DACA41-02-R-0007

US Army Corps of Engineers
Kansas City District
You Matter - We Care

Whole Neighborhood Revitalization

Fort Leavenworth, Kansas

This is a Design-Build Request for Proposals

JUNE 2002

DEPARTMENT OF THE ARMY
Kansas City District, Corps of Engineers
760 Federal Building
Kansas City, Missouri 64106

SPECIFICATIONS FOR CONSTRUCTION OF
WHOLE NEIGHBORHOOD REVITALIZATION
PN056034

FORT LEAVENWORTH, KANSAS

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SOLICITATION, OFFER, AND AWARD *(Construction, Alteration, or Repair)*	1. SOLICITATION NO.	2. TYPE OF SOLICITATION	3. DATE ISSUED	PAGE OF	PAGES
	DACA41-02-R-0007	[ ] SEALED BID *(IFB)* [X] NEGOTIATED *(RFP)*	6/27/2002	1	73

IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.

4.	5. REQUISITION/PURCHASE REQUEST NO.	6. PROJECT NO.

7. ISSUED BY CODE	8. ADDRESS OFFER TO
U.S. Army Engineer District, Kansas City 760 Federal Building, 601 E. 12th Street Kansas City, Missouri 64106-2896 Tel: (816) 983-3845 Fax: (816) 426-5169	See Item 7

9. FOR INFORMATION CALL:	A. NAME	B. TELEPHONE NO. *(Include area code)*	
	Perry D. Marks, Jr.	816-983-3850 Ext.	(NO COLLECT CALLS)

SOLICITATION

NOTE: In sealed bid solicitation "offer" and "offeror" mean "bid" and "Bidder".

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS *(Title, identifying no., date):*

Whole Neighborhood Revitalization
Fort Leavenworth, Kansas

This Family Housing Project consists of the design and construction of forty-two (42) duplexes (a total of 84 dwelling units). Of this total, there are four (4) single-story handicap-accessible units required for this project. Eighty (80) of the housing units will be a mix of 3 and 4 bedroom two-story structures with full basements. The four (4) handicapped accessible units will be single story with slab-on-grade foundations. Each housing unit incorporates a double-car garage, a concrete driveway for additional parking, and a covered front porch. Site work consists of site preparation, supporting utility systems, demolition and site improvements. The project will also include demolition of 86 existing housing units, consisting of four-plex and six-plex structures. Demolition shall not begin until completion and acceptance of the new family housing units constructed under this project.

11. The Contractor shall begin performance within 10 calendar days and complete it within ** calendar days after receiving [ ] award [X] notice to proceed. This performance period is [X] mandatory, [ ] negotiable. **See Section 00800)

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? *(If "YES", indicate within how many calendar days after award in Item 12B.)*	12B. CALENDAR DAYS
[X] YES [ ] NO	10

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and 6 copies to perform the work required are due at the place specified in Item 8 by 2:00 p.m. local time 7/29/2002 *(date).* If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelolpes 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 [X] is, [ ] is not required. NOT TO EXCEED 20% OF TOTAL BID AMOUNT

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 120 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

NSN 7540-01-155-3212 1442 102 **STANDARD FORM 1442** (REV. 4-85)
Prescribed by GSA
FAR (48 CFR) 53.236-1(d)

DACA41-02-R-0007 **OFFER** *(Must be fully completed by offeror)*

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*

DUNS NO:

CODE FACILITY CODE

15. TELEPHONE NO. *(Include area code)*

(FAX #)

16. REMITTANCE ADDRESS (Include only if different from Item 14)

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 to or greater than the minimum requirement stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.*

AMOUNTS: See Schedule of Prices

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

AWARD *(To be completed by Government)*

21. ITEMS ACCEPTED

22. AMOUNT

23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN ITEM *(4 copies unless otherwise specified)*

25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO

☐ 10 U.S.C. 2304(c) ( ) ☐ 41 U.S.C. 253(c) ( )

26. ADMINISTERED BY CODE

27. PAYMENT WILL BE MADE BY

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return ____ copies to 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 contact 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.

☐ 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.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type of print)*

31A. NAME OF CONTRATING OFFICER *(Type or print)*

30B. SIGNATURE	31b. UNITED STATED OF AMERICA	31C. AWARD DATE

STANDARD FORM 1442 BACK (REV. 4-85)

SECTION 00010 Solicitation Contract Form

BASE SCHEDULE

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		1.00	Lump Sum		
	SITE WORK FFP - All site work outside of the five foot (5ft) line, excluding costs in items 0002 and 0007.				
				NET AMT	_____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002		1.00	Lump Sum		
	DEMOLITION FFP - Demolition of 86 existing housing units and associated infrastructure and site restoration.				
				NET AMT	_____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0003		60.00	Each		
	THREE BEDROOM DWELLING UNITS FFP - Sixty (60) - three-bedroom dwelling units.				
				NET AMT	_____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004		2.00	Each		
	THREE BEDROOM HANDICAP DWELLING UNITS FFP - Two (2) - three bedroom handicapp accessible dwelling units.				
				NET AMT	_____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0005		20.00	Each		
	FOUR BEDROOM DWELLING UNITS FFP - Twenty (20) - four-bedroom dwelling units.				
				NET AMT	_____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0006		2.00	Each		
	FOUR BEDROOM HANDICAP DWELLING UNITS FFP - Two (2) - four-bedroom handicap accessible dwelling units.				
				NET AMT	_____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0007		1.00	Lump Sum		
	DESIGN COSTS FFP - All design costs for items 0001 through 0006 above.				
				NET AMT	_____

TOTAL BASE AMOUNT _____

GOVERNMENT REQUESTED BETTERMENTS (OPTION SCHEDULE)

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0008		1.00	Lump Sum		

OPT - FINISH STUDY
FFP - Provide FINISH STUDY in the basement of the 80 dwelling units as indicated on the plans provided with this RFP, including all design costs and incidental work as required by the statement of work.

NET AMT _____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0009		1.00	Lump Sum		

OPT - FLOORING UPGRADES
FFP - Provide solid oak flooring and porcelain tile flooring in areas indicated on the floor plans provided with this RFP, including design costs and all incidental work as required by the statement of work.

NET AMT _____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0010		1.00	Lump Sum		

OPT - CEILING HEIGHT UPGRADE
FFP - Provide nine-foot (9') ceiling height throughout the first floor of all two-story residences, including design costs and all incidental work as required by the statement of work.

NET AMT _____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0011		1.00	Lump Sum		

OPT - FENCE UPGRADES
FFP - Provide fenced back yards in locations indicated on site plans provided with the RFP, including all design costs and incidental work as required with the statement of work.

NET AMT _____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0012		1.00	Lump Sum		

OPT - RESIDENCE UPGRADE PACKAGE
FFP - Provide Residence upgrade package. Includes gas fireplaces, attic fan, ceiling fans, garage door openers (accessible unit garage door openers are base bid), special ceiling treatment, crown molding and chair rail (dining room and great room), ceramic tile in kitchen (between counter backsplash and upper cabinets), and finished garage walls and ceiling (gyp brd taped and sanded). Install vinyl-coated steel siding to the exterior of all dwelling units in lieu of fiber-cement lap siding, Provide 25% brick veneer to the front elevation only of all dwelling units, Refer to floor plans provided with this RFP, including design costs and all incidental work as required by the statement of work.

NET AMT _____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0013		1.00	Lump Sum		

OPT - HEAT PUMP UPGRADES
FFP - Provide Geothermal heat pumps in lieu of 90% AFUE efficient furnaces.

NET AMT _____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0014		1.00	Lump Sum		

OPT - SOCCER FIELD
FFP - Provide Soccer field in the location indicated on the site plans provided with this RFP, including all design costs and incidental work as required by the statement of work.

NET AMT _____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0015		1.00	Lump Sum		

OPT - RECREATIONAL UPGRADES
FFP - Provide one (1) half-court basketball court, jogging trails, tot lots and one (1) picnic pavilion in the locations indicated on the site plans provided with this RFP, including all design costs and incidental work as required by the statement of work.

NET AMT _____

TOTAL OFFERED BETTERMENTS (OPTIONS) _____

TOTAL BASE PLUS BETTERMENTS _____

COST LIMITATION – TARGET CEILING (JUNE 1999)

The target ceiling for contract award for design and construction is **$18,000,000**, based on the funds made available for this project. The Government cannot guarantee that additional funds will be made available for award. Offerors are under no obligation to approach that ceiling.

FIELD OFFICE OVERHEAD

NOTICE TO OFFERORS: For your offer to be responsive, you must declare below the single accounting practice that you apply to contracts to calculate field office overhead for all change orders, modifications and requests for equitable adjustment. Pursuant to Federal Acquisition Regulations (FAR) Parts 31.105(d)(3) and 31.203(d)(1), an accounting practice that varies from modification to modification is not allowable. Select one of the following:

1. TIME DISTRIBUTION BASE FOR A PER DIEM RATE
   If you use this practice, see Special Clause "Field Office Overhead Per Diem Rate" _____

2. DIRECT COST DISTRUBITION BASE FOR A PERCENTAGE MARKUP
   If you use this practice, see Special Clause "Field Office Overhead Percentage Markup" _____

3. OTHER ACCOUNTING PRACTICE THAT IS ALLOWABLE UNDER THE FAR AND THAT USES A SINGLE DISTRIBUTION BASE. _____

YOU MUST DESCRIBE THE ACCOUNTING PRACTICE IN SUFFICIENT DETAIL BELOW TO ALLOW THE CONTRACTING OFFICER TO DETERMINE WHAT ACCOUNTING PRACTICE IS BEING UTILIZED BY YOUR COMPANY AND THAT IT COMPLIES WITH THE FAR.

_____
_____
_____

FAILURE TO FULLY COMPLY WITH THE ABOVE REQUIREMENT OR, IF ALTERNATIVE 3 IS DECLARED AND YOUR DESCRIPTION DOES NOT CLEARLY STATE OR DESCRIBE A CONSISTENT ACCOUNTING PRACTICE USING A SINGLE DISTRIBUTION BASE, WILL BE CAUSE FOR YOUR OFFER TO BE REJECTED AS NON-RESPONSIVE.

CONTRACT SPECIALIST: Perry D. Marks 816-983-3850 Perry.D.Marks@usace.armymil
PROJECT MANAGER: David E. Werner 816-983-3265 David.E.Werner@usace.army.mil

NOTES:

(1) Proposal prices must be entered for all items CLINS in the Base Schedule. Offerors shall enter prices for those CLINS in the Betterments Schedule for those betterments they can offer without exceeding the cost limits identified at clause COST LIMITATION – TARGET CEILING (JUNE 1999). If the total Base Schedule exceeds the target ceiling, offerors shall leave betterment CLINS blank. Award will be made as a whole to one Contractor on the basis of price and other non-price factors. Offeror's attention is directed to SECTION 00120 PROPOSAL EVALUATION AND CONTRACT AWARD for further details.

(2) If a modification to an offer is submitted which provides for a lump sum adjustment to the total cost, the application of the lump sum adjustment to each price in the Proposal Schedule must be stated. If it is not stated, the offeror agrees that the lump sum adjustment shall be applied on a pro rata basis to every price in the Proposal Schedule.

(3) Offeror's attention is directed to SECTION 00100 paragraph titled "Arithmetic Discrepancies" wherein are procedures for correction of errors.

(4) Offeror's attention is directed to SECTION 01100: GENERAL for special provisions pertaining to this Solicitation.

(5) Offeror's attention is directed to SECTION 01100, paragraph titled **Kansas** Sales and Use Tax".

(6) The general outline of the principal features of each item as listed does not in any way limit the responsibility of the offeror for making a thorough investigation of the drawings and specifications to determine the scope of work included in each item.

(7) Offeror's attention is directed to the CONTRACT CLAUSES wherein the apparent low offeror is required to submit a small business and small disadvantaged business subcontracting plan. The subcontracting plan shall be submitted in the format that appears at the end of SECTION 00600. Submission of the plan is required prior to award. Award will not be made under this solicitation before the Contracting Officer approves the plan.

(8) Determination of the Offeror's total price for the proposed work will be based on the TOTAL of the BASE SCHEDULE and OPTION (BETTERMENTS) SCHEDULE. Immediate award will be made of the BASE SCHEDULE. At the option of the Government, the OPTION SCHEDULE may be awarded at the proposal price after Notice of Award for the BASE SCHEDULE work. The Government does not guarantee any work beyond that of the BASE SCHEDULE. The Government reserves the right to pick up the OPTION SCHEDULE at the proposal price within **120 calendar days**, after the Notice to Proceed. Offeror's attention is directed to SECTION 00100, paragraph titled "Evaluation of Options", for further details.

(9) Offeror's attention is directed to the CONTRACT CLAUSES, FAR 52.223-9, Certification and Estimate of Percentage of Recovered Material Content for EPA-Designated Items. Certification will be required upon contract completion unless the Contracting Officer has approved a waiver. The waiver must be approved prior to contract award.

(10) The Government will procure this facility through a Best value competitive acquisition in accordance with the provisions set forth in the Request for Proposal (RFP).

CAUTION!

BEFORE SIGNING AND MAILING THIS PROPOSAL, please take note of the following, as failure to perform any one of these actions may cause your offer to be rejected.

1. AMENDMENTS: Have you acknowledged receipt of ALL Amendments? If in doubt as to number of amendments issued, please contact our office.

2. SEALED PROPOSALS: Sealed envelopes containing proposals shall be marked to show the offeror's name and address, the solicitation number, amendments received, and the date and time proposals are due.

3. AMENDED PROPOSAL PAGES: If any of the Amendments furnished amended proposal pages, the amended proposal pages must be used in submitting your proposal.

4. LATE PROPOSALS: In order for a late mailed proposal to be considered, generally it must have been sent by either registered or certified mail not later than 5 calendar days before the receipt of proposals date.

5. PROPOSAL GUARANTEE: Sufficient proposal guarantee in proper form must be furnished with your proposal, if your proposal exceeds $50,000.

6. MISTAKE IN PROPOSAL: Have you reviewed your proposal prices for possible errors in calculations or work left out?

7. TELEGRAPHIC MODIFICATIONS: If you modify your proposal by telegram, be sure to allow sufficient time for the telegram to reach us prior to the time set for receipt of proposals. Any doubt should be resolved in favor of allowing Extra Time.

8. FACSIMILE PROPOSALS, MODIFICATIONS, OR WITHDRAWALS: Will not be considered.

9. SECTION 00600: Certifications must be completed and submitted with your proposal. Small Business and Small Disadvantaged Business Subcontracting Plan, found at the end of Section 00600, must be submitted prior to award.

10. HAND-DELIVERED PROPOSAL: If proposals are hand-delivered, you must be aware of security requirements in effect in the Federal Building. No additional time will be allowed due to security requirements.

11. BUY AMERICAN ACT: All offerors are cautioned that, prior Government conduct notwithstanding, the Contractor's selection of a domestic construction material (as defined in SECTION 00700) which would require the subsequent selection of a foreign construction material for compatibility is not a justification for waiver of the Buy American Act. It is the Contractor's responsibility to verify, prior to submitting the materials for approval, that each system can be built to meet the contract specifications without the use of foreign construction materials.

THE MAGNITUDE OF THIS PROJECT IS REPRESENTED BY THE FOLLOWING ESTIMATED PRICE RANGE (See FAR 36.204 and DFARS 236.204): Between $10,000,000 and $25,000,000.

SCR-DB-017 COST LIMITATION – TARGET CEILING – JUNE 1999

The target ceiling for contract award for design and construction is $18,000,000, based on the funds made available for this project. The Government cannot guarantee that additional funds will be made available for award. Offerors are under no obligation to approach this ceiling.

SECTION 00100 Bidding Schedule/Instructions to Bidders

CLAUSES INCORPORATED BY FULL TEXT

52.204-6 DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER (JUN 99)

(a) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation "DUNS" followed by the DUNS number that identifies the offeror's name and address exactly as stated in the offer.

(b) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one. A DUNS number will be provided immediately by telephone at no charge to the offeror. For information on obtaining a DUNS number, the offeror, if located within the United States, should call Dun and Bradstreet at 1-800-333-0505. The offeror should be prepared to provide the following information:

(1) Company name.

(2) Company address.

(3) Company telephone number.

(4) Line of business.

(5) Chief executive officer/key manager.

(6) Date the company was started.

(7) Number of people employed by the company.

(8) Company affiliation.

(c) Offerors located outside the United States may obtain the location and phone number of the local Dun and Bradstreet Information Services office from the Internet Home Page at http://www.customerservice@dnb.com. If an offeror is unable to locate a local service center, it may send an e-mail to Dun and Bradstreet at globalinfo@mail.dnb.com.

(End of provision)

52.214-5000 ARITHMETIC DISCREPANCIES (MAR 1995)

(a) For the purpose of initial evaluation of proposals, the following will be utilized in resolving arithmetic discrepancies found on the face of the price proposal schedule as submitted by the offeror:

(1) Obviously misplaced decimal points will be corrected;
(2) Discrepancy between unit price and extended price, the unit price will govern;
(3) Apparent errors in extension of unit prices will be corrected;
(4) Apparent errors in addition of lump-sum and extended prices will be corrected.

(b) For the purpose of price proposal evaluation, the Government will proceed on the assumption that the offeror intends his proposal to be evaluated on the basis of the unit prices, the totals arrived at by resolution of arithmetic discrepancies as provided above and the price proposal will be so reflected in the evaluation of proposals.

(c) These correction procedures shall not be used to resolve any ambiguity concerning which proposal is low.

(End of Statement)

52.215-1 INSTRUCTIONS TO OFFERORS--COMPETITIVE ACQUISITION (MAY 2001)

(a) Definitions. As used in this provision--

“Discussions” are negotiations that occur after establishment of the competitive range that may, at the Contracting Officer's discretion, result in the offeror being allowed to revise its proposal.

In writing, writing, or written means any worded or numbered expression that can be read, reproduced, and later communicated, and includes electronically transmitted and stored information.

“Proposal modification” is a change made to a proposal before the solicitation's closing date and time, or made in response to an amendment, or made to correct a mistake at any time before award.

“Proposal revision” is a change to a proposal made after the solicitation closing date, at the request of or as allowed by a Contracting Officer as the result of negotiations.

“Time”, if stated as a number of days, is calculated using calendar days, unless otherwise specified, and will include Saturdays, Sundays, and legal holidays. However, if the last day falls on a Saturday, Sunday, or legal holiday, then the period shall include the next working day.

(b) Amendments to solicitations. If this solicitation is amended, all terms and conditions that are not amended remain unchanged. Offerors shall acknowledge receipt of any amendment to this solicitation by the date and time specified in the amendment(s).

(c) Submission, modification, revision, and withdrawal of proposals. (1) Unless other methods (e.g., electronic commerce or facsimile) are permitted in the solicitation, proposals and modifications to proposals shall be submitted in paper media in sealed envelopes or packages (i) addressed to the office specified in the solicitation, and (ii) showing the time and date specified for receipt, the solicitation number, and the name and address of the offeror. Offerors using commercial carriers should ensure that the proposal is marked on the outermost wrapper with the information in paragraphs (c)(1)(i) and (c)(1)(ii) of this provision.

(2) The first page of the proposal must show--

(i) The solicitation number;

(ii) The name, address, and telephone and facsimile numbers of the offeror (and electronic address if available);

(iii) A statement specifying the extent of agreement with all terms, conditions, and provisions included in the solicitation and agreement to furnish any or all items upon which prices are offered at the price set opposite each item;

(iv) Names, titles, and telephone and facsimile numbers (and electronic addresses if available) of persons authorized to negotiate on the offeror's behalf with the Government in connection with this solicitation; and

(v) Name, title, and signature of person authorized to sign the proposal. Proposals signed by an agent shall be accompanied by evidence of that agent's authority, unless that evidence has been previously furnished to the issuing office.

(3) Submission, modification, or revision, of proposals.

(i) Offerors are responsible for submitting proposals, and any modifications, or revisions, so as to reach the Government office designated in the solicitation by the time specified in the solicitation. If no time is specified in

the solicitation, the time for receipt is 4:30 p.m., local time, for the designated Government office on the date that proposal or revision is due.

(ii)(A) Any proposal, modification, or revision received at the Government office designated in the solicitation after the exact time specified for receipt of offers is “late” and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late offer would not unduly delay the acquisition; and--

(1) If it was transmitted through an electronic commerce method authorized by the solicitation, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of proposals; or

(2) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of offers and was under the Government's control prior to the time set for receipt of offers; or

(3) It is the only proposal received.

(B) However, a late modification of an otherwise successful proposal that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

(iii) Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the proposal wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

(iv) If an emergency or unanticipated event interrupts normal Government processes so that proposals cannot be received at the office designated for receipt of proposals by the exact time specified in the solicitation, and urgent Government requirements preclude amendment of the solicitation, the time specified for receipt of proposals will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume.

(v) Proposals may be withdrawn by written notice received at any time before award. Oral proposals in response to oral solicitations may be withdrawn orally. If the solicitation authorizes facsimile proposals, proposals may be withdrawn via facsimile received at any time before award, subject to the conditions specified in the provision at 52.215-5, Facsimile Proposals. Proposals may be withdrawn in person by an offeror or an authorized representative, if the identity of the person requesting withdrawal is established and the person signs a receipt for the proposal before award.

(4) Unless otherwise specified in the solicitation, the offeror may propose to provide any item or combination of items.

(5) Offerors shall submit proposals in response to this solicitation in English, unless otherwise permitted by the solicitation, and in U.S. dollars, unless the provision at FAR 52.225-17, Evaluation of Foreign Currency Offers, is included in the solicitation.

(6) Offerors may submit modifications to their proposals at any time before the solicitation closing date and time, and may submit modifications in response to an amendment, or to correct a mistake at any time before award.

(7) Offerors may submit revised proposals only if requested or allowed by the Contracting Officer.

(8) Proposals may be withdrawn at any time before award. Withdrawals are effective upon receipt of notice by the Contracting Officer.

(d) Offer expiration date. Proposals in response to this solicitation will be valid for the number of days specified on the solicitation cover sheet (unless a different period is proposed by the offeror).

(e) Restriction on disclosure and use of data. Offerors that include in their proposals data that they do not want disclosed to the public for any purpose, or used by the Government except for evaluation purposes, shall--

(1) Mark the title page with the following legend: This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed--in whole or in part--for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this offeror as a result of--or in connection with-- the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in sheets [insert numbers or other identification of sheets]; and

(2) Mark each sheet of data it wishes to restrict with the following legend: Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal.

(f) Contract award. (1) The Government intends to award a contract or contracts resulting from this solicitation to the responsible offeror(s) whose proposal(s) represents the best value after evaluation in accordance with the factors and subfactors in the solicitation.

(2) The Government may reject any or all proposals if such action is in the Government's interest.

(3) The Government may waive informalities and minor irregularities in proposals received.

(4) The Government intends to evaluate proposals and award a contract without discussions with offerors (except clarifications as described in FAR 15.306(a)). Therefore, the offeror's initial proposal should contain the offeror's best terms from a cost or price and technical standpoint. The Government reserves the right to conduct discussions if the Contracting Officer later determines them to be necessary. If the Contracting Officer determines that the number of proposals that would otherwise be in the competitive range exceeds the number at which an efficient competition can be conducted, the Contracting Officer may limit the number of proposals in the competitive range to the greatest number that will permit an efficient competition among the most highly rated proposals.

(5) The Government reserves the right to make an award on any item for a quantity less than the quantity offered, at the unit cost or prices offered, unless the offeror specifies otherwise in the proposal.

(6) The Government reserves the right to make multiple awards if, after considering the additional administrative costs, it is in the Government's best interest to do so.

(7) Exchanges with offerors after receipt of a proposal do not constitute a rejection or counteroffer by the Government.

(8) The Government may determine that a proposal is unacceptable if the prices proposed are materially unbalanced between line items or subline items. Unbalanced pricing exists when, despite an acceptable total evaluated price, the price of one or more contract line items is significantly overstated or understated as indicated by the application of cost or price analysis techniques. A proposal may be rejected if the Contracting Officer determines that the lack of balance poses an unacceptable risk to the Government.

(9) If a cost realism analysis is performed, cost realism may be considered by the source selection authority in evaluating performance or schedule risk.

(10) A written award or acceptance of proposal mailed or otherwise furnished to the successful offeror within the time specified in the proposal shall result in a binding contract without further action by either party.

(11) The Government may disclose the following information in postaward debriefings to other offerors:

(i) The overall evaluated cost or price and technical rating of the successful offeror;

(ii) The overall ranking of all offerors, when any ranking was developed by the agency during source selection;

(iii) A summary of the rationale for award; and

(iv) For acquisitions of commercial items, the make and model of the item to be delivered by the successful offeror.

(End of provision)

52.215-20 REQUIREMENTS FOR COST OR PRICING DATA OR INFORMATION OTHER THAN COST OR PRICING DATA (OCT 1997)—ALTERNATE IV (OCT 1997)

(a) Submission of cost or pricing data is not required.

(b) Provide information described below:

SEE SECTION 00120 FOR REQUIRED DOCUMENTATION FOR PRICE PROPOSAL

(End of provision)

52.216-1 TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a **single firm fixed price design-build construction** contract resulting from this solicitation.

(End of clause)

52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation for each trade	Goals for female participation for each trade
10%	6.9%

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

(1) Name, address, and telephone number of the subcontractor;

(2) Employer's identification number of the subcontractor;

(3) Estimated dollar amount of the subcontract;

(4) Estimated starting and completion dates of the subcontract; and

(5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is **Leavenworth County, Kansas.**

52.233-2 SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from

CHARLENE A. POINTS
760 FEDERAL BUILDING
601 E 12TH STREET
KANSAS CITY, MO 64106-2896

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

(End of provision)

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

http://www.arnet.gov/far/
http://www.acq.osd.mil/dp/dars/dfars/dfars.html
http://acqnet.saalt.army.mil/library/AFAR/AFARS_OCTOBER_2001.pdf
http://www.hq.usace.army.mil/cepr/asp/library/

(end of provision)

SECTION 00110

PROPOSAL SUBMISSION REQUIREMENTS AND INSTRUCTIONS

SECTION 00110

PROPOSAL SUBMISSION REQUIREMENTS AND INSTRUCTIONS

1. 1.00 GENERAL PROPOSAL INFORMATION.

General. The proposal should be prepared simply and economically, providing straightforward, concise delineation of capabilities to perform the contract. The proposal should be practical, legible, clear and coherent.

2.00 GENERAL PROPOSAL SUBMISSION INSTRUCTIONS

a. Who May Submit.

(1) Proposals may be submitted by firms formally organized as design/build entities, or by design firms and construction contractors that have associated specifically for this project. In the latter case, a single design firm or construction contractor may offer more than one proposal by entering into more than one such association. For the purpose of this solicitation, no distinction is made between formally organized design/build entities and project-specific design/build associations. Both are referred to as the design/build offeror, (or simply "offeror"), or the design/build contractor, (or simply "Contractor"), after award of a contract.

(2) Any legally organized offeror may submit a proposal, provided that the offeror, or offeror's subcontractor, has on its permanent staff professional architects and engineers registered in the appropriate technical disciplines and provided that the requirements specified in the solicitation are met. All designs must be accomplished under the direct supervision of appropriately licensed professionals.

b. General Requirements.

(1) All offerors shall be required to submit a proposal with the minimum content as specified herein. Proposals without the minimum content may be rejected. Proposals will be received until the date and time indicated on Standard form 1442 at the following address:

U.S. Army Engineer District, Kansas City
757 Federal Building
ATTN: CENWK-CT-C/Marks
601 East 12th Street
Kansas City, Missouri 64106-2896

(2) PREPROPOSAL CONFERENCE

There will be a preproposal conference held at the Frontier Conference Center, on **10 July 2002** at Fort Leavenworth, Kansas. Written questions need to be submitted to Mr. Perry Marks at the address above **no later than 03 July 2002** to ensure that they can be answered at the preproposal conference.

(3) PROPOSAL FORMAT AND SUBMITTAL REQUIREMENTS

a. In order to be considered for award of a contract for the requirements of this solicitation, the offeror must submit a proposal with its offer. Failure to submit a complete proposal will result in the entire offer being rejected. The proposal shall consist of 2 parts:

(1) TECHNICAL/MANAGEMENT PROPOSAL.

(2) PRICE PROPOSAL consists of the original signed Standard Form 1442 "solicitation, Offer, and Award"; providing a price for all line items in the bid schedule; and acknowledgment of all amendments to the solicitation.

b. Proposal Characteristics

(1) All text must be legible and easily read. The page size of the offeror's proposal shall not exceed 8-1/2 by 11 inches. Diagrams, charts and tables shall conform to the paper size. All text shall be typed single-spaced. Margins (1-inch) shall be clean and clear. If fold-out charts are unavoidable, and are to be utilized, all sheets shall be reproduced on 11 by 17 inch, and folded to 8-1/2 by 11 inch size with the title clearly visible at the bottom right corner. Each volume shall be contained within a 3-ring loose leaf binder and submitted in the following quantities (no heat or spiral bound volumes).

NOTE: Limit the technical/management portion of the proposal to a maximum of 100 pages. If more than 100 pages are submitted, only the first 100 pages will be evaluated.

VOLUME I	Technical/management proposal	Original & 6 copies
VOLUME II	Price Proposal	Original & 6 copies

(2) The Offeror's name, address, signature and telephone number shall appear on any document submitted to be evaluated. Each Volume of the proposal shall be identified by the Solicitation number, Volume number, name, address, and telephone number of the offeror on the cover page. Each Volume shall also contain a table of contents, list of tables, list of figures, list of appendices, list of acronyms and at the bottom left side of each page the volume number shall be included. The list of acronyms should include all acronyms appearing in that volume. The cover page of each part shall be properly printed with: (i) the solicitation number; (ii) the project title - **"WHOLE NEIGHBORHOOD REVITALIZATION, FORT LEAVENWORTH, KANSAS",** (iii) the name, address, and telephone number of the firm submitting the proposal, and the name of the firm's point of contact; and one of the following on each volume in bold letters. Mark the original copy as "ORIGINAL" and the six copies as "COPY."

VOLUME I: TECHNICAL/MANAGEMENT PROPOSAL

VOLUME II: PRICE PROPOSAL

(3) The Proposal's clarity, organization and cross referencing is mandatory. No material shall be incorporated by reference. General cross-references or cross referencing guides will not be considered appropriate cross-references.

(4) The Proposal shall be organized by factors and subfactors. They shall be described in separate sections, appropriately tabbed in a report form. All pages of each factor/subfactor shall be sequentially numbered. Elaborate or lengthy presentations are not necessary or desirable.

(5) The Technical/Management narrative shall be written in a way to demonstrate a clear understanding of the requirements, but should not parrot the specifications. The Technical/Management proposal shall not refer the reviewer to information contained in the Price proposal.

3.00 PART I - TECHNICAL /MANAGEMENT PROPOSAL SUBMISSION INSTRUCTIONS:

a. The Technical/Management proposal shall address the offeror's proposed approach to fully perform the requirements of the RFP. Offerors are discouraged from providing information not required by the solicitation.

b. The offeror shall address each of the following Factors and Sub factors, in sufficient detail to permit a complete and comprehensive evaluation: The Offeror must submit a written statement certifying that all items of his proposal complies with the requirements of this solicitation. The compliance statement will be signed by the Offeror and provided with the contractual/financial information as required in paragraph 4.00.

c. Any deviation from the solicitation requirements may result in non-consideration of its proposal. If deviations are included, they must be clearly indicated in the Offeror's Statement of Compliance. After award, the solicitation requirements will govern in the event of a conflict between these requirements and the Offeror's proposal.

FACTOR 1 - Offeror Relevant Experience. The Offeror shall provide a minimum of three (3) project examples that are similar in terms of project size and scope. These examples must have been completed in the three (3) year period preceding the date of this solicitation. If the Offeror represents the combining of two or more companies, state if this project represents a joint venture of the listed parties. The offeror should address past performance separately, for projects as general contractor and as Architect/Engineer

SUB FACTOR A Similar Projects: Each example will provide a general description of the project scope, location, cost, date of completion, solicitation and contract type, and Owner/Architect references (names and telephone numbers).

SUB FACTOR B All projects within the last five years: The Offeror will also provide a list of all projects completed within the five (5) year period preceding the date of this solicitation, including Owner/Architect references.

SUB FACTOR C Safety Record: Provide a list of OSHA citations in which you were a party during the last 5 years. Provide a brief synopsis of the outcome for each citation, including the dollar amount of any fines assessed. Additionally, provide the number of reportable workplace accidents expressed as a percentage of man-hours worked, for each of the last 3 years.

FACTOR 2 - Offeror Past Performance Information.*:* The Offeror will provide a "Past Performance Evaluation Questionnaire" to the point of contact for each of the project examples required in item 3.00(1). The project point of contact must complete the questionnaire and mail, fax, or email it directly to Mr. Perry D. Marks, Contract Specialist, at Perry.D.Marks@nwk02.usace.army.mil no later than the closing date on the RFP. The Offeror is responsible for ensuring that the completed questionnaires are provided by the closing date. Questionnaires that arrive after the solicitation closing date and time will not be considered. A copy of the questionnaire is included at the end of paragraph 3.00. (NOTE: the Offeror should complete items 1-4 in the questionnaire in order to help the respondent identify the particular project they will be evaluating.)

FACTOR 3 - Offeror's Proposed Betterments: The Offeror shall provide a list of proposed betterments included in its proposal. Include only those betterments that will be provided within the specified price range of this project. A list of the Government desired betterments can be found in the bid schedule provided with this RFP. The Offeror's pricing shall be provided on the bid schedule, but must not be included with this list of betterments.

FACTOR 4 - Project Management Plan, and sub factors: The Offeror will provide a project management plan that addresses sub factor items a thru-e below.

SUB FACTOR A - Quality Control: The Offeror must provide a complete and comprehensive quality control plan to support the performance requirements of Section 01451 of this RFP. Describe the process by which the QC staff will monitor work in the field and how action is to be taken to correct deficiencies. Describe the process by which the QC staff will work with government quality assurance personnel and the Contracting Officer to insure timely action is taken on deficiencies or quality problems in the field. The Quality Control Plan shall be a rational, workable plan, and shall stand alone for easy monitoring by the Contracting Officer and the Contracting Officer's Representative. It shall not be dependent on the contractor's other internal management plans. The Offeror must indicate how it intends to incorporate the Corps Three Phase Inspection process to provide seamless integration with the Quality Assurance Operations performed by the Government.

SUB FACTOR B - Proposed Staffing: The Offeror will provide a project management-staffing sub-plan. This sub-plan will include an organizational chart indicating the positions of all key personnel, their primary duties, and state whether the person is an employee, a subcontractor, or a consultant. At a minimum the Offer shall provide a resume, including level of authority, for the Project Manager, Project Architect, Landscape Architect, Civil Engineer, Mechanical Engineer, Electrical Engineer, QC Manager and the Job Superintendent and should reflect each individual's involvement, if any, in the project examples provided. If reassignment of personnel is possible, the names and resumes of the alternative professionals for each should be submitted. Additionally, each resume must list at least two professional references. The Government has a right to rereview the Contractor's key personnel if they should change or be replaced for any reason once the contract has been awarded. The organizational chart must also indicate whether key personnel are full or part time, and the geographic location where they are currently based.

SUB FACTOR C Design & Construction Scheduling: The Offeror will provide a project management sub-plan for integrated design and construction scheduling to support the requirements of Section 01320. This schedule will be graphically represented, and must indicate specific dates for completion of all critical tasks. The Offeror must clearly indicate any activities that are being "Fast Tracked."

SUB FACTOR D - Construction Closeout: The Offeror will provide a plan specifically developed for project closeout activities for individual residences or groups of residences, and how he will incorporate this system to complete the project. The project closeout schedule will be graphically represented, and must indicate the number of calendar days required for completion of required closeout tasks. These elements include:

ELEMENT (1) Testing of equipment and systems with schedules and reports
ELEMENT (2) Prefinal inspection date
ELEMENT (3) Time required for correction of deficiencies
ELEMENT (4) Anticipated transfer to the Government The plan must indicate specific dates for <u>final</u> project closeout tasks. These include:

SUB ELEMENT (a) Completion of personnel training requirements
SUB ELEMENT (b) Date O&M manuals and as-builts will be provided
SUB ELEMENT (c) Date Offeror intends to move off-site

SAMPLE TRANSMITTAL LETTER
AND
PAST PERFORMANCE EVALUATION QUESTIONNAIRE
WHOLE NEIGHBORHOOD REVITALIZATION – DACA41-02-R-0007

Date: _____

To: _____
_____
_____

We have listed your firm as a reference for work we have performed for you as listed below. Our firm has submitted a proposal under a project advertised by the U.S. Army Corps of Engineers, Kansas City District. In accordance with Federal Acquisition Regulations (FAR), an evaluation of our firm's past performance will be completed by the Corps of Engineers. Your candid response to the attached questionnaire will assist the evaluation team in this process.

We understand that you have a busy schedule and your participation in this evaluation is greatly appreciated. Please complete the enclosed questionnaire as thoroughly as possible. Space is provided for comments. Understand that while the responses to this questionnaire may be released to the offeror, FAR 15.306 (e)(4) prohibits the release of the names of the persons providing the responses. Complete confidentiality will be maintained. Furthermore, a questionnaire has also been sent to _____ of your organization. Only one response from each office is required. If at all possible, we suggest that you individually answer this questionnaire and then coordinate your responses with that of _____, to forge a consensus on one overall response from your organization.

Please send your completed questionnaire to the following address:

U.S. Army Engineer District, Kansas City
ATTN: CENWK-CT-C/Marks
760 Federal Building
601 East 12th Street
Kansas City, Missouri 640106-2896

The questionnaires can also be e-mailed to Perry.D.Marks@nwk02.usace.army.mil or faxed to 816-426-5169

If you have questions regarding the attached questionnaire, or require assistance, please contact Mr. Marks at (816) 983-3850.

[NOTE: Offeror should complete items 1-4 in the questionnaire in order to help the respondent identify the particular project they will be evaluating.)]

PAST PERFORMANCE EVALUATION QUESTIONNAIRE

Upon completion of this form please send directly to the U.S. Army Corps of Engineers in the enclosed addressed envelope or fax to 815-426-5169, ATTN: Perry D. Marks. Do not return this form to our offices. Thank you.

1. Contractor/Name & Address (City and State):

2. Type of Contract: Fixed Price _____ Cost Reimbursement _____
Other (Specify) _____

3. Title of Project/Contract Number:
_____
_____

4. Description of Work: (Attach additional pages as necessary)

5. Complexity of Work: High _____ Mid _____ Routine _____

6. Location of Work:_____

7. Date of Award: _____

8. Status: Active _____ (provide percent complete)
Complete _____ (provide completion date)

9. Name, address and telephone number of Contracting Officer's Technical Representative:

QUALITY OF PRODUCT/SERVICE:

10. Evaluate the contractor's performance in complying with contract requirements, quality achieved and overall technical expertise demonstrated.

Excellent Quality	
Above Average Quality	
Average Quality	
Below Average Quality	
Unsuccessful or Experienced Significant Quality Problems	

Remarks: _____

_____

11. To what extent were the contractor's reports and documentation accurate, complete and submitted in a timely manner?

Excellent Quality	
Above Average Quality	
Average Quality	
Below Average Quality	
Unsuccessful or Experienced Significant Quality Problems	

Remarks: _____

_____

12. To what extent was the contractor able to solve contract performance problems without extensive guidance from government/owner counterparts?

Excellent	
Above Average	
Average	
Below Average	
Unsuccessful	

Remarks: _____

_____

13. How well did the contractor manage and coordinate subcontractors, suppliers, and the labor force?

Excellent	
Above Average	
Average	
Below Average	

Unsuccessful	

Remarks: _____
_____

CUSTOMER SATISFACTION:

14. To what extent were the end users satisfied with:

	Quality?	**Cost?**	**Schedule?**
Exceptionally Satisfied			
Highly Satisfied			
Satisfied			
Somewhat Dissatisfied			
Highly Dissatisfied			

Remarks: _____
_____

15. If given the opportunity, would you work with this contractor again?

Yes _____ No _____ Not Sure _____

TIMELINESS OF PERFORMANCE:

16. To what extent did the contractor meet the task order schedules?

Completed Substantially Ahead of Schedule	
Completed on Schedule with no Time Delays	
Completed on Schedule with Minor Delays Under Extenuating Circumstances	
Experienced Significant Delays without Justification	

Remarks: _____
_____

CONTRACTORS SAFETY RECORD:

17. How would you rate the contractors overall safety record? What OSHA violations and fines were assessed. Were the number of accidents excessive as a percentage of man-hours worked.

Excellent	
Above Average	
Average	

Below Average	
Unsuccessful or Experienced Significant Problems	

Remarks: _____

_____

OTHER REMARKS:

18. Use the space below to provide other information related to the contractor's performance. This may include the contractor's selection and management of subcontractors, flexibility in dealing with contract challenges, their overall concern for the Government's interest (if applicable), project awards received, etc.

_____

_____

_____

_____

[End of sample]

4.00 PART II - PRICE PROPOSAL & CONTRACTUAL/FINANCIAL PROPOSAL SUBMISSION INSTRUCTIONS

The Price proposal will not be scored but will be evaluated subjectively. In selecting the best overall proposal, the Government will consider the value of each proposal in terms of the quality offered for the price. The price proposal section of the proposal shall refer directly to items of the proposal schedule and shall be identified as such. The price proposal shall be evaluated for realism, reasonableness, and completeness as described in Section 00120.

a. Contract documents. This information shall be submitted in a separate tabbed section within Volume II. The information in this section shall contain the following, one original and six (6) copies.

1)Completed Standard Form 1442
2) Representations and Certifications
3) Proposal bonds
4) Statement of Compliance

b. Price Proposal Information. Offeror shall complete all portions of the Price Proposal Schedule and furnish in a separate tabbed section of Volume II, one original and six (6) copies.

SECTION 00111 SMALL
BUSINESS SUBCONTRACTING REQUIREMENTS

NOTICE TO OFFERORS

If the selected Offeror is a large business, the Offeror is required to submit an acceptable subcontracting plan before any contract award can me made. Should the selected Offeror fail to submit an acceptable subcontracting plan within the time limit prescribed by the Contracting Officer, the offeror will be considered non-responsible and ineligible for award.

If your firm is a large business and your proposal exceeds **$1,000,000 for construction**, your attention is directed to the following provisions contained in the solicitation:

52.219-8, Utilization of Small, Small Disadvantaged and Women-Owned Business Concerns (Alternate I)
52.219-9, Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan (Alternate I)
52.219-16, Liquidated Damages - Small Business Subcontracting Plan
52.226-1, Utilization of Indian Organizations and Indian-Owned Economic Enterprises

For your information, the United Army Corps of Engineers considers the following goals reasonable and achievable for a fiscal year during the performance of the resultant contract.

a. 61.4% of planned subcontracting dollars will be placed with all small business concerns.

b. 9.1% of planned subcontracting dollars will be placed with those small business concerns owned and controlled by socially and economically disadvantaged individuals.

c. 5% of planned subcontracting dollars will be placed with those small business concerns owned and controlled by women.

d. 3% of planned subcontracting dollars will be placed with those small business concerns owned and controlled by service disabled veterans.

e. There are no established goals for planned subcontracting dollars placed with those small business concerns owned and controlled by certified Hubzone concerns, small business concerns owned and controlled by veterans, and Historic Black Colleges and/or Minority Institutions, however, subcontracting with these concerns is strongly encouraged.

Goals included in any proposed subcontracting plan should be at least equal to those indicated above. If lesser goals are proposed, you must substantiate how the proposed plan represents the firm's best effort to comply with the terms and conditions of the solicitation. Offerors are strongly encouraged to become familiarize with the intent of the solicitation provisions and the elements of the subcontracting plan.

The subcontracting plan must contain, at a minimum, the elements set forth in solicitation provision 52.219-9. Proposed plans will be reviewed to ensure the plan represents the firm's best efforts to maximize subcontracting opportunities for small, small disadvantaged and women-owned businesses. Subcontracting plans require Contracting Officer approval prior to contract award.

The approved subcontracting plan (to include goals) will become a material part of the contract. An example of a format of a subcontracting plan is attached for your information. The attached ***plan is an example only*** and should not be construed as the only acceptable subcontracting plan format. Any format will be acceptable provided the plan addresses each element as required by the Federal Acquisition Regulations and its supplements.

Should you have any questions or need assistance in developing your plan, please contact the assigned Contract Specialist or the District's Deputy for Small Business at 816-983-3927 or fax your inquiries to 816-426-2979.

SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED
SMALL BUSINESS SUBCONTRACTING PLAN
EXAMPLE

DATE: _____

CONTRACTOR: _____
ADDRESS: _____
PHONE NO: _____
PROJECT TITLE: _____
SOLICITATION NO: _____
CONTRACT NO: _____

1. In accordance with the contract clauses at 52.219-8 and 52.219-9, *(name of contractor)* submits the following Subcontracting Plan for Small, Small Disadvantaged, and Women-owned Business Concerns.

2. Subcontracting goals for this contract:

a. Total contract amount is $_____.

b. Total dollars planned to be subcontracted (to all types of businesses): $_____.

Type of Subcontractor	Amount Planned to be Subcontracted	Percentage of Subcontracted Dollars
Large Business		%
Small Businesses		%
- Small Disadvantaged*		%
- Small Women-Owned		%
- Small Service Disabled Veterans Owned		%
- Small Veteran Owned		%
HubZone Concern		%
Historical Black College and Minority Institution		%
Total		100%

***NOTE:** *Women-owned businesses are not considered a small disadvantaged business. Do not include subcontract awards to women-owned businesses in your calculations unless the firm meets the definition of a small disadvantaged business.*

3. The principal items or areas we will subcontract under this contract are *(NOTE:* ***Construction contractors remember to include materials/supplies*** *when developing plan. Also, list each subcontracted task by Division and Section number):*
_____

a. Of the items or areas stated in 3; we plan to subcontract the following to Small Businesses:
_____

b. Of the items or areas stated in 3.a; we plan to subcontract the following to Small Disadvantaged Businesses:
_____

c. Of the items or areas stated in 3.a; we plan to subcontract the following to Small Women-Owned Businesses:
_____

d. Of the items or areas stated in 3.a; we plan to subcontract the following to Small Service Disabled Veterans-Owned Businesses:
_____

e. Of the items or areas stated in 3.a; we plan to subcontract the following to Small Veteran-Owned Businesses:

_____

f. Of the items or areas stated in 3; we plan to subcontract the following to Hub Zone concerns:

_____

g. Of the items or areas stated in 3; we plan to subcontract the following to Historically Black Colleges and Minority Institutions:

_____

*****NOTE: SEE LAST PAGE IF THIS SOLICITATION HAS OPTIONS** (delete this statement from your plan)*****

4. Provide a description of the method your firm used to develop the subcontracting goals in paragraph 2:

_____
_____
_____
_____
_____

5. Indirect costs were ( ) were not ( ) used in establishing subcontracting goals. ***If indirect costs are included in your goals, furnish a description of the method used to determine the proportionate share of indirect costs to be incurred with (i) small business concerns (ii) small disadvantaged business concerns and (iii) women-owned.***

6. The following individual will administer this Subcontracting Plan on behalf of (name of contractor):

Name: Title:
Address:
Telephone:

The aforementioned individual's specific duties will include, but is not limited to:

a. Developing and maintaining source lists of small, small disadvantaged and women-owned small business concerns. Sources used are the Small Business Administration's Procurement Automated Source System (PASS), the National Minority Purchasing Council Vendor Information Service, Minority Business Development Agency, US Department of Commerce, Local Minority Business Development Centers, Economic Development Centers, and National Center for American Indian Enterprise Development.

b. Assuring the inclusion of small, small disadvantaged, and women-owned small business concerns in all solicitations for products or services which they are capable of providing; and ensuring that all solicitations are structured to permit the maximum possible participation by small, small disadvantaged and women-owned small business concerns.

c. Establishing and maintaining records of all subcontract awards to ensure appropriate documentation of non-selection of proposals submitted by a small, small disadvantaged business, or women-owned small business concerns.

d. Preparing and submitting the Subcontracting Report for Individual Contracts (SF 294) and the Summary Subcontract Report (SF 295) in accordance with instructions provided, and coordinating and preparing for all compliance reviews by Federal agencies.

e. Promoting activities necessary to further the intent of the subcontracting plan. Activities include motivational training of purchasing personnel; attendance at workshops, seminars and trade fairs conducted by or on behalf of small business and/or small disadvantaged and/or women-owned small business concerns; and general cooperation with members of the small, small disadvantaged and women-owned small business concerns or their representatives.

7. The following steps will be taken to ensure that small, small disadvantaged, and women-owned small business concerns receive notice of and have an equitable opportunity to compete for intended awards of subcontracts and/or purchase orders for the products and/or services describe in paragraph 4 above:

a. Sources will be requested through SBA's PASS system, business development organizations, minority and small business trade associations and at small, minority and women-owned small business procurement conferences; sources will be contacted; and proposalding materials will be provided to all responding parties expressing an interest.

b. The firm will conduct and maintain internal motivational training to guide and encourage purchasing personnel to maintain source lists and guides to small, small disadvantaged, and women-owned small business concerns. Purchasing activities will be monitored to ensure sufficient time is allowed for interested offerors to prepare proposals and to ensure continuous compliance with the approved Subcontracting Plan.

8. *[Name of contractor]* agrees that the clause entitled "Utilization of Small, Small Disadvantaged and Women-Owned Business Concerns" will be included in all subcontracts that offer further subcontracting opportunities. All subcontractors, except small business concerns, who receive subcontracts in excess of $500,000 ($1,000,000 in the case of construction) will be required to adopt a plan similar to this one. Such plans will be reviewed to assure that all minimum requirements of an acceptable subcontracting plan have been satisfied.

The acceptability of proposed goals shall be determined on a cases-by-case basis depending on the supplies/services involved, the availability of potential small, small disadvantaged, and women-owned subcontractors, and prior experience. Once approved and implemented, plans will be monitored through the submission of periodic reports or, as time and availability of funds permit, periodic visits to subcontractors facilities to review applicable records and subcontracting program progress.

9. The Firm agrees to submit periodic reports and cooperate in any studies or surveys required by the Contracting Activity or Small Business Administration to determine the extent of the firm compliance with the subcontracting plan.

10. *(Name of Contractor)* agrees to maintain at least the following types of records to document compliance with the Subcontracting Plan:

a. The names of all organizations, agencies, and associations contacted for small, small disadvantaged, and women-owned small business sources, along with records of attendance at conference, seminars and trade fairs where additional sources were developed.

b. Source lists, guides, and other data identifying small business concerns, small disadvantaged business concerns and women-owned small business concerns.

c. Records of subcontracts award in excess of $100,000 will demonstrate how small business concerns, small disadvantaged business concerns and women-owned business concerns were solicited or provide an explanation as to why these business concerns were not considered for subcontracting opportunities.

d. Records of subcontract award data to include subcontractor's name and address, to be kept on a contract-by-contract basis.

e. Minutes of internal motivational and training meetings held for the guidance and encouragement of purchasing personnel, and records of all monitoring activities performed for compliance evaluation.

f. Copies of SF 294 and SF 295 showing date and place of filing and copies of all other reports or results of reviews conducted by the contracting agency or other interested agencies of the Federal government to monitor our compliance with this Subcontracting Plan.

11. *(Name of Contractor)* will submit a SF 295, Summary Subcontract Report, on Corps of Engineers projects only. The SF 295 shall be completed and distributed in accordance with the Corps of engineers Supplemental Instructions. *(Name of Contractor)* will not report Corps of Engineers projects through any other Agency unless authorized by the Contracting Officer.

Contractor's Signature:_____

Typed Name:_____

Title:_____

Date:_____

This Plan is Accepted By:

_____
Contracting Officer

Date:_____

NOTE: *If this solicitation has options, the plan must contain separate goals for* ***each*** *option. EXAMPLE:*

1. Option #_____

a. Total contract amount is $_____.

b. Total dollars planned to be subcontracted (to all types of businesses): $_____.

Type of Subcontractor	Amount Planned to be Subcontracted	Percentage of Subcontracted Dollars
Large Business		%
Small Businesses		%
- Small Disadvantaged*		%
- Small Women-Owned		%
- Small Service Disabled Veterans Owned		%
- Small Veteran Owned		%
HubZone Concern		%
Historical Black College and Minority Institution		%
Total		100%

SECTION 00120

PROPOSAL EVALUATION AND CONTRACT AWARD

SECTION 00120

PROPOSAL EVALUATION AND CONTRACT AWARD

1.00 INFORMAL SOURCE SELECTION PROCESS

All complete and conforming offers received in response to this solicitation will be evaluated in accordance with informal source selection procedures. The principal objective of this process is to select the responsible offeror that represents the overall Best Value to the Government, price and other factors considered (the Best Value). The Government reserves the right to consider and evaluate information regarding past performance from sources outside the proposal. The right is reserved to accept other than the lowest price offer and to reject any or all offers. Award may be made to the superior proposal, regardless of cost or price, provided that the price is determined to be reasonable. The process is designed to ensure the impartial, equitable, and comprehensive evaluation of all technically acceptable, responsible proposals received in response to this solicitation.

a. Source Selection Organization

The source selection organization is established as a separate organization and management chain of command whose only purpose is to accomplish the objective above. The organization consists of a Source Selection Authority (SSA) and a Source Evaluation Board (SSEB). The SSEB is comprised of separate Technical Evaluation and Price Evaluation teams. The organization is designed to ensure active ongoing involvement of appropriate contracting, technical, logistics, legal, price analysis, small business and other functional staff management expertise.

b. Source Selection Procedure

(1) The source selection procedures will begin with an initial review of proposals for completeness and conformity to the solicitation, and will continue with a technical and price evaluation conducted by the SSEB. The SSEB shall evaluate the proposals based solely on the evaluation criteria identified below in the paragraph Evaluation Factors. The results of the SSEB evaluations will be presented to the SSA, who will rank the proposals based on the Best Value to the Government, price and other factors considered. The SSA will also either make the final source selection decision or determine whether it is appropriate to engage in clarifications or communication prior to establishment of a competitive range, or to establish a competitive range and conduct discussions with those offerors that are included in the competitive range. The Government intends to award without discussions. All communication leading to establishment of the competitive range will be conducted in accordance with FAR Part 15.306b.

(2) If a competitive range is established, discussion will be conducted with offerors who are included in the competitive range. After conclusion of discussions and receipt of final revised technical proposals, the SSEB will complete the evaluation and establish final weighted technical ratings. Results of the final weighted technical ratings will be presented to the SSA. The SSA shall then rank the proposals based on the Best Value to the Government, price and other factors considered, and make the final source selection decision.

(3) The proposals received in response to this RFP will be evaluated individually to select the most advantageous proposal. To be considered acceptable, each offeror shall specifically address each of the evaluation factors listed below. Sufficient detail shall be provided, citing specific data as may be

required, such that the proposal may be adequately evaluated. The proposal must show clearly that the offeror has an understanding of the work tasks required and has the capability and responsibility to accomplish the work.

(4) The Government is not responsible for information overlooked during the evaluation which is not located in the appropriate proposal section. To ensure the evaluation credit is appropriately received for proposal material submitted, do not incorporate by reference documents not contained in the proposal. References to sections of the proposal shall be by specific paragraph number (and name, if applicable), page number and section.

2.00 BASIS FOR AWARD

The Government intends to select, without discussions, the responsible offeror whose proposal conforms to the solicitation and is determined to be the Best Value to the Government in accordance with the following relationship between price and technical merit. The technical evaluation factors, when combined are significantly more important than the price (see paragraphs below that describe the relative Weight of Technical Criteria and Price.) The closer the total evaluated technical scores of technical acceptable proposals are to one another, the greater the importance of the price coefficient will be in making the final determination. The closer the final price evaluations are to one another, the greater the importance of the total evaluation of technical scores will be in making the selection determination.

3.00 EVALUATION FACTORS AND SUBFACTOR CRITERIA

Evaluation of each factor, sub factor along with their relative weighting to one another are described below.

FACTOR 1. Offeror Relevant Experience. **(is equal in value to factor 2):**
Based on the information provided by the Contractor, in the questionnaires and other information, the Government will evaluate and rate the example projects provided by the Offeror for similar construction and/or design-build projects. Examples of projects, which most closely resemble the project identified in this solicitation, will receive the highest consideration. It is the Governments intention to ensure maximum participation in this solicitation. Therefore, the Government will consider as relevant experience all residential subdivision and multifamily development examples of sufficient size and scope to demonstrate the Offeror's ability to manage the work to be executed in this solicitation. Examples must indicate the Offeror's responsibility for both site development and construction of the residential units. Equal weight will be given for work performed in either the public or private sector.

FACTOR 2. Offeror Past Performance Information (is equal in value to factor 1):
The Government will evaluate the satisfaction of the customers in the example projects identified by the Offeror and from which Past Performance Evaluation Questionnaires have been received. The Government may contact customer identified by Offeror to assure validity of the questionnaires received. The Government may also contact sources other than those provided by the Offeror to obtain information with respect to past performance. These other sources may include, but are not limited to ACASS (Architect-Engineer Contract Administration Support System), CCASS (Construction Contractor Appraisal Support System), telephone interviews, and personal knowledge of contractor performance capability obtained from Government personnel. The following subfactors will be used by the Government to evaluate the General Contractor and the Architect/Engineer individually and an overall rating provided for each. **Each of the following sub factors is weighted equally.**

SUB FACTOR A. Customer Satisfaction:

SUB FACTOR B. Quality of the Product Produced.
SUB FACTOR C. Adherence to Project Schedule.
SUB FACTOR D. Management Processes.
SUB FACTOR E. Safety Record.

Factor 3. Offeror's Proposed Betterments (equal in value to factor 1): The Government will evaluate the Offeror's proposed betterments that are within the Government's required price range (see bid schedule of this RFP). More betterments will be considered more favorably than fewer betterments. In the event of a tie, betterments with a higher relative weighting will be considered more favorably than betterments with a lower relative weighting. Betterments are listed in the order of their importance.

a. Finish study in basement	**(a. is the most important factor)**
b. Flooring upgrade	**(b. is approximately equal to a.)**
c. 9' Ceiling height	**(c. is approximately equal to a.)**
d. Fences	**(d. is slightly less than c.)**
e. Residence package upgrade	**(e. is approximately equal to d.)**
f. Geothermal Heat Pumps	**(f. is approximately half the value of a.)**
g. Soccer Fields	**(g. is approximately half the value of f.)**
h. Basketball, Jogging Trails and Pavilion	**(h. is approximately equal to g.)**

Factor 4. Project Management Plan, and Sub-Factors (is twice the value of factor 1): The following sub-factors, when combined constitute the Offeror's Project Management Plan. The Government will evaluate these sub-factors to determine the Offeror's ability to provide a plan for an integrated design-build process. **Sub factor A is the most important. Sub factor B is approximately half as important as A and is slightly more important than sub factor C. Sub factor C is approximately half as important as A, but is slightly less important than B. Sub factor D is the least important, and is approximately half as important as C.**

SUB FACTOR A. Quality Control: The Government will review and evaluate the QC plan for inclusion of specific quality control practices and requirements necessary for the successful completion of all phases of this project. These phases include design stages as well as construction specialties. The personnel and qualifications of the individuals performing in the Quality Control organization will also be evaluated. However, if personnel changes occur after award, these individuals may be evaluated again at the Government's discretion.

SUB FACTOR B. Proposed Staffing: The Government will evaluate and rate the resumes of Key Personnel identified in the proposal package who will be directly responsible for the day-to-day design and construction activities. Particular attention will be paid to the inclusion of the major construction subcontractors during the design process as well as the definition of the roles and responsibilities of the various subcontractors. This narrative shall not exceed five (5) pages.

SUB FACTOR C. Design & Construction Scheduling : Adherence to Project Schedule. The Government will evaluate the schedule to assess how the Offeror intends to comply with the Governments need date and anticipated construction schedule and requirements of SECTION 01320. Additional consideration will be given to Offeror's who provide "fast tracking" as part of his construction schedule. The Contractor's schedule must reflect a single task oriented structure for both design and construction. The schedule will be reviewed for completeness and the inclusion of the Government's required milestones. A schedule that demonstrates it is reasonable, feasible and improves on the Government's need dates will be considered more favorably during the evaluation.

SUBFACTOR D. Construction Closeout: The Government will review and evaluate the Offeror's closeout plan to determine the Offeror's understanding of the close out requirements of the solicitation. Particular emphasis will be placed on O&M Manual production and the training of Installation Staff and processes described and contained in SECTION 01450.

Evaluation Methodology. Each individual of the SSET will consider all information provided in the technical volume of the proposal. Once these individual analyses are completed, the team will meet and determine a rating for each of the evaluation factors for Offeror Performance Capability by consensus decision. After each of the Factors for each of the proposals are rated, the team will develop, again by consensus, a final overall rating for Offeror Performance Capability.

4.00 Price. Price will be evaluated separately from the Technical Proposal and is weighted significantly less than all items of the Technical Proposal. The following items will be considered in this evaluation.

a. Realism. The price is compatible with the solicitation's scope and is neither excessive nor insufficient for the effort required by this RFP.

b. Reasonableness: The price must be fully justified and documented, developed using appropriate and acceptable methodologies, factual and verifiable data, and the price is supported by valid suitable assumptions and estimating techniques.

c. Completeness. All cost information required by the Request for Proposal (RFP) has been submitted.

5.00. DEBRIEFING OFFERORS

In accordance with FAR 15.505 Preaward Debriefing of Offerors, and FAR 15.506 Postaward Debriefing of Offerors, the offer should be aware of the following.

The Offeror may request a preaward debriefing by submitting a written request for debriefing to the Contracting Officer within 3 days after receipt of the notice of exclusion from competition. Offerors will be provided with an opportunity to address any negative past performance information on which the offeror has not previously had such an opportunity.

If the offeror does not submit a timely request the offeror need not be given either a preaward or a postaward debriefing. Offerors are entitled to no more than one debriefing for each proposal.

--- End of Section ---

CLAUSES INCORPORATED BY FULL TEXT

52.203-2 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (APR 1985)

(a) The offeror certifies that --

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to –

(i) Those prices,

(ii) The intention to submit an offer, or

(iii) The methods of factors used to calculate the prices offered:

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory --

(1) Is the person in the offeror's organization responsible for determining the prices offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provison _____ (insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization);

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision.

(c) If the offeror deletes or modifies subparagraph (a)(2) of this provision, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

(End of provision)

52.204-3 TAXPAYER IDENTIFICATION (OCT 1998)

(a) Definitions.

“Common parent,” as used in this provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

“Taxpayer Identification Number (TIN),” as used in this provision, means the number required by the Internal Revenue Service (IRS) to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the IRS. If the resulting contract is subject to the payment reporting requirements described in Federal Acquisition Regulation (FAR) 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(d) Taxpayer Identification Number (TIN).

___ TIN:._____

___ TIN has been applied for.

___ TIN is not required because:

___ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;

___ Offeror is an agency or instrumentality of a foreign government;

___ Offeror is an agency or instrumentality of the Federal Government.

(e) Type of organization.

___ Sole proprietorship;

___ Partnership;

___ Corporate entity (not tax-exempt);

___ Corporate entity (tax-exempt);

___ Government entity (Federal, State, or local);

___ Foreign government;

___ International organization per 26 CFR 1.6049-4;

___ Other _____

(f) Common parent.

___ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this provision.

___ Name and TIN of common parent:

Name _____

TIN _____

(End of provision)

52.209-5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (DEC 2001)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that--

(i) The Offeror and/or any of its Principals--

(A) Are ( ) are not ( ) presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have ( ) have not ( ), within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(C) Are ( ) are not ( ) presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in subdivision (a)(1)(i)(B) of this provision.

(ii) The Offeror has ( ) has not ( ), within a three-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

THIS CERTIFICATION CONCERNS A MATTER WITHIN THE JURISDICTION OF AN AGENCY OF THE UNITED STATES AND THE MAKING OF A FALSE, FICTITIOUS, OR FRAUDULENT CERTIFICATION MAY RENDER THE MAKER SUBJECT TO PROSECUTION UNDER SECTION 1001, TITLE 18, UNITED STATES CODE.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was

placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

(End of provision)

52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (APR 200) ALTERNATE I (APR 2002)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is **233220 – Multifamily Housing Construction**.

(2) The small business size standard is **$28.5 Million**.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) Representations. (1) The offeror represents as part of its offer that it ( ) is, ( ) is not a small business concern.

(2) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, for general statistical purposes, that it ( ) is, ( ) is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a women-owned small business concern.

(4) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a veteran-owned small business concern.

(5) (Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(4) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a service-disabled veteran-owned small business concern.

(6) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, as part of its offer, that--

(i) It ( ) is, ( ) is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR part 126; and

(ii) It ( ) is, ( ) is not a joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. (The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture: _____.) Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(7) (Complete if offeror represented itself as disadvantaged in paragraph (b)(2) of this provision.) The offeror shall check the category in which its ownership falls:

( ) Black American.

( ) Hispanic American.

( ) Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

( ) Asian-Pacific American (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China, Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, U.S. Trust Territory of the Pacific Islands (Republic of Palau), Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru).

( ) Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

(c) Definitions. As used in this provision--

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

Small business concern means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business concern means a small business concern --

(1) That is at least 51 percent owned by one or more women or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; or

(2) Whose management and daily business operations are controlled by one or more women.

(d) Notice.

(1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women-owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

(End of provision)

52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FEB 1999)

The offeror represents that --

(a) [ ] It has, [ ] has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation;

(b) [ ] It has, [ ] has not, filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

(End of provision)

52.223-13 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (OCT 2000)

(a) Submission of this certification is a prerequisite for making or entering into this contract imposed by Executive Order 12969, August 8, 1995.

(b) By signing this offer, the offeror certifies that--

(1) As the owner or operator of facilities that will be used in the performance of this contract that are subject to the filing and reporting requirements described in section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023) and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106), the offeror will file and continue to file for such facilities for the life of the contract the Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of EPCRA and section 6607 of PPA; or

(2) None of its owned or operated facilities to be used in the performance of this contract is subject to the Form R filing and reporting requirements because each such facility is exempt for at least one of the following reasons: (Check each block that is applicable.)

[ ] (i) The facility does not manufacture, process or otherwise use any toxic chemicals listed under section 313(c) of EPCRA, 42 U.S.C. 11023(c);

[ ] (ii) The facility does not have 10 or more full-time employees as specified in section 313.(b)(1)(A) of EPCRA 42 U.S.C. 11023(b)(1)(A);

[ ] (iii) The facility does not meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

[ ] (iv) The facility does not fall within Standard Industrial Classification Code (SIC) major groups 20 through 39 or their corresponding North American Industry Classification System (NAICS) sectors 31 through 33; or

[ ] (v) The facility is not located within any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Northern Mariana Islands, or any other territory or possession over which the United States has jurisdiction.

SECTION 00700 Contract Clauses

CLAUSES INCORPORATED BY REFERENCE:

52.202-1 Alt I	Definitions (Dec 2001) --Alternate I	MAY 2001
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	APR 1984
52.203-7	Anti-Kickback Procedures	JUL 1995
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	JAN 1997
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	JAN 1997
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	JUN 1997
52.204-4	Printed or Copied Double-Sided on Recycled Paper	AUG 2000
52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, or Proposed for Debarment	JUL 1995
52.211-13	Time Extensions	SEP 2000
52.215-2	Audit and Records--Negotiation	JUN 1999
52.215-10	Price Reduction for Defective Cost or Pricing Data	OCT 1997
52.215-15	Pension Adjustments and Asset Reversions	DEC 1998
52.215-19	Notification of Ownership Changes	OCT 1997
52.219-4	Notice of Price Evaluation Preference for HUBZone Small Business Concerns	JAN 1999
52.219-8	Utilization of Small Business Concerns	OCT 2000
52.219-16	Liquidated Damages-Subcontracting Plan	JAN 1999
52.222-3	Convict Labor	AUG 1996
52.222-4	Contract Work Hours and Safety Standards Act - Overtime Compensation	SEP 2000
52.222-6	Davis Bacon Act	FEB 1995
52.222-7	Withholding of Funds	FEB 1988
52.222-8	Payrolls and Basic Records	FEB 1988
52.222-9	Apprentices and Trainees	FEB 1988
52.222-10	Compliance with Copeland Act Requirements	FEB 1988
52.222-11	Subcontracts (Labor Standards)	FEB 1988
52.222-12	Contract Termination-Debarment	FEB 1988
52.222-13	Compliance with Davis-Bacon and Related Act Regulations.	FEB 1988
52.222-14	Disputes Concerning Labor Standards	FEB 1988
52.222-21	Prohibition Of Segregated Facilities	FEB 1999
52.222-26	Equal Opportunity	APR 2002
52.222-27	Affirmative Action Compliance Requirements for Construction	FEB 1999
52.222-35	Equal Opportunity For Special Disabled Veterans, Veterans of the Vietnam Era and Other Eligible Veterans	DEC 2001
52.222-36	Affirmative Action For Workers With Disabilities	JUN 1998
52.222-37	Employment Reports On Special Disabled Veterans, Veterans Of The Vietnam Era and Other Eligible Veterans	DEC 2001
52.223-6	Drug Free Workplace	MAY 2001
52.223-14	Toxic Chemical Release Reporting	OCT 2000
52.225-13	Restrictions on Certain Foreign Purchases	JUL 2000
52.226-1	Utilization Of Indian Organizations And Indian-Owned Economic Enterprises	JUN 2000
52.227-1	Authorization and Consent	JUL 1995
52.227-4	Patent Indemnity-Construction Contracts	APR 1984
52.228-11	Pledges Of Assets	FEB 1992

52.228-14	Irrevocable Letter of Credit	DEC 1999
52.229-3	Federal, State And Local Taxes	JAN 1991
52.229-5	Taxes--Contracts Performed In U S Possessions Or Puerto Rico	APR 1984
52.230-2	Cost Accounting Standards	APR 1998
52.232-17	Interest	JUN 1996
52.232-23 Alt I	Assignment of Claims (Jan 1986) - Alternate I	APR 1984
52.232-27	Prompt Payment for Construction Contracts	FEB 2002
52.232-33	Payment by Electronic Funds Transfer--Central Contractor Registration	MAY 1999
52.233-3	Protest After Award	AUG 1996
52.236-5	Material and Workmanship	APR 1984
52.236-8	Other Contracts	APR 1984
52.236-9	Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements	APR 1984
52.236-10	Operations and Storage Areas	APR 1984
52.236-12	Cleaning Up	APR 1984
52.236-13	Accident Prevention	NOV 1991
52.236-24	Work Oversight in Architect-Engineer Contracts	APR 1984
52.236-5000	Plant and Material Removal After Contract Termination (Mar 1995)	MAY 1999
52.242-13	Bankruptcy	JUL 1995
52.244-4	Subcontractors and Outside Associates and Consultants (Architect-Engineer Services)	AUG 1998
52.244-6	Subcontracts for Commercial Items	DEC 2001
52.247-34	F.O.B. Destination	NOV 1991
52.248-3	Value Engineering-Construction	FEB 2000
52.249-2 Alt I	Termination for Convenience of the Government (Fixed-Price) (Sep 1996) - Alternate I	SEP 1996
52.253-1	Computer Generated Forms	JAN 1991
252.201-7000	Contracting Officer's Representative	DEC 1991
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies	MAR 1999
252.209-7000	Acquisition From Subcontractors Subject To On-Site Inspection Under The Intermediate Range Nuclear Forces (INF) Treaty	NOV 1995
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Terrorist Country	MAR 1998
252.215-7000	Pricing Adjustments	DEC 1991
252.215-7002	Cost Estimating System Requirements	OCT 1998
252.219-7003	Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan (DOD Contracts)	APR 1996
252.225-7012	Preference For Certain Domestic Commodities	AUG 2000
252.225-7014	Preference For Domestic Specialty Metals	MAR 1998
252.225-7030	Restriction On Acquisition Of Carbon, Alloy, And Armor Steel Plate	OCT 1992
252.225-7031	Secondary Arab Boycott Of Israel	JUN 1992
252.227-7022	Government Rights (Unlimited)	MAR 1979
252.227-7033	Rights in Shop Drawings	APR 1966
252.242-7000	Postaward Conference	DEC 1991
252.247-7023	Transportation of Supplies by Sea	MAR 2000
252.247-7024	Notification Of Transportation Of Supplies By Sea	MAR 2000

CLAUSES INCORPORATED BY FULL TEXT

52.215-12 SUBCONTRACTOR COST OR PRICING DATA (OCT 1997)

(a) Before awarding any subcontract expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, on the date of agreement on price or the date of award, whichever is later; or before pricing any subcontract modification involving a pricing adjustment expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, the Contractor shall require the subcontractor to submit cost or pricing data (actually or by specific identification in writing), unless an exception under FAR 15.403-1 applies.

(b) The Contractor shall require the subcontractor to certify in substantially the form prescribed in FAR 15.406-2 that, to the best of its knowledge and belief, the data submitted under paragraph (a) of this clause were accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract modification.

(c) In each subcontract that exceeds the threshold for submission of cost or pricing data at FAR 15.403-4, when entered into, the Contractor shall insert either--

(1) The substance of this clause, including this paragraph (c), if paragraph (a) of this clause requires submission of cost or pricing data for the subcontract; or

(2) The substance of the clause at FAR 52.215-13, Subcontractor Cost or Pricing Data--Modifications.

52.215-21 REQUIREMENTS FOR COST OR PRICING DATA OR INFORMATION OTHER THAN COST OR PRICING DATA--MODIFICATIONS (OCT 1997)

(a) Exceptions from cost or pricing data. (1) In lieu of submitting cost or pricing data for modifications under this contract, for price adjustments expected to exceed the threshold set forth at FAR 15.403-4 on the date of the agreement on price or the date of the award, whichever is later, the Contractor may submit a written request for exception by submitting the information described in the following subparagraphs. The Contracting Officer may require additional supporting information, but only to the extent necessary to determine whether an exception should be granted, and whether the price is fair and reasonable--

(i) Identification of the law or regulation establishing the price offered. If the price is controlled under law by periodic rulings, reviews, or similar actions of a governmental body, attach a copy of the controlling document, unless it was previously submitted to the contracting office.

(ii) Information on modifications of contracts or subcontracts for commercial items. (A) If--

(1) The original contract or subcontract was granted an exception from cost or pricing data requirements because the price agreed upon was based on adequate price competition or prices set by law or regulation, or was a contract or subcontract for the acquisition of a commercial item; and

(2) The modification (to the contract or subcontract) is not exempted based on one of these exceptions, then the Contractor may provide information to establish that the modification would not change the contract or subcontract from a contract or subcontract for the acquisition of a commercial item to a contract or subcontract for the acquisition of an item other than a commercial item.

(B) For a commercial item exception, the Contractor shall provide, at a minimum, information on prices at which the same item or similar items have previously been sold that is adequate for evaluating the reasonableness of the price of the modification. Such information may include--

(1) For catalog items, a copy of or identification of the catalog and its date, or the appropriate pages for the offered items, or a statement that the catalog is on file in the buying office to which the proposal is being submitted. Provide a copy or describe current discount policies and price lists (published or unpublished), e.g., wholesale,

original equipment manufacturer, or reseller. Also explain the basis of each offered price and its relationship to the established catalog price, including how the proposed price relates to the price of recent sales in quantities similar to the proposed quantities.

(2) For market-priced items, the source and date or period of the market quotation or other basis for market price, the base amount, and applicable discounts. In addition, describe the nature of the market.

(3) For items included on an active Federal Supply Service Multiple Award Schedule contract, proof that an exception has been granted for the schedule item.

