, and record drawings. There shall be a designer of record for each design discipline. The designer of record is solely liable for design errors and/or omissions and shall have professional liability insurance to insure the designer against design errors and omissions. The Contractor's Quality Control Staff will check and certify all submittals. See paragraph DESIGNER(S) OF RECORD for additional requirements.

1.5.11 Mandatory Sections

Mandatory Sections are those sections included in Divisions 2 through 16 of the RFP which have been completely edited and shall be included in the Contractor's technical specifications verbatim.

1.5.12 Solicitation or Request for Proposal (RFP)

Documents furnished to prospective offerors containing proposal information and specifying criteria and project requirements for design and construction of the project. The documents include this specification, attachments, and the information drawings.

1.5.13 Construction Specifications

Construction specifications are the Contractor's developed construction specifications consisting of the Government-furnished Division 1 (General Requirements) sections and the Contractor-written sections in Divisions 2 through 16 which will be used to construct the project. Divisions 2 through 16 shall include any the Contract mandatory specifications.

1.5.14 Design Development (60 Percent Design) Submittal

(AM#4) Design Development (60 Percent Design) Submittal shall mean 60 percent completion of all building design, including foundations; site work design; and utility design. See paragraph DESIGN SUBMITTALS for further clarification.

1.6 SUBMISSION OF CONSTRUCTION DRAWINGS, SPECIFICATIONS AND DESIGN ANALYSES

1.6.1 Certification

With each submittal the Contractor shall certify that all items submitted in the design documents (after contract award) comply with the Contract requirements. The criteria specified in this Contract are binding contract criteria and in case of any conflict, after award, between the Contract criteria and Contractor's submittals, the criteria stated in the Document Order of Precedence in Section 00800 SPECIAL CONTRACT REQUIREMENTS will govern. The Contractor shall present with the letter of transmittal for each design submittal (including the 100 percent corrected design (compliance check) submittal) a certification that the submittal (drawings, specifications, design analysis, etc.) complies with the requirements stated above. Prepare the design certification and transmittal letter in the format shown on Attachment A attached at the end of this Section.

1.6.1.1 Signatures

The certification shall be signed by an officer of the Contractor's company and the licensed architect/engineer designer of record attesting that the drawings, specifications and design analyses prepared for the construction of the facility meet the requirements of the Contract.

1.6.2 Deviations

Deviations from the Contract requirements shall be identified in each design submittal's letter of transmittal. Deviations from the Contract requirements will be considered for approval by the Contracting Officer. The Contracting Officer may reject any deviation proposed by the Contractor without explanation.

1.6.3 Field Verification

The Contractor shall verify field conditions which are significant to design by field inspection, researching and reviewing the existing documents pertaining to the site and existing building(s), and evaluating observable existing conditions. The information shall be reflected in the design documents. It is the responsibility of the Contractor to evaluate existing conditions in the immediate proximity of the project to determine if such conditions may affect, or be affected by the proposed construction. If there are site conditions which appear to affect the proposed

construction the Contractor shall inform the Contracting Officer, in writing, before proceeding with the project.

1.6.4 Number of Copies

The number of copies for distribution is specified in paragraph "Review Document Distribution." For each design submittal, submit for review and acceptance the specified number of copies of the construction drawings, specifications, design analyses, equipment schedules, submittal register, and all other submittal data, which shall be in accordance with the requirements of the Contract Documents. Upon final acceptance, make distribution of the accepted design and construction documents within 7 calendar days. With each distribution, provide one CD-ROM disk (or more if required) containing all documents. The CD-ROM disks shall be fixated "Final," which is a recording option that renders the disk totally used so that no other data tracks can be added in a later recording session. Proposed modifications shall be submitted in 8 copies. Final modifications, after negotiations, shall be submitted in 8 copies (including one reproducible).

1.6.5 Final Construction Documents

Each distributed set shall consist of full-size paper drawings, specifications, submittal register, design analysis, and a CD-ROM disk(s) containing all of the final design documents (e.g. drawing, specification, submittal register, and design analysis files). Provide documents complete, accurate, and explicit enough to show compliance with the Contract requirements and to permit construction. Drawings and specifications illustrating systems proposed to meet the requirements of the Contract shall reflect proper detailing for each such system to assure appropriate use, proper fit, compatibility of components and coordination with the specifications and design analysis required by this section. Coordinate drawings to ensure there are no conflicts between design disciplines and between drawings and specifications. See Section 01016 DESIGN DOCUMENTS REQUIREMENTS for additional requirements. During and upon completion of the project, the accepted design documents shall be corrected to reflect as-built conditions in accordance with Section 01770 CONTRACT CLOSEOUT.

1.6.5.1 Final Construction Drawings

In addition to the required number of hard copies of final design documents (e.g. drawings, specifications, submittal register, and design analysis), final design (100 percent) drawings and record (i.e. as-built) drawings after the completion of the project shall be submitted on CD-ROM disk in the CADD format required by the Contract. Furnish three CD-ROM disks, one each for the Area Office, Corps of Engineers' District Office, and one for the User. On the CD-ROM disk include the .dgn or .dwg CADD drawing files, the CADD drawing files in .CAL format (CADD files converted to .CAL) for viewing on MaxView Reader, and an Excel spreadsheet listing for each drawing the drawing number, sequence number, level/layer assignments, line colors, line weights, and line types. See Section 01016 DESIGN DOCUMENT REQUIREMENTS for additional requirements. The CADD drawings shall be furnished in AutoCAD vs 14 (user requirement).

1.6.5.2 Computer Aided Design and Drafting (CADD) Systems

Within 10 days of Contract Notice to Proceed, furnish for approval samples of CADD electronic files created on the equipment and software to be used

for this work. CADD work will not proceed until the Contractor's proposed CADD system and resulting CADD files have been acceptably demonstrated to work on the Corps of Engineers' Fort Worth District Office and the User's CADD systems.

1.6.6 Specifications and Design Analysis

Specifications and design analysis shall be provided in hard copy and on the same CD-ROM disk as the drawings, Microsoft Word for Windows format (Version 6 minimum, but shall be compatible with the version used at Fort Worth District). The Division 1 sections included in the RFP shall be reprinted in the final 100 percent construction specifications. Hard copies of the specifications and design analyses shall be bound separately in 3-ring binders. Each set of documents shall have its own Table of Contents. See Section 01016 DESIGN DOCUMENTS REQUIREMENTS for editing and format requirements.

1.7 DESIGN DOCUMENTS

Design documents shall include construction drawings, specifications, submittal register, design analysis, and drafts of DD Form 1354. Detailing and installation of all equipment and materials shall comply with the manufacturers' recommendations. Construction drawings and specifications shall not make reference to RFP requirements. The Contractor, including designers, shall visit the site and make other trips as necessary during the design to accomplish the work. See Section 01016 DESIGN DOCUMENT REQUIREMENTS for additional descriptions.

1.7.1 Drawings

See paragraph SUBMISSION OF CONSTRUCTION DRAWINGS, SPECIFICATIONS AND DESIGN ANALYSES, subparagraph "Final Construction Documents."

1.7.2 Specifications

Specifications shall be in sufficient detail to fully describe and demonstrate the quality of materials, the installation and performance of equipment, and the quality of workmanship. Specifications shall conform to the Construction Specifications Institute (CSI) 16-Division 3-Part format and follow the CSI's section numbering system defined in CSI MasterFormat. No two sections shall have the same section number. Division 1 specifications shall consist of the Division 1 sections included in the RFP. The specifications shall clearly identify the specific products chosen to meet the requirements of the Contract (manufacturers' brand names and model numbers or similar product information). Turfing sections shall indicate planting dates.

1.7.3 Design Analysis

Describe the design of each discipline of work, including all features and the necessary calculations, tables, methods, and sources used in determining equipment and material sizes and capacities. Provide sufficient information to support the design of the various categories such as, but not limited to, architectural, interior design, structural, mechanical, electrical, civil including grading, drainage, paving, environmental, and outside utility services, and RFP included items.

1.7.4 DD Form 1354

The 1354 process consists of a preliminary (draft) DD Form 1354 and a Final DD Form 1354. Prepare a preliminary (draft) of DD Form 1354, TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY, so that Lackland Air Force Base can update their real property maintenance records. This draft shall contain as many of the resource code items with cost and quantity data as can be developed from the Contractor's final 100% design documents. Submit it to the Contracting Officer within 30 days of the Government's acceptance of the 100% design documents. The Government will use this Final DD Form 1354 to develop the interim 1354. The form, a sample of a completed form, and a general list of resource codes with cost and quantity data are included in the ATTACHMENTS. An electronic file of the form, DD1354.frl, for use with Delrina Perform Pro Form Filler, version 16 Jul 1992, or its successor software Form Flow Filler, Version 2.22 (March 5, 1999) is located on the Solicitation and Contract CD-ROM disks.

1.8 DESIGN AND CONSTRUCTION PERSONNEL QUALIFICATIONS

1.8.1 Project Manager - Design

The design project manager shall have a recognized four year or higher college degree in architecture or engineering, be professionally licensed, and have at least 3 years experience in managing design projects and have at least 5 years of design experience. The Design Project Manager may be the lead designer, but shall not be the same individual as the Construction Project Manager.

1.8.2 Project Manager - Construction

The project manager shall have a recognized four-year or higher college degree in architecture, engineering (or related technical fields), or construction management and have at least 5 years experience in managing design and construction projects or 10 years experience in managing construction projects only. The Construction Project Manager shall not be the same individual as the Design Project Manager.

1.8.3 Project Architect

The project architect shall have a recognized four-year or higher college degree in architecture, be professionally licensed, 3 years experience as a lead architect, and have at least 5 years design experience.

1.8.4 Designers

In addition to the Project Architect, provide at least one professional licensed architect or engineer for each of the other design disciplines (landscape architectural, interior designer, civil, electrical, mechanical, and structural design) with at least 5 years experience in their discipline. Each lead designer shall have a recognized four-year (or higher) college degree in architecture or engineering. The fire protection system shall be designed by a registered engineer with a minimum of five years experience in designing fire protection systems. (Am#3) Analysis, design and installation of the lightning protection system shall be accomplished by a lightning protection specialist. The field work, analysis, and design of the cathodic protection system shall be accomplished by or under direct supervision of an engineer licensed in corrosion engineering or a corrosion specialist certified by the National Association of Corrosion Engineers (NACE). Corrosion Engineer or Corrosion Specialist shall have a minimum of five years experience in designing and installing cathodic protection systems. (Am#3)

1.8.5 Interior Designer

Interior Designer shall be National Council For Interior Design Qualification (NCIDQ) certified or professionally licensed.

(Am#3) 1.8.6 Lightning Protection Specialist

Lightning Protection Specialist shall be a master certified by the lightning protection institute (LPI) in design and installation. This specialist shall have a minimum of five years experience in Design and Installation of lightning protection systems.

1.8.7 Design Quality Control Manager

Design quality control manager and the alternate manager qualifications are specified in Section 01430 DESIGN QUALITY CONTROL. Design quality control manager shall not be the same person as the construction quality control manager.

1.8.8 Construction Quality Control Manager

Construction quality control manager and assistants qualifications are specified in Section 01451 CONSTRUCTION QUALITY CONTROL. Construction quality control manager shall not be the same person as the design quality control manager.

1.8.9 Communications Consultant

This project requires the utilization of a Communications Consultant (CC) who is a Registered Communications Distribution Designer (RCDD). This shall include all phases of design and coordination with other disciplines for all systems listed in the Design Criteria References and these Design Instructions. The CC shall have a minimum of five years of Telecommunications Design experience. The use of any on-staff electrical engineers for design of the telecommunication systems and who are not RCDD is not acceptable.

1.8.10 CADD Personnel

CADD personnel shall be proficient in the preparation of architectural and engineering drawings and the CADD equipment that will be used to create the required drawings and record drawings. The lead CADD person shall have at least 5 years experience on the proposed equipment.

1.8.11 Project Schedule Scheduler

Qualifications for the Scheduler are specified in Section 01320 PROJECT SCHEDULE.

1.9 DESIGNER(S) OF RECORD

The Contractor shall identify, for approval, the Designer of Record for each area of work. One Designer of Record may be responsible for more than one area. All areas of design disciplines shall be accounted for by a listed, registered Designer of Record. The Designer(s) of Record shall stamp, sign, and date all design and construction drawings under their responsible discipline at each design submittal stage, including modification drawings after start of construction **(see Section 00700,**

CONTRACT CLAUSES, Clause 52.236-25 entitled "Requirement for Registration of Designers). (AM#4)

1.10 CONSTRUCTION MANAGEMENT KEY PERSONNEL

The Contractor's construction management key personnel shall be actively involved during the design process to effectively integrate the design and construction requirements of this Contract. In addition to the typical required construction activities, the Contractor's involvement shall include, but is not limited to, actions such as integrating the design schedule into the Master Schedule to maximize the effectiveness of fast-tracking design and construction (within the limits allowed in the Contract), ensuring constructability and economy of the design, integrating the material and equipment acquisition programs to meet critical schedules, effectively interfacing the construction QC program with the design QC program, and maintaining and providing the design team with accurate, up-to-date redline and as-built documentation. The Contractor shall require and manage the active involvement of key trade subcontractors in the above activities. The Contractor's Quality Control Staff will check and certify all submittals.

1.11 DESIGN SUBMITTALS

1.11.1 General

The Contractor shall schedule the number and date of the design submittal phases and conferences. Design submittals are required at the design development (preliminary 60 percent), construction drawing (final 100 percent design) stages, and at the corrected construction drawing (final design) stage. The number, date, and contents of the design submittal phases shall be reflected in the project schedules. An authorization letter to start work will be provided separately by the Contracting Officer for each phase of the design. See paragraph "Government Design Review and Acceptance" and Section 01016 DESIGN DOCUMENTS REQUIREMENTS for additional requirements.

1.11.2 Design Development (60 Percent Design) Submittal

The 60 percent design submittal includes the 60 percent in-progress **(AM#4) site and building design**. These documents shall be packaged and stamped "For Review Only - Design Development (60% Design)". Each sheet of the drawings shall also be **(AM#4) so stamped (AM#4)**. See Section 01016 DESIGN DOCUMENTS REQUIREMENTS for additional requirements.

1.11.3 Construction Drawing (100 Percent Design) Submittal

The 100 percent design submittal includes complete site and utility design and building design and shall be stamped "For Review Only -100% Design", and each sheet of the drawings shall also be stamped. Contractor shall make final proposal of all materials and finishes at this stage.

1.11.4 Compliance Check Design Submittal

The compliance check design submittal(s) after the Government review of the 100 percent complete site and building designs shall be stamped "100% Corrected Design"; and each sheet of the drawings shall also be stamped and signed by the Designer of Record.

1.11.5 Insufficient Design Submittals and Delays

No additional time for completion of the contract will be granted to the Contractor due to insufficient design submittals. Delays caused by the Contractor in completion of the 60 percent design, 100 percent design, or the 100 percent corrected design will not be considered as valid reason to delay the entire project within the specified project duration.

1.11.6 Deviations or Betterments

The Contractor shall bring to the Government's attention any deviations or betterments made to the RFP and Contractor's proposal documents. These shall be summarized in letter form with reasons and highlighted or clouded details on the applicable drawings and documents submitted. See Section 00800 SPECIAL CONTRACT REQUIREMENTS for additional requirements concerning betterments.

1.11.7 Review Design Documents

The Contractor shall submit all drawing design documents on black-line media with "FOR REVIEW" stamped in 1/2-inch high letters in the lower right corner in red ink. Specifications and Design Analyses shall be hard copy with "FOR REVIEW" stamped in 1/2-inch high letters in the lower right corner in red ink. The Contractor shall submit Contractor-approved documents on black-line media with "APPROVED FOR CONSTRUCTION" similarly stamped.

1.12 DESIGN REVIEWS

Design reviews will be held in the offices of the Fort Worth District's San Antonio Area Office at the Design Development (preliminary 60 percent), Construction Drawings (final 100 percent), and corrected final stages of the final design in accordance with the Contractor's Project Schedule. The Government shall have thirty (30) calendar days review period for each submittal (60 percent design and 100 percent Design) and fourteen (14) calendar days review period for resubmittal of the 100 percent Design (**(AM#4) Compliance Check Design**) after incorporation of final review comments. Design review conference(s) between the Contractor and the Government may be held after submittal of the 60 percent and 100 percent design(s) if the Government determines them necessary. The time for Government review will be calculated from the date of receipt of the design submittals at the Government address to the date annotated conformance review comments are mailed to the Contractor.

1.12.1 Review Intent

Reviews will be for conformance with the technical requirements of the Contract. If the Contractor disagrees technically with any comment and does not intend to comply with the comment, the Contractor shall clearly outline, with ample justification, the reasons for noncompliance within 5 days after receipt of these comments in order that the comment(s) can be resolved. The Contractor shall furnish disposition of all comments, in writing, with the next scheduled submittal. If the Contractor believes the action required by any comment exceeds the requirements of the Contract, the Contractor shall immediately notify the Contracting Officer in writing and take no action regarding this matter until the matter is resolved.

1.12.2 Late Submittals

If a design submittal is over one (1) day late in accordance with the

latest design schedule, the Government review period will be extended 7 days. The review conference will be held the week after the review period. Submittal date revisions shall be in writing at least one week prior to the affected submittal.

1.12.3 Review Document Distribution

For each review, review documents shall be sent, in the quantity indicated, to the addresses listed below. The documents will be in their then present "on-board" design status. All documents must contain an index of contents.

Work shall, however, continue up to the time of the review conference date(s) when 2 copies of then-current design documents will be brought to the issuing office for the conference review. Originals of transmittal letters shall be sent to the Area Engineer, address as shown below, and copies should accompany each mail package. Transmittal letters shall indicate distribution by use of the "ATTN" code shown in the address.

No. of Copies

(6- Review)	District Engineer
(2- Final)	US Army Engineer District, Fort Worth ATTN: CESWF-EC-AM (Mr. Bob Gilbert) (AM#1) P.O. Box 17300 Fort Worth, TX 76102-0300
(3- Review)	HQ AETC/CECT
(3- Final)	ATTN: Mr. Refugio Fernandez 266 F Street Randolph AFB, TX 78150-4321
(1- Review)	AFSVA/SVXF
(1- Final)	Attn: Mr. Ben Roth 10100 Reunion Place, Suite 502 San Antonio, Texas 78216-4138
(8- Review)	37 CES/CECCI
(3- Final)	ATTN: Mr. Carlos Garcia 155 Gott Street Lackland AFB, TX 78236
(5- Review)	Area Engineer
(5- Final)	ATTN: CESWF-AO-S 4204 Woodcock, Suite 245 San Antonio, TX 78228-1319

1.12.4 Additional Review Time

If for any reason the Government requires more time than that stated for review, then the Contractor will be granted an extension of time equal to the number of calendar days of delay.

1.12.5 Government Design Review and Acceptance

Government personnel will present review comments for discussion and resolution. Copies of comments, annotated by the Designer of Record with comment action agreed on, will be made available to all parties at least 10 calendar days prior to the conference. Review conferences will be scheduled by the Contractor. Unresolved problems will be resolved by immediate follow-on action at the end of conferences. Valid comments will

be incorporated into the Documents. On receipt of final corrected design documents (with all backcheck comments incorporated) that are acceptable, the Contracting Officer shall notify the Contractor in writing that the documents are accepted and construction may begin. Furnish the final design and construction documents in accordance with paragraph "Number of Copies." The Government, however, reserves the right to not accept design document submittals if outstanding unincorporated comments are of too great a significance. In this case, every effort shall be made during follow-up action between the Contractor and the Fort Worth District to resolve conflicts and problems such that documents can be accepted. However, if final submittal(s) are incomplete or deficient, requiring correction by the Contractor and resubmittal for review, the cost of rehandling and reviewing will be deducted from payment due the Contractor at the rate of \$500.00 per submittal.

1.13 Final Construction Documents

Following the last submittal, the Contractor shall forward the completed original set of reproducibles for acceptance. Upon Government acceptance of corrected 100 percent final design documents, the original will be returned to the Contractor for reproduction purposes. The Contractor shall be responsible for reproduction. Within 7 calendar days after acceptance, the Contractor shall mail 1 complete set of the accepted design documents to the Fort Worth District, CESWF-EC-AM Attn: Bob Gilbert, (AM#1) and 5 complete sets to the Corps of Engineers' Area Engineer, San Antonio Area Office. Each set shall consist of full size paper drawings, specifications, and design analysis and CD-ROM disk(s) containing all drawing, specifications, submittal register, and design analysis files). During and upon completion of the project, the accepted design documents shall be corrected to reflect as-built conditions in accordance with Section 01770 CONTRACT CLOSEOUT.

1.14 COORDINATION

1.14.1 Written Records

The Contractor shall prepare a written record of each design site visit, meeting, or conference, either telephonic or personal, and furnish copies to the Contracting Officer and all parties involved within 5 working days. Include subject, names of participants, outline of discussion, and recommendation or conclusions. Number each written record for the particular project under design in consecutive order.

1.14.2 Design Needs List

Throughout the life of the Contract the Contractor shall furnish the Contracting Officer a biweekly "needs" list for design related items. This list shall itemize in an orderly fashion design data required by the Contractor to advance the design in a timely manner. Each list shall include a sequence number, description of action item, and the name of the individual or agency responsible for satisfying the action item and remarks. Maintain the list on a continuous basis with satisfied action items checked off and new action items added as required. Once a request for information is initiated, that item shall remain on the list until the requested information has been furnished or otherwise resolved. Mail copies of the lists\ to both the Contracting Officer and the agencies tasked with supplying the information.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 ATTACHMENTS

ATTACHMENT A

[Prime Contractor's Letterhead]

Date: _____

Contract No.: _____

[Reviewing Component Address]

Subject: DESIGN CERTIFICATION AND TRANSMITTAL FOR

Project Title: _____

Project Location: _____

Contract No.: _____

Gentlemen,

Enclosed are the following documents which I hereby certify are in compliance with the Contract requirements of the subject construction contract and can be used to commence construction subject to Government acceptance:

- 1. Project Drawings
- 2. Project Specifications
- 3. Design Analysis
 - a. Civil
 - b. Water Supply and Wastewater Collection
 - c. Architectural
 - d. Interior Design
 - e. Structural
 - f. Mechanical
 - g. Fire Protection
 - h. Electrical
 - i. Environmental
- j. Landscape Architectural
- 4. Submittal Register

[Typed Name and Signature of the
Officer of the Prime Contractor's company]

5. Deviations

Copy to: [As standard with the Contractor]

[Typed Name and Signature of the
Licensed Architect/Engineer of Record]

-- End of Section --

SECTION 01016

DESIGN DOCUMENT REQUIREMENTS

09/2001

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 basic designation only.

ACI INTERNATIONAL (ACI)

ACI SP-66 (1994) ACI Detailing Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1 (2000) Structural Welding Code - Steel

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

ICBO Bldg Code (1997) Uniform Building Code (3 Vol.)

MILITARY HANDBOOKS (MIL HDBK)

MIL HDBK 1008C (10 June 1997) Fire Protection For Facilities Engineering, Design and Construction

US ARMY CORPS OF ENGINEERS, SOUTHWESTERN DIVISION (SWD)

SWD-AEIM (October, 2000) Architectural and Engineering Instructions Manual (SWD-AEIM)

1.2 RELATED SECTIONS

00570 CONTRACT DEFINITIONS
00830 DESIGN AND CONSTRUCTION PROCEDURES
00840 REFERENCED DOCUMENTS

1.3 SUBMITTALS

SD-05 Design Data

Design Data Checklists; .

Include the Fire Protection, Code Analysis, and Handicapped Checklists (Attachments A, B, and C) at the end of this Section with the Design Analysis and submit with the design submittals.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 DRAWINGS

Prepare, organize, and present drawings in the format specified. Provide drawings complete, accurate, and explicit enough to show compliance with the Contract requirements and to permit construction. The layout of individual sheets and the organization of the assembled set shall follow and communicate a logical sequence. General information shall be presented first, progressing to more detailed information. When assembling details, begin in the upper left-hand corner of the sheet with letters progressing to the right and down. Drawings illustrating systems proposed to meet the requirements of the Contract performance specifications shall reflect proper detailing for each such system to assure appropriate use, proper fit, compatibility of components, and coordination with the design analysis and specifications required by this section. Coordinate drawings to ensure there are no conflicts between design disciplines and between drawings and specifications. For specific drawing requirements, see paragraphs: DESIGN DEVELOPMENT (60 PERCENT PRELIMINARY DESIGN) REQUIREMENTS, CONSTRUCTION DOCUMENTS (100 PERCENT DESIGN) REQUIREMENTS, and DESIGN DETAILS.

The following subparagraphs cover general drawing requirements and supplement those specified in SWD-AEIM, Chapter VIII DRAWINGS.

3.1.1 CADD Drawings

The Contractor shall ensure that all delivered CADD digital files and data (e.g., base files, reference files, cell/block libraries) are compatible with the Government's target CADD system and operating system, which is AutoCAD R14, running on Microsoft Windows 95/NT, and adhere to the standards and requirements specified. The term "compatible" means that data is in native digital format i.e. .dgn, and can be accessed directly by the target CADD system without translation, preprocessing, or postprocessing of the digital data files. It is the responsibility of the Contractor to ensure this level of compatibility.

3.1.2 CADD Standards

CADD drawings shall be prepared in accordance with the applicable general and discipline-specific provisions for drawing formats, level/layer assignments, line colors, line weights, and line types of the "Tri-Service A/E/C Standards" and the "SWD Architectural and Engineering Instruction Manual (AEIM), Chapter VIII, "Drafting Standards."

The CADD standards for design of this project, including seed/prototype files containing the Government's preset standard settings and electronic reference files containing the Government's standard border/title block sheets, are located at the following Web site:

<http://tsc.wes.army.mil/products/standards/aec/aecstdweb.asp>.

The Contractor shall submit a written request for approval of any deviations from the Government's established CADD standards. No deviations will be permitted unless prior written approval of such deviation has been received from the Government.

3.1.3 Size of CADD Drawings

Overall Size of CADD drawings shall be SI AI (594 mm by 841 mm (23.39 by 33.11 inches)), at the trim line. Full size drawings shall be submitted

for all design submittals. SI working units and the District's standard file-naming convention shall be used. See Section 01015 DESIGN REQUIREMENTS AFTER AWARD for the Metric/English option.

3.1.4 .CAL Files

In addition to copying the electronic CADD drawing files to the Submittals' CD-ROM disk, include the drawings in .cal format so that the drawings may be viewed on screen using MaxView Reader that is located on the Solicitation and Contract CD-ROM disks. Include a "sendable" compiled Project.svd index file, created with MaxView Author, so that the drawings may be viewed by double-clicking on this file. MaxView's web site is <http://www.maxview.com>. Keep the CADD files and the .cal files in separate folders.

3.1.5 Drawing Format

Title block shall include, as a minimum, project title and location, sheet title, and sequence number. For each design submittal, each Contractor-prepared drawing shall bear the printed name and signature of the registered architect or appropriate registered engineer responsible for the work portrayed on that drawing and proposed to meet the Contract requirements. For the final submittal, each Contractor-prepared drawing shall bear the stamp or seal and signature of the registered architect or appropriate registered engineer responsible for the work portrayed on that drawing and proposed to meet the Contract requirements.

3.1.6 Drawings Sequence

Arrange drawings by design discipline in accordance with the SWD-AEIM, Chapter VIII, Appendix A, Plate D1, Standard Arrangement Of Drawings.