(2) The Contractor grants the Contracting Officer or an authorized representative the right to examine, at any time before award, books, records, documents, or other directly pertinent records to verify any request for an exception under this clause, and the reasonableness of price. For items priced using catalog or market prices, or law or regulation , access does not extend to cost or profit information or other data relevant solely to the Contractor's determination of the prices to be offered in the catalog or marketplace.

(b) Requirements for cost or pricing data. If the Contractor is not granted an exception from the requirement to submit cost or pricing data, the following applies:

(1) The Contractor shall submit cost or pricing data and supporting attachments in accordance with Table 15-2 of FAR 15.408.

As soon as practicable after agreement on price, but before award (except for unpriced actions), the Contractor shall submit a Certificate of Current Cost or Pricing Data, as prescribed by FAR 15.406-2.

(End of clause)
52.219-9 SMALL BUSINESS SUBCONTRACTING PLAN (JAN 2002)

(a) This clause does not apply to small business concerns.

(b) Definitions. As used in this clause--

Commercial item means a product or service that satisfies the definition of commercial item in section 2.101 of the Federal Acquisition Regulation.

Commercial plan means a subcontracting plan (including goals) that covers the offeror's fiscal year and that applies to the entire production of commercial items sold by either the entire company or a portion thereof (e.g., division, plant, or product line).

Individual contract plan means a subcontracting plan that covers the entire contract period (including option periods), applies to a specific contract, and has goals that are based on the offeror's planned subcontracting in support of the specific contract, except that indirect costs incurred for common or joint purposes may be allocated on a prorated basis to the contract.

Master plan means a subcontracting plan that contains all the required elements of an individual contract plan, except goals, and may be incorporated into individual contract plans, provided the master plan has been approved.

Subcontract means any agreement (other than one involving an employer-employee relationship) entered into by a Federal Government prime Contractor or subcontractor calling for supplies or services required for performance of the contract or subcontract.

(c) The offeror, upon request by the Contracting Officer, shall submit and negotiate a subcontracting plan, where applicable, that separately addresses subcontracting with small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business concerns, small disadvantaged business, and women-owned small business concerns. If the offeror is submitting an individual contract plan, the plan must

separately address subcontracting with small business, veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns, with a separate part for the basic contract and separate parts for each option (if any). The plan shall be included in and made a part of the resultant contract. The subcontracting plan shall be negotiated within the time specified by the Contracting Officer. Failure to submit and negotiate the subcontracting plan shall make the offeror ineligible for award of a contract.

(d) The offeror's subcontracting plan shall include the following:

(1) Goals, expressed in terms of percentages of total planned subcontracting dollars, for the use of small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns as subcontractors. The offeror shall include all subcontracts that contribute to contract performance, and may include a proportionate share of products and services that are normally allocated as indirect costs.

(2) A statement of--

(i) Total dollars planned to be subcontracted for an individual contract plan; or the offeror's total projected sales, expressed in dollars, and the total value of projected subcontracts to support the sales for a commercial plan;

(ii) Total dollars planned to be subcontracted to small business concerns;

(iii) Total dollars planned to be subcontracted to veteran-owned small business concerns;

(iv) Total dollars planned to be subcontracted to HUBZone small business concerns;

(v) Total dollars planned to be subcontracted to small disadvantaged business concerns; and

(vi) Total dollars planned to be subcontracted to women-owned small business concerns.

(3) A description of the principal types of supplies and services to be subcontracted, and an identification of the types planned for subcontracting to--

(i) Small business concerns;

(ii) Veteran-owned small business concerns;

(iii) HUBZone small business concerns;

(iv) Small disadvantaged business concerns; and

(v) Women-owned small business concerns.

(4) A description of the method used to develop the subcontracting goals in paragraph (d)(1) of this clause.

(5) A description of the method used to identify potential sources for solicitation purposes (e.g., existing company source lists, the Procurement Marketing and Access Network (PRO-Net) of the Small Business Administration (SBA), veterans service organizations, the National Minority Purchasing Council Vendor Information Service, the Research and Information Division of the Minority Business Development Agency in the Department of Commerce, or small, HUBZone, small disadvantaged, and women-owned small business trade associations). A firm may rely on the information contained in PRO-Net as an accurate representation of a concern's size and ownership characteristics for the purposes of maintaining a small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned small business source list. Use of PRO-Net as its source list does not relieve a firm of its responsibilities (e.g., outreach, assistance, counseling, or publicizing subcontracting opportunities) in this clause.

(6) A statement as to whether or not the offeror in included indirect costs in establishing subcontracting goals, and a description of the method used to determine the proportionate share of indirect costs to be incurred with—

(i) Small business concerns;

(ii) Veteran-owned small business concerns;

(iii) HUBZone small business concerns;

(iv) Small disadvantaged business concerns; and

(v) Women-owned small business concerns.

(7) The name of the individual employed by the offeror who will administer the offeror's subcontracting program, and a description of the duties of the individual.

(8) A description of the efforts the offeror will make to assure that small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business and women-owned small business concerns have an equitable opportunity to compete for subcontracts.

(9) Assurances that the offeror will include the clause of this contract entitled ``Utilization of Small Business Concerns'' in all subcontracts that offer further subcontracting opportunities, and that the offeror will require all subcontractors (except small business concerns) that receive subcontracts in excess of $500,000 ($1,000,000 for construction of any public facility) to adopt a subcontracting plan that complies with the requirements of this clause.

(10) Assurances that the offeror will--

(i) Cooperate in any studies or surveys as may be required;

(ii) Submit periodic reports so that the Government can determine the extent of compliance by the offeror with the subcontracting plan;

(iii) Submit Standard Form (SF) 294, Subcontracting Report for Individual Contracts, and/or SF 295, Summary Subcontract Report, in accordance with paragraph (j) of this clause. The reports shall provide information on subcontract awards to small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, small disadvantaged business concerns, women-owned small business concerns, and Historically Black Colleges and Universities and Minority Institutions. Reporting shall be in accordance with the instructions on the forms or as provided in agency regulations.

(iv) Ensure that its subcontractors agree to submit SF 294 and SF 295.

(11) A description of the types of records that will be maintained concerning procedures that have been adopted to comply with the requirements and goals in the plan, including establishing source lists; and a description of the offeror's efforts to locate small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns and award subcontracts to them. The records shall include at least the following (on a plant-wide or company-wide basis, unless otherwise indicated)

(i) Source lists (e.g., PRO-Net), guides, and other data that identify small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns.

(ii) Organizations contacted in an attempt to locate sources that are small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, or women-owned small business concerns.

(iii) Records on each subcontract solicitation resulting in an award of more than $100,000, indicating--

(A) Whether small business concerns were solicited and, if not, why not;

(B) Whether veteran-owned small business concerns were solicited and, if not, why not;

(C) Whether HUBZone small business concerns were solicited and, if not, why not;

(D) Whether small disadvantaged business concerns were solicited and, if not, why not;

(E) Whether women-owned small business concerns were solicited and, if not, why not; and

(F) If applicable, the reason award was not made to a small business concern.

(iv) Records of any outreach efforts to contact--

(A) Trade associations;

(B) Business development organizations;

(C) Conferences and trade fairs to locate small, HUBZone small, small disadvantaged, and women-owned small business sources; and

(D) Veterans service organizations.

(v) Records of internal guidance and encouragement provided to buyers through--

(A) Workshops, seminars, training, etc.; and

(B) Monitoring performance to evaluate compliance with the program's requirements.

(vi) On a contract-by-contract basis, records to support award data submitted by the offeror to the Government, including the name, address, and business size of each subcontractor. Contractors having commercial plans need not comply with this requirement.

(e) In order to effectively implement this plan to the extent consistent with efficient contract performance, the Contractor shall perform the following functions:

(1) Assist small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns by arranging solicitations, time for the preparation of bids, quantities, specifications, and delivery schedules so as to facilitate the participation by such concerns. Where the Contractor's lists of potential small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business subcontractors are excessively long, reasonable effort shall be made to give all such small business concerns an opportunity to compete over a period of time.

(2) Provide adequate and timely consideration of the potentialities of small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns in all ``make-or-buy'' decisions.

(3) Counsel and discuss subcontracting opportunities with representatives of small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business firms.

(4) Provide notice to subcontractors concerning penalties and remedies for misrepresentations of business status as small, veteran-owner small business, HUBZone small, small disadvantaged, or women-owned small business for the purpose of obtaining a subcontract that is to be included as part or all of a goal contained in the Contractor's subcontracting plan.

(f) A master plan on a plant or division-wide basis that contains all the elements required by paragraph (d) of this clause, except goals, may be incorporated by reference as a part of the subcontracting plan required of the offeror by this clause; provided--

(1) the master plan has been approved, (2) the offeror ensures that the master plan is updated as necessary and provides copies of the approved master plan, including evidence of its approval, to the Contracting Officer, and (3) goals and any deviations from the master plan deemed necessary by the Contracting Officer to satisfy the requirements of this contract are set forth in the individual subcontracting plan.

(g) A commercial plan is the preferred type of subcontracting plan for contractors furnishing commercial items. The commercial plan shall relate to the offeror's planned subcontracting generally, for both commercial and Government business, rather than solely to the Government contract. Commercial plans are also preferred for subcontractors that provide commercial items under a prime contract, whether or not the prime contractor is supplying a commercial item.

(h) Prior compliance of the offeror with other such subcontracting plans under previous contracts will be considered by the Contracting Officer in determining the responsibility of the offeror for award of the contract.

(i) The failure of the Contractor or subcontractor to comply in good faith with (1) the clause of this contract entitled "Utilization Of Small Business Concerns," or (2) an approved plan required by this clause, shall be a material breach of the contract.

(j) The Contractor shall submit the following reports:

(1) Standard Form 294, Subcontracting Report for Individual Contracts. This report shall be submitted to the Contracting Officer semiannually and at contract completion. The report covers subcontract award data related to this contract. This report is not required for commercial plans.

(2) Standard Form 295, Summary Subcontract Report. This report encompasses all of the contracts with the awarding agency. It must be submitted semi-annually for contracts with the Department of Defense and annually for contracts with civilian agencies. If the reporting activity is covered by a commercial plan, the reporting activity must report annually all subcontract awards under that plan. All reports submitted at the close of each fiscal year (both individual and commercial plans) shall include a breakout, in the Contractor's format, of subcontract awards, in whole dollars, to small disadvantaged business concerns by North American Industry Classification System (NAICS) Industry Subsector. For a commercial plan, the Contractor may obtain from each of its subcontractors a predominant NAICS Industry Subsector and report all awards to that subcontractor under its predominant NAICS Industry Subsector.

(End of clause)

52.222-15 CERTIFICATION OF ELIGIBILITY (FEB 1988)

(a) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(End of clause)
52.225-9 BUY AMERICAN ACT--BALANCE OF PAYMENTS PROGRAM—CONSTRUCTION MATERIALS (FEB 2002)

(a) Definitions. As used in this clause--

Component means an article, material, or supply incorporated directly into a construction material.

Construction material means an article, material, or supply brought to the construction site by the Contractor or a subcontractor for incorporation into the building or work. The term also includes an item brought to the site preassembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

Cost of components means--

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the end product (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition, plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the end product.

Domestic construction material means--

(1) An unmanufactured construction material mined or produced in the United States; or

(2) A construction material manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind for which nonavailability determinations have been made are treated as domestic.

Foreign construction material means a construction material other than a domestic construction material.

United States means the 50 States and the District of Columbia, U.S. territories and possessions, Puerto Rico, the Northern Mariana Islands, and any other place subject to U.S. jurisdiction, but does not include leased bases.

(b) Domestic preference. (1) This clause implements the Buy American Act (41 U.S.C. 10a-10d) and the Balance of Payments Program by providing a preference for domestic construction material. The Contractor shall use only domestic construction material in performing this contract, except as provided in paragraphs (b)(2) and (b)(3) of this clause.

(2) This requirement does not apply to the construction material or components listed by the Government as follows:

-- NONE --

(3) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(2) of this clause if the Government determines that

(i) The cost of domestic construction material would be unreasonable. The cost of a particular domestic construction material subject to the requirements of the Buy American Act is unreasonable when the cost of such material

exceeds the cost of foreign material by more than 6 percent. For determination of unreasonable cost under the Balance of Payments Program, the Contracting Officer will use a factor of 50 percent;

(ii) The application of the restriction of the Buy American Act or Balance of Payments Program to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American Act or Balance of Payments Program. (1)(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(3) of this clause shall include adequate information for Government evaluation of the request, including--

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American Act or Balance of Payments Program applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(3)(i) of this clause.

(3) Unless the Government determines that an exception to the Buy American Act or Balance of Payments Program applies, use of foreign construction material is noncompliant with the Buy American Act or Balance of Payments Program.

(d) Data. To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars) \1\
Item 1			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....
Item 2			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....

Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued).

List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.

Include other applicable supporting information.

(End of clause)

52.232-5 PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS (MAY 1997)

(a) Payment of price. The Government shall pay the Contractor the contract price as provided in this contract.

(b) Progress payments. The Government shall make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer.

(1) The Contractor's request for progress payments shall include the following substantiation:

(i) An itemization of the amounts requested, related to the various elements of work required by the contract covered by the payment requested.

(ii) A listing of the amount included for work performed by each subcontractor under the contract.

(iii) A listing of the total amount of each subcontract under the contract.

(iv) A listing of the amounts previously paid to each such subcontractor under the contract.

(v) Additional supporting data in a form and detail required by the Contracting Officer.

(2) In the preparation of estimates, the Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site also may be taken into consideration if--

(i) Consideration is specifically authorized by this contract; and

(ii) The Contractor furnishes satisfactory evidence that it has acquired title to such material and that the material will be used to perform this contract.

(c) Contractor certification. Along with each request for progress payments, the Contractor shall furnish the following certification, or payment shall not be made: (However, if the Contractor elects to delete paragraph (c)(4) from the certification, the certification is still acceptable.)

I hereby certify, to the best of my knowledge and belief, that--

(1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;

(2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements and the requirements of chapter 39 of Title 31, United States Code;

(3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract; and

(4) This certification is not to be construed as final acceptance of a subcontractor's performance.

_____

(Name)

_____

(Title)

_____

(Date)

(d) Refund of unearned amounts. If the Contractor, after making a certified request for progress payments, discovers that a portion or all of such request constitutes a payment for performance by the Contractor that fails to conform to the specifications, terms, and conditions of this contract (hereinafter referred to as the "unearned amount"), the Contractor shall--

(1) Notify the Contracting Officer of such performance deficiency; and

(2) Be obligated to pay the Government an amount (computed by the Contracting Officer in the manner provided in paragraph (j) of this clause) equal to interest on the unearned amount from the 8th day after the date of receipt of the unearned amount until--

(i) The date the Contractor notifies the Contracting Officer that the performance deficiency has been corrected; or

(ii) The date the Contractor reduces the amount of any subsequent certified request for progress payments by an amount equal to the unearned amount.

(e) Retainage. If the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, the Contracting Officer shall authorize payment to be made in full. However, if satisfactory progress has not been made, the Contracting Officer may retain a maximum of 10 percent of the amount of the payment until satisfactory progress is achieved. When the work is substantially complete, the Contracting Officer may retain from previously withheld funds and future progress payments that amount the Contracting Officer considers adequate for protection of the Government and shall release to the Contractor all the remaining withheld funds. Also, on completion and acceptance of each separate building, public work, or other division of the contract, for which the price is stated separately in the contract, payment shall be made for the completed work without retention of a percentage.

(f) Title, liability, and reservation of rights. All material and work covered by progress payments made shall, at the time of payment, become the sole property of the Government, but this shall not be construed as--

(1) Relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or

(2) Waiving the right of the Government to require the fulfillment of all of the terms of the contract.

(g) Reimbursement for bond premiums. In making these progress payments, the Government shall, upon request, reimburse the Contractor for the amount of premiums paid for performance and payment bonds (including coinsurance and reinsurance agreements, when applicable) after the Contractor has furnished evidence of full payment to the surety. The retainage provisions in paragraph (e) of this clause shall not apply to that portion of progress payments attributable to bond premiums.

(h) Final payment. The Government shall pay the amount due the Contractor under this contract after--

(1) Completion and acceptance of all work;

(2) Presentation of a properly executed voucher; and

(3) Presentation of release of all claims against
the Government arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned under the Assignment of Claims Act of 1940 (31 U.S.C. 3727 and 41 U.S.C. 15).

(i) Limitation because of undefinitized work. Notwithstanding any provision of this contract, progress payments shall not exceed 80 percent on work accomplished on undefinitized contract actions. A "contract action" is any action resulting in a contract, as defined in FAR Subpart 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract modifications issued pursuant to the Changes clause, or funding and other administrative changes.

(j) Interest computation on unearned amounts. In accordance with 31 U.S.C. 3903(c)(1), the amount payable under subparagraph (d)(2) of this clause shall be--

(1) Computed at the rate of average bond equivalent rates of 91-day Treasury bills auctioned at the most recent auction of such bills prior to the date the Contractor receives the unearned amount; and

(2) Deducted from the next available payment to the Contractor.

52.232-10 PAYMENTS UNDER FIXED-PRICE ARCHITECT-ENGINEER CONTRACTS (AUG 1987)

(a) Estimates shall be made monthly of the amount and value of the work and services performed by the Contractor under this contract which meet the standards of quality established under this contract. The estimates shall be prepared by the Contractor and accompanied by any supporting data required by the Contracting Officer.

(b) Upon approval of the estimate by the Contracting Officer, payment upon properly executed vouchers shall be made to the Contractor, as soon as practicable, of 90 percent of the approved amount, less all previous payments; provided, that payment may be made in full during any months in which the Contracting Officer determines that performance has been satisfactory. Also, whenever the Contracting Officer determines that the work is substantially complete and that the amount retained is in excess of the amount adequate for the protection of the Government, the Contracting Officer may release the excess amount to the Contractor.

(c) Upon satisfactory completion by the Contractor and acceptance by the Contracting Officer of the work done by the Contractor under the "Statement of Architect-Engineer Services", the Contractor will be paid the unpaid balance of any money due for work under the statement, including retained percentages relating to this portion of the work. Upon satisfactory completion and final acceptance of the construction work, the Contractor shall be paid any unpaid balance of money due under this contract.

(d) Before final payment under the contract, or before settlement upon termination of the contract, and as a condition precedent thereto, the Contractor shall execute and deliver to the Contracting Officer a release of all claims against the Government arising under or by virtue of this contract, other than any claims that are specifically excepted by the Contractor from the operation of the release in amounts stated in the release.

(e) Notwithstanding any other provision in this contract, and specifically paragraph (b) of this clause, progress payments shall not exceed 80 percent on work accomplished on undefinitized contract actions. A "contract action" is any action resulting in a contract, as defined in FAR Subpart 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract modifications issued pursuant to the Changes clause, or funding and other administrative changes.

52.233-1 DISPUTES. (DEC 1998) -- ALTERNATE I (DEC 1991)

(a) This contract is subject to the Contract Disputes Act of 1978, as amended (41 U.S.C. 601-613).

(b) Except as provided in the Act, all disputes arising under or relating to this contract shall be resolved under this clause.

(c) "Claim," as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract. A claim arising under a contract, unlike a claim relating to that contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding $100,000 is not a claim under the Act until certified as required by subparagraph (d)(2) of this clause. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under the Act. The submission may be converted to a claim under the Act, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

(d)(1) A claim by the Contractor shall be made in writing and, unless otherwise stated in this contract, submitted within 6 years after accrual of the claim to the Contracting Officer for a written decision. A claim by the Government against the Contractor shall be subject to a written decision by the Contracting Officer.

(2) (i) Contractors shall provide the certification specified in subparagraph (d)(2)(iii) of this clause when submitting any claim -

(A) Exceeding $100,000; or

(B) Regardless of the amount claimed, when using -

(1) Arbitration conducted pursuant to 5 U.S.C. 575-580; or

(2) Any other alternative means of dispute resolution (ADR) technique that the agency elects to handle in accordance with the Administrative Dispute Resolution Act (ADRA).

(ii) The certification requirement does not apply to issues in controversy that have not been submitted as all or part of a claim.

(iii) The certification shall state as follows: "I certify that the claim is made in good faith; that the supporting data are accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable; and that I am duly authorized to certify the claim on behalf of the Contractor.

(3) The certification may be executed by any person duly authorized to bind the Contractor with respect to the claim.

(e) For Contractor claims of $100,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over $100,000, the Contracting Officer must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made.

(f) The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in the Act.

(g) If the claim by the Contractor is submitted to the Contracting Officer or a claim by the Government is presented to the Contractor, the parties, by mutual consent, may agree to use ADR. If the Contractor refuses an offer for alternative disputes resolution, the Contractor shall inform the Contracting Officer, in writing, of the Contractor's specific reasons for rejecting the request. When using arbitration conducted pursuant to 5 U.S.C. 575-580, or when using any other ADR technique that the agency elects to handle in accordance with the ADRA, any claim, regardless of amount, shall be accompanied by the certification described in subparagraph (d)(2)(iii) of this clause, and executed in accordance with subparagraph (d)(3) of this clause.

(h) The Government shall pay interest on the amount found due and unpaid from (1) the date the Contracting Officer receives the claim (certified, if required); or (2) the date that payment otherwise would be due, if that date is later, until the date of payment. With regard to claims having defective certifications, as defined in (FAR) 48 CFR 33.201, interest shall be paid from the date that the Contracting Officer initially receives the claim. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Contracting Officer receives the claim and then at the rate applicable for each 6-month period as fixed by the Treasury Secretary during the pendency of the claim.

(i) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under or relating to the contract, and comply with any decision of the Contracting Officer.

(End of clause)

52.236-2 DIFFERING SITE CONDITIONS (APR 1984)

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of

(1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or

(2) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

(b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

(c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.

(d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

(End of clause)
52.236-3 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK (APR 1984)

(a) The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to

(1) conditions bearing upon transportation, disposal, handling, and storage of materials;

(2) the availability of labor, water, electric power, and roads;

(3) uncertainties of weather, river stages, tides, or similar physical conditions at the site;

(4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Government, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Government.

(b) The Government assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Government. Nor does the Government assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

(End of clause)
52.236-6 SUPERINTENDENCE BY THE CONTRACTOR (APR 1984)

At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the worksite a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.

(End of clause)
52.236-7 PERMITS AND RESPONSIBILITIES (NOV 1991)

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, and municipal laws, codes, and regulations applicable to the performance of the work. The Contractor shall also be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.

(End of clause)
52.236-11 USE AND POSSESSION PRIOR TO COMPLETION (APR 1984)

(a) The Government shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the Government intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The Government's possession or use shall not be deemed an acceptance of any work under the contract.

(b) While the Government has such possession or use, the Contractor shall be relieved of the responsibility for the loss of or damage to the work resulting from the Government's possession or use, notwithstanding the terms of the clause in this contract entitled "Permits and Responsibilities." If prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

(End of clause)
52.236-14 AVAILABILITY AND USE OF UTILITY SERVICES (APR 1984)

(a) The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.

(b) The Contractor, at its expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of each utility used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

(End of clause)
52.236-17 LAYOUT OF WORK (APR 1984)

The Contractor shall lay out its work from Government established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

(End of clause)
52.236-23 RESPONSIBILITY OF THE ARCHITECT-ENGINEER CONTRACTOR (APR 1984)

(a) The Contractor shall be responsible for the professional quality, technical accuracy, and the coordination of all designs, drawings, specifications, and other services furnished by the Contractor under this contract. The Contractor shall, without additional compensation, correct or revise any errors or deficiencies in its designs, drawings, specifications, and other services.

(b) Neither the Government's review, approval or acceptance of, nor payment for, the services required under this contract shall be construed to operate as a waiver of any rights under this contract or of any cause of action arising out of the performance of this contract, and the Contractor shall be and remain liable to the Government in accordance with applicable law for all damages to the Government caused by the Contractor's negligent performance of any of the services furnished under this contract.

(c) The rights and remedies of the Government provided for under this contract are in addition to any other rights and remedies provided by law.

(d) If the Contractor is comprised of more than one legal entity, each such entity shall be jointly and severally liable hereunder.

(End of clause)

52.236-26 PRECONSTRUCTION CONFERENCE (FEB 1995)

If the Contracting Officer decides to conduct a preconstruction conference, the successful offeror will be notified and will be required to attend. The Contracting Officer's notification will include specific details regarding the date, time, and location of the conference, any need for attendance by subcontractors, and information regarding the items to be discussed.

(End of clause)
52.242-14 SUSPENSION OF WORK (APR 1984)

(a) The Contracting Officer may order the Contractor, in writing, to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of the Government.

(b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting Officer's failure to act within the time specified in this contract (or within a reasonable time if not specified), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by the unreasonable suspension, delay, or interruption, and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor, or for which an equitable adjustment is provided for or excluded under any other term or condition of this contract. (c) A claim under this clause shall not be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order), and (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the contract.

(End of clause)
52.243-1 CHANGES--FIXED-PRICE (AUG 1987) - ALTERNATE III (APR 1984)

(a) The Contracting Officer may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract in the services to be performed.

(b) If any such change causes an increase or decrease in the cost of, or the time required for, performance of any part of the work under this contract, whether or not changed by the order, the Contracting Officer shall make an equitable adjustment in the contract price, the delivery schedule, or both, and shall modify the contract.

(c) The Contractor must assert its right to an adjustment under this clause within 30 days from the date of receipt of the written order. However, if the Contracting Officer decides that the facts justify it, the Contracting Officer may receive and act upon a proposal submitted before final payment of the contract.

(d) If the Contractor's proposal includes the cost of property made obsolete or excess by the change, the Contracting Officer shall have the right to prescribe the manner of the disposition of the property.

(e) Failure to agree to any adjustment shall be a dispute under the Disputes clause. However, nothing in this clause shall excuse the Contractor from proceeding with the contract as changed.

(f) No services for which an additional cost or fee will be charged by the Contractor shall be furnished without the prior written authorization of the Contracting Officer.

(End of clause)
52.246-12 INSPECTION OF CONSTRUCTION (AUG 1996)

(a) Definition. "Work" includes, but is not limited to, materials, workmanship, and manufacture and fabrication of

components.

(b) The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. The Contractor shall maintain complete inspection records and make them available to the Government. All work shall be conducted under the general direction of the Contracting Officer and is subject to Government inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.

(c) Government inspections and tests are for the sole benefit of the Government and do not--

(1) Relieve the Contractor of responsibility for providing adequate quality control measures;

(2) Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;

(3) Constitute or imply acceptance; or

(4) Affect the continuing rights of the Government after acceptance of the completed work under paragraph (i) of this section.

(d) The presence or absence of a Government inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specification without the Contracting Officer's written authorization.

(e) The Contractor shall promptly furnish, at no increase in contract price, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The Government may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. The Government shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract.

(f) The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements, unless in the public interest the Government consents to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

(g) If the Contractor does not promptly replace or correct rejected work, the Government may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor or (2) terminate for default the Contractor's right to proceed.

(h) If, before acceptance of the entire work, the Government decides to examine already completed work by removing it or tearing it out, the Contractor, on request, shall promptly furnish all necessary facilities, labor, and material. If the work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray the expenses of the examination and of satisfactory reconstruction. However, if the work is found to meet contract requirements, the Contracting Officer shall make an equitable adjustment for the additional services involved in the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.

(i) Unless otherwise specified in the contract, the Government shall accept, as promptly as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the Government's rights under any warranty or guarantee.

(End of clause)
52.249-10 DEFAULT (FIXED-PRICE CONSTRUCTION) (APR 1984)

(a) If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract including any extension, or fails to complete the work within this time, the Government may, by written notice to the Contractor, terminate the right to proceed with the work (or the separable part of the work) that has been delayed. In this event, the Government may take over the work and complete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the Government resulting from the Contractor's refusal or failure to complete the work within the specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the Government in completing the work.

(b) The Contractor's right to proceed shall not be terminated nor the Contractor charged with damages under this clause, if--

(1) The delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include

(i) acts of God or of the public enemy,

(ii) acts of the Government in either its sovereign or contractual capacity,

(iii) acts of another Contractor in the performance of a contract with the Government,

(iv) fires,

(v) floods,

(vi) epidemics,

(vii) quarantine restrictions,

(viii) strikes,

(ix) freight embargoes,

(x) unusually severe weather, or delays of subcontractors or suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the subcontractors or suppliers; and

(2) The Contractor, within 10 days from the beginning of any delay (unless extended by the Contracting Officer), notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of delay. If, in the judgment of the Contracting Officer, the findings of fact warrant such action, the time for completing the work shall be extended. The findings of the Contracting Officer shall be final and conclusive on the parties, but subject to appeal under the Disputes clause.

(c) If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the Government.

The rights and remedies of the Government in this clause are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

FAR http://www.arnet.gov/far/
DFARS http://www.acq.osd.mil/dp/dars/dfars/dfars.html
AFARS http://acqnet.saalt.army.mil/library/AFAR/AFARS_OCTOBER_2001.pdf
EFARS http://www.hq.usace.army.mil/cepr/asp/library/

(end of clause)

252.236-7000 MODIFICATION PROPOSALS - PRICE BREAKDOWN. (DEC 1991)

(a) The Contractor shall furnish a price breakdown, itemized as required and within the time specified by the Contracting Officer, with any proposal for a contract modification.

(b) The price breakdown --

(1) Must include sufficient detail to permit an analysis of profit, and of all costs for --

(i) Material;

(ii) Labor;

(iii) Equipment;

(iv) Subcontracts; and

(v) Overhead; and

(2) Must cover all work involved in the modification, whether the work was deleted, added, or changed.

(c) The Contractor shall provide similar price breakdowns to support any amounts claimed for subcontracts.

(d) The Contractor's proposal shall include a justification for any time extension proposed.

SECTION 00800 Special Contract Requirements

CLAUSES INCORPORATED BY FULL TEXT

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984) - ALTERNATE I (APR 1984)

This contract will have separate notice to proceed and completion dates for each phase of the work.

PHASE ONE - CONSTRUCTION OF NEW ARMY FAMILY HOUSING.

The Contractor shall be required to (a) commence **construction** work under this contract within **ten (10)** calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than **14 May 2004.** The time stated for completion shall include final cleanup of the premises.

The completion date is based on the assumption that the successful offeror will receive the notice to proceed **for construction work** by **01 October 2002**. The completion date will be extended by the number of calendar days after the above date that the Contractor receives the notice to proceed, except to the extent that the delay in issuance of the notice to proceed results from the failure of the Contractor to execute the contract and give the required performance and payment bonds within the time specified in the offer.

PHASE TWO - DEMOLITION OF EXISTING ARMY FAMILY HOUSING.

Notice to proceed for demolition will not be issued until all housing units have been accepted as ready to occupy by the government. The Contractor shall be required to (a) commence **demolition** work under this contract within **ten (10)** calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than **28 November 2004.** The time stated for completion shall include final cleanup of the premises.

The completion date is based on the assumption that the successful offeror will receive the notice to proceed **for demolition work** by **31 July 2004**. The completion date will be extended by the number of calendar days after the above date that the Contractor receives the notice to proceed, except to the extent that the delay in issuance of the notice to proceed results from the failure of the Contractor to execute the contract and give the required performance and payment bonds within the time specified in the offer.

(End of clause)

52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (SEP 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, the Contractor shall pay liquidated damages to the Government in the amount **indicated in the schedules at (c) below.**

(b) If the Government terminates the Contractor's right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(c) Schedules for Liquidated Damages.

(1) Loss of Availability for Occupancy. If the Contractor fails to complete the construction of new Army family housing units and fails to secure Government acceptance of these units as ready to occupy by the following schedule, the Contractor shall pay liquidated damages to the Government in the amount of **ONE THOUSAND**

THREE HUNDRED TWO DOLLARS AND FIFTY CENTS ($1,302.50) as a one-time lump sum payment for each individual residence.

Number of residences (by floor plan type) and required acceptance date.			
Total No. Residences	**No. Three Bedroom**	**No. Four Bedroom**	**Date**
2	**1**	**1**	**4:00 p.m. CST, 15 May 2004**
10	**8**	**2**	**4:00 p.m. CST, 10 Jun 2004**
72	**54**	**18**	**4:00 p.m. CST, 01 Jul 2004**

(2) Administration and Surveillance of Phase One - Construction. If the Contractor fails to complete the construction of all 84 new Army family housing units and fails to secure Government acceptance of these units as ready to occupy by 14 May 2004, the Contractor shall pay liquidated damages to the Government in the amount of **ONE THOUSAND ONE HUNDRED NINETY FIVE DOLLARS AND NO CENTS ($1,195.00)** for each calendar day of delay until the work is completed or accepted.

(3) Administration and Surveillance of Phase Two - Demolition. If the Contractor fails to complete the demolition of existing Army family housing and fails to secure Government acceptance of such work by 28 November 2004, the Contractor shall pay liquidated damages to the Government in the amount of **THREE HUNDRED FOURTY DOLLARS AND NO CENTS ($340.00)** for each calendar day of delay until the work is completed or accepted.

(End of clause)

52.231-5000 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE
MAR 1995)--EFARS

(a) This clause does not apply to terminations. See 52.249-5000, Basis for Settlement of Proposals and FAR Part 49.
(b) Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region **V**. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.
(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.
(d) When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet.

(End of clause)

52.232-5000 PAYMENT FOR MATERIALS DELIVERED OFF-SITE (MAR 1995)--EFARS

(a) Pursuant to FAR clause 52.232-5, Payments Under Fixed Priced Construction Contracts, materials delivered to the contractor at locations other than the site of the work may be taken into consideration in making payments if included in payment estimates and if all the conditions of the General Provisions are fulfilled. Payment for items delivered to locations other than the work site will be limited to: (1) materials required by the technical provisions; or (3) materials that have been fabricated to the point where they are identifiable to an item of work required under this contract.

(b) Such payment will be made only after receipt of paid or receipted invoices or invoices with canceled check showing title to the items in the prime contractor and including the value of material and labor incorporated into the item. In addition to petroleum products, payment for materials delivered off-site is limited to the following items: **Only those items with prior written approval by the Contracting Officer will be considered for payment under this clause. Contractor shall submit request for approval for payment for materials delivered off-site concurrently with the technical submittal to the Designer of Record.**

(End of clause)

52.236-1 PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984)

The Contractor shall perform on the site, and with its own organization, work equivalent to at least FIFTEEN PERCENT (15%) of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

52.236-25 REQUIREMENTS FOR REGISTRATION OF DESIGNERS (APR 1984)

The design of architectural, structural, mechanical, electrical, civil, or other engineering features of the work shall be accomplished or reviewed and approved by architects or engineers registered to practice in the particular professional field involved in a State or possession of the United States, in Puerto Rico, or in the District of Columbia.

(End of clause)

SCR-DB-001 DESIGN-BUILD CONTRACT - ORDER OF PRECEDENCE – AUG 1997

(a) The contract includes the standard contract clauses and schedules current at the time of contract award. It entails (1) the solicitation in its entirety, including all drawings, cuts, and illustrations, and any amendments, and (2) the successful offeror's accepted proposal. The contract constitutes and defines the entire agreement between the Contractor and the Government. No documentation shall be omitted which in any way bears upon the terms of that agreement.

(b) In the event of conflict or inconsistency between any of the provisions of this contract, precedence shall be given in the following order:

(1) Betterments: Any portions of the accepted proposal which both conform to and exceed the provisions of the solicitation.

(2) The provisions of the solicitation. (See also Contract Clause: SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION.)

(3) All other provisions of the accepted proposal.

(4) Any design products including, but not limited to, plans, specifications, engineering studies and analyses, shop drawings, equipment installation drawings, etc. These are "deliverables" under the contract and are not part of the contract itself. Design products must conform with all provisions of the contract, in the order of precedence herein.

(End of Clause)

SCR-DB-002 PROPOSED BETTERMENTS – AUG 1997

(a) The minimum requirements of the contract are identified in the Request for Proposal. All betterments offered in the proposal become a requirement of the awarded contract.

(b) A "Betterment' is defined as any component or system, which exceeds the minimum requirements stated in the Request for Proposal. This includes all proposed betterments listed in accordance with the "Proposal Submission Requirements" of the Solicitation, and all Government identified betterments.

(c) "Government identified betterments" include the betterments identified on the "List of Accepted Project Betterments" prepared by the Proposal Evaluation Board and made part of the contract by alteration, and all other betterments identified in the accepted Proposal after award.

(End of Clause)

SCR-DB-004 KEY PERSONNEL, SUBCONTRACTORS AND OUTSIDE ASSOCIATES OR CONSULTANTS – AUG 1997

In connection with the services covered by this contract, any in-house personnel, subcontractors, and outside associates or consultants will be limited to individuals or firms that were specifically identified and agreed to during negotiations. The contractor shall obtain the Contracting Officer's written consent before making any substitution for these designated in-house personnel, subcontractors, associates, or consultants.

(End of Clause)

SCR-DB-005 RESPONSIBILITY OF THE CONTRACTOR FOR DESIGN – FEB 2000

(a) The Contractor shall be responsible for the professional quality, technical accuracy, and the coordination of all designs, drawings, specifications, and any other non-construction services furnished by the Contractor under this contract. The Contractor shall, without additional compensation, correct or revise any errors or deficiency in its designs, drawings, specifications, and other non-construction services and perform any necessary rework or modifications, including any damage to real or personal property, resulting from design error or omission.

(b) Neither the Government's review, approval or acceptance of, nor payment for, the services required under this contract shall be construed to operate as a waiver of any rights under this contract or of any cause of action arising out of the performance of this contract. The Contractor shall be and remain liable to the Government in accordance with applicable law for all damages to the Government caused by the Contractor's negligent performance of any of the services described in paragraph (a) furnished under this contract.

(c) The rights and remedies of the Government provided for under this contract are in addition to any other rights and remedies provided by law.

(d) if the Contractor is comprised of more than on legal entity, each entity shall be jointly and severally liable as set forth in (a), (b), and (c) above.

(End of Clause)

WARRANTY OF CONSTRUCTION WORK – AUG 1997

(a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (1) of this clause, that work performed under this contract conforms to the contract requirements and is

free of any defect in equipment, material, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession.

(c) The Contractor shall remedy at the Contractor’s expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of:

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, or workmanship.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

(e) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

If the Contractor fails to remedy any failure, defect, or damage within a
reasonable time after receipt of notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor’s expense.

(g) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

Obtain all warranties that would be given in normal commercial practice;

Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(h) In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(i) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(j) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

(End of Clause)

SCR-DB-008 SEQUENCE OF DESIGN -CONSTRUCTION (FAST TRACK) – AUG 1997

(a) After receipt of the Contract Notice to Proceed (NTP) **for the construction phase,** 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. The Contractor may begin construction on portions of the work for which the Government has reviewed the final design submission and has determined satisfactory for purposes of beginning construction. The ACO or COR 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 ACO or COR, 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.

(End of Clause)

SCR-DB-009 CONSTRUCTOR'S ROLE DURING DESIGN PROCESS – JUN 1998

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 includes, but is not limited to, actions such as: integrating the design schedule into the Master Schedule to maximize the effectiveness of fasttracking design and construction (within the limits allowed in the contract), ensuring constructibility and economy of the design, integrating the shop drawing and installation drawing process into the design, executing 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.

(End of Clause)

SCR-DB-010 VALUE ENGINEERING AFTER AWARD – JUNE 1999

(a) In reference to Contract Clause 52.248-3, "Value Engineering Construction," the Government may refuse to entertain a "Value Engineering Change Proposal" (VECP) for those "performance oriented" aspects of the Solicitation documents which were addressed in the Contractor's accepted contract proposal and which were evaluated in competition with other offerors for award of this contract.

(b) The Government may consider a VECP for those "prescriptive" aspects of the Solicitation documents, not addressed in the Contractor's accepted contract proposal or addressed but evaluated only for minimum conformance with the Solicitation requirements.

(c) For purposes of this clause, the term "performance oriented" refers to those aspects of the design criteria or other contract requirements which allow the Offeror or Contractor certain latitude, choice of and flexibility to propose in its accepted contract offer a choice of design, technical approach, design solution, construction approach or other approach to fulfill the contract requirements. Such requirements generally tend to be expressed in terms of functions to be performed, performance required or essential physical characteristics, without dictating a specific process or specific design solution for achieving the desired result.

(d) In contrast, for purposes of this clause, the term "prescriptive" refers to those aspects of the design criteria or other Solicitation requirements wherein the Government expressed the design solution or other requirements in terms of specific material, approaches, systems, and/or processes to be used. Prescriptive aspects typically allow the Offerors little or no freedom in the choice of design approach, materials, fabrication techniques, methods of installation, or any other approach to fulfill the contract requirements.

(End of Clause)

SCR-DB-011 PARTNERING – FEB 2000

In order to most effectively accomplish this contract, the Government proposes to form a partnership with the Contractor to develop a cohesive building team. It is anticipated that this partnership would involve the Corps of Engineers, the Directorate of Installation Support, the Contractor, primary subcontractors and the designers. This partnership would strive to develop a cooperative management team drawing on the strengths of each team member in an effort to achieve a quality project within budget and on schedule. This partnership would be bilateral in membership and participation will be totally voluntary. Any cost associated with effectuating this partnership, excluding travel and lodging cost of Government personnel, will be borne by each party. The partnering meetings shall be held at Fort Leavenworth as needed. The initial meeting will be scheduled by the Contracting Officer within 60 days of NTP.

(End of Clause)

SCR-DB-012 DESIGN CONFERENCES – AUG 1997

(a) Pre-Work: As part of the Pre-work Conference conducted after contract award, key representatives of the Government and the Contractor will review the design submission and review procedures specified herein, discuss the preliminary design schedule and provisions for phase completion of the D/B documents with construction activities (fast tracking), as appropriate, meet with Corps of Engineers Design Review personnel and key Using Agency points of contact and any other appropriate pre-design discussion items.

(b) Design Review Conferences: Review conferences will be held on base for each design for each submittal. The Contractor will bring the personnel that developed the design submittal to the review conference. The conferences will take place the week after the review is complete.

(See section 01012 – DESIGN AFTER AWARD for detailed requirements.)

(End of Clause)

SCR-DB-013 TRAINING – FEB 2000

The Contractor shall provide operational and maintenance training for all systems furnished under this contract for the operating and maintenance personnel. The system manufacturer shall put on the training, where feasible. All operation and maintenance manuals shall be submitted and approved prior to conducting the training and shall be used during training. The Contractor shall video tape the training session on VHS tapes and provide the tapes to the Government.

(End of Clause)

SCR-DB-014 RECOMMENDED INSURANCE COVERAGE (FEB 2000)

The Design-Build Contractor's attention is invited to the contract requirements concerning "RESPONSIBILITY OF THE CONTRACTOR FOR DESIGN" and "WARRANTY OF CONSTRUCTION WORK". These requirements vest in the Contractor complete responsibility for the professional quality, technical accuracy, and coordination of all design, drawings, specifications and other work or materials furnish by his in-house or consultant forces. The Design-Build Contractor must correct and revise any errors or deficiencies in his work, notwithstanding any review, approval, acceptance or payment by the Government. The Contractor must correct and change any work resulting from his defective design at no additional cost to the Government. The requirements further stipulate that the Design-Build Contractor shall be liable to the Government for the damages to the Government caused by negligent performance. Though not a mandatory requirement, this is to recommend that the Design-Build Contractor investigate and obtain appropriate insurance coverage for such liability protection.

(End of Clause)

SCR-DB-016 GOVERNMENT-FURNISHED RFP DRAWINGS, SURVEYS AND SPECIFICATIONS – JUL 2001

(a) The Contractor shall

(1) Check all Government-furnished drawings and surveys immediately upon receipt;
(2) Compare all drawings and surveys and verify the figures before laying out the work;
(3) Promptly notify the Contracting Officer of any discrepancies; and
(4) Be responsible for any errors which might have been avoided by complying with this paragraph.

(b) Large scale drawings shall, in general, govern small scale drawings. Figures marked on drawings shall, in general, be followed in preference to scale measurements.

(c) Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed shall not relieve the Contractor from performing such omitted or misdescribed details of the work, but shall be performed as if fully and correctly set forth and described in the drawings and specifications.

(d) The work shall conform to the specifications and the contract drawings identified on the following index of drawings:

GENERAL

G1 COVER SHEET
G2 ABBREVIATIONS/ARCH. SYMBOLS/INDEX

CIVIL DRAWINGS

CS101 SITE SURVEY (AREA 1A)
CS102 SITE SURVEY (AREA 1B)
CS103 SITE SURVEY (AREA 1D)
CD101 CONCEPTUAL DEMOLITION PLAN (AREA 1B)
CD102 CENCEPTUAL DEMOLITION PLAN (AREA 1D)
ASD1 DEMOLITION SITE PLAN (SITE 1C)
D1 HOUSING DEMOLITION PLANS
D2 HOUSIND DEMOLITION PLANS
CG101 CONCEPTUAL DRAINAGE & GRADING PLAN (AREA 1A)
CG102 CONCEPTUAL DRAINAGE & GRADING PLAN (AREA 1B)
CG103 CONCEPTUAL DRAINAGE & GRADING PLAN (AREA 1D)
CU101 CONCEPTUAL UTILITY PLAN (AREA 1A)
CU102 CONCEPTUAL UTILITY PLAN (AREA 1B)
CU103 CONCEPTUAL SITE UTILITY PLAN (AREA 1D)
CP101 CONCEPTUAL PAVING PLAN (AREA 1B)
CP501 CONCEPTUAL PAVING DETAILS (AREA 1B)

LANDSCAPE PLANS

LP1LANDSCAPE DETAILS

ARCHITECTURAL SITE PLANS

AS1ARCHITECTURAL SITE AND TREE PLANTING PLAN – SITE 1A
AS2ARCHITECTURAL SITE AND TREE PLANTING PLAN – SITE 1B
AS3ARCHITECTURAL SITE AND TREE PLANTING PLAN – SITE 1D

ARCHITECTURAL

A1 3BDR / 4BDR (UNIT A1)
A2 3BDR / 3BDR (UNIT A2)
A3 3BDR / 4BDR (UNIT A3)
A4 3BDR / 3BDR (UNIT A4)
A5 3BDR / 4BDR (UNIT A5)
A6 3BDR / 3BDR (UNIT A6)
A7 4BDR H/C / 4BDR (UNIT A7)
A8 4BDR H/C / 3BDR (UNIT A8)
A9 3BDR H/C / 4BDR (UNIT A9)
A10 3BDR H/C / 3BDR (UNIT A10)
A11 3BDR OR 4BDR (WITH WALKOUT BASEMENT)

SECTION 00810

WAGE RATES

1. General Decision KS020006, dated 06/14/2002, 4 mods
2. General Decision KS020048, dated 03/01/02, no mods.

GENERAL DECISION KS020006 06/14/02 KS6

General Decision Number KS020006

Superseded General Decision No. KS010006

State: Kansas

Construction Type:
HEAVY
HIGHWAY

County(ies):
DOUGLAS LEAVENWORTH SHAWNEE

HEAVY CONSTRUCTION PROJECTS
HIGHWAY CONSTRUCTION PROJECTS (Excluding Jefferson County)

Modification Number	Publication Date
0	03/01/2002
1	03/29/2002
2	04/05/2002
3	05/10/2002
4	06/14/2002

COUNTY(ies):
DOUGLAS LEAVENWORTH SHAWNEE

CARP0007R 04/01/2001

	Rates	Fringes
LEAVENWORTH COUNTY		
CARPENTERS AND PILEDRIVERMEN	25.50	6.88

CARP1445B 04/01/2001

	Rates	Fringes
JEFFERSON AND SHAWNEE COUNTIES		
CARPENTERS	17.20	4.35
PILEDRIVERS	17.575	4.35

CARP2279C 04/01/2001

	Rates	Fringes
DOUGLAS COUNTY		
CARPENTERS	17.20	4.35
PILEDRIVERS	17.575	4.35

ELEC0053E 09/01/2000

	Rates	Fringes
LEAVENWORTH COUNTY (North of Fairmont, Stranger, and Tonganoxie Townships)		
LINE CONSTRUCTION:		
LINEMEN	27.80	28.75%+2.20

LINEMEN OPERATOR	25.97	28.75%+2.20
GROUNDMEN POWDERMEN	19.45	28.75%+2.20
GROUNDMEN	18.49	28.75%+2.20
RAILROAD AND CROSS COUNTRY TRANSMISSION LINES:		
LINEMAN	24.98	28.75%+2.20
LINEMAN OPERATOR	23.10	28.75%+2.20
GROUNDMAN POWDERMAN	17.25	28.75%+2.20
GROUNDMAN	16.11	28.75%+2.20
POLE TREATING SPECIALIST	26.60	28.75%+2.20
POLE TREATING TRUCK DRIVER	17.25	28.75%+2.20
POLE TREATING GROUNDMAN	16.11	28.75%+2.20

ELEC0124D 08/27/2001

	Rates	Fringes
LEAVENWORTH COUNTY (Delaware, High Prairie and Kickapoo Townships, City of Leavenworth and Ft. Leavenworth Military Reservation)		
ELECTRICIANS	28.78	10% + 9.00

ELEC0226B 03/01/2001

	Rates	Fringes
DOUGLAS, JEFFERSON, SHAWNEE, and the remainder of LEAVENWORTH COUNTY		
ELECTRICIANS	23.60	3% + 5.08

ELEC0304B 07/01/1998

	Rates	Fringes
LEAVENWORTH COUNTY (Except that portion north of Fairmont, Stranger, and Tonganoxie Townships) and DOUGLAS, JEFFERSON, SHAWNEE COUNTIES		
LINE CONSTRUCTION:		
LINEMEN	22.76	23.75%+2.00
CABLE SPLICERS	23.90	23.75%+2.00
GROUNDMEN	13.63	23.75%+2.00
POWDERMEN	18.71	23.75%+2.00
LINE TRUCK AND EQUIPMENT OPERATORS	18.71	23.75%+2.00
TRAFFIC SIGNAL TECHNICIAN	22.76	23.75%+2.00

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* ENGI0101C 04/01/2002

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
DOUGLAS COUNTIES:		

GROUP 1	17.80	6.87
GROUP 2	17.55	6.87
GROUP 3	17.30	6.87
GROUP 4	16.95	6.87
GROUP 4A	17.20	6.87

GROUP 1: Asphalt paver and spreader, Backhoe, Boring machine, Blades, all types, Clamshell, Concrete mixer paver operator, Concrete plant operator (automatic); Crane, Truck crane, Pitman crane, Hydro crane or any machine with power swing, Derrick or derrick trucks; Dragline operator, Dredge operator, Dozer, Ditching machine, Euclid loader, Hoist, 2 active drums, Loader, all types, Mechanic or welder, Mixermobile, Multi-unit scraper, Piledriver operator, Power shovel operator, Quad track, Scoop operator, all types, Sideboom cat, Cheery picker, Skimmer scoop operator, Push cat operators.

GROUP 2: Asphalt plant operator, Elevating grader operator.

GROUP 3: A-frame truck, Asphalt roller operator, Asphalt plant boiler fireman, Backfiller operator, Barber green loader, Boiler, other than asphalt, Bull float operator, Churn drill operator, Compressor operator (l), Concrete central plant operator, Concrete mixer operator, skip, Concrete pump operator, Crusher operator, Distributor operator, Finish machine operator, concrete, Fireman, other than asphalt, Flex plane operator, Fork lift, Form grader operator, Greaser, Hoist, 1 drum, Jeep ditching machine, Pavement Breaker, self-propelled (of the hydra hammer or similar type), pump operator, 4" or over, two, pump operator, other than Dredge screening and wash plant operator, Small machine operator, Spreader box operator, self-propelled, Tractor operator, over 50 h.p., Self-propelled roller operator, other than asphalt siphons and jets, Subgrading machine operator, Tank car heater operator, Combination booster and boilers, Towboat operator, Vibrating machine operator, not hand.

GROUP 4: Concrete gang saw, Self-propelled (con-cut), Conveyor operator, Harrow, disc. seeder, Oiler, Tractor operator, 50 h.p. or less without attachments.

GROUP 4A: Oiler, Motor crane.

HOURLY PREMIUMS: Following classifications shall receive ($.25) above Group I rate: Clamshells - 3 yd. capacity or over, Crane or rigs, 80 ft. of boom or over (including jib), Draglines, 3 yd. capacity or over, Piledrivers 80 ft of boom or over (including jib), Shovels and backhoes, 3 yd. capacity or over.

ENGI0101F 04/01/2002

	Rates	Fringes
LEAVENWORTH COUNTY		
POWER EQUIPMENT OPERATORS: ALL OTHER WORK		
GROUP 1	23.79	8.97

GROUP 2	22.75	8.97
GROUP 3		
OILERS	18.28	8.97
OILERS DRIVER (ALL TYPES)	21.63	8.97

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1 - Asphalt roller operator, finish, asphalt paver and spreader, asphalt plant operator, concrete plant operator, la tourneau rooter (all tiller types), concrete mixer paver, slip form paver operator (CMI, Rex, Gomeco or equal), finishing machine operator, auto grader or trimmer or sub-grader, side discharge spreader, concrete pump operator, backhoe, blade operator (all types), bulldozer operator, high loader - fork lift - skid loader (all types), quad track, scraper operator (all types), push cat, ditching machine, boilers-2, booster pump on dredge, dredge engineman, dredge operator, tow boat operator, hoisting engineer (2 active drums), crane operator, derrick or

derrick trucks, drag line operator, pile driver operator, pitman crane or boom truck (all types), shovel operator, truck crane, clamshell operator, drilling or boring machine (rotary - self propelled), boring machine (truck or crane mounted), skimmer scoop operator, mucking machine operator, sideboom cats, locomotive operator (standard gage), drillcat with compressor mounted (self-contained) or similar type self propelled rotary drill (not air tract), mechanics and welders (field and plants)

GROUP 2 - A-Frame truck operator, articulated dump truck, hoisting engine (one drum), roller operator (wtih or without blades), boilers (l), distributor operator, fireman gig, tank car heater operator (combination boiler and booster), chip spreader, back filler operator, farm tractor (all attachments), multiple compactor, concrete mixer operator, skip loader, elevating grader operator, pavement breaker, self propelled hydra-hammer (or similar type), power shield, churn drill operator, concrete saws (self propelled), conveyor operator, float operator, form grader operator, screening and washing plant, siphons and jets, vibrating machine operator (not hand held), crusher operator, conveyor operator, paymill operator, maintenance operator, welding machine, compressor, pumps, self-propelled street broom or sweeper, stump cutting machine, straw blower

HOURLY PREMIUMS
FOLLOWING CLASSIFICATIONS SHALL RECEIVE ($.25) ABOVE GROUP I RATE: Clamshells - 3 yd. capacity or over - crane or rigs 80 ft. of boom or over (including jib) - draglines, 3 yd. capacity or over - piledrivers 80 ft. of boom or over (including jib) - shovels & backhoes, 3 yd. capacity or over.

ENGI0101G 04/01/1999

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		

JEFFERSON COUNTY:

GROUP 1	15.40	5.67
GROUP 2	15.15	5.67
GROUP 3	14.90	5.67
GROUP 4	14.55	5.67
GROUP 4A	14.80	5.67

GROUP 1: Asphalt paver and spreader, Backhoe, Boring machine, Blades, all types, Clamshell, Concrete mixer paver operator, Concrete plant operator (automatic); Crane, Truck crane, Pitman crane, Hydro crane or any machine with power swing, Derrick or derrick trucks; Dragline operator, Dredge operator, Dozer, Ditching machine, Euclid loader, Hoist, 2 active drums, Loader, all types, Mechanic or welder, Mixermobile, Multi-unit scraper, Piledriver operator, Power shovel operator, Quad track, Scoop operator, all types, Sideboom cat, Cheery picker, Skimmer scoop operator, Push cat operators.

GROUP 2: Asphalt plant operator, Elevating grader operator.

GROUP 3: A-frame truck, Asphalt roller operator, Asphalt plant boiler fireman, Backfiller operator, Barber green loader, Boiler, other than asphalt, Bull float operator, Churn drill operator, Compressor operator (l), Concrete central plant operator, Concrete mixer operator, skip, Concrete pump operator, Crusher operator, Distributor operator, Finish machine operator, concrete, Fireman, other than asphalt, Flex plane operator, Fork lift, Form grader operator, Greaser, Hoist, 1 drum, Jeep ditching machine, Pavement Breaker, self-propelled (of the hydra hammer or similar type), pump operator, 4" or over, two, pump operator, other than Dredge screening and wash plant operator, Small machine operator, Spreader box operator, self-propelled, Tractor operator, over 50 h.p., Self-propelled roller operator, other than asphalt siphons and jets, Subgrading machine operator, Tank car heater operator, Combination booster and boilers, Towboat operator, Vibrating machine operator, not hand.

GROUP 4: Concrete gang saw, Self-propelled (con-cut), Conveyor operator, Harrow, disc. seeder, Oiler, Tractor operator, 50 h.p. or less without attachments.

GROUP 4A: Oiler, Motor crane.

HOURLY PREMIUMS: Following classifications shall receive ($.25) above Group I rate: Clamshells - 3 yd. capacity or over, Crane or rigs, 80 ft. of boom or over (including jib), Draglines, 3 yd. capacity or over, Piledrivers 80 ft of boom or over (including jib), Shovels and backhoes, 3 yd. capacity or over.

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* ENGI9101A 04/01/2002

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
SHAWNEE COUNTIES:		
GROUP 1	17.10	6.87
GROUP 2	16.85	6.87

GROUP 3	16.60	6.87
GROUP 4	16.25	6.87
GROUP 4A	16.50	6.87

GROUP 1: Asphalt paver and spreader, Backhoe, Boring machine, Blades, all types, Clamshell, Concrete mixer paver operator, Concrete plant operator (automatic); Crane, Truck crane, Pitman crane, Hydro crane or any machine with power swing, Derrick or derrick trucks; Dragline operator, Dredge operator, Dozer, Ditching machine, Euclid loader, Hoist, 2 active drums, Loader, all types, Mechanic or welder, Mixermobile, Multi-unit scraper, Piledriver operator, Power shovel operator, Quad track, Scoop operator, all types, Sideboom cat, Cheery picker, Skimmer scoop operator, Push cat operators.

GROUP 2: Asphalt plant operator, Elevating grader operator.

GROUP 3: A-frame truck, Asphalt roller operator, Asphalt plant boiler fireman, Backfiller operator, Barber green loader, Boiler, other than asphalt, Bull float operator, Churn drill operator, Compressor operator (l), Concrete central plant operator, Concrete mixer operator, skip, Concrete pump operator, Crusher operator, Distributor operator, Finish machine operator, concrete, Fireman, other than asphalt, Flex plane operator, Fork lift, Form grader operator, Greaser, Hoist, 1 drum, Jeep ditching machine, Pavement Breaker, self-propelled (of the hydra hammer or similar type), pump operator, 4" or over, two, pump operator, other than Dredge screening and wash plant operator, Small machine operator, Spreader box operator, self-propelled, Tractor operator, over 50 h.p., Self-propelled roller operator, other than asphalt siphons and jets, Subgrading machine operator, Tank car heater operator, Combination booster and boilers, Towboat operator, Vibrating machine operator, not hand.

GROUP 4: Concrete gang saw, Self-propelled (con-cut), Conveyor operator, Harrow, disc. seeder, Oiler, Tractor operator, 50 h.p. or less without attachments.

GROUP 4A: Oiler, Motor crane.

HOURLY PREMIUMS: Following classifications shall receive ($.25) above Group I rate: Clamshells - 3 yd. capacity or over, Crane or rigs, 80 ft. of boom or over (including jib), Draglines, 3 yd. capacity or over, Piledrivers 80 ft of boom or over (including jib), Shovels and backhoes, 3 yd. capacity or over.

IRON0010B 04/01/2001

	Rates	Fringes
IRONWORKERS:		
LEAVENWORTH COUNTY	22.70	11.63

IRON0010E 04/01/2001

	Rates	Fringes
IRONWORKERS:		

DOUGLAS, JEFFERSON, AND SHAWNEE COUNTIES	19.70	11.63

LABO0142B 04/01/2001

	Rates	Fringes
LABORERS		
JEFFERSON COUNTY		
GROUP 1	11.80	4.15
GROUP 2	12.05	4.15
DOUGLAS AND SHAWNEE COUNTIES		
GROUP 1	12.20	4.15
GROUP 2	12.45	4.15

GROUP 1: Board mat weavers & cable tiers, georgia buggy (manually operated), mixerman-no skip lift, salamander tenders, track men, tractor swamper, truck dumper, wire mesh setter, water pump up to 4 inches, and all other general laborers including flagman.

GROUP 2: Air tool operators, cement handlers (bulk), chain saw, georgia buggy (mechanically operated), grademan, hot mastic kettleman, crusher feeder, joint man, jute man, mason tender, material batch hopper and scale man, mixer man, pier hole man (working 11 feet deep), pipelayer - drainage (concrete and/or corrugated metal), signal man (crane), truck dumper - dry batch, vibrator operator, wagon and churn drill operator, asphalt raker, barco tamper, concrete saw, creosote material - handling and applying, nozzle burner (cutting torch and burning bar), conduit pipe, water and gas distribution lines, tile and duct line setter, form setter and liner on concrete paving, powderman, sandblasting and gunite nozzleman, sanitary sewer pipe layer, steel plate structure erectors, screed man.

LABO1290I 02/01/1997

	Rates	Fringes
DOUGLAS AND SHAWNEE COUNTIES		
ASBESTOS AND HAZARDOUS MATERIAL ABATEMENT WORKERS (Preparation, removal and encapsulation of hazardous materials from non-mechanical systems)	10.40	3.80

LABO1290L 02/01/1997

	Rates	Fringes
LEAVENWORTH COUNTY		
ASBESTOS AND HAZARDOUS MATERIAL ABATEMENT WORKERS (Preparation, removal and encapsulation of		

hazardous materials from non-mechanical systems)	11.40	4.15

LABO1290N 02/01/1997

	Rates	Fringes
JEFFERSON COUNTY		
ASBESTOS AND HAZARDOUS MATERIAL ABATEMENT WORKERS (Preparation, removal and encapsulation of hazardous materials from non-mechanical systems)	10.00	3.80

LABO1290W 04/01/2002

	Rates	Fringes
LABORERS		
LEAVENWORTH COUNTY		
GROUP 1	16.05	7.24
GROUP 2	17.14	7.24

GROUP 1: Board mat weavers & cable tiers, georgia buggy (manually operated), mixerman-no skip lift, salamander tenders, track men, tractor swamper, truck dumper, wire mesh setter, water pump up to 4 inches, and all other general laborers including flagman.

GROUP 2: Air tool operators, cement handlers (bulk), chain saw, georgia buggy (mechanically operated), grademan, hot mastic kettleman, crusher feeder, joint man, jute man, mason tender, material batch hopper and scale man, mixer man, pier hole man (working 11 feet deep), pipelayer - drainage (concrete and/or corrugated metal), signal man (crane), truck dumper - dry batch, vibrator operator, wagon and churn drill operator, asphalt raker, barco tamper, concrete saw, creosote material - handling and applying, nozzle burner (cutting torch and burning bar), conduit pipe, water and gas distribution lines, tile and duct line setter, form setter and liner on concrete paving, powderman, sandblasting and gunite nozzleman, sanitary sewer pipe layer, steel plate structure erectors, screed man.

PLAS0044C 04/01/1997

	Rates	Fringes
CEMENT MASONS:		
DOUGLAS & SHAWNEE COUNTIES	14.25	2.95
JEFFERSON COUNTY	13.65	2.95

PLAS0518C 04/01/2001

	Rates	Fringes
LEAVENWORTH COUNTY:		

CEMENT MASONS	20.40	8.15

PLUM0165D 06/01/2001

	Rates	Fringes
JEFFERSON AND SHAWNEE COUNTIES		
PLUMBERS	24.24	7.35

PLUM0533D 12/01/1999

	Rates	Fringes
LEAVENWORTH COUNTY		
PIPEFITTERS	26.38	9.53

PLUM0763C 08/01/2001

	Rates	Fringes
DOUGLAS COUNTY		
PLUMBERS AND PIPEFITTERS:		
Industrial and Commercial Projects	24.63	6.80
Light Commercial Projects: (heating, cooling and plumbing on construction projects bid for $50,000 or less, but does not include industrial, hospitals, colleges, and university projects)	21.19	6.80

TEAM0541F 04/01/2000

	Rates	Fringes
LEAVENWORTH COUNTY:		
GROUP 1	21.66	6.50
GROUP 2	21.17	6.50
GROUP 3	20.69	6.50

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Mechanics and welders, A-frame low boy - boom truck driver.

GROUP 2: Material trucks, Tandem two teams, Semi-trailers, Winch trucks-fork trucks, Distributor drivers and operators, Agitator and transit mix, Tank wagon drivers, Single axle, Tank wagon drivers, Tandem or semi-trailer, Isley wagons, dump trucks, Excavator, 5 cu. yds., and over, Dumpsters, Half-tracks, Speedace, Euclids and other similar excavating equipment, One team, Station wagons, Pickup truck, Material trucks, single axle, Tank wagon drivers, single axle.

GROUP 3: Oilers and Greasers.

TEAM0541J 03/25/2000

	Rates	Fringes
TRUCK DRIVERS:		
Traffic Control Service Driver	14.15	2.44+a

a. PAID HOLIDAYS: New Year's Day, Decoration Day, July 4th, Labor Day, Thanksgiving Day, Christmas Day, Employee's birthday and 2 personal days.

TEAM0696A 03/16/1997

	Rates	Fringes
DOUGLAS, JEFFERSON AND SHAWNEE COUNTIES		
TRUCK DRIVERS:		
GROUP 1	10.60	2.95
GROUP 2	10.70	2.95
GROUP 3	10.85	2.95

GROUP 1: Pickups, Panel trucks, Station wagons, Flat beds, Dump and batch trucks, single axle

GROUP 2: Tandem trucks, Warehousemen or partsmen, Mechanic helpers and servicemen

GROUP 3: Lowboys, Semi-trailers, all Transit mixer truck (single or tandem Axle), A-frame and winch trucks when used as such, Euclid, end and bottom dump, Tournarockers, Atheys, Dumpsters and similar off-road equipment and mechanics on such equipment

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(v)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination

* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour

Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

GENERAL DECISION KS020048 03/01/02 KS48

General Decision Number KS020048

Superseded General Decision No. KS010048

State: Kansas

Construction Type:
RESIDENTIAL

County(ies):
DOUGLAS LEAVENWORTH

RESIDENTIAL CONSTRUCTION PROJECTS (consisting of single family homes and apartments up to and including 4 stories)

Modification Number	Publication Date
0	03/01/2002

COUNTY(ies):
DOUGLAS LEAVENWORTH

SUKS4007A 02/01/1988

	Rates	Fringes
BRICKLAYERS	14.00	
CARPENTERS (Excluding Batt Insulation	9.96	
CEMENT MASONS	12.00	
ELECTRICIANS	10.62	
INSULATORS (Batt)	11.85	
LABORERS	7.52	
MASON TENDERS	8.50	
PAINTERS	8.55	
PLUMBERS/PIPEFITTERS	11.89	1.06
POWER EQUIPMENT OPERATORS:		
Loader	14.95	3.87
Backhoe	12.89	3.25
ROOFERS	10.85	
SHEET METAL WORKERS	8.55	
TILE SETTERS	13.05	
TRUCK DRIVERS	7.52	

WELDERS: Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(v)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.

Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

DIVISION 1 – GENERAL REQUIREMENTS

EDITED GUIDE SPECIFICATIONS PROVIDED BY THE GOVERNMENT

01010	Statement of Work
01012	Design After Award
01100	General
01312	Resident Management System (RMS)
01320	Project Schedule Design Build Construction
01330	Submittal Procedures (Design-Build)
01356	Storm Water Pollution Protection Measures
01410	Environment Protection and Erosion Control
01450	Testing for Mechanical and Electrical Systems
01451	Contractor Quality Control
01500	Temporary Construction Facilities
01567	NPDES Permit Requirements for Storm Water Discharges from Construction Sites
01911	Quarters Cleaning

SECTION 01010

STATEMENT OF WORK

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STATEMENT OF WORK

1. DESIGN OBJECTIVES.

1-1 The design and construction shall comply with the minimum requirements contained in this Request for Proposals (RFP).

1-1.1 Primary Consideration. All proposals received MUST include must include a price for all items in the base bid as a minimum. Failure to meet this requirement may result in non-consideration of the Offeror's proposal. Betterments will only be considered upon verification that the primary consideration requirements have been met.

1-2. Work Scope. This contract shall consist of the design and construction of a total of 42 duplexes, supportive infrastructure, and landscape at Fort Leavenworth, Kansas, in accordance with the requirements of this RFP.

1-2.1 Residences: For the purposes of this RFP, a duplex is defined as a one- or two-story structure divided by a common party wall into two separate residences, each with separate exterior entrances. The required number, type, and location of individual residences are as shown on the RFP documents.

1-2.2 Sitework.

1-2.2.1 Sitework. Sitework includes all design and construction of the site design to include grading, storm drainage, erosion control, pedestrian and vehicular circulation, utility systems, outdoor lighting, play lots, and physical security.

1-2.2.2 Development for this Project is planned in three separate noncontiguous sites. As indicated in the drawings, these sites have been subdivided into lots. The number of lots per site may not be changed; however, the lot configuration may be slightly altered to fit the proposer's specific design assuming that it complies with other requirements of this RFP. Approximate distribution of the housing on the three sites is as follows:

Site 1A – 30.84 acres; 46 residences
Site 1B – 17.47 acres; 18 residences
Site 1D – 9.88 acres; 20 residences

1-2.3 Special utilities and supplementary construction. At Site 1B, there are 2 water lines (12 inches and 20 inches) between Biddle Boulevard and Hancock Avenue at the back side (northeast) of the existing housing development. These lines cannot be removed.

1-2.4 Demolition considerations and requirements. Demolition of 86 housing residences located in 17 buildings will be required as a part of this Project. Above ground demolition of Delaware Village residences and their foundations are part of the base bid. Below ground utilities must be removed to a point a minimum of 5 feet from the structures being removed. Cap and install shut off valves on underground utilities. Remove all power poles, conductors and transformers for housing units removed. Contractor shall grade and seed only areas disturbed by the contractor during demolition. These residences have asbestos containing materials that must be abated prior to demolition. Refer to the asbestos specification and survey included as attachments to this RFP. There is no lead paint in the buildings to be demolished.

1-3 (NOT USED)

1-4 Design Freedom. The attached floor plans, elevations, roof plans, and site plans will not be modified. Any change or deviation must be approved by the Contracting Officer.

1-5 Method of Duplex Unit Construction. The Offeror may utilize the following construction methods: Site-built, factory-built components/modules, or manufactured housing. Use of factory-built or manufactured housing methods must not result in alteration of the RFP Floor Plans.

1-6 Definition of housing construction methods. Terms for housing construction methods used in these criteria are defined as follows:

1-6.1 Site- or stick-built housing. Residences are wholly constructed at the site.

1-6.2 Factory-built components and modules. Construction consisting of components, sub-assemblies such as modules, panelized walls, roof trusses, floor joists, and other factory-assembled components, which are transported to the construction site and further assembled into completed residences.

1-6.3 Manufactured housing. As defined in Public Law 93-383, Title 24, Chapter XX amended (1977, 1978, 1979, and 1980), a manufactured home is "a structure, transportable in one (1) or more sections which in the traveling mode is eight body feet or more in width, or forty body feet or more in length, or, when erected on site, is built on a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air conditioning and electrical systems contained therein."

2. CRITERIA REFERENCES.

2-1 Criteria to be used for design and construction shall be taken from the most current references at the date of issue of the RFP. Administrative, contractual, and procedural features of the contract shall be as described in other sections of the RFP. Referenced codes and standards herein and those listed below are minimum acceptable criteria.

2-2 Local and State Codes or Standards. The following specifications, standards, bulletins, and handbooks form a part of this document to the extent specified herein.

2-2.1 Uniform Building Code, 1997 Edition.

2-3 Federal Laws. The Federal laws and regulations listed in Table 2-1 form a part of this document. They are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20401-9325 (202) 512 - 1800

TABLE 2-1 – FEDERAL LAWS & REGULATIONS

CFR/USC No.	Description
10 CFR 430	National Appliance Energy Conservation Act (NAECA)
16 CFR 1630	Standard for Surface Flammability of Carpet and Rugs
29 CFR 1926	Occupational Safety and Health Administration (OSHA) Standards and Regulations
40 CFR 247.12	Comprehensive Procurement Guideline for Products Containing Recovered Materials, Construction Products
49 CFR 192	Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards
42 USC 4321-4361	National Environmental Policy Act (NEPA)
Army Regulation 200-1	Environmental Protection and Enhancement, May 1990
E.O. 13123	Energy Efficiency and Water Conservation in Federal Facilities

2-4 Other Government Documents and Publications. The following Government documents and publications form a part of this document to the extent specified herein:

2-4.1 Americans With Disabilities Act Accessibility Guidelines, are available from U.S. Architectural and Transportation Barriers Compliance Board, 1331 F Street, N.W., Washington, D.C. 20004-1111

2-4.2 Federal Emergency Management Agency, Mitigation Directorate; 500 C Street,

SW; Washington DC 20472: National Performance Criteria for Tornado Shelters and FEMA 320, Taking Shelter from the Storm: Building a Safe Room Inside Your Home. http://www.fema.gov/

2-5 Non-Government Publications. The following publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are Department of Defense (DoD) adopted are those listed in the Department of Defense Index of Specifications and Standards (DODISS).

2-5.1 Air-Conditioning and Refrigeration Institute (ARI). Information listed below is available from ARI, 4301 Fairfax Dr., Suite 425, ATTN: Pubs Dept., Arlington, VA 22203, Ph: 703-524-8800, Fax: 703-528-3816, Internet E-Mail: ari@dgsys.com, Directory of Certified Unitary Air Conditioners, Unitary Heat Pumps and Sound Rated Outdoor Unitary Equipment; ARI 210/240, Unitary Air Conditioning and Air-Source Heat Pump Equipment: http://www.ari.org/

2-5.2 AIR MOVEMENT AND CONTROL ASSOCIATION (AMCA), AMCA 210, Laboratory Methods of Testing Fans For Rating, is available from AMCA, 30 West University Drive, Arlington Heights, IL 60004, (312) 394-0150: http://www.amca.org/

2-5.3 American Architectural Manufacturers Association (AAMA). AAMA specifications shown in Table 2-2 are available from AAMA, 1540 East Dundee Rd., Suite 310, Palatine, IL 60067-8321,Ph: 708-202-1350,Fax: 708-202-1480 2700 River Road, Suite 118, Des Plaines, IL 60018, (312) 699-7310.