3.1.7 Drawings Required

As a minimum, the construction drawings shall consist of the following:

- a. Cover or Title Sheet
- b. Index of Drawings (each technical discipline shall have a separate drawing legend sheet located in front of each respective section), Legend, and Abbreviations
- c. Civil/Site Drawings, including Utility Drawings (Water Supply, Wastewater, Gas, Electrical, Fiber and Communication)
- d. Soil Boring Locations and Logs of Borings
- e. Turfing and Landscaping Drawings, including Irrigation Layout Drawings
- f. Architectural Drawings
- e. Interior Design Drawings
- f. Not Used
- g. Structural Drawings
- h. Mechanical Drawings

- i. Fire Protection Drawings
- j. Electrical Drawings (including communications, security and fire alarm)
- k. Lightning Protection
- l. Not Used
- m. Schedules - e.g. Doors, Windows, Interior Finishes, Equipment

3.1.8 Drawing Scales

Work shall be drawn at the scales listed below. All disciplines should use the same scale for plan sheets. Scale for all drawings and delineation will permit complete legibility. A graphic bar or checkerboard scale will be provided on each sheet near the lower left hand corner of the sheet. Unless specified elsewhere, conventional scale standards are as follows:

	<u>METRIC (SI) (ENGLISH)</u>
Site Plans (Buildings)	No smaller than 1:200 (No smaller than 1-inch = 30 feet)
Floor Plans (Note 1)	1:50 to 1:100 (1/4-inch to 1/8-inch = 1 foot)
Roof Plans	1:100 (1/8-inch = 1 foot)
Exterior Elevations	1:100 (1/8-inch = 1 foot)
Interior Elevations	1:50 (1/4-inch)
Cross Sections	1:50 to 1:100 (1/4-inch to 1/8-inch)
Wall Sections (Note 3)	1:20 (3/4-inch = 1 foot)
Stair Details	1:20 (3/4-inch = 1 foot)
Details (Note 2)	1:5 or 1:10 (3 inches or 1 1/2 inches = 1 foot)
Reflected Ceiling Plans	1:100 (1/8-inch = 1 foot)
Interior Toilet Elevations	1:20 (3/4-inch = 1 foot)
Wall Types	1:5 or 1:10 (3 inches or 1 1/2 inches = 1 foot)

Notes:

1. Scale of composite plans shall be as required so that the entire facility is drawn on one sheet without break lines.
2. The details shall be large enough to show all fixtures, accessories, equipment, materials, manner of construction, clearances required for proper maintenance, and complete dimensions. Toilet rooms and Equipment rooms are examples of the kind of spaces which shall be drawn as a Detail Plan. All details containing sheet metal flashing shall be 1:5 (3 inches = 1 foot).
3. May be 1:20 (3/4-inch = 1 foot) if pertinent details are shown at larger scale.

3.1.9 North Arrows

North arrows shall be oriented the same direction on all plan sheets and by all disciplines, including site and civil drawings. Plan north shall be

"up" or to the left on the drawings. Indicate true north on composite plan drawings.

3.1.10 Legends and Symbols

Standard material symbols used on the drawings shall be provided as a separate legend drawing located just in front of the drawings in the set. Add additional material symbols to the Legend Sheet as needed for the project.

The standard symbols used for amendments (a triangular box) or contract modifications (a type of circular box, see the chapter on Drafting Criteria) shall not be used for any other purpose, and care must be taken to avoid using similar appearing but technically different symbols.

3.1.11 Key Plans

Provide key plans whenever the site or floor plan occupies more than one sheet of drawings. Locate the Key Plans at a uniform location on all site and floor and roof plan sheets to show the interrelationship between the building portions. Orient key plans in the same direction as the floor plan on all plan type drawings of all disciplines. All key plans shall be the same size and same location on the drawings.

3.1.12 Building Composite Plans

When required because of size of the building footprint, provide composite floor plans for the architectural, structural, mechanical, fire protection, life safety, and electrical disciplines. Include match lines for combining individual portions of floor plans. For mechanical plans, provide composite plumbing and heating, air conditioning, and ventilation (HVAC) plans showing plumbing and HVAC systems for each level. For plumbing composite sheets, building outline and pertinent HVAC equipment shall be half-toned with plumbing system at standard lineweight. For HVAC composite sheets, building outline and pertinent plumbing equipment shall be half-toned with HVAC equipment at standard lineweight. Do not provide construction notes on these plans. Include a key plan and room schedule legend on the composite plan sheets.

3.1.13 Schedules

Schedules shall be clear and complete. Furnish as many columns as necessary to present the essential information. Do not use the "Remarks" column as a substitute for an information column. Normally a single item shall be presented on each schedule line. Other scheduling methods as standard with the Architect-Engineer may be used if approved by written authorization from the Contracting Officer.

3.1.14 Notes

Notes may be placed on drawings to reduce the amount of repetitive drafting, provided that clarity is not lost. General notes should be placed at the right-hand edge of the sheet and, if possible, should be located on the first sheet in the set. Notes that pertain to each drawing should be placed on each drawing. Keyed notes are permitted. General notes may be provided on a separate sheet if space does not exist on the Abbreviation and Legend sheets.

3.1.15 Dimensions

Dimensions shall be complete, accurate, and fully coordinated. Use slashes, not arrowheads or dots. Dimensions should be to points easily measurable in the construction, and shall be laid so as not to eliminate refiguring in the field. Dimensions should be tied-in to column lines, etc., to facilitate checking. Plan dimensions for frame construction should be to face of stud (or sheathing) for exterior walls, to one face of stud for interior partitions, and to centerline of openings. For masonry construction, dimensions shall be to one or both nominal faces of masonry and to jambs of openings.

- a. Horizontal dimensions shall occur on the plans and vertical dimensions on sections and elevations.

3.1.16 Standard Drawings

Standard Drawings, when furnished for site adaptation, will generally be utilized without basic architectural change. Portions of the drawings not pertinent to the project will be deleted. Specific instructions will be given when design changes are required.

3.1.17 Sketches

All sketches presented during the design phase shall be reduced to 216 mm by 280 mm (8-1/2" by 11") and included in the design analysis to document the design options and decisions evaluated during the design process.

3.2 CONSTRUCTION SPECIFICATIONS

3.2.1 Editing Construction Specifications

The Contractor shall use commercially available guide specifications for developing construction specifications, such as "SpecText" published by The Construction Specifications Institute (<http://csi.worldweb.net/technic/master/spectextms.htm>), and "MasterSpec" published by The American Institute of Architects (<http://www.arconnet.com/>), BSD SpecLink (Building Systems Design, Inc., Atlanta, GA, <http://csi.worldweb.net/technic/master/bsdms.htm> and http://www.bsdsoftlink.com/speclink/sl_frame.htm), or manufacturers' product specifications (in CSI's Manu-Spec format). Do not use DBI/CSI PerSpecView to develop the construction specifications as these are product specifications only and are not in CSI's 3-Part format. Specification paragraphs and subparagraphs shall not be rewritten to lessen the quality of the original guide specification sections. Only bracketed choices and inapplicable items may be deleted unless the changes are required to bring the specification into conformance with the performance specifications of the Contract. The Contractor shall complete the editing of all options in these specifications. Where designer notes are provided, the Contractor shall edit the choice in accordance with the recommendations and guidance of the Notes. **The specifications shall clearly identify, where appropriate, the specific products chosen to meet the requirements of the Contract (manufacturers' brand names and model numbers or similar product information). The Contractor shall be responsible for coordinating references, along with the Contract performance requirements, to specific specification sections (number and title) within the construction specifications.** See additional requirements in paragraphs DESIGN DEVELOPMENT (60 PERCENT DESIGN REQUIREMENTS) and CONSTRUCTION DRAWINGS (100 PERCENT DESIGN) REQUIREMENTS of this Section and in Section 01015 DESIGN REQUIREMENTS AFTER AWARD, paragraph DESIGN DOCUMENTS.

3.2.1.1 Required Modifications to Commercial Guide Specifications

- a. Indicate the guide specification series (e.g. CSI SpecText, MasterSpec, SpecLink) in either the header or footer of each section.
- b. Change references to the "Architect" or "Engineer" to "Contracting Officer" and "Owner" to "Government".
- c. Change references to "Section 01300" or "Section 01300 SUBMITTALS" to "Section 01330 CONSTRUCTION SUBMITTAL PROCEDURES."

3.2.1.2 Additions

If the Construction Specifications do not cover a feature that is in the project, insert additional requirements in their proper locations to adequately cover the feature of work. Additions shall not lessen the quality of materials indicated by the specifications. If a new material is added, it shall be properly referenced in "REFERENCES," "MANUFACTURERS," "MANUFACTURED UNITS," "MATERIALS," "SUBMITTALS," "TESTS," and "INSTALLATION" paragraphs, as applicable.

3.2.1.3 Deletion of Inapplicable Text Material

Delete all inapplicable text material to tailor the specifications to fit the project. After deletion has been made of all inapplicable paragraphs, subparagraphs, choices, and schedules from the body of the guide specifications (including but not limited to the correction of lists in "SUBMITTALS," "TESTS," and "INSTALLATION" paragraphs), delete all nonapplicable references listed in the preceding "REFERENCES" and "MATERIALS" paragraphs.

3.2.1.4 References to Specification Sections

The Contractor shall be responsible for coordinating references, along with the Contract requirements, to specific specification sections (number and title) within the project specifications. Revise section references (title and number) to reflect the titles and numbers of specification sections used.

3.2.1.5 Construction Submittals

The Contractor is responsible for all submittals. See Section 01330 CONSTRUCTION SUBMITTAL PROCEDURES for the definition of Government Approved and For Information Only (FIO) submittals. All submittals shall be "FIO" unless otherwise specified.

3.2.2 Division 1 Sections

Include Division 1 specifications sections contained in this Contract as part of the project specifications without change.

3.2.3 Format For Construction Specifications

Submit the construction specifications, including cover page and project table of contents, printed using a word processor.

The Lighting Fixture Standard Drawing 40-06-04 Details and Design Criteria (e.g. Army Technical Manuals (TM's), Engineering Manuals, Engineering

Technical Letters, Engineer Circulars, Engineer Pamphlets, Design Guides, and Military Handbooks) can be downloaded from the Internet at the following address:

<http://www.hnd.usace.army.mil>, then click on Techinfo then Engineer Publications or Support Documents

The guides can only be downloaded in Winzip *.zip files. These are downloadable executable files.

Design criteria manuals can also be obtained from the current version of the Construction Criteria Base CD, issued by the National Institute of Building Sciences, telephone number 202/289-7800, fax number 202-289-1092, internet address is:

<http://www.nibs.org>.

Print hard copies using laser or ink-jet printer and good quality white paper. For the design submittals, editing of the Construction Specifications shall be shown by using redlining (underlined text) for text insertions and strikeouts for text deletions. The corrected 100 percent specifications with review comments incorporated shall be cleaned up (markings for insertion and deletions removed) and submitted in both hard copy and on CD-ROM disk. Carbon copies are not acceptable.

3.2.3.1 Format

Format shall be the Construction Specification Institute (CSI) 16-Division, 3-Part Section format. Sections shall be numbered in accordance with CSI MasterFormat. No two sections shall have the same section number.

3.2.4.2 Cover Page

The Cover page shall be similar to the Contract Cover page and shall include:

- a. Project title, activity and location
- b. Construction contract number
- c. Construction Contractor's name and address
- d. Design firm's name and address
- e. Names of design team members responsible for each Contractor prepared technical discipline of the project specification
- f. Name and signature of a Principal of the design firm
- g. The Table of Contents shall list the 16 Divisions contained in CSI format and the specification section numbers and titles contained in the project specification. Do not list in the Table of Contents CSI

Divisions that are not required for the project.

3.2.4 Construction Submittals

All construction submittals shall be in accordance with Section 01330, "CONSTRUCTION SUBMITTAL PROCEDURES."

3.2.5 Submittal Register

An electronic version of the ENG Form 4288 is located on the Solicitation and Contract Award CD-ROM disks in folder "Subreg." This version is the Specsintact DOS Submittal Register program and includes a Readme.txt file. Copy the files to the computer's C:\ drive, remove the read-only attributes, and then double-click on either file "subreg.exe" or on "submit.bat." This is **not** a Windows-based program so the mouse **does not** work. Editing instructions are on-screen, such as press the "F5 (add)" and then the "E" keys to create new empty submittals, the "PgDn" key to complete editing, and the "A" key to accept. For each submittal, fill in the Section Number, Activity Number if applicable, Paragraph Number, Description, Type of Submittal (e.g. SD-01 through SD-11(See Section 01330 CONSTRUCTION SUBMITTAL PROCEDURES)), Classification (e.g. G or FIO), and the Contractor's proposed submittal date. Fill in columns "a" through "o" on the ENG Form 4288 and submit a copy of the "Subreg" folder with the updated files and a hard copy of the register as required for the various construction submittals. Unless Section 01330 CONSTRUCTION SUBMITTAL PROCEDURES allows a submittal to be Government approved ("G"), all submittals shall be "FIO" for Information Only (Contractor Approved) items.

A blank MS Excel version of the Form 4288 Submittal Register is also included in the "Subreg" folder and may be used if allowed by the Contracting Officer.

3.3 DESIGN ANALYSES

Prepare design analyses (basis of design and calculations) for each design discipline. Specific requirements relative to the technical content to be provided are specified in the paragraphs DESIGN DEVELOPMENT (60 PERCENT DESIGN REQUIREMENTS) and CONSTRUCTION DRAWINGS (100 PERCENT DESIGN) REQUIREMENTS. The design analyses shall be a presentation of facts to demonstrate that the concept of the project is fully understood and that the design is based on sound engineering. The design analysis for each discipline shall be in accordance with Chapter IX of the SWD-AEIM.

3.4 COMMON DESIGN DEFICIENCIES

The work involved in making corrections due to common deficiencies becomes lost effort and time for both the designer and the reviewer. Carefully compare the design and contract documents with all requirements at several points in the design process to avoid unnecessary changes at a later date. Some of the requirements which are most often overlooked include:

a. Requirements of the COE 2, Southwestern Division's ARCHITECTURAL AND ENGINEERING INSTRUCTIONS MANUAL (SWD-AEIM) have been repeatedly overlooked in the past.

b. Not Used.

c. Not using correct abbreviations or terminology on the drawings. Abbreviations must match what is used on the standard abbreviation sheet and terminology must match what is used in the standard technical guide

specifications.

d. Not using the correct scales, north arrow designation, section cut system, or incomplete dimensioning on the drawings.

e. Not providing sufficient space for door operation hardware at doors which swing into a wall running perpendicular to the opening. 100 mm minimum is required between edge of door frame and perpendicular walls.

f. Not providing correct and complete Design Analysis information written in the present tense. The Design Analysis will be written following the format indicated herein. A separate Fire Protection section in the Design Analysis with input from all disciplines is one area which is often overlooked and shall be included.

g. Not correctly presenting or coordinating (to avoid interference) features of Fire Protection, Noise Control, and Physical Security.

h. Not correctly referencing and cross referencing building sections, wall sections, details, etc.

i. Failure to read and use technical notes in editing the Guide Specifications.

j. Failure to coordinate all disciplines prior to submittal of projects for review.

k. Improper use of fire-retardant wood. Fire-retardant wood is combustible; its use in buildings that are of noncombustible construction is extremely limited (see ICBO Bldg Code for the minor allowable uses). Because of the potential for severe degradation, fire retardant plywood shall not be used in a roof or roofing system, or in structural applications.

l. Not listing the ANSI/BHMA numbers in addition to trade names in door hardware specifications and failure to correctly specify hardware finishes.

m. Control joints in CMU walls and brick expansion joints in face brick are not shown on both architectural plans, elevations and structural plans, or are inconsistent. Note also control joint locating and coordination for floor tile per Tile Council of America recommendations.

n. Failure to delete all publications which do not apply to the particular project.

o. North is not oriented the same direction on all sheets (civil, site, arch).

3.5 DESIGN CERTIFICATION

The Contractor shall provide certification for each design submittal in accordance with paragraph SUBMISSION OF CONSTRUCTION DRAWINGS, SPECIFICATIONS AND DESIGN ANALYSES, subparagraph "Certifications," of Section 01015 DESIGN REQUIREMENTS AFTER AWARD.

3.6 DESIGN DEVELOPMENT (60 PERCENT PRELIMINARY) DESIGN REQUIREMENTS

Preliminary design documents shall include all applicable plans, details, and specifications specified in the paragraph DESIGN DETAILS, drawn to 60

percent completion or more, unless otherwise indicated. Identify and resolve conflicts in the design requirements, between the design requirements and the Contractor's design proposal, or those due to lack of thorough understanding of the nature and scope of work prior to submittal of the 60 percent design. Drawings, design analysis, and specifications will be reviewed for compliance with the Contract design requirements at this design submittal. Submit the following:

3.6.1 Rendering

The Contractor shall prepare an architectural rendering for inclusion with the 60 percent Design Submittal. The rendering will be in full color, represent the final exterior color and material selections, approximately 500 mm by 600 mm (20 inches by 24 inches) in size, on illustration board, matted and framed with non-glare glass, and with project title on mat. The perspective shall be from an eye-level or low-level aerial point of view that will highlight the most attractive features of the project. The Contractor shall furnish one preliminary black-and-white sketch of the proposed rendering to the Contracting Officer, along with three (3) proposed exterior color schemes, for review and acceptance prior to proceeding with the color version.

3.6.2 Drawings

Furnish all drawings that are required for the 100 percent submittal. **(AM#4) All drawings shall be developed to approximately 60 percent completion.** The drawings shall be fully coordinated with the design analysis and specifications.

3.6.3 Specifications

Provide all specification sections required for 100 percent submittal. **(AM#4) All specifications required for the completion of the demolition, site work, utilities, building(s), turfing, and landscaping shall be at least mark-ups of the required technical and trade sections.** Include the identification of the "author" of the industry guide specifications used, any mandatory guide specifications required in this Contract, and a project table of contents listing all sections to be included in the project.

3.6.4 Submittal Register

Prepare a Submittal Register as specified in Section 01330 CONSTRUCTION SUBMITTAL PROCEDURES and paragraph CONSTRUCTION SPECIFICATIONS, subparagraph "Submittal Register," of this Section. Submittals for demolition, site work, utilities, and foundation design shall be 100 percent complete. Submittals **(AM#4)** shall be developed to the extent required to support the level of design included in this submittal. Submit a copy of the "Subreg" folder with the updated files and program and four hard copies of the register with this design submittal.

3.6.4 Design Analysis

The design analysis shall give the basis for design for all disciplines and should establish specific goals, objectives, and priorities for the design of this project. Identify, explain, and document use of design criteria and how the design meets goals, objectives, and priorities. The design analysis shall comply with SWD-AEIM, Chapter IX, and include narrative description and analysis of all building systems, appropriate checklists, calculations, and catalog cut sheets of equipment used in the design.

3.6.5 Sustainable Project Rating Tool (SPiRiT)

In accordance the substantiation requirements for Volume II DESIGN AND PERFORMANCE REQUIREMENTS, PERFORMANCE REQUIREMENTS Chapter 111 FACILITY PERFORMANCE, paragraph "Environmental Responsible Design," update the Contractor's Proposal's Sustainable Project Rating Tool (SPiRiT) sheets, indicating the status of design related to the listed elements to be achieved and any problems in achieving these elements.

3.6.6 Substantiation Requirements

See Volume II DESIGN AND PERFORMANCE REQUIREMENTS, PERFORMANCE REQUIREMENTS Chapters.

3.6.7 Commissioning Plan

See Section 00830 DESIGN AND CONSTRUCTION PROCEDURES, paragraph COMMISSIONING for requirements.

3.6.8 Demolition

Provide the site demolition drawings, 100 percent complete, ready to start demolition work.

3.6.9 Civil Design

The drawings shall be 100 percent complete, ready for start of construction.

Drawings shall fully describe the type and the scope of work required. Include all necessary and required details, be thoroughly checked, and be fully coordinated with the Construction Specifications and all other Construction Documents. 3.6.10 Landscaping Design

Provide Landscaping Plan, including sprinkler system layout, and any details required for this level of design.

3.6.11 Architectural Design

60 percent architectural drawing submittal shall be a complete set of architectural drawings without large scale details. All other drawings shall be complete except referencing of the large scale details. Room finish schedule, and door, window, and louver schedules, shall all be complete except for references to details.

3.6.12 Interior Design

Provide SID Notebook(s) and design analysis.

3.6.13 Structural Design

Provide foundation plans and details which shall be 100 percent complete. Provide details and notes for required structural work. Building structural members shall be at least outlined. Provide elevation views, sections, and details necessary to illustrate the design at a 60 percent level of completion. Roof framing plan(s) shall show sufficient details to clearly indicate the type of framing system used, size, and spacing of members and their elevations.

3.6.14 Mechanical Design

Provide plans, piping diagrams, sections, flow diagrams, details, schedules, and control diagrams/sequences as necessary to define the required design intent at this level of design. Floor plans shall use the architectural floor plans as a basis, with the building outline half-toned.

Unless otherwise indicated, all floor plans shall be drawn at a minimum 1:100 (1/8-inch = 1'-0") scale and shall show room names and numbers. Provide preliminary mechanical room sections to ensure that major equipment items, piping, and ductwork will fit as designed. For the 60 percent submittal, all supply and return mains shall be shown as double-lined although branch ducts, takeoffs, and ductwork to diffusers may be single-lined. Piping 6 inches and larger shall be shown as double-lined for the 60 percent submittals.

Complete Attachment C for mechanical room sizing.

3.6.15 Electrical Design

Fully coordinate the 60 percent design drawings with the design analysis. Provide sufficient plans, single-line diagrams, riser diagrams, details, and schedules as necessary to define the required design intent for this level of design. Indicate all circuits, circuit breakers or fuse locations, panelboards, and PDUs known at this level of design.

3.6.16 Fire Protection Design

Provide the Life Safety Plan and the Fire Protection site and floor plans, complete. Fire protection details shall be sufficient for this level of design.

3.6.17 Environmental Design

Provide 100 percent completed document of the following item for the 60 percent submittal:

- a. Storm Water Pollution Prevention Plan

3.7 CONSTRUCTION DOCUMENTS (100 PERCENT DESIGN) REQUIREMENTS

All documents shall be 100 percent complete, ready for start of construction.

3.7.1 Drawings

The drawings shall be complete, ready for start of construction, and include all necessary and required details, be thoroughly checked, and fully coordinated with the construction specifications and all other Construction Documents. The final drawings shall include all the requirements and drawings defined for the 60 percent submittal plus any additional detail drawings required for complete 100 percent design. Drawing scale shall match architectural drawing requirements. Plans shall be legible at full-size. Previous comments and applicable criteria changes shall have been incorporated into the design.

3.7.2 Submittal Register

Prepare a complete a Submittal Register using ENG Form 4288 "Submittal Register" as specified in Section 01330 CONSTRUCTION SUBMITTAL PROCEDURES

and paragraph CONSTRUCTION SPECIFICATIONS, subparagraph "Submittal Register," of this Section, listing submittals for all specification sections that require submittals. Submit four hard copies and on a CD-ROM disk the updated submittal register files and program for this design submittal and the final submittal.

3.7.3 Specifications

The construction specifications shall be complete, ready for start of construction, fully coordinated with the drawings and design analysis, and include all work. Specifications shall be in final form for construction and include all changes requested during the 60 percent review stage.

3.7.4 Design Analysis

The Design Analysis shall include the basic information presented in the previous submittal, corrected to reflect changes in content made in response to review comments. Outline specifications shall be omitted from the Final Design Analysis as the information is included on the final drawings and construction specifications. The design analysis shall be written in the present tense and will comply with SWD-AEIM, Chapter IX.

3.7.5 Sustainable Project Rating Tool (SPiRiT)

In accordance the substantiation requirements for Volume II DESIGN AND PERFORMANCE REQUIREMENTS, PERFORMANCE REQUIREMENTS Chapter 111 FACILITY PERFORMANCE, paragraph "Environmental Responsible Design," update the Contractor's Sustainable Project Rating Tool (SPiRiT) sheets, indicating the status of design related to the listed elements and the achievement level of the various goals listed in Volume II DESIGN AND PERFORMANCE REQUIREMENTS, PERFORMANCE REQUIREMENTS Chapter 111 FACILITY PERFORMANCE, paragraph "Environmental Responsible Design." Provide certification of achievement of the specified rating.

3.7.6 Substantiation Requirements

See Volume II DESIGN AND PERFORMANCE REQUIREMENTS, PERFORMANCE REQUIREMENTS Chapters.

3.7.7 Interior Design

Update the drawings, building related interior design (SID) and the SID Notebooks as required as a result of the 60 percent review.

3.7.8 Mechanical Design

All ductwork shall be double-lined. Piping 152 mm (6 inches) and larger shall be shown as double-lined.

3.7.9 Commissioning Plan

See Section 00830 DESIGN AND CONSTRUCTION PROCEDURES, paragraph COMMISSIONING for requirements.

3.8 DESIGN DETAILS

Drawings shall include the applicable plans, details, and requirements specified in the SWD-AEIM and those specified below.

3.8.1 Demolition

Show new work and demolition work on separate drawings. The type and the scope of removal work intended shall be clear from an inspection of the documents. Keyed notes for removal will be allowed.

a. Site Demolition Drawings (Removal Plan)

The removal plan shall show the existing physical features and condition of the site before construction. Include the field survey to show all above and below ground utilities; buildings, drives, roads and parking areas, walks, and vegetation; and such facilities as retaining walls, underground storage tanks, foundations, and existing contours. Physical features shall be as indicated and noted: to be removed, to remain, or to be relocated.

3.8.2 Civil Design

The drawings shall be complete, fully describing the type and the scope of work required. Include all necessary and required details, thoroughly checked, and fully coordinated with the Construction Specifications and all other Construction Documents. Include the following as applicable:

- Cover Sheet and index of drawings
- Location and vicinity map including haul routes
- Site plan and details
- Grading and drainage plan
- Utility plan with profiles and details
- Pavement plan and details
- Soils boring logs
- Landscaping plans and details

a. Location Plan and Vicinity Map

A Vicinity Map consists of a small scale drawing of the project location, similar to a road map. A Location Plan consists of a small scale drawing showing the Government property or reservation limit with the construction project site shown. Show the Contracting Officer-approved Contractor access and haul routes, load limits on bridges along haul routes, and the designated waste and/or borrow areas. Upon request, a reproducible base sheet will be provided by the Fort Worth District for the Contractor's use in preparing the Location Plan.

b. Site Plan

Show all the site layout information necessary to field locate the building, walks, parking lots, and all other appurtenances to be constructed for the project. All site related work to be constructed will be located by dimensions. Identify all site related items such as curbs, pavements, walks, courtyards, bollards, trash enclosures, and retaining walls. Unless otherwise specified, site plans shall be at a scale of 1:400, 1:500, or 1:600 (1" = 20' or 1" = 30'). Existing or proposed contours shall not be shown on this Plan. The Site Plan, prior to adding the dimensions, shall serve as the base sheet to the other Plans, such as the Utilities Plan, Grading and Drainage Plans and the Landscape Plan. The Site Plan will show all existing physical features and utilities within and adjacent to the work site that will remain after the proposed construction has been completed. Include free zones, construction limits, storage areas, etc.

Show the building orientation and horizontal dimensional relationships to streets, walks, property lines, easements, fences, and other structures. Space between structures will provide open areas in accordance with good land-use planning and due consideration of future development plans. Maintain fire clearance separations for access for equipment acceptable to the installation (i.e. Fire Chief). Show geometric features of all roads, streets, sidewalks and parking areas. Provide details of all site features.

c. Grading and Drainage Plan

Provide a preliminary grading and drainage plan at a scale of 1:400, 1:500, or 1:600 (1" = 20' or 1" = 30') unless otherwise specified. Indicate new and existing grading contours at 300 mm (1-foot) contour intervals. Provide spot elevations in sufficient numbers so that interpolation between contours is not required. Some examples are: corners of paved areas and parking lots, low points, high points, flow lines of ditches and swales, changes in degree of slope and grading at building corners to insure positive drainage from the facility.

Indicate finished floor elevation of new building(s). Finished floor elevations shall be a minimum of 300 mm (12 inches) above the highest point of the outside finished grade and slope away from the building. Grade contours shall be at 240 mm (1 foot) intervals and spot elevations shall be provided at all site development features.

Show layout of the new and existing storm drainage systems, if applicable, including existing and new storm drainage flows, ditches, swales and piped systems.

Provide the appropriate top of structure elevations and pipe invert elevations of both the new and existing drainage system.

d. Erosion Control Plans

Erosion control plans shall show locations of all sediment basins, diversion ditches, areas to receive rock blanket, and other erosion control structures, indicating the approximate drainage areas each will serve. Indicate the materials, construction, and capacity of each structure.

e. Composite Utilities Plan With Profiles And Details

If required, provide a Composite Utilities Plan at a scale of 1:400, 1:500, or 1:600 (1" = 20' or 1" = 30'). Indicate locations of new and existing utilities. Plans shall show layout of the new and existing storm drainage, gas, sanitary sewer, fire protection, electrical, communication, water, steam, and any other utility systems which need to be provided for. Include new and existing contours. Show mains and distribution lines as well as all appurtenances such as meters, manholes, and valves.

f. Grading Sections

Grading sections through the new building showing finished and existing grades may be provided to supplement the required grading plan.

g. Pavement Plan and Details

Provide pavement plans for all parking lots, roads, equipment pads and sidewalks. Include cross sections of all paving designs and include details of curbs, gutters, pads, sidewalks, stairs, inlets and other

features.

h. Soils Boring Logs

Provide logs of soil borings provided by the geotechnical engineer.