TABLE 2-2 - AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION SPECIFICATIONS

No.	Description
AAMA 1002.10	Voluntary Specifications for Aluminum Insulating Storm Products for Windows and Sliding Glass Doors

2-5.4 American Gas Association (AGA). Standards and specifications are available from AGA, 1515 Wilson Blvd., Arlington, VA 22209, Ph: 703-841-8556,Fax: 703-841-8406: http://www.aga.org/

2-5.5 American National Standards Institute, Inc. (ANSI). Copies of the standards listed in Table 2-3 are available from ANSI, 11 West 42nd St., New York, NY 10036, Ph: 212-642-4900, Fax: 212-302-1286: http://www.ansi.org/

TABLE 2-3 - AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARDS

Std. No.	Std. Description

TABLE 2-3 - AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARDS

Std. No.	Std. Description
A112.19.1	Enameled Cast Iron Plumbing Fixtures
A112.19.2	Vitreous China Plumbing Fixtures (DoD Adopted)
A112.19.4	Porcelain Enameled Formed Steel Plumbing Fixtures (DoD Adopted)
A112.19.5	Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards) (DoD Adopted)
A161.1	Recommended Construction and Performance Standards for Kitchen and Vanity Cabinets
B16.5	Steel Pipe Flanges and Flanged Fittings (DoD Adopted)
B16.22	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings (DoD Adopted)
B16.26	Cast Copper Alloy Fittings for Flared Copper Tubes (DoD Adopted)
B31.8	Gas Transmission and Distribution Piping Systems
C2	National Electrical Safety Code
ANSI C105 AWWA A21.5	Polyethylene Encasement for Ductile-Iron Pipe Systems
Z21.10.1	Water Heaters, Gas, Volume I, Storage Type, 75,000 BTUH Input or Less
Z21.45	Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
Z60.1	American Standard for Nursery Stock
Z124.1	Plastic Bathtub Units
Z124.2	Plastic Shower Receptors and Shower Stalls

2-5.6 American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) documents, listed in Table 2-4, are available from ASHRAE,1791 Tullie Cir., NE, Atlanta, GA 30329-2305, Ph: 404-636-8400 Fax: 404-321-5478 1791 Tullie Circle, N.E., Atlanta, GA 30329, (404) 636-8400: http://www.ashrae.org/

TABLE 2-4 – AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR-CONDITIONING ENGINEERS (ASHRAE)

No.	Description
ASHRAE -	Handbook of Fundamentals
ASHRAE -	Residential Cooling Load Calculations
ASHRAE 62	Ventilation for Acceptable Indoor Air Quality
ASHRAE 52	Method of Testing Air Cleaning Devices used in General Ventilation for Removing Particulate Matter
ASHRAE 111	Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air Conditioning, and Refrigeration Systems

2-5.7 American Society of Mechanical Engineers (ASME). ASME B16.11, Forged Fittings, Socket-Welding and Threaded, and ASME B31.8, Gas Transmission and Distribution Systems, are available from ASME, 22 Law Dr., Box 2300, Fairfield, NJ 07007-2900, Ph: 800-843-2763, Fax: 201-882-1717: http://www.asme.org/

2-5.8 American Society for Testing and Materials (ASTM). ASTM specifications listed in Table 2-5 are available from ASTM, AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) 1916 Race St., Philadelphia, PA 19103, Ph: 215-299-5585, Fax: 215-977-9679: http://www.astm.org/

TABLE 2-5 - AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) SPECIFICATIONS

Spec. No.	Spec. Description
A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
A526	Specification for Steel Sheet Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality (DoD Adopted)
B117	Method of Salt Spray (Fog) Testing (DoD Adopted)
C90	Specification for Hollow Load-Bearing Concrete Masonry Units (DoD Adopted)
C216	Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale) (DoD Adopted)
D3676	Rubber Cellular Cushion Used for Carpet or Rug Underlay

TABLE 2-5 - AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) SPECIFICATIONS

Spec. No.	Spec. Description
D1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft 2700kN-m/m)
D1785	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 (DoD Adopted)
D2513	Standard Specification for Thermoplastic Gas Pressure Piping (DoD Adopted)
D2683	Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing (DoD Adopted)
D2846	Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot and Cold-Water Distribution Systems (DoD Adopted)
D3018	Specification for Class A Asphalt Shingles Surfaced with Mineral Granules (DoD Adopted)
E84	Standard Test Method for Surface Burning Characteristics of Building Materials (DoD Adopted)
E90	Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions (DoD Adopted))
E108	Standard Methods of Fire Tests of Roof Coverings
E119	Standard Methods of Fire Tests of Building Construction and Materials
E162	Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source (DoD Adopted)
E283	Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
E330	Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
E336	Standard Test Method for Measurement of Airborne Sound Insulation in Buildings
E547	Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential
E648	Critical Radiant Flux of Floor-Covering Systems Using a Radiant Energy Source
E779	Measuring Air Leakage by the Pressurization Method

TABLE 2-5 - AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) SPECIFICATIONS

Spec. No.	Spec. Description
E1007	Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures
E1465	Standard Guide for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings
F1292	Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment
E1423	Standard Practice for Determining the Steady State Thermal Transmittance of Fenestration Systems
E 1554	Determining External Air Leakage of Air Distribution Systems by Fan Pressurization.
F 1066	Standard Specification for Sheet Vinyl Composition Floor Covering
F1487-98	Standard Consumer Safety Performance Specification for Playground Equipment for Public Use
G90	Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight

2-5.9 American Water Works Association, Inc. (AWWA). Specifications listed below are available from AWWA, 6666 West Quincy, Denver, CO 80235, Ph: 800-926-7337, Fax: 303-795-1989, AWWA C500, Gate Valves for Water and Sewerage Systems (DoD adopted); AWWA C502, Dry-Barrel Fire Hydrants; and AWWA C503, Wet-Barrel Fire Hydrants: http://www.awwa.org/

2-5.10 Associated Air Balance Council (AABC). AABC MN-1, National Standards for Total System Balance, is available from AABC, 1518 K St., NW, Washington, DC 20005, Ph: 202-737-0202, Fax: 202-638-4833: http://www.aabchq.com/

2-5.11 American Association of Textile Chemists and Colorists (AATCC). AATCC 134, Electrostatic Propensity of Carpets, is available from AATCC, P.O. Box 12215, Research Triangle Park, NC 27709, (919) 549-8141.: http://www.aatcc.org/

2-5.12 Builders Hardware Manufacturers Association, Inc. (BHMA). Specifications shown in Table 2-6 are available from the Builders Hardware Manufacturers Association, Inc. (BHMA), 355 Lexington Ave., New York, NY 10017, Ph: 212-661-4261, FAX: 212-370-9047.

TABLE 2-6 - BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA) SPECIFICATIONS

No.	Description (Specs. are DoD Adopted)

TABLE 2-6 - BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA) SPECIFICATIONS

No.	Description (Specs. are DoD Adopted)
BHMA 101	Butts and Hinges
BHMA 301	Door Controls, Closers
BHMA 501	Auxiliary Locks and Associated Products
BHMA 601	Bored and Preassembled Locks and Latches
BHMA 611	Interconnected Locks and Latches

2-5.13 Council of American Building Officials (CABO). The CABO One (1) and Two (2) Family Dwelling Code and Model Energy Code, are available from the COUNCIL OF AMERICAN BUILDING OFFICIALS (CABO) 5203 Leesburg Pike, Suite 708, Falls Church, VA 22041, Fax: 703-379-1546: http://www.intlcode.org/

2-5.14 Electronic Industries Association Telecommunications Industry Association (EIA/TIA). EIA/TIA Standard EIA/TIA-570, is available from Electronic Industries Association, Engineering Department, Order From: Global Engineering Documents, 7730 Carondelet Ave., Suite 407 Clayton, MO 63105, Ph: 800-854-7179, or 714-979-8135, Fax: 314-726-6418

2-5.15 Illuminating Engineering Society of North America (IESNA). The IESNA Lighting Handbook, is available from Illuminating Engineering Society of North America, (IESNA), 120 Wall St., 17th Floor, New York, NY 10005-4001, Ph: 212-248-5000, Fax: 212-248-5017: http://www.iesna.org/

2-5.16 International Conference of Building Officials (ICBO). The Uniform Building Code is available from the, INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO), 5360 S. Workman Mill Rd., Whittier, CA 90601-2258, Ph: 310-699-0541, Fax: 310-692-3853: http://www.icbo.org/

2-5.17 National Association of Corrosion Engineers (NACE). NACE RP-0286, The Electrical Isolation of Cathodically Protected Pipelines, is available from NACE, P.O. Box 218340, Houston, TX 77218: http://www.nace.org/.

2-5.18 National Electrical Manufacturers Association (NEMA). NEMA standards listed below are available from the National Electrical Manufacturers Association (NEMA), NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA),2101 L St., NW, Suite 300,Washington, DC 20037-1526
Ph: 202-457-8474 Fax: 202-457-8473 NEMA DC 3, Wall-Mounted Room Thermostats; and NEMA WD 1, General Requirements for Wiring Devices: http://www.nema.org/

2-5.19 NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB), NEBB-01, Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems, is available from NEBB, 875 Grove Mount circle, Gaithersburg, MD 20877-4121, Ph: 301-977-3698, Fax: 301-977-9589: http://www.nebb.org/

2-5.20 National Fenestration Rating Council (NFRC). NFRC 100-91, Procedure for Determining Fenestration Product Thermal Properties, is available from NFRC, 1300 Spring Street, Suite 500, Silver Spring, MD. Telephone: (301) 589-NFRC, http://www.nrfc.org

2-5.21 National Fire Protection Association, Inc. (NFPA). NFPA codes listed in Table 2-7 are available from the National Fire Protection Association, Inc.

(NFPA), 1Battery March Park, P.O. Box 9101, Quincy, MA 02269. Telephone: (617) 770-3000, Fax: (617) 770-0700: http://www.nfpa.org/

TABLE 2-7 - NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) CODES

Code No.	Code Description
NFPA 30	Flammable Liquids Code
NFPA 31	Installation of Oil Burning Equipment
NFPA 54	National Fuel Gas Code
NFPA 70	National Electrical Code (DoD Adopted)
NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code
NFPA 101M	Alternative Approaches to Life Safety
NFPA 255	Method of Test of Surface Burning Characteristics of Building Materials
NFPA 501A	Manufactured Home Installations
NFPA 701	Standard Methods of Fire Tests for Flame Resistant Textiles and Films

2-5.22 National Wood Window and Door Association (NWWDA) standard, NWWDA I.S.2, Standard for Wood Window Units is available from the National Wood Window and Door Association (NWWDA), 1400 East Touhy Ave., Suite 470, Des Plaines, IL 60018, (847) 299-5200, Fax: (847) 299-1286: http://www.nwwda.org/.

2-5.23 Sheet Metal and Air Conditioning Contractors National Association (SMACNA). SMACNA Installation Standards for Residential Heating and Air Conditioning Systems and SMACNA-07, HVAC Systems, Testing, Adjusting, and Balancing, are available from SMACNA, 4201 Lafayette Center Drive, Chantilly, VA 22180, (703) 803-2980, Fax: (703) 803-3732: http://www.smacna.org/

2-5.24 Underwriters Laboratories, Inc. (UL) specifications listed in Table 2-8 are available from the Underwriters Laboratories, Inc. (UL), 333 Pfingston Road, Northbrook, IL 62096. Telephone: (847) 272-8800. Fax: (847) 509-6220: http://www.ui.com/.

TABLE 2-8 – UNDERWRITERS LABORATORIES SPECIFICATIONS

No.	Description (Specs. Are DoD Adopted)
UL 430	Waste Disposers
UL 507	Electric Fans
UL 555	Fire Dampers
UL 567	Pipe Connectors for Flammable and Combustible Liquids and LP Gas
UL 746C	Polymeric Materials - Use in Electrical Equipment Evaluations
UL 749	Household Dishwashers
UL 858	Household Electric Ranges
UL 923	Microwave Cooking Appliances
UL 900	Test Performance of Air Filter Units

3. SITE PLANNING AND DESIGN.

3-1 Scope. This Project consists of the construction of 42 duplexes (84 residences) on 3 sites of approximately 48.7 acres of total land area. The site design, project composition, and gross density are fixed and shall not be altered except as required to accommodate site constraints such as grading limitations and utility routing.

3-2 Buffer area. Provide a berm and landscape buffer to visually separate the new housing area at Site 1D from the cemetery to the southwest, as shown in the RFP Drawings.

3-2.1 Spoilage area. The RFP Drawings indicate an area on the south side of Site 1A to be used for placing excess soil resulting from sitework in this Project. Spoilage (if any) shall be placed evenly along the designated area in quantities shown on the Drawings.

3-2.2 Residence grouping and orientation. The residence grouping layout is indicated on the drawings and is fixed. The final grouping layout shall not vary significantly from this layout except as required for utility routing and accommodations for topography.

3-2.3 Grading. The grading will maintain existing topography to the extent possible, but must incorporate the specific grading requirements indicated below. The successful offeror’s final grading design must manage site runoff, ensure drainage away from the residences and other site features and provide a smooth transition between graded and natural areas.

3-2.3.1 Grading within 15 feet of the building shall not be less than 4 percent away from the building.

3-2.3.2 Site grading in turfed areas between 15 feet and 50 feet from a building shall maintain existing topography to the extent possible, but must incorporate the specific grading requirements indicated below. The successful Offeror’s proposed grading must manage all site runoff, ensure drainage away from residences and other site features, and provide a smooth transition between graded and natural areas.

3-2.3.3 Grading slopes over 3:1 shall not occur within the project boundaries.

3-2.3.4 All drainage swales shall have flat bottoms lined with sod or erosion control material to prevent erosion.

3-2.3.5 Driveways shall not be steeper than 5 percent slope.

3-3. Cul-de-sac Design. The diameter of the cul-de-sacs shall be a minimum of 100 feet to accommodate the turning radius of moving vans and fire trucks.

3-3.1 Intersection Design. Provide intersections as indicated on the drawings.

3-3.2 Street design. Curbs shall be depressed at entrances to driveways unless the rolled types of curbs are provided throughout. All gradients shall provide positive drainage with no ponding, 1 percent minimum slope, 6 percent maximum slope parallel to traffic.

3-3.2.1 Residential street widths shall have two 10-foot moving lanes, two 2-foot curb and gutter sections, and one 7-foot parking lane for a total street width of 31 feet back-to-back of curb. Curb width is assumed to be 6 inches.

3-3.2.2 Curb and gutters shall be concrete, roll type, 2’-0” wide.

3-3.2.3 Street Construction: Street paving shall be 3.5-inch thick asphalt KDOT BM-2, on 16.5 inches of graded-crushed-aggregate base course equal to KDOT AB-3. KDOT refers to the Kansas Department of Transportation Standard Specifications for Road

and Bridge Construction. Subgrade for streets shall be compacted to 95 percent maximum density as described in the Geotechnical Report attached. The graded-crushed-aggregate base course shall be compacted to 95 percent maximum density as described in the Geotechnical Report.

3-3.2.4 Street Signs: Provide street signs at all intersections. Signs shall comply with the Manual on Uniform Traffic Control Devices (http://mutcd.fhwa.dot.gov) for size and location. Street names will be provided by the installation. Signage letters shall be dark brown characters (FED-STD-595-A-#20059) on a standard buff white background (FED-STD-595-A-#33690). Posts shall be galvanized steel painted dark brown (FED-STD-595-A-#20059).

3-3.2.5 Residence Driveway. Driveways shall be a minimum of 20 feet wide with a maximum gradient of 5 percent away from the garage. Pavement for driveways shall be portland cement concrete, 6 inches thick, 650 psi flexural strength at 28 days with 6x6/w2.9xw2.9 WWF on a 4-inch graded-crushed-aggregate base course (KDOT AB-3) compacted to 95 percent maximum density. Provide control joints at a maximum spacing of 12 feet.

3-3.3 Dumpster Pads. Provide portland cement concrete pad, 10’-6” wide x 20’ long, 6” thick, 650-psi flexural strength at 28 days with 6x6/w2.9xw2.9 WWF on a 6” graded-crushed-aggregate base course (KDOT AB-3) compacted to 95 percent maximum density. Provide an anchored concrete wheel stop at the rear of the pad to protect the landscaping. Provide landscaping to screen the dumpster and improve the appearance of the dumpster pad.

3-3.3.1 Sidewalk design. Sidewalks shall be provided on one side of any street within the Project limits. Walks shall be a minimum of 5 feet wide and made of non-reinforced concrete with a minimum thickness of 4 inches. Walks along the street shall have a 5-foot-wide grassed space maintained between the sidewalk and the back of the curb. Ramps for handicapped individuals shall be provided at intersections by depressing street curbs and adjacent sidewalk.

3-3.3.2 Jogging Paths. As a bid option, provide 8-foot-wide asphalt jogging paths where indicated. Jogging path paving shall be 2-inch-thick asphalt KDOT BM-2, on 4 inches of graded-crushed-aggregate base course equal to KDOT AB-3. Connect jogging paths to existing pedestrian circulation as indicated.

3-4 Outdoor Play Areas. The design of the children's outdoor play areas (playgrounds) shall comply with the safety requirements of ASTM F 1487 and ASTM F 1292. Playground grading shall be well-drained and should be sloped between 2% and 4%.

3-4.1 Child Safety and Accessibility.

3-4.1.1 Use zones. In accordance with ASTM F 1487, a use zone is a clear, unobstructed area under and around play equipment where a child would be expected to land when jumping or falling from a piece of play equipment. These zones require a playground safety surface in accordance with ASTM F 1292. Requirements for use zones vary for the age group and for different pieces of equipment. All use zones for play equipment should be shown on the site plan to ensure there is no conflict between play activities on the ground and swinging or jumping from the equipment. Use zones will not overlap.

3-4.1.2 Playground safety surface. A playground safety surface is constructed of a material that meets the shock absorbency criteria recommended in ASTM F 1292. Playground safety surfaces shall be provided throughout all use zones and under all play equipment as required.

3-4.1.3 Playground equipment made of lumber treated with arsenic, such as CCA, is not acceptable.

3-4.2 Manufactured play equipment. Provide the following play equipment:

3-4.2.1 Site 1A: The existing play lot at site 1A shall remain in use. Provide a new combination play unit as follows:

Combination Play Unit: Short plastic slide, spiral slide, hop-scotch climber, deck-to-deck climber (climber equal to Playworld Systems Superdome 0400), pipe wall with steering wall, Tic-Tac-Toe, transition station with step, and 6-foot horizontal spiral ladder with access ladder, equal to Playworld Systems - Challengers 350-0007.

3-4.2.2 Site 1B: Provide one new playground with one each of the following equipment:

Swing Set: 4-swing set, 10-feet high, 2 rigid molded rubber adult seats, 2 pliable rubber (over stainless steel core) slash-proof infant seats, 4/0 straight link galvanized swing chain with hanger with bearings, equal to Playworld Systems - Standard Swing 0253.

Double Large Slide: Two 60-inch plastic slides, vinyl-coated steel ladder and deck, 3½-inch galvanized steel powder-coated posts, full-length handrails on ladder, equal to Playworld Systems - Double-Lightning, CH3982.

Jungle Gym: Geodesic dome structure, 17-foot diameter, 7-foot high, 1-1/16-inch OD powder-coated galvanized pipe, walk-in adult access, equal to Playworld Systems - Super Dome 0400.

Combination Play Unit: Short plastic slide, spiral slide, hop-scotch climber, deck-to-deck climber, pipe wall with steering wall, Tic-Tac-Toe, transition station with step, and 6-foot horizontal spiral ladder with access ladder, equal to Playworld Systems - Challengers 350-0007.

Park Bench: 8-foot-long, angle-leg, pressure-treated pine planks for seat and back, 2-3/8-inch painted galvanized steel pipe frame with end caps, equal to Playworld Systems – Bench 1372.

3-4.2.3 Site 1C: All existing play lot equipment shall remain in use and shall not be demolished or salvaged.

3-4.2.4 Site 1D: Provide one new playground with one each (except as noted) of the following equipment:

Swing Set: 6-swing set, 10 feet high, 4 rigid molded rubber adult seats, 2 pliable rubber (over stainless steel core) slash-proof infant seats, 4/0 straight link galvanized swing chain with hanger with bearings, equal to Playworld Systems - Standard Swing 0255.

Double Large Slide: Two 60-inch plastic slides, vinyl-coated steel ladder and deck, 3½-inch galvanized steel powder-coated posts, full-length handrails on ladder, equal to Playworld Systems - Double-Lightning, CH3982.

Jungle Gym: Geodesic dome structure, 17-foot diameter, 7-foot high, 1-1/16-inch OD powder-coated galvanized pipe, walk-in adult access, equal to Playworld Systems - Super Dome 0400.

Combination Play Unit: Short plastic slide, spiral slide, hop-scotch climber, deck-to-deck climber, pipe wall with steering wall, Tic-Tac-Toe, transition station with step, and 6-foot horizontal spiral ladder with access ladder, equal to Playworld Systems - Challengers 350-0007.

(2) Park Bench: 8-foot long, angle-leg, pressure-treated pine planks for seat and back, 2-3/8-inch painted galvanized steel pipe frame with end caps equal to Playworld System – Bench 1372.

Picnic Table: 8-foot long, portable, perforated steel top and seats, 2-3/8-inch galvanized steel pipe frame, powder-coated top and frame, equal to Playworld Systems – 1403.

3-4.3 Site 1D: Provide a picnic shelter (minimum 400-square-foot coverage) with 4 picnic tables. Shelter shall have a concrete floor and standing seam metal roof. Concrete floor shall be 4 inches thick, have 650-psi. flexural strength at 28 days with 6x6/w2.9xw2.9 WWF on a 4-inch graded-crushed-aggregate base course (KDOT AB-3) compacted to 95 percent maximum density.

3-4.4 Site 1D: Basketball court. Provide 45′ x 45′ concrete pad with painted court markings for half-court basketball. Provide a permanent basketball goal. Goal shall consist of a galvanized steel post, Poly-type fan-shaped backboard, heavy-duty steel goal with chain net. Concrete floor shall be 4 inches thick, have 650-psi flexural strength at 28 days with 6x6/w2.9xw2.9 WWF on a 4-inch graded-crushed-aggregate base course (KDOT AB-3) compacted to 95 percent maximum density.

3-4.5 Soccer Field: Provide space for a soccer playing field where indicated at Site 1B. Space shall be graded to drain at a 2% uniform slope. Soccer field shall remain unfenced at this time. Salvage soccer goals from Site 1A and deliver/install as indicated at Site 1B. Provide turf and sidewalks as indicated.

3-4.6 Plant materials in play areas. Trees shall be integrated into play settings, which may vary from designs shown on the Site Plans, and shall be selected from Table 3-1 below. The intent is to furnish play lots with as much shade as possible (as trees mature) without compromising fall zone and other safety requirements.

3-5 Landscape Planting Plan. The Offeror shall obtain and use the services of a registered landscape architect, experienced in site planning and planting design. A complete, integrated landscape planting plan shall be provided for the overall housing Project. The design shall reflect appropriate groupings, foundation plantings, and street tree plantings to define the open spaces to ensure a completely landscaped Project. Choose plant materials from the list indicated on Table 3-1. Selected plant materials shall be easily maintained and tolerant of the specific site conditions. Planting or seeding shall occur only during periods when beneficial results can be obtained.

TABLE 3-1: SUITABLE PLANTS FOR USE IN FORT LEAVENWORTH HOUSING AREAS

Botanical Name	Common Name
LARGE TO MEDIUM TREES	
Acer x freemanii ‘Autumn Blaze’	‘Autumn Blaze’ Maple
Taxodium distichum	Bald Cypress
Ginkgo biloba	Ginkgo, Maidenhair Tree
Sophora japonica	Japanese Pagodatree
Tilia cordata ‘Greenspire’	‘Greenspire’ Littleleaf Linden
Acer saccharum ‘Legacy’	‘Legacy’ Sugar Maple
Quercus rubra	Northern Red Oak
Fraxinus americana ‘Rosehill’	‘Rosehill’ Ash
Betula nigra (3-5 stem clump form)	River Birch (3-5 stem clump form)
Acer rubrum ‘Red Sunset’	‘Red Sunset’ Red Maple
Gleditsia triacanthos var. inermis ‘Skyline’	‘Skyline’ Thornless Honeylocust
Pinus strobus	Eastern White Pine
SMALL TREES	
Acer ginnala (3-5 stem clump form)	Amur Maple (3-5 stem clump form)
Cersis canadensis (3-5 stem clump)	Eastern Redbud (3-5 stem clump form)
Malus ‘Prairiefire’	‘Prairiefire’ Flowering Crab
Malus ‘Sugar Tyme’	‘Sugar Tyme’ Flowering Crab

TABLE 3-1: SUITABLE PLANTS FOR USE IN FORT LEAVENWORTH HOUSING AREAS

SHRUBS, GROUND COVERS AND UPRIGHT JUNIPERS	
Spiraea x bumalda ‘Anthony Waterer’	Anthony Waterer Spirea
Juniperus horizontalis ‘Blue Chip’	‘Blue Chip’ Juniper
Ilex x meserveae ‘Blue Prince’	‘Blue Prince’ Holly
Viburnum x burkwoodii	Burkwood Viburnum
Euonymus alatus ‘Compactus’	Compact Burning Bush (Dwarf Winged Euonymus)
Cotoneaster apiculatus	Cranberry Cotoneaster
Euonymus fortunei ‘Canadale Gold’	‘Canadale Gold’ Euonymus
Juniperus virginiana ‘Canaertii’	‘Canaert’ Juniper (Eastern Redcedar)
Berberis thunbergii var. atropurpurea ‘Crimson Pygmy’	‘Crimson Pygmy’ Barberry
Picea glauca ‘Conica’	Dwarf Alberta Spruce
Picea pungens ‘Glauca Globosa’	‘Globosa’ Blue Spruce
Spiraea japonica ‘Goldmound’	‘Goldmound’ Spirea
Pyracantha coccinea ‘Gnome’	‘Gnome’ Pyracantha (Firethorn)
Juniperus procumbens ‘Greenmound’	‘Greenmound’ Japgarden Juniper
Berberis thunbergii var. atropurpurea	Japanese Red Barberry
Viburnum x rhytidophylloides ‘Willowwood’	Leatherleaf (‘Willowwood’) Viburnum
Spiraea x bumalda ‘Limemound’	‘Limemound’ Spirea
Berberis x mentorensis	Mentor Barberry
Viburnum x burkwoodii ‘Mohawk’	‘Mohawk’ Viburnum
Euonymus kiautschovicus ‘Paulii’	‘Pauli’ Euonymus
Ribes sanguineum ‘Red Lake’	‘Red Lake’ Currant
Cotoneaster divaricatus	Spreading Cotoneaster
Viburnum plicatum var. Tomentosum ‘Shasta’	‘Shasta’ Doublefile Viburnum
Vinca minor	Common Periwinkle, Vinca
Buxus microphylla kor. ‘Winter Gem’	‘Winter Gem’ Boxwood
Berberis thunbergii var. atropurpurea ‘Rose Glow’	‘Rose Glow’ (Rosy Glow) Barberry
Hibiscus syriacus ‘Helene’	‘Helene’ Rose of Sharon

3-5.1 Required Quantities and Minimum Sizes:

3-5.1.1 Each duplex unit shall receive a minimum of the following plantings per unit

4 large deciduous trees (coniferous evergreen trees may be used in lieu of deciduous trees)
4 flowering trees

In addition, duplex units shall receive a minimum of the number of deciduous or evergreen shrubs and ground covers shown in typical Landscape Plans on Sheet LP1.

3-5.1.2 Minimum Sizes:

Large deciduous trees – 1¾"–2" caliper (8–10 feet)
Flowering tree – 5-6 feet
Coniferous evergreen tree – 5-6 feet
Deciduous or evergreen shrubs – 2-gallon
Evergreen dumpster screening shrubs – 5-gallon
Ground covers – 3-inch pots

3-5.3 Trees, shrubs, and ground cover. Plant varieties shall be nursery grown or plantation grown stock conforming to ANSI/ANLA Z60.1. They shall be grown under climatic conditions similar to those in the locality of the Project.

3-5.3.1 Quality. Well shaped, well grown, vigorous, healthy plants having healthy and well branched root systems shall be provided. Plants shall be free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement, and abrasion. Plants shall be provided that are typical of the species or variety, and conforming to standards as set forth in ANSI/ANLA Z60.1. Poisonous plants and plants with thorns are not allowed and should be removed from the play areas. Refer to the U.S Army Center for Health Promotion and Preventative Medicine, Guide to Poisonous and Toxic Plants: chppm-www.apgea.army.mil/ento/default. htm.

3-5.3.2 Shade and flowering trees. A height relationship to caliper shall be provided as recommended by ANSI/ANLA Z60.1. Height of branching should bear a relationship to the size and variety of tree specified, and with the crown in good balance with the trunk. Trees shall not be "poled" or the leader removed.

3-5.3.2.1 Single stem. Trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

3-5.3.2.2 Multi-stem. All countable stems, in aggregate, shall average the size specified. To be considered a stem, there should be no division of the trunk which branches more than 150 mm (6 in) from the ground level.

3-5.3.2.3 Specimen. A plant shall be provided that is well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

3-5.3.3 Deciduous shrub. Plants shall be provided that have the height and number of primary stems as recommended by ANSI/ANLA Z60.1 An acceptable plant shall be well shaped with sufficient well-spaced side branches recognized by the trade as typical for the variety grown in the region.

3-5.3.4 Coniferous evergreen. Trees shall be provided that have the height-to-spread ratio as recommended by ANSI/ANLA Z60.1. Trees shall not be "poled" or the leader removed. An acceptable plant shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

3-5.3.5 Broadleaf evergreen. Plants shall be provided that have ration of height-to-spread as recommended by ANSI/ANLA Z60.1. An acceptable plant shall be well shaped and recognized by the trade as typical for the variety grown in the region.

3-5.3.6 Ground cover. Plants shall be provided with the minimum number of runners and length of runner as recommended by ANSI/ANLA Z60.1. Plants shall be furnished that have heavy, well developed, and balanced top with vigorous well developed root system, and shall be furnished in containers.

3-5.3.7 Measurement. Plant measurements shall be in accordance with ANSI/ANLA Z60.1.

3-5.3.8 Percolation test. Test for percolation shall be done to determine positive drainage of plant pits and beds. All soil and drainage conditions detrimental to the growth of plant material shall be identified and a proposal correcting the

conditions shall be submitted.

3-5.4 Soil test. A soil test shall be performed for pH, chemical analysis, and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of plant material specified.

3-5.5 Installation. Verify the location of underground utilities. When obstructions below ground or poor drainage affect the planting operation, proposed adjustments to plant location, type of plant, and planting method or drainage correction shall be submitted. The plant material shall be installed during appropriate planting times and conditions recommended by the trade for the type and variety of plant material specified. Plant pits shall be excavated and backfilled as recommended by the trade and ANSI/ANLA Z60.1. The planting operation shall be performed only during periods when beneficial results can be obtained. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted.

3-5.6 Pruning. The total amount of foliage shall be pruned by one-fourth to one-third on installed trees and shrubs to compensate for loss of roots and transplanting shock. The typical growth habit of individual plants shall be retained. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off."

3-5.7 Maintenance during planting operation. Installed plants shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed and shall continue until the plant establishment period commences.

3-5.8 Plant establishment period. On completion of the last day of the planting operation, the plant establishment period for maintaining installed plants in a healthy growing condition shall commence and shall be in effect for the remaining contract time period not to exceed 12 months. When the planting operation extends over more than one season or there is a variance to the planting times, the plant establishment periods shall be established for the work completed.

3-5.9 Maintenance during establishment period. The maintenance of plants shall include straightening plants, tightening stakes and guying material, repairing tree wrap, protecting plant areas from erosion, maintaining erosion material, supplementing mulch, accomplishing wound dressing, removing dead or broken tip growth by pruning, maintaining edging of beds, checking for girdling of plants and maintaining plant labels, watering, weeding, removing and replacing unhealthy plants.

3-5.10 Unhealthy plant. A plant shall be considered unhealthy or dead when the main leader has died back, or 25 percent of the crown is dead. Determine the cause for an unhealthy plant. Unhealthy or dead plants shall be removed immediately and shall be replaced as soon as seasonal conditions permit in accordance with the following warranty paragraph.

3-5.11 Warranty. Furnished plant material shall be guaranteed to be in a vigorous growing condition for a period of 12 months regardless of the contract time period. A plant shall be replaced one time under this guarantee. Transplanting existing plants requires no guarantee but shall be done with care according to ANSI/ASLA standards.

3-5.12 Turf. Turf consists of seed or sod.

3-5.12.1 Seed quality. State approved seed of the latest season's crop shall be provided in the original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and

inert material. Labels shall be in conformance with applicable State seed laws. Seed mixtures shall be proportioned by weight. Weed seed shall not exceed one percent by weight of the total mixture. Use the following seed mixture:

30% Fine Blade Rye (Imagine or equal)
35% Fine Blade Bluegrass (Kentucky or equal)
35% Fine Blade Fescue (Hound Dog 5, Brandy or equal)

3-5.12.2 Sod. State approved sod shall be provided as classified by applicable State laws. Each individual sod section shall be of a size to permit rolling and lifting without breaking. Grass type shall be a blend of rye, bluegrass and fescue to match the seed noted above.

3-5.12.2.1 Quality. The sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 50 mm (2 in) in any dimension, woody plant roots, and other material detrimental to a healthy stand of turf. Sod that has become dry, moldy, or yellow from heating, or has irregular shaped pieces of sod and torn or uneven ends shall be rejected.

3-5.12.2.2 Time limitation. The limitation of time between harvesting and placing sod shall be 36 hours.

3-5.12.3 Soil test. A soil test shall be performed for pH, chemical analysis, and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of turf specified.

3-5.13 Temporary turf cover. When there are contract delays in the turfing operation or a quick cover is required to prevent erosion, the areas designated for turf shall be seeded with a temporary seed. When no other turfing materials have been applied, the quantity of one-half of the required soil amendments shall be applied and the area tilled.

3-5.14 Installation. The turf shall be installed during appropriate planting times and conditions recommended by the trade for the type and variety of turf specified. The turf operations shall be performed only during periods when beneficial results can be obtained. Drainage patterns shall be maintained. The turf shall be installed by using the methods as recommended by the trade for the type and variety of turf specified.

3-5.15 Protection. Immediately after turfing, the area shall be protected against traffic or other use by erecting barricades and providing signage as required.

3-5.16 Turf establishment period. The turf establishment period for establishing a healthy stand of turf shall begin on the first day of work under the turfing contract and shall end three months after the last day of the turfing operation. An unsatisfactory stand of turf shall be repaired as soon as turfing conditions permit.

3-5.17 Satisfactory stand of turf. Turf shall be established and satisfactory prior to final acceptance.

3-5.17.1 Seeded lawn area. A satisfactory stand of turf from the seeding operation for a lawn area is defined as a minimum 225 grass plants per square foot (2025 grass plants per square yard). Bare spots shall be no larger than 6 inches square. The total bare spots shall not exceed 2 percent of the total seeded area.

3-5.17.2. Seeded field area. A satisfactory stand of turf from the seeding operation for a field area is defined as a minimum of 10 grass plants per square foot (110 grass plants per square meter). The total bare spots shall not exceed two (2) percent of the total seeded area. Maximum bare spot size must not be larger

than 6 inches square.

3-5.17.3 Sodded area. A satisfactory stand of turf from the sodding operation is defined as living sod uniform in color and texture. Bare spots shall be no larger than 2 inches (50 mm) square.

3-5.17.4 Sprigged area. A satisfactory stand of turf from the sprigging operation is defined as a minimum of 20 sprigs per square meter. Bare spots shall be no larger than 9 inches (225 mm) square. The total bare spots shall not exceed two (2) percent of the total sprigged area.

3-5.18 Maintenance during establishment period. The maintenance of the turfed areas shall include eradicating weeds, eradicating insects and diseases, protecting embankments and ditches from erosion, maintaining erosion control materials and mulch, protecting turf areas from traffic, mowing, watering, post-fertilization, and replacing unsatisfactory turf areas.

3-5.19 Existing trees less than 50 feet from new buildings. Existing trees located beyond 50 feet from the buildings should be protected and saved except where substantial cut or fill is expected. Where existing trees can be saved, a construction fence should be placed at the drip line of the tree(s) and construction activities and storage should be prohibited from that area.

3.6 Fencing. As a part of betterment, all back yards of dwelling units shall be fenced. Fence shall be 42 inches high to match the existing post standard. Provide a 5-foot wide single gate to each yard. Fences between buildings (duplex units) shall have a double fence with a 6-foot wide minimum path to allow passage from the street to the space in back of the fenced area. If utilities are located behind the unit, allow a 10-foot wide path. Back line of fence will be as shown on Site Plans, with a minimum of 35 feet from the back of the quarters.

3-6.1 Chain link fence fabric shall be double-dipped galvanized or chromate coated steel, not less than 11-1/2 gauge, and be installed with the barb ends pointed down. Chain link fabric shall be stretched taut, and secured using tension bars, tension bands, and tie wires in accordance with industry standards. Top rail shall be 1-3/8" galvanized tubular steel. Line posts shall be 1-5/8" galvanized tubular steel.. Corner posts shall be 1-7/8" galvanized tubular steel. Posts will not to exceed 10' apart. At locations of excessive grade, a post will be installed both at the top of the slope and at the toe of slope. All posts shall be capped with the appropriate sized galvanized steel cap. Fence shall be 3-1/2' (42") in height. Each fenced yard will have a minimum of one 5' (60") wide single gate, constructed of the same quality material as the fencing, be the same height as the fencing, and be equipped with a standard gate latch to allow the gate to be secured in a closed position. Tension bands shall be 1-3/8" galvanized steel with galvanized nuts and bolts. Tension bars shall be 3/4" galvanized steel. Tie wires shall be 9 gauge and galvanized. All posts will be plumb, and encased with a minimum 6" diameter cylindrical concrete footing, poured in place to a depth of a minimum of 24". The contractor shall make reasonable efforts to ensure that the installed fencing components are free of edges or points which could cause a safety hazard. If during the construction or demolition process it is necessary to remove or relocate any of the existing Fence Service Program (FSP) rental fencing adjacent to the construction or demolition areas, the contractor will notify Fort Leavenworth’s Fencing Contractor, American Overhead Door, & Fencing, at 913-682-4640 a minimum of one month prior to the needed date, so the fencing contractor may move his fencing. The contractor will be responsible for any charges related to the removal, relocation, lost monthly revenues, or damage done to the Fencing contractors existing fencing. FSP fences within the unoccupied demolition area will be removed by the Fence Service Program contractor at no cost to the demolition contractor.

3-7 Postal Service. Provide cluster-type mailboxes where indicated on the drawings. At each location, provide 2 boxes set 90 degrees from the street on a 6-foot x 8-foot concrete pad. Mailboxes shall be plastic construction and designed for loading and unloading from the same side.

4. SITE ENGINEERING

4-0 General: It shall be the Contractor's responsibility to protect all existing utility lines from damage during excavation. Any damage resulting to existing utility lines and systems shall be repaired by the Contractor, to the satisfaction of the Contracting Officer, at no additional cost to the Government, except as noted in Item 4-0.1 below.

4-0.1 The Contractor shall be required to locate and mark underground utilities for Fort Leavenworth owned gas, water, sanitary sewer, storm sewer, and electrical, but excluding fiber/telephone and communications. The Contractor will have use of Fort Leavenworth DIS utility drawings to aid in their location. The Contractor shall be responsible for the location of the electric lines and all other utilities listed above that are of metal or have tracer wires available for locating. The utilities that are of nonconductive construction such as plastic or Transite and have no tracer wire or other means of applying a signal are to be located from the utility maps to the best of the Contractor's ability. The utilities that are located from maps that appear to be in the vicinity of the excavation are to be hand-dug for location purposes. If a line is damaged that is within 10 feet of that shown on the utility maps, the Contractor will be held responsible for its repair. The Contractor shall contact Kansas One-Call for utility checks for gas lines owned by Williams Natural Gas, Sprint, Southwestern Bell, and American Cablevision.

4-0.2 Fort Leavenworth personnel will locate underground Post telephone and communications lines. The contractor shall deliver to the DIS work order desk at building 85, 820 McClellan, or transmit via fax 913-684-8950, a diagram showing the approximate area that the posts telephone and communication lines need to be located. The Contractor shall mark the proposed route or limits of the excavation in white prior to the request so that the Government personnel will know where to mark for utilities. The Contractor should allow a minimum of ten (10) working days for the utility locates to be conducted. If the Contractor damages any marked lines during excavation, the Contractor shall contact the Government QA Representative immediately to determine whether the Contractor will perform repairs or reimburse the Government for repairs.

4-1 Soils.

4-1.1 Soil and Foundation Report (Geotechnical Report). A preliminary Soil and Foundation Report is provided as part of this RFP. A drawing indicating Subsurface Explorations and Geologic Profiles for the proposed site is also provided. The report provides an overview of soils and geologic conditions, and is furnished for informational purposes only. The Offeror to whom this contract is awarded shall, with his or her consulting professional geotechnical engineer experienced in geotechnical engineering, be responsible for determining site specific geotechnical conditions.

4-1.1.1 The Contractor provided site specific geotechnical conditions report shall include, but not be limited to:

4-1.1.1.1 Classification of soil and rock.

4-1.1.1.2 Depth to bedrock.

4-1.1.1.3 Extent of boulders.

4-1.1.1.4 Bearing capacity of soil and rock.

4-1.1.1.5 Settlement potential.

4-1.1.1.6 Compaction requirements.

4-1.1.1.7 Groundwater characteristics.

4-1.1.1.8 Infiltration and permeability.

4-1.1.1.9 Erosion and siltation.

4-1.1.1.10 Surface and subsurface drainage.

4-1.1.1.11 Soil resistivity.

4-1.1.1.12 Foundation Types

4-1.1.1.13 Swell Potential

4-1.1.1.14 Soil Modification Techniques

4-1.1.1.15 Lateral Earth Pressure Coefficient

4-1.1.2 The Offeror and his or her professional geotechnical engineer consultant shall certify in writing that the design of the Project has been developed consistent with the site specific geotechnical conditions. The certification shall be stamped by the consulting professional geotechnical engineer and shall be submitted with the 50 percent design submission. If revisions are made to the 50 percent design submission, a new certification shall be provided with the final design submission.

4-1.2 Soil compaction.

4-1.2.1 Soil compaction shall be achieved by equipment approved by a professional geotechnical engineer. Material shall be moistened or aerated as necessary to provide the moisture content that will readily facilitate obtaining the compaction specified with the equipment used. Compact each layer to not less than the percentage of maximum density specified in Table 4-1, determined in accordance with ASTM D 1557 Method D.

TABLE 4-1 – SOIL COMPACTION

Subgrade Preparation, Fills, Embankments, and Backfills	Compaction Requirements (Percentage of Maximum Density)
Structures & Building Slabs	95
Streets, Paved Areas, Bike Paths	95
Sidewalks	95
Grassed Areas	90

4-1.2.2 The requirements shall be verified or modifications recommended by the consulting professional geotechnical engineer in the report wherever engineering, soils, or climatic factors indicate the necessity. Any modification to the stated compaction requirements shall require the approval of the Contracting Officer.

4-1.3 Capillary water barrier. A capillary water barrier is required for all

interior slabs on grade, including garages, carports and storage rooms.

4-1.4 Soil treatment. Soil treatment for termites shall be by the chemical method. Methods and extent of protection required are as follows:

4-1.4.1 Soil treatment shall comply with the attached Specification Section 02364 Termiticide Treatment Measures for Subterranean Termite Control.

4-1.5 Radon mitigation. The design and construction of foundation walls, slabs, and crawl spaces shall include provisions for the reduction of radon entry and facilitate its removal. Radon mitigation shall comply with the requirements of ASTM E1465. Refer to figure 4-1 at the end of this section.

4-2 Water Distribution System. Connection to the existing water distribution system shall be made at the locations shown on the RFP drawings.

4-2.1 Water Mains and Building Service Connections. Mains shall be considered as that part of the distribution system supplying fire hydrants, or fire hydrant laterals. Service connections supply water from the main to the building. Mains shall be looped with no dead ends and be of adequate size to satisfy both domestic and fire flow requirements. Minimum main size is 6 inches. Sufficient sectional control valves shall be provided so that no more than two fire hydrants will be out of service in the event of a single break in a water main. A copper tracer wire shall be placed directly above all non-metallic mains. The tracer wire will be a 12 gauge, solid copper, coated wire. The tracer wire will run the entire length of the buried utility line. In addition, a standard grade, non-magnetic, warning Tape will be installed above all underground utility lines. The tape will be buried 1 foot below the surface, running the entire length of the buried utility. The color of the tape will correspond to the utility it is protecting (see Section 02222 for specific requirements. The pipe, valves, and all other materials shall meet the American Water Works Association (AWWA) standards for a 150 psi working pressure system. Provide sacrificial anodes for all valves and metal pipe as directed by the Contractor’s Cathodic Protection Engineer. Building connections shall be designed and constructed in accordance with the National Standard Plumbing Code.

4-2.2 Flow requirements. Water must be supplied by mains of appropriate capacity to provide 500 gpm at one-story units, 750 gpm at two-story structures, and 1,000 gpm at structures which are three or more stories high, for a flow duration of 1-1/2 hours. This mandatory flow is over and above domestic requirements. Domestic requirements shall be based on 300 gal/day per residence for single-family housing, and 250 gal/day per residence for multi-family housing. Mains shall be sized to carry this flow with a 2.5 peak hourly factor. Pressure shall be a minimum of 20 psi at each fire hydrant, and a maximum of 150 psi at each outlet after allowing for friction, elevation, and other pressure losses. Pressure at each residence shall not exceed 75 psi. Design shall be based in the Flow data in Table 4-2 below.

TABLE 4-2: FIRE FLOW DATA

Hydrant Location	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)
550’ east of the intersection	90	50	1,300

of Williams Road & Hunt Road			
Intersection of Hunt Road and Hunt Court	110	65	1,353
200’ North of Rose Loop and Pick Avenue	100	60	1,244
450’ North of Pick Avenue and Biddle Boulevard	88	66	1,300
700’ North and 800 feet West of the Intersection of Pick Avenue and Biddle Boulevard	86	50	1,061
150’ West of the Intersection of Biddle Boulevard and Hancock Avenue	90	50	1,126*

* Record information only. Fire Hydrant no longer exists.

4-2.3 Trenches. Water and gas mains may be installed in the same trench, with the gas main placed on a shelf at least 12 inches above and to one side of the water mains. (Coordinate with the local gas utility supplier to determine system acceptability). Water mains shall have a minimum of 3.5 ft of earth cover. Sufficient cover must also be provided to protect the pipe against structural damage due to superimposed surface loads.

4-2.4 Fire hydrants. Hydrants shall conform to AWWA C502, Dry-Barrel Fire Hydrants, except as required by the local utility supplier. Valves shall conform to AWWA C500, Gate Valves for Water and Sewerage Systems. Fire hydrants shall be compatible with those presently in use at the installation, with similar pump and hose connections. Fire hydrant spacing shall be no greater than 350 feet apart, by paved road. In addition, a hydrant shall be provided so that all parts of the residences can be reached by hose lines not over 350 feet long. Hydrant laterals shall be 6 inches minimum size, shall not exceed 50 feet in length, and shall have an underground shutoff valve. Valve box, at each lateral, shall be located within 10 feet of the hydrant, and shall not be located where obstructed by parked vehicles, shrubbery, etc. Guard post barriers shall be provided where hydrant locations are subject to vehicle damage.

4-2.5 Shutoff valve. Each building shall be provided with a separate service and main shutoff valve, readily accessible to maintenance and emergency personnel. Shutoff valves in walks are prohibited. Plastic shutoff valves are prohibited.

4-3 Sanitary Sewerage System. Connection to the existing sewage collection system shall be made at the location shown on the RFP drawings. Sewage collection systems shall be designed and constructed in accordance with the National Standard Plumbing Code criteria in this paragraph, and installation requirements. Pipe sizes and slopes shall be calculated using the Manning Formula. Manholes are required at all changes of direction and spaced not more than 400 ft apart. Curved sewers are prohibited. Pipes shall be designed to flow full and maintain a minimum velocity of 2 ft per second. If siphons are used, two lines of equivalent capacity shall be used with cleanouts. Where pumping is required, force mains shall be sized to minimize pumping head, with a 3 ft to 5 ft per second velocity.

4-3.1 Sewer mains. Design shall be based on an average daily per capita flow of sanitary sewage of 100 GAL per day with a 4.0 peak hourly factor. Mains shall be a minimum of 8 inch in diameter.

4-3.2 Sewer Building Laterals. Each building lateral shall be connected directly to a sewer main. Combining multiple building laterals is prohibited. Apartment units within a building may use a single building lateral. Cleanouts shall be provided to allow cleaning of all lines to grade. Cleanouts, in yard areas, shall be set in a box with a hinged cover and allow for two-way cleanout capability, both toward the house and toward the sewer main. Laterals from one building shall not cross under another building. Lines shall be sized in accordance with the National Standard Plumbing Code. Sewer laterals serving one or two residences shall be a minimum of 6″ in diameter.

4-3.3 Trenches. Sewer and water lines, mains or laterals, shall be placed in separate trenches. The separate trenches shall maintain a minimum lateral separation of 10 ft.

4-3.4 Cover. Sewer lines shall be located at a depth greater than the frost penetration. Minimum cover above the top of pipes shall be 3 ft. If the minimum cover cannot be met, the length of pipe shall be concrete encased with a minimum 3 inch thickness of concrete

4-4 Storm Drainage System. The storm drainage system shall be properly coordinated with surrounding properties to ensure that runoff does not cause damage to other properties. All drainage lines, if required, shall remain in conduit to stable grade. The minimum velocity of flow in conduits during a design storm shall be 2 ft 6 in/s. Storm water collection, disposal (and retardation) system shall be designed for a minimum of a 10-year return frequency. Rainfall intensities for Project locations shall be in accordance with local community/locality/State Transportation (Highway) agency design parameters.

4-4.1 Site specific storm drainage criteria. The Contractor shall comply with all NPDES requirements and be responsible for all permits and applications.

4-4.2 Manholes. Manholes shall be located at intersections and changes in alignment or grade. Intermediate manhole maximum spacing shall be 250 ft for pipes 3 ft or less in diameter or box drains with the smallest dimension less than 3 ft. Maximum spacing for intermediate manholes on larger pipes and drain boxes shall be 500 ft. Manholes shall be precast concrete and shall conform to ASTM C 478 or AASHTO M 199. Steel ladders shall be installed where the depth of the manhole exceeds 3 ft. The ladder shall be galvanized after fabrication in accordance with ASTM A 123. The wall along the ladder shall be vertical. The manhole shall have a 2 ft minimum opening as measured from the face of the steel ladder.

4-4.3 Drainage of roads and pavements. Provide a positive crown or sheet drainage to all streets and roads. Pavement collectors for storm water shall be by curb inlets and gutters. Open areas shall be drained by field inlets and an underground collection system. No roadside ditches shall be permitted. Overland flow shall be held to a minimum.

4-4.4 Pipe for culverts and storm drains shall be of RCP Class IV, PVC profile pipe.

4-5 Gas Distribution System. Provide a gas distribution system, connected to existing systems and designed in accordance with local codes or utility company requirements, whichever is more stringent. Gas distribution systems shall comply with the requirements of ASME B31.8. Connection to existing gas distribution system shall be made at the location shown on the enclosed RFP drawings. When connecting to existing steel piping system, provision shall be made to ensure that the integrity of the cathodic protection is not compromised. Shutoff valves shall be provided on the exterior of each building. A gas regulator and provision for future installation of an individual gas meter to monitor fuel use shall be provided for

each residence or building structure. The building service entrance shall be installed at a height sufficient to allow for future installation of the gas meter. Existing lines that are to be abandoned shall be either removed or physically disconnected from all gas sources and purged. Abandoning existing gas piping shall be done in accordance with ANSI B31.8, Gas Transmission and Distribution Piping Systems. Installation of gas piping will be in accordance with ANSI B31.8 and 49 CFR 192.

4-5.1 Materials. Materials and appurtenances shall be free of defects and suitable to accomplish the stated objectives of gas distribution systems. Pipe shall be polyethylene or steel as described below.

4-5.1.1 Polyethylene pipe shall conform to ASTM D2513, Standard Specification for Thermoplastic Gas Pressure Piping Systems, with fittings complying with either ASTM D2513 or ASTM D2683, Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing. Connections to metal pipe shall comply with ANSI B16.5, Pipe Flanges and Flanged Fittings, or manufacturer's recommended standards.

4-5.1.2 Steel pipe shall conform to ASTM A 53, Grade A or B, Type E or S, Schedule 40; or seamless or electric resistance welded, Schedule 40; black, as specified in ASME B31.8. Furnace butt welded pipe may be used in sizes 40 mm (1-1/2 inch) and smaller. Fittings 1-1/2 inches and smaller shall conform to ASME B16.11. Pipe flanges and flanged fittings larger than 1-1/2 inch, including bolts, nuts, and bolt patterns shall be in accordance with ASME B16.5, Class 150. Butt weld fittings shall be in accordance with ASME B16.9. Weld neck flanges shall be used.

4-5.2 Testing. Prove that the entire system of gas mains and service lines is gas-tight by an air test, in accordance with ANSI B31.8. The test shall continue for at least 24 hours between initial and final readings of pressure and temperature.

4-5.3 Drips. Unless high pressure natural gas is used, drips shall be installed at the low points, immediately following reduction from high pressure to medium pressure (at supply points) and at occasional low points throughout the system to provide for blowing out the lines.

4-5.4 Valves. Plug valves shall be installed at intersections of mains and other locations so that interruptions to service can be confined to no more than 30 residences.

4-5.5 Mains and service lines. Lines shall not be placed under any buildings. Lines shall be placed with a minimum of 2 ft of earth cover. Protective casings shall be provided to protect lines from superimposed street or heavy traffic loads.

4-6 Electrical Distribution. The main feed consists of overhead lines routed along the western reservation boundary into Substation No. 3, which provides all electrical service to the CGSC MFH area. Connection to the existing electrical distribution system shall be made at the location shown on the enclosed RFP drawings (Site 1A: Near Hunt Road; Site 1B: Near Pick Avenue; Site 1D: Near Hancock Avenue). These lines have adequate capacity to provide electrical service for this Project. Pad-mounted transformers shall be fed from these lines using underground feeders. The distribution level voltage is 12.47 kV from Substation No. 3.

4-6.1 System design. Provide new electrical distribution system as necessary and connect to existing system. Provide pad-mounted switch at each tie-in point. Coordinate utility interruptions in advance with Contracting Officer. System shall be a loop-primary radial system. Primary feeder cables shall be copper and concrete encased. High voltage conductors shall have protective shielding. Cable shall be buried a minimum of 3 ft below the finished grade to the top of the concrete encasement with continuous cable marker tape and tracer wire 6 inches below grade.

Cable markers shall be installed along the length of direct-burial cable runs to identify their routes from the surface. Markers will be provided at changes of direction and at intervals not to exceed 500 ft. The electrical on-site distribution system shall be designed in compliance with the rules and recommendations of ANSI C2, National Electrical Safety Code, and NFPA 70, National Electrical Code, whichever is more stringent. Underground direct-burial distribution is required unless otherwise directed. The distribution system and transformers shall be routed at the rear of the housing area. Provide tracer wire and warning tape over all electrical underground utilities (See Section 02222).

4-6.1.1 Provide three 15-kV primary conductors and one 600V insulated neutral. All primary conductor insulation shall be 133 percent and cross-linked polyethylene (NEMA WC7) or ethylene propylene rubber (NEMA WC8). Loading at connections shall be balanced between all three phases. Distribution of primary feeders shall be loop fed so that if power is lost at any location, power can be supplied from another direction until the problem is corrected. Distribution system includes conductors, pad-mounted switches, pad-mounted transformers and pads. Coordinate the installation of the electrical system with the telephone and cable TV system companies.

4-6.2 Underground splices. Underground connection or splices are prohibited, except in boxes or manholes. Splices shall be in a self-draining, rodent-resistant box with a cover.

4-6.3 Service laterals. Service laterals shall be underground. The length of secondary distribution service laterals from the transformer secondary to the building service entrances shall be minimized. Secondary service laterals shall be copper and may be direct-buried.

4-6.4 Service entrance. Only one service entrance per building shall be provided. The service entrance conductor shall be buried a minimum of 3 ft below finished grade with a minimum separation of 1 ft from telephone or TV cables. System shall be designed such that the fault current available at the service entrance equipment will not exceed 10,000 amps.

4-6.5 Transformers. Transformers shall be Contractor furnished and installed. Transformers shall be pad-mounted and have two non-fused switches for the loop connection. The high voltage compartment of the transformer shall include a load break switch with fused circuit for the transformer. The primary voltage shall be 7,200V, single-phase. The transformed secondary voltages shall be 120/240V, single-phase, three-wire, solid neutral service to residences. In selecting a transformer, the name plate rating shall not be less than 90 percent of the kilovolt/amperes (kVA) demand load calculated for the transformer. The demand load shall be calculated per NFPA 70, National Electrical Code. Transformers shall be low profile, pad mounted type, mineral oil insulated, with tamperproof enclosure. Transformers shall be certified non-PCB and shall contain less than 50 parts per million PCB.

4-6.6 Street and area lighting. Residential roadway lighting, including collector streets, shall be provided in accordance with the IES Lighting Handbook. Provide lighting at roadway intersections, and at intervals not exceeding 200 ft between intersections. Area lighting shall be provided at intervals not exceeding 200 ft. along area walkways not otherwise illuminated, common area walks connecting playgrounds, and at all steps in area walkways. Area lighting shall be provided in accordance with the IES Lighting Handbook. Luminaries shall be actuated by photoelectric control, one photocell per circuit, and supplied from multiple circuits originating from a pad-mounted transformer. Street lighting poles shall be uniformly spaced and set back from the curb edge a minimum of 4 feet and between sidewalk and curb. Street and parking area light fixtures shall be high pressure sodium. Traditional gaslight-style, 240-volt luminaires shall be used for street and area lighting as indicated in Attachment 7. Luminaire finish shall be black. Poles shall be round aluminum with black anodized finish.

4-7 Metering. Metering of utilities shall be provided as follows:

4-7.1 Master Meters. Master meters for water, electricity, and gas shall be provided for all three sites. Individual residential meters are not required. Contractor is to provide proper rough-ins with shutoff valves of main disconnects for future installation of meters (gas, water, electric) for each individual residence.

4-7.2 Individual or main disconnects meter drops. Individual utility meter drops shall be provided for all residences. Provide sockets for electric watt-hour meters at each residence. Provide manual by-pass jumper plates for each socket. Locate utility meter drops in an area readily accessible by service personnel. Meters and meter bases shall be sight screened, and located to provide convenient access while not distracting from building appearance.

4-7.3 Gas metering. Provide for future individual residence metering devices. Comply with local requirements. Meter and regulator location shall be sight screened, and located to provide convenient access while not distracting from building appearance.

4-8 Telephone. The telephone company will furnish and install distribution cables. Conduit required between underground terminal boxes and the buildings will also be furnished and installed by the telephone company. Contractor shall coordinate with the telephone company for the location, type, and installation of the required telephone system. Telephone company distribution cables and above-ground enclosures shall be routed at the rear of the housing area.

4-9 Television. The cable TV service provider will provide all site distribution systems for this project. The Contractor shall coordinate with the cable TV service provider who is responsible for all trenching, conduit, boxes, and backfilling required to install the distribution systems. Cable TV distribution cables and above-ground enclosures shall be routed at the rear of the housing area.

4-10 Cathodic Protection. Cathodic Protection (CP) is mandatory on buried ferrous metallic structures as described below:

4-10.1 Department of Transportation guidance as stated in 49 CFR, Part 192, requires that all metallic natural gas piping be coated and cathodically protected regardless of the soil resistivity.

4-10.2 Corrosion control is mandated for all metallic underground storage tanks storing petroleum or hazardous substance by 40 CFR, Part 280 and AR 200-1 and on hazardous liquid pipelines (e.g., liquid fuel) by 49 CFR, Part 195.

4-10.3 CP systems must be designed to provide protective potential to meet the requirements of the National Association of Corrosion Engineers (NACE) Standard RP-0169, Control of External Corrosion on Underground or Submerged Metallic Piping Systems, or NACE Standard RP-0185, Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems, as appropriate.

4-10.4 New or supplemental CP systems shall be compatible with existing CP systems and other adjacent structures or components. New systems should be compatible with existing systems to allow ease of repair and maintenance.

4-10.5 When plastic pipe is used to extend a steel gas distribution main, an insulated No. 8 AWG copper wire shall be exothermically welded to the existing steel

main and run the length of the new plastic main (See Section 02222 for additional requirements. This wire can be used as a locator tracer wire and to maintain continuity to any future steel gas main extension.

4-10.6 CP and protective coatings shall be provided for the following buried and submerged ferrous metallic structures regardless of soil or water resistively:

4-10.6.1 Natural gas piping.

4-10.6.2 Liquid fuel piping.

4-10.6.3 Ductile or cast iron pressurized piping.

4-10.6.4 Other structures with hazardous products as identified by the installation.

4-10.7 Cast iron pipe shall be treated as follows:

4-10.7.1 For soil resistivity below 10,000 Ohm-cm at pipeline installation depth, provide CP, bonded joints, and protective coatings.

4-10.7.2 For soil resistivity between 10,000 and 30,000 Ohm-cm at pipeline installation depth, provide bonded joints only.

4-10.8 Copper water service lines will be dielectrically isolated from ferrous pipe. Dielectric isolation shall conform with NACE RP-0286.

4-10.9 Ferrous metallic piping passing through concrete shall not be in contact with the concrete.

4-10.10 Tracer Wire: All non-conductive underground utilities will have a tracer wire buried directly above, and immediately adjacent to each line. The tracer wire will be a 12 gauge, solid copper, coated wire. The tracer wire will run the entire length of the buried utility line. The tracer wire will run on primary and secondary feeders from manhole to manhole (or valve box), and be terminated within each manhole, or valve box at a point easily reachable from the surface. On lateral lines, the tracer wire will run the entire length of the lateral and be terminated, next to the house above ground, at the point where the utility comes out of the ground. The wire will be snuggly wrapped around the pipe a minimum of three times. If the lateral line enters the house below grade, the tracer wire will be terminated above the utility line, immediately next to the exterior of the foundation, in a standard non-waterproof exterior junction box attached to a vertical piece of 1/2" plastic PVC pipe buried a minimum of one foot below the surface. Within the junction box the continuous tracer wire will be left coiled, a minimum of one foot long, with the interior of the box labeled with a permanent marking pen, (i.e. Gas Line Tracer).

Warning Tape: Standard grade, non-magnetic, Warning Tape will be installed above all underground utility lines. The tape will be buried 1 foot below the surface, running the entire length of the buried utility. The color of the tape will correspond to the utility it is protecting, as shown in SECTION 02222.

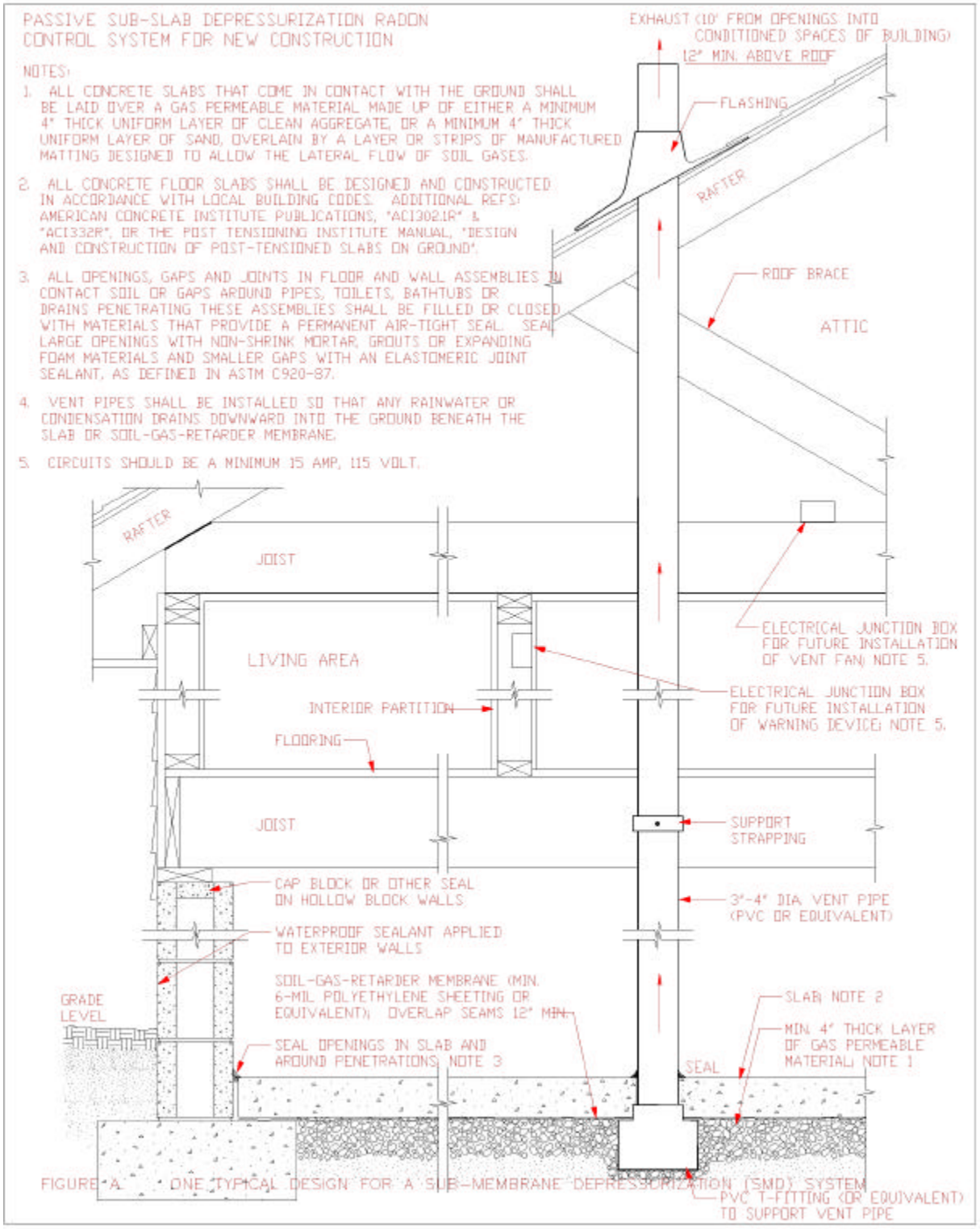
PASSIVE SUB-SLAB DEPRESSURIZATION RADON CONTROL SYSTEM FOR NEW CONSTRUCTION
NOTES:
1. ALL CONCRETE SLABS THAT COME IN CONTACT WITH THE GROUND SHALL BE LAID OVER A GAS PERMEABLE MATERIAL MADE UP OF EITHER A MINIMUM 4" THICK UNIFORM LAYER OF CLEAN AGGREGATE, OR A MINIMUM 4" THICK UNIFORM LAYER OF SAND, OVERLAIN BY A LAYER OR STRIPS OF MANUFACTURED MATTING DESIGNED TO ALLOW THE LATERAL FLOW OF SOIL GASES.
2. ALL CONCRETE FLOOR SLABS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH LOCAL BUILDING CODES. ADDITIONAL REFS: AMERICAN CONCRETE INSTITUTE PUBLICATIONS, "ACI302.1R" & "ACI332R", OR THE POST TENSIONING INSTITUTE MANUAL, "DESIGN AND CONSTRUCTION OF POST-TENSIONED SLABS ON GROUND".
3. ALL OPENINGS, GAPS AND JOINTS IN FLOOR AND WALL ASSEMBLIES IN CONTACT SOIL OR GAPS AROUND PIPES, TOILETS, BATHTUBS OR DRAINS PENETRATING THESE ASSEMBLIES SHALL BE FILLED OR CLOSED WITH MATERIALS THAT PROVIDE A PERMANENT AIR-TIGHT SEAL. SEAL LARGE OPENINGS WITH NON-SHRINK MORTAR, GROUTS OR EXPANDING FOAM MATERIALS AND SMALLER GAPS WITH AN ELASTOMERIC JOINT SEALANT, AS DEFINED IN ASTM C920-87.
4. VENT PIPES SHALL BE INSTALLED SO THAT ANY RAINWATER OR CONDENSATION DRAINS DOWNWARD INTO THE GROUND BENEATH THE SLAB OR SOIL-GAS-RETARDER MEMBRANE.
5. CIRCUITS SHOULD BE A MINIMUM 15 AMP, 115 VOLT.
EXHAUST (10' FROM OPENINGS INTO CONDITIONED SPACES OF BUILDING)
12" MIN. ABOVE ROOF
FLASHING
RAFTER
ROOF BRACE
ATTIC
RAFTER
JOIST
LIVING AREA
ELECTRICAL JUNCTION BOX FOR FUTURE INSTALLATION OF VENT FAN; NOTE 5.
ELECTRICAL JUNCTION BOX FOR FUTURE INSTALLATION OF WARNING DEVICE; NOTE 5.
INTERIOR PARTITION
FLOORING
JOIST
SUPPORT STRAPPING
CAP BLOCK OR OTHER SEAL ON HOLLOW BLOCK WALLS
3"-4" DIA. VENT PIPE (PVC OR EQUIVALENT)
WATERPROOF SEALANT APPLIED TO EXTERIOR WALLS
SOIL-GAS-RETARDER MEMBRANE (MIN. 6-MIL POLYETHYLENE SHEETING OR EQUIVALENT); OVERLAP SEAMS 12" MIN.
GRADE LEVEL
SLAB; NOTE 2
MIN. 4" THICK LAYER OF GAS PERMEABLE MATERIAL; NOTE 1
SEAL OPENINGS IN SLAB AND AROUND PENETRATIONS; NOTE 3
SEAL
PVC T-FITTING (OR EQUIVALENT) TO SUPPORT VENT PIPE
FIGURE A. ONE TYPICAL DESIGN FOR A SUB-MEMBRANE DEPRESSURIZATION (SMD) SYSTEM

Figure 4- 1

5. ARCHITECTURAL DESIGN

5-1 Architectural Design. Designs shall conform to the plans as shown in the RFP drawings. Only minor variations are permitted to accommodate ductwork, piping, and other similar requirements. All residences, except the single-story accessible units, shall be designed with full basements.

5-1.2 Design of accessible residences shall conform to the Uniform Federal Accessibility Standards (UFAS) and Americans With Disabilities Act Accessibility Guidelines (ADAAG). This means required access clearances, room sizes, bathroom layout, kitchen layout, doors and hardware, grab bars, plumbing hookups, light switches and outlets and controls must meet requirements at time of construction. The requirements for adjustable height cabinets and work surfaces and plumbing fixtures for the hearing and visually impaired must also be made at time of construction.

5-1.3 Housing unit variation. The goal is to provide distinctly different exterior appearances for each duplex. All adjacent structures will vary in two or more of the following: Floor plan (combination of different residence types), elevation and orientation, and exterior materials. Refer to paragraph on exterior materials for permissible variations in exterior materials. Duplexes shall also vary in color, in a random pattern, with no two adjacent structures being the same color. Elevations of the duplexes indicated in this RFP are included to indicate required form, massing and material usage. Final material placement may vary between adjacent units to enhance unit variation.

5-1.4 Maintainability. The design of residences, including the selection and specifying of exterior and interior finishes, equipment, appliances, and systems shall include consideration of maintenance ease and cost. Avoid products that require continuing maintenance at high cost.

5-2 Basements. Full basements shall be provided at all new residences, except at the handicapped accessible units. There shall be a minimum of 8 units with walk-out basements under the Base Bid.

5-2.1 All basements shall have foundation drains on the exterior and interior side of the basement foundation wall. Drains shall be perforated plastic pipe with geotextile fabric to filter fines. Route foundation drains to a sump pit in the basement utility room.

5-3 Materials. All materials used shall be new and shall not be discontinued.

5-4 Fire Protection and Safety. Residences will comply with the applicable National Fire Codes, including NFPA 101, Life Safety Code. Construction features will be provided in accordance with the Uniform Building Code (UBC), 1997 edition. The Design/Builder shall furnish a complete code analysis.

5-4.1 Fire resistance of party walls and roof material. Party walls shall extend without openings, from ground to the underside of roof sheathing. Provide firestops at floor, and ceiling or roof line. Provide Class A (ASTM E108, Standard Methods of Fire Tests of Roof Coverings) roof covering material throughout. Party walls (walls separating residences) shall have the minimum fire-resistance rating of one hour.

5-4.2 Alarm systems. Smoke detectors are required to sound an alarm only within the residence are not required to be transmitted to the installation fire department.

5-5 Sound Attenuation.

5-5.1 Walls and floor ceiling systems shall be designed to meet or exceed the requirements stated below. In cases where the field tested performance of the systems does not meet the designed performance, the maximum acceptable difference between field tests and sound transmission ratings shall be 2 decibels (dB) for airborne sound ratings and 5 dB for impact sound ratings.

5-5.2 Party walls construction between residences shall be designed to provide the minimum airborne sound transmission ratings and impact isolation ratings stated in Table 5-1.

TABLE 5-1 - SOUND TRANSMISSION STANDARDS FOR PARTY WALLS AND FLOOR/CEILING CONSTRUCTION

Area	FSTC[1]	FIIC[2]
Party Walls (Unit Separation)	52	-
Habitable Areas Over Garages	52	-

Note[1]: Field Sound Transmission Class. See ASTM E336.

Note[2]: Field Impact Isolation Class. See ASTM E1007.

5-5.3 Testing. Certified proof-of-performance field tests will be conducted by the Contractor to demonstrate that the floor and wall systems as constructed provide the required sound isolation. Tests for air-borne sound shall be made in compliance with ASTM E336. Tests for impact sound shall be made in compliance with ASTM E1007. Testing will take place on 4 units randomly selected by the Contracting Officer.

5-5.3.1 Any wall or floor system found to be inadequate shall have the deficiencies corrected and the additional qualifying tests conducted at the Contractor's expense. Testing at the Contractor's expense of additional units beyond the initial 4 units, of each system, may be required if the Contracting Officer determines that the quality of construction requires this additional testing.

5-5.4 Plumbing and HVAC equipment. Design of plumbing and Heating, Ventilating, Air-Conditioning (HVAC) shall include design provisions such as location, enclosure and acoustical treatment, to minimize transmission of noise generated by equipment within each residence, particularly the single-story units, and to eliminate transmission of noise to other residences.

5-6 Dimensions and Areas. The floor plans in the RFP indicate the dimensions for interior room and exterior spaces.

5-6.1 Ceiling heights in habitable rooms shall be a minimum of 2440 mm (8 ft). Ceiling height in part or all of the basement study room may be reduced to 2100 mm (7 ft) to accommodate ductwork. As a part of the betterments, provide 9-foot ceilings on the first floor of all residences, except those that are handicapped accessible.

5-7 Kitchen. The dishwasher shall be installed adjacent to the kitchen sink. A full-height pantry with a minimum of six 12-inch deep adjustable shelves shall be

provided. In addition, as part of the residence upgrade betterment, the contractor shall provide a backsplash behind the range, extending to the underside of the range hood, finished to match the backsplash above the countertop.

5-8 Provide a combination tub with shower enclosure for the typical common bathrooms in the hall. The tub will be enameled steel. The enclosure will be a single- or multiple-piece unit with integral soap dish. All bathtubs except those in the master bedroom shall be furnished with a curtain rod. The master bathrooms shall have an enameled steel bathtub with a ceramic tile backsplash enclosure extending 4 feet above the tub. Master bathroom bathtubs shall have a recessed ceramic tile soap dish and a curtain rod. The towel bar holder and the toilet paper holder arms shall be ceramic with a plastic spring-loaded rod for the towel bar. Provide one 24-inch-long towel bar for each half-bath and two 24-inch-long towel bars for each full bath. All bathroom accessories shall be rigidly attached to studs or blocking. Bathtubs in handicapped accessible units shall be ADA-compliant and incorporate grab bars and a seating bench within the tub. Master bathrooms shall also have a single-or multiple-piece shower unit made of molded acrylic. Shower units shall incorporate a tempered glass door except that shower curtains shall be used at the accessible units. Roll-in type showers are not required at accessible units. Molded acrylic shower units shall be capable of accommodating a person of 250 pounds without damage.