3.8.3 Landscaping

Provide a Landscape Plan showing trees, shrubs, ground covers, seeded and sodded areas. The Landscape Plan shall be prepared by a Licensed Landscape Architect. The landscape plan shall be in accordance with the AETC/CE Base Architectural Standards of Excellence and the performance standards. Select and specify types of plant materials that are locally grown, commercially available, and acclimated to the project environment. Include a plant materials schedule or listing which lists the botanical names, common names, key, size, and the method of transplanting for each landscape element. The landscape plan shall also show all unsurfaced ground areas disturbed by construction within the project limits with these areas shown to be seeded, sodded, or mulched as required. Include designs and details for required site furnishings and accessories.

The Contractor shall provide designs and details as necessary for required site furnishings and accessories.

a. Sprinkler Irrigation Systems

Provide a sprinkler irrigation plan, designating the trees, shrubs, bushes, ground cover, and lawn area to be irrigated. Provide flow and pressure requirements. Include appropriate details.

3.8.4 Architectural Design

a. Floor Plans

Provide double line floor plan(s) of the entire building(s), drawn at the largest scale practicable to include the entire building or floor level on a single sheet. The building footprint may be of a size that will require the floor plans to be divided into multiple areas. Floor plans shall be scaled double-line drawings showing the functional arrangement, structural column or bay indicators, material patterns, location of all openings and plumbing fixtures. Section cuts, wall types, notes and leaders, general notes, and dimensions shall be complete. The plans shall indicate room numbers and titles, door swings, door and window numbers and types. Provide door, window, louver, and other schedules as required. Show a north arrow on each floor plan. Include enlarged toilet room and stair plans. The first floor plan sheet shall include a gross area tabulation comparing the actual square footage with the authorized square footage of the facility. Fully justify architect-engineer suggestions for plan improvement. Include:

Overall, Control, Opening, and complete dimensioning
Room Names and Numbers
Wall and Building section cuts
Door Swings and Numbers
Window Types
Square Footage
General Notes

Where major structural elements are included as parts of architectural

detailing, do not indicate sizes. Define these elements as part of the structural design documents. Major elements of mechanical and electrical equipment affecting space allocation shall be shown on the architectural plan to the extent practicable and coordinated with other respective disciplines. When applicable, Government-furnished, and Contractor-installed, or Government-furnished and installed, items shall be shown as dashed lines.

b. Reflected Ceiling Plans

Reflected ceiling plans shall include all notes, complete legends and pocheing patterns of materials to be used. Provide reflected Ceiling Plans for all spaces in the building(s). Reflected ceiling plans shall show the ceiling tile layout and location of gypsum wallboard and other ceiling types where applicable. Show all light fixtures, air diffusers, grilles, registers, exit lights, public address speakers, fire alarm strobe lights, sprinkler head layout, ceiling mounted equipment access panels or removable ceiling tile and grid elements, smoke and heat detectors, wall fire ratings, ceiling mounted equipment removal pathways, ceiling mounted television mounts, and other ceiling mounted items. The fixtures and other equipment shall be laid out in a regular pattern symmetrical with the ceiling tile grid, or symmetrical with the room centerlines, columns, windows, or other feature that dominates. All ceiling mounted items shown shall be fully coordinated with all other disciplines.

c. Roof Plan

Roof plan shall be complete showing slopes, locations for roof and overflow drains, equipment, and walkways. Coordinate elements located on the roof with all disciplines.

d. Building Elevations

Provide all building elevations complete showing the appearance and architectural treatment. Elevations shall be dimensioned to show story height, total height, and relation to grade. Indicate critical elevations such as top of finish floor and top of steel

e. Building Sections

Include building cross section and longitudinal sections to show general interior volumes, framing method, relationship to adjacent structures, and height of ceilings and partitions. Identify materials used and necessary dimensions.

f. Wall Sections

Drawings shall include all wall section and stair section conditions, including enclosed corridor(s), showing vertical control elevations and dimensions. Label all materials. Cut sections should through doors, windows, and other critical wall section locations. Wall sections shall not be broken. Include additional details when necessary to illustrate abutting adjacent buildings and important or unusual features. All horizontal dimensions shall occur on the plans and vertical dimensions on the sections and elevations.

g. Room Finish Schedules

Include signage.

h. Door, Window, and Louver Schedules

Door schedule shall include door and frame types and references to door details and hardware sets. Window and louver schedules shall indicate window and louver types, sizes, and references to details.

i. Fire Ratings

Clearly indicate wall ratings and fire hazards as required by the National Fire Protection Association Codes (NFPA). See Military Handbook MIL HDBK 1008C, particularly Section 2.1 Basic Criteria and Section 2.1.2 Partitions.

In addition to the wall rating criteria required by the Codes, provide a minimum of one-hour rated wall assembly around all Janitors Closets, Store Rooms, Mechanical and Electrical Rooms or Closets. Wall fire ratings shall be graphically shown by a continuous symbol or pattern within the wall on the reflected ceiling plan and/or on a Fire Protection/Life Safety Plan. When other functions coexist with the fire protection functions, their integration shall be clearly indicated with an analysis that describes how both functions will be served. Provide a separate, composite type floor plan which makes an accurate presentation of these various features and functions. By authorized written permission, where the building and features being shown are unusually simple, this information may be included on other drawings. Rated wall details shall include the design number of the testing laboratory certifying the rating.

j. Modular Design

Use modular design practices for the design of all masonry buildings or components of buildings. Dimensions shall be figured to whole or half-unit lengths (in increments of 102 mm (4 inches)) in order to reduce on-site cutting of masonry. Units less than 102 mm (4 inches) long shall be avoided.

k. Room and Door Numbering

The Room and Door Numbering system shall be consistent for all buildings designed under any one contract. Room numbering shall start at the main entrance and proceed clockwise around functional areas.

l. Facility Elevation

The elevation of the first floor shall be indicated as 100 000 mm (100 feet) and shall be a minimum of 300 mm above finish grade. Elevation for other floors, footings, etc., shall be related to this figure. Sea level elevations shall not be shown on the building drawings. Show elevations of the first floor above sea level on the grading plan (Civil).

m. Access to Utilities

All utilities within the building, such as piping, ductwork, and electrical work, shall be concealed in finished areas unless otherwise specified in the Program and Performance Requirements. Provide plumbing chases in toilet areas. Carefully figure the clear space above ceilings and the size of chases to accommodate piping slopes and connections, ductwork crossovers, and fittings, HVAC piping and valve service spaces, and similar situations. Provide access to valves, cleanouts, etc. Space provided for utilities systems shall be adequate but not excessive.

3.8.5 Interior Design

Furnish Structural Interior Design (SID) Package, including floor plans, finish and color schedules, interior design analysis, and sample/color boards, in accordance with SWD-AEIM, Chapter III, paragraph "Interior Design." SID refers to the building related exterior and interior finishes. Use the design analysis to explain the desired image or visual appearance of the interior of the facility.

3.8.5.1 Submittal Requirements for SID Notebooks (Color/Finish Sample Boards)

- a. Furnish 4 sets of color/finish notebook(s) with attached samples of the proposed building-related finish materials mounted on 215 mm by 280 mm by 1.5 mm (8-1/2 inch by 11 inch by 1/16 inch) thick mat board in three-ring notebooks. Epoxy glue, hot-melt glue, or contact cement shall be used to attach samples; Scotch tape, double-backed tape, or rubber cement will not be acceptable. Heavy samples shall be mechanically fastened. Photographs or colored photocopies are not acceptable for material and color samples.
- b. The notebooks shall be labeled on the outside spine and front cover with the phase percentage, SID, project title and location, Contract number, date, and the Contractor's name and address.
- c. Sequence and Content of SID Submittal

The sequence and content of SID Submittals shall be as follows:

- (1) Title Page.
- (2) Table of Contents.
- (3) Narrative of Interior Design Objectives.
- (4) Exterior Elevation Drawing.
- (5) Exterior Building Material Legend.
- (6) Exterior Building Material Color Board(s).
- (7) Room Finish Schedules.
- (8) Interior Color Placement Plan.
- (9) Interior Color Notebooks (according to color placement plan).

Each sample shall indicate color, texture, and finish; and, if patterned, shall be large enough to define full pattern. Samples shall be identified as to type of material, area of installation, manufacturer, and transmittal number under which certification of the material represented will be submitted in accordance with the requirements of Section 01330 CONSTRUCTION SUBMITTAL PROCEDURES.

- (10) Not Used.
- (11) Signage Location Plans(s).
- (12) Interior Signage Color Notebooks.

3.8.6 Structural Design

Drawings shall include foundation plans and details, floor framing plans for each floor when applicable, floor slab plans, and roof framing plans.

a. Show the location of all in-wall columns or pilasters.

b. Foundation and slab plans shall show the size and location of all foundation elements, such as foundation walls, grade beams and footings. Elevations for footings shall be indicated on the plan. Plans for slabs-on-grade and exterior stoop slabs at building entrances shall show location and type of joints, slab thicknesses and reinforcing, elevation of slab surfaces, and any other design features, such as equipment bases, heavy Lab equipments, isolated foundations and the in-slab electrical raceway, which affect the slab design.

c. The sizes, locations, and elevations of footings shall be shown.

d. Coordinate slab plans with the Electrical sheets and indicate the locations of in-slab electrical raceway trench ducts or similar items.

e. Show concrete slab-on-grade thicknesses and sections.

f. Show proposed treatment of special foundations and other unique or complex features and details.

g. Provide elevation views, sections, and details necessary to illustrate the design.

h. Roof framing plans shall show sufficient details to clearly indicate the type of framing system used, size, and spacing of members and their elevations.

i. Drawings shall include overall building plan dimensions, north arrows, and design notes.

j. Grid Systems, Dimensions, and Floor Elevations

Each foundation and slab plan and roof framing plan shall have an alpha-numeric grid system aligned with any in-wall columns or pilasters, or with load bearing and non-load bearing walls, as applicable. The same grid system shall be used for all plan views. Each plan view shown shall have all necessary dimensions. On plan views, the dimensions shall define the location of grid lines, offsets, and all structural elements, as well as the overall sizes of the structure. The finish elevation of the floor slab shall be indicated as 100 000 mm (100 feet), and elevations for foundations, walls and roof members shall be referenced to this basic elevation.

k. Plan Sheets

(1) Foundation and Slab Plans

Foundation and slab plans shall show the size and location of all foundation elements, such as foundation walls, grade beams and footings. Elevations for footings shall be indicated on the plan. Plans for slabs-on-grade and exterior stoop slabs at building entrances

shall show location and type of joints, slab thicknesses and reinforcing, elevation of slab surfaces, and any other design features, such as equipment bases, heavy Lab equipments, isolated foundations and the in-slab electrical raceway, which affect the slab design.

(2) Roof Framing Plans

Roof framing plans shall be provided for all parts of the structure. Plans shall show the size, spacing, and location of all roof framing members, their supporting in-wall columns, pilasters or walls, all auxiliary members such as bracing and bridging, and the size and location of all major openings through the roof. Plans shall show support system for satellite dishes.

1. Elevation Views, Sections and Details Sheets

Elevation views, sections, and details necessary to illustrate fully the design shall be provided. Some requirements peculiar to the various structural materials are described below.

(1) Concrete

Include elevation views as necessary, plus sections and details to show the outlines of concrete cross-sections, reinforcing bar arrangements, concrete cover for rebar, installation of embedded items, and joint construction. All lap splice and embedment lengths for reinforcing bars shall be clearly indicated on the drawings. A sill detail for each foundation condition at exterior and interior doors shall be provided.

(2) Masonry

Wall reinforcing shall be located and identified on plans, in section cuts, elevation views, or in schedules. When required, include structural elevations to clarify the construction requirements for masonry reinforcement, especially the reinforcement around wall openings. Listed below are some frequently required masonry details, most of which are shown in ICBO Bldg Code and SWD-AEIM. may be extracted from other sources and incorporated into the final drawings. Edit the details to reflect the specific requirements of this project.

(3) Structural Steel, Steel Joists, and Steel Decking

Structural steel connections shall be fully detailed and shown on the drawings. The anchorage of beams, trusses, joists, and steel deck to walls or other bearings, and the extra framing or reinforcement required at deck openings shall also be detailed. Notes, details, or schedules on the drawings shall indicate the steel deck attachment method to be used, and shall give the size and spacing for perimeter, side lap, intermediate supports and end lap attachments. Welded connections shall be detailed using standard weld symbols illustrated in AWS D1.1. All applicable weld sizes, spacing, types, contours, and finishes shall be shown.

(4) Cold-Formed Steel Studs

Cold-formed steel connections shall be fully detailed and shown on the drawings. The anchorage of studs to top and bottom runners, of top and bottom runners to supporting members, and the extra framing at openings

shall also be detailed. Notes, details, or schedules on the drawings shall indicate the steel stud and runner dimensions, spacing, and attachments.

m. Schedules

(1) Foundation Schedules

Foundation schedules for footings or grade beams shall be included as applicable. The schedule shall include all pertinent information required for the foundation system being used.

(2) Framing Schedules

For concrete framing, beam, and column schedules shall conform to the requirements of the ACI SP-66. For structural steel framing, provide a column schedule complete with design loads at splices, if any, and at column bases, plus a tabulation of the loads, shears, moments and/or axial loads to be resisted by the beams and their connections.

n. Equipment Loads

All equipment loads which exceed 80 kg (176 pounds) and are not supported by concrete slab-on-grade, shall be identified on the drawings by showing equipment locations, total weights, and reaction loads at support points.

o. Notes

(1) Design Notes

Under the heading "Designer's Notes," the structural drawings shall contain notes which begin:

"The structural design was prepared using the following data:".

The data then listed shall include the structural loading criteria used for design, such as roof and floor live loads, snow load design parameters, wind speed and wind load design parameters, seismic design parameters (Zone Z, I, R_w, C, and S values), allowable soil bearing pressures (as recommended by the foundation analysis), foundation design depth, design wind uplift pressures for steel joists and other data pertinent to future alterations. Also, to be listed are the ASTM designations and stress grades of the applicable structural materials: steel, masonry, concrete for each usage, reinforcing bars, and bolts.

(2) General Notes

Other notes, which direct the work to be performed, the materials to be used, etc., shall be grouped under the heading of "General Notes." Include in these notes a description of the building's structural system, if necessary.

3.8.7 Mechanical Design

plans, piping diagrams and isometrics, mechanical room sections, water and air flow diagrams, details, schedules, control diagrams, sequence of operations, etc. as necessary to define the required design intent. Floor

plans shall use the architectural floor plans as a basis, with the building outline half-toned. Large-scale plans of congested areas shall be provided. Coordinate with architectural design for provision of access panels for all concealed valves, traps and air vents, etc. Unless otherwise indicated, all floor plans shall be drawn at a minimum 1:100 (1/8-inch = 1'-0") scale and shall show room names and numbers. Drawings shall include, but not limited to, the following:

a. Mechanical Abbreviation, Legend, and General Notes Sheet

This sheet shall include all mechanical abbreviations and symbols that will be used on the drawings. Include mechanical general installation notes that are required to clarify the construction intent that may not be readily apparent in the specifications or on the drawings. Symbols shall be grouped into sections; as a minimum, provide sections for Plumbing and HVAC. Control drawing symbols shall be shown on a separate drawing.

b. Plumbing Drawings

Plumbing Plans: Plumbing plans show show the design and layout of the domestic hot and cold water distribution systems; make-up water piping; soil, waste and vent piping; and storm water drainage system. Include routing of piping systems from the connections within the structure to a point 1.5 meters (5 feet) outside the structure. The grade of all drain lines shall be calculated and invert elevations established. All plans shall show plumbing fixtures. All electrical panels and equipment and pertinent HVAC equipment (e.g. chillers, expansion tanks, boilers, AHU's, pumps) shall be outlined in half-tone on the plumbing plans. Plans may be drawn at 1:100 (1/8 inch = 1 foot) scale as long as legibility is not compromised. Plumbing fixtures and drains shown on the drawings shall be designated by the same identification system used in the Construction Specification Plumbing Fixture Schedule. Soil, waste, vent and storm drainage piping shall be shown on separate sheets from cold and hot water distribution piping and make-up water piping. Provide a roof plan showing roof drains and sanitary vent penetrations. Include the following:

(1) Enlarged toilet room plans showing all fixtures, water, waste, and vent piping for each toilet area.

(2) Plumbing water and waste/vent riser diagrams for each toilet area. Provide plumbing water and waste/vent riser diagrams for each toilet area.

(3) Enlarged mechanical and boiler room plumbing plans, drawn at a minimum 1:50 (1/4 inch = 1'-0") scale, showing layout of all plumbing equipment and piping within the rooms. To show spatial relationships, indicate the location of HVAC equipment, gas service, condenser water or chilled water entrances, fire protection entrance and risers, and electrical panels or equipment located in the room.

(4) Plumbing details, including those for roof and overflow drains, and schedules.

c. Mechanical HVAC Drawings, Details, and Schedules

Show on mechanical HVAC drawings, all items of mechanical equipment, including boiler room equipment, chilled water equipment, condenser water

equipment, air handling units, air distribution and exhaust systems, etc., to clearly illustrate all HVAC system designs, and to determine proper space allocation within the intent of the architectural layout requirements. Plans and sections shall be developed sufficiently to ensure that major equipment items, piping, and ductwork cause no interference with structural members, electrical equipment, etc. Provide Schedules for each item of mechanical equipment. Provide installation details showing specification requirements such as isolation and balancing valves, thermometers, pressure gauges, equipment pads, strainers, vents, hangers, and vibration isolation for each item of mechanical equipment. Include enlarged mechanical and boiler room floor plans showing the layout of all HVAC equipment, piping, and ducts located within the rooms and dedicated access space for items requiring maintenance; and drawn at a minimum 1:50 (1/4 inch = 1'-0") scale. Provide mechanical and boiler room sections to show equipment and components, ductwork connections and routing, and relationship to adjacent structural features. Provide chilled and hot water system flow diagrams, showing chillers, cooling towers, piping, pumps, boilers, and all connected cooling and heating equipment. Show associated GPM flow rates. Provide airflow diagrams showing CFM quantities for outside air, return air, and supply air; supply-air side of each diagram shall be broken down into zones, with each zone supply, return, and relief/exhaust CFM quantities identified.

Mechanical HVAC Plans: Mechanical HVAC plans shall show the design and layout of the hot water piping distribution system and equipment, chilled water piping distribution system and equipment, condenser water piping distribution system and equipment, air supply and distribution systems, and ventilation and exhaust systems. Air supply and distribution systems shall show all ductwork, including supply and return mains, branch ducts, and terminal unit (single and dual duct VAV and CV boxes) takeoffs; ductwork to diffusers; diffusers, grilles, and registers; and fire and fire/smoke dampers.

d. HVAC Control Drawings

Provide a one-line control diagram showing DDC interface points, detailed sequence of operations, and DDC control points list for all mechanical equipment and systems in accordance with SWD-AEIM, Chapter V.

3.8.8 Electrical Design

Provide plans, electrical and UPS room sections, single-line diagrams, riser diagrams, details, and schedules as necessary to define the required design intent. Coordinate the electrical and communications design with the design for other disciplines. Floor plans shall use the architectural floor plans as a basis with the building outline half-toned. Unless otherwise indicated, all floor plans shall be drawn at a minimum 1:50 (1/4-inch = 1'-0") scale and shall show room names and numbers. Include the following as applicable:

- a. Electrical Abbreviations and Legends
- b. Drawing Notes
- c. One-Line Diagram

Detail the complete electrical system with a simplified one-line diagram. The diagram shall show ratings of major equipment including short circuit ratings. Use standard symbols for electrical equipment including, but not

limited to, switchgear, sectionalizing cabinets, transformers, generators, uninterruptible power systems (UPS), switchboards, panel boards, power distribution units (PDUs), motor control centers (MCCs), motor starters. Include switchgear fuses or circuit breaker ratings; transformer ratings (including K-ratings) and connection configuration; switchboard ratings (including metering); panelboard current and ampere interrupting current (AIC) ratings; PDU ratings (including isolation transformers and K-ratings), raceway and conduit sizes and material type; MCC ratings; motor starter ratings; and conductor and ground type, size, and insulation ratings.

d. Riser Diagrams

e. Power Plan

Detail the electrical wiring for outlets, including raised floor receptacles, other than lighting. Identify rooms by name and number. When applicable, include a power cable tray plan and communications tray plan, detailing the underfloor cable tray components, outlets, and routing.

f. Lighting Plan

Detail the electrical wiring and switching for lighting. Identify rooms by name and number.

g. Lighting Fixture Schedule

h. Panelboard and PDU Schedules

Detail the circuits and circuit breakers or fuse locations in various panelboards, including panelboards in power distribution units (PDUs). Panelboard schedules shall include the designation, location, mounting (flush or surface), number of phases and wires, voltage, capacity and total connected and demand load. Indicate the trip rating, frame size, interrupting rating, and number of poles for each circuit breaker in the panelboards. List the circuit number, circuit description, and load for each branch circuit. Include estimated maximum demand for each panel and for entire building and other relative information.

i. Emergency Systems

Detail the electrical requirements for emergency systems such as emergency generator, UPS, emergency lighting, and fire alarm system (coordinate with fire protection plans).

j. Site Plan

Detail the connection of pad-mounted switchgear, pad-mounted sectionalizing cabinets, vaults, and underground electrical and communications ducts. Show utilities the underground electric lines and communications ducts will cross.

k. Communications System

Detail the conduit and raceways required to support communications and audio/visual systems requirements, including, but not limited to intercoms, security, cable television, computer data, data transmission (local area network), and telephone.

1. Security System

Detail security camera and alarm requirements, and riser diagrams.

m. Lightning Protection System

Detail the lightning protection system including air terminal types and locations; cross and down conductor material, sizes and connections; ground rod material, sizes, and locations; ground counterpoise materials, sizes, and routing, and test well construction and locations. Show locations of all air terminals, roof conductors, down conductors, ground rods, and counterpoise.

n. Grounding System

Show locations for and detail grounding electrode; grounding conductor and bond materials, sizes, and locations; and isolation grounds.

o. Cathodic Protection System

Detail test point construction and locations, sacrificial anode systems, impressed current systems, etc.

p. Miscellaneous Details

Provide communications manhole details, electric vault details, special light fixture details, etc.

3.8.9 Fire Protection Design

Provide plans, diagrams, sections, and details as necessary to define the required design intent. Floor plans shall use the architectural floor plans as a basis, with the building outline half-toned. Unless otherwise indicated, floor plans shall be drawn at a minimum 1:100 (1/8 inch = 1'-0") scale and shall show room names and numbers. Drawings shall include, but not limited to, the following:

a. Fire Protection Plans

Show the following on the fire protection plans:

- fire service entry and size to a point 1525 mm (5 feet) outside of building;
- back flow preventer and size;
- system riser and size;
- zone risers, fire department connection, alarm bell, detectors, zones, room by room occupancy hazards and ceiling types per zone in tabular format, general description of system, applicable NFPA codes listing, sprinkler type per ceiling and application;
- water demand data, including design density, hose allowance, and design area for each applicable occupancy hazard; and
- a note stating that system shall be hydraulically designed.

Plans shall not show sprinkler piping or heads, unless it is necessary for coordination or system definition in special applications.

b. Fire Protection Details

Include the following fire protection details:

- mechanical riser diagram, including all pipe sizes;
- electrical riser diagram;
- any necessary sections to show routing of piping or sprinkler head locations, fire service entrance detail, exterior wall and slab penetration details, hydraulic design data from flow test provided by Government, hydrant designations from flow test, and fire protection symbols list.

c. Site Plan

Include:

- underground fire service main routing and size, from point of connection at existing water main, to building entry point;
- and fire hydrant locations used in flow test.

Label fire hydrants to match flow test designations shown on drawings and described in design analysis.

d. Life Safety Plan

Show:

- location of fire separation walls, column, floor and roof protection,
- path of travel for emergency egress and panic exits,
- access to building for fire fighting,
- rated doors and windows,
- requirement for mechanical and electrical penetrations through fire separation walls and floors,
- placement of fire extinguishers, and
- occupancy types.

3.8.10 Environmental Design

Provide the following items:

Storm Wwater Pollution Prevention Plan

If required, the Contractor shall submit for Government review and approval a basic stormwater pollution prevention plan developed in accordance with Section 01411 ENVIRONMENT PROTECTION, and Section 01421 OUTLINE OF A BASIC STORM WATER POLLUTION PREVENTION PLAN.

Plans for Storm Water Controls

The Contractor shall also provide drawings that describe stormwater control details to be used and denote where these storm water controls will be implemented during the various phases of construction of the new facility .

Design Analysis

The Contractor shall prepare a Chapter in the Design Analysis entitled: "Environmental Protection Compliance". This Chapter shall summarize how the project complies with all environmental laws and regulations. As a minimum, the Chapter shall include the following:

- a. The Permitting and/or Approving Authority(ies).

b. Construction/Operating Permits, Notices, Reviews and/or Approvals required. If, when checking with the agencies, a permit, notice or approval is not required, include a copy of the telephone conversation memorandum or letter from the agency.

c. Time required by the permitting agency(ies) to process the application(s) and issue the permits.

d. Fee schedule including filing/application fees, review fees, emissions fees, certification testing, etc.

e. Monitoring and/or compliance testing requirements.

f. Actual Environmental regulations governing the applications, exemptions, variances, etc. or at a minimum a brief summary of the regulation and title.

3.9 **ATTACHMENTS**

Attachments A, B, and C follow this page.

3.9.1 ATTACHMENT A

CODE ANALYSIS

UNIFORM BUILDING CODE (UBC) AND NFPA "LIFE SAFETY CODE" ANALYSIS

LIFE SAFETY AND FIRE PROTECTION IS AN INTEGRAL PART OF EVERY FACILITY DESIGN. RECOGNIZED CODES AND ACCEPTED SAFETY STANDARDS SHALL BE FOLLOWED IN THE DESIGN OF ALL FACILITIES. OF THE VARIOUS CODES AND SAFETY STANDARDS THE NATIONAL FIRE PROTECTION ASSOC. (NFPA) "LIFE SAFETY CODE" SHALL TAKE PRECEDENCE. ALL APPLICABLE REQUIREMENTS OF THE LIFE SAFETY CODE SHALL BE INCORPORATED INTO EACH DESIGN. FOR TYPE OF CONSTRUCTION, FIRE AREA LIMITATIONS, AND ALLOWABLE BUILDING HEIGHTS THE DESIGN SHALL FOLLOW THE UNIFORM BUILDING CODE (UBC).