5-8.1 A recessed medicine cabinet shall be provided in master bathroom only. Cabinets shall be corrosion-resistant with plate glass mirrors, hinged door type. Medicine cabinets shall be placed on a sidewall of the bathroom. Do not place recessed medicine cabinets in party walls. Medicine cabinet is in addition to mirror in all bathrooms. A single continuous length of corrosion-resistant plate glass mirror measuring the width of the vanity by 42 inches high shall be furnished in all bathrooms.

5-8.2 Two full-length shelves, 250 mm (10 inches) minimum nominal depth, are required above the washer and dryer in all locations.

5-8.3 Closet shelving. Closets (except linen closets) shall be equipped with a 305 mm (12 inches) deep shelf and a clothes hanger rod. Linen closets shall have at least four full-depth shelves. Closet shelving and rods in excess of 1200 mm (4 ft) shall have center supports. Shelves and supports shall be capable of carrying 52 kg/m (35 lbs/ft). Closet shelving shall be minimum 19 mm (3/4 inch) thick solid wood, plywood, or high density particle board. In walk-in closets, provide one full height drawer or open shelf storage unit for each 6 feet of clothes hanger rod. Factory Finished welded wire shelving and closet organizers meeting the capacity requirements is also permitted. Intermediate supports must be anchored to studs.

5-8.3.1 Closet doors. All closet doors shall be swinging. Sliding and bifold doors are not permitted.

5-8.4 Provide a minimum of three nominally 305 mm (12 inches) deep shelves with a combined length of 7300 mm (24 ft) within each interior storage room in single-story units.

5-8.4.1 Provide exterior storage in a detached 4-foot x 6-foot minimum metal storage shed.

5-8.5 Study. Constructing and finishing the Study rooms in the basement of all two-story units as indicated in the RFP Floor Plans shall be provided as a Government requested Betterment to the base bid. Under the Base Bid, the entire basement shall be unfinished, with no ceiling or floor finish material, with the exception of the stairwell area. Also, provide surface-mounted electrical power outlets, lighting, cable TV connections, and telephone outlet as shown on the RFP drawings (one for data and one for communications). As a Betterment, the Contractor shall furnish and install the interior stud walls, the furring to the perimeter walls, with gypsum board walls and paint, sheet vinyl flooring, and suspended

acoustical ceiling tile for the study rooms in the basement. Study rooms in the handicap-accessible units shall be completely finished under the Base Bid.

5-9 Interior Finishes

5-9.1 Walls and ceilings. Provide 1/2-inch gypsum wallboard, taped and smooth finished. Water-resistant wallboard shall be used in wet areas such as bath, powder, and laundry rooms. Ceiling board in these areas must be rated for ceiling use by the manufacturer. Cementitious backer board shall be used for ceramic tile applications. Interior finish shall have a flame-spread rating of 25 or less and a smoke-developed rating of 50 or less when tested in accordance with ASTM E84.

5-9.1.1 Gypsum Board Construction: All gypsum board shall be installed with screws, shall be manufactured in the United States and shall not contain asbestos. Provide metal corner beads on all gypsum board exterior corners.

5-9.1.2 As a part of the Base Bid, the stairwells shall be finished in their entirety.

5-9.1.3 As a part of the Government requested betterments, provide raised ceiling areas where indicated on the drawings.

5.9.2 Flooring. Flooring in all areas of the first and second floors of all residences, except garages and mechanical rooms, entry, entry closet, basement study, kitchen, mudroom, mudroom closet and toilet/bathrooms, shall be carpet. Entry, entry closet, basement studies, kitchen, mudroom, mudroom closet and toilet/bathrooms shall have sheet vinyl with wood base. The remainder of the basement shall be sealed concrete. As a betterment, flooring shall be hardwood flooring with wood base in areas indicated. Also in the betterment, a ceramic porcelain tile shall be used in the entry foyer, entry closet, master and full bathrooms, mud room, and mud room closet for all residences. The handicapped accessible residences will also have tile in the laundry room.

5-9.2.1 Stairs. Interior stairs shall be softwood with carpeted treads and risers.

5-9.2.2 Sheet vinyl shall conform to ASTM F1303, Standard Specification for Sheet Vinyl Floor Covering with Backing, Type I, Grade 1, Class B. Wear layer shall be urethane/PVC containing 90% binder. Flooring shall be installed as a monolithic material with seams heat welded. Provide material equal to the following:

Congoleum “Ovations” 12-foot width, 10-year limited warranty.

5-9.2.3 Ceramic tile shall conform to ANSI 137.1, moderate grade and shall be lead-free. Ceramic tile shall be installed on bathroom walls on master bathroom tubs to a minimum height of 2 feet including walls around tubs in non-accessible master baths. As a part of the betterments, ceramic tile shall also installed above all kitchen counters and below the wall cabinets and behind ranges from the counter height to the bottom of the range hood.

5-9.2.3.1 Ceramic Porcelain Tile. As a part of the bid betterments, provide ceramic porcelain floor tile where shown on the drawings. Tile shall be a stone pattern, 15” x 15” in size. Install in a thin-set mortar to match the level of the laminate flooring. Tile shall have the following characteristics:

Water Absorption: ASTM C373 0.1% max.
Abrasive Wear: ASTM C501 200 min.
Breaking Strength: ASTM C648 300 lbs. min.
Bond Strength: ASTM C482 200 psi min.
Coefficient of Friction: ASTM C 1028 0.6 dry (min.); 0.5 wet (min.)

5-9.2.4 Carpet. As part of the base bid, Carpet shall be Mohawk Aladdin Saxony, solid color, 100 percent polyester, with polyester primary and secondary backing, heatset, yarn weight of 38 ounces per square yard, 0.125-gauge, 3500 minimum density, with 10-year limited lifetime warranty or equal.

5.9.2.4.1 Carpet pad shall be ½-inch bonded urethane, minimum 6-pound density. Urethane pad will conform to ASTM.D.3676.

5-9.2.4.2 Carpet edging shall be 1-1/2-inch minimum width floor flange and minimum 5/8-inch wide face.

5-9.2.4.3 Tackless strip shall be exterior grade Douglas Fir plywood, with minimum dimensions of 1-1/8 inches wide suitable for the cushion thickness specified. Tackless strips with two or three rows of staggered pins shall be used. For areas over 20 feet long, tackless strip with three rows of pins shall be used. Pins of the proper length shall be provided to penetrate through carpet backing, but shall not be a safety hazard.

5-9.2.5 Hardwood Flooring: Furnish and install, under a betterment, hardwood flooring as indicated on the Drawings, complete with all required trim and accessories in accordance with the manufacturer's installation instructions, including wood base, base shoe molding, and reducer strips as required. All edges against dissimilar materials must incorporate a matching hardwood transition strip.

5-9.2.5.1 Hardwood flooring shall comply with NOFMA grading rules for species, grade, and cut. All materials shall carry NOFMA grade stamp. All materials shall be from one source and shall be of consistent quality, appearance and physical properties.

5-9.2.5.2 Products:

1. Provide one of the following manufacturers:

   a. Harris Tarkett
   b. Robbins
   c. Bowen

2. Species: Red oak.
3. Grade: No. 1 clear.
4. Cut: Plain sawn.
5. Thickness: ¾-inch (19 mm).
6. Width: 2-1/4 inches.
7. Length: Manufacturer's standard random.
8. Edges: Square tongue and groove.
9. Matching: End matched.
10. Finish: Unfinished, for field-applied finish.
11. Backs: Channeled (kerfed).
12. Random Lengths: Standard random-length strips.

5-9.2.5.3 Finishing Materials:

1. Urethane Finish System: Complete system of compatible components that is recommended by finish manufacturer for application indicated.

   a. Type: Water-based.
   b. Stain: Penetrating and nonfading type, ultraviolet (UV) stable as recommended by urethane finish manufacturer for compatibility. Color: light oak.
   c. Floor Sealer: Pliable, oil-based, penetrating type, as recommended by urethane finish manufacturer for compatibility.

d. Clear Finish Coats: Formulated for multicoat application on wood flooring.

2. Application: Minimum of 3 coats, 4 mil D.F.T. each.
3. Wood Filler: Formulated to fill and repair seams, defects, and open-grain hardwood floors; compatible with finish system components and recommended by filler and finish manufacturers for use indicated. If required to match approved samples, provide pigmented filler.

5-9.2.5.4 Felt Underlayment: Where strip or plank flooring is nailed to solid-wood subfloor, install flooring over a layer of asphalt-saturated felt stapled in place with minimum 3-inch overlaps. Run underlayment tight to stud partitions, as detailed on Drawings.

5-9.3 Painting. Finishes shall be lead free. All interior surfaces, except factory prefinished material, shall be painted a minimum of one prime coat and one finish coat.

5-9.3.1 Walls in all rooms and all painted trim shall be painted with eggshell enamel. Colors shall be Post standard colors. All interior wall surfaces shall be painted with off-white paint equal to Sherwin Williams SW-1018. All ceilings, except basement study rooms, shall receive an off-white blown-on acoustical finish.

5-9.4 Trim. As a part of the base bid, provide colonial-style painted wood door casing, floor bases and other trim as required. All base shall be colonial-style painted solid wood, 3 inches high with quarter-round base shoe. As a part of the betterments, provide painted wood chair rail moulding and 6-inch painted wood crown moulding in the dining rooms and the great rooms.

5-9.5 Basement Finishes. Basements walls shall be unpainted concrete except where interior drywall partitions are indicated. In those cases, the drywall shall be painted and a wood base provided. As a betterment, the concrete walls of the basement study shall have furring and drywall and a lay-in acoustical ceiling. The floor shall be sealed concrete except that the study shall have sheet vinyl as indicated above.

5-10 Garages. Provide a double car garage for each residence. Slope slabs to drain out the garage door. Garages shall be uninsulated except on walls and ceiling areas adjacent to heated spaces. Garage doors shall have hardware that can be opened and locked from inside and outside of the garage. Under the Base Bid, the garage interior is unfinished exposed structure, without gypsum board walls. The garage ceilings shall receive gypsum board with mud and tape, but no paint. Under the Betterment, the garage walls shall receive gypsum board with mud and tape, but no paint. The ceilings shall be completely finished with acoustical texture blown-on finish.

5-11 Roofing and Drainage. Minimum slopes for roofs shall be 1:3.

5-11.1 Roof water. Seamless guttering and downspouts shall be provided for all roof areas. Downspouts draining onto a lower roof shall have metal or plastic splash deflectors. Concrete splash blocks shall be provided under downspouts. No downspouts shall be drained across sidewalks or driveways. Provide 4-inch PVC drainage sleeves under walks if downspouts are unavoidable.

5-11.2 Roof surface. Roofing shall be limited to the following:

5-11.2.1 Minimum of 225-pound Class A wind-resistant fiberglass shingles conforming to ASTM D3018, Specification for Class A Asphalt Shingles Surfaced With Mineral Granules. Provide a 25-year warranty on roofing shingles. Roofing shingles shall

be Tamko Elite Glass-Seal or equal. Color shall be “Rustic Black.”

5-11.3 Roof Construction.

5-11.3.1 Roof shingles shall be nailed (pneumatic nailing is permitted). Staples are not allowed.

5-11.3.2 Roof shingles must be installed per manufacturer’s recommendations.

5-11.3.3 Do not install shingles when it is too windy.

5-11.3.4 Do not install shingles when temperature will not allow self-stick surfaces to adhere.

5-12 Exterior Finishes. Emphasis shall be placed on low maintenance and durability for exterior finish materials. Materials shall be residential in size, scale, and texture. Exterior finish materials for exterior screen walls, and garages will match the primary dwelling unit. In order to create variety in the appearance of the neighborhood, a variety of exterior color schemes for the units shall be incorporated. Stucco, concrete, masonry, vinyl or aluminum siding are not permitted. The following siding materials are the only materials permitted for use.

5-12.1 Brick. Brick may be furnished as a betterment to the Base Bid, and when provided shall conform to ASTM C216, Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale). Provide brick cap and flashing for all offset brick veneer. Brick shall start three courses above the finished grade.

5-12.1.1 Brick color, finish and hue shall vary between adjacent units, but all brick shall be generally red in color. Provide a minimum of two different brick colors for this Project.

5-12.2 Fiber-Cement board siding. Siding shall have a minimum non-prorated 35-year warranty on the finish. Siding shall be kept a minimum of 6 inches above finish grade. Siding shall be installed in accordance with manufacturer's recommendations. A manufacturer's representative shall instruct the installer of the siding, appurtenances, and accessories as to the manufacturer's required installation procedures. The Government construction inspectors responsible for the job shall be included in their instruction.

5-12.2.1 siding. Under the Base Bid, furnish fiber-cement siding having a smooth surface, 8-inch exposure, and equal to “James Hardie, Hardiplank.”

5-12.2.2 Vinyl-coated steel siding. As a Betterment, the Contractor may furnish steel siding in lieu of fiber-cement siding to comply with the following: Specification for Steel Sheet, zinc-coated (galvanized) by the hot-dip process, commercial quality, and ASTM G90 Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight. Siding panels shall be formed to provide full-length edge interlock, so that after installation, fasteners will be concealed from view. Siding shall be pretreated and factory-laminated with a weather-resistant polymer film. When tested for 500 hours in accordance with ASTM B117, Method of Salt Spray (Fog) Testing, the siding finish shall show no signs of cracking, blistering, peeling or significant color change, and shall show no loss of adhesion from the metal more than 1.6 mm (1/16-inch) beyond a line scratched or scribed through the coating. Steel siding materials shall be separated from aluminum surfaces with a coating of bituminous paint or asphalt varnish.

5-12.3 Trim elements. Provide prefinished trim to match siding as recommended by the siding manufacturer. All exposed wood is to be primed and painted.

5-12.3.1 Wood fascia and rakes shall be 1-inch nominal boards with solid blocking or 2-inch nominal boards without blocking. Plywood, hardboard, or gypsum board is required on the base bid. Cover fascia, rakes, and soffits with prefinished steel to match siding when the betterment is provided.

5-12.3.2 Miscellaneous trim such as window trim, door sills and window sills shall be covered with prefinished steel to match siding of the betterment only.

5.12.3.3 Provide fixed decorative shutters on prominent front windows as indicated.

5.12.3.4 Front porch and step railings and balusters shall be prefinished aluminum, steel, or composite plastic. Finish shall carry a 10-year warranty. The Offeror will select a railing style appropriate to the character of the residence. The style may vary between duplexes and this variation may be used to develop variation in the exterior appearance.

5.12.3.5 Ornamental Columns at Porch. Column shall be manufactured from aluminum, cast stone, fiberglass, or composite material with minimum 8-inch size. 10-year warranty on the finish. Column shall be self-supporting and load-bearing. The style of the column, base and capitol shall be the contractor’s option but shall be compatible with the porch railing. The style may vary between duplexes and this variation may be used to develop variation in the exterior appearance.

5-12.4 Exterior ceilings and soffits. Exposure of roof framing and underside of roof/floor decks is not permitted. Exterior porch ceilings and roof eave soffits will be hardboard or exterior plywood of the appropriate grade for the base bid, and prefinished metal to match siding for the betterment.

5-12.5 Rear patios. Concrete patios shall be provided and shall be sloped to drain away from the unit, with a broom-finished concrete floor surface. Concrete steps integral to the patio shall be furnished as shown on the Drawings. Provide railings at steps to match front porch.

5-12-5.1 Units with walk-out basements shall incorporate a rear wood deck with a stair as shown on the RFP Drawings. Deck, structure, railings, and stair shall be made of cedar. Pressure-treated (CCA) pine is not acceptable. Walk-out basement shall also incorporate a concrete landing area as shown on the RFP Drawings.

5-12.5.2 The rear patios shall be screened from each other and other units by a portion of the house or by a privacy screen wall as indicated. The privacy screen wall shall be included in the base bid and shall be constructed of the same materials as the main structure. A wood fence is not permitted. Units with walk-out basements do not require screens.

5-12.6 Porches floors shall be sloped to drain away from the unit and have a concrete floor surface which provides a waterproof and non-slip surface. Plastic coating or films over concrete decks are not acceptable. Exposed wood (cedar) decks, where indicated on the drawings should be sealed not stained or painted. Steps shall be integral to the porch and shall be concrete and have railings and shall be a minimum of 48 inches wide. Porches shall be covered with roofs.

5-13 Windows. Window units shall be equal to: Capitol 7500 Series, double-hung, thermally broken extruded aluminum frame with tilt-in sashes, simulated divided lite, insulated glass, and insect screen.

5-13.1 Interior window trim and stools shall be solid-wood, paint-grades with a minimum thickness of 3/4-inch. Contractor to furnish wood blocking above the window heads for attachment of curtain rods.

5-14 Basement Window Wells: Provide a basement window well and egress window. The window wells shall be a premanufactured galvanized steel unit attached to the foundation per the manufacturer’s instructions, with six inches of granular fill and a drain piped to the foundation drain system. The window egress well may be a prefabricated unit or be site constructed of reinforced concrete, sized as indicated on the Floor Plans, with steps, six inches of granular fill, and a drain piped to the foundation drain system.

5-15 (not used)

5-16 Window Treatments. Provide 1-inch metal blinds at windows and glazed hung doors. Color shall be manufacturer's standard off white, and shall be coordinated with wall color.

5-17 Doors. See Table 7-1 for thermal performance requirements for exterior doors.

5-17.1 Entrance doors. The residence primary entrance door shall be 3 ft-6 inches in width by 6 ft-8 inches in height by 1-3/4 inch thick, thermal metal. Other residence entrance doors should meet this requirement but may be of 3-foot width. Sliding glass doors are not permitted. Incorporate a small insulated-glass area in each exterior door with curtain rods.

5-17.1.1 Entry doors. Main entry doors shall be equal to: Responsive Door “Energy-Building” steel door, 42 inches wide, prehung, 6-panel, 26-gauge with solid polyurethane core, primed and ready for field painting.

5-17.1.2 Storm doors. Storm doors shall be equal to: Columbia “New Crown” storm door, 42 inches wide, self-storing, 11-1/4-inch master frame. Marine glazed tempered glass with solar tint.

5-17.1.3 Patio doors. Patio doors shall be equal to: Therma-tru “Smooth Star” flush glazed, Model S2010, compression-molded fiberglass on solid urethane foam core.

5-17.2 Garage door. Garage doors shall be painted 24-gauge galvanized steel with embossed finish and stamped raised-panel design. Provide manufacturer’s standard full-view glazed panels. Doors on non-accessible units shall be manually operated and complete with tracks, bottom seal, counterbalance and lock. Doors on accessible units shall have a power-operated opener. Provide two remote operators per door. Finish on door shall have a “lifetime” finish warranty.

5-17.2.1 Garage doors shall be equal to: Overhead Door Corp. 281 Series, white.

5-17.3 Aluminum screen and storm doors. Screen and self-storing storm doors shall be provided for all residence exterior hinged doors. Frames shall be a minimum of 1-1/4 inches thick and 2 inches wide. Aluminum alloy materials shall be not less than 0.05-inch thick and 2 inches wide. Doors shall have solid bottom panels and midsection protective grills. Screening materials shall be nonferrous.

5-17.4 Interior doors. Interior doors shall be a minimum of 3 feet wide, except that closet and bathroom doors may be 2 ft – 6 inches wide. Interior doors shall be a minimum of 6 ft - 8 inches in height by 1-3/8-inch thick, six-panel pressboard. All doors will be painted.

5-17.5 Attic Access. In a hallway, provide a 3-foot x 3-foot attic access opening. Opening shall be for maintenance access only and shall have an insulated, removable panel.

5-18 Builders Hardware. All provided hardware shall have the same finish. Hinges, locks, and latches will comply with the specifications indicated in Table 5-2, and the following subparagraphs:

TABLE 5-2 – HARDWARE SPECIFICATIONS

Hardware Type/ Specification	Specific Requirements
Hinges BHMA 101	Hinges shall be 102 mm x 102 mm (4 in x 4 in) at exterior doors, and 90 mm x 90 mm (3-1/2 in x 3-1/2 in) at interior doors. Minimum 3 per door.
Locks & Latches BHMA 601	Series 4000, Grade 2. Provide trim of wrought brass, aluminum, or stainless steel.
Auxiliary Locks BHMA 501	Series 4000, Grade 2. Provide matching trim of wrought brass, aluminum, or stainless steel.
Interconnected Lock & Latches BHMA 611	Grade 2. Provide matching trim of wrought brass, aluminum, or stainless steel.
Closers BHMA 301	Series CO2000, Grade 2.

5-18.1 Locks and keys. Provide a master keying system. Locks for each residence, including garage door, shall be keyed alike. The Contractor shall provide one extra set of cores for each 50 residences and furnish four keys for each key change and for master key system and control key. Locks and keys shall conform to the standards and requirements of the Builders Hardware Manufacturers Association (BHMA) listed above. Exterior storage units shall have a hasp. Padlocks will be provided by the occupants.

5-18.1.1 Front and back door locks, interior garage door, and garage door cylinders must be Best Lock Corporation’s Model 62K7AB4D-STK-612-RH, Brass Finish, M-keyway, interchangeable core, entrance locks. Key locks so that one key operates all locks in a unit. Prior to purchase, contact Mike Richey, DIS locksmith, at (913)684-7798 for make and model numbers.

5-18.2 Weatherstripping and exterior thresholds. Provide nonferrous metal or vinyl weatherstripping for all residence exterior doors. Vinyl magnetic weatherstripping is acceptable for metal doors. Exterior thresholds shall be nonferrous metal. Low-rise thresholds shall be furnished for the accessible units.

5-18.3 Applications. Locks and hinges shall be applied as follows:

5-18.3.1 Exterior hinged doors shall have 1-1/2 pair of hinges, lockset, and an auxiliary lock or interconnected lock and latch,

5-18.3.2 Interior doors shall have three hinges and latchset with BHMA 601, F75 or F76 operations.

5-18.3.3 Doors in fire-rated walls, residence to garage, shall have 1-1/2 pair of ball-bearing hinges, lockset, auxiliary lock or interconnected lock.

5-19 Building Signage.

5-19.1 Building Signage. All new units shall be provided with an address sign located beside the front door so that it is well illuminated by the porch light. The sign shall have four digits and 3-inch high reflective numbers on a colored background to match the unit's exterior trim color.

5-20 Cabinets. Kitchen and vanity cabinets shall be factory manufactured of wood. Wall cabinets shall have adjustable shelves. Cabinets shall have magnetic catches except where spring-loaded self-closing hinges are provided. Cabinets shall include handles pulls and shall conform to ANSI A161.1, Recommended Performance and Construction Standards for Kitchen and Vanity Cabinets, except where modified below. Wall and base cabinets and vanities shall be essentially of the same construction and appearance.

5-20.1 Cabinets construction: Cabinets shall be equal to: Merillat Deluxe "Whitebay II Arch." With white laminate surface.

5-20.1.1 Wall cabinets shall be standard depth.

5-20.1.2 Provide 12-inch deep, floor-to-ceiling pantry cabinet in each kitchen with five (5) adjustable shelves.

5-20.1.3 In the kitchen, provide glass panels in one upper cabinet (one pair of doors). Also shoe molding (1/4 round) is required at all base cabinets where they meet the floor surface.

5-20.2 Countertops. Countertops finish may be high pressure laminated plastic 0.043-inch thick with post-formed tops. Minimum backsplash height is 4 inches. Provide lavatories mounted in 2-foot-wide (minimum) countertops, with vanity bases. Vanity sinks/tops are specified in paragraph 8.

5-21 Appliances. Provide the following equipment in accordance with specifications listed, one each per residence. A listing of currently labeled Energy Star appliances is available through the internet at the EPA Website: http://www.energystar.gov/products/appliances.html.

5-21.1 Refrigerators. Comply with UL 250, Household Refrigerators and Freezers and shall bear the EPA "Energy Star" certified label. Provide refrigerators with frost-proof, top freezer, automatic defrosting, and ice maker. Refrigerator shall have two vegetable bottom baskets, at least four adjustable shelves, at least two shelves and egg container in door; freezer compartment shall contain separate interior shelves, multiple door shelves, and ice maker. Provide reversible (left swing and right swing interchangeable) doors. Provide baked enamel finish. Refrigerators shall conform to the energy compliance standards of 10 CFR 430, including those refrigerators manufactured before the code took effect. The use of refrigerants with an Ozone Depletion Potential (ODP) of .05 or less is required. Connect the icemaker to the building water service. Minimum refrigerator volume and maximum energy use are as follows:

5-21.1.1 Volume: 0.58 CM, 21 CF

5-21.1.2 Energy Efficiency: 722 kWh/yr.

5-21.1.3 Contractor shall furnish refrigerator a GE Model GTS22KCMWW, 21.7-cubic-foot top freezer with factory-installed icemaker, color white or equal.

5-21.2 Ranges and ovens. Ranges shall be gas-fired, 760 mm (30 inches) wide and

provided with porcelain enamel cooktop, oven, clock and timer, oven light, and cooking surface light. Oven shall have black glass window door, broiler pan, and self-lock racks.

5-21.2.1 Gas ranges shall have two, 150 mm (6-inch) and two, 205 mm (8-inch) burners, a self-cleaning oven, and AGA-approved electronic ignition. Gas ranges shall be in accordance with AGA Z21.1, American National Standard for Household Cooking Gas Appliances. Furnish GE Spectra 30 freestanding XL44, Model JGBP28WEAWW, gas, self-cleaning, with sealed burners, electronic clock and timer, or equal.

5-21.3 Microwave ovens. “User-furnished”

5-21.4 Range hoods. Provide metal range hoods, the same length and finish as the range, with separately switched light and exhaust fan. The hood shall have a washable filter and be vented directly to the outside, not the attic. The fan shall be two-speed and shall have a capacity of not less than 78.7 L/s per meter of range hood (50 cfm per linear foot of range hood). The sound level shall not exceed 6 sones. Duct the fan to the exterior and provide backdraft protection. GE Profile 30, Model JV535CWW, white.

5-21.4.1 Provide fire extinguishing system in each kitchen range hood. System shall be UL listed, complying with NFPA 17A for residential kitchen hoods. Chemical storage containers shall be concealed in kitchen cabinets over the range hood, but shall be readily accessible for maintenance. Interconnection of the range hood extinguishing system and the fire alarm system is not required. Twenty First Century International Fire Equipment and Services Corp. Guardian 1, Model 1384-A, dry system.

5-21.5 Garbage disposals. Garbage disposals shall conform to UL 430 and ASSE 1008; Waste Disposers; continuous feed, minimum 1/2 HP motor, stainless steel grinding elements, two 360-degree stainless steel swivel impellers, manual motor reset, and sound insulation. Furnish Insinkerator Model Badger 5, or equal.

5-21.6 Dishwashers. Dishwashers shall conform to UL 749, Household Electric Dishwashers, and be UL listed, electric type, with air gap, racks, lift-out utensil holder, spraying arms, and detergent dispenser. Unit shall be listed as “Energy Star” compliant and shall bear the “Energy Star” label. The automatic controls shall cycle through the Wash, Rinse, Dry / Heat, and Stop phases, and shall be capable of rinse and hold cycle as well as a no heat-drying feature. The unit shall contain instantaneous, or in-line, water heater booster, with automatic thermostat set for 60 degrees C (140 degrees F). Rated energy use for standard capacity models will not exceed 620 kWh/yr. Furnish GE Model GSD4500GWW, white, or equal.

5-21.7 Color. Kitchen appliances, except disposals, shall be of matching finish, white in color.

5-22 Fireplaces. As a betterment, provide a gas fireplace in each residence. Fireplaces shall comply with ANSI Z21.50 and have the following features:

- Firebox shall be at least 36 inches wide and 15 inches deep.
- Zero-clearance to combustible surfaces.
- 22,000 Btu/h natural gas log set with electronic ignition.
- Remote wall switch.
- Glass doors with brass finish.
- Direct vent flue through the roof. Separate outside air intake.
- Install per National Fuel Gas Code Z2223.1.
- Painted wood fireplace surround with mantle.
- Stone, brick or tile hearth. Full width of surround x 1 foot deep.
- Enclose exterior flue in a brick chimney or wood framed enclosure with siding.

5-22.1 Fireplaces shall be equal to: Majestic DV580, direct6 vent, AGA/CGA wall furnace, AFUE rating, 38,000 Btu’s, Insta-Flame Ceramic Burner System, 7-piece ceramic fiber split oak log set with steel grate, millivolt ignition system, tempered glass panel, manual flame adjustment, wall switch kit, electrical junction box, flex connector with shut-off, 20-inch termination pipe with wall firestop, zero clearance, limited lifetime warranty.

6. UNIT DESIGN - STRUCTURAL.

6-1 SELECTION OF STRUCTURAL SYSTEMS AND MATERIALS. The structural systems and materials to be selected for the design of the residences will be suitable for permanent-type construction; capable of carrying the required loads; and compatible with fire protection requirements, and architectural and functional concepts. Materials may be of any of those listed in table 6-1, or any combination, selected for desirability, economy, general availability, low maintenance costs over the design life of the residences, and resistance to fire.

a. Design Considerations. It is required at the inception of the design that the structural system layout be properly coordinated with the architect to develop an overall effective plan.

b. The Design-Build Contractor will establish the type of structure and construction used. In selecting the type of structural system, the total facility should be considered, since the choice will influence such features as heating, ventilation or air-conditioning, as well as architectural, lighting, and utility requirements.

c. Structural Materials. When choosing structural materials for a specific Project, consideration will be given to:
(1) Availability of labor and materials.
(2) Design life of the facility and maintenance costs over this period.
(3) Feasibility of preassembling or precasting major structural elements.
(4) Site environment, including accessibility, climate, seismic hazard, subsurface conditions, and wind velocity.

6-2 DESIGN REQUIREMENTS.

a. Design Codes. Design methods and stress allowances or load factors for the various structural materials will be according to the current editions of the codes and specifications listed below.

TABLE 6-1 STRUCTURAL DESIGN METHODS AND STRESS ALLOWANCES

Materials	Codes or Specifications
Aluminum	The Aluminum Association (AA), "Specifications for Aluminum Structures"
Concrete	American Concrete Institute (ACI), "Building Code Requirements for Reinforced Concrete"
Masonry	American National Standards Institute (ANSI), "American Standard Building Code Requirements for Reinforced Masonry" Brick Institute of America (BOA), "Recommended Building Code Requirements for Engineering Brick Masonry" National Concrete Masonry Association (NCMA), Specifications For the Design and Construction of Load Bearing Concrete Masonry"
Precast-Prestressed Concrete	Prestressed Concrete Manuals
Steel	American Institute of Steel Construction (AISC), "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings" Steel Deck Institute (SDI), “SDI Design Manual for Composite Decks, Form Decks, and Roof Decks”
Steel Joists	Steel Joists Institute (SJI), "Standard Specifications and Load Tables, Open Web Steel Joists and Longspan Steel

	Joists," and similar publications covering deep longspan steel joists
Steel, Light Gage	American Iron and Steel Institute (AISI), "Specifications for the Design of Cold-Formed Steel Structural Members" “Design of Cold–formed Load-bearing Steel Systems and Masonry Veneer/Steel Stud Walls,” TI 809-07
Welding	American Welding Society Codes, Standards and Specifications
Wood	National Forest Products Association, "National Design Specifications for Stress Grade Lumber and its Fastenings" Truss Plate Institute (TPI), “Design Specification for Metal Plate Connected Wood Trusses” American Plywood Association (APA), “APA Design/Construction Guide “

b. Design Dead, Live, Snow and Wind Loads. The load assumptions for the design of buildings and other structures will conform to ASCE 7-98, “Minimum Design Loads for Buildings and Other Structures.”

c. Seismic Design. The seismic design of the new residences will be according to FEMA 302, “NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures”. Use site class “D”, Ss = 0.13, S1 = 0.06 for seismic calculations. Acceptable lateral force resisting systems will be any of those listed in table 5.2.2 of FEMA 302. Wood framed structures with panel diaphragms and shear walls will be classified as light frame walls with shear panels. Light gage metal framing which uses tensioned diagonal bracing will be classified as ordinary steel concentrically braced frames.

d. Design Dead Loads. Use actual weights of materials. For mechanical equipment, use weight of actual equipment plus a ten percent increase for future replacements.

e. Design Live Loads. Use 40 psf for the floor live load. Use 60 psf for the floor live load at exterior cantilevered balconies if used. Uninhabitable attics will be designed for a live load of 10 psf. A minimum roof live load of 20 psf for maintenance and construction will be used.

f. Climatic Considerations. Use a 20-psf ground snow load for determining snow loads. Use 90-mph design wind speed for determining wind loads. Foundations and utilities shall be located below the depth of maximum frost penetration. Minimum depth for heated structures is 34 inches. Minimum depth for unheated structures is 45 inches.

g. Tornado Shelter Design. The one story, handicapped units will not have basements and as such will be designed to include the provision for a tornado shelter to protect the occupants during severe wind events. The shelter will be located in the master bedroom closet and will meet the requirements of FEMA 320, “Taking Shelter From the Storm: Building a Safe Room Inside Your House.” The walls will consist of 6-inch solid grouted and reinforced concrete masonry walls as a minimum. The ceiling will consist of a minimum of two layers of ¾-inch plywood and 14 gage continuous steel sheathing on 2x6 joists at 16 inches o.c. Design and detailing shall be in accordance with drawings AG-1 through AG-5 of FEMA 320.

6-3 DESIGN DEVELOPMENT

a. Building Design. Lateral structural design and siting considerations may conflict with functional considerations in building design. For instance,

shear walls may limit horizontal flexibility and diaphragms may limit vertical circulation.

b. Building Configuration. Lateral loading considerations may require limits on the height of structures and design configurations. It must be noted that the building configuration plays an important role in the performance of the structure when subjected to lateral wind and seismic forces. To obtain optimal lateral resistance and performance, a symmetrically configured structural framing system with effectively and efficiently placed lateral resisting elements (shear walls and braced frames) must be considered. Further, the nonstructural elements must be seismic and wind resistant in order to maintain the expected capability (against collapse or post-earthquake operations).

c. Shelter Design for Tornado. Structures to be constructed in tornado areas will be designed so structural integrity and continuity are provided from the foundation to the roof, irrespective of the materials selected for the facility. All components of the structure must be tied positively together to establish an overall integrated resistance to high wind effects.

6-4 DESIGN CONSIDERATIONS

a. If wind loading on the main lateral force resisting system and/or the components and cladding members are greater than the seismic loadings and thus the controlling forces that are used for structural design, the structural seismic detailing requirements given in FEMA 302 must also be used. Both wind and seismic loading for components and cladding must be investigated to determine controlling forces regardless of controlling loads on the main force resisting system.

b. The tributary area “A” to be used in determining the exterior wind pressure coefficients for components and cladding shall be the actual loaded area of the structural element under consideration and not the entire area of the loading region in which the member resides. However, for rectangular tributary areas, the width need not be assumed to be less than one third of the length of the member.

c. When determining the internal wind pressure coefficients for buildings, doors and windows shall be assumed opened or closed as required to produce the coefficients that will produce the greatest wind loadings, both inward and outward.

d. When the design roof snow or snow on rain loading is less than 0.96 KN/sq m (20 psf), a roof live loading for construction and maintenance of 0.96 KN/sq m (20 psf) shall be used for the design of the structure. The minimum roof live load is used in lieu of and not in addition to the snow or rain on snow loading.

e. The maximum net inward and outward loads used in the design shall be indicated on the contract drawings. The design engineer is responsible for calculating the wind loads based on the ASCE 7 wind load requirements. The component and cladding loads shall be calculated based on the tributary area of the member under consideration. A minimum tributary area of one square meter (10 sf) shall be used.

f. Lateral Resistance. Walls used or required for lateral resistance to wind or earthquake shall be considered bearing walls and shall have a complete load path to the foundation.

g. Embedded Steel. Nonstructural steel (handrails, etc.) embedded in concrete shall be prefinished galvanized steel or plastic. All damaged galvanized

areas shall be repaired prior to embedment.

h. Wood Flooring Systems. Wood flooring systems shall be glued and screwed. Glue lines shall not be considered for stress transfer.

i. Subfloor. ¾-inch tongue and groove plywood, glued and screwed in place, is required for all rooms requiring a subfloor. ¾-inch tongue and groove plywood subfloor for wet areas (i.e., bathrooms, kitchens, laundry room, and utility rooms)is required and will be rated for Exposure 1 or exterior use.

j. Underlayment: Sanded face underlayment (plywood) is required. Underlayment must be a minimum thickness of 8.7 mm (11/32 inches). Acceptable sanded face underlayment panels can be APA rated A-C, B-C, A-D, B-D, or C-C plugged. Underlayment should be rated for Exposure 1 or exterior use. Underlayment should be installed after interior finish work is complete to avoid damage to the underlayment.

k. Construction Tolerances. Allowable variations from level, or specified slopes, shall be as follows:

For overall length, or surface of 10 feet or less: plus or minus 1/8-inch.

Up to 20 feet: plus or minus 1/4-inch.

Up to 40 feet: plus or minus 3/8-inch.

Walls are to be constructed straight, true, and plumb.

l. Do not use keys in horizontal and vertical concrete construction joints. Specify the use of joints roughened to ¼-inch amplitude per ACI 318.

m. All foundations are to be of reinforced, cast-in-place concrete.

n. Use minimum 4,000 psi strength concrete measured at 28 days for all concrete work.

o. Concrete stoops shall be provided at all exterior doors. All stoops shall have frost protection.

p. Cast-in-place anchor bolt shall be used at all x-bracing or shear wall hold down locations. The use of expansion bolt anchors is not permitted for connections between elements of the main lateral force resisting system. Cast-in-place anchor straps are not allowed.

q. Slab on grade construction shall be detailed so that the slabs are independent of the foundations and footings. A 6-inch sand cushion shall be provided between the bottom of the slab and any underlying foundation elements.

r. Concrete Reinforcement: Fiber reinforced concrete is not an acceptable alternative to be utilized in this Project.

s. Brick veneer with steel stud backup exterior wall systems shall strictly adhere to the criteria and detailing requirements of TI 809-05 and TI809-07.

t. Steel or wood columns shall not be embedded over all or part of their height in CMU or concrete.

u. CMU masonry shall be placed in running bond pattern only.

v. In units where tensioned diagonal bracing is used, the stability of the

structure shall not depend on any single connection. Redundancy shall be provided either by using multiple bays of tension only bracing members or by using members that are capable of resisting both tension and compression in the same bay.

w. The use of field welding for connections between members of the main lateral force resisting system shall be avoided.

x. The use of APA sheathing over light gage steel framing as structural roof or floor diaphragms is not allowed.

y. Use of particle board for walls, floors, or roofs will not be allowed.

z. If wood framing systems are selected for use on this Project, use APA's "Code Plus " system for walls, floors, and roofs.

aa. Floor joists supporting plywood floor sheathing should be spaced no further than 16 inches on center.

bb. Veneered plywood is to be used for walls, floors, and roofs. Oriented strand board (OSB) may be used at walls only.

cc. If light gage steel is selected for the building's framing system, coordinate thermal requirements and detailing with HVAC system design. Brick veneer with steel stud backup exterior wall systems will strictly adhere to the criteria and detailing requirements of TI 809-05 and TI 809-07. The technical instructions are available in electronic form via the TECHINFO internet site http://www.hnd.usace.army.mil/techinfo/.

7. UNIT DESIGN - THERMAL PERFORMANCE.

7-1 Thermal Characteristics. Residence construction shall provide at least the minimum R values/maximum U values indicated in Table 7-1 for the appropriate weather region. R and U values shall be calculated in accordance with ASHRAE methods.

TABLE 7-1 THERMAL CHARACTERISTIC REQUIREMENTS[1, 2]

Weather Region	Wall[3] R Value	Ceiling/ Roof R Value[4]	Basement R Value[6]	Slab on Grade R Value[7]	Door R Value[8]	Glazed Openings U Value[9]	
						Window	Door
7	3.3 (19)	6.7 (38)	1.8 (10)	0.9 (5)	0.9 (5)	2.2 (0.38)	2.2 (0.38)

Note[1]: Metric R values are in square meter-kelvin (K)/watt. (English R values are bracketed, and are in square foot-degrees F/BTUH). (R = 1/U)

Note[2]: R values listed represent the minimum acceptable insulation values for each construction type. Listed U values represent the maximum thermal conductance allowed for windows and doors.

Note[3]: Requirements for opaque, exterior walls.

Note[4]: For buildings with ventilated attics, no credit may be taken for the roof construction. R value shall be computed for construction between conditioned space and ventilated attic or building exterior. Insulation for floors which extend over outside air spaces shall conform to the ceiling and roof requirements.

If cathedral ceilings are being used, the effective R-Value of the overall roof area must meet the required “Ceiling/Roof” performance level. The effective R-Value of the overall roof area can be determined by calculating the weighted average of the R-Values of the different areas (based on the percentage of the total roof area each type covers). For example, if the Ceiling/Roof insulation required was R-38 and 25 percent of the ceiling was cathedral insulated to R-19, and then the required R-Value for the remaining roof would be: (38-0.25*19)/0.75=44.33, or R-45 (min).

If metal framing is used, insulation between wall studs shall be derated per Table 8C-2 of ASHRAE 90.1 as follows:

Size/Gauge of Member	Framing Spacing (inches)	Rating of Insulation (R)	Derated (R) Value
2 x 4; 18-16 Ga.	16″ o.c.	R-13 R-15	R-6.0 R-6.4
2 x 4; 18-16 Ga.	24″ o.c.	R-13 R-15	R-7.2 R-7.8
2 x 6; 18-16 Ga.	16″ o.c.	R-19 R-21	R-7.1 R-7.4
2 x 6; 18-16 Ga.	24″ o.c.	R-19 R-21	R-8.6 R-9.0

Note[5]: Not used.

Note[6]: Requirements for basement wall insulation extending downward 3050 mm (10 ft) from outside finished grade, or downward from outside finished grade to basement floor, whichever is less.

Note[7]: Requirements for perimeter insulation. Perimeter insulation shall extend downward to a total distance of 610 mm (24 inches) as described above.

Note[8]: Requirements for opaque doors in exterior walls (insulated metal).

Note[9]: Window requirements for double pane, low emissivity glass windows as specified in paragraph 5 of this STATEMENT OF WORK. Total Window (including glazing and frame) U values as rated by the National Fenestration Rating Council (NFRC) shall be used. Glazing area shall be limited to 14 percent of the heated floor space. Solar Heat Gain Coefficient shall be limited to 0.55. Solar Heat Gain Coefficient shall be limited to 0.40.

7-2 Thermal Insulation.

7-2.1 Characteristics. Thermal insulation shall have a flame-spread rating of 25 or less and a smoke-development rating of 50 or less, exclusive of the vapor barrier, when tested in accordance with ASTM E84. A vapor barrier shall be provided on the warm-in-winter side of exterior wall and ceiling insulation. Polyurethane is allowed as an insulation material for slabs and outside concrete or unit masonry walls. It is prohibited as an injected insulation material in walls or floor cavities or within the building envelope.

7-3 Air Infiltration.

7-3.1 To limit air infiltration buildings will be sealed with an air infiltration barrier, installed in accordance with the manufacturer's recommendations. The building envelope shall be caulked, gasketed, weatherstripped or otherwise sealed: around window and door frames, between wall cavities and frames, between walls and ceiling and roof, between walls and floors, at access doors and panels, at utility penetrations through walls, floors, and roofs, and at any other exterior envelope joint which may be a source of air leakage. These steps, in combination with provision of a continuous vapor barrier and sealed ductwork as specified in paragraph 10. shall constitute tight building construction.

7-3.2 A blower door test, performed in accordance with ASTM E 779, Measuring Air Leakage by the Pressurization Method, shall be performed on 5 percent of the Project buildings, which will been randomly selected by the Contracting Officer. If buildings are to be turned over in phases, the blower door test shall be performed on 5 percent of the buildings completed in each phase. No additional testing will be required if ALL of the tested buildings pass the test requirements. If less than 100 percent of the tested buildings pass the test, an additional 5 percent of the

Project buildings shall be tested. This process shall continue until 100 percent of the total number of tested buildings pass the blower door test. All prototype units will be included in the required blower door testing procedures.

7-3.2.1 Before beginning the test, all combustion devices shall be turned off, and all intentional openings in the building envelope (dryer vent, bathroom and kitchen exhausts, etc.) shall be sealed. All doors and windows shall be closed and latched.

7-3.2.2 To pass the blower door test, the building shall have an air tightness rating within the range of 3 to 4 ACH at 50 Pa (0.2 inch of water). The Contractor shall correct all residences not found in compliance, and shall be responsible for all labor and materials required to reduce air leakage to within acceptable parameters. All testing shall be performed by a firm certified by the Associated Air Balance Council, the National Environment Balancing Bureau, or State licensed to perform such tests within the state where the Project is being constructed.

7-3.2.3 Any measures taken to reduce the air leakage to acceptable values shall be permanent, and shall be implemented on all similar residences.

8. UNIT DESIGN - PLUMBING.

8-1 Plumbing system shall be designed and installed in accordance with the National Standard Plumbing Code. Inspection and testing of the plumbing system shall be performed as prescribed in the Plumbing Code.

8-2 Water Piping. Under slab supply piping shall be limited to residence service entrance only. Service line to each residence shall be no less than 25 mm (1 inch) diameter and shall include pressure reducing valves inside the house at the service entrance. All water piping shall be sized in accordance with methods outlined in the National Standard Plumbing Code.

8-2.1 Copper tubing. All interior water piping shall be type K or L hard-drawn copper. Water piping under concrete slabs shall be copper tubing, type K, annealed. Joints under the slabs are prohibited. Type M copper tubing shall not be installed. Fittings for soft copper tubing shall conform to ANSI B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes, and for hard-drawn to ANSI B16.22, Wrought Copper and Copper alloy Solder Joint Pressure Fittings.

8-3 Soil, Waste, Vent, and Drain Piping. Soil, waste, vent, and drain, piping shall be Schedule 40 PVC suitable for installation in a residential waste, soil, vent, and drain system. Each fixture and piece of equipment, except water closets, requiring connection to the drainage system, shall be provided with a trap. Provide deep seal trapped drain for cooling coil condensate drain. Soil, waste, and drain piping installed below floor slabs shall be Schedule 40 PVC pipe. Building waste main lines shall be no less than 102-mm (4-inch) diameter. All soil, waste, and drain piping shall be sized in accordance with the methods outlined in the National Standard Plumbing Code. “Wye” connections shall be used for common drain lines between residences. Tee connections are not permitted. Full-sweep, 90-degree ells shall be used in all drain connections.

8-3.1 Provide a floor drain near HVAC units to receive condensate, and near clothes washers.

8-4 Gas Connections. The use of semi-rigid tubing and flexible connectors for gas equipment and appliances is prohibited, except that the final connections to the kitchen ranges shall be made using flexible connectors conforming to ANSI Z21.45, Flexible Connectors of Other Than All Metal Construction for Gas Appliances, not less than 1000 mm (40 inches) long. Provide accessible gas shutoff valve and coupling for each gas equipment item. Comply with UBC or model code seismic requirements. Exposed horizontal piping shall not be installed farther than 150 mm (6 inches) from the nearest parallel wall in laundry areas or areas where clothes hanging could be attempted. See paragraph 4 for gas line distribution requirements.

8-5 Plumbing Fixtures. Fixtures shall be provided complete with fittings, and chromium- or nickel-plated brass (polished bright or satin surface) trim. All fixtures, fittings, and trim in a Project shall be from the same manufacturer and shall have the same finish.

8-5.1 Plumbing shall meet the following criteria:

8-5.1.1 Exposed traps shall be chromium-plated, adjustable-bent tube, 20-gauge brass. Concealed traps may be plastic (ABS).

8-5.1.2 Faucets shall be single-control type having replaceable seals and seats removable either as a seat insert or as a part of a replaceable valve unit. Water flow shall be no more than .158 L/s (2.5 gpm) from any faucet. Faucets shall be the following makes and models to match existing post standards for availability of uniform parts, and ease of replacement.

Lavatory - Gerber #43-431
Tub and shower - Gerber #48-720-83
Kitchen - (2 handle with spray) - Gerber #42-516

8-5.1.3 Shower and bath combination shall be controlled by a diverter valve. Baths and shower and bath combinations shall be provided with waste fitting pop-up, concealed with all parts removable and renewable through the overflow and outlet openings in the tub. Showers and shower and bath combinations shall be equipped with a combination valve and flow control device to limit the flow to 0.158 L/s (2.5 gpm) at pressures between 137.9 to 413.7 kPa (20 and 60 psi). Control valves shall be anti-scald type.

8-5.1.4 Piping shall be concealed except in unfinished basement areas. Individual shutoff or stop valves shall be provided on water supply lines to all plumbing fixtures except bathtubs and showers. Ball-type, ¼-turn shutoff valves shall be provided for each bathroom group. Connections to fixtures shall be copper or polyethylene. Flexible connections are not allowed.

8-5.1.5 Fixtures shall be water conservation type, in accordance with the National Standard Plumbing Code.

8-5.1.6 Vitreous china plumbing fixtures shall conform to ANSI A112.19.2, Vitreous China Plumbing Fixtures. Stainless steel fixtures shall be in accordance with ANSI A112.19.3, Stainless Steel Plumbing Fixtures (residential design). Plastic fixtures shall conform to ANSI Z124. Enameled cast iron plumbing fixtures shall comply with ANSI A112.19.1, and enameled steel fixtures shall comply with ANSI A112.19.4.

8-5.2 Water closets. Water closets shall have elongated bowl with inclined tank, close coupled siphon jet, floor outlet with wax gasket, closed-front seat and cover, and an anti-siphon float valve. Water consumption shall be no more than 6 L (1.6 gal) per complete flushing cycle. Water closet trim shall conform to ANSI A112.19.5, Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards). Gerber “Ultra flush.” Color to be white.

8-5.3 Lavatories. Lavatories shall be cross-link acrylic molded counter top with integral bowl, oval-shaped, minimum 19 by 16 inches in size. Lavatories shall have pop-up drains.

8-5.4 Bathtubs. Bathtubs shall be slip resistant and shall be constructed of steel with enclosure gel-coated, glass fiber reinforced polyester resin. Combination tub/showers shall feature as a three-piece or one-piece surround, integral shelves for soap and shampoo, and a wash cloth holder. Appropriately located integral grab bars are required for handicapped accessible units.

8-5.5 Showers. Shower stalls shall be three-piece or one-piece gel-coated, molded acrylic, glass-fiber reinforced polyester with an integral shelf/soap dish. Shower floors shall be slip resistant. Unit floors shall be set in grout bed. Appropriately located integral grab bars are required for handicapped accessible units.

8-5.6 Kitchen sinks. Kitchen sinks shall be Type 302 stainless steel, 20-gauge minimum, seamless drawn, and sound deadened. Sinks shall be double bowl, self-mounting without mounting rings, complete with cup strainer and plug. Food waste disposers are specified in paragraph 5. Strainer and plug shall be eliminated where food waste disposers are provided.

8-6 Clothes Washer Connections. Drainage and hot and cold water supply shall be provided for all automatic clothes washers. Washer connection, complete with 2-inch drain, 3/4-inch hose thread supplies with water shutoff valves shall be provided in standard manufactured recessed wall box with single-face plate. Boxes shall be

constructed of plastic or sheet steel. Steel boxes shall have a corrosion-resistant epoxy enamel finish. Boxes shall be mounted a minimum of 2 feet-10 inches above the finish floor. Electrical outlets for both washer and dryer shall also be provided. For units in the basement, hot and cold stops and drain standpipe may be provided without master box.

8-7 Refrigerator Ice Maker Connection. Cold water supply shall be provided for refrigerator ice makers. Ice maker connection shall include an angle valve and a 1/4 inch hose thread supply, and shall be provided in standard manufactured recessed wall box with single-face plate (plastic or steel). Boxes shall be mounted a minimum 2 ft-10 inches above the finish floor.

8-8 Hose Bibbs. Hose bibbs shall be provided at the front and rear of each dwelling unit. Hose bibbs shall be frostproof, and shall be supplied with an integral vacuum breaker.

8-9 Piping Location. Water piping running in attics and spaces over garages shall be installed on the warm side of insulation and shall be wrapped with insulation and a vapor barrier jacket. Determination of the warm side shall be the same as determined for vapor barrier location. No water piping runs in exterior walls shall be allowed.

8-10 Cleanouts. Cleanouts shall be provided at each change in direction of sanitary sewer lines, at the intervals specified in the National Standard Plumbing Code, and at the building service entrance. All cleanouts shall be permanently accessible. Ground cleanouts shall be installed in a 12-inch by 12-inch concrete pad, flush with grade. Interior and exterior cleanouts shall have standard locations in all residences to the greatest extent possible. Exterior cleanouts shall be two-way type.

8-11 Water Heater. Water heaters shall be Rheem “Professional” energy miser gas water heater, models 41V40 PRO(N) and 41V50 PRO(N), 8/12-year limited warranty or equal. Hot water piping for the first 10 ft downstream of the water heater shall be insulated. The water heater relief drain shall be manufacturer approved, and shall be indirectly connected to the building sanitary sewer system. Water heaters shall installed in accordance with Table 8-1.

Table 8-1: Water Heater Sizing

Rheem “Profesional”	3 BR	4 BR	
	2 Bath	2 Bath	3 Bath
41V40 PRO(N)	X	X	
51V50 PRO(N)			X

Gas fired water heaters shall be in accordance with ANSI Z21.10.1, Water Heaters, Gas, Volume I, Storage Type, 22 kW (75,000 BtuH) Input or less, and shall be sealed combustion high efficiency type. Water heaters with powered ventilation shall be vented in accordance with manufacturer’s instructions. Water heaters shall be installed to allow easy removal and maintenance without obstructions.

8-12 Foundation Sump Pumps: Units with basements shall be provided with sump pump and basin connected to foundation drain and discharging to outdoors. Units shall be located in basement utility room. Equipment to have check valve, cord and plug connection and unions for easy removal/replacement.

9. UNIT DESIGN - ELECTRICAL.

9-1 Conformance to Code. The electrical system shall be designed in compliance with the rules and recommendations of ANSI C2, National Electrical Safety Code, and NFPA 70, National Electrical Code (NEC), and applicable model codes, whichever is more stringent.

9-2 Service Entrance. Service entrances, exterior meters, and panels shall be enclosed or sight screened. Service feeders shall be underground with exterior meters. Individual electric watt-hour meters, Class 200, shall be installed for each dwelling unit. Panel boards shall be painted galvanized steel and furnished with main breakers. Load centers are acceptable if commercial grade. Provide main circuit breaker in the main panel for each residence, sized in accordance with the NEC (200 amps minimum). Electrical panels, disconnects, etc. shall be manufactured by Square “D” or Cutler Hammer. Panel board doors shall be flush one-piece fronts. Panel boards may be surface or recessed mounted depending on their location. No recessed panel boards are to be located in party walls and fire walls. Panelboards for individual residences shall be the plug-in circuit breaker type. Driven ground rod and grounding wire design shall be required at each unit’s main distribution panel. The panelboard shall have at least 24 full-size slots. Provide full size circuit breakers and one full-size spare circuit breaker for every five active circuits. Walls housing service entrance panels shall have sufficient thickness to accommodate wiring bends. A panelboard directory shall clearly indicate each circuits purpose or use and the room served.

9-3 Panel Locations. Residence panels shall be located in the basement near the rear of the unit or in the garage of the single-story units.

9-4 Conductors. Conductors shall be copper. Conductors #10 AWG and below shall be solid. Raceways are not required for interior conductors above grade.

9-4.1 No conductors shall be routed on the exterior of the dwelling unit except for service entrance conductors and they shall be routed in conduit. Exterior above grade conduits shall be galvanized rigid steel. Exterior conduit below grade shall be schedule 40 (minimum) PVC. EMT is permitted only in interior or protected locations.

9-5 Outlet Circuits. Lighting and convenience outlets shall be on separate circuits. Outlets on party walls shall be offset to maintain integrity of the fire wall and sound deadening rating of the wall.

9-6 Exterior Lighting and Outlets. Provide energy efficient high quality lighting for each residence. The minimum efficiency standard for lighting is 50 lumens/watt. This efficiency can be achieved with fluorescent and compact fluorescent lighting. Lighting must also be color corrected with a Color Rendering Index (CRI) of 60 or better. Provide a minimum of one lighting fixture and one ground-fault-protected outlet in each residence's entry, garage, and patio area. Provide light fixtures on each side of the garage door. Provide exterior outlets with “In-Use” weatherproof covers. Provide a fixture in the patio area, except that the patio area light shall not be provided where the patio is adjacent to an exterior entrance and is adequately served by the lighting fixture required herein before. Light fixtures at entry, garage, and patio areas shall be switched from the residence interior and shall incorporate motion detection. The light fixture at the front entry shall also light the street address. Common trash areas shall be lighted. These lights shall be controlled by photocell, activated by minimum light level of 0.5 footcandle. Lights in common areas should have high impact-resistant

plastic lenses, and/or be otherwise made vandal-proof.

9-7 Interior Lighting and Switched Outlets.

9-7.1 Generally, incandescent lighting shall be used. Lighting shall provided in accordance with the IES Lighting Handbook. The general type and style of light fixtures shall be in accordance with those indicated in Attachment. Interior lighting will be both efficient and color corrected. Color Rendering Index (CRI) of 85 or better and a standard lighting color of 3500 K are required. Minimum efficiency standard for lighting are as follows:

9-7.1.1 Fluorescent tubes, 4 feet: 90 lumens/watt.

9-7.1.2 Fluorescent tubes less than 4 feet: 80 lumens/watt.

9-7.1.3 Compact fluorescent and other lamps: 50 lumens/watt.

9-7.2 Locations. Ceiling lights are preferred. Provide light fixtures operated by wall switches for all rooms. Wall-switch operated ceiling lights shall be provided in dining and utility rooms, halls, bedrooms, kitchens, dinette areas, and basements. Additional light fixtures shall be provided in rooms whose configuration requires them for adequate lighting. Wall-switch operated wall-mounted lights shall be provided in bathrooms and half baths located above the mirror over the lavatory. Walk-in closets and interior bulk storage rooms shall be provided with ceiling lights, wall switch operated. A minimum of two ceiling-mounted lighting fixtures shall be provided in the garage (one per vehicle bay). Garage lights shall be controlled by a switch (switches) located at each door opening into the garage. Use wall sconces in stairwell at 8-feet above the floor. Recessed light fixtures are preferred in most rooms except kitchens, baths, dining rooms and stairways.

9-7.2.1 Dining room ceiling light fixtures shall be hanging chandelier-type as indicated. Fixtures may be designed for incandescent use, and do not have to meet the 50 L/Watt requirement.

9-7.2.2 The general lighting intensity in kitchens shall be 320 to 540 Lx (30 to 50 footcandles). Kitchen light sources shall be fluorescent and lamps shall be easy to change. Supplementary lighting shall be provided at the sink and under one of the wall cabinets for a work center to produce a composite lighting level of 210 Lx (75 footcandles) using fluorescent fixtures surface-mounted below wall cabinets. Kitchen range hood shall be provided with a light, fan, switches, and fire suppression system.

9-7.2.3 A ceiling outlet shall be provided in all garages for the future addition of garage door openers.

9-7.2.4 In bathrooms, provide independent wall switch control of the exhaust fan and lights.

9-7.2.5 Furnish rough-in box for future light in attic space.

9-7.2.6 The ceiling light fixtures boxes in the following rooms: family room, living room, dining room, and all bedrooms, shall be provided with a metallic fixture box suitably supported from the ceiling structure so that it may support a ceiling fan, and with additional wiring to allow for independent wall switch control of the fan and light.

9-8 Heat and Smoke Detectors. Provide heat and smoke detectors in accordance with NFPA 72 and NFPA 101, and other applicable codes. Provide a heat detector in the garage. Heat and smoke detectors shall be interconnected so that if any device goes into alarm, the alarm in all other devices shall activate. The kitchen hood fire

suppression system shall be interlocked with the heat and smoke detector alarms. Detectors shall have battery backup.

9-8.1 Heat detectors shall be of the fixed temperature type and UL Listed.

9-8.2 Residential smoke detectors shall be photoelectric type, 120 volt, and UL Listed. Detectors shall incorporate a built in piezo horn rated 90 dB at 10 feet, red LED alarm/power on indicator, test button, and tamper proof locking base. Detectors shall not contain radioactive material.

9-9 Carbon Monoxide Alarm Detectors: All residences shall receive carbon monoxide detectors as follows:

9-9.1 One CO detector shall be located on each level of the residence. A required detector shall be located in vicinity of the bedrooms, such as in the corridor outside of the bedrooms. CO detectors will not be provided in garages, furnace rooms, unfinished basements or unfinished attics.

9-9.2 CO detectors shall be hardwired and wall-mounted at the same height as the thermostat, approximately 52 inches off the floor. Dead air spaces such as corners shall be avoided. Units may be powered from circuits powering smoke detectors. In all cases, manufacturer's guidelines and recommendations shall be followed.

9-9.3 CO detectors shall be equipped with an audible alarm, battery back-up, continuous digital display, peak level memory, test button, and test reset button and shall be UL listed by passing standard test UL 2034.

9-10 Telephone. Pre-wire residences in accordance with local telephone company requirements. Provide outlets in kitchen, study room, living room and bedrooms of each residence. Eight position modular jack connectors shall be provided at all outlets. The jacks provided in the kitchen shall be for a wall-mounted phone. Wiring methods shall comply with EIA/TIA Standard 570, Residential and Light Commercial Telecommunications Wiring Standard. Cable and jacks shall be Category 5E per TIA/EIA 568A, Commercial Building Telecommunications Cabling Standard. Each residence shall be pre-wired separately from other residences in the same building. Provide two plug-in type terminal blocks in the basement located on an outside wall near the protected telephone terminal. Provide two outside telephone lines, one terminated to each terminal block. All interior wiring shall terminate to one of these plug-in terminal blocks. The occupant shall be able to choose which line each telephone outlet is plugged into. Each telephone circuit shall be labeled “Telephone” along with the room served. The two outside telephone lines shall terminate in a surface mounted, weatherproof, protected telephone terminal located on an outside wall adjacent to the building meter equipment. ("Demarcation Box"). The protected telephone terminal cover shall be provided with means for padlocking, shall be accessible from the outside, and shall be permanently labeled, "Telephone". Only one protected telephone terminal shall be required for each separate building. Each protected telephone terminal shall accommodate a minimum of two outside telephone lines per residence. A single #6, CU, green equipment grounding conductor shall be run in 1/2-inch non-metallic conduit from the building metering equipment to the protected telephone terminal box. Number of pairs and type of cable, type of modular jacks, and sizes of protected telephone terminals and outlet boxes shall be coordinated with local Telephone Company (Southwestern Bell). Place telephone jacks in locations as indicated on the RFP Floor Plans. The protected telephone terminal unit shall be located near the side or rear of each residence and adjacent to the metering equipment.

9-10.1 Data. Pre-wire residences for data. Provide outlets in study room and bedrooms of each residence. Eight-position modular jack connectors shall be provided at all outlets. Wiring methods shall comply with EIA/TIA Standard 570,

Residential and Light Commercial Building Telecommunications Wiring Standard. Cable and jacks shall be Category 5E per TIA/EIA 568A, Commercial Building Telecommunications Cabling Standard. Each residence shall be pre-wired separately from other residences in the same building. All wiring shall terminate at the telephone system demarcation box. Each data circuit shall be labeled “Data” along with the room served. Place data jacks in locations as indicated on the RFP Floor Plans.

9-11 Television.

9-11.1 Commercial Cable Television. Cable television (TV) outlets shall be located in the living room, kitchen, study room, and bedrooms of each housing unit as indicated. Each housing unit shall be prewired in conformance with all local cable TV company (Time Warner) requirements. Each residence shall be prewired separately from other residences in the same building. The local cable company (Time Warner) has requested that the cables be run inside the house in the following manner. Contained within the stud walls or other hidden areas and in accordance with industry standards, run two separate and continuous RG-6 cables from each room outlet location to a central location in the basement near either the electrical panel or the phone terminal box with sufficient cable for the necessary connections. Each pair of cables terminating in the basement shall be labeled “Cable TV” along with the room served. Each wall outlet in the designated rooms shall contain 8 inches of extra cable, neatly rolled up in a standard electrical wall junction box, and covered with a solid plastic face plate. For additional technical information prior to installation, contact Mr. Ron Lust, Time Warner Field Service Supervisor, (913) 682-2113. Place cable television outlets in locations as indicated on the RFP Floor Plans. The protected television terminal shall be located near the side or rear of each residence and adjacent to the protected telephone terminal.

9-12 Door Bell. The front entrance to each residence shall be provided with a low-voltage doorbell or buzzer and an illuminated push button.

9-13 Convenience Outlets. All outlets shall be of the grounded type. Provide GFCI and convenience outlets in accordance with the NEC and attached RFP Floor Plans.

9-13.1 Near condensing units, provide a GFCI receptacle with a waterproof cover.

9-14 Special Outlets. Provide 240 V electric outlets for electric dryer. Provide outlet for garage door opener in all units whether an opener is specified or not.

9-15 Wiring. Maximum use shall be made of nonmetallic sheathed cable for branch circuit wiring, and of service entrance cable for heavy-duty interior circuits and for service entrance conductors. Service entrance conductors shall be installed a minimum of 36 inches below finished grade. Installed conductors in conduit shall be used only where specifically required by the NEC.

9-16 Branch Circuit Conductors. Branch circuit conductors and over current devices shall be as rated by NEC. A minimum of one spare circuit space for every five active breakers in the panel shall be provided per residence. Individual circuits shall be provided for the washer, dryer (with receptacles located behind the washer and dryer), dishwasher, garbage disposal, freezer, furnace or air handling unit, air conditioning unit, and water heater. Two utility circuits (20-amp) shall be provided in the kitchen area for the convenience outlets for small appliances serving the kitchen and dining area. A separate 20-amp branch circuit

shall be provided for each refrigerator. A separate 20-amp branch circuit shall be provided for each bathroom receptacle per the NEC. All branch circuits serving bedroom outlets shall be protected by arc-fault circuit interrupters. The study room shall be served by at least one dedicated circuit.

9-17 FM Remote Load Shed System. All residences will be interfaced with the installation's FM remote load shed system. The Offeror will install microprocessor-based FM receiver/switches at each condensing unit. A booster antenna, including pole, devices, and all wiring, must be installed at each of the three sites.

9-18 Mechanical Equipment. All mechanical equipment shall be direct connected and provided with overcurrent protection sized per the manufacturer. All equipment shall be provided with local disconnecting means. Disconnect switch for condensing units shall be fused, dead front, pullout type, NEMA 3R rated, of metal constructed housings.

9-18.1 Radon Removal System. Provide 20 amp, 120 volt circuit in junction box near radon removal pipe in attic for future fan, attic light and outlet.

9-19 Demolition. Disconnect and remove electrical services for units to be removed. Remove both above and below ground electrical services. Maintain service to units not being removed.

10. UNIT DESIGN - HEATING, VENTILATING, AND AIR CONDITIONING.

10-1 Design. Heat gain and loss calculations shall be, as a minimum, in accordance with the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Residential Cooling Load Calculation methodology. Computer-generated load calculations shall be provided, and shall include complete input and output summaries. Design shall be based on the weather data shown in Table 10-1.

TABLE 10-1 – WEATHER DATA

Type of Design / Design Information	
	Inch-pound
Heating	
Indoor Design Temperature	70°F
Outdoor Design Temperature	3°F
Annual Heating Degree Days	4822
Largest Number of Monthly Heating Degree Days	1032
Cooling	
Indoor Design Temperature	75°F
Outdoor Design Dry Bulb Temperature	93°F
Outdoor Design Wet Bulb Temperature	76°F

Note[1]: Inch-pound data are based on degree days Fahrenheit to a base of 65 degrees F.

10-1.1 Load calculations. Computer generated load calculations shall be performed for each possible orientation up to four representative orientations for each building type included in the Project. Room air flow requirements shall be computed based on the individual room load. However, the minimum acceptable air flow shall be 0.5 cfm/ft^2 for all spaces. The design for each individual residence shall be based on the heating and cooling loads as well as room airflow requirements computed for the building type and orientation which it most closely matches. Internal loads shall be included in the computerized load calculations in accordance with ASHRAE recommendations for residential analyses.

10-1.2 Duct system layout. For a given building type, a single duct layout may be used regardless of orientation, provided that the system is sized to provide the required air flow for each room at its worst case orientation. Balancing dampers shall then be used to reduce air flow to the appropriate level as required. Permanent access to dampers shall be provided.

10-2 Equipment Safety and Efficiency. All materials and equipment shall be the standard cataloged product of manufacturer's regularly engaged in production of such materials and equipment, and shall be the manufacturer's latest standard design.

Each major component of the heating and cooling system(s) shall have the manufacturer's information on a plate secured to the equipment.

10-2.1 All heating and cooling equipment proposed and installed in this contract shall bear the Energy Star Label.

10-2.2 Equipment shall comply with the requirements of American Gas Association (AGA), American National Standards Institute (ANSI), Air Conditioning and Refrigeration Institute (ARI), American Society for Testing and Materials (ASTM), Gas Appliance Manufacturers Association (GAMA), National Electric Manufacturers Association (NEMA), National Fire Protection Association (NFPA), Underwriters Laboratories, Inc. (UL) or other national trade associations as applicable.

10-2.3 Equipment efficiencies as listed in Table 10-2 below are minimum acceptable levels. Energy conservation as it relates to equipment operating costs will be considered in the evaluation process.

Table 10-2: Minimum Equipment Efficiencies

	Natural gas fired equip	Ground Source Heat pump (ground coupled)		Electric cooling equip
Furnace AFUE	90%[1]	Size A[2]	Size B[2]	
SEER		12[3]	13[3]	10[3]

Note[1]: Efficiency is based on DOE test procedure 10CFR430, Subpart B, Appendix N.
Note[2]: Size A heat pumps have a capacity of 5.9 kW (20,000 Btu/h or less. Size B heat pumps have a capacity of 5.9 kW to 13.5 kW (20,000 to 46,000 Btu/h)
Note[3]: Efficiency is based on DOE test procedure 10CFR430, Subpart B, Appendix M.

10-3 Heating and Cooling Systems. Each residence shall be provided with central heating and air conditioning systems. Systems shall be designed, installed, balanced, and adjusted to distribute heat and cooling to all habitable rooms, as well as bathrooms, in proportion to the calculated load requirements of these spaces. Fans in air handlers and furnaces shall be multi-speed, direct drive type. System installation shall conform to SMACNA Installation Standards for Residential Heating and Air Conditioning Systems except as altered by this document.

10-3.1 Equipment sizes selected for installation shall not oversized more than 125 percent of the calculated loads.

10-3.2 Exterior air conditioning units shall be concrete pad-mounted, with location selected based on site specific conditions and intended uses of outdoor space. Effort shall be made to locate the unit(s) out of the occupant's direct line of sight (screen with shrubbery or wall, locate on sides of residence, avoid placement under windows, etc.). However, the primary concern shall be coordination with the mechanical area location. Mechanical equipment shall be located in basement utility room (first floor rooms in accessible units), and shall be arranged to allow for ease of maintenance, and for proper venting if required. This utility room shall be provided with a light and electrical receptacle.

10-3.3 Forced warm air systems. Warm air furnaces shall be induced combustion, upflow natural gas. Furnaces shall be equipped with electronic ignition. Natural gas

shall be equipped with a flue to exhaust flue gases above the building roof. Units shall be vented in accordance with NFPA 211. High efficiency (AFUE ≥ 90 percent) gas furnaces shall be vented in accordance with AGA requirements and the manufacturer's instructions. Condensate drains for high efficiency units shall be manufacturer approved, and shall be indirectly connected to the building sanitary sewer system. Combustion air shall be provided from the outside in accordance with the appliance listing. For areas with a 97.5 percent outdoor dry bulb design temperature below 20 degrees F, combustion air shall be provided in accordance with SMACNA Installation Standards for Residential Systems. Furnaces shall be equipped with centrifugal fan, disposable filters, controls, and transformer. Fans shall be multi-speed, direct-drive type. It shall be possible to service and replace all controls and internal components from one side of the furnace. Heat exchangers shall be guaranteed for a minimum service life of 10 years. The contractor shall supply Carrier, model number 58MCA or equal.

10-3.4 Split system air conditioning and ground source heat pumps. As a part of the betterments, provide geothermal heat pumps.

10-3.4.1 Electric Air Conditioning system equipment shall consist of an air-cooled condensing unit and evaporator evaporator/blower as matched components with the furnace, all by the same manufacturer. Refrigerants used shall have an Ozone Depletion Potential (ODP) of .05 or less. The condensing unit shall contain, as a minimum, the features indicated in Table 10-3. Equipment shall be sized to meet the total load determined by computer calculation. Equipment may be oversized to no more than 125 percent of the computer-generated load. Evaporator/blower shall be provided complete with centrifugal fan, disposable filters, controls, and transformer. Fans shall be multi-speed, direct drive type. Provide with FM controller for condensing unit shutoff. The contractor shall supply a Carrier, Model number, 38CKC or equal.

TABLE 10-3 – SPLIT SYSTEM AIR CONDITIONING FEATURES

High and low pressure compressor protection.
Filter-drier.
Hermetically sealed compressor with built-in overloads and locked rotor protection.
Electric crankcase heaters.
Start and run capacitors.
Anti-short-cycle timer. (factory installed)
Testing and charging refrigerant connections.
Compressor guaranteed for a minimum service life of 5 years.
Fan and coil guards.

10-3.4.2 The evaporator coil, evaporator/blower, shall be provided with a liquid strainer, expansion device, pre-insulated housing, copper or aluminum coil, and insulated condensate drain pan. Centrifugal blower, and electric resistance supplemental heaters. Coil face velocity shall be limited to 550 fpm.

10-3.4.3 The condensing unit and matched coil, (evaporator/blower), shall deliver a Seasonal Energy Efficiency Rating (SEER), consistent with the minimum requirements shown in Table 10-2.

10-3.4.4 Refrigerant Charge Verification: When split-system air conditioning systems are selected for installation, the Contractor shall check, calibrate, and charge the refrigerant system following installation and start-up of the equipment. These tests shall be accomplished on the same 15 percent of the units which undergo blower door and duct tightness testing. If the tested units show a low or excessive refrigerant charge, all new systems shall be checked after start-up, but prior to acceptance by the Government.

10-3.5 Unacceptable systems. Room unit heaters space heaters, room (window) air conditioning units; floor furnaces, gravity warm air systems, and electric resistance heaters (see Note[1]) are not permitted.

Note[1]: Electric resistance heaters may be used for supplemental heat in heat pumps.

10-4 Air Distribution. Provide systems conforming to the recommendations of the ASHRAE Air Distribution Manual or the SMACNA Residential Comfort System Installation Standards Manual. For two-floor residences, provide separate main supply ducts with volume control dampers for each floor. These main ducts shall be run directly from the air handler or furnace to the appropriate building level. As a minimum, provide a separate ducted return for each floor level.

10-4.1 Supply diffusers. Wall, ceiling, and/or baseboard supply diffusers shall be located to ensure that the air distribution will completely cover all surfaces of exterior walls with a blanket of conditioned air or may be of a compact design so long as 'dead spots' within the units are avoided. At least one diffuser shall be provided in each habitable room. Diffusers shall have louvered faces with individually adjustable blades, and shall be provided with integral opposed blade damper. Diffusers shall be provided with air deflectors as required for proper air flow in the space. Plastic diffusers are prohibited. Core velocity shall be limited to 600 fpm maximum, with a maximum pressure drop of 0.1-inch water. Airflow from any single diffuser shall be limited to 200 cfm maximum. Ceiling mounted units shall have factory finish to match ceiling color, and be installed with rims tight against ceiling. Sponge-rubber gaskets shall be provided between ceiling or wall and surface-mounted diffusers for air leakage control. Diffuser boots shall be sealed tight to the wall or ceiling they penetrate using duct mastic or caulking. Suitable trim shall be provided for flush- mounted diffusers. Duct collar connecting the duct to diffuser shall be airtight and shall not interfere with volume controller. Wall supply registers shall be installed at least 6 inches below the ceiling.

10-4.2 Return and exhaust grilles. Grilles shall be fixed horizontal or vertical louver type similar in appearance to the supply diffuser face. Plastic units are prohibited. Core velocity shall be limited to 400 fpm maximum, with a maximum pressure drop of 0.06-inch water. Grilles shall be provided with sponge-rubber gasket between flanges and wall or ceiling. Register/grille boots shall be sealed tight to the wall or ceiling they penetrate using duct mastic or caulking. Wall return grilles shall be located at least 6 inches above the floor. Return grilles shall be located in hallways, finished basements, or other normally unoccupied spaces to minimize the sound level in occupied spaces.

10-4.3 Ductwork. Ductwork shall be externally insulated sheet metal or flexible metal. Length of flexible duct shall be limited to 6 ft. Flexible ductwork shall not be spliced or joined and shall be a single continuous piece from diffuser boot to trunk/branch duct. Systems composed entirely of flexible ductwork with distribution boxes are prohibited. Sub-slab, intra-slab, or crawlspace ductwork is also prohibited. Volume dampers shall be provided at each branch take-off. All ductwork shall be concealed. No portion of the building construction (such as joist space in a floor or ceiling, wall stud space, etc.) shall be used as a duct. The requirements for ductwork set forth below apply to all ductwork installed in the

residence, supply systems, return systems, exhaust systems, ventilation systems, and outside air supply ductwork.

10-4.3.1 Maximum velocity in supply ducts shall be limited to 900 fpm for mains and 600 fpm for branches.

10-4.3.2 Ducts shall be airtight with no visible or audible leaks to ensure quiet, economical system performance. Ductwork in conditioned spaces shall be constructed for a 1 inch static pressure construction class with seal class C, as described in the SMACNA HVAC Duct Construction Standard, unless a higher pressure class and/or seal class is required by actual, system operating conditions. Ductwork in unconditioned spaces shall be constructed for a 2-inch static pressure construction class with seal class C, unless a higher pressure class and/or seal class is required by actual, system operating conditions. All duct seams and joints shall be sealed using duct mastic. Tape shall not be used as a means for sealing ductwork.

10-4.3.3 For flexible ductwork, the inner core shall be mechanically fastened to all fittings, preferably using drawbands installed directly over the inner core and beaded fitting. If beaded fittings are not used, then the inner core shall be fastened to the fitting using #8 screws equally spaced around the diameter of the duct, and installed to capture the wire coil of the inner liner (3 screws for ducts up to 12 inch in diameter and 5 screws for ducts over 12 inch in diameter). The inner core must be sealed to the fitting using mastic or tape. Tape used for sealing the inner core shall be applied with at least 1 inch of tape on the duct lining and 1 inch of tape on the fitting, and shall be wrapped at least three times. The outer sleeve (vapor barrier) must be sealed at connections with a drawband and three wraps of approved tape. The vapor barrier must be complete without any holes or rips, and seams shall be sealed with mastic or approved tape. Pressure sensitive tapes used in conjunction with flexible duct connections shall be as recommended by the duct manufacturer and shall be UL 181A listed and so indicated with a UL 181A mark or aluminum-backed butyl adhesive tape (15 mil minimum). Drawbands shall be stainless steel worm drive hose clamps or UV resistant nylon duct ties.

10-4.3.4 Provide a minimum of 2-inch thick mineral fiber insulation (or other listed insulation with an equivalent R value) on the exterior of all supply and return air ducts in unconditioned spaces. Exhaust ductwork does not require insulation. Insulation shall be faced with a vapor barrier material having a performance rating not to exceed 1.0 perm. Insulation, vapor barrier, and closure systems shall be non-combustible as defined in NFPA 255, with a flame-spread rating of not more than 25, and a smoke development rating of not more than 50, as defined in ASTM E-84.

10-4.3.5 Return, exhaust, and ventilation air ductwork shall be sized for a maximum velocity of 900 fpm. Short runs of return air duct 5 ft or less which directly precede the air handler or furnace shall be acoustically lined to minimize noise.

10-4.4 Filtration. Provide a disposable pleated 1 inch panel filter, sized for and installed in the return air system in accordance with UL 900. Filter shall be rated for 20 percent efficiency as determined by ASHRAE 52, Method of Testing Air Cleaning Devices used in General Ventilation for Removing Particulate Matter. All filters shall be easily accessible for changing and maintenance and shall be installed in the return grilles whenever possible. See paragraph 5 for Kitchen exhaust hood grease filters.

10-4.5 Radon Removal System. Refer to paragraph 4 for radon removal system requirements.

10-5 Thermostats and Humidistats. Thermostats shall be located on interior partitions, approximately 5 ft above the finished floor. Locating a thermostat on

the wall adjacent to a stairway, on an exterior wall, or where it is subject to unrepresentative temperatures is unacceptable.

10-5.1 Thermostats shall be Lightstat light-activated Model 15970, Energy Star labeled, microprocessor-based, with built-in key pads for scheduling of day and night temperature settings. Thermostats shall be programmable for heating only, cooling only, or heating and cooling as required. When out of the scheduling mode, thermostats shall have continuous display of time, with AM and PM indicator, continuous display of day of week, and either continuous display of room temperature with display of temperature set point on demand, or continuous display of temperature set point with display of room temperature on demand. In the programmable mode, the display shall be used for setting and interrogating time program ON-OFF set points for all 7 days of the week. The time program shall allow two separate temperature-setback intervals per day. Thermostats shall have a means for temporary and manual override of the program schedule, with automatic program restoration on the following day. Thermostats shall have a replaceable battery to maintain the timing and maintain the schedule in memory for one year in the event of a power outage. Maximum differential shall be ±2 degrees F. For a listing of Energy Star labeled thermostats see http://www.epa.gov/appdstar/hvac/thermostats.html. When used for heat-pump applications, the thermostat shall have an emergency heat switch.

10-6 Exhaust Fans. Bathroom and kitchen range hood exhaust fans shall be ducted to the outside. Bathroom fans shall be switched separately from bathroom lights. Each bathroom shall have its own fan. Exhaust fans shall not discharge near the air conditioning condensing unit, entry doors, patios, porches, or garages. Fans shall be tested and rated in accordance with AMCA 210, and shall operate with 120-volt, single-phase power supply. Exhaust fans shall be provided with backdraft damper. Bathroom exhaust fans shall be ceiling mounted and shall be sized to provide not less than 10 air changes per hour in the space served. Maximum allowable noise level for bathroom exhaust fans shall be 2 sones as installed. See paragraph 5 for Kitchen range exhaust fans.

10-7 Dryer Vents. A 4-inch diameter dryer vent shall discharge to the exterior, and provide connection to occupant-owned dryer (one dryer per vent). The vents shall be rigid aluminum with exterior wall cap and backdraft damper. Vent pipes shall be a maximum of 14 feet long, with no more than three right angle elbows (with minimum radius of 6 inches), and have a maximum vertical run of 12 feet. Dryer vents shall not exhaust closer than 10 feet from the air conditioning condensing unit, entry doors, patios, or garages. Dryer vents shall not run through non-accessible spaces or garages.

10-8 Humidification. Humidifiers may be of the bypass or duct insertion type. Humidifiers shall be controlled by wall-mounted or return duct mounted humidistat.

10-9 Piping Requirements. Air conditioner condensate drains, refrigerant suction, and exterior refrigerant liquid lines shall be insulated with 1 inch (minimum) thick cellular glass or unicellular foam pipe insulation. Exterior refrigerant line insulation shall be encased in either an aluminum or PVC jacket to prevent damage. Condensate lines shall be one size larger than the drain pan connection, be properly trapped, and not directly connected to a sanitary sewer system (air gap fitting required).

10-10 Testing, Adjusting, and Balancing. Adjusting and balancing of each residence shall be the Contractor's responsibility. Following adjusting and balancing, testing of air and water systems shall be performed on 5 percent of the Project buildings (not to exceed 10 buildings), which have been randomly selected by the Contracting Officer. If buildings are to be turned over in phases, testing shall be performed on 5 percent of the buildings completed in each phase (not to exceed 5 buildings per phase). No additional testing will be required if at least 90 percent

of the tested buildings pass the test requirements. If less than 90 percent of the tested buildings pass the test, an additional 5 percent of the Project buildings (not to exceed 5 buildings) shall be tested. This process shall continue until 90 percent of the total number of tested buildings pass. The Contractor shall correct all residences not found in compliance, and shall be responsible for all labor and materials required for this effort. AABC MN-1, NEBB-01, SMACNA-07 or ASHRAE 111 shall be used as the standard for providing testing of air and water systems. The selected standard shall be used throughout the Project. Instrumentation accuracy shall be in accordance with the standard selected. Testing shall be accomplished by a firm certified for testing by the Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB). Prior to testing, adjusting, and balancing, the Contractor shall verify that the systems have been installed and are operating as specified. Where specific systems require special or additional procedures for testing, such procedures shall be in accordance with the standard selected. Approved detail drawings and all other data required for each system and/or component to be tested shall be made available at the job site during the entire testing effort. Testing shall not commence until approved by the Contracting Officer. The facility shall be essentially complete with final ceiling, walls, windows, doors, and partitions in place. Doors and windows surrounding each area to be balanced shall be closed during testing and balancing operations. Air systems, hydronic systems, and exhaust fans shall be complete and operable. All data, including deficiencies encountered and corrective action taken, shall be recorded. Following final acceptance of certified reports by the Contracting Officer, the setting of all HVAC adjustment devices shall be permanently marked by the Contractor's balancing engineer so that adjustment can be restored if disturbed at any time.

10-11 Duct Tightness Testing Requirements. The installation of the supply and return ductwork within the units is an item of prime concern with respect to the energy efficient operation of the residence as a whole. With that consideration in mind, for heating and air conditioning designs which include ductwork outside of the conditioned envelope, the Contractor will be required to test the proto-type units and all units which are blower door tested for tightness (see paragraph 7.c.(2)) to ascertain the leakage levels from the ductwork in accordance with the following requirements. For system designs which place all the ductwork within the conditioned envelope of the structure, no ductwork testing will be required.

10-11.1 Duct tightness testing shall ensure that the leakage rate from ductwork (where the ductwork system is not entirely within the conditioned envelop) shall not exceed 0.15 $(L/s)/m^2$ (0.03 cfm/ft^2). If the units tested fail to meet this requirement, the ductwork installation shall be examined, corrections made, and the test redone until the installation passes this requirement. No ductwork systems may be installed in other units until the proto-type units ductwork systems have been validated. Several methods to accomplish this testing are acceptable

10-11.1.1 Testing may be done in accordance with ASTM Standard E 1554-94, “Determining External Air Leakage of Air Distribution Systems by Fan Pressurization”. This method describes the process and methodology required to accomplish basically a ‘blower door subtraction’ method of duct tightness testing.

10-11.1.2 Testing may also be accomplished utilizing “Duct Blaster” methodologies and pressurizing the ductwork to 25 Pascal (0.1 inch of water).

10-11.2 The Contractor is advised that the EPA may test, or hire a consultant to test randomly selected residences constructed in this Project. These tests will be completed without cost to the Contractor, however, the Contractor will be required to coordinate access to the selected unit. If accomplished, this testing is not expected to interfere or delay the construction Contractor in any manner.

10-12 Whole House Fans. As a betterment bid, provide a whole house fan in each residence. Locate the fan in the ceiling of the bedroom hallway exhausting into the attic. Fan shall be a minimum of 36-inch propeller fan, 1/3 HP, belt driven, with automatic closing louver. Provide adequate attic ventilation for exhaust. Control fan by wall switch near fan, interlock with furnace/AC unit so that it will not run when whole-house fan is on.

11. Not Used

12. CONTRACTOR PREPARED SPECIFICATIONS

12-1 The contractor's DESIGNER OF RECORD shall have the freedom to use the following in his Specifications: AIA Masterspec, CSI standard specification, manufacturer's standard data and installation instructions, COE guide specifications, or the new Uniform Facility Guide Specifications. The specifications shall be tailored to meet the requirements of this job. Specifications shall be brief and to the point. Inapplicable data and materials shall be deleted. All prescriptive information and edited guide specifications provided by the Government with this RFP shall be incorporated into the final edited specifications and drawings. Specific requirements are outlined in the Specification Outline portion of this RFP. See also Section 1012, "DESIGN AFTER AWARD" and other specifications provided with this RFP for detailed requirements and guidelines.

12-2 Contractor prepared specifications and individual specification sections for this work shall be organized into divisions and sections in accordance with Construction Specifications Institute (CSI), Master list of Tiles and Numbers for Construction Industry, latest edition.

12-3 Submittal requirements, submittal procedures and quality control are addressed in other specification sections provided with this RFP. The DESIGNER OF RECORD shall use the asbestos, and all other prescriptive specifications provided with this RFP without editing.

SECTION 01012

DESIGN AFTER AWARD

1.0 GENERAL

1.1 Design Quality Control (DQC) Plan: The Contractor shall prepare and submit DQC for Government review prior to starting any work. At a minimum the Contractor's DQC Plan shall provide and maintain an effective quality control program, which will assure that all services required by this design-build contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, all documents shall be technically reviewed by competent, independent reviewers identified in the DQC Plan. The same element that produced the product shall not perform the independent technical review (ITR).

The Contractor shall include the design schedule in the master project schedule, showing the sequence of events involved in carrying out the project tasks within the specific contract period. This should be at a detailed level of scheduling sufficient to identify all major tasks including those that control the flow of work. The schedule shall include review and correction periods associated with each item. This should be a forward planning as well as a project monitoring tool. The schedule reflects calendar days and not dates for each activity. If the schedule is changed, the Contractor shall submit a revised schedule reflecting the change within seven calendar days. The Contractor shall include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. These completed checklists shall be submitted at each design phase as part of the project documentation.

The DQC Plan shall be implemented by an assigned person with the Contractor's organization who has the responsibility of being present during the times work is in progress, and shall be cognizant of and assure that all documents on the project have been coordinated. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. The Contractor shall notify the Contracting Officer, in writing, of the name of the individual and the name of an alternate person assigned to the position.

The Contracting Officer will notify the Contractor, in writing, of the acceptance of the DQC Plan. After acceptance, any changes proposed by the Contractor are subject to the acceptance of the Contracting Officer.

1.2 <u>Description of The Project.</u> Design and construct 84 family housing residences (42 duplexes). This consists of 62 three-bedroom and 22 four-bedroom residences, supporting infrastructure, site development and landscaping at Fort Leavenworth, Kansas, in accordance with requirements of this RFP.

1.3 The Contractor shall propose a schedule for each of the design submittal phases. As a minimum, design submittals are required at the “fast track, preliminary (50%), final (100%), and at the design complete phase. The requirements of each design stage are listed hereinafter. The Contractor shall show the submittal phase and schedules for each design submittal phase in the progress charts. The 50%, 100%, and “design complete” submittals shall be submitted individually and each package complete, and includes each of the major categories listed in paragraph “Contents of Design Submittals”. The contractor may elect to not “fast track” work and submit all work in a combined 50%, 100% and Final submittal process.

1.4 To facilitate fast-track design-construction activities the contractor may choose to submit a 100% Site/Utility Design as the first design submittal. Following review, resolution, and incorporation of all Government comments, and submittal of a satisfactory set of site/utility design documents, the Kansas City District shall issue a limited Notice to Proceed (NTP) which shall allow the contractor to proceed with site development activities within the parameters set forth in the accepted design submittal.

Submittal review, comment, and resolution times from this specification apply to this initial 100% Site/Utility Design Submittal. No on-site construction activities shall begin prior to receipt of a construction NTP by the contractor.

1.5 DESIGN CAUTION: This RFP (Request for Proposal) contains drawings and some prescriptive specifications of some work items. The contractor shall use the conceptual drawings and specifications as the basis of further design effort. The contractor shall not deviate significantly from those drawings and specification without prior Government approval. Housing layouts and depicted materials shown have been reviewed and approved by the Installation and shall not be significantly revised except to accommodate site utility layouts, mechanical, electrical or structural elements. The contractor is required to survey the site and use this survey for the basis of actual design. Metric design is not required.

1.6 "Dr. Checks". Dr. Checks is a web based system for management of project reviews and review comments. Dr. Checks will be utilized by the contractor and the Government to make and manage review comments. The AE/Contractor is not required to make replies or annotation to the Dr. Checks Comments prior to the review conference. Comments will be sorted, printed and review by individual reviewers. The access to Dr. Checks will be at no charge to the contractor. Microsoft Internet Explorer 5.0 is necessary to access and utilize the program. The Government will provide access passwords to the contractor and setup the project for using Dr. Checks to manage the review. The contractor shall be responsible to provide responses to comments and maintain necessary documentation for the management of all reviews accomplished under this contract. Additional information about the program and how it is used can be found at Dr. Check web address: http://65.204.17.188/projnet/home/version1/index.cfm .

2.0 DESIGNER OF RECORD

2.1 Contractor Design Services. Design work accomplished by the Design-Build Contractor (also referred to in this RFP as DESIGNER or DESIGNER(s) of RECORD) consists of design and preparation of Design Analysis, Construction Drawings and Specifications. Dr. Checks will be utilized for the processing of design review comments and responses.

Although Structural (i.e., building related) Interior Design shall be performed by the DESIGNER, Furniture Related Interior Design is not required by the DESIGNER.

Energy Evaluation and Energy Analysis, as required by the Kansas City District AE Manual, Chapter 14, paragraph 1.1 and 4., respectively, will not be required to be performed by the DESIGNER.

The Contracting officer may allow the use of shop drawings in lieu of Contract Design drawings (where practical) and allow the use of catalogue cuts and manufactures installation instructions that show compliance with this RFP in lieu of providing specifications. The Contractor is encouraged to utilize this process to improve the efficiency and timeliness of the

design effort.

2.2 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 drawings under their responsible discipline at each design submittal stage (see SCR - "Registration of Designers”). The Contractor shall designate a Project Manager who shall monitor the progress of the design for the Construction Contractor. This person shall provide whatever coordination needs to be accomplished between the Construction Contractor and the Designer(s) of Record to minimize problems during design and construction.

3.0 DEFINITION OF DESIGN SUBMITTALS

3.1 First Site/Utility Design Submittal (100%) “Fast Track”. This submittal is provided to allow the contractor to concentrate initial efforts for the site/utility portions of the project. By allowing this work to be separated, the contractor is given the opportunity to “fast track” and begin construction on the site/utility work prior to completion of the building designs. This submittal shall consist of the following:

3.1.1 Design analysis, developed to 100% for site work and utility work only.

3.1.2 100% complete site/utility drawings

3.1.3 Final site/utility specifications

3.1.4 Environmental permits, as required. When environmental permits are not required, the Contractor shall provide a statement with justification to that effect.

3.2 Preliminary Conformance Review Submittal (50%). The submittal shall also depict any work submitted utilizing the “Fast Track” process to ensure proper coordination. This submittal is intended to insure that the contractor’s design is proceeding in accordance with the terms of the solicitation and in a timely manner. This submittal shall consist of the following:

3.2.1 Design analysis, developed to 50%

3.2.2 50% complete drawings

3.2.3 Draft specifications

3.2.4 Environmental permits, as required. When environmental permits are not required, the Contractor shall provide a statement with justification to that effect. If the Contractor has elected to “Fast Track” site and utility work, no additional site/utility design information is required for this submittal (except utility interface with each floor plan type). However if the Contractor elected not to “Fast Track”, then site/utility plans and specification, at least 50% complete will be provided.

3.3 Final Design Submittal (100%). The review of this submittal is to insure that the design is in accordance with directions provided the

Contractor during the design process as well as the original solicitation. The Contractor shall submit the following documents for Final Design Review:

3.3.1 Annotated 50% review comments and responses utilizing Dr. Checks.

3.3.2 The Design Analysis submitted for Final Design Review shall be in its final form. The Design Analysis shall include all backup material previously submitted and revised as necessary. All design calculations shall be included. The Design Analysis shall contain all explanatory material giving the design rationale for any design decisions.

3.3.3 The Contract Drawings submitted for Final Design Review will be in a design complete condition, ready for construction. It shall include the drawings previously submitted which have been revised and completed as necessary. The Contractor is expected to have completed all of his coordination checks including the incorporation of any design review comments generated by the previous design reviews. If deemed appropriate by the Contracting Officer, shop drawings will be considered design drawings.

3.3.4 The Draft Specifications on all items of work submitted for Final Design Review shall consist of legible marked-up specification sections. The Specifications on all items of work submitted for Final Design Review shall consist of ready to construct specification sections.

3.3.5 If the Contractor has elected to “Fast Track” site and utility work, no additional site/utility design information is required for this submittal (except utility interface with each floor plan type). However if the Contractor elected not to “Fast Track”, then site/utility plans and specification, at least 100% complete will be provided.

3.3.6 The Contractor may begin construction work for items the Government has reviewed, and the Final Design Submission has been determined satisfactory for purposes of beginning construction. The Administrative Contracting Officer (ACO) or COR 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 ACO or COR, the initial submission failed to meet the minimum quality requirements as set forth in the Contract.

3.4 Design Complete Submittal. After the Final Design Review, the Contractor shall revise the Contract Documents by incorporating any comments generated during the Final Design Review and shall prepare final hard copy Contract Specifications. The Contractor shall submit the following documents for the design complete submittal:

3.4.1 Design analysis, in final 100% complete form.

3.4.2 100% complete drawings.

3.4.3 Final specifications

3.4.4 Annotated Final review comments and responses utilizing Dr. Checks.

3.4.5 Electronic Submission: All CADD files in native AutoCAD format, as well as all prepared technical specifications and design analysis shall be provided on CD-ROM. Two copies are required.

3.4.6 Design to construction procedure.

a. The Contractor shall submit the Design Complete Submittal within the number of calendar days specified in his project schedule. Final copies of drawings and specifications must be available to the Government prior to starting any construction work.

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 with the Design Complete Submittal and are satisfactory to the Government.

c. Design Reviews by the Government are to primarily verify that the final design conforms to the RFP. They are not for technical verification of the design. Where possible, obvious errors and omissions will be noted and brought to the Contractor's attention. However, the Government does not assume any responsibility either explicitly or implied for the technical adequacy of the design documents. The Government never approves the design.

3.5 Structural Interior Design. The Contractor will submit three of each: samples, catalogue cuts, manufacture's installation instructions, and other information as necessary to fully describe all interior and exterior finish items (installed) that shown conformance with this RFP. All interior finish materials will be submitted together to allow coordination of color and finish selections. Likewise, all exterior finish materials will be submitted together to allow coordination of color and finish selections. Each submittal item will be identified with a title block that includes the Contractor's name, contract number, name and location of the project, and name of the applicable item of work being submitted. These items will also be stamped and approved by the Designer of Record and the Contractor's Quality Control Manager prior to submission. Approved items do not need to be resubmitted during subsequent design reviews.

4.0 QUANTITY OF DESIGN SUBMITTALS

4.1 The Contractor shall submit copies of each item required to be submitted at the "Fast Track" Preliminary (50%) and Final (100%) Conformance Review Submittal in accordance with paragraph 5.1 below. All drawings submitted for review shall be half-size. In addition to the quantities listed in table 5.1, the Contractor shall submit one full size set of plans to the installation (Dave Murdock) and one full size set of plans FM-LV for each review submittal. Also submit one (1) full size copy for the installation and five (5) full size sets of drawings for FM-LV at the Design Complete Stage. Full size drawings shall be 24" X 36".

5.0 MAILING OF DESIGN SUBMITTALS

5.1 Mail all design submittals to the Government during design and construction using 2-day mailing service. All submittals are to be sent by express mail or other expeditious means. Distribution of each design submittal shall be made by the AE directly to the reviewing agencies with the required number of copies as indicated on the following submissions listing.

	Fast Track	50%	100%	Design complete
Commander Director of Installation Support ATTN: ATZL-GCE-E/David Murdock 820 McClellan Avenue (Bldg 85) Fort Leavenworth, KS 66027-2326	15	15	15	6
US Army Corps of Engineers Fort Leavenworth Area Office ATTN: CENWK-FM-LV/Prinslow 750 West Warehouse Road, Bldg 234 Fort Leavenworth, Kansas 66027-3387	6	6	6	6
Directorate of Information Management (DOIM) ATTN: Bob Windom Bldg. 135 Fort Leavenworth, Kansas 66207	1	1	1	1
U.S. Army Corps of Engineers Kansas City District ATTN: CENWK-PM-MO/Werner -Rm 807 601 E. 12th St., 700 Federal Bldg. Kansas City, MO 64106-28296	12	12	12	5

5.2 Each design submittal shall have a transmittal letter accompanying it indicating the date, design percentage, type of submittal, list of items submitted, transmittal number and point of contact with telephone number.

6.0 COORDINATION:

6.1 Written Records. The Contractor shall prepare a written record of each design site visit, meeting, or conference, either telephonic or personal, and furnish within five (5) working days copies to the Contracting Officer and all parties involved. The written record shall 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.

6.2 Design Needs List. Throughout the life of his contract the Contractor shall furnish the COR a monthly "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, name of the individual or agency responsible for satisfying the action item and remarks. The list will be maintained 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. Copies of the list will be mailed to both the Administrative Contracting Officer and the agencies tasked with supplying the information.

6.3 The importance of careful checking and coordination of Drawings, Specifications, and other Project Documents cannot be overemphasized. It shall be the responsibility of the DESIGNER to check and coordinate all Project data prior to all design submittals. Deficiencies, ambiguities, conflicts and

inconsistencies shall be rectified prior to submittal of Documents. The letter of transmittal shall certify that all Documents have been checked, coordinated, approved, signed, and dated and that the Documents comply with Contract requirements. The transmittal letter shall be signed by a principal of the DESIGNER's firm.

7.0 GOVERNMENT REVIEW

7.1 Within 21 days after Notice to Proceed: If the Contractor's design schedule is different than the design schedule submitted with his proposal, the Contractor shall submit, for approval, a complete updated design schedule with all submittals and review times indicated in calendar dates. The Contractor shall update the design schedule at least once a month. The Contractor will also provide an updated design schedule whenever circumstances dictate a change in schedule. No design submittals will be reviewed or evaluated until after receipt and acceptance of the proposed design/review schedule.

7.2 Review Conferences. All review conferences will be held at Fort Leavenworth, Kansas and will be scheduled approximately 14 calendar days after the Government receives all required design submittals for each review required. The review will be for conformance with the requirements of the RFP. At a minimum the following Contractor personnel shall attend these conferences: The Design PM, all Designers of Record and the Construction Project Manager.

The DESIGNER shall be responsible for preparing and distributing meeting minutes for all conferences. Conference notes will be prepared and furnished to the COR, within 5 days after date of conference. These minutes shall include the date, place and a list of attendees, their organization and telephone number. General comments made during the conference, or decisions affecting criteria changes, must be recorded in the basic conference notes. The minutes must clearly indicate for any actions required that effect schedule or the next submittal and who is responsible, what is expected and when it is required. The Contractor shall answer and respond to all comments in Dr. Checks, and shall be included with the next scheduled submittal.

7.3 If a design submittal is late in accordance with the contractor's current design schedule, the Government review period will be extended an equal number of days for each day the contractor is late. Revisions to submittal submission dates and schedules must be made in writing at least one (1) week prior to the effected submittal. Submittals will not be reviewed during the last two weeks of December or the first 3 days of January. The contractor shall include this dead time in his schedule and adjust it accordingly.

7.4 Post review conference action: Copies of comments, annotated with comment action agreed on, will be made available to all parties before the conference adjourns. Unresolved problems will be resolved by immediate follow-on action at the end of conferences. Valid comments will be incorporated. After receipt of final corrected design documents upon incorporation of backcheck comments the Kansas City District will recommend issuance of a Construction Notice to Proceed (NTP). The Government, however, reserves the right to disapprove design document submittals if comments are significant. If final or backcheck submittal(s) are incomplete or deficient, and require 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 $ 5,000.00 per submittal.

8.0 DESIGN ANALYSIS: The Design Analysis (DA) shall be prepared by the DESIGNER in accordance with the guidance provided in the Kansas City District AE Manual. The Design Analysis will incorporate all contract requirements that are not appropriate for inclusion in the contract drawings and specifications

8.1 Media and Format. Present the design analysis on 8-1/2-inch by 11-inch paper except that larger sheets may be used when required for graphs or other special calculation forms. All final documents will be provide to the Government on CD-ROM

8.2 Organization. The DA shall be bound in one document. Furnish a table of contents, which shall be an index of the indices, when there is more than one volume. The title page shall indicate the name of the project, project number and the applicable submittal being made for review (“fast track, 50%, etc)

8.3 Design Calculations. Provide a general table of contents in addition to the individual indices. Bind them separately from the narrative part of the design analysis. The design calculations shall be clean and legible. Identify the source of loading conditions, supplementary sketches, graphs, formulae, and references. Explain all assumptions and conclusions. Calculation sheets shall carry the names or initials of the author and the checker and the dates of calculations and checking. No portion of the calculations shall be computed and checked by the same person. Include descriptions of the computer programs used and copies of the input data and output summaries. Provide sufficient information to permit manual checks of the results.

9.0 GENERAL DESIGN CRITERIA: criteria included in the RFP is intended to serve as a minimum standard for the DESIGNER in the preparation of Design Documents, which will satisfactorily meet design, and construction standards for the project. Technical manuals and other DOD criteria shall not be included by reference in the DESIGNER-prepared Specifications and Drawings. **Additional criteria** that may prove helpful in preparing the design are as follows:

- **Engineering Technical Letters (TL),** latest editions. (See Techinfo at http://www.hnd.usace.army.mil/techinfo/)

- **Fire Protection Plan.** All building design shall be in conformance with Military Handbook 1008C(see http://www.hnd.usace.army.mil/techinfo/). A fire protection plan shall be developed and submitted with the preliminary design submittal. It shall be updated with subsequent submittals.

- **Army Technical Manuals (TM),** latest editions.(See Techinfo)

- **U.S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1),** latest edition is provided as an attachment to the Electronic Bid Sets provided with this RFP.

- **Kansas City District AE Instruction Manual.** (Included in RFP Documents) The District AE Instruction Manual is provided as general guide in the preparation of Design Documents. Chapters 18 and 19 of the Manual do not apply to the design of this Project.

9.1 DRAWINGS: Prepare all drawings using AutoCAD Release 2000. The final full-size drawings shall be a 24" x 36" format. The Contractor will be provided and use standard Corps of Engineers title blocks and borders on all drawings. An index of drawings will be included with each submittal. Additionally the contractor will use the Tri-Service Standards for CADD/GIS that are an attachment to this RFP. The Contractor can access the web site for Computer-Aided Designed Systems as guidance for standard details, cell libraries, title blocks, and layer/level assignments. https://tsc.wes.army.mil/products/standards/aec/intro.as. All Design complete files will be submitted on a read/write CD-Rom and must be independent, freestanding, and not supported by reference files. All Xrefs files shall be removed at the "Design Complete" submittal.

9.2 SPECIFICATIONS

9.2.1 The Specifications will be bound and have a cover with the project name, number and submittal phase. It will include a table of contents, an index page at the beginning of each specification section. The Kansas City District will provide electronic copies of the files contained in this RFP to the designer. The designer shall incorporate these Specifications into their final design documents. However the technical specifications provided with this RFP are not inclusive, and must be supplemented by the Designer as necessary to satisfy the all RFP requirements.

The Contractor is encouraged to use one of the major, well-known master guide specification sources such as **MASTERSPEC** from the American Institute of Architects**, SPECTEXT** from Construction Specification Institute or he may use **Corps of Engineers Guide Specifications,** etc. The Designer shall edit the specifications specifically for this project.

When the Contractor intends to provide a brand-name product indicated in RFP the solicitation (this does not include "or equal" submittals) no additional specification or submittal review for compliance is required. Instead the designer shall include a copy of the product manufacture's cut sheet and installation instructions that show compliance with the RFP in the appropriate Construction Division Section. The Contractor may also submit product manufactures cut sheets and installation instructions for other items not specifically identified by brand name in lieu of a specification provided this does not change once the product is reviewed for compliance with the RFP, by the COR. The specification should be brief, and to the point. Discuss only the criteria needed to comply with this RFP.

9.2.2 Submittal Register. (Eng Form 4288 (RMS)). Develop the submittal requirements during construction during the design phase of the contract, by producing a Contractor Submittal Register during design. Attach a submittal register to each section of the specifications for the submittal requirements of that section. Prepare the Submittal Register on ENG Form 4288. The Contractor shall be responsible for listing all required submittals necessary to insure the project requirements are complied with. The Register shall identify submittal items such as shop drawings, manufacturer's literature, certificates of compliance, material samples, guarantees, test results, etc that the Contractor shall submit for review and/or approval action during the life of the construction contract. The Contractor shall place all the Submittal Register pages in an appendix of the final specifications. The DESIGNER shall create the Specifications, Submittal Register using the Corps' Resident Management System (RMS). The Corps will provide the DESIGNER with the necessary RMS software. The DESIGNER shall complete all information,

including title and location and specification section blocks and all columns of ENG Form 4288 (RMS) Submittal Register.

10.0 CONTENTS OF DESIGN SUBMITTALS

10.1 "FAST-TRACK" 100% site/utility design submittal if applicable.

10.1.1 The documents furnished with this RFP have established many of the factors influencing site decisions. Existing utility systems will be upgraded where necessary to meet design loads. Those not defined by the RFP are the responsibility of the Design-Build contractor:

10.1.2 All "fast track" drawings shall be developed to 100 percent completion. In addition to the individual utility plans, submit a combined utility plan drawn to the same scale as the individual utility plans.

a. General Site Layout: Scale shall be included.

b. Site Grading and Drainage Plans: Show locations of all sediment basins, diversion ditches, and other erosion control structures. Indicate the approximate drainage areas each will service. Indicate the materials, construction and capacity of each structure. Include limits of landscaping and seeded areas. General site grading and drainage shall be indicated by contour lines with an interval of not more than approximately 1 m [3 feet].

c. Road Alignment Plans: Scale shall be no greater than as indicated and profiles showing pavement and shoulder widths, azimuths and curve data, limits of grading, and erosion control. The materials to be used shall be indicated.

d. Traffic Control Plan: Traffic routing and signage shall be in accordance with The Manual on Uniform Traffic Control Devices for Streets and Highways, U.S. Department of Transportation, Federal Highways Administration.

e. Utility Systems: The Contractor shall prepare a design narrative for the natural gas, water supply, storm drainage, and wastewater systems relating to this project. Include an analysis of the existing distribution systems capability to supply sufficient quantity at adequate levels. If the existing distribution systems are inadequate, provide the design solution to augment the systems to provide the requirements for the new facilities.

f. Sanitary Sewer Plan: Scale shall be as indicated and profiles showing location and elevation of pipe, thrust blocks, manholes, etc. Materials and construction of main and appurtenances shall be indicated.

d. Water Supply Line Plans: Scale shall be as indicated and profiles showing locations of valves, thrust blocks, connections, etc. Materials shall be indicated and specifications shall be provided for valves, pipes, etc.

g. Electrical Plan Requirements:

Required diagrams and details on Site Electrical Drawings.

a. Off-Site Electrical Distribution Plan:
b. Off-Site Primary Circuit Routing Plans:
c. Off-Site One Line Diagram. (If applicable)
d. Off-Site Details. (Aerial Pole Line Construction, etc.) (If applicable).
e. On-Site Electrical Distribution Plan:
f. On-Site One Line Diagram.
g. On-Site Distribution Transformer Schedule: Provide with the following headings:

Transformer Designation. Transformer Size (KVA). Building(s)

Served. Primary Phase(s) and Circuit to which connected.

h. On-Site Details (Site Lighting, Trenching, Pad-Mounted Transformer, etc.).

h. Specifications: Provide final draft specifications which include all sections which apply to site/utility work.

i. Design Analysis: Design analysis shall include design calculations fully developed to support the design of the site and utility systems included in this submittal.

j. Geotechnical: Soils analysis and geotechnical report. Geotechnical information must be provided to support all assumptions and design parameters utilized in the presented site/utility design as applicable.

10.2 The 50% design submittal shall contain as a minimum, the following:

10.2.1 Landscape, Planting and Turfing: The concept drawings shall be prepared at a scale which corresponds with the site layout and grading plans and, likewise, shall include reference coordinates, north arrows, graphic scales and appropriate legends. An overall planting layout shall be developed and shall include enlarged detail plans of specific areas, as needed, to clarify requirements. The proposed layout shall indicate shade trees, evergreen trees, flowering trees, shrub masses, etc., according to designated functional and visual locations of planting. A legend which also indicates sizes of plants recommended for each of the above categories shall be included. The drawings and all subsequent plans shall indicate existing and proposed buildings, paved areas, signs, light standards, transformers, dumpster areas, storm drainage system, and other structures and utilities.

10.2.2 Architectural

a. The first sheet of the Architectural plans shall include a detailed code analysis that demonstrates compliance with the RFP solicitation, including all applicable NFPA and Life Safety Code requirements. Architectural Floor Plans shall indicate dimensions, columns lines, and detail references. Bathrooms and other specialized areas shall be drawn to 1/4" scale and shall show any needed interior features.

b. Finish schedule shall indicate material, finishes, colors and any special interior design features such as soffits, fascias, and lighting troughs, etc.

c. All required equipment shall be shown on the drawings with an equipment list.

d. List any special graphics requirements that will be provided.

e. Schedules shall be provided for both doors and windows. These schedules shall indicate sizes, types, and details for all items shown on floor plans.

f. Hardware sets using BHMA designations.

g. SID package.

h. Fire Protection and Life Safety Analysis.

10.2.3 Structural Systems

a. The first sheet of the Structural plans shall include a detailed code analysis that demonstrates compliance with the RFP. State the live loads to be used for design. Include roof and floor loads; wind loads, lateral earth pressure loads, seismic loads, etc., as applicable.

b. Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.

c. Furnish calculations for all principal roof, floor, and foundation members.

d. This submittal shall include drawings showing roof and floor framing plans as applicable. Principal members will be shown on the plans. A foundation plan shall also be furnished showing main footings and grade beams where applicable. Where beam, column, and footing schedules are used, show schedules and fill in sufficient items to indicate method to be used. Show typical bar bending diagram if applicable. Typical sections shall be furnished for roof, floor, and foundation conditions. Structural drawings for proposals and submittals shall be separate from architectural drawings.

e. Provide any computer analyses used shall be widely accepted, commercially available programs and complete documentation of the input and output of the program.

f. Provide complete seismic analyses for all building structural components. Seismic calculations shall clearly demonstrate compliance with all requirements set forth in the Statement of Work.

10.2.4 Plumbing Systems

a. Mechanical and plumbing sheets can be combined. The first sheet of the mechanical/plumbing plans shall include a detailed code analysis that demonstrates compliance with the RFP. List all references used in the design including Government design documents and industry standards.

b. If know at the time of design, submit catalogue cuts, manufactures installation instructions, and other appropriate information for each plumbing fixture, in lieu of a specification.

c. Prepare detail calculations and indicate appropriate size for systems such as domestic water piping and natural gas piping.

d. Indicate locations and general arrangement of plumbing fixtures and major equipment.

e. Include plan diagrams of all gas, hot water, cold water, waste and vent piping. Piping layouts and risers should also include natural gas (and meter as required), and other specialty systems as applicable.

f. Include equipment and fixture connection schedules with descriptions, capacities, locations, connection sizes and other information as required.

10.2.5 Electronic Systems: Electronic Systems responsibilities include the following: Fire Detection and Alarm System, Telephone System, Cable Television System, Special Grounding Systems, Cathodic Protection, Central Control and Monitoring System.

a. The design analysis shall include all calculations required to support design decisions and estimates at this stage of design. The analysis shall include specific criteria furnished, conference minutes and cost analyses of all systems considered.

b. Design of the fire alarm and detection system shall include layout drawings for all devices and a riser diagram showing the control panel, annunciator panel, all zones, radio transmitter and interfaces to other systems (HVAC, sprinkler, etc.).

c. The location of telephone outlets are shown on the plans. Include legend and symbol definition to indicate height above finished floor. Underground telephone distribution conduit shall be shown on either the electrical plan.

d. Grounding System. The specifications and drawings shall completely

reflect all of the design requirements. The specifications shall require field tests (in the construction phase), witnessed by the Contracting Officer, to determine the effectiveness of the grounding system. The design shall include drawings showing existing construction. Verification of the validity of any existing drawings and/or any other data furnished by the Government shall be the responsibility of the engineering services firm.

e. Provide a statement describing the extent of any exterior work such as telephone lines, cable television (TV) distribution cables, duct banks, etc., outside of 5 feet from the building line.

f. When cathodic protection is required, provide the name of the licensed corrosion engineer or NACE specialist. Provide the following for cathodic protection systems:

- Clearly define areas of structures or components in soil or water to be protected.
- Type system recommended, comparison of systems, cost estimates showing all equipment alternatives.
- Calculations on all systems that are considered showing all information and descriptions.

Design of Cathodic Protection. The design shall clearly provide a thorough and comprehensive specification and drawing. The design plans and specifications shall show extent of the facilities to be protected, location and type of anodes, location of test points, details for sectionalizing an underground piping system. This design shall be complete enough to purchase equipment and build without design changes to meet criteria of protection.

g. Exterior work to be shown on electrical site plan.

- Existing and new communications service lines, both overhead and underground, shall be properly identified.
- Show removals and relocations, if any.

h. Provide a descriptive narrative of all electronic systems that are required for project. Define any hazardous areas (as defined in the National Electric Code) and indicate the type of equipment proposed for use in such areas. Show the location of all electronic system panels, etc., on the floor plans. Show the proposed riser diagrams for all systems. Sizes of all conduit, wires, cables, panels, etc. Provide a complete symbol legend for all devices or equipment shown on the plans. For work requiring removals or demolition, the designer shall show by use of drawings or narrative, how demolition work is to be done.

10.2.7 Electrical and Mechanical Systems: Provide all information as required on the 100% design submittal developed to 50% completion.

10.2.8 Specifications: Draft of specifications for housing units, including index and trade sections.

10.3 The 100% design submittal shall contain, as a minimum, the following items for all submittals:

10.3.1 General: A complete set of construction documents plans and specifications at the same level of detail as if the project were to be bid including a complete list of equipment, fixtures and materials to be used. The final drawings are an extension of the reviewed 50% drawings and are to

include the 50% comments and responses. All details shall be shown on the drawings.

10.3.2 The design analysis is an extension of the reviewed 50% design analysis and supports and verifies that the design complies with the requirements of the project.

10.3.3 Submit marked-up specifications. The specifications shall be coordinated with the drawings and describe in detail all items shown on the drawings.

10.3.4 Landscape, Planting and Turfing Final design drawing(s) shall include a complete schedule of plant materials which indicates their botanical and common names, plan symbols, quantities, sizes, condition furnished, and pertinent remarks. Scale of drawing shall be prepared at 1" = 30'. Drawing shall correspond with the site layout and grading plans and reference coordinates, north arrows, graphic scales and appropriate legends. An overall planting layout shall be developed and shall include enlarged detail plans of specific areas as needed, to clarify requirements. Final design drawings, indicating proposed plants by a (+) mark for the plant location and a circle which is scaled at approximately 2/3 the ultimate growth spread (diameter) of plants, shall also include a complete schedule of plant materials which indicates botanical and common names, plan symbols, quantities, sizes, condition furnished, and pertinent remarks. Final drawings shall also include the basic details for installation of tree, shrub, and ground cover planting, as well as any other applicable details for clarification of specific project requirements.

10.3.5 Architectural

10.3.5.1 All architectural drawings shall be coordinated with the other engineering disciplines. Ensure that the plans are in compliance with the applicable codes. It will be the Contractor's responsibility to implement the comments generated from any design review submittal as well as verify the consistency between plans and specification. The evaluation of the Contractor's submittals shall be based on degree to which the submittal meet the requirements set forth in this document and the specifications.

10.3.5.2 SID package.

10.3.6 Structural Design

10.3.6.1 Furnish complete checked calculations for all structural members. Incorporate any changes required by comments on 50% Design Submittal.

10.3.6.2 Prior to this submittal, structural drawings shall be coordinated with all other design disciplines.

10.3.6.3 The final structural drawings shall contain the following information as a set of general notes:

The allowable soil bearing value.
The design stresses of structural materials used.
The design live loads used in the design of various portions of the structures.
The design wind speed.
The seismic zone and the "K", "C", "I" and "Z" values used in design.

10.3.6.4 All structural drawings and calculations shall be checked and stamped by the designer of record (a registered Professional Engineer).

10.3.7 Specific Mechanical and Plumbing Requirements:

10.3.7.1 Required Plans, Diagrams, Schedules and Details on Unit Mechanical Drawings:

10.3.7.1.1. Mechanical Floor Plan: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:

Room designations.
Mechanical legend and applicable notes.
Location of all ductwork or piping (double line ductwork required).
Location and capacity of all terminal units (i.e., registers, diffusers, grilles). Exhaust fan and range hood location.
Size of all ductwork and piping.
Thermostat location.
Location of heating/cooling plant (i.e., hot water heater, furnace, condenser, heat pump wells, etc).
Location of all air handling equipment.
Return air paths (i.e., undercut doors, transfer grilles).
Flue piping size and location.

10.3.7.1.2. Equipment Schedule: Complete equipment Schedules shall be provided. Schedule shall also include:

Capacity
Electrical characteristics
Efficiency
Manufacturer's name
Optional features to be provided
Physical size

10.3.7.1.3 Details: Construction details, sections, elevations, etc., shall be provided where required for clarification of methods and materials of design. Roof and exterior wall penetrations shall be detailed on the drawings.

10.3.7.2 Plumbing Floor Plan: Mechanical and Plumbing floor plans can be combined and shall show all principal architectural features of the building which will affect the plumbing design. Separate plumbing plans will not be required if sufficient information can be shown on the mechanical plans to meet the requirements shown above. The floor plan shall also show the following:

Room designations.
Fixture Schedule.
Location of utility entrances.
Waste and water pipe location and size.
Fixture designations.

10.3.7.3 Design Analysis: Complete design calculations for mechanical systems. Include computations for sizing PM&E equipment, air duct design, and U-factors for ceilings, roofs and exterior walls and floors. Contractor

shall employ commercially available energy analysis techniques to determine the energy performance of all passive systems and features. Use of hourly energy load computer simulation (e.g., TRNSYS, DOE 2.1 Blast, etc.) is required. These calculations can be used to size the mechanical systems. Based on the results of calculations, provide a complete list of the materials and equipment proposed for heating and plumbing, with the manufacturer's published cataloged product installation specifications and roughing-in data. The heating and cooling equipment data shall include the manufacturer's wiring diagrams, installation specifications, ARI certification, and the standard warranty for the equipment.

10.3.8 Specific Electrical Requirements:

10.3.8.1 Required Plans, Diagrams, Schedules, and Details on Unit Electrical Drawings:

10.3.8.1.1. Electrical Floor Plan. The floor plans shall show all principle architectural features of the building which will affect the electrical design. The floor plan shall also show the following:

Room designations.
Electrical legend and applicable notes.
Lighting fixtures, properly identified.
Location of smoke and CO detectors.
Location of telephone and cable TV outlets.
Switches for control of lighting.
Receptacles.
Location and designation of panelboards. Plans should clearly indicate type of mounting required (flush or surface) and be reflected accordingly in specifications. Service entrance (conduit and main disconnect).
Location, designation and rating of motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment. Show necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.

10.3.8.1.2. Building Riser Diagram (from pad-mounted transformer to unit load center panelboard): Indicate the types and sizes of electrical equipment and wiring. Include grounding and metering requirements.

10.3.8.1.3. Load Center Panelboard Schedule(s): Schedule shall indicate the following information:

Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting.
Branch Circuit Designations.
Load Designations.
Circuit Breaker Characteristics. (Number of Poles, Trip Rating, AIC Rating)
Branch Circuit Connected Loads (AMPS).
Special Features.

10.3.8.1.4 Lighting Fixture Schedule: (Schedule shall indicate the following information:)

Fixture Designation.

General Fixture Description.
Number and Type of Lamp(s).
Type of Mounting.
Special Features.

10.3.8.1.5. Details: Construction details, sections, elevations, etc., shall be provided where required for clarification of methods and materials of design.

10.3.8.2. Required Electrical Design Analysis: Design analysis and calculations for the electrical systems shall be prepared by a licensed professional engineer with experience in family housing, and shall be stamped as such. The design analysis shall be separately bound, in one or more volumes. Show functional and engineering criteria, design information, and calculations applicable to the project. The analysis shall be organized in a format appropriate for review, approval, and record purposes. The design calculations shall indicate methods and references identified, and shall explain assumptions and conclusions.

10.3.8.2.1. Voltage Drop (VD) Calculations: Select conductor sizes of primary feeders, site lighting circuits, service laterals, and unit feeder conductors. Calculate maximum length for each phase of each primary circuit, using a maximum allowable VD for each circuit. Calculate voltage drops for each conductor. Maximum allowable voltage drop for site lighting and service laterals is 3%. The combined voltage drop for the service laterals, unit feeders, and branch circuit cannot exceed 5%. Calculate the available fault current at the main breaker for the living unit panel. Provide a coordination study to support breaker selection.

10.3.9 Specifications: Provide final specifications. The Contractor shall make final identification of all materials and finishes at this stage.

10.4 Design complete submittal:

10.4.1 Design Drawings: Drawings shall be 100% complete, signed and sealed by the designer of record. All previous review comments shall be incorporated.

10.4.2 Design Analysis: Complete design analysis for all design disciplines. The final Fire Protection and Life Safety Analysis shall be included in the Design Analysis.

10.4.3 Design Specifications: Complete design specifications for all sections of work that demonstrates compliance with the RFP. All previous review comments shall be incorporated.

10.4.4 Comment Response Package: Complete package showing all comments from all previous reviews and the respective response and disposition.

10.4.5 This submittal shall include all drawings and design information from the 100% site/utility submittal to form a complete design package.

11.0 DESIGN RELATED PRODUCTS

11.1 DD Form 1354: Three (3) sets of DD Form 1354, Transfer and Acceptance of Military Real Property shall be prepared in accordance with ER 415-345-38 and submitted to the Contracting Officer. Copies of Form 1354 and ER 415-

345-38 will be furnished to the successful contractor following award of the project.

11.2 Submittal Register, ENG FORM 4288: The Contractor shall complete and submit three (3) copies of a "preliminary" Eng Form 4288, Submittal Register to Contracting Officer. The "preliminary" Eng Form 4288, Submittal Register shall have the column "Submittal Identification", "Specification Paragraph Number", "Description of Submittal" "Type of Submittal", and "Remarks" completed; the Contractor shall identify whether the submittal is for "Government Approval" or for "Government Information" under the column "Remarks." The "final" Eng Form 4288, Submittal Register, shall be in accordance with clause CONTRACTOR SUBMITTALS AND SUBMITTAL CONTROL in this section.

11.3 Reproduction: Upon Government approval of 100% design documents, the original will be returned to the Contractor for reproduction purposes. The Contractor will be responsible for his own reproduction as well as reproduction for Government use. The original design drawings will be retained by the Contractor for recording of as-built conditions. Upon completion of the project, the original design documents shall be corrected to reflect as-built conditions and new revised drawings turned over to the Government.

12 Other Miscellaneous Requirements and Standards.

12.1 OSHA Regulations. The DESIGNER shall be responsible for full compliance with regulations of the occupational Safety and Health Act of 1970 and for the design of the Project to preclude violations to said act from occurring as a result of the design.

12.2 Site Inspection. The Government has provided site and soils information within the Request for Proposal (RFP) for the DESIGNER to use in preparing subsequent design. The DESIGNER shall be responsible for making the necessary field visits to assess existing conditions and to obtain such detailed information as is required to complete the design. Investigations to determine existing conditions and requirements include required upgrades/improvement to existing utilities.

12.3 Site Survey and Subsurface Explorations. Topographic Survey of the buildings site and Subsurface Investigations Report for the buildings site are furnished as part of the RFP. Boring logs and basic soils design assumptions shall be shown on the DESIGNER prepared Construction Drawings. If additional topographic surveys are required by the DESIGNER beyond those provided with
the RFP, it shall be the responsibility of the DESIGNER to perform these additional surveys.

12.4 Design Project Manager. During the prosecution of the work under the Contract, the DESIGNER shall keep in close liaison with the Corps of Engineers Project Delivery Team and the Contracting Officer, who will coordinate the work with the Installation and the Contractor. All requests made by the Installation, Using Service and/or other agencies shall be made through the Contracting Officer. The Using service has no authority to make changes or direct the Contractor to do any work under this contract. At appropriate times, representatives of the Contracting officer may review the progress and technical adequacy of the work. Such review will not relieve the DESIGNER from performing all Contract requirements, except as may be waived

by written instruction.

12.5 Checking of Shop Drawings. The DESIGNER shall check and recommend approval, or disapproval, of all contractor shop and working drawings, including catalog cuts, diagrams, samples required for the selection of material and/or colors, and other descriptive data designated for designer approval, pursuant to Section 01330, Submittal Procedures, and the technical provisions of the Construction Specifications approved by the government.

12.5.1 Pursuant to Section 01330, Submittal Procedures, for those submittals designated for approval by the DESIGNER, the contractor will submit copies of the shop and working drawings, catalog cuts, diagrams, and ENG Form 4025 directly to the DESIGNER for review and recommendations for approval. Any notes or changes recommended by the DESIGNER shall be incorporated on all copies of the drawings, catalog cuts, etc. The Designer’s recommended approval or disapproval shall be recorded on ENG Form 4026, or similar approved form, and copies thereof forwarded to the Resident Engineer. Action codes are contained on ENG Form 4025. Copies of the corrected shop drawings, catalog cuts, diagrams, etc., and copies of the ENG Form 4025 shall be forwarded by the DESIGNER to the Resident Engineer. Samples for selection of materials and/or color shall be returned to the Resident Engineer. The DESIGNER shall not mark actions on ENG Form 4025.

12.5.2 Data submitted from more than one manufacturer for a single item shall be returned with' a recommendation of "Not Approved" through the Resident Engineer, with the request that the contractor submit one (1) make, since approval can be given to only one. Substitutions submitted at a later date shall not be approved unless the contractor gives a valid reason, such as delayed delivery, discontinuance of manufacture, etc., which has been verified by the Resident Engineer. Equipment or materials which do not ' meet all requirements of the RFP and the plans and Specifications will not be approved. Substitute equipment and materials submitted by the contractor will be given no consideration and will be returned "Not Approved" through the Resident Engineer unless accompanied by a full explanation by the contractor, describing all points in which it differs from the requirements of the Specifications, how its substitution will affect other items, and the reasons for submittal. If material is submitted in this manner by the contractor, and if, in the opinion of the DESIGNER, the substitute has merit and should be considered, the entire Submittal together with comments and recommendations, will be forwarded to the Resident Engineer for action and approval.

12.6.3 The contractor is responsible for field fit and dimensions.

12.6 Design Services During Construction: The DESIGNER must perform necessary visits to the site and preparation of modifications to the plans and Specifications, as required, such as those required by changed field conditions.

13.0 Designer Responsibility. The DESIGNER's responsibilities will remain in force until construction of the Project has been completed. During this period, the DESIGNER will be responsible for the correction of any design errors or deficiencies and any reconstruction costs resulting there from.

14.0 As-built Drawings. The Design Build Contractor shall provide final as-built drawings. The Design Build Contractor shall maintain Red Line as-built Drawings and CADD files during the course of Project construction. At the completion of the project one set of final As-built Drawings shall be

furnished to the Government on full-size mylar, along with two copies of electronic files in AutoCAD on CD.

15.0 NPDES Permit Requirements. The DESIGNER's site design shall include all appropriate measures, including best management practices, to control pollutants in storm water discharges during construction, in accordance with applicable state or local erosion and sediment control requirements. The construction activities for this Project are anticipated to disturb more than five acres. Pursuant to Section 01410, Environmental Protection and Erosion Control, the Corps of Engineers will obtain a National Pollution Discharge Elimination System (NPDES) permit for storm water discharges associated with construction activities. The design shall assure that all requirements under the terms and conditions set out by the permit are complied with.

16.0 Hazardous Materials. It is not anticipated that the DESIGNER will encounter any hazardous material not already identified with the RFP documents during the course of the Project design. However, in the event that a suspected hazardous material is encountered during field investigation or other design related effort, the DESIGNER will inform the ACO immediately. Further, a letter shall be forwarded to the ACO fully documenting the suspected material, location and other pertinent information. The term hazardous material shall include but not be limited to, lead based paint, asbestos, PCBs and pesticides. The DESIGNER has no responsibility, unless specifically stated otherwise in the Contract, to design for the remediation of any suspected hazardous material.

APPENDIX A

The final Design Documents shall include 100 percent complete and coordinated Drawings and Specifications.

1 Drawings. All Drawings shall bear the stamp (seal) and signature of the design discipline (Professional Engineer or Architect) responsible for the design of the Project. Upon completion of the Work, the electronic media and hard copy documentation shall become the property of the Government.

1.1 Drawings. Drawings shall include the following, as a minimum, in the order listed:

1.1.1 Civil Drawings.

a. Detailed Code Analysis Sheet
b. Demolition Plan

c. Site Layout (Complete Plans and Dimensions: Site layout shall show all surface features including buildings, pavements, roadways, curbs, manholes, fire hydrants, valve boxes, culvert headwalls, utility poles, exterior lighting poles, foundations at grade, sidewalks, meters, lift station, etc.

d. Grading and Drainage Plan
(1) New and existing grading contours with spot elevations and contours, at paved areas.
(2) Contours shall not be greater than 0.50-meter.
(3) Complete storm drainage systems with manholes, inlets, headwalls, etc. (4) Identify storage area for stockpiled topsoil.
(5) Identify limits of construction and limits of grading.
(6) Indicate berms, swales, flumes, etc.
(7) Identify temporary erosion control measures.
(8) Locate area for Design/Build Contractor's storage, office, parking, and staging.
(9) Locate temporary fence.
(10) Underdrain drainage system.
(11) Set elevations for all buildings, foundations, manholes, etc. to a fixed elevation datum.

e. Site Utility Plan; Routing of sewer, water, gas, telephone, communications and electrical services.

f. Site Details
(1) Profile of gravity flow systems
(2) Paving section details including:

(a) Transition details between pavement types
(b) Pavement edge details

(3) Temporary markings and barricades
(4) Identify type of new surfaces and provide joint patterns in new concrete paving Concrete paving construction, contraction and expansion joints

(6) Details of at-grade foundations
(7) Sidewalk details
(8) Drainage inlet and outlet details
(9) Manhole details
(10)Curb details

g. Landscaping:
(1) Identify limits
(2) Provide layout of planting, seeding, sodding, and ground cover
(3) Plant Lists
(4) Planting and details

1.1.2 Structural Drawings

a. Code Analysis Sheet. Structural Notes: Design statements shall be made on these Drawings such as design loads, design codes, allowable soil loads, etc.
b. Foundation Plans and Details
c. Roof and Wall Framing and Construction Details
d. Steel Details
e. Schedules

1.1.3 Architectural Drawings

a. Plans
(1) Code Analysis Sheet, Life Safety Plans
(2) Overall Floor Plan
(3) Enlarged Floor Plans
(4) Ceiling Plans
(5) Roof Plans

b. Elevations
(1) Exterior Buildings- all unit combinations and types
(2) Interior Elevations – Bathroom, Kitchen as required to indicate mounting heights for cabinets and accessories

c. Section and Details
(1) Building
(2) Walls
(3) Windows and Doors

d. Schedules (some can be provided in the Specifications)
(1) Door and Windows/Hardware
(2) Room Finish (can be provided in Specifications)

1.1.4 HVAC Drawings may be combined with plumbing drawings as long as they are clear and legible

a. Plans
(1) Overall Floor Plans: Layout of A/C units and ductwork, complete piping and equipment plans.
(2) HVAC equipment piping plans may be combined with plumbing plans as long as they are clear and legible.
(3) Enlarged Floor Plans: Mechanical rooms, and bathrooms.

b. Sections and Details

(1) Mechanical rooms and piping trenches. User equipment piping and systems.
(2) Fire protection details (risers, etc).
(3) Site utilities metering details.

c. Schedules: Mechanical equipment schedules for all equipment items.

1.1.5 Plumbing Drawings may be combined with HVAC drawings provided they are clear and legible.

a. Plans
(1) Overall Floor Plan: Layout of all plumbing and piping.
(2) Enlarged Floor Plans: Mechanical rooms and rest rooms
(3) Plumbing details.

b. Schedules: Plumbing equipment schedules for all items.

c. Schematics
(1) Sewer Piping Schematics
(2) Cold Water Piping Schematics
(3) Hot Water Piping Schematics

1.1.6 Electrical Drawings

a. Site Electrical Plan
(1) All electrical and communication services shown and sized.
(2) Transformers and vaults.
(3) Exterior equipment shown with service.
(4) Exterior lighting plans and details.
(5) Electrical feeds to all equipment.

b. Lighting Plans
(1) Layout of all lighting fixtures with circuits.
(2) Lighting panels and transformer(s).
(3) Lighting Panel Schedule.

c. Power Plans
(1) Layout of all receptacles, including junction boxes if required.
(2) Location of electrical disconnects for special equipment.
(3) Power panels and transformer(s).
(4) Panel schedules.
(5) Location of all major equipment requiring power.

-- End of Section --

SECTION 01100

GENERAL

PART 1 GENERAL

1.1 INQUIRIES Pursuant to SECTION 00100 paragraph titled "Instructions to Offerors--Competitive Acquisition", any inquiries regarding this Request for Proposals, before proposals are opened, should be addressed to the District Engineer, Kansas City District, Corps of Engineers, 700 Federal Building, Kansas City, Missouri 64106, ATTN: Mr. David Werner. Inquiries for which oral explanation or advice on the plans and specifications will suffice may be referred to Mr. Werner by calling Area Code 816-983-3265. Telephone calls concerning the mailing of plans and specifications should be made to Contracting Division at Area Code 816-983-3975. Collect telephone calls will not be accepted. (KCDO APR 84)

1.2 SUPERINTENDENCE OF SUBCONTRACTORS: The Contractor shall be required to furnish an on-site superintendent on the Contractor's payroll to be responsible for coordinating, directing, inspecting and expediting the subcontract work.

1.3 IDENTIFICATION OF EMPLOYEES: The Contractor shall be responsible for furnishing to each employee and for requiring each employee engaged on the work to display identification as may be approved and directed by the Contracting Office. All prescribed identification shall immediately be delivered to the Contracting Officer, for cancellation upon the release of any employee.

a. The contractor shall provide each employee an identification (ID) badge on contract start date or on employment start date. The ID badge shall be made of nonmetallic material to prevent electrical shock. The badge shall be easily readable and include the employee's name, contractor's name, functional area of assignment, security clearance if applicable, and color photograph. The ID badge shall be approved by the contracting officer or his or her designee before contract start date.

b. Display of ID Badges: Contractor personnel shall wear the ID badge at all times when performing work under this contract to include attending Government meetings and conferences. Unless otherwise specified in the contract, each contractor employee shall wear the ID badge in a conspicuous place on the front of exterior clothing and above the waist except when safety or health reasons prohibit such placement. Also see paragraph 1.43 in this section titled “Access Control Requirements”.

1.4 APPLICATION OF WAGE RATES:

The inclusion of the Davis-Bacon Act General Wage Decision or the Service Contract Act Wage Determination in the solicitation is a statutory requirement. It is not a representation by the U.S. Army Corps of Engineers that any specific work task can be performed by any specific trade. Which work tasks can be performed by what trades depends on and is determined by the prevailing area practice for the local area where the contract is being performed. It is the sole responsibility of the offeror to determine and comply with the prevailing area practice. Inquiries regarding a prevailing area practice should be directed to the Corps of Engineers, Contractor Industrial Relations Specialist (telephone number 816-983-3723) or to the

Department of Labor Regional Wage and Hour Division.

Application of wage rates and fringe benefits: For the application of the wage rates and fringe benefits contained in the Decisions of the Secretary of Labor, attached to and a part of this contract, all work required within 5 feet outside building lines shall be considered Residential Construction. All other construction not defined herein as Residential Construction shall be considered Heavy Construction.

1.5 PAYMENTS TO SUBCONTRACTORS: The Contractor's attention is directed to CONTRACT CLAUSE titled "Payment Under Fixed-Price Construction Contracts." In addition to the requirements set forth in the referenced paragraph, the Government will reimburse the Contractor, upon request, for amount of premiums paid by the subcontractors for performance and payment bonds (including coinsurance and reinsurance agreements, when applicable) after the Contractor furnishes evidence of full payment to the surety.

1.6 PAYMENTS TO CONTRACTOR (KCD MAY 90 - FORMERLY FAR 52.2/9101(a)): The following is an example of a Contractor's release of claims clauses required to comply with the provisions of paragraph (h) of the CONTRACT CLAUSE titled "Payments Under Fixed-Price Construction Contracts":

RELEASE OF CLAIMS

The undersigned Contractor under contract dated _____, 19____, between the United States of America and said Contractor for the located at _____, in accordance with paragraph (h) of the CONTRACT CLAUSE titled "Payments Under Fixed-Price Construction Contracts" of said contract, hereby releases the United States, its officers, agents, and employees from any and all claims arising under or by virtue of said contract or any modification or change thereof except with respect to those claims, if any, listed below:

(Here itemize claims and amounts due.)

1.7 LABORATORY AND TESTING FACILITIES: The Contractor shall provide and maintain all measuring and testing devices, laboratory equipment, instruments, transportation, and supplies necessary to accomplish the required testing. All measuring and testing devices shall be calibrated at established intervals against certified standards. The Contractor's measuring and testing equipment shall be made available for use by the Government for verification of their accuracy and condition as well as for any inspection or test desired pursuant to the CONTRACT CLAUSE titled "Inspection of Construction." The location of the laboratory shall be convenient to the site such that test results are available prior to proceeding with the next sequential phase of the work. (KCD)

1.8 NORMAL WORKING HOURS.
(a) Normal working hours are limited to Monday through Friday, 7:30 a.m. to 4:30 p.m., except for federal holidays

(b) Work outside of normal working hours, or on weekends or federal holidays, is by exception only, and the contractor shall obtain written approval for work to be performed outside of normal working hours. When work outside of normal work hours is requested by the contractor, and permission is granted by the Contracting Officer, this will be for the convenience of the contractor at no additional cost to the Government. The decision to

permit work outside of normal hours lies solely with the Contracting Officer, and the denial of such a request will not be considered as the basis for an equitable adjustment under this contract.

(c) In unusual circumstances, such as emergency work, or when utility interruptions are required for an extended period of time, or traffic is adversely affected, etc., work outside of normal work hours may be required by the Contracting Officer.

1.9 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER:

(a) This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE titled "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 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.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY

WORK DAYS BASED ON (5) DAY WORK WEEK

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(16)	(14)	(9)	(7)	(7)	(7)	(7)	(9)	(6)	(7)	(9)	(17)

(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 titled "Default (Fixed Price Construction)." (ER 415-1-15)

1.10 REQUIRED INSURANCE SCHEDULE: In accordance with CONTRACT CLAUSE titled "Insurance - Work On A Government Installation," the Contractor shall procure

and maintain during the entire period of his performance under this contract the following minimum insurance.

Type	Amount
Workmen's Compensation State Statute	coverage complying with applicable
Employers' Liability	minimum amount of $100,000.00
General Liability on Comprehensive Form of Policy	minimum limits of $500,000 per occurrence for bodily injury which includes, but is not limited to, insurance for all work required herein
Comprehensive Automobile Liability	minimum limits of $200,000 per person and $500,000 per occurrence for bodily injury, and $20,000 per occurrence for property damage

(End of clause)

1.11 CONTRACTOR-FURNISHED EQUIPMENT DATA: At or before 30 days prior to final inspection and acceptance of the work, the Contractor shall submit the data mentioned in the following subclauses.

(1) Equipment List. An itemized equipment list showing unit retail value and nameplate data including serial number, model number, size, manufacturer, etc., for all Contractor-furnished items of mechanical equipment, electrical equipment, and fire protection systems installed under this contract.

(2) Guarantees. A list of all equipment items which are specified to be guaranteed accompanied by a copy of each specific guarantee therefore. For each specific guaranteed item, a name, address, and telephone number shall be shown on the list for subcontractor who installed equipment, equipment supplier or distributor and equipment manufacturer. The completion date of the guarantee period shall correspond to the applicable specification requirements for each guaranteed item.

(3) Warranty Service Calls. The Contractor shall furnish to the Contracting Officer the names of local service representatives and/or Contractors that are available for warranty service calls and who will respond to a call within the time periods as follows: 4 hours for heating, air-conditioning, refrigeration, air supply and distribution, and critical electrical service systems and food service equipment, and 24 hours for all other systems. The names, addresses, and telephone numbers for day, night, weekend, and holiday service responses shall be furnished to the Contracting Officer and also posted at a conspicuous location in each mechanical and electrical room or close to the unit.

1.12 DATE OF SAFETY AND HEALTH REQUIREMENTS MANUAL (EM 385-1-1):

(a) The date of the U.S. Army Corps of Engineers Safety and Health Requirements Manual in effect on the date of this solicitation is 3 September 1996. See Section 00700, Contract Clause titled "Accident Prevention." (KCD 18 DEC 1992)

(b) Section 06.I of EM 385-1-1 is deleted. Job hazard analysis for confined space entry procedures is still required, as per 01.A.09 of EM 385-1-1. OSHA Standards 29 CFR 1910.146 or 29 CFR 1926 shall apply.

(c) Before initiation of work at the job site, an accident prevention plan, written by the prime contractor for the specific work and hazards of the contract and implementing in detail the pertinent requirements of EM 385-1-1, will be reviewed and found acceptable by designated Government personnel.

1.13 COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) The Contractor shall comply with OSHA standards as well as the most current edition of the Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1). The OSHA standards are subject to change and such changes may affect the Contractor in his performance under the contract. It is the Contractor's responsibility to know such changes and effective dates of changes. (KCD APR 84)

1.14 CONSTRUCTION EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE Whenever a modification or equitable adjustment of contract price is required, the Contractor's cost proposal for equipment ownership and operating expenses shall be as set forth in SPECIAL CLAUSE titled "Equipment Ownership and Operating Expense Schedule." A current copy of EP 1110-1-8 "Construction Equipment Ownership and Operating Expense Schedule" can be ordered from the Government Printing Office (GPO) by calling Telephone No. 202-512-1800.

1.15 SHOP DRAWINGS: The Contractor's attention is directed to clause "Specifications and Drawings for Construction" of the Contract Clauses.

1.16 SUBMITTALS:

(a) Submittal Procedures. See Division One SECTION: SUBMITTAL PROCEDURES.

(b) Shop Drawings shall be submitted in ample time to secure approval prior to the time the items covered thereby are to be delivered to the site. ENG Form 4025 and 4026 shall be used for the transmittal of shop drawings. Unless otherwise specified, shop drawings shall be submitted not less than 30 days before commencement of fabrication of fabricated items and not less than 15 days before delivery of standard stock manufactured items. Where materials are stock with the manufacturer, catalog data, including specifications and full descriptive matter, may be submitted as shop drawings. When catalog includes non applicable data, the applicable data shall be clearly designated and identified by item number, item name, and name of manufacturer. Shop drawings submitted (including initial and final submittals) shall be reproductions on high quality paper with clear and legible print. Drawings shall generally be bordered a minimum of one inch and trimmed to neat lines and unless otherwise specified, the minimum scale shall be 3/8-inch to the foot. Shop drawings quality will be subject to approval. Each shop drawing, including catalog data, shall be identified with a title block including the name of Contractor, contract number, name and location of project, and name of item of work or structure to which the shop drawing applies. Material fabricated or delivered to the site before approved shop drawings have been returned to the Contractor will be subject to rejection. **NO CONSTRUCTION OR INSTALLATION SHALL BE DONE FOR ANY ITEM REQUIRING SHOP DRAWINGS, UNTIL ALL SHOP DRAWINGS FOR THAT ITEM HAVE BEEN APPROVED.**

(c) As-Built Shop Drawings: Upon completion of the work under this contract, the Contractor shall furnish five complete sets of prints or one complete set of reproducibles of all shop drawings as finally approved. These drawings shall show all changes and revisions made up to the time the equipment is completed and accepted. The quality of the reproducibles and prints is subject to approval.

(d) As-Built Drawings: The Contractor shall maintain three separate sets of red-lined, full scale, as-built construction drawings marked up to fully indicate as-built conditions. These drawings shall be maintained in a current condition at all times until completion of the work, and shall be available for review by Government personnel at all times. All variations from the contract drawings, for whatever reason, including those occasioned by modifications, optional materials, and the required coordination between trades, shall be indicated. These variations shall be shown in the same general detail utilized in the contract drawings. The Contractor shall also be responsible for updating the Government-furnished CADD files to reflect the current as-built conditions throughout the duration of the project. The updated CADD design files shall be maintained in the AutoCAD 2000 software format consistent with the graphic standards established in the CADD contract drawings provided by the Government. The Contractor will be provided a copy of the Tri-Service CADD standards to facilitate his efforts in the maintenance of design files. The updated CADD files shall be reviewed by the Government on a monthly basis during the progress payment evaluation. The Contractor shall be prepared to demonstrate the status of the updated CADD files in his on-site office. The as-built utility drawings shall show locations and elevations of all underground new utilities and existing utilities encountered, including dimensions from permanent structures and/or survey locations. The submittal requirements for as-built utility drawings shall be shown as separate activities on the Contractor-prepared network analysis. Upon completion of the work, the marked-up drawings and the updated CADD files shall be furnished to the Contracting Officer on CD ROM. In multiphase construction where portions of a system are to be turned over to the user prior to completion of the project, the marked-up drawings for that portion shall be furnished to the Contracting Officer at that time. (MRD ltr 30 Oct 70 and KCD 8 Apr 91)

(e) CADD Files: The Government will provide to the Contractor, within 30 calendar days after Notice of Award, copies of the CADD computer files of the RFP drawings for the production of as-built drawings. These files will be in AutoCAD 2000 or newer software format. The Government provides no warranty, expressed or implied, of the CADD computer files. The Contractor shall assume all responsibility to verify the CADD drawing files. The Contractor will not utilize the CADD drawing computer files to resolve dimensional or other discrepancies. The Government will not guarantee the measurable accuracy of the CADD drawing computer files.

(f) Purchase Orders: Each purchase order issued by the Contractor or his subcontractors for materials and equipment to be incorporated into the project, shall be maintained on file at the Contractor's field office for inspection and review by Government representatives. Each purchase order shall (1) be clearly identified with applicable DA contract number, (2) carry an identifying number, (3) be in sufficient detail to identify the material being purchased, (4) indicate a definite delivery date, and (5) display the DMS priority rating. At the option of the Contractor, the copies of the purchase orders may or may not indicate the price of the articles purchased.

(MRD Ltr 22 Oct 74)

1.17 SPECIAL REFERENCES

(a) Shop Drawings. Bidder's attention is directed to paragraph titled "Shop Drawings", wherein are set forth basic requirements for Shop Drawings.

(b) Approved Equal. Bidder's attention is directed to paragraph titled "Approved Equal."

(c) Payment to Subcontractors. Bidder's attention is directed to paragraph titled "Payments to Subcontractors."

1.18 DIFFERENCES IN DRAWINGS: In addition to the provisions of CONTRACT CLAUSE paragraph "Specifications and Drawings for Construction," the structural drawings shall govern in cases where they differ from the architectural drawings.