CHECK LIST

PROJECT NAME _____ DATE _____

LOCATION _____

3.9.1.1 UNIFORM BUILDING CODE ANALYSIS

a. OCCUPANCY CLASSIFICATION (See Table 5A):

Area:	Classification:
(GROUP: _____):	Div. _____
(GROUP: _____):	Div. _____
(GROUP: _____):	Div. _____

PRINCIPAL OCCUPANCY _____

OTHERS (SPECIFY) _____

b. TYPE OF CONSTRUCTION :

c. OCCUPANCY SEPERATION REQUIRED (SEE TABLE 5-B):

_____	TO	_____	=	_____	HRS
_____	TO	_____	=	_____	HRS
_____	TO	_____	=	_____	HRS
_____	TO	_____	=	_____	HRS

d. FIRE RESISTANCE OF EXTERIOR WALLS: (SEE TABLE 5-A)

NORTH _____

SOUTH _____
 EAST _____
 WEST _____
 OTHER _____

e. OPENINGS IN EXTERIOR WALLS: (SEE TABLE 5-A)

NORTH _____
 SOUTH _____
 EAST _____
 WEST _____
 OTHER _____

f. MAX. ALLOWABLE FLOOR AREA (SEE TABLE 5-C):

ALLOWABLE:

IF SPRINKLERED: _____

ALLOW. AREA INCREASES _____

CALCULATED ACTUAL FLOOR AREA:

Floor	Square Footage
-------	----------------

Totals:

g. MAX. ALLOWABLE HEIGHT (SEE TABLE 5-D):

METERS (FEET): _____

STORIES: _____

Proposed Height of Building: _____

Actual No. of Stories: _____

h. COMMENTS:

DESIGNER: _____

3.9.1.2 NFPA 101 "LIFE SAFETY CODE"

a. CLASSIFICATION OF OCCUPANCY:

HAZARD OF CONTENTS:

LOW _____

ORDINARY _____

HIGH _____

b. FIRE RESISTIVE REQUIREMENTS:

EXTERIOR WALLS: _____ HRS _____

INTERIOR WALLS: _____ HRS _____

STRUCTURAL FRAME: _____ HRS _____

VERTICAL OPENINGS: _____ HRS _____

FLOORS: _____ HRS _____

ROOFS: _____ HRS _____

EXTERIOR DOORS: _____ HRS _____

EXTERIOR WINDOWS: _____ HRS _____

BOILER ROOM ENCLOSURE _____ HRS _____

OTHER (LIST) _____ HRS _____

_____ HRS _____

_____ HRS _____

_____ HRS _____

c. MEANS OF EGRESS:

OCCUPANCY LOAD FACTOR: _____

OCCUPANCY	FACTOR	ACTUAL AREA	ACTUAL LOAD
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

d. NUMBER OF EXITS REQUIRED:

e. MINIMUM WIDTH OF EXITS:

CALCULATED: _____

ACTUAL: _____

f. MAXIMUM ALLOWABLE TRAVEL DISTANCE TO EXIT:

WITH SPRINKLERS: _____

g. EXIT DOORS:

MINIMUM WIDTH ALLOWED: _____

MAXIMUM LEAF WIDTH ALLOWED: _____

WIDTH REQUIRED FOR NO.OF OCCUPANTS: _____

h. EXIT CORRIDORS:

MAX. COMMON PATH OF TRAVEL: _____

MINIMUM ALLOWABLE WIDTH: _____

REQUIRED TO HAVE EXIT AT EACH END OF CORRIDOR?

DEAD END CORRIDORS ALLOWED? _____

MAXIMUM LENGTH: _____

WALL FIRE RESISTANCE REQUIRED: _____

DOORS & FRAME FIRE RESISTANCE REQUIRED:

i. STAIRS:

MINIMUM WIDTH _____ FOR OCCUP. LOAD OF _____

MAX. RISER ALLOWED: _____

MINIMUM TREAD ALLOWED: _____

LANDINGS:

MIN. SIZE: _____

MAX. VERTICAL DIST. BETWEEN LANDINGS: _____

REQUIRED HEIGHT OF RAILINGS:

HANDRAILS:

REQUIRED AT EACH SIDE? _____

INTERMEDIATE RAIL REQUIRED? _____

HEIGHT ABOVE NOSING _____

INTERMEDIATE RAIL REQUIRED? _____

MAX. SPACE ALLOWED BETWEEN RAILS: _____

STAIR ENCLOSURE REQUIRED? _____

STAIR TO ROOF REQUIRED? _____

STAIR TO BASEMENT REQUIRED? _____

j. HATCHWAY ACCESS TO ROOF REQUIRED? _____

k. LADDER ACCESS TO ROOF REQUIRED?

l. HORIZONTAL EXIT REQUIREMENTS:

m. PROTECTION OF OPENINGS NEAR EXTERIOR STAIR EXIT DOORS:

n. SMOKEPROOF ENCLOSURE REQUIRED:

o. RAMPS:

MAX. SLOPE TO USE AS EXIT _____

HANDRAILS REQUIRED? _____

p. COMMENTS:

DESIGNER: _____

FOLLOWING IS A LIST OF ADDITIONAL "NFPA" CODES THAT ARE COMMONLY USED. INDICATE WHICH OF THESE CODES ARE USED AND ADD THOSE REQUIREMENTS TO THIS ANALYSIS.

- NFPA 10 FIRE EXTINGUISHERS, PORTABLE
- NFPA 75 COMPUTER/DATA PROCESSING FACILITIES
- NFPA 80 FIRE DOORS AND WINDOWS
- NFPA 88A PARKING STRUCTURES
- NFPA 409 AIRCRAFT HANGARS
- AFM 88-4 DATA PROCESSING FAC. DESIGN AND CONST.
- AF ETL 89-3 FIRE PROTECTION CRITERIA FOR ELECTRONIC

Typed Name and Signature of the
Licensed Architect/Engineer of Record
Professional Seal of the Licensed Architect/Engineer of Record

3.9.2 ATTACHMENT B

ADA ARCHITECTURAL DESIGN CHECKLIST

Project Name: _____
 Project Location: _____
 Design Phase: _____

ITEM
 INCORP N/A
 LATER
 NO.

1. Established with the Base/owner of the facility the requirements for handicap accessibility. _____
2. Received a waiver for no handicap accessibility requirements on the facility. _____
3. Facility is designed utilizing:
 - New Construction Criteria _____
 - Building Alteration Criteria _____
 - Historic Building Preservation Criteria: _____
4. Accessible Route (egress/corridors/halls/aisles).
 - Provided minimum fire egress routes. _____
 - Provided minimum site accessible routes. _____
 - Provided proper clearance widths. _____
 - Provided proper floor level changes. _____
 - Provided proper floor materials. _____
 - Provided protection from protruding objects. _____
5. Ramps:
 - Maximum slopes less than 1:12 _____
 - Maximum run less than 30 feet for 1:12 slopes _____
 - 40 feet for 1:16 slopes _____
 - Minimum clear width exceeds 914mm. _____
 - Provided proper edge protection. _____
 - Provided handrails of proper configuration and diameter. _____
 - Provided proper handrail extensions at top and bottom of ramp. _____
 - Provided handrails at proper mounting heights. _____
 - Provided proper landings. _____
 - Provided proper cross slope on ramp surface. _____

ITEM
 INCORP
 N/A
 LATER
 NO.

6. Stairs:

- Protected the space below stairs from access by the blind. _____
- Provided handrails of proper configuration and diameter. _____
- Provided proper handrail extensions at top and bottom of stairs. _____
- Provided handrails at proper mounting heights. _____
- Provided treads greater than 280mm in width. _____
- Provided Proper nosings. _____

7. Elevators:

- Provided buttons and lanterns at the proper mounting height. _____
- Provided Braille characters. _____
- Provided proper door widths. _____
- Provided proper clearance inside elevator car. _____

8. Doors And Hardware:

- Provided proper door widths. _____
- Provided proper clearance on both sides of jambs. _____
- Entrance vestibules provided with adequate clearances. _____
- Provided levers on locksets and exit hardware. _____
- Provided closers with mechanical adjustments. _____
- Provided accessible thresholds. _____
- Provided protection plates on doors heavily used by wheel chair bound people. _____

ITEM INCORP NO.	N/A	LATER			
9.			Toilet Facilities:		
			- Provided proper floor clearance through out the toilet rooms.	_____	_____
			- Provided minimum number of required accessible fixtures.	_____	_____
			- Provided accessible toilet stalls.	_____	_____
			- Provided stall doors with correct direction of swing.	_____	_____
			- Provided accessible water closets.	_____	_____
			- Provided grab bars at accessible water closets.	_____	_____
			- Provided grab bars with correct configuration and dimension.	_____	_____
			- Provided accessible sinks/lavatories.	_____	_____
			- Provided accessible urinals.	_____	_____
			- Provided accessible water coolers and fountains.	_____	_____
			- Provided accessible mirrors.	_____	_____
			- Provided accessible toilet accessories at required locations.	_____	_____
			- Provided all fixtures and accessories at proper mounting heights and clearances.	_____	_____
			- Provided insulated or protected exposed pipes at lavatories.	_____	_____
10.			Shower/Tub Facilities:		
			- Provided the minimum number of accessible showers/tubs.	_____	_____
			- Provided showers/tubs with grab bars.	_____	_____
			- Provided showers/tubs with seats as required.	_____	_____
			- Provided controls mounted at the proper height and location.	_____	_____
			- Provided proper clearances and dimensions in showers/tubs.	_____	_____
			- Provided proper floor clearance through out shower/tubs rooms.	_____	_____
			- Provided doors with correct direction of swing and clearance.	_____	_____

ITEM NO.		INCORP	N/A	LATER
11.	Storage:			
	- Provided accessible cabinets, shelves, closets, and drawers as required.	_____	_____	_____
	- Provided proper clearance, mounting heights, and reach provisions.	_____	_____	_____
12.	Telephones and Vending:			
	- Provided the minimum number of required accessible public telephones.	_____	_____	_____
	- Provided proper floor clearance around telephone.	_____	_____	_____
	- Phone and controls mounted at proper heights and within reach.	_____	_____	_____
	- Provided vending machines on an accessible route.	_____	_____	_____
	- Provided vending machines with accessible clearances and protruding object safe guards.	_____	_____	_____
13.	Fixed Or Built-in Seating And Tables:			
	- Provided the minimum number of accommodations for accessibility in areas which required fixed furniture.	_____	_____	_____
	- Provided proper floor clearance around furniture.	_____	_____	_____
	- Provide proper knee space at tables.	_____	_____	_____
	- Provided tables and counters with proper top surface heights.	_____	_____	_____
14.	Assembly Areas:			
	- Provided the minimum number of accessible seating spaces.	_____	_____	_____
	- Provided seating which is easily accessible to emergency egress.	_____	_____	_____
	- Provided companion seating.	_____	_____	_____
	- Integrated and dispersed accessible seating with the rest of the seating.	_____	_____	_____
	- Provided accessible dressing rooms.	_____	_____	_____
	- Provided level floor surface at accessible seat locations.	_____	_____	_____
	- Provided clear ground or floor space at accessible seat locations	_____	_____	_____
	- Provided access to all performing areas and associated spaces.	_____	_____	_____

ITEM NO.		INCORP	N/A	LATER
15.	Dining Halls And Cafeterias:			
	- Provided the minimum number of accessible dining spaces.	_____	_____	_____
	- Provided accessible counters and bars.	_____	_____	_____
	- Provided accessible aisles between tables or walls.	_____	_____	_____
	- Provided clear floor space at accessible dining locations.	_____	_____	_____
	- Provided accessible food service lines meeting minimum clearances and reaches.	_____	_____	_____
	- Provided accessible tableware and condiment areas.	_____	_____	_____
	- Provided raised speaker platform with protected edges.	_____	_____	_____
16.	Medical Care Facilities:			
	- At least 10% of the general patient rooms are accessible.	_____	_____	_____
	- Provided the number of accessible patient rooms as required for specialized treatment, long term care, or alterations of existing patient rooms.	_____	_____	_____
	- Provided at least one accessible entrance with weather protecting canopy or roof overhang.	_____	_____	_____
	- Provided minimum clearances within the patient rooms and around the beds.	_____	_____	_____
	- Provided accessible patient toilet/bath rooms.	_____	_____	_____
17.	Business And Mercantile:			
	- Provided at least one accessible sales counter, services counter, teller, information window, etc.	_____	_____	_____
	- Security bollards when provided, do not prevent access or egress to people in wheel chairs.	_____	_____	_____
18.	Libraries:			
	- Provided access to all reading and stack areas, reference reference rooms, reserve areas, and special facilities or collections.	_____	_____	_____
	- Provided at least 5% or a minimum of one of each element or fixed seating, tables, or study carrels as accessible	_____	_____	_____
	- Provided at least one lane of check out areas as accessible.	_____	_____	_____
	- Provided adequate clearance and reach distances at card catalogs and magazine displays.	_____	_____	_____
	- Provide stacks with minimum clear aisle width.	_____	_____	_____

ITEM NO.		INCORP	N/A	LATER
19.	Temporary Lodging:			
	- All common and public use areas are accessible.	_____	_____	_____
	- Provided accessible units, sleeping rooms, and suites.	_____	_____	_____
	- Provided sleeping accommodations for persons with hearing impairments.	_____	_____	_____
	- Provided a dispersed class and a range of room options.	_____	_____	_____
	- Provided accessible rooms in ADAL projects.	_____	_____	_____
	- Provided an accessible route to accessible sleeping rooms.	_____	_____	_____
	- Provided accessible clearance widths within sleeping rooms and around beds.	_____	_____	_____
	- Provided accessible doors within accessible sleeping rooms.	_____	_____	_____
	- Provided accessible fixed or built-in furniture and storage units.	_____	_____	_____
	- Provided accessible controls throughout accessible units.	_____	_____	_____
	- Where provided as part of an accessible unit each of the following were provided as accessible: living area, dining area, at least one sleeping area, patio/terrace, balcony, toilet/bath, and carport/garage/parking.	_____	_____	_____
	- Where provided as apart of an accessible unit, the kitchen, kitchenettes, wet bars, or similar amenities were also provided with accessible features.	_____	_____	_____
	- Provided visual alarms, notification devices, and accessible telephones.	_____	_____	_____
	- Provided accessible doors and doorways designed to allow passage into and within all sleeping units or other covered units.	_____	_____	_____

20. Transportation Facilities:

(This section covers Air, Rail, and Bus public transportation facilities. See Section 10 of the ADA Guide for specific requirements for these facilities)

3.9.3 ATTACHMENT C

MECHANICAL ROOM SIZE FORM

**NOTE: Mechanical Systems Design Documents and Guides -
Mechanical Room Size Form**

**At the final design stage, the mechanical designer shall
fill out this Mechanical Room Size Form and include it in
the final design calculations.**

The information submitted on this sheet shall be placed in a data base for future use on similar DoD, COE project. (The data base shall be used to help determine appropriate mechanical room sizes). Include this sheet in the final design calculations.

Project:

Location:

Engineer:

Gross floor area of building:

Gross square footage includes (the entire building) stairs, corridors, etc.

Floor area of mechanical room:

Percent of gross building area is the mechanical room size:

Type of facility:

Sources of energy (E, G, S):

Mechanical equipment:

List of equipment outside the mechanical room and location:

Is the mechanical room too small?

Does the User think the mech room is too small? (Y, N, Don't know)

Additional remarks:

Abbreviations:

- AC - air compressor
- AHU - air handling unit
- B - boiler
- CU - air cooled condensing unit
- DF - direct fired
- DX - direct expansion chilled water heat exchanger

E - electric
FC - fan coil unit
FP - fire protection
G - natural gas or propane
HX - heat exchanger
LC - liquid chiller
MUA - make up air unit
UH - unit heater
ST - domestic hot water storage tank
S - steam

-- End of Section --

ATTACHMENT B

AETC STANDARDS FOR INSTALLATION EXCELLENCE

ATTCH. C - DD FORM 1354, SAMPLE, AND CATEGORY CODES

TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY

Form Approved
OMB No. 0704-0188

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1. FROM (Installation/Activity/Service and Zip code)	2. OPERATING UNIT	3. DISTRICT CODE	4. OPERATING AGENCY	5. DATE	6. JOB NUMBER	7. SERIAL NUMBER	8. CONTRACT NUMBER
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9. TO (Installation/Activity/Service and Zip code)	10. OPERATING UNIT	11. DISTRICT CODE	12. OPERATING AGENCY	13. ACCOUNTING NUMBER	14. ACCOUNTABLE OFFICE NUMBER	15. TYPE OF TRANSACTION	16. PROJECT NUMBER
						A. <input type="checkbox"/> NEW CONSTR. <input type="checkbox"/> EXISTING FAC. <input checked="" type="checkbox"/> CAPITAL IMP. <input type="checkbox"/> OTHER (Specify)	B. <input type="checkbox"/> BENF/O <input type="checkbox"/> PHYSICAL COM. <input type="checkbox"/> FINAN. COM. <input type="checkbox"/> OTHER (Specify)

ITEM NO.	CATEGORY CODE	FACILITY (Category description)	NO. OF UNITS	TYPE	UNIT OF MEAS.	TOTAL QUANTITY	COST	DRAWING NUMBERS	REMARKS
17	18	19	20	21	22	23	24	25	26

27. STATEMENT OF COMPLETION: The facilities listed herein are in accordance with maps, drawings, and specifications and change orders approved by the authorized representative of the using agency except for the deficiencies listed on the reverse side.	28. ACCEPTED BY (Signature)	DATE
TRANSFERRED BY (Signature) TITLE (Area Engr./Base Engr./DPWO)	TITLE (Post Engr./Base Civ. Engr./Navy Rep.)	29. PROPERTY VOUCHER NUMBER

30.

CONSTRUCTION DEFICIENCIES

31. REMARKS

INSTRUCTIONS

This form has been designed and issued for use in connection with the transfer of military real property between the military departments and to or from other government agencies. It supersedes ENG Forms 290 and 290B (formerly used by the Army and Air Force) and NAVDOCKS Form 2317 (formerly used by the Navy).

Existing instructions superseded for any applicable additional information

extent that the various items and columns on the superseded forms have been retained. Additional instructions, as appropriate, will be promulgated by the military departments in connection with any new items appearing hereon.

With the issuance of this DD form, it is not intended that the departments shall revise and reprint manuals and directives simply to show the number of this DD form. Such action can be accomplished through the normal

TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY

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1. FROM (Installation/Activity/Service and Zip code) USAED, Ft. Worth Corps of Eng P.O. Box 17300 Ft. Worth, Texas, 76102-0300	2. OPERATING UNIT	3. DISTRICT CODE	4. OPERATING AGENCY	5. DATE	6. JOB NUMBER	7. SERIAL NUMBER	8. CONTRACT NUMBER 63-XX-C-XXX
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9. TO (Installation/Activity/Service and Zip code)	10. OPERATING UNIT	11. DISTRICT CODE	12. OPERATING AGENCY	13. ACCOUNTING NUMBER	14. ACCOUNTABLE OFFICE NUMBER	15. TYPE OF TRANSACTION A. <input checked="" type="checkbox"/> NEW CONSTR. <input type="checkbox"/> EXISTING FAC. <input type="checkbox"/> CAPITAL IMP. <input type="checkbox"/> OTHER (Specify) B. <input type="checkbox"/> BENF/O <input type="checkbox"/> PHYSICAL COM. <input type="checkbox"/> FINAN. COM. <input type="checkbox"/> OTHER (Specify)	16. PROJECT NUMBER
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ITEM NO.	CATEGORY CODE	FACILITY (Category description)	NO. OF UNITS	TYPE	UNIT OF MEAS.	TOTAL QUANTITY	COST	DRAWING NUMBERS	REMARKS
17	18	19	20	21	22	23	24	25	26
1	530155	Blood Process Lab	1	P	SF	20,623	\$2,309,500.00		
2	812225	Primary Distribution Line U.G.		P	LF	2,058	\$128,237.00		
3	824464	Gas Mains		P	LF	131	\$29,230.00		1 1/2" Line
4	832266	San Sewer Main		P	LF	236	\$24,383.00		4"=95 LF; 6"=140 LF
5	841161	Water Supply Main		P	LF	259	\$36,753.00		16"=40 LF
6	851143	Curbs & Gutter		P	LF	640	\$5,860.00		3"=76 LF; 6"=75 LF
7	852261	Vehicle Parking Lot		P	SY	1,248	\$51,486.00		
8	852289	Sidewalk		P	SY	634	\$9,987.00		

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TRANSFERRED BY (Signature)	TITLE (Post Engr./Base Civ. Engr./Navy Rep.)	29. PROPERTY VOUCHER NUMBER
TITLE (Area Engr./Base Engr./DPWO)		

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ITEM NO.	CATEGORY CODE	FACILITY (Category description)	NO. OF UNITS	TYPE	UNIT OF MEAS.	TOTAL QUANTITY	COST	DRAWING NUMBERS	REMARKS
17	18	19	20	21	22	23	24	25	26
9	871183	Storm Drain		P	LF	98	\$5,835.00		
10	872245	Fence		P	LF	230	\$28,659.00		
11	93220	Landscaping		P	SY	5,000	\$92,433.00		
12	93310	Demolition		P	EA	1	\$7,119.00		
							\$2,729,500.00		Sub Total E&D During Construction Contingencies Work by Others S&A Construction Cost P&D Costs Total Cost

27. STATEMENT OF COMPLETION: The facilities listed hereon are in accordance with maps, drawings, and specifications and change orders approved by the authorized representative of the using agency except for the deficiencies listed on the reverse side.	28. ACCEPTED BY (Signature) _____ TITLE (Post Engr./Base Civ. Engr./Navy Rep.)	DATE _____
TRANSFERRED BY (Signature) _____ TITLE (Area Engr./Base Engr./DPWO)	DATE _____	29. PROPERTY VOUCHER NUMBER _____

<u>CATEGORY</u> <u>CODE</u>	<u>DESCRIPTION</u>	<u>UOM</u>	<u>METRIC</u> <u>UOM</u>
72111	UNACCOMPANIED ENLISTED HOUSING	SF	M2
81113	ELECTRIC POWER, COAL FIRED	KV	
81115	ELECTRIC POWER, OIL FIRED	KV	
81117	ELECTRIC POWER, GAS FIRED	KV	
81121	ELECTRIC POWER, NUCLEAR	KV	
81122	ELECTRIC POWER, PHOTOVOLTAIC	KV	
81150	UNINTERRUPTABLE POWER SUPPLY	KV	
81160	STANDBY GENERATOR	KV	
81171	ELECTRIC POWER, HYDRO	KV	
81230	EXTERIOR LIGHTING	LF	M
81241	OVERHEAD ELECTRIC LINES	LF	M
81242	UNDERGROUND ELECTRIC LINES	LF	M
81320	SUBSTATION	KV	
81350	ELECTRIC SWITCHING STATION	KV	
81360	TRANSFORMERS	KV	
82110	HEATING PLANT, COAL FIRED	MB	
82117	HEATING PLANT, DUAL-FUEL	MB	
82118	HEATING PLANT, WOOD-FIRED	MB	
82120	HEATING PLANT, OIL-FIRED	MB	
82130	HEATING PLANT, GAS-FIRED	MB	
82140	HEATING PLANT, NUCLEAR	MB	
82150	HEATING PLANT, STEAM	MB	
82160	HEATING PLANT, ELECTRIC	MB	
82182	HEATING PLANT, SOLAR	MB	
82187	HEATING PLANT, GEOTHERMAL	MB	
82210	STEAM CONDENSATE LINES	LF	M
82220	HOT WATER LINES	LF	M
82221	HOT/CHILLED WATER LINES	LF	M
82240	STEAM LINES	LF	M
82310	GAS GENERATING PLANT	MB	
82410	GAS PIPELINES	LF	M
82610	A/C/REFRIGERATION PLANT	TN	MT
82625	HEAT PUMP	TN	MT
82710	CHILLED WATER DISTRIBUTION SYSTEM	LF	M
83110	PRIMARY WASTE WATER TREATMENT	KG	
83112	SECONDARY WASTE WATER TREATMENT	KG	
83113	ADVANCED WASTE WATER TREATMENT	KG	
83120	SEPTICTANK AND DRAIN FIELD	KG	
83130	RAW SEWAGE LAGOON/OXIDATION POND	KG	
83140	INDUSTRIAL WASTE TREATMENT PLANT	KG	
83150	SEWAGE LIFT STATION	KG	
83180	GRAVITY OIL/GREASE SEPARATOR	KG	
83181	WATER AND GRIT SEPARATOR	KG	
83210	SANITARY SEWER LINES	LF	M
83220	COMBINED SEWER	LF	M
83240	INDUSTRIAL WASTE SEWER	LF	M
83310	INCINERATOR FACILITY	TN	MT
83312	REFUSE COLLECTION FACILITY	TN	MT

CATEGORY			METRIC
<u>CODE</u>	<u>DESCRIPTION</u>	<u>UOM</u>	<u>UOM</u>
83320	RECYCLING FACILITY	TN	MT
83410	SANITARY LANDFILL	AC	
83420	HAZARDOUS WASTE LANDFILL	AC	
84110	WATER TREATMENT PLANT	KG	
84125	FILTER PLANT FACILITY	KG	
84130	WATER WELL, POTABLE	KG	
84141	PUMP STATION, POTABLE	KG	
84150	CHLORINATOR FACILITY	KG	
84210	WATER DISTRIBUTION LINES, POTABLE	LF	M
84215	SUPPLY MAIN, POTABLE	LF	M
84330	FIRE PROTECTION SYSTEM, NONPOTABLE	LF	M
84450	CHLORINATOR FACILITY, NONPOTABLE	KG	
84470	WATER WELL, NONPOTABLE	KG	
84472	PUMP STATION, NONPOTABLE	KG	
84510	WATER DISTRIBUTION LINES, NONPOTABLE	LF	M
84610	WATER STORAGE TANKS, POTABLE	GA	L
84620	RESERVOIR, POTABLE	GA	L
84710	WATER STORAGE TANKS, NONPOTABLE	GA	L
84720	RESERVOIR, NONPOTABLE	GA	L
84730	FIRE PROTECTION POND	GA	L
84740	WATER RETAINING BASIN	GA	L
85110	CANTONMENT AREA ROADS, SURFACED	SY	M2
85120	VEHICLE BRIDGE	SY	M2
85130	CANTONMENT AREA ROADS, UNSURFACED	SY	M2
85150	CANTONMENT AREA TANK TRAIL	SY	M2
85210	ORG. VEHICLE PARKING, SURFACED	SY	M2
85211	ORG. VEHICLE PARKING, UNSURFACED	SY	M2
85212	STAGING/MARSHALLING AREA	SY	M2
85215	NONORG. VEHICLE PARKING, SURFACED	SY	M2
85216	NONORG. VEHICLE PARKING, UNSURFACED	SY	M2
85218	NONORG. VEHICLE PARKING GARAGE	SY	M2
85220	SIDEWALKS AND WALKWAYS, SURFACED	SY	M2
85221	SIDEWALKS AND WALKWAYS, UNSURFACED	SY	M2
85225	PAD	SY	M2
85230	PEDESTRIAN BRIDGE	SY	M2
85710	TRAINING AREA ROADS, SURFACED	SY	M2
85715	TRAINING AREA ROADS, UNSURFACED	SY	M2
85720	TRAINING ATEA TANK TRAILS, SURFACED	SY	M2
85725	TRAINING AREA TANK TRAILS, UNSURFACED	SY	M2
85730	TRAINING AREA BRIDGE	SY	M2
86010	RAILROAD TRACKS	MI	M2
86110	RAILROAD BRIDGE	LF	M
86120	CRANE TRACKS	LF	M
86130	RAILROAD SCALES	LF	M
86140	COAL TRESTLE	LF	M
87110	STORM SEWER	LF	M
87120	DRAINAGE DITCH	LF	M
87130	IRRIGATION FACILITY	LF	M

CATEGORY			METRIC
<u>CODE</u>	<u>DESCRIPTION</u>	<u>UOM</u>	<u>UOM</u>
87140	DIKES	LF	M
87150	RETAINING STRUCTURE	LF	M
87171	POLLUTANT DRAINAGE SYSTEM	LF	M
87210	FENCING AND WALLS	LF	M
87250	GATE	LF	M
87255	FIRE BREAKS	LF	M
88010	FIREALARM SYSTEM	BX	
88020	WATCH REPORTING SYSTEM	BX	
88030	AIR RAID ALARM SYSTEM	BX	
88040	INTRUSION ALARM SYSTEM	BX	
88045	RADIATION SENSING DEVICE	BX	
88110	AUTOMATIC WATER SPRINKLER SYSTEM	SF	M2
88120	SPECIAL FIRE EXTINGUISHING SYSTEM	SF	M2
88130	STANDPIPE SYSTEM	SF	M2
89111	POWER PLANT BUILDING	SF	M2
89112	ACETYLENE PLANT	SF	M2
89113	POWER SUBSTATION/SWITCHING STATION BLDG	SF	M2
89115	ENVIRONMENTAL TEST LABORATORY	SF	M2
89117	INERT GAS FACILITY	SF	M2
89120	PLANT/UTILITIES BUILDING	SF	M2
89121	HEATING PLANT BUILDING	SF	M2
89123	COMPRESSED AIR PLANT	SF	M2
89126	REFRIGERATION/AIR CONDITIONING BUILDING	SF	M2
89130	HAZARDOUS BUILDING	SF	M2
89131	SEWAGE/WASTE TREATMENT BUILDING	SF	M2
89132	OXYGEN PLANT	SF	M2
89133	REFUSE AND GARBAGE BUILDING	SF	M2
89141	WATER SUPPLY/TREATMENT BUILDING, POTABLE	SF	M2
89144	WATER SUPPLY BUILDING, NONPOTABLE	SF	M2
89148	WATER STORAGE BUILDING	SF	M2
89150	SHREDDER FACILITY	SF	M2
89210	MONITORING WELLS	EA	M2
89215	ENVIRONMENTAL TEST FACILITY	EA	M2
89220	ENERGY MANAGEMENT CONTROL SYSTEM	EA	
89221	SEWAGE HOLDING TANK	EA	
89225	GAS STORAGE TANK	EA	
89226	VAPORIZER STATION	EA	
89230	TRAFFIC SIGNALS	EA	
89235	FREQUENCY CONVERTER	EA	
89240	FIRE HYDRANTS	EA	
89245	FOAM MIX TANK	EA	
89250	RAILROAD CROSSING SIGNALS	EA	
89260	DECORATIVE FOUNTAIN/POND	EA	
89270	DAM	EA	
89280	LIGHTNING PROTECTION SYSTEM	EA	
89285	IMPROVED LAND - USAREUR	AC	
89286	SEMI-IMPROVED LAND - USAREUR	AC	
89287	UNIMPROVED LAND - USAREUR	AC	
89310	INERT GAS LINE	LF	

CATEGORY			METRIC
<u>CODE</u>	<u>DESCRIPTION</u>	<u>UOM</u>	<u>UOM</u>
89320	COMPRESSED AIR LINE	LF	M
89330	VACUUM LINE	LF	M
89340	UTILDORS	LF	M
89410	COOLING TOWER	CM	
89510	IMHOFF TANK	GA	L
89520	POLLUTANT CATCH BASIN	GA	L
89530	SEWAGE HOLDING TANK	GA	L
89540	FOAM MIX TANK	GA	L
89550	WASTE POL STORAGE TANK	GA	L
89560	HAZARDOUS WASTE HOLDING TANK	GA	L
93210	SITE CLEARING AND GRADING	SY	M2
93220	LANDSCAPE PLANTTING	SY	M2
93310	DEMOLITION	EA	
93410	CUT AND FILL	CY	M3

Units of Measure

UNIT OF MEASURE	DESCRIPTION
AC	ACRES
BL	BARRELS (42 Gallons Liquid)
BX	BOXES
CM	CUBIC FEET PER MINUTE
CY	CUBIC YARDS
EA	EACH
GA	GALLONS
KG	THOUSANDS OF GALLONS PER DAY
KV	KILOVOLT - AMPERES
LF	LINEAR FEET
MB	MILLIONS OF BRITISH THERMAL UNITS
MI	MILES
SF	SQUARE FEET
SY	SQUARE YARDS
TN	TONS (2,000 POUNDS OR COOLING CAPACITY)
M2	SQUARE METERS
L	LITERS
M	METERS
M3	CUBIC METER
KL	THOUSAND OF LITERS PER DAY
MT	METRIC TON

**US Army
Corps of Engineers**

Southwestern Division

Attachment D

**Architectural and Engineering
Instructions Manual (AEIM)**



ATTACHMENT E

GEOTECHNICAL REPORT

**LACKLAND AIR FORCE BASE, TEXAS
DESIGN BUILD FY00/01/02 DORMITORIES**

FOUNDATION AND PAVEMENT DESIGN ANALYSIS

1. General. The purpose of this report is to provide subsurface information, and foundation and pavement design recommendations in support of the Request for Proposal, FY00/01/02 Dormitories at Lackland Air Force Base, Texas. Included in this project are three (3), three-story Dormitories that accommodate approximately 34,000 GSF (\pm) of space for living/bath room modules, day rooms, storage rooms, and mechanical/electrical closets. It is anticipated that new building construction will consist of load- and non-load bearing CMU walls in combination with structural steel framing and/or concrete beams, columns, and precast hollow core planks. At Lackland AFB, the typical architectural theme for Dormitories is brick veneers and standing seam metal roofing. Support features include new privately-owned vehicle parking areas, access roads, utilities, landscaping, sidewalks, and covered pavilions.

The site of the Dormitory complex is located within the 1200 Block of Lackland AFB, which is on the east side of Military Highway. This area is bounded to the north by Kelly Drive, east by Lockburne Avenue, south by McChord Street, and west by Truemper Street. At the time of this report, a current topographic survey was not available nor was the establishment of finish floor elevations.

2. Subsurface Investigations. Fourteen (14) test holes were drilled in the areas of proposed construction during August 1998, May 1999, and June 1999 by JEDI Drilling and the U.S. Army Corps of Engineers, Fort Worth District. Two (2) additional test holes were drilled in December 2001 by Rone Engineers. Borings 10A-1331 through 8A4C-1343 (JEDI Drilling & Corps of Engineers) and B4AC-1 and B4AC-2 (Rone Engineers) were drilled to determine subsurface conditions and obtain representative soil and rock samples for laboratory testing. Samples recovered from borings 10A-1331, 8A4C-1332, 3ST-1333, 8A4C-1335, and 10A-1336

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were sealed in airtight containers and taken to the laboratory of TEAM Consultants, Incorporated (Arlington, Texas) for testing. Advancement of the test holes and sample recovery was performed using 4-, 8-, and 10-inch diameter continuous flight and hollow stem augers, a 2-inch diameter Shelby tube sampler, a 4-inch diameter core barrel sampler, and an 8-inch diameter rock bit. The borings were drilled to total depths ranging from 10.0 feet to 40.5 feet below existing grade at the time of drilling. Results of the field investigation are shown on Sheets LB1 through LB3, Logs of Borings and Boring Locations (Appendix A).

a. Groundwater Conditions. Groundwater conditions were monitored immediately upon completion of the test holes and after a 24-hour observation period. Static water levels measured at those times varied between 13 and 28 feet below existing grade. It should be noted, however, that groundwater conditions are relative to the time of drilling, annual precipitation, and drainage conditions at the site.

b. Soil Resistivity Testing. Two (2) soil resistivity tests were performed near the locations of test holes 3ST-1333 and 8A4C-1343. The resistivity values measured in the field are 1092.0 ohms-cm and 1340.5 ohms-cm, respectively. Soil resistivity test results are presented in the 'Remarks' column of the aforementioned borings (Appendix A).

3. Subsurface Conditions.

a. General Geology. Lackland Air Force Base is located on the western edge of San Antonio in south central Texas. Physiographically, the base is situated in the West Gulf Coastal Plains Section of the Coastal Plains physiographic province. The topography is characterized by a gently rolling land surface that slopes southeastward toward the Gulf of Mexico. Local drainage flows into Leon Creek along the eastern boundary of the base.

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Primary material underlying Lackland Air Force Base consists of strata belonging to three geologic formations. The Taylor Marl, found only along the northern edge of the base, is Cretaceous in age, and consists of soft to moderately hard, calcareous shale. The southern one-third of the base is underlain by the Navarro Group, Cretaceous in age, and consisting of sandy, silty clay shale. The tertiary age Midway Group underlies the remainder of the base and consists of glauconitic sands and clays with occasional bentonite in the lower part, and highly plastic montmorillonitic clay shale in the upper part.

Overburden materials have an average thickness of about 20 feet and generally consist of silty, limy clay, overlying chert and limestone gravel. Varying amounts of clay are present in the gravel. Groundwater is usually present in the gravel beds immediately above the primary strata.

Lackland Air Force Base is located within the Balcones fault zone, an area characterized by numerous parallel and en echelon faults, usually downthrown to the south and traceable up to 30 or 40 miles. Faulting and jointing associated with the Balcones are present within the base area.

b. Site Conditions. The site for the Dormitory complex is relatively flat and contains some obstacles that could hamper new building construction. Based on limited site specific information, obstructions to new construction include asphalt pavements, concrete sidewalks, foundation remnants, and below-grade utilities. Subsurface conditions encountered during the field investigations consist of strata of high to low plasticity clays (CH and CL) that are underlain by a deposit of clayey gravel (GC) and a deeper formation of weathered clay shale primary. Subsurface stratigraphy of the overburden features, as determined from the field investigations, can be described by three (3) generalized strata as follows:

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Stratum I. Stratum I soils are clays of high plasticity (CH) that are apparent from ground surface to approximate depths ranging from 4.0 to 21.0 feet below existing grade. The CH clays are mottled black, dark brown, light brown, and gray, very stiff to hard, sandy, gravelly, limy, and caliche.

Stratum II. Stratum II soils are clays of medium to low plasticity (CL) that vary in thickness from a knife-edge to approximately 19 feet across the site. The lean clays are mottled light yellow-brown, light gray, strong brown and white, very stiff, sandy, silty, and limy. Trending in a northerly direction, the Stratum II soils become very gravelly.

Stratum III. The final overburden feature encountered is a deposit of clayey sandy gravel (GC). The dense to very dense gravel is comprised of coarse to fine limestone and chert fragments held together in a light yellow-brown and gray clay matrix. Thickness of the gravel deposit varies from approximately 1.7 to 10.7 feet between test holes.

Beneath the overburden materials is a formation of weathered clay shale that is present to the total depth investigated, 40.5 feet. The weathered shale is yellow-brown and light gray, soft to very soft (Rock Classification), sandy, glauconitic, massive, blocky, and contains numerous healed fractures. Between the test holes performed, depth to the primary-overburden contact varies from approximately 11.0 to 27.8 feet below existing grade.

Subsurface conditions representative of the project site are shown on the boring logs, Sheets LB2 and LB3. The legend on the individual boring logs show overburden materials as classified in the laboratory using procedures presented in ASTM D 2488 or visually classified in the field. It should be noted that the actual interface between material types might be far more gradual or abrupt than presented; therefore, actual subsurface conditions in areas not sampled may differ from those predicted. The nature and extent of variations across the site

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may not become evident until construction commences, and the actual construction process may alter subsurface conditions as well. If variations become evident at the time of construction, CESWF-EC-DG should be contacted to determine if the recommendations presented in this report need to be reevaluated.

4. Laboratory Testing. Representative soil and rock samples collected from borings 10A-1331, 8A4C-1332, 3ST-1333, 8A4C-1335, and 10A-1336 were subjected to laboratory testing for identification, moisture content, grain-size distribution, Atterberg limits, and density. The accumulative test results are tabulated and presented in Appendix C. Results of identification and moisture content testing are shown on the individual boring logs, Appendix A.

The laboratory test results are also presented graphically in Appendix B as follows: Plasticity characteristics are shown on Plate 1, Plasticity Chart. Moisture content values of representative samples are shown with respect to depth on Plate 2. Atterberg limits test results are shown with respect to depth on Plate 3. Dry density values of representative undisturbed samples and their corresponding moisture contents are shown with respect to depth on Plate 4.

5. Discussions. The following discussions are provided in support of the foundation and pavement design recommendations made for the new Dormitory Complex.

a. Soil Activity Considerations. Results of the field investigation indicate that the project site is characterized by strata of high to low plasticity clays that are underlain by a deposit of clayey gravel. Thickness of the overburden varies from approximately 11.0 to 27.8 feet within the areas of proposed building construction. Based on laboratory test results, the upper 20 feet of in situ materials is moisture deficient and therefore will be susceptible to volumetric changes during periods of seasonal moisture variations. Liquid limits measured from representative samples collected from within the active zone vary from 25 to 90 percent,

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with the higher values recorded from samples collected near the surface. Corresponding plastic limits range from 12 to 25 percent and plasticity indices vary from 10 to 75 percent. In many cases, in situ moisture contents are at or slightly above the soil's plastic limit, an indication that the overburden will be susceptible to consolidation when loaded.

An expansive soil analysis was performed to determine the load-deformation relationship of the active soils when subjected to changing moisture conditions. The analysis assumes that the expansive soils are in a saturated condition, the active zone is 20 feet, and initially, no surcharge. Based on these conditions, the active soils have a heave potential of approximately 4.25 inches. Additional iterations were performed to determine what affects surcharging the in situ materials would have on the soil's expansion-consolidation potential. The load conditions assumed are a 100-psf building load acting in conjunction with various amounts of fill placed above existing grade. The results are tabulated below. The column entitled "R&R" represents the amount of existing soils that would have to be removed and replaced (R&R) with nonexpansive backfill material to limit post construction volumetric changes to 1 inch or less.

<u>Thickness of fill, in.</u>	<u>Heave, in.</u>	<u>Settlement, in.</u>	<u>R&R, in.</u>
0	4.25	N.A.	72
12	3.20	1.30	66
24	2.90	1.75	60
36	2.60	2.15	54
48	2.35	2.50	48
60	2.15	2.80	48

Results of the expansive soil analysis indicate that the overburden is quite active and therefore precludes the use of slab-on-grade construction within the Dormitories. The analysis demonstrates that the in situ clays are capable of producing very high expansion pressures (± 4.0 TSF), meaning it would take a considerable amount of surcharge load to combat the

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soil's expansion potential. Consequently, the increased load would cause the soils to consolidate.

b. Foundation Design Considerations. Based on subsurface conditions encountered at the project site, the proposed Dormitories should be founded on drilled and underreamed pier foundations. When properly designed, the drilled pier foundation will provide the level of performance needed to support the anticipated building loads. At this particular site, pier underreams should be founded at least 30 feet below existing grade. The bearing material at this depth is the yellow-brown and light gray clay shale. The advantages in founding piers at this depth are (1) the foundation will bypass the upper expansive clays, thus limiting the potential for differential foundation movements; (2) a high shear strength bearing medium can be utilized; and (3) the foundation would bear below the "perched" water table. Based on historical laboratory shear strength test results and engineering judgment, the weathered shale is capable of sustaining an allowable bearing capacity of 20,000 psf (net). This bearing allowable takes into account a factor of safety equal to 3 against shear failures.

The expansion potential of the upper clays could cause lightly-loaded piers to experience uplift. To avoid this condition, piers should be spaced at least 20 feet center-to-center in an attempt to impose a significant amount of dead load on the foundation. If the aforementioned pier spacing cannot be met, pier underreams should be sized such that the underream diameter is 2.5 times the diameter of the pier shaft. For constructibility reasons, underream diameters should not be greater than 3 times the diameter of the pier shaft.

When the foundation is subjected to uplift forces from either the expansion of the active clay soils or lateral (wind) loads, tensile stresses will develop within the pier concrete. The result could be cracking in the concrete if the piers are not sufficiently reinforced. To this end,

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an analysis was performed to determine minimum reinforcing steel requirements to combat the tension stresses. The results indicate that 18-inch diameter piers should contain a minimum of 1.5 percent reinforcing steel, and piers larger than 18 inches in diameter should be reinforced with a minimum of 1 percent steel.

(1) Floor Slab System. The expansion potential of the in situ soils could cause floor slabs supported on-grade to experience long-term differential movements in excess of 1 inch. This amount of movement would cause deformation sensitive materials (ceramic tile flooring, sheet rock walls, etc.) to crack, which is not acceptable, and would cause functional problems within the completed buildings. Therefore, ground-level floor slabs within the new Dormitories should be supported above a minimum 6-inch void to compensate for the active subgrade.

(2) Subgrade Preparation and Backfill Considerations. Subgrade preparation below structurally-supported floor slab construction will be dependant on whether the building pad is a cut or fill section. For cut sections, site preparation should consist of removing all existing materials to achieve the final subgrade elevation(s) below the floor slab system(s). For fill sections, subgrade preparation should consist of removing the upper 6 inches of existing materials and replacing with compacted select backfill material. Any additional fill required to achieve the final subgrade elevation(s) below the floor slab system(s) should be select material as well.

c. Pavement Design Considerations. The pavement designs presented in this report are based on criteria contained in *TM 5-822-5/AFM 88-7, Chapter 1*, *TM 5-822-2/AFM 88-7, Chapter 5*, and engineering judgment.

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(1) Traffic Types and Conditions. Three (3) pavement structures were analyzed and designed for this project; namely, asphalt access roads and parking areas, and concrete aprons in front of trash dumpster pad(s). Types of vehicles expected to occupy the access roads and parking areas are light-duty passenger cars and trucks, two-axle trucks, and fire/emergency medical vehicles (Category II). The concrete aprons were designed for trash collection trucks (Category III). A Class E Street was assigned to these pavements based on their anticipated frequency of use. Considering these conditions, a design index of 2 has been assigned to the flexible pavement sections and a design index of 3 to the concrete aprons.

(2) Pavement Design Parameters. California Bearing Ratio (CBR) and plate bearing tests were not conducted for this project due to the availability of historical pavement design data. In the past, the clayey subgrade indicative of Lackland AFB has been assigned CBR values ranging from 4 to 6 percent when compacted to 90 percent of laboratory maximum density, and around 19 percent when lime-stabilized and compacted to 95 percent. Previously conducted plate-bearing tests indicate that a modulus of subgrade reaction ranging from 75 pci to 150 pci can be assigned to the in situ soils when compacted to 90 percent of laboratory maximum density. The test results indicate that the strength value is a function of the soil's plasticity level, such that soils having high plasticity indices typically have low CBR and modulus values. Since the near surface in situ soils at the project site are highly plastic, design CBR and modulus of subgrade reaction values equal to 4 percent and 100 pci, respectively, were assigned to the raw subgrade.

(3) Lime Stabilization. Laboratory test results indicate that the upper 60 to 72 inches of in situ soils have a high expansion potential; therefore, the raw subgrade should be lime-stabilized to reduce the soil's plasticity level. Although lime series testing was not

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performed for this project to determine the application rate of lime for the soil-lime mixture, historical test results indicate that at least 5 percent by dry weight of the soil should be used.

(4) Material Sources. It should be noted that material sources in the San Antonio area are capable of producing a high quality crushed aggregate for concrete mixes to meet strength requirements. Therefore, the concrete mix design should consider a 28-day flexural strength of 650 psi. Also of note is that Alkali/Silica Reaction with Portland Cement Concrete has never been a problem with the aggregate material sources in this area.

6. Recommendations. The following foundation and pavement design recommendations are based on results of the field investigation, laboratory test results, and engineering studies.

a. Foundation Design Recommendations. The proposed Dormitories should be supported on reinforced concrete drilled and underreamed piers. Pier underreams should be founded at least 30 feet below existing grade within the yellow-brown and light gray clay shale. An allowable end bearing capacity of 20,000 psf (net) should not be exceeded when sizing pier underreams. The bearing allowable can be increased for wind load conditions. The load used to size the piers should consist of full dead load plus that portion of the live load that acts more or less continuously, usually 50 percent.

All pier shafts should be a minimum of 18 inches in diameter to facilitate clean out and inspection of the pier hole during construction. The center-to-center spacing between individual piers should be at least 20 feet to ensure that a sufficient amount of dead load is imposed on the foundation. If the minimum pier spacing cannot be met, pier underreams should be sized such that the underream diameter is 2.5 times larger than the diameter of the pier shaft. In no case shall the underream diameter exceed 3 times the diameter of the pier shaft. A minimum 6-inch void should be maintained beneath all grade beams, and the void

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area shall be protected with concrete retainer blocks as shown in the latest edition of the SWD-AEIM.

All piers should contain a minimum amount of reinforcing steel to resist tensile forces caused by the swelling of the surrounding clay soils and/or lateral wind loads acting on the foundation. To this end, piers 18 inches in diameter should contain at least 1.5 percent steel, and piers larger than 18 inches in diameter should be reinforced with a minimum of 1.0 percent steel.

The contractor shall have temporary steel casing and pumps at the job site prior to construction of drilled piers. Groundwater should be anticipated during drilling operations; therefore, the above information should be provided in the contract documents as foundation notes. The final pier depths shall be determined in the field by the Contracting Officer's representative.

Drilling equipment should be of suitable type and of sufficient size to satisfactorily perform the required drilling for the soil conditions identified. To this end, all drill rigs shall have minimum torque and crowd capacities of 50,000 lb-ft and 30,000 lb-ft, respectively. Guide specification ***CEGS-02466 DRILLED FOUNDATION CAISSONS*** should be edited to the requirements listed above.

(1) Ground-level Floor Slab Systems. Ground-level floor slabs within the new Dormitories should be structurally-supported to compensate for the active subgrade. A minimum 6-inch void should be provided beneath the supported floor slab system(s). Stoops, porches, approaches, etc. should be structurally-supported as well.

(2) Subgrade Preparation and Fill Requirements.

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(a) Fill Section. Subgrade preparation should consist of removing a minimum of 6 inches of existing materials and replacing with compacted select backfill material. Any additional fill required to reach the final subgrade elevation below the building floor slab system should be select material as well. The upper 6 inches of existing subgrade exposed after excavation operations should be scarified, moistened, aerated, and recompacted to the same density as required for select fill. Select fill should be placed in controlled lifts not exceeding 8 inches in loose thickness and compacted to at least 90 percent of maximum laboratory density as determined in accordance with ASTM D 1557.

(b) Cut Section. Subgrade preparation should consist of removing all existing materials to a depth that allows for a minimum 6-inch void below the building floor slab system. The upper 6 inches of existing materials exposed after excavation operations should be scarified, moistened, manipulated, and recompacted to at least 90 percent of laboratory maximum density as determined in accordance with ASTM D 1557.

(c) Material Testing Requirements. Testing shall be the responsibility of the contractor to ensure that the subgrade, fill, and backfill materials are properly compacted. To this end, the following frequencies of testing for each building pad shall be included in the contract as a minimum:

- In-place density of the subgrade, fills, and backfills shall be performed for every 2000 square feet per lift in accordance with ASTM D 1556 or ASTM D 2922.
- Optimum Moisture and Laboratory Maximum Density of select fill and backfill shall be performed for every 500 cubic yards or when any change in material occurs.

(3) Pavilions and other Small Support-type Structures. Covered pavilions (if applicable) and any other small support-type structures (≤ 500 GSF) can be supported on
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reinforced concrete slabs-on-grade with turned-down edge beams. The turned-down edge beam should extend a minimum of 12 inches below outside finished grade and should be sized for a safe bearing pressure of 1,500 psf (net). Subgrade preparation should consist of providing a minimum of 24 inches of compacted select fill below the soil-supported slab.

(4) Below-Grade Structures. The following information is provided for the design of all below-grade structures. An at-rest lateral earth pressure coefficient (k_o) of 0.7, an angle of internal friction (ϕ) of 28° , a safe bearing pressure of 2,000 psf, and a cohesion value (c) of 100 psf shall be used. The backfill material should be assumed to have a moist unit weight of 125 pcf, and all backfill should be select material.

(5) Drainage and Landscaping. Proper drainage is an important design consideration to ensure satisfactory long-term foundation performance. Exterior grading adjacent to the Dormitories should be sloped away from the structures a minimum of 5 percent for the first 10 feet. Runoff from the roofs should be adequately discharged away from foundation edges. In no case should water be allowed to pond adjacent to or beneath the building structures, both during and after construction.

Landscaping adjacent to the buildings should be kept to a minimum. Large trees and bushes should not be planted any closer to the foundation than the plant's mature "umbrella" width. Maintaining a growth of grass around the facilities is recommended. Installing an irrigation system adjacent to the foundation is not advisable unless this system and the drainage conditions around the buildings are maintained over the life of the structure.

(6) Mechanical Connections. All exterior mechanical connections should be of the flexible type. Flexible connections should be capable of resisting a minimum of 1 inch of

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both vertical and horizontal movement. All condensate lines should drain away from foundation edges.

(7) Foundation Material Definitions.

(a) Satisfactory Materials Satisfactory materials include materials classified in ASTM D 2487 as GW, GM, GC, GP, SW, SP, SM, SC, CL, and CH and shall be free of trash, debris, roots or other organic matter, or stones larger than 3 inches in any dimension.

(b) Unsatisfactory Materials Unsatisfactory materials include materials classified in ASTM D 2487 as Pt, OH, OL, ML, MH and any other materials not defined as satisfactory.

(c) Select Soils Select soils shall be a satisfactory material having a liquid limit of 35 percent or less, and a plasticity index of not less than 4 nor greater than 15 when tested in accordance with ASTM D 4318.

(d) Cohesionless and Cohesive Materials. Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

(e) Capillary Water Barrier Capillary Water Barrier shall consist of clean, crushed, nonporous rock, crushed gravel, or uncrushed gravel. The maximum particle size shall be 1-1/2 inches and no more than 2 percent by weight shall pass the No. 4 size sieve.

(f) Degree of Compaction. Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557.

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The above material definitions, subgrade preparation procedures, and material testing requirements should be presented in **Guide Specification CEGS-02315 EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS**.

b. Pavement Design Recommendations. The following pavement sections are recommended for the privately-owned vehicle (POV) parking areas, access roads, and for concrete apron(s) in front of trash dumpster pad(s). These sections were derived from criteria contained in *TM 5-822-5/AFM 88-7, Chapter 1* and *TM 5-822-2/AFM 88-7, Chapter 5* and engineering judgment.

(1) Rigid Pavement. The following pavement section is recommended for a minimum distance of 15 feet in front of trash dumpster pad(s). Use a Design Index of 3 (Category III, Class E Street), a modulus of subgrade reaction of 100 pci, and a concrete flexural strength of 650 psi at 28 days.

6" Portland Cement Concrete reinforced with No. 4 bars spaced 16 inches o.c.e.w.

6" Aggregate Base Course compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

(2) Flexible Pavement. The following pavement section is recommended for the POV Parking areas and access roads. Use a Design Index of 2 (Category II, Class E) and CBR values of 4 percent for the raw subgrade when compacted to 90 percent of maximum laboratory density, and 19 percent when lime-stabilized and compacted to 95 percent.

1-1/2" Hot-Mix Surface Course

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7" Aggregate-Base Course compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6" Lime-Stabilized Subgrade compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

The following note should be incorporated as part of the pavement details on the contract drawings.

"The water content shall not be less than 1 percent above optimum during compaction of the raw subgrade."

(3) Pavement Material Definitions.

(a) Hot-Mix Surface Course. Aggregates and asphaltic materials shall conform to the requirements of the Texas Department of Transportation, Standard Specifications for Construction of Highways, Streets and Bridges, (TXDOT, Std Spec), Items 300 and 340. The paving mixture shall conform to the requirements for Type "D" (fine-graded surface course) grading. Asphaltic material for the paving mixture should be asphaltic cement, viscosity grade AC-20. **Edit Guide Specification *CEGS-02741 BITUMINOUS PAVING FOR ROADS, STREETS AD OPEN STORAGE AREAS.***

(b) Prime Coat and Tack Coat. Asphaltic material for the prime coat shall be cut-back asphalt, grade MC-30, conforming to the requirements of TXDOT, Std Spec, Item 300, "Asphalts, Oils, Emulsions." Prime coat should be applied to the surface of the aggregate base course. Asphaltic material for the tack coat shall be cut-back asphalt, grade RC-250, or emulsified asphalt, grade SS-1, conforming to the requirements of TXDOT, Std Spec, Item 300, "Asphalts, Oils, Emulsions." Tack coat should be applied to all surfaces that

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contact new asphalt pavement. **Edit Guide Specification *CEGS-02748 BITUMINOUS TACK AND PRIME COATS.***

(c) Aggregate Base Course. **Aggregates shall conform to the requirements of Guide Specification *CEGS-02722 AGGREGATE BASE COURSE.*** The gradation should conform to the requirements of TXDOT, Std Spec, Item 247, for Type "A", Grade 1 material.

(d) Lime-Stabilized Subgrade. The material shall consist of a mixture of raw subgrade and hydrated lime. The application rate of lime should be 5 percent by dry weight of the raw soil. **Edit Guide Specification *CEGS-2712 LIME-STABILIZED SUBGRADE.***

(e) Raw Subgrade. **The material shall conform to the requirements of Guide Specification *CEGS-02300 RAW SUBGRADE.***

(3) Vehicular Pavement Testing Requirements. Testing shall be the responsibility of the contractor to ensure that the subgrade and base course materials are properly constructed. To this end, the following testing requirements shall be included in the contract as a minimum:

- In-place density testing of the subgrade, lime-stabilized subgrade, and aggregate base course shall be performed, at a minimum, every 2500 square feet per lift in accordance with ASTM D 1556 and ASTM D 2922. ASTM D 1556 shall be used as a check at least once per lift for each 5000 square feet of completed subgrade, lime-stabilized subgrade, and aggregate base course.
- One sieve analysis (ASTM C 136 and ASTM D 422) shall be performed for each 1000 tons of aggregate base course placed, with a minimum of one analysis performed for each day's run until the course is completed.
- One liquid limit and plasticity index shall be performed for each sieve analysis per ASTM D 4318.

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- Smoothness measurements shall be taken in successive positions parallel to the pavement centerline with a 12-foot straightedge. Measurements shall be taken perpendicular to the pavement centerline at 15-foot intervals. Surface smoothness shall not exceed 3/8 inch.