1.19 DAMAGE TO WORK (1966 MAR OCE): The responsibility for damage to any part of the permanent work shall be as set forth in the CONTRACT CLAUSE titled "Permits and Responsibilities." However, if, in the judgment of the Contracting Officer, any part of the permanent work performed by the Contractor is damaged by flood or earthquake, which damage is not due to the failure of the Contractor to take reasonable precautions or to exercise sound engineering and construction practices in the conduct of the work, the Contractor will make the repairs as ordered by the Contracting Officer and full compensation for such repairs will be made at the applicable contract unit or lump sum prices as fixed and established in the contract. If, in the opinion of the Contracting Officer, there are no contract unit or lump sum prices applicable to any part of such work an equitable adjustment pursuant to CONTRACT CLAUSE titled, "Changes," of the contract, will be made as full compensation for the repairs of that part of the permanent work for which there are no applicable contract unit or lump sum prices. Except as herein provided, damage to all work (including temporary construction), utilities, materials, equipment and plant shall be repaired to the satisfaction of the Contracting Officer at the Contractor's expense, regardless of the cause of such damage.

1.20 WORK ADJACENT TO ROADS AND HIGHWAYS: Where the construction work is on or adjacent to, or involves hauling over public or private roads, streets, or highways, all herein referred to as "roads," the said roads shall, except as otherwise specified or directed, be kept open for traffic at all times during the construction period. Further, the Contractor shall, during said construction, provide, erect and maintain warning signs, or other safety devices and, when necessary, provide flagmen for protection of traffic to the satisfaction of the Contracting Officer and local authorities. The Contractor shall keep the right-of-way of the roads free of debris that might be caused to accumulate thereon by his operations, and upon completion of the work, shall clean up the said roads and repair any damage to the roads occasioned by his operations under this contract to the satisfaction of the Contracting Officer and local authorities having jurisdiction. The drainage from the roads shall not be obstructed by the construction work. The Contractor shall be responsible for obtaining and paying for all permits required for operation on all roads.

1.21 APPROVED EQUAL: The drawings and the TECHNICAL PROVISIONS of these specifications may, in some instances, refer to certain items of equipment,

material, or article by trade name. References of this type shall not be construed as limiting competition, but shall be regarded as establishing a standard of quality. In this respect, the Contractor's attention is directed to CONTRACT CLAUSE titled "Material and Workmanship."

1.22 SCHEDULE OF WORK: The Contractor's attention is directed to CONTRACT CLAUSE titled "Schedule for Construction Contracts," wherein if, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer.

1.23 UPKEEP OF ROADWAY AREAS WITHIN A MILITARY INSTALLATION WHICH THE CONTRACTOR USES: In addition to the requirements in CONTRACT CLAUSE titled "Operations and Storage Areas," the Contractor shall comply with the following requirements: Where the construction work is on or adjacent to, or involves hauling over public roads, streets, or highways located on a military installation, all herein referred to as "roads," the said roads shall except as otherwise specified or directed, be kept open for traffic at all times during the construction period. The Contractor shall keep the roads including adjacent construction site free of debris including litter, waste construction material, mud etc., that might be caused to accumulate thereon by his operations, and upon completion of the work, shall clean up the said roads and construction site and repair any damage occasioned with his operations under this contract to the satisfaction of the Contracting Officer. The drainage from the roads shall not be obstructed by the construction work.

1.24 PROTECTION OF UTILITY LINES:

(a) It shall be the Contractor's responsibility to protect all existing utility lines from damage during excavation for utilities systems. Any damage resulting to existing utility systems shall be repaired by the Contractor, to the satisfaction of the contracting officer, at no additional cost to the Government.

(b) The Directorate of Installation Support (DIS) will delineate existing buried lines only for fiber/telephone and communications, and only when requested by the Resident Engineer. This delineation will define a four (4) foot area of liability. Any damage done to an existing line within two (2) feet of the flag shall be repaired by the Contractor as mentioned in section (a) above. If the damage occurs outside the area, the Installation Engineer Office will assume responsibility for needed repairs.

1.25 CLOSEOUT OF CONTRACTS: (KCD JULY 1990) The closing out of various features of the contract shall be done before or on the Government contract construction completion date. The Contractor's specific submittals and items required for closeout include, but are not limited to, Operation and Maintenance Manuals (O&M), training, spare parts, equipment list, guarantees, as-built shop drawings and contract drawings.

The Contractor shall review the contract documents and prepare a plan for closeout no later than 90 days after the notice to proceed date for approval by the Contracting Officer Representative (COR). The closeout plan shall also include the Specification Volume No., specification reference section and building name on each closeout item. A summary of the type of closeout information required for each of the items shall be prepared by the Contractor for the closeout plan. The closeout data base shall be updated as

required by the Contracting Officer to ensure adequate tracking of the items noted.

The following is a general list of the various types of closeout materials and the data required for each. (* indicates data required on initial submittal)

(a) O&M Manuals:

Descriptions*, Specification Paragraph*, Date Due*, No. Copies Due*, Date Submit Action Code, Resubmit Date, Approved, Date to User

(b) Training Requirements:

Description*, Specification Paragraph*, Length Required*, Date Scheduled, Plan Submitted, Plan Approved, Date Training Held

(c) Spare Parts Required:

Description*, Specification Paragraph*, Quantity Required*, Date Turned Over to User

(d) Salvaged Material:

Description*, Specification-Plan Requirement*, Quantity*, Turn In Document Received

(e) Government-Furnished Equipment:

Description*, Specification-Plan Requirement*, GFCI-GFGI*, Number Required*, Date Equipment Data Required*, Date Equipment Required*, Turnover Document Provided

(f) Utilities Provided or Relocated by Others:

Description*, Relocate or Provide*, Specification-Plan Note*, Date Required*

1.26 MODIFICATIONS PRIOR TO DATE SET FOR OPENING BIDS. The right is reserved, as the interest of the Government may require, to revise or amend the specifications or drawings or both prior to the date set for opening bids. Such revisions and amendments, if any, will be announced by an amendment or amendments to this Request for proposal. If the revisions and amendments are of a nature which requires material changes in quantities or prices bid or both, the date set for opening bids may be postponed by such number of days as in the opinion of the issuing officer will enable bidders to revise their bids. In such cases, the amendment will include an announcement of the new date for opening bids. (KCD APR 84)

1.27 UNEXPECTED HAZARDOUS SUBSTANCES: In the event that suspected hazardous substances are revealed during construction activities, all such construction activities in the immediate area shall be immediately suspended. Hazardous substances for purposes of this specification only, shall be defined as CERCLA hazardous substances, infectious or radioactive wastes, asbestos or oil. The Contractor shall leave the materials undisturbed and shall immediately report the find to the Contracting Officer's Representative (COR) so that proper authorities can be notified. The Contractor shall not resume construction activities in the vicinity of the suspected hazardous substances

until written clearance is received from the COR. Identification and removal of any such materials will be conducted in accordance with all Federal, state and local environmental laws and regulations according to the CONTRACT CLAUSE titled "Differing Site Conditions."

1.28 SURVEY MARKERS: Reference is made to CONTRACT CLAUSE titled "Permits and Responsibilities", The Contractor shall be responsible for removing and relocating survey markers. Relocation shall be performed by a professional registered Land Surveyor.

1.29 DEMOLITION: Disposal of demolition waste shall be in accordance with all applicable Federal, State and local regulations, including KDHE the "Kansas Department of Health and Environment."

1.30 EXCAVATION NOTIFICATION: Prior to any excavation on either public or private properties, the contractor shall Kansas “ DIG SAFE” to locate any underground utilities in the area.

1.31 ENCOUNTERING EXISTING UNDERGROUND UTILITIES:

During any excavation activity, existing underground utilities encountered shall be immediately reported to the Contracting Officer.

Within 48 hours of encountering underground utilities, the Contractor shall submit to Contracting Officer a marked-up copy of contract drawing that best represents the location, general description and approximate depth of the utilities below finished grade.

Also, the Contractor shall incorporate the above information in required marked-up full scale contract drawing indicating as-built conditions in accordance with all contract provisions pertaining to "As-Built Drawings."

1.32 DAILY WORK SCHEDULES: In order to closely coordinate work under this contract, the Contractor shall prepare for and attend a weekly coordination meeting with the Contracting Officer and Using Service at which time the Contractor shall submit for coordination and approval, his proposed daily work schedule for the next 2-week period. Required temporary utility services, time and duration of interruptions, road cuts, and repairs requiring traffic control, and protection of adjoining areas shall be included with the Contractor's proposed 2-week work schedule. Coordination action by the Contracting Officer relative to these schedules will be accomplished during these weekly meetings.

1.33 SITE FENCING AND MOWING: The Contractor shall provide orange snow fencing around the entire work site; all site storage areas are considered a part of the work site. When grass/weeds exceed six inches in height, all areas contained by orange snow fencing shall be mowed. Snow fencing on pavement shall be supported by weighted orange barrels.

1.34 CLEANLINESS OF PAVED SURFACES: When paved surfaces are jointly used by the Government and Contractor, the Contractor shall keep all paved surfaces, and hardstands, clean at all times.

1.35 WORK ON WEEKENDS OR HOLIDAYS: If the Contractor intends to work on weekends or holidays, the Contractor shall notify the Security Police and the Resident Office by noon the Thursday prior to the weekend or 48 hours prior to a holiday.

1.36 UTILITY MARKING AND LOCATING: The contractor shall be required to locate and mark underground utilities for Fort Leavenworth owned water, sanitary sewer, storm sewer, and electrical, but excluding fiber/telephone and communications. The Contractor will have use of Fort Leavenworth DIS utility drawings to aid in locating. The Contractor shall be responsible for the location of the electric lines and all other utilities listed above that are of metal or have tracer wires available for locating. The utilities that are of nonconductive construction such as plastic or Transite and have no tracer wire or other means of applying a signal are to be located from the utility maps to the best of the Contractor's ability. The utilities that are located from maps that appear to be in the vicinity of the excavation are to be hand-dug for location purposes. If a line is damaged that is within 10ft. of that shown on the utility maps, the Contractor will be held responsible for its repair. The Contractor shall contact Kansas One-Call for utility checks for Williams Natural Gas, Sprint, Southwestern Bell, and American Cablevision. Fort Leavenworth personnel will locate underground telephone and communications lines. The Contractor shall contact the Directorate of Installation Support (DIS) Work Order Desk at (913) 684-5555 to request this service. The Contractor shall mark the proposed route or limits of the excavation in white prior to the request so that the Government personnel will know where to mark for utilities. If the Contractor damages any marked lines during excavation, the Contractor shall contact the Government COR immediately to determine whether the Contractor will perform repairs or reimburse the Government for repairs.
The Contractor shall be required at the request of other contractors working in the area to flag the utilities being installed on this contract within 14 days of the request by the other contractor working in the area.

1.37 SPECIAL SAFETY REQUIREMENTS: The Contractor shall comply with local fire regulations and NFPA 241-1986 "Safeguarding Building Construction and Demolition Operations." Fire extinguishers rated and approved by the National Fire Protection Association, of sufficient size, type, and quantity to cope with all known hazards, shall be provided by the Contractor at the construction site during the execution of this contract; the extinguishers shall be removed upon acceptance of the project.

1.38 POLICY FOR STORAGE OF HAZARDOUS MATERIALS ON CONSTRUCTION SITES: In addition to specification section 02090, the following is the policy for storage of hazardous materials on construction sites located at Ft. Leavenworth, Kansas

a. Definition of hazardous materials is any substance which, by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful, and is likely to cause death injury.

b. Hazardous material will not be stored in Government facilities.

c. Each construction site shall have a hazardous material storage area. This area will be the only location that hazardous material shall be stored on a construction site. Exceptions must have prior written approval.

d. Contractor will provide an emergency folder that will be kept on-site and up-to-date at all times (on the injury board). This folder shall contain:

(1) a copy of every MSDS (material safety data sheet) with amount and location of all hazardous material on site.

1.39 KANSAS SALES AND USE TAX (JUL 1997). In accordance with FAR Clause 52.229, notice is given that the contract price excludes the Kansas sales tax and compensating (use) tax on all sales of tangible personal property and materials purchased by the Contractor or subcontractors for the construction of projects, including repairing or remodeling facilities, for the United States. In accordance with Kansas Stats. Anno., sec. 79-3606(e), the Contracting Officer will issue and furnish to the Contractor an exemption certificate for this project with the Notice to Proceed. The Contractor and the subcontractors will use the exemption certificate for this project in the purchase of supplies, materials and furnishings for incorporation in the project. The Contractor and the subcontractors shall furnish a copy of such certificate to all suppliers/material from whom such purchases are made, and the suppliers shall execute invoices covering the same bearing the number of such certificate. Pursuant to a 1977 Amendment to K.S.A., 1976 Supp., 79-3606(e), effective 1 July 1977, the Contractor is required to retain all invoices for a period of five (5) years during which time these invoices are subject to audit by the Kansas Director of Taxation. Upon completion of the project, the Contractor shall complete the Project Completion Certification (Form STD 77, Rev. 6/77) in duplicate returning one copy to the Contracting Officer, and forwarding the other to the Kansas Director of Taxation. (KCD)

1.40 ACCESS CONTROL REQUIREMENTS. All contractors must comply with the installation’s increased security posture. All contractors who are employed at, or engage in work upon any federal military reservation are required to conform to the rules and regulations established by the national and local command authorities.

1.40.1 General Instructions. Contractors are immediately required to register all of their vehicles and provide a comprehensive list of their employees who will engage in employment on the post IAW the increased access security measures being implemented by the Fort. The current security posture will require 100% controlled access after 1 Jan 02. As a result of this requirement, contractors must comply with the following guidance:

a. Contractors, on their company letterhead, will annotate the contract number and project they are working under, and a list of all people who will require access to the post to fulfill the requirements of the contract. This list will be taken to the issuing contracting officer for a verification signature that the contract is valid.

b. The list will then be taken to the Provost Marshall’s Office (PMO) located at 410 McPhearson Avenue where a copy will be made and kept on record for validation during 100% identification checks at the gate. Due to the turnover in personnel, submission of updated lists will be required every three months.

c. All contractors are required to register their vehicles at the PMO. This registration includes both company owned vehicles or personally owned vehicles that are required by the contractor to fulfill the terms of an active contract. All contractors will need license, registration and proof of insurance in order to register vehicles.

d. For contractors with two or more vehicles in their fleet, the PMO’s office will allow them to send one employee in with proof of insurance and the vehicle’s registration documents to register the company vehicles. It is the contractor’s responsibility to ensure that all operators of their vehicles are validly licensed and that their names are on the access roster for the contract.

e. Permanent post decals will be issued only to those contractors who contract term exceeds one year. All others will received a 90-day pass and renew it as required for the duration of contract completion.

f. Failure to follow these procedures may cause untimely delays in post access and could subject the contractor to termination action. Such delays are not allowable as a claim against the government due to the contractor's failure to comply with this memorandum, all applicable regulations, and DoD Directives.

g. All vehicle passes will be turned in to the PMO upon completion of the contract. Contractors will then provide a memo notifying the local contracting officer that this has been completed.

1.40.2 Restricted Access to a Military Installation

a. As of January 1, 2002, the installation has instituted 100% controlled access. Controlled access means there will be military police located at the entry gates. Vehicles entering the installation may be subject to stop and search procedures. At times of increased security alerts, control may be increased or access may be restricted completely. Some gates may be closed during periods of the day or night.

b. The Contractor is responsible for furnishing to each employee, and for requiring each employee working on the installation; to display or possess identification as may be approved and directed by the Contracting Officer. All prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon the release of any employee.

c. Passes issued to contractors and their employees are valid for 90 days and must be renewed upon expiration.

SECTION 01312

RESIDENT MANAGEMENT SYSTEM (RMS)
05/00

1.1 GENERAL

The Government will use the Resident Management System for Windows (RMS-W) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS-Windows, referred to as RMS-QC (QC for Quality Control), to record, maintain, and submit various information throughout the contract period. This joint Government-Contractor use of RMS-W and RMS-QC will facilitate electronic exchange of information and overall management of the contract. RMS-QC provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

Administration
Finances
Quality Control
Submittal Monitoring
Scheduling
Import/Export of Data

1.1.1 Correspondence and Electronic Communications

For ease and speed of communications, both Government and Contractor will, to the maximum extent feasible, exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.1.2 Other Factors

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01320, "Project Schedule", Section 01330, SUBMITTAL PROCEDURES, and Section 01451, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through RMS-QC. Also, there is no separate payment for establishing and maintaining the RMS-QC database; all costs associated therewith shall be included in the contract pricing for the work.

1.2 RMS-QC SOFTWARE

RMS-QC is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the RMS-QC software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the RMS-QC software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide RMS-QC on 3-1/21, high-density diskettes or CD-ROM. Any program updates of RMS-QC will be made available to the Contractor via the Government RMS Website as they become available.

1.3 SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run RMS-QC:

Hardware

IBM-compatible PC with 200 MHz Pentium or higher processor

32+ MB RAM

4 GB hard drive disk space for sole use by the RMS-QC system

3 1/2 inch high-density floppy drive

Compact disk (CD) Reader

Color monitor

Laser printer compatible with HP LaserJet III or better, with minimum 4 MB installed memory.

Connection to the Internet, minimum 28 BPS

Software

Microsoft (MS) Access 97 or newer version database software

MS Windows 95 or newer version operating system (MS Windows NT 4.0 or newer is recommended)

Word Processing software compatible with MS Word 97 or newer

Internet browser

The Contractor's computer system shall be protected by virus protection software that is regularly upgraded with all issued manufacturer's updates throughout the life of the contract.

Electronic mail (E-mail) compatible with MS Outlook

1.4 RELATED INFORMATION

1.4.1 RMS-QC User Guide

After contract award, the Contractor shall download instructions for the installation and use of RMS-QC from the Government RMS Internet Website; the Contractor can obtain the current address from the Government. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.4.2 Contractor Quality Control(CQC) Training

The use of RMS-QC will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.4.3 Video Training for RMS-QC

After contract award, the Contractor will be provided with a CD containing a training video on the use of RMS-QC.

1.5 CONTRACT DATABASE

Prior to the pre-construction conference, the Government shall provide the Contractor with basic contract award data to use for RMS-QC. The Government will provide data updates to the Contractor as needed, generally by files attached to E-mail. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.6 DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the RMS-QC database throughout the duration of the contract. The Contractor shall establish and maintain the RMS-QC database at the Contractor's site office. Data updates to the Government shall be submitted by E-mail with file attachments, e.g., daily reports, schedule updates, payment requests. If permitted by the Contracting Officer, a data diskette or CD-ROM may be used instead of E-mail (see Paragraph DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM). The RMS-QC database typically shall include current data on the following items:

1.6.1 Administration

1.6.1.1 Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of RMS-QC software from the Government, the Contractor shall deliver Contractor administrative data in electronic format via E-mail.

1.6.1.2 Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in RMS-QC. Within 14 calendar days of receipt of RMS-QC software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format via E-mail.

1.6.1.3 Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with 'IS". Letters initiated by the Contractor's home (main) office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.6.1.4 Requests for Information

RMS-QC includes a means for the Contractor to enter, log, and transmit requests for information (RFI) to the Government. RFIs can be exchanged electronically using the import/export functions of RMS-QC. The

Contractor shall also provide the Government with a signed, printed copy of each RFI. All RFIs from the Contractor to the Government shall have the prefix “RFI” and shall be numbered sequentially beginning with RFI-0001.

1.6.1.5 Equipment

The Contractor's RMS-QC database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.6.1.6 EM 385-1-1, Corps of Engineers Safety Manual and RMS Linkage

The current version of the Safety Manual, EM 385-1-1, is an attachment to this solicitation.

1.6.1.7 Management Reporting

RMS-QC includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of RMS-QC. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

1.6.2 Finances

1.6.2.1 Pay Activity Data

The RMS-QC database shall include a list of pay activities that the Contractor shall develop in conjunction with the construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.6.2.2 Payment Requests

All progress payment requests shall be prepared using RMS-QC. The Contractor shall complete the payment request worksheet and include it with the payment request. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using RMS-QC. The Contractor shall submit the payment requests with supporting data by E-mail with file attachment(s). If permitted by the Contracting Officer, a data diskette may be used instead of E-mail. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

1.6.3 Quality Control (QC)

RMS-QC provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the RMS-QC generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01451, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the

Contractor shall submit a data diskette or CD-ROM reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.6.3.1 Daily Contractor Quality Control (CQC) Reports.

RMS-QC includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by RMS-QC shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the RMS-QC-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01451, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government using E-mail or diskette within 24 hours after the date covered by the report. Use of either mode of submittal shall be coordinated with the government representative. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

1.6.3.2 Deficiency Tracking.

The Contractor shall use RMS-QC to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC Comments. The contractor shall maintain a current log of its QC comments in the RMS-QC database. The Government will log the deficiencies it has identified using its QA comments. The Government's QA comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA comments.

1.6.3.3 Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in RMS-QC.

1.6.3.4 Accident/Safety Tracking.

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize RMS-QC to advise the Government of any accidents occurring on the jobsite. This brief supplemental entry is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 200.

1.6.3.5 Features of Work

The Contractor shall include a complete list of the features of work in the RMS-QC database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.6.3.6 QC Requirements

The Contractor shall develop and maintain a complete list of QC testing, transferred and installed property, and user training requirements in RMS-QC. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via RMS-QC.

1.6.4 Submittal Management

The Government will provide the initial submittal register, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. Thereafter, the Contractor shall maintain a complete list of all submittals, including completion of all data columns as described in Section 01330, SUBMITTAL PROCEDURES. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use RMS-QC to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using RMS-QC. RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.6.5 Schedule

The Contractor shall develop a construction schedule consisting of pay activities, in accordance with Contract Clause "Schedules for Construction Contracts". This schedule shall be input and maintained in the RMS-QC database either manually or by using the Standard Data Exchange Format (SDEF). The updated schedule data shall be included with each pay request submitted by the Contractor.

1.6.6 Import/Export of Data

RMS-QC includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data, and schedule data using SDEF.

1.7 IMPLEMENTATION

Contractor use of RMS-QC as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its RMS-QC database, and to provide the Government with regular database updates. RMS-QC shall be an integral part of the Contractor's management of quality control.

1.8 DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of updates, payment requests, correspondence and other data is by E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of computer diskettes or CD-ROM for data transfer. Data on the disks or CDs shall be exported using the RMS-QC built-in export function. If used, diskettes and CD-ROMs will be submitted in accordance with the following:

1.8.1 File Medium

The Contractor shall submit required data on 3-1/211 double-sided high-density diskettes formatted to hold 1.44 MB of data, capable of running under Microsoft Windows 95 or newer. Alternatively, CD-ROMs may be used. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.8.2 Disk or CD-ROM Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the RMS-QC

file name, full contract number, project name, project location, data date, name and telephone number of person responsible for the data.

1.8.3 File Names

The Government will provide the file names to be used by the Contractor with the RMS-QC software.

1.9 MONTHLY COORDINATION MEETING

The Contractor shall update the RMS-QC database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions. The contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable RMS-QC export file is received.

1.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification.

-- End of Section --

SECTION 01320
PROJECT SCHEDULE
DESIGN-BUILD CONSTRUCTION

1. GENERAL

1.1 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Schedules

Initial Project Schedule; G-RE;

Preliminary Project Schedule; G-RE;

Periodic Schedule Updates; G-RE;

Three (3) copies of the schedules showing codes, values, categories, numbers, items, etc., as required.

SD-08 Statements

Qualifications; FIO;

Documentation showing qualifications of personnel preparing schedule reports.

SD-09 Reports

Narrative Report; FIO;

Schedule Reports; FIO;

Three [3] copies of the reports showing numbers, descriptions, dates, float, starts, finishes, durations, sequences, etc., as required.

1.2 QUALIFICATIONS

The Contractor shall designate an authorized representative who shall be responsible for the preparation of all required project schedule reports. This person shall have previously created and reviewed computerized schedules. Qualifications of this individual shall be submitted to the Contracting Officer's Representative for review with the Preliminary Project Schedule submission.

2. PRODUCTS (Not Applicable)

3. EXECUTION

3.1 GENERAL

Pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS, a Project Schedule as described below shall be prepared. The Contractor shall be responsible for scheduling of all design, procurement and construction activities. Contractor management personnel shall actively participate in its development. Designers. Subcontractors and suppliers working on the project should also contribute in developing and maintaining an accurate Project Schedule. The approved Project Schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

3.2 BASIS FOR PAYMENT

The schedule shall be the basis for measuring Contractor progress. Lack of an approved schedule or scheduling personnel shall result in an inability of the Contracting Officer's Representative to evaluate Contractor progress for the purposes of payment. Failure of the Contractor to provide all information, as specified below, shall result in the disapproval of the entire Project Schedule submission and the inability of the Contracting Officer's Representative to evaluate Contractor progress for payment purposes. In the case where Project Schedule revisions have been directed by the Contracting Officer's Representative and those revisions have not been included in the Project Schedule, then the Contracting Officer's Representative may hold retainage up to the maximum allowed by contract, each payment period, until revisions to the Project Schedule have been made.

3.3 PROJECT SCHEDULE

The computer software system utilized by the Contractor to produce the Project Schedule shall be capable of providing all requirements of this specification. Failure of the Contractor to meet the requirements of this specification shall result in the disapproval of the schedule. Manual methods used to produce any required information shall require review by the Contracting Officer's Representative.

3.3.1 Use of the Critical Path Method

The Critical Path Method (CPM) of network calculation shall be used to generate the Project Schedule. The Contractor shall provide the Project Schedule in either the Precedence Diagram Method (PDM) or the Arrow Diagram Method (ADM).

3.3.2 Level of Detail Required

With the exception of the initial and preliminary schedule submission, the Project Schedule shall include an appropriate level of detail. Failure to develop or update the Project Schedule or provide data to the Contracting Officer's Representative at the appropriate level of detail, as specified by the Contracting Officer's Representative, shall result in the disapproval of the schedule. The Contracting Officer's Representative will use, but is not limited to, the following conditions to determine the appropriate level of detail to be used in the Project Schedule.

3.3.2.1 Activity Durations

Contractor submissions shall be required to follow the direction of the Contracting Officer's Representative regarding reasonable activity durations. Reasonable durations are those that allow the progress of activities to be

accurately determined between payment periods. A rule of thumb, that the Contractor should use, is that less than 2 percent of all non-procurement activities' Original Durations shall be greater than 20 days.

3.3.2.2 Design and Permit Activities

The Contractor shall integrate design and permitting activities, including necessary conferences and follow-up actions and design package submission dates into the schedule.

3.3.2.3 Procurement Activities

Tasks related to the procurement of long lead materials or equipment shall be included as separate activities in the project schedule. Long lead materials and equipment are those materials that have a procurement cycle of over 90 days. Examples of procurement process activities include, but are not limited to: submittals, reviews, procurement, fabrication, delivery, installation, start-up, and testing.

3.3.2.4 Government Activities

Government and other agencies activities that could impact progress shall be shown. These activities include, but are not limited to: design reviews, submittal reviews, environmental permit approvals by State regulators, inspections, utility tie-in, Government Furnished Equipment (GFE) and notice to proceed for phasing requirements.

3.3.2.5 Workers Per Day

All activities shall have an estimate of the average number of workers per day that are expected to be used during the execution of the activity. If no workers are required for an activity, in the case of activities related to procurement, for example, then the activity shall be identified as using zero workers per day. The workers per day information for each activity shall be identified by the Workers Per Day Code.

3.3.2.6 Responsibility

All activities shall be identified in the project schedule by the party responsible to perform the work. Responsibility includes, but is not limited to, the subcontracting firm, contractor work force, or government agency performing a given task. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by the Responsibility Code.

3.3.2.7 Work Areas

All activities shall be identified in the project schedule by the work area in which the activity occurs. Activities shall not be allowed to cover more than one work area. The work area of each activity shall be identified by the Work Area Code.

3.3.2.8 Modification or Claim Number

Any activity that is added or changed by contract modification or used to justify claimed time shall be identified by a mod or claim code that changed

the activity. Activities shall not belong to more than one modification or claim item. The modification or claim number of each activity shall be identified by the Mod or Claim Number.

3.3.2.9 Bid Item

All activities shall be identified in the project schedule by the Bid Item to which the activity belongs. An activity shall not contain work in more than one bid item. The bid item for each appropriate activity shall be identified by the Bid Item Code.

3.3.2.10 Phase of Work

All activities shall be identified in the project schedule by the phases of work in which the activity occurs. Activities shall not be allowed to contain work in more than one phase of work. The project phase of each activity shall be by the unique Phase of Work Code.

3.3.2.11 Category of Work

All Activities shall be identified in the project schedule according to the category of work which best describes the activity. Category of work refers, but is not limited to, the procurement chain of activities including such items as submittals, reviews, procurement, fabrication, delivery, installation, start-up, and testing. The category of work for each activity shall be identified by the Category of Work Code.

3.3.2.12 Feature of Work

All activities shall be identified in the project schedule according to the feature of work to which the activity belongs. Feature of work refers, but is not limited to a work breakdown structure for the project. The feature of work for each activity shall be identified by the Feature of Work Code.

3.3.3 Scheduled Project Completion

The schedule interval shall extend from notice-to-proceed to the contract completion date.

3.3.3.1 Project Start Date

The schedule shall start no earlier than the date that the Notice to Proceed (NTP) was acknowledged. The Contractor shall include as the first activity in the project schedule an activity called "Start Project". The "Start Project" activity shall have: a "ES" constraint, a constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

3.3.3.2 Constraint of Last Activity

Completion of the last activity in the schedule shall be constrained by the contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the critical path. The Contractor shall include as the last activity in the project schedule an activity call "End Project". The "End Project" activity shall have: a "LF" constraint, a constraint date equal to the completion date for the project, and a zero day duration.

3.3.3.3 Early Project Completion

In the event the project schedule shows completion, the project prior to the contract completion date, the Contractor shall identify those activities that have been accelerated and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. Contractor shall specifically address each of the activities noted at every project schedule update period to assist the Contracting Officer's Representative to evaluate the Contractor's ability to actually complete prior to the contract period.

3.3.4 Interim Completion Dates

Contractually specified interim completion dates shall also be constrained to show negative float if the early finish date of the last activity in that phase falls after the interim completion date.

3.3.4.1 Start Phase

The Contractor shall include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have: a "ES" constraint, a constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

3.3.4.2 End Phase

The Contractor shall include as the last activity in a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have: a "LF" constraint, a constraint date equal to the completion date for the project, and a zero day duration.

3.3.4.3 Phase X

The Contractor shall include a hammock type activity for each project phase called "Phase X" where "X:” refers to the phase of work. The "Phase X" activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5 Default Progress Data Disallowed

Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual Start and Finish dates on the CPM schedule shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the Actual Start and Finish dates on the Daily Quality Control report for every in progress or completed activity and insure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's schedule and the inability of the Contracting Officer's Representative to evaluate Contractor progress for payment purposes.

3.3.6 Out-of-Sequence Progress

Activities that have posted progress without predecessors being completed (Out-of-Sequence Progress) shall be allowed only by the case-by-case review of the Contracting Officer's Representative. The Contracting Officer's

Representative may direct that changes in schedule logic be made to correct any or all out-of-sequence work.

3.3.7 Extended Non-Work Periods

Designation of Holidays to account for non-work periods of over 5 days shall not be allowed. Non-work periods of over 5 days shall be identified by addition of activities that represent the delays. Modifications to the logic of the project schedule shall be made to link those activities that may have been impacted by the delays to the newly added delay activities.

3.3.8 Negative Lags

Lag durations contained in the project schedule shall not have a negative value.

3.4 PROJECT SCHEDULE SUBMISSIONS

The Contractor shall provide the submissions as described below. The data disk, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.4.1 Preliminary Project Schedule Submission

The Preliminary Project Schedule, defining the Contractor's planned operations for the first 60 calendar days shall be submitted for review within 20 calendar days after Notice to Proceed is acknowledged. The approved preliminary schedule shall be used for payment purposes not to exceed 60 calendar days after Notice to Proceed.

3.4.2 Initial Project Schedule Submission

The Initial Project Schedule shall be submitted for review within 40 calendar days after Notice to Proceed. The schedule shall provide a reasonable sequence of activities which represent work through the entire project and shall be at a reasonable level of detail.

3.4.3 Periodic Schedule Updates

Based on the result of progress meetings, specified in "Periodic Progress Meetings," the Contractor shall submit periodic schedule updates. These submissions shall enable the Contracting Officer's Representative or to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer's Representative or authorized representative, is necessary for verifying the contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

3.4.4 Standard Activity Coding Dictionary

The Contractor shall submit, with the Initial Project Schedule, a coding scheme that shall be used throughout the project for all activity codes contained in the schedule. The coding scheme submitted shall list the values for each activity code category and translate those values into project specific designations. For example, a Responsibility Code Value, "ELE", may be identified as "Electrical Subcontractor." Activity code values shall

represent the same information throughout the duration of the contract. Once approved with the Initial Project Schedule submission, changes to the activity coding scheme must be approved by the Contracting Officer's Representative.

3.5 SUBMISSION REQUIREMENTS

The following items shall be submitted by the Contractor for the initial submission, and every periodic project schedule update throughout the life of the project:

3.5.1 Data Disks

Three (3) data disks containing the project schedule shall be provided. Data on the disks shall adhere to SDEF format specified in ER 1-1-11, Appendix A

3.5.1.1 File Medium

Required data shall be submitted on 3.5 disks, formatted to hold 1.44 MB of data, under the Microsoft Windows operating system or on a WINDOWS formatted CD-ROM disk, or e-mail attachments.

3.5.1.2 Disk Label

A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Initial, Update, or Change), full contract number, project name, project location, data date, name and telephone number or person responsible for the schedule, and the software version format of the disk.

3.5.1.3 File Name

Each file submitted shall have a name related to either the schedule data date, project name, or contract number. The Contractor shall develop a naming convention that will insure that the names of the files submitted are unique. the Contractor shall submit the file naming convention to the Contracting Officer's Representative for review.

3.5.2 Narrative Report

A Narrative Report shall be provided with each update of the project schedule. This report shall be provided as the basis of the Contractor's progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken.

3.5.3 Approved Changes Verification

Only project schedule changes that have been previously approved by the Contracting Officer's Representative shall be included in the schedule submission. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4 Schedule Reports

Format for each activity for the schedule reports listed below shall contain:

Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float. Actual Start and Actual Finish Dates shall be printed for those activities in-progress or completed.

3.5.4.1 Activity Report

A list of all activities sorted according to activity number.

3.5.4.2 Logic Report

A list of Preceding and Succeeding activities for every activity in ascending order by activity number and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort.

3.5.4.3 Total Float Report

A list of all activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates.

3.5.4.4 Earnings Report

A compilation of the Contractor's Total Earnings on the project from the Notice to Proceed until the most recent Monthly Progress Meeting. This report shall reflect the Earnings of specific activities based on the agreements made in the field and approved between the Contractor and Contracting Officer's Representative at the most recent Monthly Progress Meeting. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining Contractor Payment. Activities shall be grouped by bid item and sorted by activity numbers. This report shall: sum all activities in a bid item and provide a bid item percent; complete and sum all bid items to provide a total project percent complete. The printed report shall contain, for each activity: Activity Number, Activity Description, Original Budgeted Amount, Total Quantity, Quantity to Date, Percent Complete (based on cost), Earnings to Date.

3.5.5 Network Diagram

The network diagram shall be required on the initial schedule submission and on monthly schedule update submissions. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer's Representative will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity or event number, description, duration, and estimated earned value shall be shown on the diagram.

3.5.5.2 Project Milestone Dates

Dates shall be shown on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.5.3 Critical Path

The critical path shall be clearly shown.

3.5.5.4 Banding

Activities shall be grouped to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.5.5.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.6 PERIODIC PROGRESS MEETINGS

Progress meetings to discuss payment shall include a monthly on-site meeting or other regular intervals mutually agreed to at the preconstruction conference. During this meeting the Contractor will describe, on an activity-by-activity basis, all proposed revisions and adjustments to the project schedule required to reflect the current status of the project. The Contracting Officer's Representative will approve activity progress, proposed revisions, and adjustments as appropriate.

3.6.1 Meeting Attendance

The Contractor's Job Superintendent, Project Manager and Scheduler shall attend the regular progress meeting.

3.6.2 Update Submission Following Progress Meeting

A complete update of the project schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, shall be submitted not later than 4 working days after the monthly progress meeting.

3.6.3 Progress Meeting Contents

Update information, including Actual Start Dates, Actual Finish Dates, Remaining Durations, and Cost to Date shall be subject to the review of the Contracting Officer's Representative. The following minimum set of items which the Contractor shall address, on an activity by activity basis, during each progress meeting.

3.6.3.1 Start and Finish Dates

The Actual Start and Actual Finish dates for each activity currently in-progress or completed activities.

3.6.3.2 Time Completion

The estimated Remaining Duration for each activity in-progress. Time-based progress calculations must be based on Remaining Duration for each activity.

3.6.3.3 Cost Completion

The earnings for each activity started. Payment shall be based on earnings for each in-progress or completed activity. Payment for individual activities shall not be made for work that contains quality defects. A portion of the overall project amount may be retained based on delays of activities.

3.6.3.4 Logic Changes

All logic changes pertaining to Notice to Proceed on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, lag durations, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

3.6.3.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities are those delays beyond the Contractors control such as strikes and unusual weather. Also included are delays encountered due to submittals, Government Activities, deliveries or work stoppage which makes re-planning the work necessary, and when the schedule does not represent the actual prosecution and progress of the work.

3.7 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor requests an extension of the contract completion date, he shall furnish such justification, project schedule data and supporting evidence as the Contracting Officer's Representative may deem necessary for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof of delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any reviews.

3.7.1 Justification of Delay

The project schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The Contracting Officer's Representative's determination as to the number of allowable days of contract extension, shall be based upon the project schedule updates in effect for the time period in question and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in the extension of the schedule, shall not be a cause for a time extension to the contract completion date.

3.7.2 Submission Requirements

The Contractor shall submit a justification for each request for a change in the contract completion date of under two weeks based upon the most recent schedule update at the time of the Notice to Proceed or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

a. A list of affected activities, with their associated project schedule activity number.
b. A brief explanation of the causes of the change.
c. An analysis of the overall impact of the changes proposed.
d. A sub-network of the affected area.

Activities impacted in each justification for change shall be identified by a unique activity code contained in the required data file.

3.7.3 Additional Submission Requirements

For any request for time extension for over 2 weeks, the Contracting Officer's Representative may request an interim update with revised activities for a specific change request. The Contractor shall provide this disk within 4 days of the Contracting Officer's Representative's request.

3.8 DIRECTED CHANGES

If Notice to Proceed (NTP) is issued for changes prior to settlement of price and/or time, the Contractor shall submit proposed schedule revisions to the Contracting Officer's Representative within 7 days of the NTP being issued. The proposed revisions to the schedule will be approved by the Contracting Officer's Representative prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer's Representative may furnish the Contractor suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until the Contractor submits revisions, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer's Representative, then the Contractor shall advise the Contracting Officer's Representative within 7 days of receipt of the revisions. Regardless of the objections, the Contractor will continue to update their schedule with the Contracting Officer's Representative's revisions until a mutual agreement in the revisions may be made. If the Contractor fails to submit alternative revisions within 7 days of receipt of the Contracting Officer's Representative's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's Representative's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

SECTION 01330
SUBMITTAL PROCEDURES
Design-Build

PART I GENERAL

Attachments: Submittal Register
ENG Form 4025, Transmittal Form

1.1 SUMMARY

This section includes administrative and procedural requirements for construction submittals presented by the contractor after 100% corrected plans and specifications have been accepted by the government. This section also includes requirements for developing, submitting and maintaining a “Submittal Register".

1.2 CONTRACTOR RESPONSIBILITIES

The Contractor is responsible for total management of his work including approval, scheduling, control, and certification of all submittals. The submittal management system provided in these specifications is intended to be a complete system for the Contractor to use to control the quality of materials, equipment and workmanship provided by manufacturers, fabricators, suppliers and subcontractors. The Contractor shall review each submittal for contract compliance. The Submittal Register (ENG Form 4298) will be utilized to log and monitor all submittal activities. No construction or installation activities shall be performed prior to required approvals and government compliance review of applicable submittals. The Contractor shall perform a check to assure that all materials and/or equipment have been tested, submitted and approved during the preparatory phase of quality control inspections. The Contractor shall coordinate all submittals with the Contractor's Designer (A-E). Approval bv the Contractor's Designer means that the submittal is in compliance with the requirements of the RFP contract.

1.4 SUBMITTAL IDENTIFICATION (SD)

Submittals required are identified by SD numbers and titles as follows:

SD-01 Preconstruction Submittals

Tabular lists showing location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

In addition, the following items are included:

Construction progress schedule
Accident Prevention Plan /Safety and Health program and plan

Work plan
Quality control plan
Environmental protection plan
Permits

SD-02 Shop Drawings

Submittals which graphically show relationships of various components of the work, schematic diagrams of systems, details of fabrication, layouts of particular elements, connections, and other relational aspects of the work.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Samples, including both fabricated and unfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.

Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged. Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accordance with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test, required to be performed by the contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on samples taken from the job site, on portion of work during or after installation.

Investigation reports

Daily checklists

Final acceptance test and operational test procedure

SD-07 Certificates

A document, required of the Contractor or through the Contractor, from a supplier, installer, manufacturer, or other lower tier Contractor, the purpose of which is to confirm the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verifications of quality.

Statement signed by an official authorized to certify on behalf of the manufacturer of a product, system or material, attesting that the product, system or material meets specified requirements. The statement must be dated after the award of the contract, must state the Contractor's name and address, must name the project and location, and must list the specific requirements which are being certified.

Confined space entry permits.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and material safety data sheets, if any, concerning impedances, hazards, and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or, instructions.

Factory test reports.

SD-10 Operation and maintenance Data

Data intended to be incorporated in operations and maintenance manuals.

SD-l1 closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

In addition, the following items are included:

As-built drawings

Special warranties

Posted operating instructions

Training plan

1.5 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.5.1 Designer Approved (“G-AE”)

Designer approval is required for extensions of design, critical materials, deviations, any deviations from the solicitation, the accepted proposal, or the completed design, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction”, they are considered to be “shop drawings". All submittals noted in the technical specifications and Submittal Register as “G-AE” are subject to approval by the Contractor's Designer, prior to submittal to the Government. The Contracting Officer has the option to review any submittal. The Government will review all “G-AE” submittals for conformance to the solicitation and all submittals designated as variations from the Solicitation or 100% corrected design or as directed by the Contracting Officer.

1.5.2 Government Reviewed Construction submittals ("G-RE")

"G-RE" submittals subject to Government review are those so designated by the Contacting Officer during the design process or preconstruction meeting. All "G-RE" submittals shall be reviewed and approved by the Contractor’s Quality Control Representative and the Contractor’s Designer prior to submittal to the Government. Within the terms of the Contract Clause entitled “Specification and Drawings for Construction,” they are considered to be "shop drawings." Any variance must clearly identify the variance as specified in paragraph: "Variations", below.

Government review is required for designated “G-RE” submittals and variations from the solicitation requirements and completed design. Review will be only for conformance with the contract requirements. This also includes those construction submittals for which the design documents did not include enough detail to ascertain contract compliance. Government review will not include development of design

calculations or other means of determining adequacy of design. The Contractor and his designer retain the sole responsibility for adequacy of design.

1.5.4 Information Only (FIO)

All submittals not requiring Contractor's Designer and Government review will be for information only. They are not considered to be "shop drawings”, within the terms of the Contract Clause referred to above. The Contracting Officer has the option to review any submittal.

1.6 GOVERNMENT REVIEWED SUBMITTALS

The Contracting Officer's review of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information appear to meet the Solicitation requirements. Government Review will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Design and CQC requirements of this contract is responsible for design, compliance with design criteria required in the solicitation, dimensions, all design extensions, such as the design of adequate connections and details, etc. and the satisfactory construction of all work. After submittals have been reviewed for conformance, or approval as applicable, by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.7 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer, obtain the Contractor's Designer approval and Government review, or approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Any submittal found to contain errors or unapproved variations from the solicitation or accepted proposal, shall be resubmitted as one requiring "approval” action, requiring both Designer's approval and Government conformance review or approval, as applicable. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.8 WITHHOLDING OF PAYMENT

No payment for materials incorporated in the work will be made if all required Designer or Contractor Quality Control Representative approvals or required Government conformance reviews, or approvals as applicable, have not been obtained. No payment will be made for any materials incorporated in the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.9 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the construction drawings, Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. The Contractor's Quality Control (CQC) representative, and the Designer, as applicable, shall check, approve and stamp, sign, and date each item, indicating action taken. Proposed variations from the solicitation (contract requirements) or accepted 100% corrected design shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's. or fabricator’s drawings; descriptive literature including (but not limited to)catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list);certifications; warranties, and other such required submittals. Submittals requiring conformance review or approval by the Government shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.10 SUBMITTAL REGISTER AND ENG SUBMITTAL REGISTER

The Contractor's Designer(s) shall develop a complete list of submittals during design. The Designer shall identify required submittals in the specifications. The list is to be used in preparing the Submittal Register for a computerized equivalent as approved by the Contracting Officer’s Representative. The example Submittal Register furnished with the Solicitation was created using Specsintact Software. The Contractor shall replace this example Submittal Register with the actual submittal register for the completed design specifications. The list is not all inclusive and additional submittals may be required. The attached and contractor generated submittal register identifies only the submittal section, type of submittal, description of item submitted, paragraph number related to type of submittal item (section submittal paragraph if none listed), submittal classification (G), and submittal reviewer identifier (AE or RE). Any submittal without a submittal classification and submittal reviewer identifier is considered to be For Information Only (FIO). The submittal register generated by the Government Resident Management System (RMS) Software is used for tracking construction submittals and is referred to as ENG Form 4288 (RMS) . Much of the same information contained on the Contractor-generated Submittal Register will be included on the ENG Forms 4288 (RMS). The Contractor shall maintain an ENG Form 4288 (RMS) for the project in accordance with the attached ENG Form 4288 (RMS) Instructions on which will be listed each item of equipment and material of each type for which fabricators, drawings, and/or related descriptive data, test reports, samples, spare parts lists, O&M manuals, or other types of submittals are required by the

completed project specifications. Upon acceptance of the ENG Form 4288 (RMS) by the Contracting Officer, the ENG Form 4288 (RMS) will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. The E-110 Form 4288 (PMS) ACTIVITY NO, is filled in when a network analysis system is a contract requirement. The TRANSMITTAL NO. and ITEM NO, shall be left blank and used later to record the respective transmittal and item number corresponding to those listed on the transmittal form entitled: "TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE" (ENG Form 4025). The approved ENG Form 4288 (RMS) will become the scheduling document and will be used to control submittals throughout the life of the contract. The submittal register and the progress schedules shall be coordinated. Updates to the submittal register showing the Contractor action codes and actual dates shall be submitted monthly or until all submittals have been satisfactorily completed. When the progress schedule is revised, the ENG Form 4288 (RMS) shall also be revised and both submitted for approval.

1.11 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 30 calendar days exclusive of mailing time) shall be allowed and shown on the register for conformance reviews by the Contracting Officer for submittals requiring Government review and for submittals which vary from the solicitation or accepted 100% corrected design. No delay damages or time extensions will be allowed for time lost in late submittals. An additional 20 calendar days shall be allowed and shown on the resister for conformance reviews by the Government of submittals for food service equipment and refrigeration and HVAC control systems.

1.12 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting all submittals in accordance with the instructions on the reverse side of the form. These forms are included in the Quality Control System (QCS) software that the Contractor is required to use for this contract. This form shall be properly, completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.13 SUBMITTAL PROCEDURES

Submittals shall be made as follows:

1.13.1 Procedures

1.13.1.1 “G-AE" Submittals

All submittals shall be reviewed and approved by the Contractor's Quality Control Representative and Contractor's Designer prior to submittal to the Government. A conformance review is required by the Government on all submittals, prior to construction of the related items.

Except as noted below, data for all items listed as submittals in the various sections shall be submitted in seven (copies). All seven copies shall be submitted to the Area Engineer using the transmittal form. Items not to be submitted in multiples, such as samples and test cylinders, shall be submitted to the Area or Resident Engineer (as directed), accompanied by seven (7) copies of the transmittal form.

Each required submittal, which is in the form of a drawing, shall be submitted as seven (7) prints of the drawing. Drawing prints shall be either blue or black line permanent-type prints on a white background or blueprint and shall be sufficiently clear and suitable for making legible copies.

Catalog cuts and other descriptive data which have more than one model, size, or type or which shows optional equipment shall be clearly marked to show the model, size, or type and all optional equipment which is provided. Submittals on component items forming a system or that are interrelated shall be submitted at one time as a single submittal in order to demonstrate that the items have been properly coordinated and will function as a unit.

1.13.1.2 "G-RE" and FIO Submittals

Except as noted below, data for all items listed, as “G-RE" Submittals in the various sections shall be submitted in five (5) copies. All five copies shall be submitted to the Area Engineer for solicitation conformance review using the transmittal form. Items not to be submitted in multiples, such as samples and test cylinders, shall be submitted to the Area or Resident Engineer (as directed) accompanied by five (5) copies of the transmittal form.

Except as noted below, data for all items listed as “FIO” Submittals in the various sections shall be submitted in three (3) copies. All three copies shall be submitted to the Area Engineer using the transmittal form. Items not to be submitted in multiples, such as samples and test cylinders, shall be submitted to the Area or Resident Engineer (as directed) accompanied by three (3) copies of the transmittal form.

All "G-RE" and "FIO” submittals shall be reviewed and approved by Contractor’s Quality Control Representative and Contractor's Designer (as applicable) prior to submittal to the Government. A completed Government conformance review is required on all submittals, prior to Construction of the related items.

The Government has the option to review any FIO submittals.

1.13.1.4 Certificates of Compliance

Each certificate shall be signed by an official authorized to certify in behalf of the manufacturing company and shall contain the name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material if, after tests are performed on selected samples, the material is found not to meet the specific requirements.

1.13.1.5 Purchase Orders

Copies of purchase orders shall be furnished to the Contracting Officer when the Contractor requests assistance for expediting deliveries of equipment or materials, or when requested by the Contracting officer for the purpose of quality assurance review. Each purchase order issued by the Contractor or his subcontractors for materials and equipment to be incorporated into the project shall (1) be clearly identified with the applicable DA contract number, (2) carry an identifying number, (3) be in sufficient detail to identify the material being purchased, (4) indicate a definite delivery date, and (5) display the DMS priority rating, if applicable.

1.13.1.6 operation and Maintenance Instructions and/or Manuals

Where required by various technical sections, operations and maintenance instructions and/or manuals with parts lists included shall be provided by the Contractor in quintuplicate, unless otherwise specified, and shall be assembled in three-ring binders with index and tabbed section dividers and having a cover indicating the contents by equipment or system name and project title and shall be submitted to the Area Engineer for review (after approval by the Contractor’s Quality Control Representative), 90 days prior to final tests of mechanical and electrical systems, unless otherwise specified. Each operation and maintenance manual shall contain a copy of all warranties. If field testing requires these copies to be revised, they shall be updated and resubmitted for review within 10 calendar days after completion of tests. (The Operations and Maintenance Instructions and/or Manuals shall be shown as a separate activity on the Contractor-prepared construction schedule bar chart or network analysis system.

1.13.1.6 Interior/Exterior Finish Sample and Data

All submittals regarding color boards (Section 09915) for interior finish samples and data shall be submitted concurrently and all submittals for exterior finish samples and data shall be submitted concurrently. These color boards are in addition to the samples

required under the specific technical specifications listed as “samples”.

1.13.2 Variations

Variations from the solicitation (contract requirements) or the accepted 100% corrected design must be approved by the Contractor’s Designer, Contractor's Quality Control Representative and Contracting Officer. For submittals which include proposed variations, the column "variation" of ENG Form 4025 shall be checked and a serial letter shall be simultaneously prepared and sent to the Area Engineer referencing this variation. The Contractor shall set forth in writing the reason for any variations and clearly annotate such variations on the submittal. The narrative shall include documentation of the nature and features of the variation and why the variation is desirable and beneficial to the Government. When submitting a variation for acceptance, the Contractor warrants that the contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of the work. The Contractor shall take actions and bear the additional costs, including review costs by the Government, necessary due to the proposed variation. In addition to the submittal review period specified above, allow ten (10) additional working days for consideration by the Government of submittals with variations. The Government reserves the right to rescind inadvertent action codes of submittals containing unnoted variations.

1.14 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved “Submittal Register".

1.15 SUBMITTALS (FINAL COPY)

Upon completion of review of submittals requiring Government conformance review or approval, the submittals will be identified as having received satisfactory review by being so stamped and dated.

1.15.1 “G-AE" Submittals

The Contracting officer has the oDtion to review any submittal. Two (2) copies of “G-AE" submittals, for conformance review by the Government, will be returned to the Contractor, except for samples, test cylinders, and O&M manuals for which two (2) copies of the transmittal form only will bt returned to the Contractor, The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. All “G-AE” submittals shall be reviewed and approved by the Contractor’s Designer and Contractor's Quality Control Representative prior to submittal to the Government.

1.15.2 "G-RB" Submittals

Two (2) copies of “G-RE” submittals for conformance review will be returned to the Contractor except for samples, test cylinders, and O&M manuals for which two (2) copies of the transmittal form only will be returned to the Contractor.

1.16 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Review by the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the contracting officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications; so prescribe.

1.17 STAMPS

Stamps used by the Contractor's Designer and the Contractor's designated Quality Control person on the submittal data to certify that the submittal meets contract requirements shall be similar to the following (use two stamps or submittals reviewed by both). Stamps shall be located on the back of the ENG Form 4025.

CONTRACTOR
(Firm Name)

_____ Approved.

_____ Approved with corrections as noted on submittal data and/or attached sheet(s).

SIGNATURE: _____

TITLE: Contractor’s Chief of Quality Control_____

DATE: _____

SIGNATURE: _____

TITLE: Designer of Record _____

DATE: _____

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☐ GOV'T. APPROVAL

ITEM NO. *a.*	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* .	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See instruction no. 8)* *c.*	NO. OF COPIES *d.*	CONTRACT REFERENCE DOCUMENT SPEC. PARA. NO. *e.*	DRAWING SHEET NO. *f.*	FOR CONTRACTOR USE CODE *g.*	VARIATION *(See instruction No. 6)* .	FOR CE USE CODE *i.*

REMARKS	I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated. NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED *(List by Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.

2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.

3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288-R for each entry on this form.

4. Submittals requiring expeditious handling will be submitted on a separate form.

5. Separate transmittal form will be used for submittals under separate sections of the specifications.

6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications--also, a written statement to that effect shall be included in the space provided for "Remarks".

7. Form is self-transmittal, letter of transmittal is not required.

8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I.

9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A -- Approved as submitted.

B -- Approved, except as noted on drawings.

C -- Approved, except as noted on drawings. Refer to attached sheet resubmission required.

D -- Will be returned by separate correspondence.

E -- Disapproved (See attached).

F -- Receipt acknowledged.

FX -- Receipt acknowledged, does not comply as noted with contract requirements.

G -- Other *(Specify)*

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

Project Name Below:
WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS

Contractor's Name Below:

Contract Number Below:
DACA41-02-R-0007

SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02210**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Field Testing Control					X							X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

* EP=ENG DIV, EP-D; GL=ENG DIV, EP-GL; RE=RESIDENT ENG; AE=ARCHITECT / ENG FIRM

SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02220**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.3	Work Plan					X							X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02221**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Field Testing Control					X							X	RE									
			1.2	Capillary Water Barrier						X						X	RE									
			1.2	Soil Treatment							X					X	RE									
			1.2	Select Material						X						X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02222**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Field Testing Control					X							X	RE									
			1.2	Select Granular Material						X						X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02225**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Field Testing Control					X							X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02233**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Testing Laboratory					X							X	RE									
			1.2	Material Source					X							X	RE									
			1.2	Initial Tests						X						X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02235**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Equipment	X											X	RE									
			1.2	Testing Laboratory					X							X	RE									
			1.2	Test Reports					X							X	RE									
			1.2	Lime							X					X	RE									
			1.2	Lime Sources							X					X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02364**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.1	Termiticides			X								X											
			1.1	Equipment				X							X											
			1.1	Foundation Exterior					X						X											
			1.1	Utilities and Vents					X						X											
			1.1	Soil Moisture					X						X											
			1.1	Verification of Measurement					X						X											
			1.1	Equipment Calibration and Tank Calibration						X					X											
			1.1	Qualifications							X				X											
			1.1	Termiticides								X			X											
			1.1	Temiticide Application Plan									X			X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02510**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.3	Installation			X								X											
			1.3	Waste Water Disposal Method			X								X											
			1.3	Satifactory Installation					X						X											
			1.3	Bacteriological Disinfection							X					X	RE									
			1.3	Meters							X					X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02511**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Burlap, sheeting, curing compound, joint filler							X					X	RE									
			1.2	Sealants							X					X	RE									
			1.2	Wire fabric							X					X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02531**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.3	Portland Cement							X				X											

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02551**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Testing Laboratory					X							X	RE									
			1.2	Equipment, mixing plant						X						X	RE									
			1.2	Coarse aggregate, fine aggregate, mineral filler							X					X	RE									
			1.2	Aggregate gradation, crushed particle, specific							X					X	RE									
				gravity test																						
			1.2	Bituminous Material							X					X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

ENG FORM 4288, JULY 96

* EP=ENG DIV, EP-D; GL=ENG DIV, EP-GL; RE=RESIDENT ENG; AE=ARCHITECT / ENG FIRM

SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02630**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Placing Pipe			X								X											
			1.2	Resin Certification, pipeline testing, hydrostatic test							X					X	RE									
				density, frame and cover gratings																						

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ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02748**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.3	Tests						X						X	RE									
			1.3	Waybills and delivery tickets						X						X	RE									

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ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02921**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Equipment	X											X	RE									
			1.2	Surface Erosion Control Material	X											X	RE									
			1.2	Chemical Treatment Material	X											X	RE									
			1.2	Delivery Schedule	X											X	RE									
			1.2	Finished Grade and Topsoil	X										X											
			1.2	Quantity Check	X										X											
			1.2	Seed Establishment Period	X										X											
			1.2	Maintenance Record	X											X	RE									
			1.2	Application of Pesticide	X											X	RE									
			1.2	Delivered Topsoil								X			X											
			1.2	Soil Amendments								X			X											
			1.2	Mulch								X			X											
			1.2	Equipment Calibration						X						X	RE									
			1.2	Soil Test						X						X	RE									
			1.2	Seed							X				X											
			1.2	Topsoil							X				X											
			1.2	pH Adjuster							X				X											
			1.2	Fertilizer							X				X											
			1.2	Organic Material							X				X											
			1.2	Soil Conditioner							X				X											
			1.2	Mulch							X				X											
			1.2	Pesticide							X				X											

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ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02922**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Equipment	X										X											
			1.2	Chemical Treatment Material	X										X											
			1.2	Equipment				X							X											
			1.2	Delivery Schedule					X						X											
			1.2	Finished Grade and Topsoil					X						X											
			1.2	Topsoil					X						X											
			1.2	Equipment Calibration						X					X											
			1.2	Soil Test						X					X											
			1.2	Sod							X				X											
			1.2	Topsoil							X				X											
			1.2	pH Adjuster							X				X											
			1.2	Fertilizer							X				X											
			1.2	Organic Material							X				X											
			1.2	Soil Conditioner							X				X											
			1.2	Pesticide							X				X											
			1.2	Topsoil								X			X											
			1.2	Soil Amendments								X			X											
			1.2	Temporary Seeding								X			X											
			1.2	Quantity Check									X		X											
			1.2	Sod Establishment Period									X		X											
			1.2	Maintenance Record, and Application of Pesticide									X		X											

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(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **02930**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.2	Chemical Treatment Material	X										X											
			1.2	Shop Drawings		X									X											
			1.2	Equipment				X							X											
			1.2	Delivery Schedule					X						X											
			1.2	Finished Grade and Topsoil					X						X											
			1.2	Underground Utilities					X						X											
			1.2	Soil Test						X					X											
			1.2	Percolation Test						X					X											
			1.2	Plant Material							X				X											
			1.2	Topsoil							X				X											
			1.2	pH Adjuster							X				X											
			1.2	Fertilizer							X				X											
			1.2	Organic Material							X				X											
			1.2	Soil Conditioner							X				X											
			1.2	Organic Mulch							X				X											
			1.2	Pesticide							X				X											
			1.2	Topsoil								X			X											
			1.2	Soil Amendments								X			X											
			1.2	Mulch								X			X											
			1.2	Plant Establishment Period, and Maintenance Record									X		X											
			1.2	Application of Pesticide									X		X											
			1.2	Maintenance Instructions										X	X											

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **13280**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.4	Asbestos Hazard Abatement Plan	X											X	RE									
			1.4	Respiratory Protection Program	X											X	RE									
			1.4	Cleanup and Disposal	X											X	RE									
			1.4	Detailed Drawings	X											X	RE									
			1.4	Materials and Equipment	X											X	RE									
			1.4	Qualifications	X											X	RE									
			1.4	Training Program	X											X	RE									
			1.4	Medical Requirements	X											X	RE									
			1.4	Encapsulants	X											X	RE									
			1.4	Exposure Assessment and Air Monitoring						X						X	RE									
			1.4	Licenses, Permits and Notifications						X						X	RE									
			1.4	Vacuum, Filtration Equipment							X				X											

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ENG FORM 4288, JULY 96

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **15776**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.3	List of Materials	X											X	RE									
			1.3	Shop Drawings		X										X	RE									
			1.3	Installation, Operation, and Maintenance Instructions			X							X		X	RE									
			1.3	Warranty							X					X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

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SUBMITTAL REGISTER

(ER 415 1-10)

CONTRACT NO. **DACA41-02-R-0007**

TITLE AND LOCATION: **WHOLE NEIGHBORHOOD REVITALIZATION RFP, FORT LEAVENWORTH, KANSAS**

CONTRACTOR: **0**

SPECIFICATION SECTION: **15777**

ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFI-CATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	CLASSI-FICATION: INFORMATION ONLY	GOVERNMENT REVIEWED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.*	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.4	List of Materials	X											X	RE									
			1.4	Shop Drawings		X										X	RE									
			1.4	Technician's Certification							X					X	RE									
			1.4	Contractor's Qualifications					X							X	RE									

NOTE: THE A/E IS TO REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE DESIGN AND RFP. THIS REVIEW IS TO TAKE PLACE PRIOR TO FORWARDING SUBMITTAL TO THE RESIDENT ENGINEER (RE) FOR HIS APPROVAL UNDER THE HEADING "REVIEWER"

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SECTION 01356

STORM WATER POLLUTION PREVENTION MEASURES

08/96

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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 448	(1998) Sizes of Aggregate for Road and Bridge Construction
ASTM D 4355	(1992) Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
ASTM D 4439	(1997) Standard Terminology for Geosynthetics
ASTM D 4491	(1996) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 1996)) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1995) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(1988; R 1996) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(1995) Identification, Storage, and Handling of Geosynthetic Rolls

1.2 GENERAL

The Contractor shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Section 01410 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit specified in Section 01567 NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES.

1.3 SUBMITTALS

Government review is required for all submittals with a “G-RE" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-13 Certificates

Mill Certificate or Affidavit; FIO.

1.4 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the Contractor are described in the Storm Water Pollution Prevention Plans (SWPPP) attached to Section 01567 NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

The geotextile shall comply with the requirements of ASTM D 4439, and shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of -18 to 49 degrees C. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT	
Grab Tensile	ASTM D 4632	445	N min.
Elongation (%)		30	% max.
Trapezoid Tear	ASTM D 4533	245	N min.
Permittivity	ASTM D 4491	0.2 sec-1	
AOS (U.S. Std Sieve)	ASTM D 4751	20-100	

2.1.2 Silt Fence Stakes and Posts

The Contractor may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 50 mm by 50 mm when oak is used and 100 mm by 100 mm when pine is used, and shall have a minimum length of m. Steel posts (standard “**U**” or “T" section) utilized for silt fence construction, shall have a minimum mass of 1.98 kg per linear meter and a minimum length of 1.5 m.

2.1.3 mill Certificate or Affidavit

A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The Contractor shall

submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

2.1.4 Identification Storage and Handling

Filter fabric shall be identified, stored and handled in accordance with ASTM D 4873.

2.1.5 Support Mesh

Support mesh shall be 14-1/2 gage or heavier steel wire with a mesh spacing of 150 by 150 mm or a prefabricated polymeric mesh of equivalent strength.

2.2 EROSION CONTROL BLANKETS

Erosion control blankets shall be a machine-produced mat with a biodegradable agricultural straw matrix (approximately 0.27 kg/sq m)and photodegradable netting on each side. The blanket shall be sewn together with degradable thread. Installation staple patterns shall be clearly marked on the erosion control blanket with environmentally safe paint.

2.3 COMPONENTS FOR SEDIMENT TRAP

Coarse aggregate shall conform to ASTM D 448, Size 3, 357, or 5. Minor variations from the gradations specified will be permitted. Stone for riprap shall consist of fieldstone or rough unhewn quarry stone of approximately rectangular shape. The stone shall be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering. The specific gravity of individual stones shall be at least 2.5. Riprap stones shall weigh between 23 and 68 kg each, except that approximately 10 percent may weigh 23 kg or less. At least 60 percent shall weight more than 45 kg. Geotextile shall conform to paragraph GEOTEXTILES.

2.4 COMPONENTS FOR INLET PROTECTION

Aggregates for gravel filter should be sized to get the greatest amount of filtering action possible (by using smaller-sized stone), while not creating significant ponding problems.

2.5 STONE CONSTRUCTION ENTRANCE

Aggregate for construction entrance shall conform to ASTM D 448, Size 1. Minor variations from the gradation specified will be permitted. Geotextile shall conform to paragraph GEOTEXTILES.

2.6 GEOTEXTILES

Geotextile for other than silt fence shall conform to the following requirements. Geotextile shall be a nonwoven pervious sheet of polymeric material and shall consist of long-chain synthetic polymers composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. The use of woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) will not be allowed. Stabilizers and/or inhibitors shall be added to the base polymer, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and exposure. Regrind material, which consists of edge trimmings and other scraps that have never reached the consumer, may be used to produce the geotextile. Post-consumer recycled material may also be used. Geotextile shall be formed into a network such that the filaments

or yarns retain dimensional stability relative to each other, including the selvages. Geotextiles shall meet the requirements specified below. Where applicable, property values represent minimum average roll values (MARV) in the weakest principal direction. Values for AOS represent maximum average roll values.

GEOTEXTILE PHYSICAL PROPERTIES

PROPERTY	TEST VALUE	TEST METHOD
Elongation at Break, percent	Greater Than 50	ASTM D 4632
Apparent Opening Size (U.S. Sieve)	70	ASTM D 4751
Puncture, N	250	ASTM D 4833
Grab Tensile, N	700	ASTM D 4632
Trapezoidal Tear, N	250	ASTM D 4533
Ultraviolet Stability (percent strength retained at 500 hours)	50	ASTM D 4355

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 400 mm above the ground surface and shall not exceed 860 mm above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. when joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 150 mm overlap, and securely sealed. A trench shall be excavated approximately 10 mm wide and 00 mm deep on the upslope side of the location of the silt fence. The 10 mm by 00 mm trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon review by the Contracting Officer.

3.2 SEDIMENT TRAP

The area under the embankment shall be cleared, grubbed, and stripped of any vegetation and root mat. Fill material for the embankment shall be placed in accordance with Section 02300 EARTHWORK. A geotextile shall be placed between the riprap and sub grade.

3.3 STONE CONSTRUCTION ENTRANCE

The area of the entrance shall be cleared of all vegetation, roots, and other objectionable material. A minimum of 75 mm of aggregate shall be placed in a cut section to provide stability and secure the geotextile. The geotextile shall be placed beneath coarse aggregate for the full width and length of the entrance.

3.4 MAINTENANCE

The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Inspection and maintenance of protective measures shall conform to the requirements in the **SWPPP.**

-- End of Section --

STORM WATER POLLUTION PREVENTION PLAN
For
FY02 - Whole Neighborhood Revitalization
Army Family Housing
Fort Leavenworth, Kansas

Attachments: Storm Water General Permit For Construction Activities

References: Erosion Control Plan
Section 01410 ENVIRONMENT PROTECTION
Section 01356 STORM WATER POLLUTION PREVENTION MEASURES
Environmental Protection Plan

1. GENERAL

The Government has operational control over the specifications for all areas of the project. The Contractor has operational control over day-to-day activities for all areas of the project. The references listed above shall be considered part of the Storm Water Pollution Prevention Plan (SWPPP).

2. SITE DESCRIPTION

2.1. Nature of Construction Activity

The project consists of construction of eight-four (84) new family housing units associated roads, parking areas, sidewalks, utilities, landscaping and playground areas. Eighty-six existing housing units will be demolished and their basements backfilled, roads and utilities demolished and the ground returned to a natural state.

2.2. Area of Site

The total area of the new construction site is approximately 23 acres in three separate nno contigiuous sites. The total area of the construction site that is expected to be disturbed by excavation, grading, or other activities is approximately 23 acres. The amount of impervious area will increase by 7.6 acres after completion of construction. Fill materials at the site shall be obtained from excavation and from sources off the Government premises if necessary. Fill materials shall consist of gravel, sand, lean clay, or silt as required in the specifications.

2.3. Runoff Coefficients

The runoff coefficient of the site before construction was approximately 0.3. The runoff coefficient of the site after construction is complete will be approximately 0.6. Soils at the site consist of lean and fat clays.

2.4. Soil Contamination

There are no known soil contamination areas at the project site.

2.5. General Location Map

See the Location Plan in the drawings for the project location.

2.6. Site Map

See the Site maps and plans included with the RFP drawings.

2.7. Receiving Waters

Drainage from the construction site flows to Corral Creek.

2.8. Endangered or Threatened Species or Critical Habitat

The project site is not located in designated critical habitat and there are no known "listed species" located in the project area.

3. CONTROLS

Unless otherwise indicted, the Contractor shall be responsible for installing and maintaining all controls described below.

3.1. Erosion and Sediment Controls

All control measures shall be installed and maintained by the Contractor in accordance with the manufacturer's specifications. If periodic inspections or other information indicates a control has been used inappropriately, or incorrectly, the Contractor shall replace or modify the control with the approval of the Contracting Officer. If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts. Litter, construction debris, and construction chemicals exposed to storm water shall be prevented from becoming a pollutant source for storm water discharges. See the Environmental Protection Plan for the Contaminant Prevention Plan.

3.1.1. Stabilization Practices

3.1.1.1. Temporary Seeding

Temporary seeding of disturbed areas may be performed at the Contractor's option.

3.1.1.2. Mulching

All seeded areas shall be mulched on the same day as the seeding in accordance with the SEEDING requirements of the specifications.

Where soil disturbing activities will be stopped in an area for over 14 days, the disturbed areas shall be protected from erosion by stabilizing the area with mulch or other similarly effective erosion control measures.

3.1.1.3. Erosion Control Blanket

Erosion control blankets shall be installed where needed and be indicated on the drawings by the Design-Build AE as soon as possible after seeding.

3.1.1.4. Permanent Seeding and Sodding

Except as otherwise permitted below, seeding or sodding of disturbed portions of the site where construction activities permanently cease shall be initiated no more than 14,days after the construction activity ceases. Where the initiation of seeding or sodding by the 14th day after construction activity permanently ceased is precluded by snow cover or frozen ground conditions, seeding or sodding shall be initiated as soon as practicable.

3.1.1.5. Defined Drainage Course

Clearing and grubbing within 50 feet of a defined drainage course should be avoided unless otherwise indicated on the drawings.

Where changes to defined drainage courses are to occur as part of the project, clearing and grubbing within 50 feet of the defined drainage course should be delayed until all materials and equipment necessary to complete the drainage change are on site. Changes to defined drainage courses shall be completed as quickly as possible once the work has been initiated. The area impacted by the construction of the drainage course change shall be revegetated or protected from erosion as soon as possible.

3.1.1.6. Preservation of Natural Vegetation

Existing vegetation shall be preserved where practical. The time period for soil areas to be without vegetative cover shall be minimized to the extent practical.

3.1.1.7. Dust Control

The Contractor shall comply with paragraph AIR RESOURCES of Section 01410 ENVIRONMENT PROTECTION of the specifications and the Air Pollution Control Plan.

3.1.2. Structural Practices

3.1.2.1. Temporary Silt Fence

Temporary silt fencing shall be installed along the boundaries of the construction sites as need and the contractor shall show these locations on the drawings prior to beginning land disturbance activities upstream of the silt fencing.

The down slope boundary silt fencing shall be removed only after the project site has been permanently stabilized. Silt fence placed across ditches shall be removed when the grass has matured sufficiently to protect the ditch or swale. Any sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade, prepared and seeded.

3.1.2.2. Temporary Interceptor Ditch and Swale

Any temporary interceptor ditches and swales shall be shown on the drawings and shall be constructed after the temporary sediment trap and prior to beginning any other land disturbance activities upstream of the silt fencing. The interceptor ditch and swale shall be topsoiled and seeded and stabilized with an erosion control blanket.

Any interceptor ditch and swale shall be removed only after the project site(s) has been permanently stabilized. The area shall be restored to existing condition.

3.1.1.3. Storm Drain Inlet Protection

Storm drain inlet protection at existing inlets shall be installed prior to beginning land disturbance activities in the contributing drainage area. Inlet protection at new inlets shall be installed immediately after construction and backfilling of drainage structure.

Storm drain inlet protection structures shall be removed and when the contributing drainage area has been stabilized.

3.1.2.4. Outlet Protection

Permanent preformed scour holes shall be constructed as needed and as soon as possible after construction of storm drain or culvert outlet.

3.1.2.5. Temporary Sediment Trap

Sediment traps shall be constructed prior to beginning any other land disturbance activities upstream of the sediment trap.

The sediment traps shall be removed after the contributing drainage areas have been permanently stabilized. The area shall be restored to its original condition.

3.2. Permanent Storm Water Management

The following measures must be installed during construction to control pollutants in stormwater discharges that occur after construction activity has been completed:

- All disturbed areas of the site are being seeded, sodded, rock mulched or paved.

- Drainage channels are graded at non-erosive slopes.

- The outfall of all storm drains shall consist of a concrete headwall with riprap in order dissipate the energy stormwater discharges and prevent downstream erosion.

3.3. Other Controls

3.3.1. Solid and Hazardous Waste Management

No solid materials, including building materials, shall be discharged to waters-of the United States. Unless otherwise specified, the Contractor shall remove scrap building material, product/material shipping waste, food containers, cups, and any other trash or litter from the site at least once per week. Portable toilets shall be provided at the site for proper disposal of sanitary sewage. The Contractor shall comply with paragraph WASTE DISPOSAL of Section 01410 ENVIRONMENT PROTECTION of the specifications.

3.31 Off-Site Vehicle Tracking

Off-site vehicle tracking of sediments and the generation of dust shall be minimized. A stone construction entrance shall be constructed prior to the beginning of any other land disturbance activities in order to reduce vehicle tracking of sediments. If the action of vehicles traveling over the stone pad is not sufficient to remove the majority of mud from tires, the tires shall be washed before the vehicle leaves the site. If washing is necessary, provisions must be made to intercept the wash water and trap the sediment so it can be collected and stabilized. The entrance shall be removed upon completion of construction activities. The paved street adjacent to the site entrance shall be swept daily to remove any excess mud, dirt, or rock tracked from the site. The use of water trucks to remove materials dropped, washed, or tracked onto roadways will not be permitted under any circumstances.