- Thickness of the aggregate base course and lime-stabilized subgrade shall be measured for each 5000 square feet of material placed.

References:

- Laboratory Test Results - TEAM Consultants, Incorporated, Report No. 982091
- TM 5-818-7 - Foundation in Expansive Soils
- TM 5-818-1/AFM 88-3, Chapter 7 – Soils and Geology Procedures for Foundation Design of Buildings and Other Structures (Except Hydraulic Structures)
- TM 5-822-2/AFM 88-7, Chapter 5 – General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas
- TM 5-822-5/AMF 88-7, Chapter 1 – Pavement Design for Roads, Streets, Walks, and Open Storage Areas
- Texas Department of Transportation Standard Specifications for Construction of Highways, Streets and Bridges
- SWD-AEIM Architectural-Engineering Instruction Manual

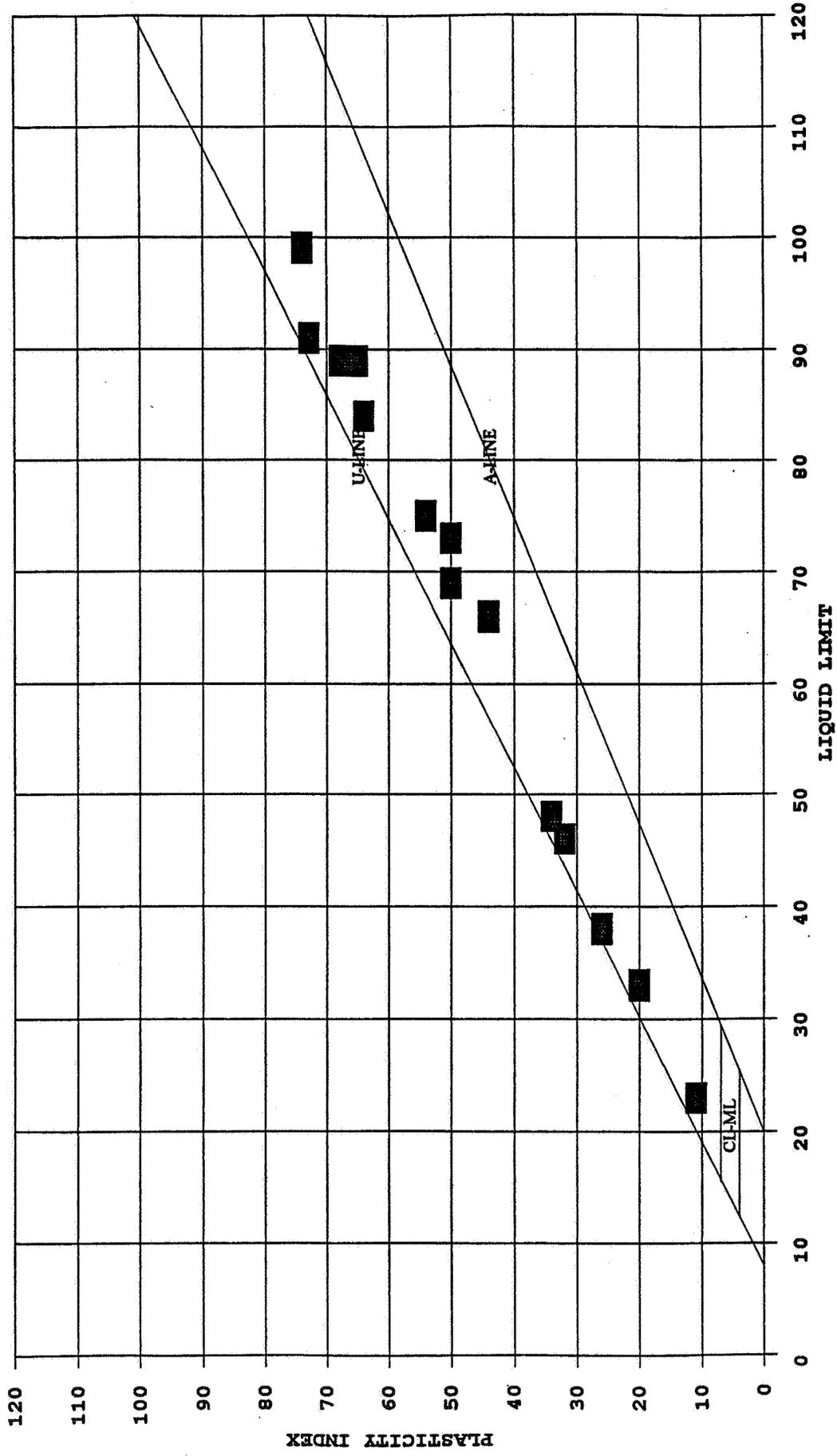
**FORT WORTH DISTRICT
JANUARY 2002**

APPENDIX A

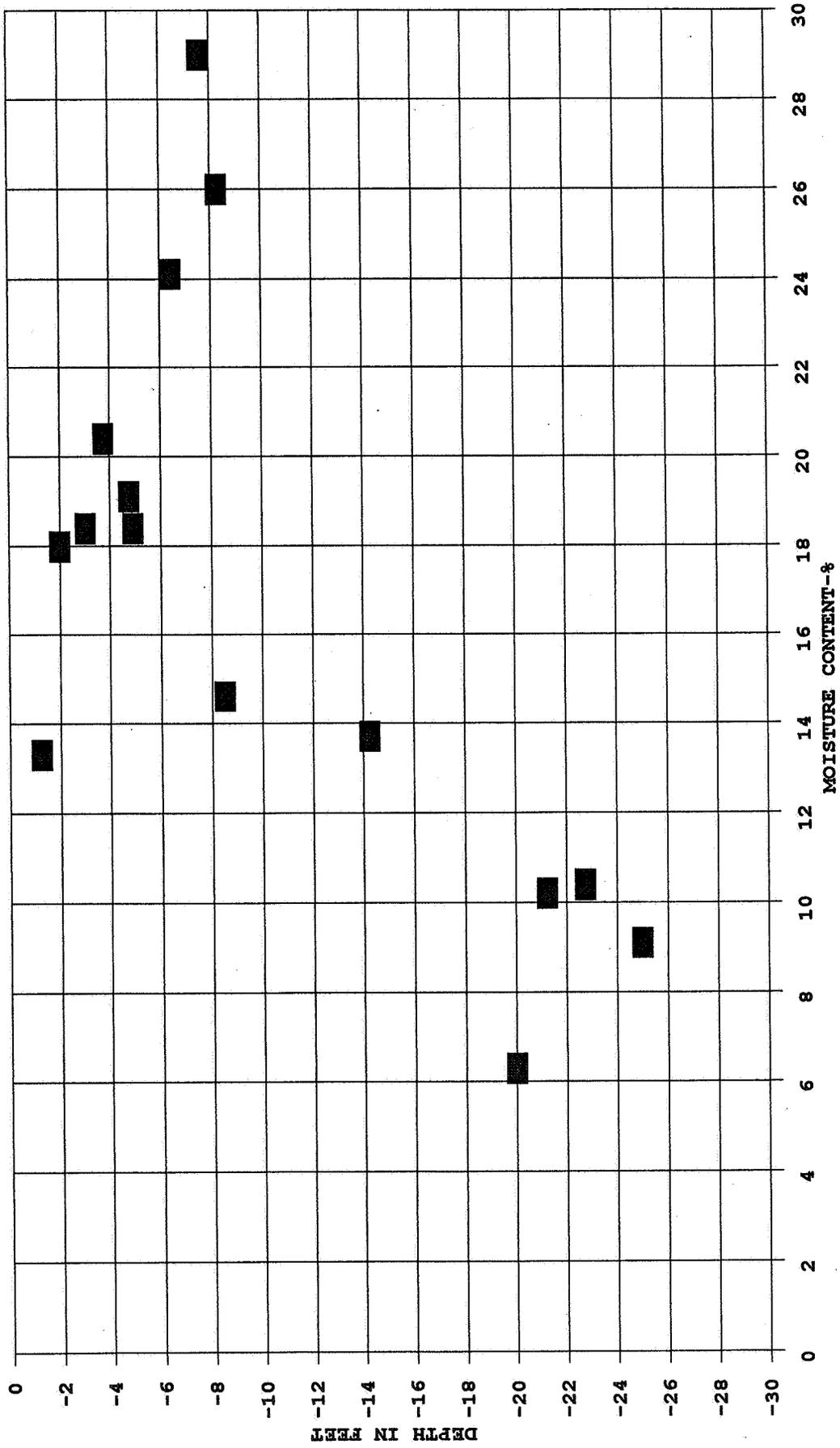


APPENDIX B

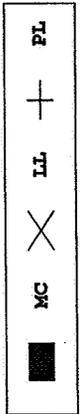
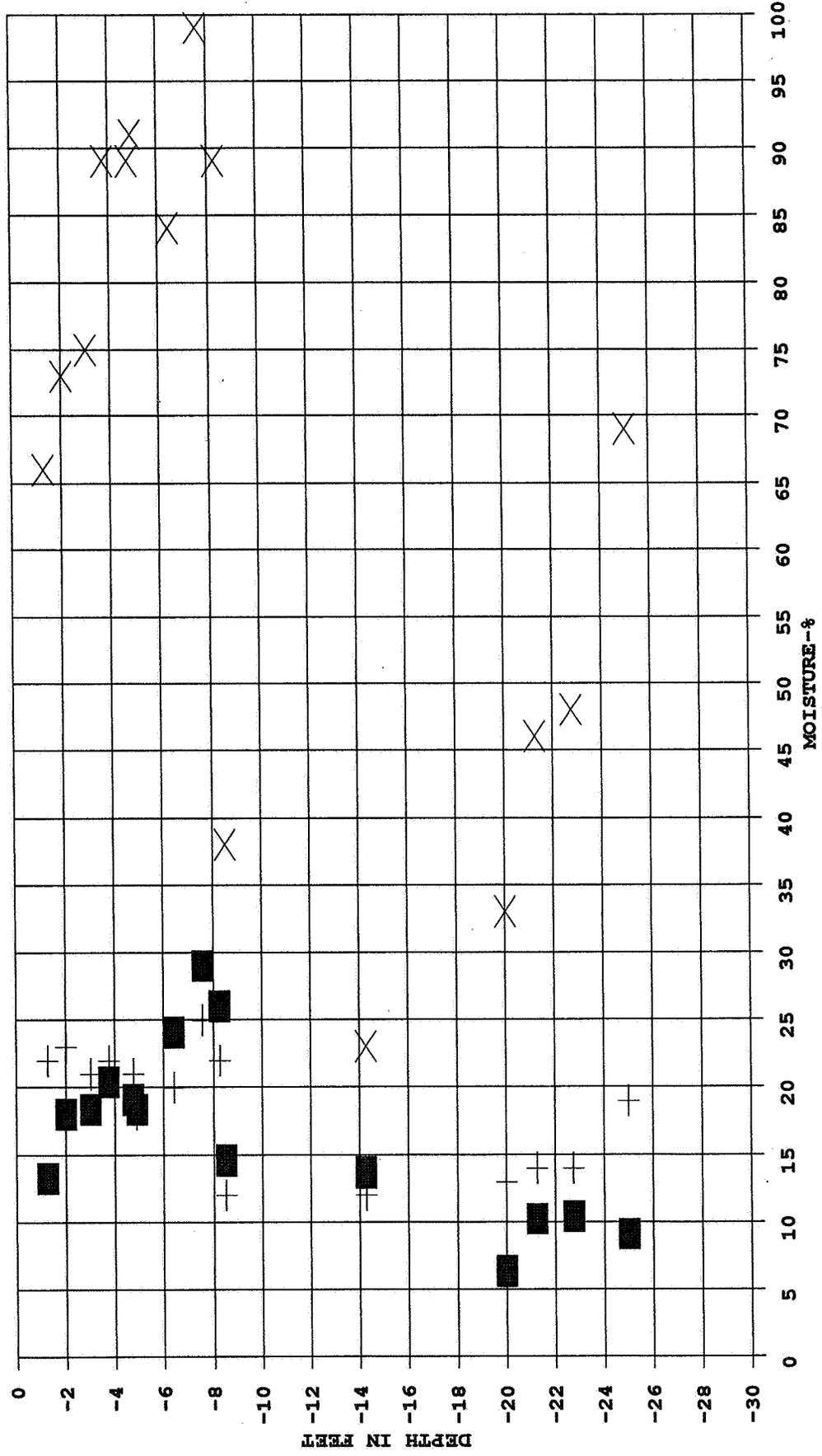
PLASTICITY CHART



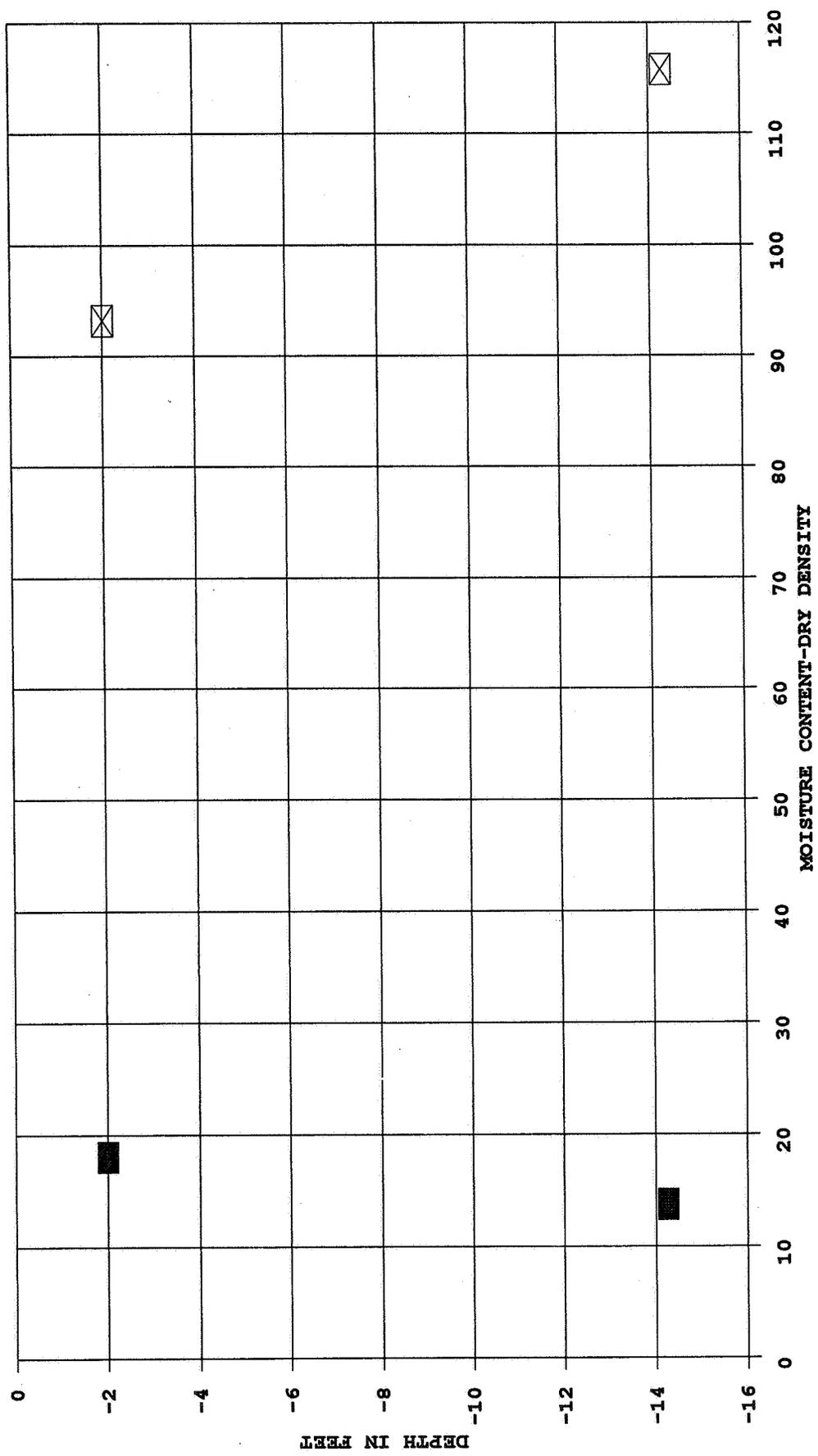
MOISTURE CONTENT VS DEPTH



ATTERBERG LIMITS VS DEPTH



MOISTURE CONTENT-DRY DENSITY VS DEPTH



Moisture Content -  Dry Density - PCF 

APPENDIX C

SUMMARY OF LABORATORY TEST RESULTS

**LABORATORY TESTING SERVICES
FY00/01/02 DORMITORIES
LACKLAND AFB, TEXAS**

Boring No.	Sample No.	Sample Depth, (ft.)	Visual Description	Percent Passing Sieve							
				#4	#10	#20	#40	#60	#80	#100	#200
10A-1331	JAR D	4.0 - 5.8	Dark Brown Clay w/calcareous nodules	94.9	92.3	90.5	89.0	87.5	85.9	85.1	80.2
	JAR E	5.8 - 7.0	Light Brown Calcareous Clay	99.9	99.0	98.0	97.3	96.8	96.1	95.6	92.5
	JAR F	7.0 - 10.0	Tan & Light Brown Calcareous Clay w/silt	100.0	99.8	99.5	99.0	97.5	92.8	90.0	80.1
8A4C-1332	JAR C	3.0 - 6.5	Brown & Dark Brown Clay	99.6	98.2	96.6	95.3	94.0	92.5	91.6	86.2
	JAR D	6.5 - 10.0	Tan Clay w/calcareous nodules	100.0	99.4	98.5	97.7	97.1	96.2	95.7	92.0
	JAR F*	18.5 - 24.0	Tan Clayey Gravel w/sand	65.0	60.4	57.3	54.9	52.6	50.8	50.0	47.0
	JAR G*	24.0 - 26.0	Light Brown Clayey Gravel w/sand	40.6	38.5	37.3	36.2	35.3	34.4	34.0	32.3
3ST-1333	ST- 1	1.0 - 3.0	Dark Gray Clay	99.1	98.7	98.0	97.2	96.4	95.3	94.5	89.5
	ST- 3	14.0 - 14.5	Tan Silty Clay w/iron stains	99.8	99.5	97.8	94.6	86.1	77.0	73.3	61.9
	JAR E*	19.0 - 21.0	Tan Clayey Gravel w/sand	61.0	57.9	56.8	55.8	54.0	51.6	50.5	46.5
8A4C-1335	JAR B*	0.9 - 5.1	Dark Brown Gravelly Clay w/sand	61.6	60.5	59.4	58.3	57.0	55.7	54.9	50.8
	JAR C	5.1 - 10.0	Tan Clay w/calcareous nodules	99.7	99.3	98.8	98.3	97.9	97.3	96.8	93.4
	JAR F*	21.0 - 24.5	Tan Gravelly Clay w/sand	70.0	66.4	64.6	63.3	61.7	60.1	59.4	56.4
10A-1336	JAR A	0.0 - 2.5	Dark Brown Sandy Clay w/occasional gravel	93.2	89.0	85.6	82.2	78.1	74.3	72.7	66.4
	JAR B	2.5 - 5.0	Dark Gray Clay w/calcareous nodules	98.7	96.9	95.2	94.1	93.1	91.8	90.9	85.8

* DUE TO PARTICLE SIZE IN THE SAMPLES DELIVERED TO THE LABORATORY AND THE LIMITED VOLUME OF THE SAMPLE, THE GRADATION ANALYSIS MAY NOT BE REPRESENTATIVE OF IN SITU FIELD CONDITIONS.

SUMMARY OF LABORATORY TEST RESULTS

**LABORATORY TESTING SERVICES
FY00/01/02 DORMITORIES
LACKLAND AFB, TEXAS**

Boring No.	Sample No.	Sample Depth, (ft.)	Visual Description	Moisture Content, (%)	Unit Dry Weight, (pcf)	Atterberg Limits		Remarks	
						LL	PI		
10A-1331	JAR D	4.0 - 5.8	Dark Brown Clay w/calcareous nodules	18.4	---	91	18	73	---
	JAR E	5.8 - 7.0	Light Brown Calcareous Clay	24.1	---	84	20	64	---
	JAR F	7.0 - 10.0	Tan & Light Brown Calcareous Clay w/silt	14.6	---	38	12	26	---
8A4C-1332	JAR C	3.0 - 6.5	Brown & Dark Brown Clay	19.1	---	89	21	68	---
	JAR D	6.5 - 10.0	Tan Clay w/calcareous nodules	26.0	---	89	22	65	---
	JAR F	18.5 - 24.0	Tan Clayey Gravel w/sand	10.2	---	46	14	32	---
	JAR G	24.0 - 26.0	Light Brown Clayey Gravel w/sand	9.1	---	69	19	50	---
3ST-1333	ST- 1	1.0 - 3.0	Dark Gray Clay	18.0	93.2	73	23	50	---
	ST- 3	14.0 - 14.5	Tan Silty Clay w/iron stains	13.7	115.7	23	12	11	---
	JAR E	19.0 - 21.0	Tan Clayey Gravel w/sand	6.3	---	33	13	20	---
8A4C-1335	JAR B	0.9 - 5.1	Dark Brown Gravelly Clay w/sand	18.4	---	75	21	54	---
	JAR C	5.1 - 10.0	Tan Clay w/calcareous nodules	29.0	---	99	25	74	---
	JAR F	21.0 - 24.5	Tan Gravelly Clay w/sand	10.4	---	48	14	34	---
10A-1336	JAR A	0.0 - 2.5	Dark Brown Sandy Clay w/occasional gravel	13.3	---	66	22	44	---
	JAR B	2.5 - 5.0	Dark Gray Clay w/calcareous nodules	20.4	---	89	22	67	---

DRILLING LOG		DIVISION	INSTALLATION	FT. WORTH	SHEET
SOUTHWESTERN					1 of 1 SHEETS
Hole No. 10A-1331					
1. PROJECT PERMANENT PARTY DORMITORY					
2. LOCATION Coordinates of Station LACKLAND AFB, TEXAS					
3. DRILLING AGENCY JEDI					
4. HOLE NO. (as shown on drawing title and the number) 10A-1331					
5. NAME OF DRILLER RAMON GUTIERREZ					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEG. FROM VERT. DEG. FROM VERT.					
7. THICKNESS OF OVERBURDEN					
8. DEPTH DRILLED INTO ROCK					
9. TOTAL DEPTH OF HOLE					
10. DATE HOLE STARTED COMPLETED 20 AUG 98 20 AUG 98					
11. SIGNATURE OF INSPECTOR KEN MCCLESKEY					
12. REMARKS (Identify this with well logs, depth of weathering, etc. if significant)					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SOIL CORE NO.	BOX OF SAMPLE NO.
18.4	0.0 TO 0.3'	VISUAL	CLAY - HIGH PLASTICITY, FIRM, DRY, BLACK, SLIGHTLY SANDY, SLIGHTLY SILTY, SLIGHTLY GRAVELLY TO GRAVELLY, PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
24.1	0.3' TO 0.7'		GRAVEL - MEDIUM DENSE, DRY, LIMESTONE AND CHERT, UP TO 3" DIA., SCATTERED COBBLES, SUBROUNDED, CLAY MATRIX (MEDIUM PLASTICITY, YELLOW BROWN TO BLACK, SLIGHTLY SANDY, SILTY). (PROBABLY FILL)		
10'	0.7' TO 10.0'		CLAY		
	10.0' TO 5.8'		CLAY - HIGH PLASTICITY, FIRM TO HARD, DRY TO MOIST, BLACK TO DARK GRAY BROWN, SLIGHTLY SANDY, SLIGHTLY SILTY TO SILTY, SLIGHTLY GRAVELLY TO GRAVELLY, CALCAREOUS. (PROBABLY FILL)		
	5.8' TO 10.0'		HIGH PLASTICITY MEDIUM PLASTICITY BELOW APPROX. 7.0', SOFT TO FIRM, MOIST, YELLOW BROWN TO GRAY, SLIGHTLY SANDY, SILTY TO VERY SILTY, SLIGHTLY GRAVELLY TO GRAVELLY, SLIGHTLY CALICHOED TO VERY CALICHOED (ESPECIALLY BETWEEN 5.8' TO 7.0'). VAGUE BLOCKY STRUCTURE, CALCAREOUS. NOTE: PROBABLY A WEATHERED SHALE MIXED W/ GRAVEL AND USED AS FILL.		
ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71					

DRILLING LOG		DIVISION	INSTALLATION	FT. WORTH	SHEET
SOUTHWESTERN					1 of 1 SHEETS
Hole No. 8A4C-1335					
1. PROJECT PERMANENT PARTY DORMITORY					
2. LOCATION Coordinates of Station LACKLAND AFB, TEXAS					
3. DRILLING AGENCY JEDI					
4. HOLE NO. (as shown on drawing title and the number) 8A4C-1335					
5. NAME OF DRILLER RAMON GUTIERREZ					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEG. FROM VERT. DEG. FROM VERT.					
7. THICKNESS OF OVERBURDEN 24.5'					
8. DEPTH DRILLED INTO ROCK 15.0'					
9. TOTAL DEPTH OF HOLE 40.5'					
10. DATE HOLE STARTED COMPLETED 24 AUG 98 24 AUG 98					
11. SIGNATURE OF INSPECTOR KEN MCCLESKEY					
12. REMARKS (Identify this with well logs, depth of weathering, etc. if significant)					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SOIL CORE NO.	BOX OF SAMPLE NO.
18.4	0.0 TO 24.5'	VISUAL	CLAY		
	0.0 TO 0.5'		MEDIUM TO HIGH PLASTICITY, SOFT TO FIRM, DRY TO MOIST, BLACK, SLIGHTLY SANDY, SLIGHTLY SILTY TO SILTY, SLIGHTLY GRAVELLY TO GRAVELLY, PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
29.0	0.5' TO 5.1'		HIGH PLASTICITY, FIRM TO HARD, DRY, DARK BROWN TO BLACK, SLIGHTLY SANDY, VERY GRAVELLY (BORDERLINE CLAYEY GRAVEL), PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
	5.1' TO 21.0'		HIGH PLASTICITY, SOFT TO FIRM, DRY TO MOIST, YELLOW BROWN TO GRAY, SLIGHTLY SANDY, SLIGHTLY GRAVELLY TO GRAVELLY (NEAR 21.0'), CALCAREOUS. NOTE: MATERIAL IS PROBABLY A WEATHERED SHALE MIXED W/ GRAVEL AND USED AS FILL.		
	21.0' TO 24.5'		MEDIUM PLASTICITY, FIRM TO HARD, MOIST TO WET, YELLOW BROWN TO GRAY, SLIGHTLY SANDY, GRAVELLY TO VERY GRAVELLY (BORDERLINE CLAYEY GRAVEL), CALCAREOUS. (PROBABLY FILL)		
	24.5' TO 40.5'		SHALE - WEATHERED, SOFT (RX CLASS.), MOIST, YELLOW BROWN TO GRAY, FERRUGINOUS STAINING, GLAUCONITIC SANDY SEAMS (ESPECIALLY BETWEEN 24.5' TO 39.0'), SILTY TO VERY SILTY, THICKER, BLOCKY, NON-GLAUCONITIC SHALE SEAMS BELOW APPROX. 39.0'.		
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DRILLING LOG		DIVISION	INSTALLATION	FT. WORTH	SHEET
SOUTHWESTERN					1 of 1 SHEETS
Hole No. 8A4C-1332					
1. PROJECT PERMANENT PARTY DORMITORY					
2. LOCATION Coordinates of Station LACKLAND AFB, TEXAS					
3. DRILLING AGENCY JEDI					
4. HOLE NO. (as shown on drawing title and the number) 8A4C-1332					
5. NAME OF DRILLER RAMON GUTIERREZ					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEG. FROM VERT. DEG. FROM VERT.					
7. THICKNESS OF OVERBURDEN 26.0'					
8. DEPTH DRILLED INTO ROCK 7.0'					
9. TOTAL DEPTH OF HOLE 33.0'					
10. DATE HOLE STARTED COMPLETED 24 AUG 98 24 AUG 98					
11. SIGNATURE OF INSPECTOR KEN MCCLESKEY					
12. REMARKS (Identify this with well logs, depth of weathering, etc. if significant)					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SOIL CORE NO.	BOX OF SAMPLE NO.
19.1	0.0 TO 0.5'	VISUAL	CLAY - HIGH PLASTICITY, SOFT TO FIRM, DRY, BROWN TO BLACK, SLIGHTLY SANDY TO SANDY, SILTY, SLIGHTLY GRAVELLY TO GRAVELLY, PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
26.0	0.5' TO 3.0'		GRAVEL - MEDIUM DENSE TO DENSE, DRY, LIMESTONE AND CHERT, UP TO 3" DIA., AVG. 1" DIA., SCATTERED COBBLES, ANGULAR TO SUBROUNDED, SLIGHTLY SANDY, SLIGHTLY SILTY, SLIGHTLY GRAVELLY TO GRAVELLY. (PROBABLY FILL)		
	3.0' TO 18.5'		CLAY		
	18.5' TO 26.0'		HIGH PLASTICITY, FIRM TO HARD, DRY TO MOIST, DARK BROWN TO BLACK TO GRAY, SLIGHTLY SANDY TO SANDY, SILTY, SLIGHTLY GRAVELLY TO GRAVELLY. (PROBABLY FILL)		
	26.0' TO 33.0'		SHALE - WEATHERED, SOFT (RX CLASS.), MOIST, YELLOW BROWN TO GRAY, FERRUGINOUS STAINING, GLAUCONITIC SANDY SEAMS, SILTY.		
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DRILLING LOG		DIVISION	INSTALLATION	FT. WORTH	SHEET
SOUTHWESTERN					1 of 1 SHEETS
Hole No. 10A-1336					
1. PROJECT PERMANENT PARTY DORMITORY					
2. LOCATION Coordinates of Station LACKLAND AFB, TEXAS					
3. DRILLING AGENCY JEDI					
4. HOLE NO. (as shown on drawing title and the number) 10A-1336					
5. NAME OF DRILLER RAMON GUTIERREZ					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEG. FROM VERT. DEG. FROM VERT.					
7. THICKNESS OF OVERBURDEN					
8. DEPTH DRILLED INTO ROCK					
9. TOTAL DEPTH OF HOLE					
10. DATE HOLE STARTED COMPLETED 20 AUG 98 20 AUG 98					
11. SIGNATURE OF INSPECTOR KEN MCCLESKEY					
12. REMARKS (Identify this with well logs, depth of weathering, etc. if significant)					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SOIL CORE NO.	BOX OF SAMPLE NO.
13.3	0.0 TO 10.0'	VISUAL	CLAY		
	0.0 TO 10.0'		CLAY - HIGH PLASTICITY, SOFT TO FIRM, DRY TO MOIST, BLACK, SLIGHTLY SANDY TO SANDY, SILTY, SLIGHTLY GRAVELLY TO GRAVELLY, PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
20.4	0.0 TO 10.0'		HIGH PLASTICITY, FIRM TO HARD, DRY TO MOIST, BLACK, SLIGHTLY SANDY TO SANDY, SILTY TO VERY SILTY, SLIGHTLY GRAVELLY TO GRAVELLY (ESPECIALLY IN TOP 10.0'), PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
	10.0' TO 10.0'		MEDIUM TO HIGH PLASTICITY, FIRM, MOIST, YELLOW BROWN TO GRAY, SLIGHTLY SANDY, SILTY TO VERY SILTY, SLIGHTLY GRAVELLY TO GRAVELLY, SLIGHTLY CALICHOED TO VERY CALICHOED (NEAR 10.0'), VAGUE BLOCKY STRUCTURE, CALCAREOUS. NOTE: PROBABLY A WEATHERED SHALE MIXED W/ GRAVEL AND USED AS FILL.		
ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71					

DRILLING LOG		DIVISION	INSTALLATION	FT. WORTH	SHEET
SOUTHWESTERN					1 of 1 SHEETS
Hole No. 35T-1333					
1. PROJECT PERMANENT PARTY DORMITORY					
2. LOCATION Coordinates of Station LACKLAND AFB, TEXAS					
3. DRILLING AGENCY JEDI					
4. HOLE NO. (as shown on drawing title and the number) 35T-1333					
5. NAME OF DRILLER RAMON GUTIERREZ					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEG. FROM VERT. DEG. FROM VERT.					
7. THICKNESS OF OVERBURDEN					
8. DEPTH DRILLED INTO ROCK					
9. TOTAL DEPTH OF HOLE					
10. DATE HOLE STARTED COMPLETED 20 AUG 98 20 AUG 98					
11. SIGNATURE OF INSPECTOR KEN MCCLESKEY					
12. REMARKS (Identify this with well logs, depth of weathering, etc. if significant)					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SOIL CORE NO.	BOX OF SAMPLE NO.
18.0	0.0 TO 19.0'	VISUAL	CLAY		
	0.0 TO 6.7'		HIGH PLASTICITY, SOFT TO FIRM (HARD BY 2.0'), DRY TO MOIST, BLACK, SLIGHTLY SANDY, SLIGHTLY SILTY TO SILTY, SLIGHTLY GRAVELLY TO VERY GRAVELLY, PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
	6.7' TO 19.0'		LOW PLASTICITY, SOFT TO FIRM, DRY TO WET (ZONE AROUND 14.5'), YELLOW BROWN TO GRAY, SLIGHTLY CALICHOED TO VERY CALICHOED (AROUND 10.0'), SLIGHTLY SANDY, SILTY TO VERY SILTY, SLIGHTLY GRAVELLY TO VERY GRAVELLY, VAGUE BLOCKY STRUCTURE, CALCAREOUS. NOTE: PROBABLY A WEATHERED SHALE MIXED W/ GRAVEL AND USED AS FILL.		
	19.0' TO 21.0'		GRAVEL - MEDIUM DENSE TO DENSE, DRY, LIMESTONE AND CHERT, UP TO 3" DIA., ANGULAR TO SUBROUNDED, SLIGHTLY SANDY, CLAYEY TO VERY CLAYEY (AS 6.7' TO 19.0'). (PROBABLY FILL)		
	21.0' TO 25.4'		CLAY		
	21.0' TO 25.0'		MEDIUM PLASTICITY, FIRM TO HARD, DRY, LIGHT BROWN TO YELLOW BROWN, SLIGHTLY SANDY TO SANDY, SILTY TO VERY SILTY, GRAVELLY, CALCAREOUS. (PROBABLY FILL)		
	25.0' TO 25.4'		MEDIUM TO HIGH PLASTICITY, FIRM TO HARD, DRY, RED BROWN TO DARK RED BROWN, SLIGHTLY SANDY, SLIGHTLY SILTY, SLIGHTLY GRAVELLY. (PROBABLY FILL)		
	25.4' TO 25.4'		NOTE: WEATHERED SHALE POSSIBLY ENCOUNTERED AT APPROX. 25.4'.		
ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71					

DRILLING LOG		DIVISION	INSTALLATION	FT. WORTH	SHEET
SOUTHWESTERN					1 of 1 SHEETS
Hole No. 8A-1337					
1. PROJECT PERMANENT PARTY DORMITORY					
2. LOCATION Coordinates of Station LACKLAND AFB, TEXAS					
3. DRILLING AGENCY JEDI					
4. HOLE NO. (as shown on drawing title and the number) 8A-1337					
5. NAME OF DRILLER RAMON GUTIERREZ					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEG. FROM VERT. DEG. FROM VERT.					
7. THICKNESS OF OVERBURDEN 24.0'					
8. DEPTH DRILLED INTO ROCK 1.0'					
9. TOTAL DEPTH OF HOLE 25.0'					
10. DATE HOLE STARTED COMPLETED 20 AUG 98 20 AUG 98					
11. SIGNATURE OF INSPECTOR KEN MCCLESKEY					
12. REMARKS (Identify this with well logs, depth of weathering, etc. if significant)					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SOIL CORE NO.	BOX OF SAMPLE NO.
18.0	0.0 TO 2.0'	VISUAL	CLAY		
	0.0 TO 2.0'		CLAY - HIGH PLASTICITY, SOFT TO FIRM, DRY TO MOIST, BLACK TO YELLOW BROWN TO GRAY, SLIGHTLY SANDY, SLIGHTLY GRAVELLY TO GRAVELLY, PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
	2.0' TO 9.5'		GRAVEL - MEDIUM DENSE, DRY, LIMESTONE AND CHERT, UP TO 1" DIA., AVG. APPROX. 0.5" DIA., SUBANGULAR TO SUBROUNDED, VERY LITTLE CLAY MATRIX. NOTE: TWO 200,000 GALLON FUEL TANKS WERE REMOVED FROM THIS LOCATION THE GRAVEL IS PROBABLY FILL PLACED AFTER TANK REMOVAL.		
	9.5' TO 11.0'		CONCRETE - POSSIBLE SLAB CONSTRUCTED AT BASE OF FUEL TANKS, POSSIBLY USING REBAR.		
	11.0' TO 24.0'		GRAVEL		
	11.0' TO 19.5'		MEDIUM DENSE, DRY, LIMESTONE AND CHERT, UP TO 2" DIA., AVG. APPROX. 1" DIA., SUBANGULAR TO SUBROUNDED, VERY SILTY WHITE TO VERY LIGHT YELLOW GRAY POWDER. (PROBABLY FILL)		
	19.5' TO 24.0'		MEDIUM DENSE, WET, LIMESTONE AND CHERT, UP TO 2" DIA., VERY CLAYEY (HIGH PLASTICITY, YELLOW BROWN TO GRAY), SILTY, POSSIBLE FUEL ODOOR. (PROBABLY FILL)		
	24.0' TO 25.0'		SHALE - WEATHERED, SOFT (RX CLASS.), DRY TO MOIST, YELLOW BROWN TO GRAY, SILTY, FERRUGINOUS STAINING, DENBRITES, BLOCKY STRUCTURE, SLIGHTLY CALICHOED.		
ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71					

DRILLING LOG		DIVISION	INSTALLATION	FT. WORTH	SHEET
SOUTHWESTERN					1 of 1 SHEETS
Hole No. 10A-1334					
1. PROJECT PERMANENT PARTY DORMITORY					
2. LOCATION Coordinates of Station LACKLAND AFB, TEXAS					
3. DRILLING AGENCY JEDI					
4. HOLE NO. (as shown on drawing title and the number) 10A-1334					
5. NAME OF DRILLER RAMON GUTIERREZ					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEG. FROM VERT. DEG. FROM VERT.					
7. THICKNESS OF OVERBURDEN					
8. DEPTH DRILLED INTO ROCK					
9. TOTAL DEPTH OF HOLE					
10. DATE HOLE STARTED COMPLETED 20 AUG 98 20 AUG 98					
11. SIGNATURE OF INSPECTOR KEN MCCLESKEY					
12. REMARKS (Identify this with well logs, depth of weathering, etc. if significant)					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SOIL CORE NO.	BOX OF SAMPLE NO.
18.0	0.0 TO 10.0'	VISUAL	CLAY		
	0.0 TO 4.5'		HIGH PLASTICITY, FIRM TO HARD, DRY TO MOIST, BLACK, SLIGHTLY SANDY, SILTY, SLIGHTLY GRAVELLY TO VERY GRAVELLY (ESPECIALLY IN TOP 1.0'), PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
	4.5' TO 10.0'		MEDIUM TO HIGH PLASTICITY, FIRM, MOIST, YELLOW BROWN TO GRAY, SLIGHTLY SANDY, SILTY TO VERY SILTY, SLIGHTLY GRAVELLY TO VERY GRAVELLY, SLIGHTLY CALICHOED TO CALICHOED, ROUNDED BITS OF SHALE PRESENT (POSSIBLY A HIGHLY WEATHERED SHALE USED AS FILL).		
ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71					

DRILLING LOG		DIVISION	INSTALLATION	FT. WORTH	SHEET
SOUTHWESTERN					1 of 1 SHEETS
Hole No. 8A-1337A					
1. PROJECT PERMANENT PARTY DORMITORY					
2. LOCATION Coordinates of Station LACKLAND AFB, TEXAS					
3. DRILLING AGENCY JEDI					
4. HOLE NO. (as shown on drawing title and the number) 8A-1337A					
5. NAME OF DRILLER RAMON GUTIERREZ					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEG. FROM VERT. DEG. FROM VERT.					
7. THICKNESS OF OVERBURDEN 22.0'					
8. DEPTH DRILLED INTO ROCK 3.5'					
9. TOTAL DEPTH OF HOLE 25.5'					
10. DATE HOLE STARTED COMPLETED 24 AUG 98 24 AUG 98					
11. SIGNATURE OF INSPECTOR KEN MCCLESKEY					
12. REMARKS (Identify this with well logs, depth of weathering, etc. if significant)					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SOIL CORE NO.	BOX OF SAMPLE NO.
18.0	0.0 TO 1.5'	VISUAL	CLAY - HIGH PLASTICITY, SOFT TO FIRM, DRY TO MOIST, BLACK TO DARK BROWN, SLIGHTLY SANDY, SLIGHTLY SILTY TO SILTY, SLIGHTLY GRAVELLY TO GRAVELLY, PLANT ROOTS, CALCAREOUS. (PROBABLY FILL)		
	1.5' TO 1.8'		GRAVEL - MEDIUM DENSE, DRY, LIMESTONE AND CHERT, UP TO 1" DIA., ANGULAR TO SUBROUNDED, SLIGHTLY SANDY, CLAYEY TO VERY CLAYEY. (PROBABLY FILL)		
	1.8' TO 6.2'		CLAY - AS 0.0 TO 1.5', ABOVE. (PROBABLY FILL)		
	6.2' TO 18.0'		GRAVEL - MEDIUM DENSE TO DENSE, DRY TO MOIST, LIMESTONE AND CHERT, UP TO 1" DIA., AVG. 0.25" DIA., OR LESS, SUBANGULAR TO SUBROUNDED, SLIGHTLY SANDY TO SANDY, CLAYEY TO VERY CLAYEY SANDY, SILTY (LIGHT YELLOW BROWN) SEAM BETWEEN APPROX. 13.0' TO 15.0'. (PROBABLY FILL)		
	18.0' TO 20.0'		CLAY - MEDIUM TO HIGH PLASTICITY, FIRM, DRY TO MOIST, YELLOW BROWN TO GRAY, SLIGHTLY SANDY, SLIGHTLY GRAVELLY TO VERY GRAVELLY, CALCAREOUS. NOTE: POSSIBLY A WEATHERED SHALE MIXED W/ GRAVEL AND USED AS FILL.		
	20.0' TO 22.0'		GRAVEL - MEDIUM DENSE TO DENSE, DRY TO WET, LIMESTONE AND CHERT, UP TO 1" DIA., ANGULAR TO SUBROUNDED, SLIGHTLY SANDY, CLAYEY TO VERY CLAYEY (HIGH PLASTICITY, YELLOW BROWN), SLIGHTLY SILTY. (PROBABLY FILL)		
	22.0' TO 25.5'		SHALE - WEATHERED, SOFT (RX CLASS.), MOIST, YELLOW BROWN TO GRAY, SILTY, FERRUGINOUS STAINING, BLOCKY STRUCTURE, SILTY, GLAUCONITIC SAND LENSES.		
ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71					

- NOTES:
- USE THIS SHEET FOR BORING LOGS ONLY.
 - MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.
 - LEGEND SHOWS OVERBURDEN MATERIALS AS CLASSIFIED VISUALLY IN THE LABORATORY, OR CLASSIFIED BY PROCEDURES PRESENTED IN ASTM D 2487 AND ASTM D 2488.
 - DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
 - ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

SYM	D.O. NO.	ACTION	DATE	DESCRIPTION OF REVISION
ENGINEERING/CONSTRUCTION DIVISION DESIGN BRANCH				U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS
DESIGNED BY:	LACKLAND AIR FORCE BASE SAN ANTONIO, TEXAS			
DRAWN BY:	FY00/01/02 DORMITORIES			
REVIEWED BY:	LOGS OF BORINGS			
SUBMITTED BY:	JOHN WISE		DATED:	
CONTR. NO.	DRAWING NUMBER		SEQUENCE NO.	
	LB2 OF 3			
CADD FILE NAME: GDRMSLB1.DGN				

ATTACHMENT F

EC 1110-1-94

CLASS OF TYPE OF CONSTRUCTION

Attachment I

DORMITORY DESIGN GUIDE

ATTACHMENT J

LACKLAND AFB

SOIL & WATER MANAGEMENT PLAN

LACKLAND AIR FORCE BASE SOIL & WATER MANAGEMENT PLAN

1. GENERAL PROVISIONS.

1.1. **Purpose and Application.** The purpose of this Soil & Water Management Plan (Plan) is to provide procedures for the handling of soil, water and associated materials, including, but not limited to construction debris, generated during construction and maintenance activities. This Plan is applicable to all construction or maintenance activities, including utility service activities, conducted on Lackland Air Force Base, the Lackland Training Annex (LTA), and the portion of Kelly Air Force Base subject to realignment to Lackland Air Force Base (Kelly Field Annex) before and after the date of such realignment.

1.2. **Requirement to Backfill.** The Contractor of any construction or maintenance activity will return or backfill the maximum amount of soil possible, except for wet soil, to the excavation from which it originated.

1.3. **Reservation of Rights.** Notwithstanding Contractor responsibilities under this Plan the Air Force reserves the right to handle and manage excess soils or contaminated water accumulated in connection with any construction or maintenance activity on Air Force property.

1.4. **Special Definitions:**

1.4.1. "**Contractor**" is any person, operator, contractor or subcontractor, including a utility provider, who performs work involving construction or maintenance activities on Air Force property under or through a contract or agreement with the Air Force.

1.4.2. "**Customary Contractor Costs**" are those costs and expenses incurred while engaged in construction or maintenance activities that the Contractor typically assumes as a matter of business practice when performing services of similar scope and type, and under similar circumstances, on the property of such Contractor's nonmilitary business customers. The Contractor will provide upon written request by the Air Force a copy of such customary construction and maintenance costs.

1.4.3. "**Excess soil**" is the soil that cannot be returned to the excavation.

1.4.4. "**Installation Restoration Program (IRP) site**" is a site where hazardous substances have been deposited, stored, disposed of, placed, or have otherwise come to be located, and has been designated by the Air Force as an Installation Restoration Program site pursuant to its Installation Restoration Program.

LACKLAND AIR FORCE BASE
SOIL & WATER MANAGEMENT PLAN

1.5. **Revisions.** The Air Force may revise this Plan from time to time to comply with changes in environmental laws or for other purposes consistent with Air Force missions. At least 90 days prior to the proposed implementation of any such revision, unless a shorter period is necessitated to comply with the law, the Air Force Contracting Officer (CO) will notify in writing each affected Contractor of the proposed revision. The parties will consult to determine whether a Contractor's agreement or contract incorporating this Plan by reference needs to be modified.

1.6. **Conflicts.** In the event of a conflict between this Plan and the Contractor's agreement, the terms of the agreement will prevail unless inconsistent with applicable law, in which case, the applicable law controls.

1.7. **Point of Contact.** The point of contact for implementation of this Plan is the Lackland Air Force Base Installation Commander or designee.

2. WORK PROCEDURES.

2.1. Contaminated Soil or Water Management and Identification.

2.1.1. **Identification.** The Air Force will preliminarily identify the soil and water in each proposed work area suspected of being contaminated. This identification will be based on existing environmental, process, and historical data for the proposed work area.

2.1.2. **Management.** The Contractor will manage all soil or water that is or is reasonably suspected of being contaminated in compliance with all applicable laws, regulations, and Air Force policy, including but not limited to this Plan.

2.2. Digging Permit:

2.2.1. **Application.** The Contractor must apply for an Air Force Digging Permit (Permit) not less than fourteen (14) days before the proposed commencement of any digging. Permit applications should be submitted to _____ . Emergency situations are covered in paragraph 2.3.

2.2.2. Permit Issuance:

2.2.2.1. The Digging Permit will be routed through all necessary components of the Air Force to identify conflicts with other known underground structures, and to identify areas of possible contamination.

2.2.2.2. If no soil or water contamination is suspected in the proposed work area the Contractor may proceed.

LACKLAND AIR FORCE BASE
SOIL & WATER MANAGEMENT PLAN

2.2.2.3. If the proposed work area contains known or suspected areas of soil or water contamination, the Permit will be annotated to indicate the location of any known or suspected contamination. The Permit may also indicate the type of suspected contamination if that information is available. The Contractor will proceed only at the direction of the CO.

2.3. **Emergency Situations:**

2.3.1. In emergency situations the Contractor may proceed as necessary to accomplish any required work, subject to applicable Federal, state, and local laws and regulations.

2.3.1.1. Excavated soils will be staged within the immediate work area.

2.3.1.2. Water collected in or around the excavation site may be discharged onto the ground unless the water is reasonably suspected of being contaminated.

2.3.2. Permit Application. As soon as practicable, but not later than three (3) days after commencing emergency digging activities, the Contractor will notify the Air Force of its emergency digging activities so the Air Force can issue a Digging Permit. Following issuance of the Digging Permit, the Contractor will continue the work as provided for in this Plan for nonemergency activities.

2.4. **Contractor Identified Contamination.**

2.4.1. Notice. If during the excavation the Contractor identifies or suspects soil or water contamination not identified on either the Digging Permit or previously on maps supplied to the Contractor, the Contractor shall immediately notify the Air Force of its suspicion.

2.4.2. Sampling. The Contractor may sample and analyze the Contractor identified soil or water at Contractor's expense. Prior to sampling the Contractor shall notify the Air Force of its intent and offer the Air Force the opportunity to take a sample split to be analyzed at Air Force expense.

2.4.3. Cost Reimbursement. Upon Contractor's written request, the Air Force will reimburse the Contractor for its sampling and analysis costs at not more than the prevailing rates in the market area, but only if:

2.4.3.1. The soil is determined to be hazardous waste or Texas nonhazardous Industrial Class 1 or 2 waste; or

LACKLAND AIR FORCE BASE
SOIL & WATER MANAGEMENT PLAN

2.4.3.2. The water is determined to contain contaminants above the controlling action levels (i.e., Maximum Contaminant Levels (MCLs)) as defined by the EPA or TNRCC, and

2.4.3.3. Such costs are not Customary Contractor Costs.

2.4.3.4. Such sampling and testing is only required to meet the requirements imposed by the landfill as a condition of disposal from Air Force property.

3. EXCESS SOIL DISPOSAL.

3.1. **Classification and Manifests.** The Air Force will classify and manifest excess soil and other materials excavated during approved construction and maintenance activities.

3.2. **Wet Soil:**

3.2.1. The Contractor will manage clean wet soil as directed by the Contracting Officer (CO).

3.2.2. The Contractor will dispose of contaminated wet soil as indicated in 2.1.2 above for similarly classified soil.

3.3. **Clean Soil Transportation.** The Contractor, at Contractor's expense, will transport excess clean soil within Lackland AFB, LTA, or the Kelly Annex as directed by the CO.

4. CONTAMINATED WATER DISPOSAL.

4.1. Water collected from existing IRP sites or plumes associated with such sites will be containerized, sampled, and if necessary, disposed of as directed by the CO. In addition, based on field observations (i.e., sight, smell, or touch), if the Contractor reasonably suspects contamination, the water will be containerized, sampled, and if necessary, disposed of properly.

4.2. Water not suspected of being contaminated, based upon existing information or site indicators, may be disposed of by pumping it directly onto the ground.

5. ANTI-DEFICIENCY ACT. No provision of this Plan shall be interpreted as constituting a commitment or requirement that the United States of America obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1342, or any other applicable provision of law.

ATTACHMENT K

DoD ANTI-TERRORISM/FORCE PROTECTION MEASURES



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE CIVIL ENGINEER SUPPORT AGENCY
TYNDALL AIR FORCE BASE, FLORIDA 32403-5319

15 Feb 00

MEMORANDUM FOR AT/FP POINTS OF CONTACT

FROM: HQ AFCESA/CESC (LAFRENZ)
139 Barnes Drive, Suite 1
Tyndall AFB, FL 32403-5219

SUBJECT: Erata to Interim Department of Defense Antiterrorism/Force Protection Construction Standards, December 16, 1999

1. The Security Engineering Working Group (SEWG) considered using agency comments about the Interim DoD AT/FP Construction Standards at their meeting on 8 Feb 00. The following erata to the Interim Standards are effective immediately. Official correspondence from the DoD will follow. The nature and impact of the erata requires immediate dissemination and implementation.
2. The following changes are applicable to Security Engineering Standard 1: Sitework.
 - a) Paragraph AP2.1.3. Facility Standoff/Separation. Delete the fourth, fifth, and sixth sentence. The remaining paragraph will read "Facility standoff distances are intended to prevent the progressive collapse of structures. For all cases below, standoff distances will be to the face of that portion of a structure that meets the criteria of an inhabited structure or a troop billeting or primary gathering structure. Portions of structures with lesser occupancies may be located within the stated standoff distances."
 - b) Paragraph AP2.1.3.1. Add the following after the existing sentence. "When the standoff distance is not available, select a cost for the low level of protection against a 50 pound TNT explosive at the available standoff. Costs to achieve the low level of protection are included in Appendix 4. For design purposes, design the building elements to sustain an equivalent degree of damage to what it would experience from a 50 pound TNT explosive placed at 80 feet."
 - c) Paragraph AP2.1.3.2. Add the following after the existing sentence. "When the standoff distance is not available, select a cost for the low level of protection against a 220 pound TNT explosive at the available standoff. Costs to achieve the low level of protection are included in Appendix 4. For design purposes, design the building elements to sustain an equivalent degree of damage to what it would experience from a 220 pound TNT explosive placed at 150 feet."
 - d) Paragraph AP2.1.3.5. Change 50 feet to 30 feet. The sentence will read "Maintain a minimum building separation of 30 feet for troop billeting and primary gathering structures."
3. The following changes are applicable to Security Engineering Standard 2: Parking and Roadways.

- a) Delete Paragraph AP2.2.2. Substitute the following. "AP2.2.3. To limit the possibility of progressive collapse, locate parking lots and roadways at least 80 feet from troop billeting and primary gathering structures. The standoff distance from roadways is measured from the nearest edge of pavement. Portions of structures with lesser occupancies may be located within the stated standoff distance. When the standoff distance is not available, select a cost for the low level of protection against a 50 pound TNT explosive at the available standoff. Costs to achieve the low level of protection are included in Appendix 4. For design purposes, design the structure to sustain an equivalent degree of damage to what it would experience from a 50 pound TNT explosive placed at 80 feet."
- b) Add the following paragraph. "AP2.2.2. Roadways and parking shall not be closer than 30 feet to any inhabited structure."

4. The following changes are applicable to Security Engineering Standard 4: Superstructure.

Delete Paragraph AP2.4.1.1. Substitute the following. "AP2.4.1.1. For all inhabited structures of three stories or more, design to sustain local damage with the structural system as a whole remaining stable and not being damaged to an extent disproportionate to the original local damage. This shall be achieved through an arrangement of the structural elements that provides stability to the entire structural system by transferring loads from any locally damaged region to adjacent regions capable of resisting those loads without collapse. This shall be accomplished by providing sufficient continuity, redundancy, or energy dissipating capacity (ductility) or a combination thereof, in the members of the structure. That analysis will include removal of one primary vertical or one primary lateral load-carrying element without progressive collapse. For further guidance, refer to American Society of Civil Engineers Standard 7-95, Minimum Design Loads for Buildings and Other Structures."

5. Questions may be referred to the undersigned at DSN 523-6332 or e-mail Jim.Lafrenz@tyndall.af.mil.

JAMES L. LAFRENZ, P.E.
Security Engineering Working Group
Senior Structural Engineer

DL1. DEFINITIONS

DL1.1. Terms used in this Manual are defined below:

DL1.1.1. Active Vehicle Barrier. A vehicle barrier which must be manually or automatically deployed in response to detection of a threat.

DL1.1.2. Aggressor. Any person seeking to compromise an asset. Aggressor categories include protesters, criminals, terrorists, and subversives.

DL1.1.3. Annealed Glass. The most common form of glass available. Depending on manufacturing techniques, it is also known as plate, float, or sheet glass.

DL1.1.4. Asset. A resource requiring protection. For this interim standard, the asset is limited to people.

DL1.1.5. Conventional Construction. Building construction including doors, windows, or manufacturers' components which is not designed to resist tools, weapons, or explosives but is designed to resist common environmental conditions.

DL1.1.6. DoD Personnel. Any U.S. military, DoD civilian, or family member.

DL1.1.7. Exclusive Standoff Zone. A controlled area surrounding a structure into which only service and delivery vehicles are allowed. The perimeter of this area is defined by perimeter barriers and is set at a standoff distance sufficient to reduce the blast effects of vehicle bomb detonations on the protected structure.