3.3.3. On-Site Storage of Construction and Waste Material

Construction and waste materials shall be stored away from drainage courses and low areas. See SECTION 02090 for other specific waste storage

requirements. See the Environmental Protection Plan for Spill Control Plan and the Contaminant Prevention Plan.

3.3.4. Other Pollutant Sources

Concrete trucks will not be allowed to discharge drum wash water to ditches or storm drains. Excess concrete and concrete truck wash water shall be disposed of off Government property in accordance with all Federal, State, Regional and Local laws and regulations or shall be discharged into a temporary infiltration/holding basin. Hardened concrete shall be removed from the basin periodically and properly disposed of.

3.3.5. Approved State and Local Plans

There are no applicable State or Local requirements for sediment and erosion site plans or site permits.

4. INSPECTION AND MAINTENANCE

Qualified Contractor personnel shall be responsible for all inspections and maintenance specified below.

4.1. Frequency of Inspections

Disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site, shall be inspected at least once every fourteen (14) calendar days and within 24 hours of the end of a storm event of 0.5 inches or &eater. Additional inspections shall be conducted as specified herein.

Where sites have been finally or temporarily stabilized or runoff is unlikely due to winter conditions (e.g., site is covered with snow, ice, or frozen ground exists), such inspections shall be conducted at least once every month.

4.2. Inspection Reports

A report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, and major observations relating to the implementation of the SWPPP shall be made by the Contractor and retained as part of the SWPPP. Major observations should include: the location(s) of discharges of sediment or other pollutants from the site; location(s) of BMPs that need to be maintained; location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location; and locations(s) where additional BMPs are needed that did not exist at the time of the inspection. The report shall identify any incidents of non-compliance. Where a report does not identify any incidents of non-compliance, the report shall contain a certification that the facility is in compliance with the SWPPP and the NPDES general permit. The Contractor shall sign the report.

4.3. Modification of SWPPP

Based on the results of the inspection, the SWPPP shall be modified by the Government as necessary to include additional or modified Best Management Practices (BMPs) designed to correct problems identified. Revisions to the SWWPPP shall be completed by the Government and provided to the Contractor within 5 calendar days following the inspection. If existing BMPs need to be modified or if additional BMPs are necessary, implementation shall be completed by the Contractor within 7 calendar days of the inspection..

4.4. Inspection and Maintenance Procedures

All erosion and sediment control measures and other protective measures identified herein shall be maintained by the Contractor in effective operating condition. If site inspections identify best management practices that are not operating effectively, maintenance shall be performed by the Contractor within 7 calendar days of the inspection.~

4.4.1. Disturbed Areas and Material Storage Areas

Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system.

4.4.2. Temporary Seeding

Seeded areas should be inspected frequently. Areas with failures must be repaired and reseeded within the planting season.

4.4.3. Mulching

Inspect mulched areas frequently and reapply mulch when necessary.

4.4.4. Erosion Control Blanket

Re-anchor loosened matting and staples as required.

4.4.5. Permanent Seeding and Planting

Seeded areas should be inspected frequently. Areas with failures must be repaired and reseeded within the planting season.

4.4.6. Sod Stabilization

Inspect the sod frequently after it is first installed, especially after large storm events, until it is established as permanent cover. Remove and replace dead sod.

4.4.7. Silt Fence

Silt fences shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately. Close attention shall be paid to the repair of damaged silt fencing resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-third the height of the barrier.

4.4.8. Storm Drain Inlet Protection

The structures shall be inspected after each rain and repairs made as needed. Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one-third of the design depth of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode.

4.4.9. Outlet Protection

Inspection shall be performed after high flows for scour and dislodged stones. Repairs shall be made immediately.

4.4.10. Temporary Sediment Trap

Sediment traps should be inspected after each runoff-producing storm event. The Contractor shall remove sediment and the trap restored to its original dimensions when the sediment has accumulated to one half the design volume of the wet storage. Sediment removal from the trap shall be deposited in a suitable area and in such a manner that it will not erode and cause sedimentation problems. Filter stone shall be regularly checked to ensure that filtration performance is maintained. Stone choked with sediment shall be removed and cleaned or replaced. The structure should be checked regularly to ensure that it is structurally sound and has not been damaged by erosion or construction equipment. The height of the stone outlet should be checked to ensure that it's center is at least I foot below the top of the embankment.

4.4.11. Discharge or Downstream Locations

Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts toreceiving waters. Where discharge locations are inaccessible, nearby downstream locations shall be inspected to the "tent that such inspections are practicable.

4.4.12. Vehicle Entrance/Exit Locations

Locations where vehicles enter or exit the site shall be inspected for evidence of offsite sediment tracking. The entrance shall be maintained in a condition which will prevent tracking or flow of mud onto adjacent roads and streets. This may require periodic top dressing with additional stone or the washing and reworking of existing stone as conditions demand and repair and/or cleanout of any structures used to trap sediment.

5. NON-STORM WATER DISCHARGES

The following non-storm water discharges are anticipated to occur during the construction period:

- fire hydrant flushings
- waters used to wash vehicles where detergents are not used
- water used to control dust in accordance with the Air Pollution Control Plan
- potable water sources including waterline flushings
- routine external building wash down which does not use detergents
- pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless spilled material has been removed) and where detergents are not used
- air conditioning concentrate
- uncontaminated ground water or spring water
- foundation or footing drains where flows are not contaminated with process materials such as solvents.

SECTION 01410

ENVIRONMENTAL PROTECTION AND EROSION CONTROL

PART 1 GENERAL

1.1 SCOPE

This section covers protection of the environment, including control of erosion and prevention of environmental pollution and damage due to construction operations.

1.1.1 Environmental Pollution and Damage

Environmental pollution and damage is defined herein as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

1.1.2 Erosion Control

Erosion control is defined herein as that portion of the environmental protection effort that addresses the prevention of soil erosion and the control of sediments.

1.2 QUALITY CONTROL

The Contractor shall establish and maintain quality control for environmental protection of all provisions herein. The Contractor shall record on daily reports any problems in complying with laws, regulations and ordinances, and the corrective action taken.

1.3 PERMITS OBTAINED BY THE CORPS OF ENGINEERS

The Contractor shall comply with all requirements under the terms and conditions set out in any permit obtained by the Corps of Engineers.

1.4 SUBMITTALS

Government review for conformance with the RFP is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Environmental Protection Plan; G-RE

Not later than twenty (20) days after receipt of Notice to proceed, the Contractor shall submit in writing an Environmental Protection Plan containing erosion control considerations and other provisions for protection of the environment. Review of the Contractor's Plan will not relieve the Contractor of his responsibility for adequate and continuing control of pollutants and other environmental protection measures. The Plan shall include, but not be limited to, the following:

a. A list of Federal, State and local laws, regulations, and permits concerning environmental protection, pollution control and abatement

that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations and permits.

b. Methods for protection of features to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection, i.e., trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, archeological and cultural resources.

c. Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations. The Contractor shall set out the procedures to be followed to correct erosion and pollution of the environment due to accident, natural causes or failure to follow the procedures set out in accordance with the environmental protection plan.

d. Permit or license and the location of the solid waste disposal area.

e. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials; in addition, an overall drawing showing the plan for temporary control of erosion.

f. Environmental monitoring plans for the job site, including land, water, air, noise, and soil erosion monitoring.

g. Traffic control plan.

h. Methods of protecting surface and ground water during construction activities.

i. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. The plan shall include measures for marking the limits of use areas.

j. Plan of borrow area(s)

k. Additional items to be included in the submittal include silt fences to control soil in runoff, description of BMPs to be used, how the disturbed area will be protected from erosion, locations where the BMPs will be installed, a description of the types of temporary and permanent non-structural BMPs that will be used. Update as appropriate during construction.

1.5 SUBCONTRACTORS

Assurance of compliance with this section by subcontractors is the responsibility of the Contractor.

1.6 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with the aforementioned Federal, State or local laws or regulations, permits and other elements of the Contractor's environmental protection Plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted, nor costs or damages be allowed the Contractor, for any such suspension.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 PROTECTION OF ENVIRONMENTAL RESOURCES

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine his activities to areas defined by the drawings and specifications. Environmental protection shall be as stated in the following subparagraphs.

3.1.1 Protection of Land Resources

Prior to the beginning of any construction, the Contractor shall identify all land resources to be preserved within the Contractor's work area. The Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without special permission from the Contracting Officer. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such special emergency use is permitted, the Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs.

3.1.1.1 Work Area Limits

In order to minimize damages and unnecessary construction traffic, the Contractor shall, prior to the start of construction, mark the areas that are not necessary to accomplish the work. Isolated areas within the general work area which are to be saved and protected shall also be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible. The Contractor shall convey to his personnel the purpose of the marking and the need to protect all objects.

3.1.1.2 Protection of Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques.

3.1.1.3 Reduction of Exposure of Unprotected Erodible Soils

Earthwork brought to final grade shall be finished as indicated and specified. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. Except in instances where the constructed feature obscures borrow areas, quarries and waste material areas, these areas shall not initially be cleared in total. Clearing of such areas shall progress in reasonably sized increments as needed to use the areas developed as approved by the Contracting Officer.

3.1.1.4 Temporary Protection of Disturbed Areas

Such methods as necessary shall be utilized to effectively prevent erosion and to control sedimentation, including but not limited to retardation and control of runoff. Runoff from the construction site shall be controlled by construction of diversion ditches, benches, and berms to retard and divert runoff to protected drainage courses, and any measures required by area-wide plans approved under paragraph 208 of the Clean Water Act.

3.1.1.5 Erosion and Sedimentation Control Devices

Prior to any earth disturbance, the Contractor shall have in place applicable temporary soil erosion and sedimentation control features. The Contractor shall construct or install all temporary and permanent erosion and sedimentation control features as indicated in the Environmental Protection Plan. Temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing and mulching shall be maintained until permanent drainage and erosion control facilities are completed and operative.

3.1.1.6 Location of Field Offices, Storage and Other Contractor Facilities

The Contractors' field offices, stage areas, stockpiles storage, and temporary buildings shall be placed in areas designated on the drawings. Temporary movement or relocation of Contractor facilities shall be made only on approval by the Contracting Officer.

3.1.1.7 Borrow Areas on Government Property

Borrow areas on Government property shall be managed to minimize erosion and to prevent sediment from entering nearby water courses or lakes.

3.1.1.8 Spoil Areas on Government Property

Spoil areas on Government property, if any, shall be managed and controlled to limit spoil to areas designated on the drawings and prevent erosion of soil or sediment from entering nearby water courses or lakes. Spoil areas shall be developed in accordance with the grading plan indicated on the drawings.

3.1.1.9 Temporary Excavations and Embankments

Temporary excavations and embankments for plant and/or work areas shall be controlled to protect adjacent areas from despoilment.

3.1.1.10 Disposal of Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers which are emptied on a regular schedule. All handling and disposal shall be conducted to prevent contamination.

3.1.1.10.1 Disposal of Solid Waste by Removal from Government Property

The Contractor shall transport all solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal.

3.1.1.11 Disposal of Chemical Waste

Chemical waste shall be stored in corrosion resistant containers, removed from the work area and disposed of in accordance with Federal, State and local regulations.

3.1.1.12 Disposal of Discarded Materials

Discarded materials other than those which can be included in the solid waste category will be handled as directed by the Contracting Officer.

3.2 PRESERVATION AND RECOVERY OF HISTORICAL, ARCHEOLOGICAL AND CULTURAL RESOURCES

Existing historical, archeological and cultural resources within the Contractor's work area will be so designated by the Contracting Officer and precautions taken to preserve all such resources as they existed at the time they were pointed out to the Contractor. The Contractor shall install all

protection for these resources and shall be responsible for their preservation during this contract. If during construction activities the Contractor observes unusual items that might have historical or archeological value, such observations shall be reported as soon as practicable to the Contracting Officer. Recording and preservation of historical and archeological finds during construction activities are specified in Special Clauses.

3.3 PROTECTION OF WATER RESOURCES

The Contractor shall keep construction activities under surveillance, management and control to avoid pollution of surface and ground waters. Special management techniques as set out below shall be implemented to control water pollution by the listed construction activities which are included in this contract.

3.3.1 Washing and Curing Water

Waste waters directly derived from construction activities shall not be allowed to enter water areas. These waste waters shall be collected and placed in retention ponds where suspended material can be settled out or the water evaporates so that pollutants are separated from the water.

3.3.2 Stream Crossings

Stream crossings, if required, shall be controlled during construction. Crossings shall provide movement of materials or equipment which do not violate water pollution control standards of the Federal, State or local government.

3.3.3 Monitoring of Water Areas Affected by Construction Activities

Monitoring of water areas affected by construction activities shall be the responsibility of the Contractor. All water areas affected by construction activities shall be monitored by the Contractor.

3.4 PROTECTION OF FISH AND WILDLIFE RESOURCES

The Contractor shall keep construction activities under surveillance, management and control to minimize interference with, disturbance to and damage of fish and wildlife. Species that require specific attention along with measures for their protection will be listed by the Contractor prior to beginning of construction operations.

3.5 PROTECTION OF AIR RESOURCES

The Contractor shall keep construction activities under surveillance, management and control to minimize pollution of air resources. All activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with all State and Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained for these construction operations and activities specified in this section. Special management techniques as set out below shall be implemented to control air pollution by the construction activities which are included in the contract.

3.5.1 Particulates

Dust particles, aerosols, and gaseous by-products from all construction activities, processing and preparation of materials, such as from asphaltic batch plants, shall be controlled at all times, including weekends, holidays and hours when work is not in progress.

3.5.1.1 Particulates Control

The Contractor shall maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause the air pollution standards mentioned in paragraph PROTECTION OF AIR RESOURCES to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated at such intervals as to keep the disturbed area damp at all times. The Contractor must have sufficient competent equipment available to accomplish this task. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs.

3.5.2 Hydrocarbons and Carbon Monoxide

Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits at all times.

3.5.3 Odors

Odors shall be controlled at all times for all construction activities, processing and preparation of materials.

3.5.4 Monitoring of Air Quality

Monitoring of air quality shall be the responsibility of the Contractor. All air areas affected by the construction activities shall be monitored by the Contractor.

3.5.5 Protection of Sound Intrusions

The Contractor shall keep construction activities under surveillance, and control to minimize damage to the environment by noise. The Contractor shall use methods and devices to control noise emitted by equipment.

3.6 POST-CONSTRUCTION CLEAN UP

The Contractor shall clean up area(s) used for construction.

3.7 RESTORATION OF LANDSCAPE DAMAGE

The Contractor shall restore all landscape features damaged or destroyed during construction operations outside the limits of the approved work areas. Such restoration shall be in accordance with the plan submitted for review by the Contracting Officer. This work will be accomplished at the Contractor's expense.

3.8 MAINTENANCE OF POLLUTION CONTROL FACILITIES

The Contractor shall maintain all constructed facilities and portable pollution control devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.9 TRAINING OF CONTRACTOR PERSONNEL IN POLLUTION CONTROL

The Contractor shall train his personnel in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of facilities (vegetative covers, and instruments required for monitoring purposes) to ensure adequate and continuous environmental pollution control.

3.10 PAYMENT

No separate payment or direct payment will be made for the cost of the work covered under this section, and such work will be considered as a subsidiary obligation of the Contractor.

-- End of Section --

SECTION 01450
TESTING FOR MECHANICAL AND ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 APPLICABILITY

This section applies to all mechanical and electrical systems and all systems using electro magnetically driven equipment, or electronic systems; and high and low voltage electrical distribution systems (except branch panels). For purposes of this section a system is an entity comprised of a series of closely related interdependent components and which is capable of independent performance of a useful function. System components shall include all software and programming as applicable for the system. Some typical examples include:

1.1.1 Independently functioning HVAC systems.

1.1.2 Alarms.

1.1.3 Furnace and Air Conditioning Condenser.

1.1.4 Electrical equipment including cable, splices, switchgear, relays, circuit breakers, fuses, transformers, instrumentation, etc.

1.2 SUBMITTALS

1.2.1 Test Plan List, G-RE.

No later than sixty calendar days after Notice to Proceed, in accordance with section: Submittal Procedures, and other requirements of the technical provisions, the Contractor shall submit a list for review consisting of all systems for which test plans are required. This list will be reviewed by the Government and any systems found to be missing will be required to be added by the Contractor and appropriate test plans submitted. No work will be permitted on any of the above systems until this list is submitted.

1.2.2 Test Plans, G-RE.

Test plans shall be submitted for review for all systems contained on the list submitted as required above. Test plans should be submitted as soon as possible so that the progress of the project and corresponding payments will proceed on schedule.

1.2.3 Operational Test Certifies, G-RE.

PART 2 PRODUCTS (Not applicable)

PART 3 EXECUTION

3.1 TEST PLAN

3.1.1 Test Plans and operational Testing

The Contractor shall develop test plans and schedule operational testing for the systems in the approved list. The testing shall be in accordance with the requirements in the appropriate technical provisions and shall include as a

minimum the requirements below. All testing required by applicable codes, standards, manufacturers, suppliers, etc., shall be incorporated into the Contractor’s test plans. Test plans shall list all equipment required to perform the tests and any Government support required. It shall be in sufficient detail to permit a step-by-step approach to the test and to demonstrate that each system operates as intended by the contract documents it shall describe as a minimum:

3.1.1.1 What system is being tested, including a listing of all components to be tested?

3.1.1.2 What individual or organization will perform the testing, who will certify the test and qualifications of test personnel?

3.1-1.3 A step by step narrative of testing procedures to be used to demonstrate contract compliance, including all governing standards, such as, sequence of controls," 11ASTM Standard XXX; 11 or, IEEE Standard XXX, 11 etc.

3.1-1.4 What testing equipment will be utilized?

3.1.1.5 What operator interaction is required?

3.1.1.6 What results are to be expected?

3.1.1.7 Seasonal limitations, if any, including date(s) of proposed testing.

3.1.1.8 A complete schematic diagram (electrical and/or pneumatic, as appropriate) showing all components, and block diagram.

3.1.1.9 A checklist to be used during the operational test.

3.1.2 Testing Process

Outlined below are a number of events related to the status of the test plan and testing. The corresponding percentages indicate the maximum percentage of the value of the system that will be permitted to be installed after the successful completion of the corresponding event indicated for all systems to which this section applies. Events must be completed sequentially. Any work performed in excess of the permitted percentages will be at the Contractor's own risk and will not be paid until the event corresponding to the percentage of system value permitted to be installed is successfully completed.

EVENT	**MAX % OF SYSTEM VALUE ** PERMITTED TO BE INSTALLED**
3.1.2.1. Contractor has submitted list of systems that require test plans to be reviewed and system work is ongoing but no test plan has been submitted.	**50**
3.1.2.2. Test plan submitted	**65**
3.1.2.3. * Test plan approved	**80**
3.1.2.4. Successful completion of test including submission of required documents reports (i.e. balancing reports for all HVAC systems), operations and maintenance manuals, spare parts, and spare parts data.	**100**

* The Government will process the submittal in accordance with the time frames indicated in specification: Submittal Procedures. If the test plan is unacceptable and not in compliance with the requirements of the RFP, the Government will have an additional 30 days to review the resubmittal from the date it receives the document.

** If a system involves both heating and cooling modes and one mode has been successfully tested, this percentage shall be reduced to 90% until the testing is completed on both modes. The contractor may proceed with events as indicated.

3.1.3 Operational Tests

Operational tests, including performance tests, shall be conducted for an entire system, not component parts only. Tests may be conducted only after an entire system has been completely installed. Contractor shall provide a minimum of 14-calendar day’s notice to the Contracting Officer of scheduled tests. This notice must include the Contractor's assurance that all installed work previously identified to the Contractor as being unacceptable, along with all remaining work associated with the respective system, shall be completed and acceptable by the date scheduled for the operational test. Failure of the Contractor to have all contract work acceptably complete for this test will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection costs, if any.

3.2 CERTIFICATION OF OPERATION TESTS

For each system test, the Contractor shall obtain the services of an experienced professional who shall certify that the operational test was conducted in accordance with the approved test plan and the results of this test meet all the contract requirements. These individuals must have a minimum of eight (8) years experience in the testing of particular system being tested and shall also meet qualifications (if any) set forth in other technical sections of the contract specifications.

3.3 COMPONENTS IN SYSTEM FOR PAYMENT PURPOSES

When considering the value of a system for payment purposes, the following components shall be counted as part of a system.

3.3.1 All electro magnetically driven equipment

3.3.2 Gauges, dampers, valves, actuators, controllers, pipes, test sensing elements, logic/processors, CPUs, ducts, insulation, wiring, conduit, switchgear,etc.

3.3.4 All other mechanical or electrical components, devices or equipment which are essential to the proper function of the system such as pumps, motors, furnaces, condensers, heat pumps, etc.

3.3.5 Software programs and any refrigerants are also considered "parts" of a system.

3.4 CONFLICTS IN REQUIREMENTS

The Contractor shall comply with the requirements contained in this section supplement and other testing requirements contained in the RFP contract

documents. If a conflict exists between the requirements of this section and other parts of the contract documents, the requirements of this section shall take precedence.

---End of Section ---

SECTION 01451

CONTRACTOR QUALITY CONTROL
07/93

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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(1992) Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(1990) Use in the Evaluation of Testing and Inspection Agencies as Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause entitled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both on-site and off-site, and shall be keyed to the proposed construction sequence.

3.2 QUALITY CONTROL PLAN

3.2.1 General

The Contractor shall furnish for Governmental review with his technical proposal a Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause entitled "Inspection of Construction."

The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. The Government will use the plan submitted with his technical proposal for the first 30 days of operation. The Contractor will not be permitted to begin work until a revised CQC plan has been reviewed and all comments have been incorporated. The Contractor will only be permitted to begin construction work after acceptance of the CQC Plan applicable to the particular feature of work. Work outside of the features of work included in his RFP proposal will not be permitted to begin until acceptance of a revised CQC Plan containing the additional features of work to be started.

3.2.2 Content of the CQC Plan

The CQC plan shall include, as a minimum, the following to cover all construction operations, both on-site and off-site, including work by subcontractors, fabricators, suppliers, and purchasing agents:

3.2.2.1 A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC system manager who shall report to the project manager or someone higher in the Contractor's organization. Project manager in this context shall mean the individual with responsibility for the overall management of the project including quality and production.

3.2.2.2 The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

3.2.2.3 A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters will also be furnished to the Government.

3.2.2.4 Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, off-site fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.

3.2.2.5 Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities will be approved by the Contracting Officer.)

3.2.2.6 Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

3.2.2.7 Procedures for tracking construction deficiencies from identification

through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.

3.2.2.8 Reporting procedures, including proposed reporting formats.

3.2.2.8 A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. It could be identified by different trades or disciplines, or it could be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4 Notification of Changes

After acceptance of the QC plan, the Contractor shall notify the Contracting Officer in writing a minimum of seven calendar days prior to any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the Quality Control Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both on-site and off-site work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

The Contractor shall identify an individual within his organization at the worksite who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. This CQC System Manager shall be on the site at all times during construction and will be

employed by the Contractor, except as noted in the following. An alternate for the CQC System Manager will be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate will be the same as for the designated CQC Manager.

3.4.1 CQC Organizational Staffing

The Contractor shall provide a CQC staff which shall be at the worksite at all times during progress, with complete authority to take any action necessary to ensure compliance with the contract.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a construction person with a minimum of five years in related work. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 Additional Requirement

In addition to the above experience and education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management For Contractors". If the Contractor needs this training, training will be provided by Government personnel after award of a contract.

3.4.4 Organizational Changes

The Contractor shall obtain Contracting Officer's acceptance before replacing any member of the CQC staff. Requests shall include the names, qualifications, duties, and responsibilities of each proposed replacement.

3.5 SUBMITTALS

Submittals shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

3.6 CONTROL

The controls shall include at least three phases of control to be conducted by the CQC System Manager for all definable features of work, as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work and shall include:

a. A review of each paragraph of applicable specifications.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. A check to assure that provisions have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for constructing the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that phase of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. The Government shall be notified at least 48 hours in advance of beginning any of the required action of the preparatory phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of preliminary work to ensure that it is in compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verification of full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with sample panels is appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work on-site, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon or conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

As determined by the Government, additional preparatory and initial phases may be conducted on the same definable features of work if the quality of on-going work is unacceptable, if there are changes in the applicable CQC staff, on-site production supervision or work crew, if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number

system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, will be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an off-site or commercial test facility will be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of $3,830 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 On-Site Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials will be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Corps of Engineers Division Laboratory, f.o.b., at the following address:

For delivery by mail:

USACE Research and Development Center
ATTN: Joe Tom, CEERD-SC-E
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

For other deliveries: Same as above.

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Contractor's Quality Control Completion Inspection

Based upon the Contracting Officer's concurrence that the work is nearing substantial completion, and at least 14 days prior to pre-final inspection, the Contractor's Quality Control Inspection personnel shall conduct a detailed inspection. The Contracting Officer's Representative shall be notified of the inspection date in order that he/she may participate, if he/she so elects. The work shall be inspected for conformance to plans, specifications, quality, workmanship, and completeness. The Contractor shall prepare an itemized list of work not properly completed, inferior workmanship, or not conforming to plans and specifications. The list shall also include outstanding administrative items such as as-built drawings, O&M Manuals, and spare parts. The list shall be included in the Quality Control documentation and submitted to the Contracting Officer with an estimated date for correction of each deficiency within five (5) working days after conducting the inspection.

3.8.2 Pre-Final Inspection

The Contractor's Quality Control Inspection personnel, Designer of Record, superintendent, other primary management person, and the Contracting Officer's representatives will be in attendance at this inspection. Additional Government personnel, including but not limited to those from the Directorate of Installation Support (DIS), user groups and major commands may be in attendance. The pre-final inspection will be formally scheduled by the Contracting Officer based upon notice from the Contractor. This notice will be given to the Contracting Officer at least 14 days prior to the pre-final inspection and must include the Contractor' assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining contract work, will be complete and acceptable by the date scheduled for the pre-final inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection costs in accordance with the contract clause titled "Inspection of Construction". At this inspection the Contracting Officer will develop a specific list of incomplete and/or unacceptable work performed under the contract and will subsequently furnish this list to the Contractor. Failure of the Contracting Officer to detect and list all incomplete and/or unacceptable work during this inspection will not relieve the Contractor from acceptably performing all work required by the contract documents.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, Designer of Record, superintendent, other primary management person, and the Contracting Officer's representative will be in attendance at this inspection.

Additional Government personnel including, but not limited to, those from the Directorate of Installation Support (DIS), use groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon notice from the Contractor. This notice will be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and must include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection costs in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals reviewed, with contract reference, by whom, and action taken.

g. Off-site surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 24 hours after the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every seven days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the worksite, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

3.11 IMPLEMENTATION OF GOVERNMENT RESIDENT MANAGEMENT SYSTEM FOR CONTRACTOR QUALITY CONTROL OF CONTRACT:

3.11.1 Government-Furnished CQC Programming Module

The Contractor shall utilize a Government-furnished CQC Programming Module (a computerized executable file which is Windows based and operates on a minimum of 200 MHz Pentium IBM compatible computers). Note: A Hewlett-Packard LaserJet 4 printer (or better) is required to print the reports from this program. The Module includes a Daily CQC Reporting System form which must also be used. This form may be in addition to other Contractor desired reporting forms. However, all other such reporting forms shall be consolidated into this one Government-specified Daily CQC Report Form. The Contractor will also be required to complete Government-Furnished Module elements which include, but are not limited to, Prime Contractor staffing; letter-codes; planned cumulative progress earnings; subcontractor information showing trade, name, address, point of contact, and insurance expiration dates; definable features of work; pay activity and activity information; required Quality Control tests tied to individual activities; planned User Schooling tied to specific specification paragraphs and contractor activities; Installed Property Listing; Transfer Property Listing; and submittal information relating to specification section, description, activity number, review period and expected procurement period. The sum of all activity values shall equal the contract amount, and all Bid Items, Options and Additives (if applicable) shall be separately identified, in accordance with the "Bid Schedule". Bid Items may include multiple

activities, but activities may only be assigned to one such Bid Item. This Module shall be completed to the satisfaction of the Contracting Officer prior to any contract payment (except for Bonds, Insurance and/or Mobilization, as approved by the Contracting Officer) and shall be updated as required.

3.11.2 Quality Assurance Comments

During the course of the contract, the Contractor will receive various Quality Assurance comments from the Government that will reflect corrections needed to Contractor activities or reflect outstanding or future items needing the attention of the Contractor. The Contractor will acknowledge receipt of these comments by specific number reference on his Daily CQC Report, and will also reflect on his Daily CQC Report when these items are specifically completed or corrected to permit Government verification.

3.11.3 Contractor's Scheduling System

The Contractor's scheduling system shall include, as specific and separate activities, all Preparatory Phase Meetings (inspections); all O&M Manuals; and all Test Plans of electrical and mechanical equipment or systems that require validation testing or instructions to Government representatives.

4.1 Prototype Housing Units.

The purpose of the prototype housing unit is to verify the details of the approved design and material selections, and to establish the quality level against which the remaining work will be judged. At the plant, or at the site, construction connection details shall be exposed for study by authorized Government inspectors for a period of time agreed to by the Contractor and the Contracting Officer. The housing unit or units at the plant and/or the prototype at the site are subject to Contracting Officer's approval. At the site, the complete prototype shall be constructed for each housing unit type. Each stage of work shall be completed and accepted on the prototype prior to starting work on the same stage for similar housing units in the project. The stages are; foundations, framing, rough-in, and finishes.

At each phase of acceptance a final inspection will be made of each prototype constructed. The Contractor's Quality Control Inspection personnel and superintendent, Design Project Manager, all Designers of Record or other primary management person, and the Contracting Officer's representatives will be in attendance at this inspection. Additional Government personnel, including but not limited to those from Base/Post Civil/Facility Engineer, user groups and major commands may be in attendance. The final inspection will be formally scheduled by the Contracting Officer based upon notice from the Contractor. This notice will be given to the Contracting Officer at least 14 days prior to the final inspection.

4.1.1 "Site-Built or stick built."

The Offeror shall construct prototypes of one (1) three bedroom residence and one (1) four bedroom residence. Prototypes of the accessible units are not required. These prototypes shall be remain in the “rough in” stage (no interior finishes), providing visual access to all utility systems and framing. The exterior of both prototype units shall be completed to protect and secure these structures. The interior finishes shall not be installed until all remaining residences are completed and accepted by the

Government. When the last new units are constructed, these “rough in” stage prototype units shall be completed and turned over to the Government with the last turn-over group.

4.1.2 "Manufactured" or "Factory-Built."

A prototype housing unit shall be required for each housing unit type of each run fabricated at the plant for manufactured or factory-built homes. The Offeror shall construct factory prototypes of one (1) three bedroom residence and one (1) four bedroom residence, assembled at the factory from transportable structure, modules, or panelized building sections.

4.1.2.1 Manufactured.

If the housing units are classified as manufactured housing, all interior and exterior systems which form integral parts of the transportable module shall be constructed and assembled for inspection by the Government. This shall include, as a minimum, wall and ceiling construction, interior finishes, utility piping, wiring, and ductwork fastening and assembling of adjacent modules, connection details to sinks, installed kitchen cabinets and countertops. Portions of the work shall be left unfinished or exposed to demonstrate interior construction details.

4.1.2.2 Factory-Built.

If the housing units are classified as factory-built housing, all wall panels which are fabricated in the plant for shipment to the site shall have prototype units constructed and assembled for in-plant inspection by the Government. This shall include, as a minimum, wall framing, roof and ceiling framing, connection details, utility piping, wiring and ductwork, interior and exterior wall finishes which form part of the factory-built wall. In addition, the Contractor shall construct as part of the factory-built prototype, installed samples of wall insulation, finished siding (if not part of wall assembly), sample installed bathtub and sink and installed kitchen sink and cabinets to demonstrate proper installation and wall connections. Portions of the work shall be left unfinished or exposed to demonstrate interior construction details.

a. Prototypes of each transportable structure, module or panelized building section will be constructed at the factory. These prototypes will remain in the rough-in stage (no interior finishes) to allow visual inspection and approval by the COR. Approved prototype structures, modules or sections will then be assembled at the factory to allow COR inspection and approval of all connections, details, and construction. Upon receipt of COR approval, the manufacturer will install samples of wall insulation, exterior siding, gypsum board walls and ceilings, interior trim, receptacles, switches, light fixtures, windows, doors, kitchen and bathroom cabinetry, sinks, faucet, ceramic tile, bathtubs, and shower stalls. However, portions of the work will remain unfinished to allow visual comparisons with modules or sections on the production line. The approved prototype residences will remain at the factory until the manufacturing processes for all structures, modules or sections are completed. Additional structures, modules or sections may not be manufactured until the factory prototypes have been approved by the COR in their entirety.

b. Upon COR acceptance of the factory prototype residences, the manufacturer will be allowed to begin full-scale production runs for all structures, modules or sections, including installation of interior and exterior finishes. The successful Offeror must ensure that structures, modules or sections are not be shipped until foundations are ready to receive them.

c. Once the transportable structures, modules or sections are shipped to the site, they will be permanently assembled, anchored in place,

utilities connected, and exterior finishes completed as quickly as possible to protect and secure the structure.

4.1.3.3 One Floor Prototype.

If only one floor of the prototype is manufactured or factory-built, factory assembly of the manufactured or factory-built portion of the prototype is required. In all cases, the factory prototype shall consist of one of each building type. The factory prototype shall be assembled to verify assembly connections, details, construction, and transportation of the finished housing unit.

4.1.2.4 Structural Integrity.

Manufactured and factory-built homes shall be of individual housing units attached to one another in a manner which shall provide a finished structural assembly having an appearance and structural integrity comparable to a site-built single or multi-family residence built to applicable codes.

4.1.4.3 Construction Tolerances.

Assembled housing units shall be true and plumb and all within specified construction tolerances for all alignments specified and/or shown in the RFP. Adjacent walls shall be attached at roof and floor levels in such a manner as to preclude placing any wood member in cross-grain bending or cross-grain tension, and to avoid putting nails in withdrawal.

- - End of Section - -

SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

1.1 GENERAL REQUIREMENTS

1.1.1 Site Plan

The Contractor shall prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area, and details of the fence installation. Any areas that may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

1.1.2 Identification of Employee

The Contractor shall be responsible for furnishing to each employee, and for requiring each employee engaged on the work to display, identification as approved and directed by the Contracting Officer. Prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon release of any employee. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works. Also see SECTION 01100 General Requirements

1.1.3 Employee Parking

Contractor employees shall park privately owned vehicles within the confines of the construction boundary lines as shown on the contract drawings. Contractor employees' parking is not allowed on existing streets nor shall it interfere with existing and established parking requirements of the military installation.

1.2 AVAILABILITY AND USE OF UTILITY SERVICES

1.2.1 Payment for Utility Services

The Contractor shall enter into a utility agreement with the installation. The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies. The Installation will read the meter and bill the Contractor monthly for utilities used. The amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to the Government.

1.2.2 Meters and Temporary Connections

The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall provide and maintain necessary temporary connections, distribution lines, meters and meter bases required to measure the amount of each utility used by the Contractor. The Contractor shall notify the Contracting Officer, in writing, 5 working days before final electrical connection is desired so that a utilities contact can be established. The Government will make the final hot connection after inspection and approval of the Contractor's temporary wiring installation.

The Contractor shall not make the final electrical connection. At the end of the contract all temporary meters installed will become the property of the Government.

1.2.3 Advance Deposit

An advance deposit for utilities consisting of an estimated month's usage or a minimum of $50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed to the Contractor prior to the end of the current fiscal year.

1.2.4 Final Meter Reading

Before completion of the work and final acceptance of the work by the Government, the Contractor shall notify the Contracting Officer, in writing, 5 working days before termination is desired. The Government will take a final meter reading and disconnect service. All temporary meters will be turned over to the DIS upon removal. The Contractor shall then remove all the temporary distribution lines, meters and meter bases, and associated paraphernalia. The Contractor shall pay all outstanding utility bills before final acceptance of the work by the Government.

1.2.5 Sanitation

The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

1.2.6 Telephone

The Contractor shall make arrangements and pay all costs for telephone facilities desired.

1.3 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.3.1 Bulletin Board

Immediately upon beginning of work, the Contractor shall provide a weatherproof glass-covered bulletin board not less than 915 by 1220 mm (36 by 48 inches) in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the Contractor.

1.3.2 Project and Safety Signs

The requirements for the signs, their content, and location shall be as shown on the drawings. The signs shall be erected within 15 days after receipt of the notice to proceed. The data required by the safety sign

shall be corrected daily, with light colored metallic or non-metallic numerals. Upon completion of the project, the signs shall be removed from the site.

1.4 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

1.4.1 Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the Contracting Officer shall be removed.

1.4.2 Barricades

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.5 CONTRACTOR’S TEMPORARY FACILITIES

1.5.1 Administrative Field Offices

The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

1.5.2 Storage Area.

Fencing of materials or equipment will not be required at this site; however, the Contractor shall be responsible for cleanliness and orderliness of the area used, and for the security of any material or equipment stored in this area.

1.5.3 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but shall be within the military boundaries. Fencing of materials or equipment will not be required at this site; however, utilities will not be provided to this area by the Government.

1.5.4 Appearance of Trailers

Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers, which, in the opinion of the Contracting Officer, require exterior painting or maintenance, will not be allowed on the military property.

1.5.5 Maintenance of Construction Staging and Storage Area

Perimeter construction fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

1.5.6 New Building

In the event a new building is constructed for the temporary project field office, it shall be a minimum 3.6 m (12 feet) in width, 5 m (16 feet) in length and have a minimum of 2.1 m (7 feet) headroom. It shall be equipped with approved electrical wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. It shall be provided with a worktable with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building shall be waterproof, shall be supplied with heater, shall have a minimum of two doors, electric lights, a telephone, a battery operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Approved sanitary facilities shall be furnished. The windows and doors shall be screened and the doors provided with dead bolt type locking devices or a padlock and heavy-duty hasp bolted to the door. Door hinge pins shall be non-removable. The windows shall be arranged to open and to be securely fastened from the inside. Glass panels in windows shall be protected by bars or heavy mesh screens to prevent easy access to the

building through these panels. In warm weather, air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 11 degrees C (20 degrees F) below the outside temperature when the outside temperature is 35 degrees C (95 degrees F), shall be furnished. Any new building erected for a temporary field office shall be maintained by the Contractor during the life of the contract and upon completion and acceptance of the work shall become the property of the Contractor and shall be removed from the site. All charges for telephone service for the temporary field office shall be borne by the Contractor, including all long distance charges.

1.5.7 Security Provisions

Adequate outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

1.6 GOVERNMENT FIELD OFFICE

1.6.1 ACCOMMODATIONS FOR GOVERNMENT INSPECTORS

The Contractor shall furnish a temporary office facility approximately 12 feet by 70 feet with a minimum of 840 square feet of floor space. It shall be located where directed and shall be reserved for Government personnel only. Drinking water facilities, adequate lighting, local commercial telephone service, air-conditioning, heating equipment, and a toilet room with water closet and lavatory with sewage facilities shall be furnished and maintained by the Contractor. The office shall be furnished with the following:

- two lockable offices
- center conference area with conference table and chairs for ten people
- four separate phone lines (local calls) answerable at both offices; one line for fax machine, one for computer connectivity to district LAN, and two lines for voice communications.
- four legal-size filing cabinets (4-drawer each)
- four desks
- four office chairs
- one copy machine, 11 x 17 capable, with automatic document feed
- three telephones
- one answering machine
- one fax machine
- four plan holders
- **three Personnel computers with the following specifications:**
  - Intel Pentium III 550MHz Processor (512K L2 cache)
  - 4 - PCI SLOTS 3 - ISA SLOTS
  - 128MB 100 MHz SDRAM (1DIMM)
  - Tower Case
  - 1.44MG 3.5” Floppy Drive
  - 13.6 GB ATA-33 Hard Drive (7200 RPM)
  - 40X Var. Speed Internal IDE CD-ROM drive
  - 16MB Diamond Stealth S540 2X/4X AGP Card
  - 17” .26mm 1280x1024 Flat Screen N/I Monitor
  - 128-voice PCI wavetable onboard sound

104 Key Enhanced Keyboard
MS Windows 98 on CD-ROM
MS Office Pro 2000 on CD-ROM
3 button PS/2 Mouse & Mouse Pad
PCMCIA Dual Slot Reader, any two Type I-IV Cards
100 MB Zip Drive
Stereo Speakers, shielded 15W (60Watt PMPO)
3COM 3C509C 10/100 PCI Network Card (Rev 5.2)
Three Year Limited Parts and Labor Depot Warranty
First Year On-Site Warranty
FCC Certified, Novell Certified, Windows NT Certified, Year 2000 Compliant
Energy Star Compliant
Free Freight - FOB Destination

- one laser printer, an HP LaserJet 4000 or equivalent
- two copies of the NAS scheduling software that the contractor intends to use to manage the project
- provide a maintenance service contract for all computers, printers, fax machine, and copier for the duration of the project
- provide a DSUCSU router, 10-port hub and server (as specified above) to establish connectivity to the Kansas City District's local area network.

Used furniture, in good condition, will be acceptable. Entrance doors shall be equipped with a substantial lock. The Contractor shall provide janitor service, fuel for the heating facilities, electricity, telephone and water, all at no cost to the Government, except the Contractor will not be liable for Government long- distance calls. **All automation/computer equipment and the LAN connections are to be in place and operational within 30 days after Notice to Proceed.** The entire facility, including furniture **and computer equipment/office automation equipment**, will remain the property of the Contractor and shall be removed from the site after completion of the work. The Contractor shall provide three (3) handheld cellular telephones, Motorola Model 1700+ or equal, with service for the duration of the project. Service shall be digital cellar iDEN technology with integrated digital push to talk 2-way radio coverage within Missouri and Kansas.

1.6.2 Joint Use Conference/Meeting Facility

The contractor shall provide an independent facility approximately 12 feet by 40 feet with adequate heating, air conditioning, lighting and furniture to conduct meetings and briefings for 25 personnel. This facility shall be jointly used by the Government and the contractor to conduct briefings, preparatory inspections, and coordination meetings. The facility/trailer will not be used as an office or storage trailer for either the contractor or the Government, but will be dedicated solely to conduct meetings and briefings by either the contractor or the Government. The area may be used store/maintain as-built drawings.

1.6.3 Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer and providing as a minimum the facilities specified above. The trailer shall be securely anchored to the ground at all four corners to guard against movement during high winds.

1.7 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as telephone or other suitable devices. The devices shall be made available for use by Government personnel.

1.8 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing around the perimeter of each work site. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 1.1 m (42 inches) high, supported and tightly secured to steel posts located on maximum 3 m (10 foot) centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

1.9 CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud, which is tracked onto paved or surfaced roadways, shall be cleaned away. Materials resulting from demolition activities that are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

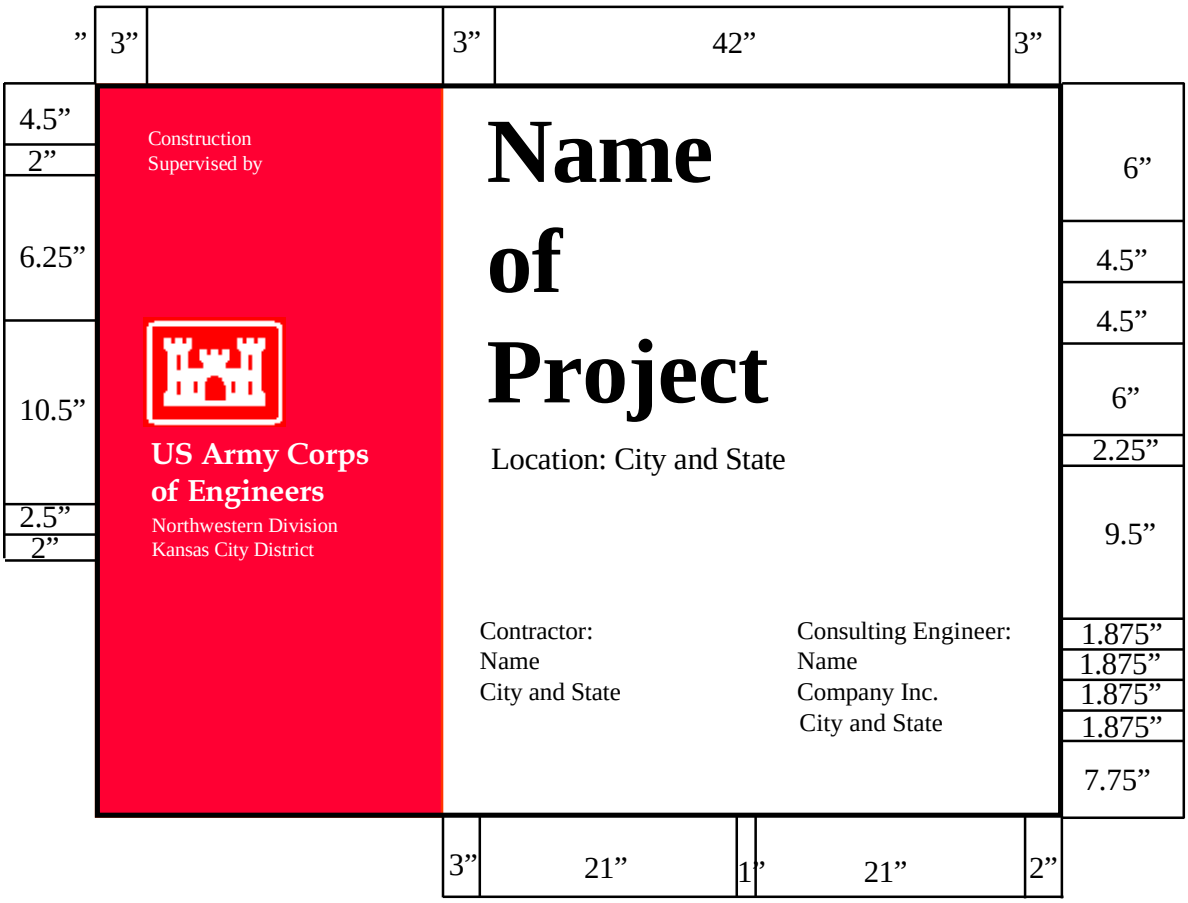
1.10 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including topsoil and seeding as necessary.

*** * END OF SECTION * ***

The graphic format for this 4'x 6' sign panel follows the legend guidelines and layout as specified below. The large 4'x 4' section of panel on the right is to be white with black legend. The 2'x 4' section of the sign on the left with with the full Corps signature (reverse version) is to be screen printed Communications Red on the White background.

This sign is to be placed with the Safety Performance Sign (See Fig. 2).



Legend Group 1: One to two-line description of Corps relationship to project
Color White
Typeface 1.25" Helvehca Regular
Maximum line lenth: 19"

Legend Group 2: Division\ District Name Placed below 10.5" Reverse Signature (6" Castle).
Color: White
Typeface: 1.25" Helvetica Regular

Legend Group 3: One- to three-line project title legend describes the work beging done under this contract.
Color: Black
Typeface: 3" Helvetica Bold
Maximum line length: 42"

Legend Group 4: One- to two-line identification of project or facility (civil works) or name of sponsoring department (military).
Color: Black
Typeface: 1.5" Helveticia Regular
Maximum line length: 42"

Cross-align the first line of Legend Group 4 with the first line of the Corps Signature (US Army Corps) as shown.

Legend Groups 5a-b: One- to five-line identification of prime contractors including: type (arcthitect, general contractor, etc.), corporate or firm name, city, state. Use of Legend Group 5 is optional.
Color: Black
Typeface: 1.25" Helvetica Regular
Maximum line length: 21"

All typography is flush left and rag right, upper and lower case with initial capitals only as shown. Letter- and word-spacing to follow Corps standards

Sign Type	Legend Size	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
CID-01	Various	4' x 6'	4" x 4"	HDO-3	48"	WH-RD/BK

CONSTRUCTION SIGN (CORPS OF ENGINEERS DESIGN)
(Use with Fig 2)

Fig. 1

SAFETY PERFORMANCE SIGN

Each contractor's safety record is to be posted on Corps managed or supervised construction projects and mounted with the construction project identification sign.

The graphic format, color, size and typefaces used on the sign are to be reproduced exactly as specified below. The title with First Aid logo in the top section of the sign and the performance record captions are standard for all signs of the type. Legend Groups 2 and 3 below identify the project and the contractor and are to be placed on the sign as shown.

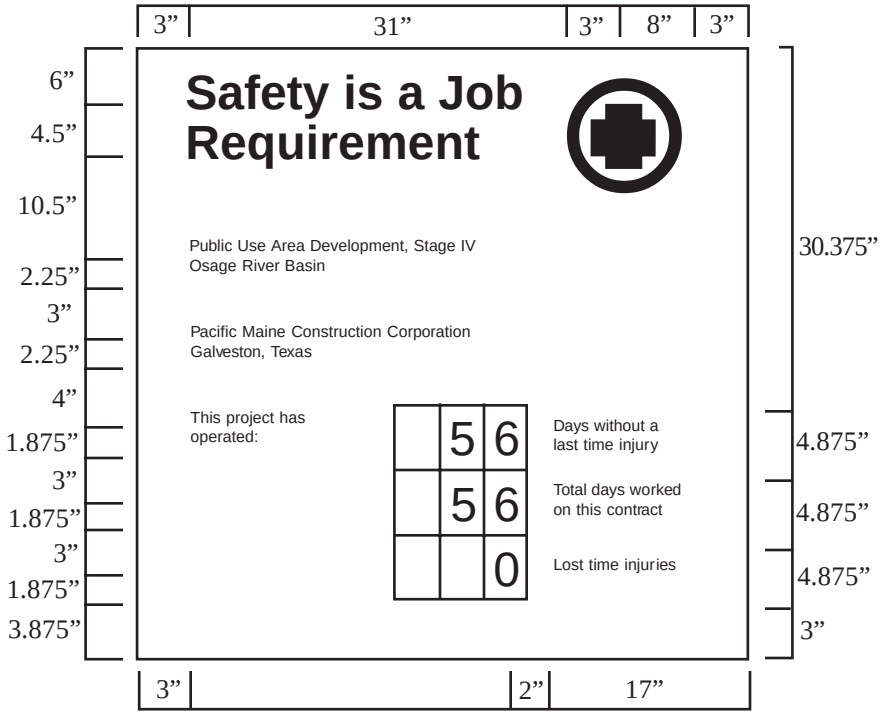
Safety record numbers are mounted on individual metal plates and are screw mounted to the background to allow for daily revisions to posted safety performance record.

Legend Group 1: Standard two-line title "Safety is a Job requirement" with (8 od.) Safety Green First Aid logo.
Color: to match PMS 347
Typeface: 3" Helvetica Bold
Color: Black

Legend Group 2: One to two-line project title legend describes the work being done under this contract and name of host project.
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

Legend Group 3: One to two-line identification; name of prime contractor and city, state address.
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

Legend Group 4: Standard safety record captions as shown.
Color: Black
Typeface: 12.5" Helvetica Regular



Sign Type	Legend Size	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
CID-02	Various	4' X 4'	4" X 4"	HDO-3	48"	WH/BK - GR

Replaceable numbers are to be mounted on white .060 aluminum plates and screw-mounted to background.
Color: Black
Typeface: 3" Helvetica Regular
Plate size: 2.5" X 5"

All typography is flush left and rag right. Upper and lower case with initial capitals only as shown. Letter - and word - spacing to follow Corps standards.

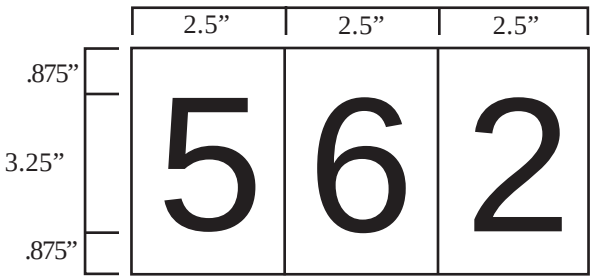


Fig. 2

SECTION 01567

NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES

04/00

Attachments: Storm Water Pollution Prevention Plan
Notice of Intent

PART 1 GENERAL

1.1 REFERENCES (Not Applicable)

1.2 SUBMITTALS (Not Applicable)

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall be responsible for implementing the terms and requirements of the attached "Kansas Water Pollution Control General Permit and Authorization to Discharge Stormwater Runoff From Construction Activities" (hereafter referred to as the "Permit") as specified below. The Government shall be the permittee. The Government has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications. The Contractor shall have day-to-day operational control of those activities which are necessary to ensure compliance with the requirements specified herein. The Government shall be responsible for all submissions to the State. The Government shall retain the official copy of all documents pertaining to compliance with the Permit during construction. The project site is not located in designated critical habitat and there are no known "listed species" located in the project area.

3.2 IMPLEMENTATION

3.2.1 Notice of Intent

The Government shall complete and submit the Notice of Intent (NOI) in accordance with the Permit and pay the annual permit fee. The Contractor may not begin land disturbance activities until authorized by the Contracting Officer's Representative (COR).

3.2.2 Storm Water Pollution Prevention Plan

Unless otherwise indicated, the Contractor shall be responsible for implementing all measures described in the Storm Water Pollution Prevention Plan (SWPPP). The Contractor shall sign the Contractor's Certification. The Contractor's Certification shall be submitted to the COR at least 2 days prior to beginning land disturbance activities. The Government will be responsible for making any required modifications to the SWPPP.

3.2.3 Inspections and Reporting

The Contractor shall be responsible for all inspections specified in the SWPPP and the Permit. The Contractor shall also prepare all reports summarizing the inspections as required by the SWPPP and the Permit. The Government shall sign the reports. Copies of inspection reports shall be furnished to the COR for attachment to the SWPPP no more than 2 days after each inspection. The Contractor shall notify the COR within 24 hours if an inspection identifies any incidents of non-compliance with the SWPPP and the Permit.

3.2.4 Maintenance

The Contractor shall be responsible for maintaining all erosion and sediment control measures and other protective measures identified in the SWPPP in an effective operating condition. The Government reserves the right to require the Contractor to perform maintenance on erosion and sediment control measures and other protective measures if the COR determines that environmental protection requirements are not being met.

3.2.5 Notice of Termination

The Contractor shall notify the COR within 2 days after final stabilization on all portions of the site has been achieved in accordance with Part VII of the Permit. The Government shall complete and submit the Notice of Termination to the State.

3.2.6 Retention of Records

The Government shall be responsible for retaining copies of the permit, SWPPP, site inspection records, Contractor's certifications, NOI, and NOT in accordance with the Permit.

-- End of Section --

SWPPP SITE INSPECTION REPORT FORM

Project Name: FY99 Whole Barracks Renewal	Location: Ft Leavenworth, KS
Name of Inspector:	Date:
Inspectors Qualifications:	
Date of Last Storm Event of 0.5 Inches or Greater:	Date of Last Inspection:

INSPECTION CHECKLIST:

PRACTICE	MAINTENANCE REQUIRED
Disturbed Areas	
Material Storage Areas	
Temporary Seeding	
Mulching	
Erosion Control Blanket	
Permanent Seeding	
Sod Stabilization	
Silt Fence	
Storm Drain Inlet Protection	
Outlet Protection	
Sediment Trap	

Changes required to SWPPP:		
Reasons for changes:		
	Date SWPPP was revised:	
The Facility is in compliance with the SWPPP and NPDES Permit?	Yes:	No:

SWPPP RECORD OF REVISIONS

FY99 Whole Barracks Renewal
Fort Leavenworth, Kansas

Date	Sections Modified	Description of Modification	Approval Signatures

DOCUMENT CERTIFICATION FORM

For Stormwater Discharges Associated with Construction Activity
Authorized by a Kansas Water Pollution Control General Permit
Under the National Pollutant Discharge Elimination System

Complete this form and attach it to any documents or forms (except the NOI, NOT, or NOTO) required to be prepared by this general permit. Any documents or reports requested by KDHE regarding the project and its stormwater discharges shall include this form.

DOCUMENT CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature: _____

Name (typed or printed): _____

Title: _____

Date: _____

Construction Project Name: Whole Neighborhood Revitalization - PN 56034 - FY 2002

Permit Number: KS No. _____ Fed. No. _____ Gn. No. _____

Name of Document(s): _____

Description of Document(s): _____

_____

_____

Date of Document(s): _____

CONTRACTOR'S CERTIFICATION FORM

For Stormwater Discharges Associated with Construction Activity
Authorized by a Kansas Water Pollution Control General Permit
Under the National Pollutant Discharge Elimination System

This form is to be completed by the Contractor responsible for implementation of the day to day activities necessary to complete the requirements of the Stormwater Pollution Prevention Plan. This completed form must be included in, or kept with the site specific Stormwater Pollution Prevention plan.

CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the Kansas Water Pollution Control general permit that authorizes the stormwater discharges associated with construction activity from the construction site identified below, and the Stormwater Pollution Prevention plan prepared for the project.

Construction Project Name: Whole Neighborhood Revitalization - PN 56034 - FY 2002

Permit Number: KS No. _____ Fed. No. _____ Gn. No. _____

Contractor's Signature: _____

Name (typed or printed): _____

Company Name: _____

Company Address: _____

_____

Company Phone Number: _____

Project Responsibilities: _____

_____

_____

_____

GENERAL NPDES PERMIT
for
DISCHARGES OF STORMWATER RUNOFF FROM CONSTRUCTION ACTIVITIES

FORMS

See Attached Sheet for Instructions

NOTICE OF INTENT (NOI)
For Stormwater Discharges Associated with Construction Activity
Authorized by a Kansas Water Pollution Control General Permit
Under the National Pollutant Discharge Elimination System

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form requests authorization for coverage under a Kansas Water Pollution Control general permit issued for stormwater runoff from construction activities in the State of Kansas. Becoming a permittee obligates the discharger to comply with the terms and conditions of the general permit. **Completion of this NOI does not provide automatic coverage under the general permit. You will be notified when the Kansas Department of Health and Environment (KDHE) accepts the NOI.** INCOMPLETE APPLICATIONS WILL BE RETURNED TO THE APPLICANT. Please Print or Type.

I. OWNER & RECORD LOCATION INFORMATION

Owners Name: U.S. Army Engineer District

Name of Company: Corps of Engineers

Mailing Address: 700 Federal Bldg.
601 E. 12th St.

City: Kansas City State: MO Zip Code: 64106-2896

Will permit records be located on site? ☒ Y; ☐ N

If no, provide address where records will be kept:

Business Name:

Street Address:

City:

II. SITE INFORMATION

A. LOCATION

Name of Project: Whole Neighborhood Revitalization

Address: 3 separate sites

City: Ft Leavenworth State: KS Zip Code: 66027-5000

Contact Person: David Werner

___ Quarter of the ___ Quarter of Section ___,

Township: South, Range: ___ ☐ E; ☐ W;

County: Leavenworth

Phone: 816-983-3265

B. EXISTING CONDITIONS/USES

Is any part of the project located on Indian Lands? ☐ Y; ☒ N

If site runoff goes into a Municipal Separate Storm Sewer System; Owner/Operator's Name: Not Applicable

Name of the first receiving water; stream; or lake: Corral Creek

Are there any known soil contamination areas which will be disturbed by the construction activity? ☐ Y; ☒ N

Are there any intakes for public drinking water supplies located within ½ mile of the site discharge points? ☐ Y; ☒ N

Are there any known historical or archeological sites present? ☐ Y; ☒ N

Are any threatened or endangered species known to be present near the site or in the receiving water body? ☐ Y; ☒ N

If yes, list species and describe habitat location in relation to project location:

Are any Critical Water Quality Management Areas, Special Aquatic Life Use Waters, or Outstanding Natural Resource Waters located within one-half mile of the site boundary? ☐ Y; ☒ N

Describe the site soil types: Lean and fat clays

If you have other existing environmental permits at this site, list their permit numbers (e.g. I-UA44-C277):

C. FUTURE SITE ACTIVITY/USES

Description of Planned Project: Construct 84 family housing units and demolish 86 existing at 3 separate non contiguous sites.

C. FUTURE SITE ACTIVITIES/USES CONTINUED:

Anticipated Start Date: September 2002 and Completion Date: November 2004 Estimate of final runoff coefficient: 0.6

Estimated area to be disturbed: 48.2 Acres Total area of the site: 58.2 Acres Increase in Impervious Area: 7.6 Acres

Types of fill materials and source: Gravel, sand, lean clay, or silt from off-site sources.

D. STORMWATER POLLUTION CONTROL MEASURES

Do you plan to disturb ten or more acres that are within a common drainage area? ☒ Y: ☐ N

If yes, will a sediment basin be installed in that drainage area? ☐ Y: ☒ N

If no, on a separate sheet, explain why and what other erosion and sediment control measures that will be implemented in lieu of a sediment basin.

Attach a description of the best management practices, planned to be utilized to control erosion and sedimentation and other pollutants in stormwater discharges during construction. Include a description of applicable local erosion and sediment control requirements.

Describe on a separate sheet of paper the best management practices that will be installed during the project construction which will be left in place after construction is complete in order to control pollutants which will be generated by the final land use. Include a description of applicable local stormwater pollution control requirements for permanent stormwater management features.

On a separate sheet describe the intended sequence of major activities which disturb soils for major portions of the site.

E. MAPS

Attach to this NOI the appropriate maps as described in the instructions. Include the required information on the maps.

III. ANNUAL FEE

Enclose a check for the first year of the annual fee specified in K.A.R. 28-16-1 et seq. as amended (Make check payable to "KDHE-Water Pollution Control Permit").

IV. APPLICANT CERTIFICATIONS

I, the undersigned, certify that a Stormwater Pollution Prevention Plan will be or has been developed for the construction site listed in Section II of this NOI. I further certify that the plan will be implemented at the time construction begins, and, as required by the NPDES general permit for Stormwater Runoff from Construction Activity, will revise the SWP2 plan if necessary.

I certify that I have read and understand the Part I requirements relating to criteria for coverage under the NPDES general permit for Stormwater Runoff from Construction Activity, including those requirements relating to the protection of Threatened or Endangered Species identified in K.A.R. 115-15-1 and sites listed or eligible for listing on the National Register of Historic Places; and

To the best of my knowledge, the discharges which will be covered under this NPDES general permit for Stormwater Runoff from Construction Activity and the construction of BMPs to control stormwater runoff are not likely to and will not likely adversely affect any species identified in K.A.R. 115-15-1; or the discharges and construction are eligible for coverage under the NPDES general permit due to a previous authorization from the Kansas Department of Wildlife and Parks; and

I further certify to the best of my knowledge such discharges and construction of BMPs to control stormwater runoff do not have an effect on properties listed or eligible for listing on the National Register of Historic Places under the National Historic Preservation Act; or the discharges and construction are eligible for coverage under the NPDES general permit due to a previous agreement with the State Historic Preservation Officer.

I understand that continued coverage under the NPDES general permit for Stormwater Runoff from Construction Activity is contingent upon maintaining eligibility as provided for in Part I of the general permit.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on the inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature Date

Michael G. Trial LTC Harold W. Waugh

Name and Official Title (Please Print)

Deputy District Engineer for Project Management KCD COE

Director of Installation Support Ft Leavenworth

General Permit No.: S-MCSTφ-9601-1

Kansas Permit No.: S-LR15-0001

Federal Permit No.: KS-R100320

Kansas Water Pollution Control General Permit and Authorization to Discharge

STORMWATER RUNOFF FROM CONSTRUCTION ACTIVITIES

Under the National Pollutant Discharge Elimination System

Pursuant to the Provisions of Kansas Statutes Annotated 65-164 and 65-165, the Federal Water Pollution Control Act as amended (33 U.S.C. 1251 et seq.; the "Clean Water Act"),

Owner: U.S. Department of the Army

% Kansas City District, Corps of Engineers

Owner's Address: 700 Federal Building
Kansas City, MO 64106-2896

Name of Contact Person: David Werner Phone Number: (816) 983-3265

Name of Facility/Project to be Constructed:

Facility/Project Address or Location:

Receiving Stream & Basin:

is authorized to discharge stormwater runoff from construction activities at the site described herein in accordance with the limitations and conditions set forth in this general NPDES permit and shall comply with Kansas Surface Water Quality Standards (K.A.R. 28-16-28 et seq.).

The general NPDES Permit S-MCSTφ-9601-1 is effective January 1, 1997 through December 31, 2001. This general NPDES permit authorization supersedes all previous permits, agreements, decrees, or orders, in effect between KDHE and the permittee for the discharge of stormwater runoff from construction activities at the site described herein. The use of this general NPDES permit for the project described herein shall become effective on _____, and shall expire on _____

PROJECT DESCRIPTION:

Approximately 17 acres of land disturbance necessary for the construction of a training building, associated infrastructure and appurtenances, and street intersection improvements

_____
Secretary, Kansas Department of Health and Environment

_____
Date

AUTHORIZED ACTIVITY DESCRIPTION:

Construction activity (e.g. clearing, grubbing, excavating, grading, etc.) that disturbs a cumulative total of five (5.0) or more acres or that is part of a larger common plan of development or sale which will disturb a cumulative total of five or more acres.

Owners of construction sites with stormwater discharges who intend to be authorized under this general NPDES permit shall have submitted a Notice of Intent in accordance with Part III of this general NPDES permit. Before allowing any site vegetation to be removed or the site disturbed the owner of a construction site must receive written notification from the Kansas Department of Health and Environment (KDHE) they are authorized to discharge stormwater associated with construction activity. This permit, containing site specific information and signed by the Secretary of the Kansas Department of Health and Environment, is KDHE's authorization to discharge under the provisions of this general NPDES permit.

Any site owner who is subject to NPDES permit requirements for stormwater discharges and discharges stormwater associated with construction activity prior to receiving authorization from KDHE is in violation of both State and Federal laws.

NOTICE of TERMINATION

Signature and submission of Permit pages 1 and 2 to KDHE constitutes notice that the permittee relinquishes authorization to discharge stormwater runoff from construction activities at the site described above.

I certify under penalty of law that all authorized discharges of stormwater runoff from construction activities at the site described above have been eliminated or I am no longer the permittee or owner of the construction site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge stormwater runoff from construction activities under this general NPDES permit at this construction site, and that discharging pollutants in stormwater runoff from construction activities to waters of the State is unlawful under K.S.A. 65-164 and 65-165 and the Clean Water Act where the discharge is not authorized by a Kansas Water Pollution Control Permit. I also understand that submittal of this Notice of Termination does not release the undersigned from liability for any violations of this general NPDES permit, K.S.A. 65-164 and 65-165, Kansas Surface Water Quality Standards (K.A.R. 28-16-28 et seq.), or the Clean Water Act.

Print Name:_____ Date:_____

Signature:_____

This Notice of Termination is being submitted because:

- ☐ The entire project is completed and has been finally stabilized (See Part VII. of this general permit).
- ☐ Ownership of the site has changed (NOTE: A Notice of Transfer of Ownership form must accompany the Notice of Termination if there is a change in ownership of the entire permitted tract).

PREFACE

The purpose of this general permit is to: implement the Federal Water Pollution Control statutes and regulations; implement permitting discharges of stormwater runoff from construction sites subject to National Pollution Discharge Elimination System (NPDES) permit requirements; protect the waters of the State; and minimize off site migration of sediments and contaminants.

This general permit does not authorize the placement of fill materials in flood plains, the obstruction of stream flow, directing stormwaters across private property, changing the channel of a defined drainage course, etc. This general permit is intended to address only the quality of the stormwater runoff and to minimize off site migration of sediments and contaminants.

The issuance of this general NPDES permit to a project owner for a construction project is considered to be a Federal Action as that term is used in the Endangered Species Act and the National Historic Preservation Act of 1966. Projects requiring a Federal Action (e.g. a NPDES permit for discharges of stormwater runoff from construction activity) must be in compliance with these two Federal Laws. Applicants for coverage under this general NPDES permit should contact the Kansas Department of Wildlife and Parks and the State Historic Preservation Officer to ensure the proposed project is in compliance with these Federal Laws. The permittee must remain in compliance with any conditions these two agencies place and enforce upon the project.

Other appropriate agencies should be contacted to determine the need for additional permits, authorizations, or requirements, if any. In particular the applicant should contact the local separate storm sewer agency (see endnote 1, Permit page 11). Other agencies such as the United States Army Corps of Engineers; Kansas Department of Agriculture, Division of Water Resources; and local governments or jurisdictions should be made aware of the project by the applicant.

Authorization to Discharge under this general permit does not constitute approval of the project under the provisions of the Environmental Coordination Act, K.S.A. 82a-326(a)(4) and (b).

Part I. WHAT THIS PERMIT COVERS

This general permit authorizes the discharge of stormwater and certain non-stormwater discharges from construction sites as long as:

1. the site is located in Kansas but is not on Indian Lands (see endnote 2, Permit page 11);

2. the construction activity will disturb five or more acres during the life of the project (for projects of less than five acres, see endnote 3, Permit page 11);

3. the discharge is more than one-half stream mile from a Outstanding Natural Resource Water, Critical Water Quality Management Area, or Special Aquatic Life Use Water (see endnote 4, Permit page 11). The Director may waive this limitation;

4. the discharge does not cause a violation of the Kansas Surface Water Quality Standards;

5. the stormwater discharge does not adversely affect threatened or endangered species as listed in K.A.R. 115-15-1; and

6. the construction activity does not adversely affect any identified historical or archeological sites listed or eligible for listing on the National Register of Historic Places.

In addition, non-stormwater discharges from:

flushing water hydrants and potable water lines,

water only (i.e. without detergents or additives) rinsing of streets and buildings, and

site watering to establish vegetation,

performed during construction activities are authorized under this general permit provided the non-stormwater discharges are addressed in the permittee's site specific Stormwater Pollution Prevention (SWP2) plan required by Part VI. of this general permit.

Part II. WHAT THIS PERMIT DOES NOT COVER

This general permit does not authorize any other discharge of sewage, pollutants or wastewater to waters of the State including such sewage,

wastewaters, or pollutants as:

hazardous substances or oil from an on-site spill or improper handling and disposal practices;

wash and/or rinse waters from concrete mixing equipment including ready mix concrete trucks; or

wastewater generated from wet air pollution control equipment for asphalt plants, or the containment of scrubber water in lined ponds.

KDHE reserves the right to deny coverage under this general permit to applicants for stormwater discharges from construction or earth disturbing activities at sites which have contaminated soils which will be disturbed by the construction activity.

If the permittee is not in compliance with the conditions of any agreement or authorization issued under the National Historic Preservation Act or Endangered Species Act by the State Historic Preservation Officer (SHPO) or the Kansas Department of Wildlife and Parks (KDWP), then the permittee is not eligible for coverage under this general permit and shall make an application for an individual NPDES permit to the Kansas Department of Health and Environment. The permittee shall apply for an individual NPDES within 30 days of being notified by the SHPO or KDWP of non-compliance with the referenced statutes.

Part III. HOW TO APPLY

A Notice of Intent (NOI) for Stormwater Runoff from Construction Activities form shall be used to apply for authorization to discharge stormwater runoff from construction activities. A clean, clear copy of the form may be used. Copies can also be obtained by contacting KDHE at the address given in Part VIII of this general NPDES permit. The form must be completed in its entirety or it will be returned to the applicant.

The annual permit fee as required by K.A.R. 28-16-1 et seq. as amended must be paid in order to receive and maintain authorization to discharge under this general permit (Make check payable to "KDHE - Water Pollution Control Permit").

The NOI and fee for the first year of the permit must be submitted at least 60 days prior to the anticipated starting date for construction. The applicant shall mail the NOI and fee to KDHE at the address given in Part VIII of this general permit.

A copy of the NOI shall be sent by the applicant to any local agencies who require erosion and sediment control plans, grading plans, etc. to be prepared or approved. Applicants with projects located within the following Kansas municipalities shall send a copy of the NOI to the stormwater agency for the municipality: Kansas City, Wichita, Topeka, and Overland Park (see endnote 1, Permit page 11).

Part IV. STARTING ACTIVITY

The owner of the project is not authorized to discharge under this general permit until after receipt of a "Kansas Water Pollution Control General Permit and Authorization to Discharge Stormwater Runoff from Construction Activities" which specifically describes the project.

A copy of the NOI and the KDHE Authorization to Discharge for the specific project shall be posted at the construction site or shall be readily available from the permit site. The local office of the permittee, their contractor or consultant is considered to be readily available from the project site if they are located in the same county as the project site.

Part V. CONTINUING ACTIVITY

The permittee shall pay an annual permit fee as required by K.A.R. 28-16-1 et seq. as amended as long as KDHE has not accepted the Notice of Termination (NOT) certifying the site has been finally stabilized.

This general permit will expire five years from the date it became effective. The expiration date may or may not coincide with the date the authorized project or development is scheduled for completion. If the project or development completion date will be after the expiration date of this general permit, then the permittee must notify the department of their intent to continue to discharge stormwater runoff. The notification must be in writing and must include an updated construction schedule. KDHE may require the permittee to update the NOI and its associated information.

The permittee shall notify KDHE at least 180 days before this general permit expires if the potential for the discharge of stormwater runoff during construction activity is expected to continue past the expiration date of this general permit.

Part VI. STORMWATER POLLUTION PREVENTION PLAN REQUIREMENTS AND GUIDELINES

Before starting construction the permittee shall develop a stormwater pollution prevention plan (SWP2 plan) which is specific to the construction activities which are to be employed at the site authorized by this general permit to discharge stormwater runoff. The permittee shall fully implement the provisions of the SWP2 plan required under this part as a condition of this general permit throughout the term of the construction project.

The purpose of the SWP2 plan is to ensure the design, implementation, management, and maintenance of "Best Management Practices" (BMPs) in order to reduce the amount of sediment and other pollutants in stormwater discharges associated with the construction activities; comply with the Kansas Surface Water Quality Standards; and ensure compliance with the terms and conditions of this general permit.

The permittee shall select, install, utilize, operate, and maintain the BMPs in accordance with the concepts and methods described in Environmental Protection Agency (EPA) document number EPA 832-R-92-005, entitled ***Stormwater Management for Construction Activities*** *- Developing Pollution Prevention Plans and Best Management Practices*, published in September, 1992 (see endnote 5, Permit page 11). The permittee is not limited to the BMPs provided in the EPA guidance manual. Other guidance must utilize practices with similar effectiveness and the permittee should develop BMPs with the goal of site specific effectiveness in mind.

General SWP2 Plan Requirements

The permittee shall have the SWP2 plan prepared under the supervision of and sealed by a licensed professional engineer or landscape architect or a certified professional in erosion and sediment control (see endnote 6, Permit page 11). The engineer or landscape architect must be licensed to practice in the state of Kansas.

The permittee shall ensure the BMPs are properly installed at the locations and relative times specified in the SWP2 plan. Margin or border BMPs, to control runoff where it leaves the site boundary, shall be installed or marked for preservation before general site clearing is started. Stormwater discharges from disturbed areas which leave the site shall pass through an appropriate impediment to sediment movement, such as a sedimentation basin, sediment trap, silt fence, etc., prior to leaving the construction site.

The permittee shall amend and update the SWP2 plan as appropriate during the term of the construction activity. Amendments to the SWP2 plan shall be prepared under the supervision of and sealed by a licensed professional engineer or landscape architect or a certified professional in erosion and sediment control. The engineer or landscape architect must be licensed to practice in the state of Kansas. The permittee shall amend the SWP2 plan, at a minimum, whenever:

- there is a change in design, operation, or maintenance of BMPs;
- there is a change in the design of the construction project which could significantly affect the quality of the stormwater discharges;
- the permittee's inspections indicate deficiencies in the SWP2 plan or any BMP;
- KDHE notifies the permittee of deficiencies in the SWP2 plan;
- the SWP2 plan is determined to be ineffective in significantly minimizing or controlling erosion and sedimentation (e.g. there is evidence, such as excessive site erosion, or excessive sediment deposits in streams or lakes); or
- KDHE determines violations of Surface Water Quality Standards may occur or have occurred.