DL1.1.8. Facility. Any single building, project, or site.

DL1.1.9. Fragment Retention Film. A thin optically clear film applied to glass to minimize the spread of glass fragments when the glass is shattered. The film may also be treated with reflective coatings to provide obscuration.

L1.1.10. Glazing. Glass, plastic, or composite sheets used in windows.

DL1.1.11. Inhabited Structure. Structures intended to be occupied by DoD personnel with a personnel density of greater than one person per 400 square feet. This density generally excludes industrial and storage facilities. This does not include guard type facilities, single and duplex detached family housing. It may include portions of structures in which not all areas have such population densities.

DL1.1.12. Laminated Glass. Two or more individual sheets of glass bonded together by a polyvinyl butyral (PVB) plastic interlayer.

DL1.1.13. Level of Protection. The degree to which an asset is protected against a tactic based on the asset's value. Levels of protection refer to the amount of damage a structure is allowed to sustain or the probability that an aggressor will be defeated by the protective system. Specific levels of protection are associated with each tactic.

DL1.1.14. Major Renovation. Modifications to buildings that cost in excess of 50 percent of the replacement cost of the building.

DL1.1.15. Minimum Standards. Protective measures to be applied to all inhabited structures or billeting or primary gathering structures regardless of the identified threat. These measures provide a degree of protection that will not preclude direct effects of blast, but will minimize collateral damage of buildings and people and will limit progressive collapse of structures. They add relatively little additional cost, and they may also facilitate future upgrades and deter acts of aggression.

DL1.1.16. Nonexclusive Standoff Zone. A controlled area used in conjunction with an exclusive standoff zone which provides less restrictive land use than an exclusive standoff zone. Cars (but not trucks) may be granted uncontrolled access to a nonexclusive standoff zone. The nonexclusive standoff zone perimeter is defined by barriers and set at a standoff distance sufficient to reduce the blast effects of a truck bomb detonation on the protected structure.

DL1.1.17. Passive Vehicle Barrier. Any perimeter barrier that serves the function of arresting or impeding vehicular movement and that is non-movable.

DL1.1.18. Perimeter Barrier. A fence, wall, passive vehicle barrier, landform, or line of vegetation applied along an exterior perimeter used to obscure vision, hinder personnel access, or hinder or prevent vehicle access.

DL1.1.19. Permanent Structure. All structures intended for use by DoD personnel for more than three years. They are normally, but not exclusively, structures designed with masonry exteriors.

DL1.1.20. Planning Team. The team responsible for criteria development on a project and for generating all of the necessary programming documents. The installation project planning team typically consists of a facilities planner, and representatives from security forces, force protection, intelligence, logistics, operations, and the facility user.

DL1.1.21. Primary Gathering Structures. A subset of inhabited structures in which 50 or more DoD personnel routinely gather (e.g., office buildings, and indoor recreation facilities).

DL1.1.22. Protective Measures. Elements of a protective system which protect an asset against a threat. Protective measures are divided into defensive and detection measures.

DL1.1.23. Protective System. An integration of all of the protective measures required to protect an asset against the range of threats applicable to the asset.

DL1.1.24. Standoff Distance. A distance maintained between a structure or inhabited portion of a structure and the potential location for an explosives detonation to reduce the explosives' blast effects on the structure. Standoff distances required vary with building component construction.

DL1.1.25. Tactics. The specific methods of achieving the aggressor's goals to injure personnel, destroy military assets, or steal military materiel or information.

DL1.1.26. Temporary Structures. Structures intended for use for a period of 3 years or less, and are not expeditionary. These structures are often capable of being relocated such as some pre-engineered

buildings, trailers, and stress tension shelters.

DL1.1.27. Troop Billeting Structure. A subset of inhabited structures in which DoD personnel are billeted, not to include military family housing.

DL1.1.28. Threat Severity Levels. Levels within each tactic which correspond to different sets of tools, weapons, and explosives. The severity of effects of the tools, weapons, and explosives increases with increasing threat severity levels.

C1. CHAPTER 1

CONSTRUCTION STANDARDS

C1.1. GENERAL.

C1.1.1. Recent terrorist attacks have demonstrated the vulnerability of U.S. military and civilian personnel and the facilities where they work and live. A heightened awareness of the terrorist threat has prompted the Department of Defense (DoD) to find methods to reduce injuries and death in the event of future attacks. To address that issue, DoD Instruction 2000.16 (reference a) established DoD Standard 20, which requires the development of antiterrorism/force protection guidelines for new construction. This interim standard partially implements that requirement.

C1.1.2. The purpose of this standard is to ensure that force protection standards are incorporated into the planning, programming, and budgeting for the design, and construction of Military Construction (MILCON) funded facilities. This interim standard will be updated with the completion of the first volume of the DoD Security Engineering Manual. This standard includes minimum construction requirements that will be incorporated into all inhabited new MILCON construction and major renovations regardless of the threat level. It also addresses measures that can be applied where higher threat levels apply. Inhabited structures are defined for the purposes of this standard as structures occupied by DoD personnel with a personnel density of greater than one person per 400 square feet. This density generally excludes industrial and storage facilities and also does not cover guard facilities or family housing. The standard also provides additional guidance for troop billeting and primary gathering structures, a special case of inhabited structures.

C1.1.3. This interim construction standard addresses what could effectively be addressed in the short term and what the Chairman of the Joint Chiefs of Staff wanted to be covered as soon as possible. It applies to all DoD agencies and services with MILCON programming, design, or construction responsibilities. It applies to new MILCON construction and major renovations for inhabited structures both within and outside the continental United States funded under the MILCON appropriation for fiscal year 2002 and beyond. This interim standard is the minimum set for DoD. Each Commander-in-Chief (CINC) may set more stringent AT/FP construction standards to meet the specific threats in that CINC's area of responsibility.

C1.2. SCOPE.

C1.2.1. This standard provides guidance to:

C1.2.1.1. Specify the planning, engineering, design, and construction criteria for incorporating force protection requirements into MILCON projects.

C1.2.2. This standard establishes minimum construction standards for all DoD inhabited structures with additional requirements for troop billeting and primary gathering structures.

C1.3. CONSTRUCTION STANDARDS.

C1.3.1. Minimum Standards. Minimum standards apply regardless of the identified threat..... The minimum standards include application of effective layout or prudent use of elements not specifically required to mitigate threats. They also may facilitate future upgrades and increased threat conditions (THREATCON) and may deter acts of aggression. Minimum standards are addressed in detail in Appendix 2. Those measures are to be considered minimum construction standards that will be incorporated into all new construction and major renovations for inhabited structures. Appendix 2 includes additional protective measures for troop billeting and primary gathering structures, a critical subset of inhabited structures.

AP2. APPENDIX 2

DOD ANTITERRORISM/FORCE PROTECTION MINIMUM STANDARDS

AP2.1. SECURITY ENGINEERING STANDARD 1: SITEWORK.

AP2.1.1. Facility Access.

AP2.1.1.1. Eliminate, minimize, or mitigate lines of approach perpendicular to inhabited structures.

AP2.1.1.2. Minimize vehicle access points.

AP2.1.1.3. Coordinate with the installation master plan to site facilities with large non-DoD visitor populations away from inhabited structures where possible.

AP2.1.2. Facility Characteristics.

AP2.1.2.1. Avoid conditions within 30 feet of inhabited structures that permit concealment of aggressors or that would obscure the view of objects or packages 6 inches in height from the view of security personnel.

AP2.1.2.2. Minimize exposure to surveillance and observation of assets within inhabited structures from uncontrolled natural or man-made vantage points.

AP2.1.3. Facility Standoff / Separation. Facility standoff distances are intended to prevent the progressive collapse of structures. For all cases below, standoff distances will be to the face of that portion of a structure that meets the criteria of an inhabited structure or a troop billeting or primary gathering structure. Portions of structures with lesser occupancies may be located within the stated standoff distances. When the standoff distance is not available, select a cost for the low level of protection against a 50 pound TNT explosive at the available standoff. Costs to achieve the low level of protection are included in Appendix 4. For design purposes, design the structure to sustain an equivalent degree of damage to what it would experience from a 50 pound TNT explosive placed at 80 feet.

AP2.1.3.1. Maintain a minimum standoff distance of 80 feet from inhabited structures to installation perimeters.

AP2.1.3.2. For troop billeting and primary gathering structures, maintain a minimum standoff distance of 150 feet from the structures to installation perimeters.

AP2.1.3.3 Locate trash containers at least 30 feet from inhabited structures.

AP2.1.3.4. Locate trash containers at least 80 feet from troop billeting and primary gathering structures.

AP2.1.3.5. Maintain a minimum building separation of 50 feet for troop billeting and primary gathering structures.

AP2.2. SECURITY ENGINEERING STANDARD 2: PARKING AND ROADWAYS.

AP2.2.1. Parking beneath inhabited structures is strongly discouraged. If unavoidable, mitigate by designing columns assuming loss of lateral support at any one floor level (i.e., a laterally unsupported length equal to two stories) to avoid progressive collapse and control access to the parking structure.

AP2.2.2. To limit the possibility of progressive collapse, locate parking lots and roadways at least 30 feet from inhabited structures and 80 feet from troop billeting and primary gathering structures. The standoff distance from roadways is measured from the nearest edge of pavement. Portions of structures with lesser occupancies may be located within the stated standoff distance. When the standoff distance is not available, select a cost for the low level of protection against a 50 pound TNT explosive at the available standoff. For design purposes, design the structure to sustain an equivalent degree of damage to what it would experience from a 50 pound TNT explosive placed at 80 feet.

AP2.3. SECURITY ENGINEERING STANDARD 3: BUILDING LAYOUT.

AP2.3.1. Minimize or mitigate exposure of personnel in inhabited structures to potential glass fragment hazards.

AP2.3.2. Design circulation within inhabited structures to provide detection of people approaching controlled areas or occupied spaces.

AP2.3.3. Locate activities with large non-DoD visitor populations within or around inhabited structures away from protected assets where possible.

AP2.3.4. When possible, position exterior doors on inhabited structures so they cannot be easily targeted from the installation perimeter or uncontrolled vantage points.

AP2.4. SECURITY ENGINEERING STANDARD 4: SUPERSTRUCTURE.

AP2.4.1. Structural. The intent of these requirements is to minimize the possibility of progressive collapse. Where these requirements cannot be met for major MILCON funded renovations or existing structures, design the renovation to provide as much mitigation as is practical.

AP2.4.1.1. For inhabited structures of three stories or more, use a moment resisting frame support system and design in structural redundancy that allows the loss of one primary vertical or one primary lateral load-carrying element without progressive collapse.

AP2.4.1.2. For all multistory inhabited structures, design all multistory vertical load carrying elements assuming loss of lateral support at any one floor level (i.e., a laterally unsupported length equal to two stories).

AP2.4.1.3. Exterior masonry walls will be reinforced in all inhabited structures.

AP2.4.1.4. On multistory inhabited structures, run concrete floor slab reinforcement continuously through both faces of the slab and into the beams and columns to improve capability to withstand load reversals.

AP2.4.1.5. Exterior walls in inhabited structures will employ one-way wall elements spanning vertically to minimize blast loads on columns.

AP2.4.1.6. Structurally separate portions of inhabited structures with lesser occupancies from the inhabited portions of the structure when portions with lesser occupancies are located within prescribed standoff distances.

AP2.4.2. Non-structural. Attach interior ceiling mounted fixtures to the supporting structural system (i.e., use seismic detailing from Technical Instruction 809-4) in inhabited structures. This includes suspended ceilings, light fixtures, and mechanical and electrical ducting and pipes.

AP2.4.3. Exterior Windows. For single glazed windows in inhabited structures, use a minimum of ¼-inch (6-mm) annealed laminated glass. For insulated glass units, the inner pane should be a minimum of ¼-inch (6-mm) annealed laminated glass.

AP2.4.4. Exterior Doors. Use a minimum of ¼-inch (6-mm) annealed laminated glass for exterior door glazing in inhabited structures.

AP2.5. SECURITY ENGINEERING STANDARD 5: MAILROOMS.

AP2.5.1. Avoid routing key utilities (including communications, fire detection and alarm, water mains, etc.) through or on common walls to mailrooms in inhabited structures.

AP2.5.2. Locate mailrooms on perimeters of inhabited structures.

AP2.6. SECURITY ENGINEERING STANDARD 6: MECHANICAL AND UTILITY SYSTEMS.

AP2.6.1. Locate air intakes above the first story ceiling (for two-story or higher inhabited structures) or on the roof of single-story inhabited structures , and restrict access to the intakes.

AP2.6.2. Control access to roofs of inhabited structures. Avoid external ladder access by providing entry from internal stairways or ladders such as in mechanical rooms. Alternatively, secure external ladders.

AP2.6.3. Include an emergency shutoff switch in the control system that immediately shuts down the heating, ventilation, and air conditioning (HVAC) system of inhabited structures.

AP2.6.4. Ensure that redundant utilities in inhabited structures do not run in the same locations or chases.

AP2.6.5. Secure exterior access to power/heat plants, gas mains, water supplies, communications, electrical service, or other support facilities or infrastructure.

AP2.6.6. Construct fire protection systems in inhabited structures using seismic detailing.

**DEPARTMENT OF DEFENSE
INTERIM ANTITERRORISM/FORCE PROTECTION
CONSTRUCTION STANDARDS**

PROGRESSIVE COLLAPSE DESIGN GUIDANCE

4 April, 2000

The following provides guidance for designers to use in implementing the progressive collapse requirements in the DoD Interim Antiterrorism/Force Protection Construction Standards. This guidance may be used until more formal guidance is established in the DoD Security Engineering Manual.

A progressive collapse is a chain reaction of failures following damage to a relatively small portion of a structure. The damage resulting from progressive collapse is out of proportion to the damage that initiated the collapse. Consequences of progressive collapse are unnecessary loss of life and trapping survivors in the collapsed structure. Soon to be published errata to the 16 December 1999 Department of Defense Interim Antiterrorism/Force Protection Construction Standard states the following. "For all inhabited structures of three stories or more, design to sustain local damage with the structural system as a whole remaining stable and not being damaged to an extent disproportionate to the original local damage. This shall be achieved through an arrangement of the structural elements that provides stability to the entire structural system by transferring loads from any locally damaged region to adjacent regions capable of resisting those loads without collapse. This shall be accomplished by providing sufficient continuity, redundancy, or energy dissipating capacity (ductility) or a combination thereof, in the members of the structure. That analysis will include removal of one primary vertical or one primary lateral load-carrying element without progressive collapse. For further guidance, refer to American Society of Civil Engineers Standard 7-98, Minimum Design Loads for Buildings and Other Structures."

The sequences of events that occur during a potential progressive collapse event are diagrammed in Figure 1. However, there are two different approaches that can be used to obtain resistance to progressive collapse. These approaches are referred to as direct and indirect design and are defined as follows:

Direct design is the explicit consideration of resistance to progressive collapse during the design process through either the alternate path method or the specific local resistance method. The alternate path method allows local failure to occur but seeks to provide alternate load paths so that the damage is absorbed and major collapse is averted. The specific local resistance method seeks to provide sufficient strength to resist failure by defining a load for which the structure must be designed.

Indirect design is the implicit consideration of resistance to progressive collapse during the design process through the provision of minimum levels of strength, continuity, and ductility.

The guidance presented in this document adopts the alternate path method. The other methods may be included in the DoD Security Engineering Manual as is appropriate. The primary objective in a progressive collapse analysis is to check the structure for alternative load paths after some elements are potentially lost through some abnormal loading such as an explosive event. These alternative load paths will need to provide sufficient damage tolerance to minimize the loss of life that might otherwise occur and will allow the safe egress of occupants from the damaged structure.

ALTERNATE LOAD PATH ANALYSIS PROCEDURE

Perform a two- or three-dimensional static analysis of the structure to evaluate the effects of the removal of either one primary vertical or one primary lateral load-carrying element. This should be done for several locations throughout the structure. This analysis must be performed in addition to any other load analyses. For inhabited structures where the threat/risk analysis indicates that there is no threat to the facility the DoD minimum standards apply and removal of the primary load carrying elements shall be limited to external building perimeter members as described below. Where the threat/risk analysis indicates only an external explosive threat, the collapse analysis will also be limited to external building perimeter members. Where the threat/risk analysis indicates that there is an internal explosive threat, a progressive collapse analysis shall be performed that includes the removal of primary external and internal load-carrying elements. Dead and live loads associated with the removed elements shall be distributed to adjacent members or to the floor in the story below the removed elements. To begin the progressive collapse analysis, the following structural elements shall be removed:

Moment resisting frame systems. Remove only one column or one beam at any level within the structure for each analysis. Any in-fill walls that provide lateral support to the column or beam on either side of a removed column or above a removed beam shall also be removed. If a structural slab system is used (instead of beams), remove one full bay of the slab. In this case, a bay is defined as the area bounded by four columns.

Loadbearing/shear wall systems. Remove a width of wall equal to two times the wall height but no less than the distance between expansion or control joints. At corners, with loadbearing or shear walls in two directions, remove a width of wall equal to the wall height in each direction but no less than the distance between expansion or control joints. Wall height is defined as the vertical distance between horizontal supporting elements. The width of wall to be removed may be reduced to actual distance between vertical intersecting elements that are loadbearing and are structurally connected to the wall being removed. If a structural slab system is used (instead of beams), remove an area of slab equal in width to the wall removed and in length back to the first interior loadbearing element.

Braced frame system. Initiate analysis by the removal of only one column, or one beam for each analysis as described for the moment resisting frame systems. Provide redundant bracing along a column line such that the loss of a column or beam along with one bay of bracing will not result in the collapse of the remaining portions of the building. Bracing may consist of cross members, knee braces or “K” braces.

METHODS OF ANALYSIS

With the appropriate member removed from the structure, perform a two or three dimensional static linear elastic or non-linear structural analysis as indicated below.

For linear elastic methods, when the analysis indicates that the ultimate moment capacity of a member is exceeded, release the rotational degree of freedom for the member, insert a fixed resistant moment equal to the ultimate moment of the yielding member, and reanalyze the revised structure. If the shear capacity or response limits of a member are exceeded, the member is considered a failed member. A failed member must be removed from the model before proceeding with the remainder of the analysis. When a failed member is removed, any dead or live loads associated with the member must be accounted for by distribution to other members. This can be done by distributing the load to other members in the same story as the failed member or by adding the load of the failed member to the members in the story below the failed member. Perform this analysis in an iterative manner until the structure stabilizes. If progressive collapse occurs, revise the design and repeat the analysis procedure from the beginning.

For non-linear methods, only a single iteration of the analysis is required unless member shear capacity is exceeded or member response limits are exceeded. If member shear capacity is exceeded or response limits are exceeded, the member is no longer considered capable of carrying load and is considered a failed member. Failed members shall be removed from the model before the remainder of the analysis can be performed. When a failed member is removed, any dead or live loads associated with the member must be accounted for by distribution to other members. This can be done by distributing the load to other members in the same story as the failed member or by adding the load of the failed member to the members in the story below the failed member. If the analysis indicates that progressive collapse will occur, then revise the design as required, and repeat the analysis procedure from the beginning.

LIMITS OF DAMAGE

An acceptable level of damage resulting from the removal of the primary load carrying elements may extend into the story above and below the area where the member is being removed. For framed systems, the damage shall not extend to an area greater than one bay in any direction from a column. For other framed systems, damage shall not extend outside an area greater than 750 sq. ft (70 m²) or 15 percent of the floor area.¹ If

¹ See reference Lyendecker and Ellingwood

the damage exceeds the allowable amount, revise the design and repeat the progressive collapse analysis procedure from the beginning.

LOADING

To avoid an overly conservative analysis, reduce the assumed loading on the structure to what is reasonably expected as indicated below. Note that the design live load is reduced to one-half of the total anticipated value.

$$P = D + 0.5*L + 0.2*W$$

where D = design dead load,
 L = design live load, and
 W = design lateral wind load.

MATERIAL AND MEMBER PROPERTIES

For concrete and steel, increase the strength of these materials to 10% above the specified design strength. This provides a realistic value of actual strengths in the materials. For masonry and wood, use the actual design strength without increase.

For all members in flexure, compression, torsion, and tension, use the nominal capacity, i.e., do not apply strength reduction (?) factors. For all members in shear, evaluate by applying the appropriate strength reduction (?) factors.

CONNECTIONS

To ensure that the structure performs as analyzed, all connections shall develop the capacity of the weaker member being connected unless analysis indicates that a reduced value may be used. In order to ensure ductility and reserve capacity in the connections, all seismic guidance located in TI 809-04 and TI 809-05 or guidance located within the DAHSCWE Manual on connection ductility shall be incorporated.

MEMBER RESPONSE LIMITS

Table 1 below provides the maximum allowable ductility and/or rotation limits for most structural members to limit the possibility of collapse. The values listed are for typical elements in conventional construction (i.e., construction that has not been hardened to resist to resist an abnormal load such as an explosive event).

Table 1. Structural Member Ductility and Rotation Limits

COMPONENT	DUCTILITY (?)¹	ROTATION (?)²	Notes
Reinforced Concrete (R/C) Beam ³		6-degrees	
R/C One-way Slabs w/o tension membrane ³		6-degrees	
R/C One-way Slabs w/ tension membrane ³		12-degrees	
R/C Two-way slabs w/o tension membrane ³		6-degrees	
R/C Two-way Slabs w/ tension membrane ³		12-degrees	
R/C Columns (tension controls) ³		6-degrees	
R/C Columns (compression controls)	1		
R/C Frames		2-degrees	Max sidesway H/25
Prestressed Beams	2		
Steel Beams	20	12-degrees	
Metal Stud Walls	7		
Open Web Steel Joist (based on flexural tensile stress in bottom chord)	6		
Metal Deck	20	12-degrees	
Steel Columns (tension controls)	20	12-degrees	
Steel Columns (compression controls)	1		
Steel Frames		2-degrees	Max sidesway H/25
One-way Unreinforced Masonry (unarched)	1		
One-way Unreinforced Masonry (compression membrane)	1		
Two-way Unreinforced Masonry (compression membrane)	1		
One-way reinforced Masonry		2-degrees	
Two-way Reinforced Masonry		2-degrees	
Masonry Pilasters (tension controls)		2-degrees	
Masonry Pilasters (compression controls)	1		
Wood Stud Walls	2		
Wood Trusses or Joist	2		
Wood Beams	2		
Wood Exterior Columns (bending)	2		
Wood Interior Columns (buckling)	1		

Notes for Table 1.

1. Ductility is defined as the ratio of ultimate deflection to elastic deflection (X_u/X_e).
2. Rotation for members or frames can be determined using Figures 2 and 3 provided below.
3. Concrete having more than 2-degrees rotation must include shear stirrups per requirements of DAHSCWE Manual.

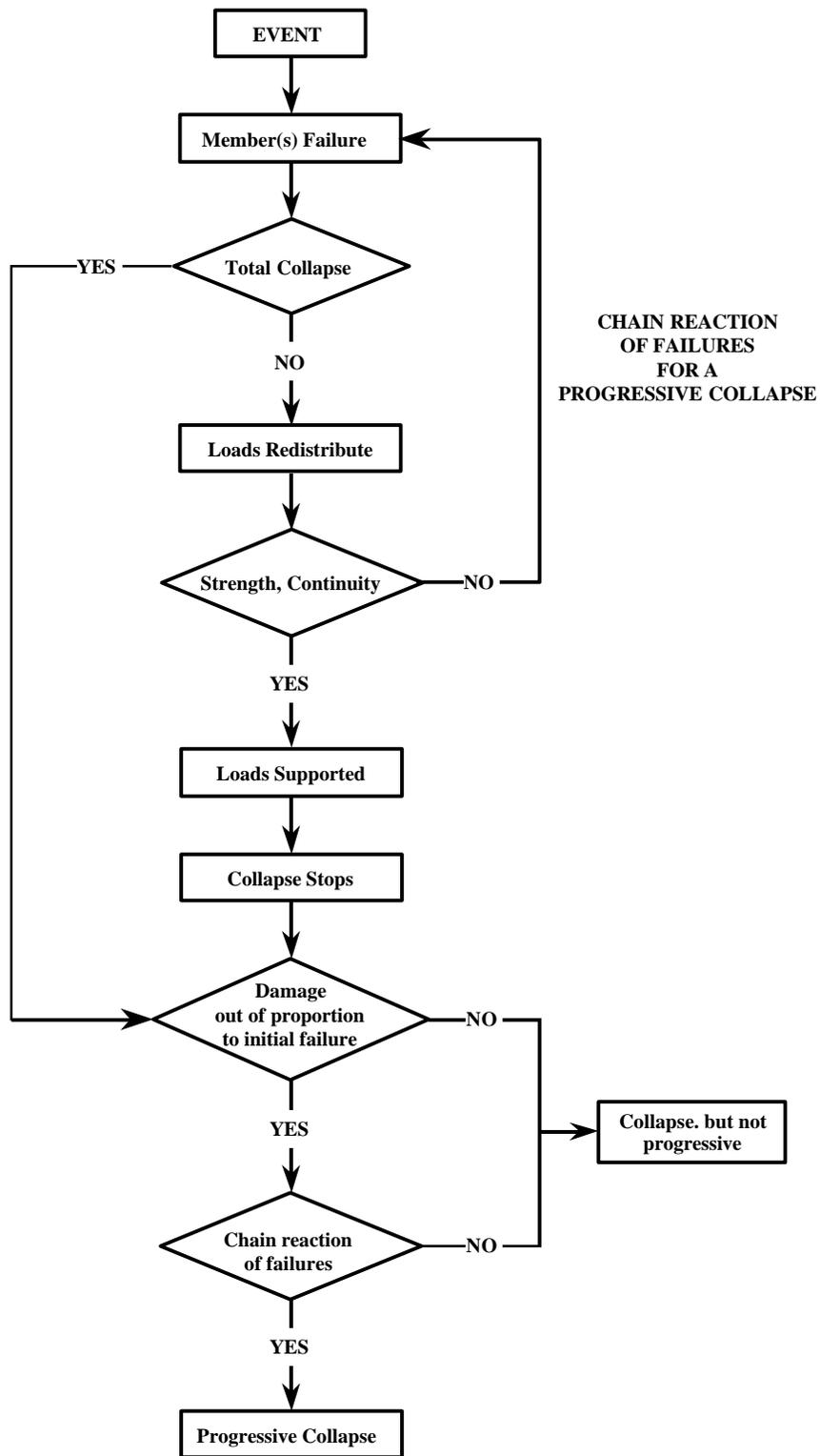


Figure 1. Progressive Collapse Flowchart

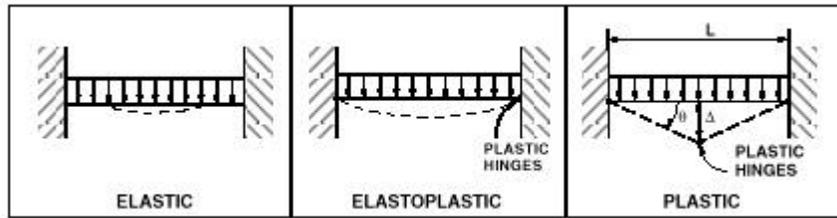


Figure 2. Measurement of Δ After Formation of Plastic Hinges

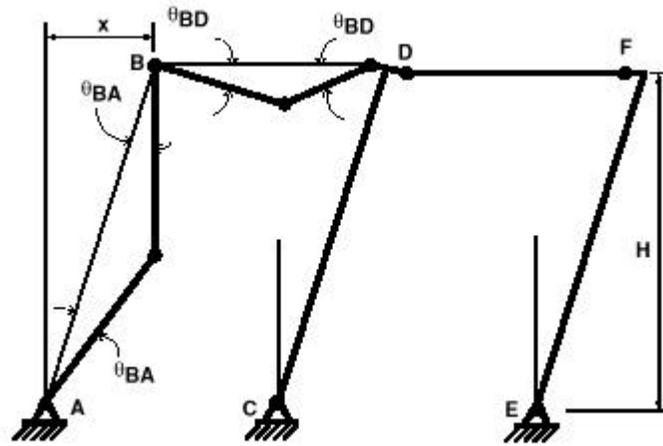


Figure 3. Sidesway and Member End Rotations (θ) for Frames

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Attachment L

DRAWINGS

See the Contract Viewer for Drawings