The permittee shall provide a copy of the SWP2 to KDHE; EPA; or any local agency or government representative if they request a copy in the performance of their official duties.

The permittee shall notify each contractor or entity (including utility crews, and city employees or their agents) who will perform work at the site of the existence of the SWP2 plan and what action or precautions shall be taken while on-site to minimize the potential for erosion and the potential for damaging any BMP. The notification shall be in writing.

The permittee shall provide contractors who are responsible for installation, operation, or maintenance of any BMP a copy of the SWP2 plan. The permittee

shall have each such contractor sign a Contractor Certification as provided by KDHE.

The permittee, their representative, and/or the contractor(s) responsible for installation, operation, and maintenance of the BMPs shall have a current copy of the SWP2 plan with them when on the project site.

Contents of SWP2 Plan.

Site Description. The permittee's SWP2 plan shall include all of the information provided in the NOI. The SWP2 plan shall expand upon the NOI information in order to make the SWP2 plan a working document which contractors and site construction workers can use to guide the installation and maintenance of BMPs.

Description of Best Management Practices. The permittee's SWP2 plan shall include a description of the BMPs they will use at the site. The SWP2 plan shall provide the following general information for each BMP which will be used one or more times at the site:

a physical description of the BMP;

the site and physical conditions which must be met for effective use of the BMP;

the BMP installation / construction procedures, including typical drawings; and

operation and maintenance procedures for the BMP.

The SWP2 plan shall provide the following information for each specific instance where a BMP is to be installed:

whether the BMP is temporary or permanent;

where, in relation to other site features, the BMP is to be located;

when, in relation to each phase of the construction procedures to complete the project, the BMP will be installed; and

what site conditions must be met before removal of the BMP, if the BMP is not a permanent BMP.

Temporary and Permanent Non-Structural BMPs. The permittee's SWP2 plan shall require existing vegetation to be preserved where practical, and the time period for soil areas to be without vegetative cover is to be minimized to the extent practical.

The permittee's SWP2 plan shall specify the following BMPs:

Clearing and grubbing within 50 feet of a defined drainage course should be avoided.

Where changes to defined drainage courses are to occur as part of the project, clearing and grubbing within 50 feet of the defined drainage course should be delayed until all materials and equipment necessary to complete the drainage change are on site.

Changes to defined drainage courses shall be completed as quickly as possible once the work has been initiated. The area impacted by the construction of the drainage course change is to be revegetated or protected from erosion as soon as possible.

Where soil disturbing activities will be stopped in an area for over 14 days, the disturbed areas shall be protected from erosion by stabilizing the area with mulch or other similarly effective erosion control BMPs.

Examples of non-structural BMPs which the permittee should consider specifying in the SWP2 plan include: temporary seeding, final seeding, mulching, geotextiles, sod stabilization, protection of existing vegetation for use as buffer strips (especially along drainage courses), protection of trees, preserving existing stream channels as overflow areas when channel shortening is allowed, soil stabilizing emulsions and tackifiers, mulch tackifiers, preservation of mature vegetation, stabilized site entrances/exits, and other appropriate BMPs.

Temporary and Permanent Structural BMPs. Examples of structural BMPs which the permittee should consider specifying in the SWP2 plan include: diverting flows from undisturbed areas away from disturbed areas, silt (filter fabric or straw bale) fences, earthen diversion dikes, drainage swales, sediment traps, rock check dams, subsurface drains (to gather or transport water for surface discharge elsewhere), pipe slope drains (to carry concentrated flow down a slope face), level spreaders (to distribute concentrated flow into sheet flow), storm drain inlet protection and outlet protection, reinforced soil retaining systems, gabions, temporary or permanent sediment basins, and other appropriate BMPs.

Sedimentation Basins. The permittee's SWP2 plan shall require a sedimentation basin, where practical, for each drainage area with 10 or more acres disturbed at one time. The sediment basin shall provide at least 3,600 cubic feet of storage per acre drained. Where use of a sediment basin of this size is impractical, the SWP2 plan shall evaluate and specify other similarly effective BMPs to be employed to minimize erosion and control sediment. The permittee's SWP2 plan shall require the basin be maintained until final stabilization of the area served by the basin. The 3,600 cubic feet of storage area per acre drained criteria does not apply to flows from areas where such flows are diverted around both the disturbed area and the sediment basin.

The permittee's SWP2 plan shall require both temporary and permanent sedimentation basins to have a stabilized emergency spillway to minimize the potential for erosion of the emergency spillway or basin embankment.

Permanent Stormwater Management. The permittee's SWP2 plan shall include a description of the measures that will be installed during construction to control pollutants in stormwater discharges that will occur after construction activity has been completed. These would include drainage channels or systems; outlet control devices, detention basins, oil water separators, catch basins, etc. This general permit does not require the permittee or his contractors to operate or maintain these measures beyond the date of KDHE's acceptance of the Notice of Termination.

Additional Site Management BMPs. The permittee's SWP2 plan shall address other BMPs, as required by site activities, to prevent contamination of stormwater runoff. Such BMPs include:

solid and hazardous waste management including: providing trash containers and regular site clean up for proper disposal of solid waste such as scrap building material, product/material shipping waste, food containers, and cups; and providing containers and proper disposal for waste paints, solvents, and cleaning compounds, etc.;

providing portable toilets for proper disposal of sanitary sewage;

storing construction materials away from drainage courses and low areas; and

installing containment berms and using drip pans at fuel and liquid storage tanks and containers.

Site Inspections by Permittee

The permittee shall ensure the construction site is inspected on a regular schedule and within twenty-four hours of the end of a storm which results in precipitation of 0.5 inches or greater. The frequency of regular inspections should be proportional to the amount of construction activity. The permittee should increase the frequency of inspections when construction activity increases. Regularly scheduled inspections shall at a minimum be once per month. For disturbed areas which have not been finally stabilized all installed BMPs and other pollution control measures shall be inspected for proper installation, operation and maintenance. Locations where stormwater leaves the site shall be inspected for evidence of erosion or sediment deposition. Any deficiencies shall be noted in a report of the inspection and corrected within seven calendar days of the inspection. The permittee shall promptly notify the site contractors responsible for operation and maintenance of BMPs of deficiencies.

A report of each inspection shall be made. The inspection report is to include the following minimum information: inspector's name, date of inspection, observations relative to the effectiveness of the BMPs, actions taken or necessary to correct deficiencies, and listing of areas where construction operations have permanently or temporarily stopped.

The inspection report shall be signed by the permittee or by the person performing the inspection if duly authorized in accordance with Part VIII, Signatory Requirements, of this general permit.

Part VII. PROJECT COMPLETION

The permittee shall notify KDHE when final stabilization is complete. The NOT needs to be submitted only once by the permittee. The project is considered to be stabilized when either perennial vegetation, pavement, buildings, or structures using man-made materials cover all areas which have been disturbed. Vegetation must have a density of at least 70 percent of undisturbed areas at the site.

The permittee shall notify KDHE of the project completion by submitting a Notice of Termination (NOT). The NOT statement is included in this Kansas Water Pollution Control General Permit and Authorization to Discharge. It is printed on the

reverse of the Authorization to Discharge. The permittee shall sign the NOT and mail it to KDHE at the address given in Part VIII of this general permit.

Part VIII. GENERAL REQUIREMENTS OF THIS PERMIT

Records

The permittee shall retain copies of this general permit, the SWP2 plan for the site named in the Authorization to Discharge, all site inspection records required by this general permit to be prepared, contractor's certifications, the NOI, and the NOT.

The permittee shall retain the records at a site which is readily available from the permitted site until final stabilization of the site is achieved. The local office of the permittee, their contractor or consultant is considered to be readily available from the project site if it is located in the same county as the project site. The records shall be accessible during normal business hours. After final stabilization the records may be maintained at the location of the permittee's main office. The records shall be retained for a period of at least three years from the date of submitting the NOT.

The permittee shall include a Document Certification Statement with all documents and information (except the NOI, NOT, and NOTO) requested by KDHE for its official records. The permittee should use the Document Certification form provided by KDHE for the purpose of compliance with this general condition of this general permit. A clean, clear copy of the form may be used.

Mailing Address

The permittee shall send all written correspondence and forms which are to be submitted to KDHE to the following address:

Kansas Department of Health and Environment
Bureau of Water - Industrial Programs Section
Building 283 - Forbes Field
J Street and 2 North
Topeka, KS 66620 - 0001

Duty to Comply.

The permittee shall comply with all conditions of this general permit. Any noncompliance with this general permit constitutes a violation of the CWA, K.S.A. 65-164 and 65-165, and/or K.A.R. 28-16-28 et seq. Noncompliance may result in enforcement action; termination of this authorization, or denial of the permittee's request for renewal.

Duty to Provide Information and Site Access

The permittee shall furnish to KDHE; the EPA; or any local agency having jurisdiction for any aspect of the project, any information which is requested to determine compliance with this general permit.

When the permittee becomes aware they failed to submit any relevant facts or submitted incorrect information to KDHE, they shall promptly submit such facts or information to KDHE at the address given in Part VIII.

The permittee shall allow the Director or an authorized representative of KDHE, the EPA, or, local agency having jurisdiction over the project, upon the presentation of proper credentials and other documents as may be required by law, to:

enter upon the site where a regulated construction project or activity is located or conducted or where records must be kept under the conditions of this general permit;

obtain samples of any discharge to waters of the State;

have access to and copy at reasonable times, any records which must be kept under the conditions of this general permit; and

inspect any facilities or equipment (including monitoring equipment and BMPs).

Signatory Requirements

The Notice of Intent, all SWP2 plans, inspection reports or information either submitted to KDHE or the operator of a separate storm sewer system, or which this general permit requires to be maintained by the permittee, shall be signed and certified by the permittee or his authorized representative. The certification shall be on the Document Certification form provided by KDHE or a facsimile thereof.

Signature Delegation. A person is a duly authorized representative only if the authorization is made in writing by the permittee and submitted to KDHE. The authorization may be to a specific person or to a specified position within the permittee's organization. The authorization may be for all aspects of the project or only for a portion of the project, such as inspection reports.

If the signature delegation is no longer accurate because a different individual or organizational position has responsibility for a particular aspect or for the overall operation of the construction site, the permittee shall send a new authorization to KDHE.

Chemical and Sewage Spills

Hazardous Substance and Oil Spill Reporting. The permittee or authorized representative is required to notify the National Response Center (800-424-8802) in accordance with the requirements of 40 CFR 117 and 40 CFR 302 as soon as they have knowledge of the discharge of any hazardous substance or oil in excess of the reportable quantity. A reportable quantity of oil is the quantity which causes a "film or sheen upon or discoloration of the surface of the water or adjoining shorelines or causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines." Reportable quantities for hazardous substances are listed in the cited CFRs. The permittee is also required to notify the Local Emergency Planning Agency and the State Division of Emergency Preparedness. The State Division of Emergency Preparedness may be reached 24 hours a day at (785) 296-3176.

Sewage, Wastes, Materials, and Substances - Spill Reporting. Any discharge or escape of sewage, substances, materials, or wastes, as set forth in K.S.A. 65-171d, which are, or threaten to contaminate or alter any of the properties of the waters of the State or pollute soil in a detrimental, harmful, or injurious manner or create a nuisance, shall immediately be reported to the Kansas Department of Health and Environment. The report shall be made by the permittee, the owner of the spilled materials, or their respective authorized representative; or in the case of discharges under conditions other than those allowed in a valid NPDES permit, by the permittee or their authorized representative. The report shall be made by telephone to KDHE (Bureau of Environmental Remediation) at 785-296-1679 or (Capital Area Security) at 785-296-0614 in accordance with K.A.R. 28-48-1.

Nothing in this general permit shall be construed to preclude KDHE's institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under the CWA (33 U.S.C. Section 1321); the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); K.S.A. 65-161 et seq.; or under state or federal statutes or regulations governing oil or hazardous substances or wastes.

Requiring a Different NPDES Permit

The Director may require the permittee to apply for and obtain an individual permit or different general permit if:

> the permittee is not in compliance with the conditions of this general permit;
>
> the discharge no longer qualifies for this general permit due to changed site conditions or regulations; or
>
> information becomes available which indicates water quality standards have been, or may be violated.

The permittee will be notified in writing of the need to apply for an individual permit or a different general permit. When an individual permit or different general permit is issued to the authorized permittee, the applicability of this general permit to the permittee is automatically terminated upon the effective date of the individual or different general permit, whichever the case may be.

Transfer of Ownership

Entire Tract. Coverage under this General NPDES permit is transferable. The transferor and transferee shall complete a Notice of Transfer of Ownership (NOTO) form and send it to the Director at the address given in Part VIII of this general permit. The NOTO shall be submitted by the permittee named on the first page of the permit within 14 days of the transfer of title to the property. When transferring ownership of the entire permitted tract the permittee shall also sign and send the NOT to KDHE.

Individual Lot or Lots. The existing permittee who intends to transfer ownership of a lot or parcel of the overall permitted area and the person who is purchasing the lot or portions of the overall tract shall complete and send KDHE an Individual Lot Certification (ILC). The ILC shall be submitted by the permittee named on the first page of the permit within 14 days of the transfer of title of the lot or parcel.

Part IX. STANDARD CONDITIONS

In addition to the conditions specified in this general permit, the permittee shall comply with the following

modified Standard Conditions which are based upon the Standard Conditions of 40 CFR 122.41. The Standard Conditions at 40 CFR 122.41 apply to all NPDES permits.

Proper Operation and Maintenance

The permittee shall at all times maintain in good working order and efficiently and effectively operate all pollution control measures and systems to achieve compliance with the terms of this general permit.

Maintenance of pollution control measures and systems which results in degradation of stormwater discharge quality, even though not causing violations of water quality standards, shall be scheduled and planned in order to minimize impacts to water quality.

In the event of permittee non-compliance with this general permit, the permittee shall take all necessary steps to minimize or prevent any adverse impact to waters of the State, including, if requested by KDHE to do so, the sampling and analysis of the stormwater discharge, to determine the nature and impact of the noncomplying discharge.

Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems which are installed by the permittee only when necessary to achieve compliance with the conditions of this general permit.

The need to halt or reduce the permitted activity in order to maintain compliance with general permit conditions shall not be a defense to the permittee in an enforcement action.

Severability

The provisions of this general permit are severable, and if any provision of this general permit and any circumstance is held invalid, then the application of such provision to other circumstances and the remainder of this general permit shall not be affected thereby.

Permit Modifications and Terminations

As provided by K.A.R. 28-16-62, after notice and opportunity for a hearing, this general permit may be modified, suspended, revoked, or terminated in whole or in part during its term for cause as provided for, but not limited to those set forth in K.A.R. 28-16-62 and K.A.R. 28-16-28b through f.

The permittee shall furnish to the Director, within a reasonable amount of time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this general permit.

Change in discharge

All discharges authorized herein shall be consistent with the terms and conditions of this general permit. Any significant changes, (e.g. an increase in disturbed area of 2 acres or 10% which ever is greater) in the scope or magnitude of the construction project or pollution control measures shall be reported to KDHE at least thirty (30) days before such change is to be implemented. Changes to the SWP2 plan shall conform with the conditions of Part VI, Stormwater Pollution Prevention Plan Requirements and Guidelines.

In the event soil contamination or hazardous substances are discovered at the site during construction activities, the permittee shall notify KDHE and revise their SWP2 plan as appropriate to address any newly discovered potential pollutant sources.

Removed substances

Solids, sludges, sediments, or other pollutants removed in the course of treatment or control of stormwater runoff shall be properly managed, in accordance with applicable statutes and regulations to prevent pollution of surface water, groundwater, or soil.

Civil, Criminal, and Administrative Penalties

Nothing in this general permit shall be construed to relieve the permittee from civil, criminal, and/or administrative penalties as provided for in K.S.A. 65-171f, K.S.A. 65-170d, K.S.A. 65-167, and 33 U.S.C. Section 1319 (enforcement). Knowingly making any false statement on any report or tampering with equipment to falsify data may result in the imposition of criminal penalties as provided for in 33 U.S.C. Section 1319 and K.S.A. 65-170c.

Property Rights

The issuance of this general permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property, nor any invasion of personal rights, nor any infringement or violation of Federal, State or local laws or regulations. This general permit in no way reduces or eliminates the

permittee's responsibilities to landowners whose property may be traversed by stormwater runoff from the project site either before, during, or after construction of the planned project. It is the permittee's responsibility to obtain any necessary approvals from any affected property owner.

Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this general permit which has a reasonable likelihood of adversely affecting human health or the environment.

Bypass

Any diversion or bypass of facilities necessary to maintain compliance with the general permit is prohibited except where necessary to prevent loss of human life, personal injury, or severe property damage, and where no feasible alternative to the bypass exists.

ENDNOTES

1. The Kansas municipalities of Kansas City, Wichita, and Topeka are required by regulation to have local programs to address pollutants from construction activities within their jurisdiction. Overland Park will also be required to develop a local plan to address construction activities within their jurisdiction in the near future. Other Kansas municipalities may have similar programs, though not required by state or federal law.

2. If you are uncertain if the project is located on Indian Lands, please contact the Bureau of Indian Affairs at (785) 486-2161 or the EPA Region VII Office of Policy and Management, Program Integration Branch at (913) 551-7045.

3. On June 4, 1992, the United States Court of Appeals for the Ninth Circuit remanded the exemption for construction sites of less than five acres to the EPA for further rule making (Decision Nos. 90-70671 and 91-70200); (i.e. The CWA can be interpreted to mean that any construction project, regardless of the area disturbed may be subject to stormwater permitting requirements.). On April 7, 1995 EPA and the Natural Resources Defense Council (NRDC) agreed to a schedule to resolve the criteria for determining what the size cutoff will be for requiring construction projects to apply for a NPDES permit for stormwater discharges. The director may waive the five acre criteria in Part I. of the permit for any specific project which will disturb less than five acres if requested in writing to do so by the owner.

4. To determine if your project is located near one of these areas find the stream segment(s) or lake(s) which receive(s) the site runoff on the Kansas Surface Water Register Maps, then check the designated uses of the stream segment(s) or lake(s) in the Kansas Surface Water Register. Copies of the Kansas Surface Water Register & Maps can be obtained by contacting the KDHE Bureau of Water at 785/296-5500.

5. This document is available through National Technical Information Services (NTIS). The NTIS publication number is PB92-235951. The NTIS order desk phone number is (800) 553-6847.

6. Certification as a professional in erosion and sediment control (CPESC) is available through the Soil and Water Conservation Society and the International Erosion Control Association. Call 1-800-THE-SOIL, 1-800-843-7645 for more information.

SECTION 01911

QUARTERS CLEANING

1.1 Scope. The work covered by this section includes special requirements for quarter's cleanliness.

1.2 Purpose. The purpose of this section is to ensure the Contractor leaves the new houses in clean "ready-to-be-lived-in" condition upon completion of the required work. The Contractor shall perform all cleaning required to meet the cleanliness standards specified herein.

1.3 Cleaning Materials. Use cleaning materials which will not create hazards to health, property or environment, and which will not damage surfaces to be cleaned.

1.4 Cleaning Equipment. Use cleaning equipment designed for the specific tasks to be performed. Electrically powered cleaning equipment shall be free from safety defects.

1.5 Quarters cleanliness. Upon completion of the required work, the Contractor shall ensure the following items are accomplished:

1.5.1 Floors, including stairs and landings, shall be clean and free of dirt, dust, marks, and scuffs; resilient tile floors shall be cleaned with a damp mop and free of dirt, marks, and streaks. Carpet shall be vacuumed and free of dirt, stains, paint and debris.

1.5.2 Ceilings, walls, woodwork, and closet shelving shall be clean and free of dirt and dust.

1.5.3 Cabinets shall be empty, clean and free of dirt, and the doors left closed.

1.5.4 The interior and exterior surfaces of doors and window glass shall be clean, free of dirt, dust, and be closed and locked.

1.5.5 Light fixtures, porch lights, exhaust fans, and range hoods shall be clean, free of dirt, dust, and turned off. New light bulbs shall be in all light sockets.

1.5.6 Porcelain fixtures, to include sinks, vanities, toilets, and bathtubs shall be cleaned thoroughly and free of dirt, cleaning residue, and (note: the word removal was deleted) stains. Shower walls and tracks must be clean and free of streaks and cleaning residue. Mirrors shall be clean and streak free.

1.5.7 Patios, garages and porches must be cleaned and free of debris, dirt and stains. During the winter, they must be free of snow and ice as well.

1.5.8 New appliances must be clean and free of dirt, dust, stains, and adhesive left from labels.

1.5.9 New furnace filters must be clean and free of dust and stains.

1.5.10 Furnaces and hot water heaters shall be clean and free of dirt and dust.

1.5.11 Exterior building surfaces shall be clean of dirt or stains.

1.5.12 Concrete surfaces, basement walls and floors, sidewalks, and driveways shall be fee of stains.

-- End of Section -

DIVISION 2 – SITE WORK

EDITED GUIDE SPECIFICATIONS PROVIDED BY THE GOVERNMENT

02090	Waste Removal and Disposal
02210	Grading
02220	Demolition
02221	Excavation, Trenching and Backfilling for Buildings
02222	Excavation, Trenching and Backfilling for Utilities Systems
02225	Preparation of Subgrade for Roadways
02230	Clearing and Grubbing
02233	Graded Crushed Aggregate Base Course
02235	Lime Modified Subgrade
02364	Termiticide Treatment Measures for Subterranean Termite Control
02510	Water Distribution System
02511	Concrete Sidewalks, Curbs and Gutters, and Exterior Slabs
02531	Sanitary Sewers
02551	Asphaltic Concrete Intermediate Leveling and Surface Courses
02748	Bituminous Tack and Prime Coat
02630	Storm Drainage System
02921	Seeding
02992	Sodding
02930	Exterior Planting

SECTION 02090
WASTE REMOVAL AND DISPOSAL
(May 2002)

PART 1 - GENERAL

1.1 SCOPE

The work covered by this section includes furnishing all labor, equipment, materials, and transportation necessary for the proper and safe collection, handling, packaging and disposal of three types of waste (solid, non-hazardous and hazardous) generated by this project.

1.1.1 The work for this project includes the painting of all surfaces both interior and exterior of governmental buildings. Specifically, this non-inclusive list includes the use of various products: paints (latex, alkyds, oil-based, enamels, aluminum, solvent-based, traffic, spray or aerosols), lacquers, polyurethane, urethanes, vanish, sealers, stains, strippers, caulks, adhesives, mineral spirits and paint thinners. Contractor shall notify in writing no later than 10 days following issuance of the Notice of Proceed of the types of products the Contractor intends to use on each building.

1.1.2 The Contractor shall coordinate, through the COR, the collection, storage and disposal of the Contractors waste with Directorate of Installation Support (DIS) Environmental Division.

1.2 REFERENCES

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

Title 49, Code of Federal Regulations (CFR), U.S. Department of Transportation (DOT) Standards

Part 171	Hazardous Substances
Part 172	Hazardous Materials Tables and Subparts B & C Hazardous Materials Communications Regulations

Title 40, CFR, U.S. Environmental Protection Agency (EPA) Protection of Environment

Parts 240 to 280	Resource Conservation and Recovery Act

Kansas Department of Health and Environment (KDHE) Kansas Statutes

Chapter 65, Article 34	Hazardous Waste Management Act
Chapter 65, Article 31	Hazardous Waste Management Standards and Regulations

1.3 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with STATEMENT OF WORK:

1.3.1 List of Hazardous Materials; G-RE

The Contractor shall submit to the COR, for review from the DIS Environmental Division, a certified list of hazardous materials or

manufacturer’s descriptive literature for all major hazardous materials proposed for use in the work specified herein.

1.3.2 List of MSDS; FIO

The Contractor shall submit to the COR, to be given to the DIS Environmental Division, a Material Safety Data Sheet (MSDS) for each hazardous material proposed in the work specified herein.

1.3.3 Proof of Disposal; G-RE

1.4 SOLID WASTE:

The Contractor shall be responsible for the proper handling and disposal of all generated solid waste. Solid waste is defined as: any discarded material in any physical state. Examples of solid waste: dried latex paint, empty paint containers (with the drippings absorbed with dry sweep or wood shavings), empty caulk containers and spray paint aerosols shooting air. An empty container is a container which contains one inch or less of liquid within the container. Examples: one gallon paint bucket with paint drippings.

1.4.1 The Contractor shall place all solid waste in a solid waste dumpster or roll-off provided by the Contractor. NO liquid solid waste shall be placed in the solid waste dumpster or roll-off. Refer to 1.5 Non-Hazardous Waste for proper disposal procedure for all Non-Hazardous liquid solid waste.

1.5 NON-HAZARDOUS WASTE:

The Contractor shall be responsible for the proper handling, packaging, shipment and disposal of all non-hazardous waste generated by this project. Non-hazardous waste is defined as: waste that is a solid waste but not a hazardous waste. Examples of non-hazardous waste are: pourable latex paint, pourable alkyd paint and latex or alkyd wash water. Any wash water waste generated by the Contractor when washing out latex or alkyd covered brushes shall be properly disposed of by pouring the wash water down the sanitary and NOT the storm sewer.

1.6 THE CONTRACTOR SHALL NOT DUMP ANY TYPE OF LIQUIDS (Latex or oil-based paint and mineral spirits) ON THE GROUND OR DOWN THE STORM OR SANITARY SEWER, except for wash water waste identified in paragraph 1.5.

1.6.1 All containers which hold one inch or more of the original product within the container shall be left inside and stored in the building where the paint was used. No non-hazardous waste shall be turned in by the Contractor through the COR to the DIS Environmental Division.

1.7 HAZARDOUS WASTE

The Contractor shall be responsible for the proper collection, handling and packaging for disposal of all hazardous waste generated by this project. The Government shall furnish services for disposal of the Hazardous Waste. Hazardous Waste is defined as: a solid waste and which meets the definition of either characteristic or listed waste as defined in 40 CFR Part 261. Examples of hazardous waste are: oil-based paints, oil-based enamels, oil-based primers, traffic paints, industrial and marine coatings, oil-based kilz, mineral spirits, paint thinners, gasoline, kerosene, oil-based stains, shellacs, strippers, polyurethane and aerosol paint. All containers which hold one inch or more of the original product within the container shall be left inside and stored in the building where the paint was used.

1.7.1 The Government has determined that certain types of paint waste debris are hazardous waste (See paragraph 1.4). The Contractor shall properly segregate, collect, label, package and store all generated hazardous waste. The job site shall be treated as a Satellite Accumulation Point.

1.7.2 The Government shall provide the Contractor, prior to the start of the project, two containers for storage of their hazardous waste: one to store any solvent contaminated rags and the other container shall be used to store mineral spirits or paint thinner. Waste materials shall be packaged for transportation, in accordance with Department of Transportation (DOT) Regulations found in 49 CFR Parts 171, 172 and 173. These containers shall be in good condition without dents or rust and have the package markings labeled on the side of the container.

1.7.3 The Contractor shall inspect each container of Hazardous Waste daily and ensure that the lid on each container of Hazardous Waste is closed and secured except when the Contractor is placing Hazardous Waste into the container. The Contractor shall maintain a log of daily Hazardous Waste generation and inspections for each container during the project. The log shall include name of project, contractor name, container number, description of type of Hazardous Waste added to each container and date of inspection for each container. A copy of the completed log shall be provided to the COR once the project is complete. The Contractor shall label each container with the following words “Hazardous Waste” on the side of each container using the red and white “Hazardous Waste” label the COR furnishes. The container storing contaminated rags shall also have the words “Dirty Rags” on the “Hazardous Waste” label.

1.7.4 After each use, the Contractor shall place and store all used solvent contaminated rags in the provided container and then close and secure the lid. Rags are defined as any type of material, ie: any type of fabric/material or paper product. Rags can be used once or many times prior to their disposal. Rags can be soiled by various contaminates, ie: grease, gasoline, mineral spirits, paint thinner, solvents, oil-based paint, traffic paint, shellac, lacquer, polyurethane and stains. Once the container is full or the project is complete, the Contractor shall coordinate a delivery through the COR to the DIS Environmental Division for proper disposal.

1.7.5 The Contractor shall place all mineral spirits or paint thinner into the provided container at the end of each working day. Once the container is full or the project is complete, the Contractor shall coordinate a delivery through the COR to the DIS Environmental Division for proper disposal.

1.7.6 THE CONTRACTOR SHALL NOT DUMP ANY TYPE OF LIQUIDS (except for wash water waste identified in paragraph 1.3.5.) ON THE GROUND OR DOWN THE STORM OR SANITARY SEWER.

1.7.7 When the project is complete, the Contractor shall return both containers through the COR to be given to the DIS Environmental Division.

--- End of Section ---

SECTION 02210 (LVN)
GRADING

PART 1 GENERAL

1.1 APPLICABLE PUBLICATIONS

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO):

T 180-93	Moisture-Density Relations of Soils Using a 10-lbs. (4.54 kg) Rammer and an 18-in (457 mm) drop

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 422-63 (R 1990)	Particle Analysis of Soils
D 1556-90	Density and Unit Weight of Soil in Place by the Sand-Cone Method
D 1557-91	Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/cu.ft. (2,700 kN-m/cu.m.))
D 2167-94	Density of Soil in Place by the Rubber-Balloon Method
D 2216-92	Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
D 2487-93	Classification of Soils for Engineering Purposes
D 2922-91	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 2937-94	Density of Soil in Place by the Drive-Cylinder Method
D 3017-88 (R1993)	Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
D 4318-93	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. The following submittals shall be submitted in accordance with SECTION: SUBMITTAL PROCEDURES .

SD-08 Statements

Field Testing Control, para. 3.9; G-RE.

Qualifications of the commercial testing laboratory who will be performing all testing in accordance with paragraph FIELD TESTING CONTROL.

1.3 DEFINITIONS

1.3.1 Satisfactory Materials

Satisfactory materials include materials classified in ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC, CL, CH, and ML.

1.3.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Materials classified in ASTM D 2487 as MH, Pt, OH, and OL are unsatisfactory. Unsatisfactory materials also include debris, refuse, roots, organic matter, frozen material, and stones larger than 150 mm in any dimension. Otherwise suitable material which contains excess moisture will not be classified as unsuitable material unless it cannot be dried by manipulation, aeration, or blending with other materials (e.g., dry soil, lime, flyash, etc.) satisfactorily as determined by the Contracting Officer.

1.3.3 Cohesionless And Cohesive Materials

Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.

1.3.4 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 or AASHTO T 180, Method D, abbreviated hereinafter as percent laboratory maximum density. The test method identified in AASHTO T 180 shall only be appropriate when more than 30% by weight of particles are retained on the ? (19.0-mm) sieve.

1.3.5 Subgrade Reinforcement Material

Subgrade reinforcement material includes sound, tough, durable crushed stone, slag or gravel, consisting of pieces varying from 25 mm to 89 mm in diameter, or other approved material, with necessary filler. When a finer

material is necessary for filler, broken stone chips, screened gravel, or sand may be used to completely fill all voids.

1.3.6 Expansive Soils

Expansive soils are defined as soils that have a plasticity index equal to or greater than 18 when tested in accordance with ASTM D 4318.

1.4 SUBSURFACE DATA

Subsurface soil boring logs are shown on the drawings.

1.5 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.6 BLASTING

Blasting will not be permitted.

PART 2 PRODUCTS

2.1 BORROW MATERIAL

Where satisfactory materials are not available in sufficient quantity from required excavations, satisfactory materials shall be obtained from a borrow source shown on the plans or as directed by the Contracting Officer.

PART 3 EXECUTION

3.1 EXCAVATION

3.1.1 General

The Contractor shall perform excavation of every description, regardless of material encountered, within the limits of the project to the lines, grades, and elevations indicated and as specified. Satisfactory excavation material shall be transported to and placed in fill areas within the limits of the work. Any soil which is disturbed by the Contractor's operations or softened due to exposure to the elements and water shall be treated as specified in Paragraph: Unsatisfactory Materials. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed and replaced with satisfactory material. Payment therefore will be made in conformance with the "CHANGES" clause of the CONSTRUCTION CLAUSES. Satisfactory material removed below the depths indicated without specific direction of the Contracting Officer shall be replaced at no additional cost to the Government to the indicated excavation grade with satisfactory materials, except that concrete footings shall be increased in thickness to the bottom of the overdepth excavations. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done

under the direction of the Contracting Officer. Excavation and filling shall be performed in a manner and sequence that will provide drainage at all times. Excavations shall be kept free from water while construction therein is in progress. Material required for fills in excess of that produced by excavation within the grading limits shall be disposed of as directed by the Contracting Officer.

3.1.2 Excavated Materials

Satisfactory excavated material required for fill or backfill shall be placed in the proper section of the permanent work required under this section or shall be separately stockpiled if it cannot be readily placed. Excavated material shall be stockpiled in such a manner as not to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way. No satisfactory excavated material shall be wasted without specific written authorization. Satisfactory and unsatisfactory material in excess of that required for the permanent work shall be disposed of off Government-owned property or as directed by the Contracting Officer.

3.2 DITCHES, GUTTERS, AND CHANNEL CHANGES

Ditches, gutters, and channel changes shall be cut accurately to the cross sections and grades indicated. All roots, stumps, rock, and foreign matter in the sides and bottom of ditches, gutters, and channel changes shall be trimmed and dressed or removed to conform to the slope, grade, and shape of the section indicated. Care shall be taken not to excavate ditches and gutters below the grades indicated. Excessive ditch and gutter excavation shall be backfilled to grade either with satisfactory, thoroughly compacted material or with suitable stone or cobble to form an adequate gutter paving as directed. All ditches and gutters excavated under this section shall be maintained until final acceptance of the work. Satisfactory material excavated from ditches and channel changes shall be placed in fill areas. Unsatisfactory and excess excavated material shall be disposed of in accordance with directions in paragraph EXCAVATED MATERIALS. No excavated material shall be deposited closer to the edges of the ditches than indicated and in no case less than 1 meter.

3.3 BACKFILL

Backfill adjacent to any and all types of structures shall be placed and compacted in such a manner as to prevent wedging action or eccentric loading upon or against any structure. Ground surface on which backfill is to be placed shall be prepared as specified in paragraph: PREPARATION OF GROUND SURFACE FOR FILL. Backfill material shall consist of and shall be placed in accordance with paragraph: FILLS AND EMBANKMENTS. Compaction requirements for backfill materials shall also conform to the applicable portions of paragraph: COMPACTION, and SECTIONS: SUBDRAINAGE SYSTEM; and EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well suited to the material being compacted.

3.4 PREPARATION OF GROUND SURFACE FOR FILL

3.4.1 General

All vegetation, such as roots, brush, heavy sods, heavy growth of grass, and all decayed vegetable matter, rubbish, and other unsatisfactory material within the area upon which fill is to be placed, shall be stripped or otherwise removed before the fill is started. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be plowed, stepped, or broken up, as directed, in such manner that the fill material will bond

with the existing surface. Prepared surfaces on which compacted fill is to be placed shall be wetted or dried as may be required to obtain the specified moisture content and density. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 150 mm, thoroughly mixed, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 300 mm and compacted as specified for the adjacent fill.

3.4.2 Subgrade Reinforcement of Existing Ground

The use of subgrade reinforcement material shall be at the direction and subject to the approval of the Contracting Officer. When in the opinion of the Contracting Officer the native ground surface materials cannot be compacted to the required density due to pumping of moisture into the material being compacted from underlying natural layers, subgrade reinforcement material may be used to "bridge" over soft underlying material and interrupt the upward migration of water. Prior to placement of subgrade reinforcement material, the surface on which the material is to be placed shall be prepared by removal of all previously disturbed material such that surface rutting no deeper than 25 mm remain. Subgrade reinforcement material shall then be placed on the prepared surface in layers not greater than 125 mm in thickness. The reinforcement material shall then be worked into the subgrade either by tracking, rolling, or tamping as required. After compaction of each layer of the reinforcement, voids remaining in the reinforcement material shall be filled with finer select material and compacted. Placement and compaction of subsequent layers of reinforcement material shall continue until, in the opinion of the Contracting Officer, sufficient "bridge" material has been placed over the soft subgrade to facilitate compaction of subsequent layers of satisfactory material to the required density, i.e., a properly weighted sheepsfoot roller "walks out." In no instance shall the elevation of the soil reinforcement material be more than 300 mm higher than the initial ground surface unless indicated differently on the plans. Additionally, the upper surface elevation of the subgrade reinforcement material shall not be located within two (2) footing widths of the bearing elevation of the footing. Payment for subgrade reinforcement, if required, will be made in accordance with the "CHANGES" clause of the "CONSTRUCTION CLAUSES."

3.5 FILLS AND EMBANKMENTS

Fills and embankments shall be constructed at the locations and to lines and grades indicated. The completed fill shall conform to theshape of the typical sections indicated or shall meet the requirements of the particular case. Satisfactory material obtained during excavation may be used in forming required fill. Fill shall be satisfactory material and shall be reasonably free from roots, other organic material, and trash and from stones having a maximum diameter greater than 150 mm. No frozen material will be permitted in the fill. Stones having a dimension greater than 75 mm shall not be permitted in the upper 150 mm of fill or embankment. The material shall be placed in successive horizontal layers of 200 mm in loose depth for the full width of the cross section and shall be compacted as specified. Each layer shall be compacted before the overlaying lift is

placed. Moisture content of cohesive fill or backfill material shall be adjusted by wetting or aerating, as required, to a range 0 to 4 percent wet of optimum moisture content as determined from laboratory tests specified in paragraph DEFINITIONS. Moisture content of cohesionless material shall be adjusted at the time of compaction as required to facilitate compaction. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Utilization of fly ash or other drying agent approved by the Contracting Officer for the purpose of adjusting the moisture content of the soil will be permitted only as an alternative to aeration at no additional cost to the Government.

3.6 COMPACTION

Each layer of fill and backfill shall be compacted to not less than the percentage of maximum density specified below:

	Percent Laboratory maximum density	
	Cohesive Material	Cohesionless material
Fill, embankment, and backfill		
Under structures, building slabs, steps, slabs on grade, around footings, and in trenches	90	95
Under sidewalks and grassed areas	85	90
Expansive soils	Compacted to not less than 90 percent nor more than 93 percent	

Approved compacted subgrades that are disturbed by the Contractor's operations or adverse weather shall be scarified and compacted as specified hereinbefore to the required density prior to further construction thereon. Recompaction over underground utilities and heating lines shall be by hand tamping.

3.7 FINISHED EXCAVATION, FILLS, AND EMBANKMENTS

All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified. Ditches and gutters shall be finished to permit adequate drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials. For subgrade areas to be paved, the following shall be accomplished as required: (a) soft or otherwise unsatisfactory material shall be replaced with satisfactory excavated material or other approved materials; (b) low areas resulting from removal of unsatisfactory material shall be brought up to required grade with

satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and shall be compacted as specified. The surface of embankments or excavated areas for road construction or other areas on which a base course or pavement is to be placed shall vary not more than 15 mm from the established grade and approved cross section. Surfaces other than those that are to be paved shall be finished not more than 50 mm above or below the established grade or approved cross section.

3.8 PROTECTION

Newly graded areas shall be protected from traffic and from erosion, and any settlement or washing away that may occur from any cause, prior to acceptance, shall be repaired and grades reestablished to the required elevations and slopes. All work shall be conducted in accordance with the environmental protection requirements of the contract.

3.9 FIELD TESTING CONTROL
(SD08-G-RE)

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. One field density and moisture content test shall be performed on every 500 cubic meters of each 200 mm lift placed. Moisture/density relations shall be determined in accordance with paragraph: Degree of Compaction. Field in-place density shall be determined in accordance with ASTM D 1556, D 2167, D 2922, or 2937. When ASTM D 2922 is used, the density calibration curves shall be checked and adjusted as necessary by the procedure described in paragraph 4, Calibration, of ASTM D 2922. The preferred method of calibration is that described in subparagraph 4.1.2, Field Calibration. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The moisture calibration curves furnished with the nuclear gauges shall be checked and adjusted as necessary by the procedure described in paragraph 7, Calibration, of ASTM D 3017. Calibration curves shall be developed using ASTM D 1556 to determine the volume of the reference samples. The calibration checks of both the density and moisture gauges shall be made at the beginning of the job on each different type of material encountered and at intervals as directed by the Contracting Officer. At least two field density tests performed in accordance with D 1556 shall be made daily and used as a check of the results obtained with ASTM D 2922/D 3017. ASTM D 2937 shall be used only for soft, fine-grained, cohesive soils. Test results shall be furnished to the Contracting Officer within 24 hours of making the test. When test results indicate that compaction is not as specified, the material shall be removed and replaced or recompacted to meet specification requirements at no additional cost to the Government. Subsequent tests on recompacted area shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results

are representative of the materials or conditions being certified by the tests.

3.9.1 Optimum Moisture and Laboratory Maximum Density

A moisture/density curve shall be made for each type material or source of material including borrow material to determine the laboratory optimum moisture and maximum density values. Additionally, one representative test shall be made at the direction of the Contracting Officer, or when any change in material occurs which may affect the optimum moisture or laboratory density. Included with each moisture/density curve will be a determination of the insitu moisture content determined in accordance with ASTM D 2216, Atterberg limits determined in accordance with ASTM D 4318, and a gradation curve determined in accordance with ASTM D 422.

3.9.2 Moisture Contents

The moisture content of material obtained from stockpile(s), excavation(s), or borrow area(s) shall be determined with a minimum of two tests per day per type of material or source of material during stable weather conditions. During unstable weather, additional tests shall be made as required by the Contracting Officer. Moisture content tests shall be made in accordance with ASTM D 2216 and checked for compliance with allowable limits relative to the laboratory optimum moisture. Atterberg limits (ASTM D 4318) and/or particle gradation tests (ASTM D 422) shall be made as required by the Contracting Officer in conjunction with each moisture content test in order to establish similarity with material used to determine the laboratory maximum density. The use of fly ash or other drying agent, approved by the Contracting Officer, to adjust the moisture content of excavated or borrow materials to within acceptable moisture ranges shall be the Contractor's option and shall be made at no additional cost to the Government. The request for approval shall be accompanied with a moisture/density curve developed for the soil in question with the minimum amount of drying agent required to reduce the moisture content from that encountered insitu to the maximum allowed relative to the laboratory optimum moisture. Henceforth, this moisture/density curve with the drying agent incorporated shall be used to determine the maximum laboratory density.

-- End of Section --

SECTION 02220

DEMOLITION
12/97

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.

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.2 GENERAL REQUIREMENTS

The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Rubbish and debris shall be removed from Government property daily, unless otherwise directed, to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer. In the interest of occupational safety and health, the work shall be performed in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections. In the interest of conservation, salvage shall be pursued to the maximum extent possible; salvaged items and materials shall be disposed of as specified.

1.3 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Statements

Work Plan; G-RE.

The procedures proposed for the accomplishment of the work. The procedures shall provide for safe conduct of the work, including procedures and methods to provide necessary supports, lateral bracing and shoring when required, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations in accordance with EM 385-1-1.

1.4 DUST CONTROL

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

1.5 PROTECTION

1.5.1 Protection of Personnel

During the demolition work the Contractor shall continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.5.2 Protection of Structures

Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, shall remain standing without additional bracing, shoring, of lateral support until demolished, unless directed otherwise by the Contracting Officer. The Contractor shall ensure that no elements determined to be unstable are left unsupported and shall be responsible for placing and securing bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.5.3 Protection of Existing Property

Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.5.4 Protection From the Weather - NOT USED

1.5.5 Protection of Trees

The Contractor must protect all trees within the demolition areas, which might be damaged during demolition, and are indicated to be left in place. They must be protected by a 1.8 m (6 foot) high fence. The fence shall be securely erected a minimum of 1.5 m from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Any tree damaged during demolition operations shall be replaced in kind or as approved by the Contracting Officer.

1.5.6 Environmental Protection

The work shall comply with all Local, State and Federal requirements.

1.6 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.7 USE OF EXPLOSIVES

Use of explosives will not be permitted.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 EXISTING STRUCTURES

Existing structures indicated shall be removed as indicated on the drawings.

3.2 UTILITIES

Existing utilities shall be removed as indicated. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area.

3.3 FILLING

Holes, open basements and other hazardous openings shall be filled.

3.4 DISPOSITION OF MATERIAL

Title to material and equipment to be demolished, except Government salvage and historical items, is vested in the Contractor upon receipt of notice to proceed. The Government will not be responsible for the condition, loss or damage to such property after notice to proceed.

3.4.1 Historical Items

If the Contractor encounters objects that appear to have historical or Archaeological significance, the Contractor will (leave them in an undisturbed condition and immediately notify the Contracting Officer.

3.5 CLEAN UP

Debris and rubbish shall be removed from the installation and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

--End of Section--

SECTION 02221 (LVN)

EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS

PART 1 GENERAL

1.1 APPLICABLE PUBLICATIONS

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO):

T 180-93	Moisture-Density Relations of Soils Using a 10-lbs. (4.54 kg) Rammer and an 18-in (457 mm) drop

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS:

D 422-63 (R 1990)	Particle-Size Analysis of Soils
D 1556-90	Density and Unit Weight of Soil in Place by the Sand-Cone Method
D 1557-91	Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/cu.ft. (2,700 kN-m/cu.m.))
D 2167-94	Density and Unit Weight of Soil in-Place by the Rubber Balloon Method
D 2216-92	Laboratory Determination of Water (Moisture) Content of Soil and Rock
D 2487-93	Classification of Soils For Engineering Purposes (Unified Soil Classification System)
D 2922-91	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 2937-94	Density of Soil in Place by the Drive-Cylinder Method

D 3017-88 (R 1993)	Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
D 4318-93	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. Submittals shall be submitted in accordance with SECTION: SUBMITTAL PROCEDURES.

SD-08 Statements

Field Testing Control, para. 3.17; G-RE.

Qualifications of the commercial testing laboratory who will be performing all testing in accordance with paragraph: TESTING.

SD-09 Reports

Capillary Water Barrier; para. 2.2, G-RE.

Select Material, para. 2.3, G-RE.

Certified test reports and analysis certifying that the materials proposed for use at the project site conform to the specified requirements.

SD-13 Certificates

Soil Treatment; para. 3.15, G-RE.

1.3 DEFINITIONS

1.3.1 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 or AASHTO T 180, Method D, abbreviated hereinafter as percent laboratory maximum density. The test method identified in AASHTO T 180 shall only be appropriate when more than 30% by weight of particles are retained on the ? (19.0-mm) sieve.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Satisfactory Materials

Satisfactory materials include materials classified in ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC, CL, CH, and ML.

2.1.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Materials classified in ASTM D 2487 as MH,

Pt, OH, and OL are unsatisfactory. Unsatisfactory materials also include debris, refuse, roots, organic matter, frozen material, man-made fills, or backfills from previous construction, and stones larger than 75 mm in any dimension. Otherwise suitable material which contains excess moisture will not be classified as unsuitable material unless it cannot be dried by manipulation, aeration, or blending with other materials (e.g., dry soil, lime, flyash, etc.).

2.1.3 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.

2.1.4 Expansive Soils

Expansive soils are defined as soils that have a plasticity index equal to or greater than 18 when tested in accordance with ASTM D 4318.

2.2 CAPILLARY WATER BARRIER
(SD09-G-RE)

Capillary water barrier shall consist of clean, crushed, nonporous rock, crushed gravel, or uncrushed gravel. The maximum particle size shall be 37.5 mm and no more than 2 percent by weight shall pass the 4.75 mm sieve.

2.3 SELECT MATERIAL
(SD09-G-RE)

Select material shall consist of natural sand and gravel, crushed rock, manufactured sand, or quarry fines. The material shall have a maximum particle size of 25 mm and a minimum of at least 15 percent passing the 75 um sieve, but not more than 49 percent. The portion of material passing the number 425 um shall either be non-plastic or shall have a plasticity index less than or equal to 12.

PART 3 EXECUTION

3.1 SUBSURFACE DATA

Subsurface soil boring logs are shown on the drawings.

3.2 CLEARING AND GRUBBING

The areas within lines 1.5 meters outside of each building and structure line shall be cleared and grubbed of trees, stumps, roots, brush, and other vegetation, debris, existing foundations, pavements, utility lines, structures, fences, and other items that would interfere with construction operations. Stumps, logs, roots, and other organic matter shall be completely removed and the resulting depressions shall be filled with satisfactory material placed and compacted in accordance with paragraph: FILLING AND SUBGRADE PREPARATION. Materials removed shall be disposed of off Government property or as directed by the Contracting Officer.

3.3 TOPSOIL

N/A.

3.4 EXCAVATION

Excavation shall conform to the dimensions and elevations indicated for each building, structure, and footing except as specified hereinafter, and shall include trenching for utility and foundation drainage systems to a point 1.5 meters beyond the building line of each building and structure, and all work incidental thereto. Excavation shall extend a sufficient distance from walls and footing stem walls to allow for placing and removal of forms. The earthen sidewalls of the excavation shall be used as forms for the footings. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed and replaced with satisfactory materials to the indicated elevation grade; except that concrete footings shall be increase in thickness to the bottom of the overdepth excavations. Payment therefore will be made in conformance with the "CHANGES" clause of the CONSTRUCTION CLAUSES. Satisfactory material removed below the depths indicated without specific direction of the Contracting Officer shall be replaced at no additional cost to the Government to the indicated excavation grade with satisfactory materials, except that concrete footings shall be increased in thickness to the bottom of the overdepth excavations. Satisfactory material shall be placed and compacted as specified in paragraph: FILLING AND SUBGRADE PREPARATION. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Contracting Officer.

3.5 DRAINAGE

Surface water shall be directed away from excavation and construction sites so as to prevent ponding of water in excavations or erosion and undermining of foundations. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained. Under no conditions will water be allowed to pond in excavations either due to seepage, surface runoff, or other means of discharge of water into excavations.

3.6 SHORING

Shoring including sheet piling, shall be furnished and installed as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Shoring, bracing, and sheeting shall be removed as excavations are backfilled, in a manner to prevent caving.

3.7 CLASSIFICATION OF EXCAVATION

Excavation will be unclassified regardless of the nature of material encountered.

3.8 BLASTING

Blasting will not be permitted.

3.9 UTILITY AND DRAIN TRENCHES

Trenches for underground utilities systems and drain lines shall be excavated to the required alignments and depths in accordance with SECTION: EXCAVATION, TRENCHING AND BACKFILLING FOR UTILITIES SYSTEMS, paragraph: EXCAVATION. Backfilling shall be performed in accordance with SECTION: EXCAVATION, TRENCHING AND BACKFILLING FOR UTILITIES SYSTEMS, paragraph: BACKFILLING AND COMPACTION.

3.10 BORROW MATERIAL

Where satisfactory materials are not available in sufficient quantity from required excavations, satisfactory materials shall be obtained.

3.11 EXCAVATED MATERIALS

Satisfactory excavated material required for fill or backfill shall be placed in the proper section of the permanent work required under this section or shall be separately stockpiled if it cannot be readily placed. Satisfactory material in excess of that required for the permanent work and all unsatisfactory material shall be disposed of as specified in SECTION: GRADING.

3.12 FINAL GRADE OF SURFACE TO SUPPORT CONCRETE

Excavation to final grade shall not be made until just before concrete is to be placed. Building foundations supporting concrete shall bear entirely on natural subgrade. In no case shall a sector of a building foundation bear partially on compacted fill and natural subgrade. Excavations and surfaces supporting concrete shall be clean and thoroughly "crumbed out" being free of clumps of loose earth and unsatisfactory material. If in the opinion of the Contracting Officer a surface supporting concrete has been "softened" due to ponding of water, freezing, or remolded due to traffic or improper excavation techniques, the material in question shall be removed and compacted to the required density.

3.13 FILLING AND SUBGRADE PREPARATION

Satisfactory materials free from roots, debris, or stones larger than 75 mm shall be used in bringing fills to the lines and grades indicated and for replacing unsatisfactory material. Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials. The surface shall be scarified to a depth of 150 mm before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 150 mm, pulverized, and compacted to the specified density. When the subgrade under footings is part fill and part natural ground, the natural ground portion shall be over excavated to a minimum depth of 1 meter and compacted as specified for the adjacent fill. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers,

pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Cohesive material shall be moistened or aerated as necessary to a 0 to 4 percent wet of optimum moisture to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

Each layer of fill and backfill shall be compacted to not less than the percentage of maximum density specified below:

	Percent Laboratory maximum density	
	Cohesive	Cohesionless material
Fill, embankment, and backfill		
Under structures, building slabs, steps, slabs on grade, around footings, and in trenches	90	95
Under sidewalks and grassed areas	85	90
Nonfrost susceptible materials		95
Subgrade		
Under building slabs, steps, and paved areas, top 300 mm	90	95
Under sidewalks, top 6″ (150 mm)	85	90

Approved compacted subgrades that are disturbed by the Contractor's operations or adverse weather shall be scarified and compacted as specified hereinbefore to the required density prior to further construction thereon. Recompaction over underground utilities and heating lines shall be by hand tamping.

3.14 SPECIAL REQUIREMENTS

3.14.1 Special Requirements.

The material within 18″ (450 mm) of the bottom of building slabs on grade shall consist of select material and the capillary water barrier material. The minimum limits of the area filled with these materials shall be the area inside the foundation walls or, if the building foundation is a slab on grade, the area within the foot print of the building. In order to protect the uncovered or placed and compacted soil surface from drying, select material shall be placed on this surface at least 6″ (150 mm) deep within 48 hours of uncovering or placing and compacting. This layer of select material shall be used as a working platform with excavations for footings and utilities being made through the layer. Any excavations through the working platform shall be backfilled with select material the entire depth of the excavation within 72 hours. An additional 6″ (150 mm) of select material and 6″ (150 mm) of capillary water barrier material shall be placed above the top of this working platform. All expansive

soil surfaces shall be protected from excessive moisture as directed by the Contracting Officer.

3.14.2 Foundation Inspection.

If soft foundation bearing surfaces are encountered, they shall be examined by a representative of the Geotechnical Branch, Kansas City District Corps of Engineers representing the Contracting Officer. The Contractor shall provide at least one days notice to the resident office for inspection of footing excavations.

3.15 SOIL TREATMENT

(SD13-G-RE)

Just prior to placing concrete slab on grade and basement slab and just prior to backfilling around concrete or masonry foundations for structures, soil treatment shall be applied. Soil treatment agents shall be delivered to the jobsite in sealed and labeled containers bearing the manufacturer's warnings to be observed in the handling and use of soil treatment agents. Labels shall bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act and shall provide recommended rates of application. Labeling information shall be submitted not less than 7 days in advance of the time the soil treatment agent is to be applied. Soil treatment agent shall consist of one of the following water-based emulsions in concentrations as recommended by the manufacturer:

3.15.1 Chloryprifos (Dursban *TC), or

3.15.2 Permethrin, (Dragnet* TC or Torpedo*), or

3.15.3 Fenalerate (Gold Crest Tribute*), or

3.15.4 Isofenphos (Pryfon* 6), or

3.15.5 Cypermethrin (Demon* 2). (*Trademarks)

All pesticide applications shall be made by state licensed and certified pest-control personnel and in accordance with manufacturer's label instructions. Contractor shall submit for review, appropriate certification and material safety data sheets. Contractor shall formulate, treat, store and dispose of pesticide in accordance with label directions.

3.16 BACKFILLING

Backfilling shall not begin until construction below finish grade has been approved, underground utilities systems have been inspected, tested and approved, forms removed, and the excavation cleaned of trash and debris. Backfill shall not be placed in wet or frozen areas. Backfill shall consist of satisfactory materials placed and compacted as specified under paragraph: FILLING AND SUBGRADE PREPARATION. Where pipe is coated or wrapped for protection against corrosion, the backfill material up to an elevation 2’(600) mm above sewer lines and 1’ (300 mm) above other utility lines shall be free from stones larger than 1” (25.4 mm) in any dimension. Heavy equipment for spreading and compacting backfill shall not be

operated closer to foundation or retaining walls than a distance equal to the height of backfill above the top of footing; the area remaining shall be compacted in layers not more than 4″ (100 mm) in compacted thickness with power-driven hand tampers suitable for the material being compacted. Backfill shall be placed carefully around pipes to avoid damage to coatings, wrappings, or tanks. Backfill shall not be placed against foundation walls prior to 7 days after completion of the walls. As far as practicable, backfill shall be brought up evenly on each side of the wall and sloped to drain away from the wall. At the discretion of the Contracting Officer, excavation for footing can be discontinued if the Contractor is not backfilling footings and/or walls or is not protecting the excavation from deterioration in a timely manner.

3.17 TESTING

(SD08-G-RE)

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or may be performed by the Contractor subject to review. One density test shall be taken for every 250 cubic meters of each 200 mm lift. Wall and/or footing backfill shall be tested at the rate of one test per lift per 30.5 linear meters. Moisture-density relations shall be determined in accordance with paragraph: Degree of Compaction. Field in-place density shall be determined in accordance with ASTM D 1556, D 2167, D 2922, or D 2937. When ASTM D 2922 is used, the density calibration curves shall be checked and adjusted as necessary by the procedure described in paragraph 4, Calibration, of ASTM D 2922. The preferred method of calibration is that described in subparagraph 4.1.2, Field Calibration, ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The moisture calibration curves furnished with the nuclear gauges shall be checked and adjusted as necessary by the procedure described in paragraph 7, Calibration, of ASTM D 3017. Calibration curves shall be developed using ASTM D 1556 to determine the volume of the reference samples. The calibration checks of both the density and moisture gauges shall be made at the beginning of the job on each different type of material encountered and at intervals as directed by the Contracting Officer. At least two field density tests performed in accordance with D 1556 shall be made daily and used as a check of the results obtained with ASTM D 2922/D 3017. ASTM D 2937 shall be used only for soft, fine-grained, cohesive soils. Test results shall be furnished the Contracting Officer within 24 hours of making the test. When test results indicate that compaction is not as specified, the material shall be removed and replaced or recompacted to meet specification requirements at no additional cost to the Government. Subsequent tests on recompacted area shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests.

3.17.1 Optimum Moisture and Laboratory Maximum Density

A moisture/density curve shall be made for each type of material and source of material including borrow material to determine the laboratory optimum moisture and maximum density values. Additionally, one representative test shall be made at the direction of the Contracting Officer, or when any change in material occurs which may affect the optimum moisture or laboratory density. Included with each moisture/density curve will be a determination of the insitu moisture content determined in accordance with ASTM D 2216, Atterberg limits determined in accordance with ASTM D 4318, and a gradation curve determined in accordance with ASTM D 422.

3.17.2 Moisture Contents

The moisture content or material obtained from stockpile(s), excavation(s), or borrow area(s) shall be determined with a minimum of two tests per day per type of material or source of material during stable weather conditions. During unstable weather, additional tests shall be made as required by the Contracting Officer. Moisture content tests shall be made in accordance with ASTM D 2216 and checked for compliance with allowable limits relative to the laboratory optimum moisture. Atterberg limits (ASTM D 4318) and/or particle gradation tests (ASTM D 422) shall be made as required by the Contracting Officer in conjunction with each moisture content test in order to establish similarity with material used to determine the laboratory maximum density. The use of fly ash or other drying agent, approved by the Contracting Officer, to adjust the moisture content of excavated or borrow materials to within acceptable moisture ranges shall be the Contractor's option and shall be made at no additional cost to the Government. The request for approval shall be accompanied with a moisture/density curve developed for the soil in question with the minimum amount of drying agent required to reduce the moisture content from that encountered insitu to the maximum allowed relative to the laboratory optimum moisture. Henceforth, this moisture/density curve with the drying agent incorporated shall be used to determine the maximum laboratory density.

3.18 CAPILLARY WATER BARRIER

Capillary water barrier under concrete floor and areaway slabs on grade shall be placed directly on the subgrade and shall be compacted with a minimum of two passes of a hand-operated plate-type vibratory compactor.

3.19 GRADING

Areas within 1.5 m outside of each building and structure line shall be constructed true to grade, shaped to drain, and shall be maintained free of trash and debris until final inspection has been completed and the work has been accepted.

3.20 PROTECTION

Settlement or washing that occurs in graded, topsoiled, or backfilled areas prior to acceptance of the work shall be repaired and grades reestablished to the required elevations and slopes.

-- End of Section --

SECTION 02222 (LVN)

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS

PART 1 GENERAL

1.1 APPLICABLE PUBLICATIONS

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.

AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)

C 33-90	Specification for Concrete Aggregates
D 1556-90	Density and Unit Weight of Soil In Place by the Sand-Cone Method
D 1557-91	Laboratory Compaction Characteristics of Soil Using Modified Effort 2,700 kN-m/cu. m.
D 2167-94	Density and Unit Weight of Soil Inplace by the Rubber Balloon Method
D 2487-93	Classification of Soils for Engineering Purposes
D 2922-91	Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)
D 2937-94	Density of Soil in Place by the Drive-Cylinder Method
D 3017-88 (R 1993)	Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
D 4318-93	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. Submittals shall be submitted in accordance with SECTION: SUBMITTAL PROCEDURES.

SD-08 Statements

Field Testing Control, para. 3.7.1; G-RE.

Qualifications of the commercial testing laboratory who will be performing all testing in accordance with paragraph TESTING.

SD-09 Reports

Select Granular Material, para. 2.1.6; G-RE.

1.3 DEFINITIONS

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, abbreviated hereinafter as percent laboratory maximum density.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Satisfactory Materials

Satisfactory materials shall consist of any material classified by ASTM D 2487 as GW, GP, GC, SW, SC, CL, and CH.

2.1.2 Unsatisfactory Materials

Unsatisfactory materials include but are not limited to those materials containing roots and other organic matter, trash, debris, frozen materials and stones larger than 75 mm, and materials classified in ASTM D 2487, as SP, ML, MH, PT, OH, and OL. Unsatisfactory materials also include man-made fills, refuse, or backfills from previous construction. Otherwise suitable material which contains excess moisture will not be classified as unsuitable material unless it cannot be dried by manipulation, aeration, or blending with other materials (e.g., dry soil, lime, flyash, etc.) satisfactorily as determined by the Contracting Officer.

2.1.3 Cohesionless and Cohesive Materials

Cohesionless materials shall 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.

2.1.4 Unyielding Material

Unyielding material shall consist of rock and gravelly soils with stones greater than 75 mm in any dimension or as defined by the pipe manufacturer, whichever is smaller.

2.1.5 Unstable Material

Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

2.1.6 Select Granular Material (SD09-FIO)

Granular material shall be crushed stone meeting the requirements of ASTM C 33 Size No. 57, class designation 4S.

PART 3 EXECUTION

3.1 SUBSURFACE DATA

Subsurface soil boring logs are shown on the drawings.

3.2 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

3.3 BLASTING

Blasting will not be permitted.

3.4 EXCAVATION

Excavation shall be performed to the lines and grades indicated. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench equal to 1/2 the depth of the excavation, but in no instance closer than 600 mm. Adequate drainage shall be provided for the stockpiles and surrounding areas by means of ditches, dikes, or other approved methods. The stockpiles shall also be protected from contamination with unsatisfactory excavated material or other material that may destroy the quality and fitness of the suitable stockpiled material. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material, if directed, shall be removed and replaced with satisfactory on-site or imported material from approved sources at no additional cost to the Government. Excavated material not required or not satisfactory for backfill shall be removed from the site. Unauthorized over excavation shall be backfilled in accordance with paragraph BACKFILLING AND COMPACTION at no additional cost to the Government.

3.4.1 Excess Material

No satisfactory excavated material shall be wasted without specific written authorization. Satisfactory material in excess of that required for the permanent work and all unsatisfactory material shall be disposed of off Government property.

3.4.2 Trench Excavation

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. The trench width below the top of the pipe shall not exceed that recommended in the installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. The trench width below the top of pipe shall not exceed 600 mm plus pipe outside diameter (O.D.) for pipes of less than 600 mm inside diameter and shall not exceed 900 mm plus pipe outside diameter for sizes larger than 600 mm inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.4.3 Bottom Preparation

The bottom of trench excavation shall be excavated square with the sidewalls the distance indicated on the plans below the bottom of the

pipe. Trench bottoms shall consist of satisfactory materials and shall be clean, free of all clods and crumbs of earth, debris, and other deleterious materials. Stones of 75 mm or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.4.3.1 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph BACKFILLING AND
COMPACTION. When removal of unstable material is required due to the fault or neglect of the contractor in his performance of the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.

3.4.4 Excavation For Appurtenances

Excavation for manholes, catch-basins, inlets, or similar structures shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.4.5 Jacking, Boring, and Tunneling

Unless otherwise indicated, excavation shall be by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

3.4.6 Dewatering

The Contractor shall take action as required and shall provide and maintain equipment necessary to remove and dispose of all surface and ground water entering excavations, trenches, or other parts of the work. Each excavation shall be kept dry, free of all accumulations of groundwater seepage at all times when the excavation is open until construction of structures and/or installation of the utility is complete to the extent that no damage from hydrostatic pressure, flotation, or other cause(s) will result. Surface water shall be diverted or otherwise prevented from entering excavations or trenches to the greatest extent practicable without causing damage to adjacent property. Existing drainage facilities may be used for disposal of surface and ground water during dewatering operations subject to prior approval of the Contracting Officer. The Contractor shall be responsible for all damages incurred to existing drainage facilities as a result of the dewatering operation. All pipes or conduits shall be left clean and free of sediment.

3.5 BACKFILLING AND COMPACTION

Backfill material shall consist of satisfactory material or select granular material. Backfill shall be placed in layers not exceeding 150 mm loose thickness for compaction by hand operated machine compactors, and 200 mm loose thickness for other than hand operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent maximum density for cohesionless soils and 90 percent maximum density for cohesive soils, unless otherwise specified.

3.5.1 Trench Backfill

Trenches shall be backfilled to the grade shown. The trench shall be backfilled to 600 mm above the top of pipe prior to performing the required pressure tests. The joints and couplings shall be left uncovered during the pressure test.

3.5.1.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

3.5.1.2 Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 150 mm loose thickness.

3.5.1.3 Bedding and Initial Backfill

Class I bedding and initial backfill shall consist of select granular material of the thickness shown. Bedding and initial backfill material within 3 meters outside of building perimeter shall be cohesive material. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

3.5.1.4 Final Backfill

The remainder of the trench, except for special materials for roadways shall be filled with satisfactory material. Backfill material shall be placed and compacted as follows:

3.5.1.4.1 Roadways

Backfill shall be placed up to the elevation at which the requirements in SECTION: LIME-MODIFIED SUBGRADE control. Water flooding or jetting methods of compaction will not be permitted.

3.5.1.4.2 Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas

Backfill shall be deposited in layers of a maximum of 300 mm loose thickness, and compacted to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. Compaction by water flooding or jetting will not be permitted. This requirement shall also apply to all other areas not specifically designated above.

3.5.2 Backfill for Appurtenances

After the manhole, catch basin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for 3 days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for final backfill, and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.6 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.6.1 Water Lines

Trenches shall be of a depth to provide a minimum cover of 1.2 meters from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

3.6.2 Electrical Distribution System

Direct burial cable and conduit or duct line shall have a minimum cover of 1 meter from the finished grade, unless otherwise indicated. Special trenching requirements for direct-burial electrical cables and conduits are specified in SECTION: ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND.

3.6.3 Tracer Wire and Plastic Marking Tape

Tracer Wire: All non-conductive underground utilities will have a tracer wire buried directly above, and immediately adjacent to each line. The tracer wire will be a 12 gauge, solid copper, coated wire. The tracer wire will run the entire length of the buried utility line. The tracer wire will run on primary and secondary feeders from manhole to manhole (or valve box), and be terminated within each manhole, or valve box at a point easily reachable from the surface. On lateral lines, the tracer wire will run the entire length of the lateral and be terminated, next to the house above ground, at the point where the utility comes out of the ground. The wire will be snuggly wrapped around the pipe a minimum of three times. If the lateral line enters the house below grade, the tracer wire will be terminated above the utility line, immediately next to the exterior of the foundation, in a standard non-waterproof exterior junction box attached to a vertical piece of 1/2" plastic PVC pipe buried a minimum of one foot below the surface. Within the junction box the continuous tracer wire will be left coiled, a minimum of one foot long, with the interior of the box labeled with a permanent marking pen, (i.e. Gas Line Tracer).

Warning Tape: Standard grade, non-magnetic, Warning Tape will be installed above all underground utility lines. The tape will be buried 1 foot below the surface, running the entire length of the buried utility. The color of the tape will correspond to the utility it is protecting, as shown below.

Electrical = Red
Gas = Yellow
Water = Blue
Sewer = Green,

Telephone = Orange
Cable TV and others = Silver

3.6.4 Trenches

Trenches cut in and across streets shall be backfilled and patched. The asphalt patch will be placed immediately after backfill is completed.

3.7 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government.

3.7.1 Determination of Density: (SD08-G-RE)

Testing shall be performed by an approved commercial testing laboratory or may be tested by facilities furnished by the Contractor. Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained. A minimum of one test per lift of backfill for every 61 meters of installation shall be performed. Laboratory tests for moisture-density relations shall be determined in accordance with ASTM 1557. The moisture/ density relationship shall be developed for each different type of material used for final backfill.

3.7.1.1 Density

Field in-place density shall be determined in accordance with ASTM D 1556, D 2167, D 2922, or D 2937. When ASTM D 2922 is used, the density calibration curves shall be checked and adjusted as necessary by the procedure described in paragraph 4, Calibration, of ASTM D 2922. The preferred method of calibration is that described in subparagraph 4.1.2, Field Calibration, ASTM
D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The moisture calibration curves furnished with the nuclear gauges shall be checked and adjusted as necessary by the procedure described in paragraph 7, Calibration, of ASTM D 3017. Calibration curves shall be developed using ASTM D 1556 to determine the volume of the reference samples. The calibration checks of both the density and moisture gauges shall be made at the beginning of the job on each different type of material encountered and at intervals as directed by the Contracting Officer. At least one field density test performed in accordance with D 1556 shall be made daily and used as a check of the results obtained with ASTM D 2922/D 3017. ASTM D 2937 shall be used only for soft, fine-grained, cohesive soils. Test results shall be furnished to the Contracting Officer within 24 hours of making the test. When test results indicate that compaction is not as specified, the material shall be removed and replaced or recompacted to meet specification requirements at no additional cost to the Government. Subsequent tests on recompacted area shall be performed to determine conformance with specification requirements and test results shall be furnished to the Contracting Officer within 24 hours. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests.

3.7.2 Displacement of Sewers

After other required tests have been performed and the trench backfill compacted to the finished grade surface, the pipe shall be inspected to determine whether significant displacement has occurred. This inspection shall be conducted in the presence of the Contracting Officer. Pipe sizes larger than 1 meter shall be entered and examined, while smaller diameter pipe shall be inspected by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgment of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, the defects shall be remedied as directed at no additional cost to the Government.

-- End of Section --

SECTION 02225 (LVN)

PREPARATION OF SUBGRADE FOR ROADWAYS

PART 1 GENERAL

1.1 APPLICABLE PUBLICATIONS

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO):

T 180-93	Moisture-Density Relations of Soils Using a 10- lbs. (4.54 kg) Rammer and an 18-in (457 mm)drop

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS:

D 422-63 (R 1990)	Particle-Size Analysis of Soils
D 1140-92	Amount of Material in Soils Finer than the No. 200 (75-um) Sieve
D 1556-90	Density and Unit Weight of Soil in Place by the Sand-Cone Method
D 1557-91	Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/cu.ft. (2,700 kn-m/cu.m)
D 2167-94 (R 1990)	Density and Unit Weight of Soil In-Place by the Rubber Balloon Method
D 2216-90	Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
D 2487-93	Classification of Soils for Engineering Purposes
D 2922-91	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 2937-94 1993)	Density of Soil in Place by the Drive-(R Cylinder Method
D 3017-88 (R 1993)	Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
D 4318-93	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. Submittals shall be submitted in accordance with SECTION: SUBMITTAL PROCEDURES.

SD-08 Statements

Field Testing Control, para. 3.4; G-RE

Qualifications of the commercial testing laboratory who will be performing all testing in accordance with paragraph: TESTING.

1.3 DEFINITIONS

1.3.1 Satisfactory Materials

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, GM, GC, SC, SW, SM, ML, CL, or CH.

1.3.2 Unsatisfactory Materials

Unsatisfactory materials shall comprise any materials classified by ASTM D 2487 as Pt, OH, OL, or MH. Unsatisfactory materials also include debris, refuse, roots, organic matter, frozen material, and stones larger than 150 mm in any dimension. Otherwise suitable material which contains excess moisture will not be classified as unsuitable material unless it cannot be dried by manipulation, aeration, or blending with other materials (e.g., dry soil, lime, flyash, etc.) satisfactorily as determined by the Contracting Officer.

1.3.3 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. Testing required for classifying materials shall be in accordance with D 422, D 1140, D 2487, and D 4318.

1.3.4 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 or AASHTO T 180, Method D, abbreviated hereinafter as percent laboratory maximum density. The test method identified in AASHTO T 180 shall only be appropriate when more than 30% by weight of particles are retained on the ? (19.0-mm) sieve.

PART 2 PRODUCTS (Not Required)

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION:

3.1.1 Construction

Immediately prior to placing base course or other paving materials the subgrade area shown on the drawings shall meet the following requirements: The subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This shall include plowing, disking, and any moistening or aerating required to obtain or restore the subgrade to the specified moisture and compaction requirements stated hereinafter. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. The elevation of the finished subgrade shall not vary more than 15 mm from the established grade and cross section. No satisfactory excavated material shall be wasted without specific written authorization. Satisfactory material in excess of that required for the permanent work and all unsatisfactory material shall be disposed of in accordance with SECTION: DEMOLITION.

3.1.2 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well suited to the type of material being compacted. The moisture content of the material shall be within the range of 0 to 4 percent wet of optimum moisture.

3.1.2.1 Rigid Pavement Subgrade

Subgrade for rigid pavements shall be compacted to at least 90 percent laboratory maximum density for the depth below the surface of the pavement shown.

3.1.2.2 Bituminous Pavement Subgrade

Subgrade for bituminous pavements shall be compacted to at least 95 percent laboratory maximum density for the depth below the surface of the pavement shown.

3.2 FINISHING

The surface of all excavations, embankments, and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for all graded areas shall be within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades shall be specified in paragraph: SUBGRADE PREPARATION above. Gutters and ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials.

3.3 SUBGRADE AND EMBANKMENT PROTECTION

During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall

not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until ballast, subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. No subbase, base course, ballast, or pavement shall be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, pavement, or ballast be placed on a muddy, spongy, or frozen subgrade.

3.4 TESTING

(SD08-G-RE)

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or may be tested by the Contractor subject to review. Moisture-density relations shall be determined as stated in paragraph: Degree of Compaction. Field in-place density shall be determined in accordance with ASTM D 1556, D 2167, D 2922, or D 2937. When ASTM D 2922 is used, the density calibration curves shall be checked and adjusted as necessary by the procedure described in paragraph 4, Calibration, of ASTM D 2922. The preferred method of calibration is that described in subparagraph 4.1.2, Field Calibration. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The moisture calibration curves furnished with the nuclear gauges shall be checked and adjusted as necessary by the procedure described in paragraph 7, Calibration, of ASTM D 3017. Calibration curves shall be developed using ASTM D 1556 to determine the volume of the reference samples. The calibration checks of both the density and moisture gauges shall be made at the beginning of the job on each different type of material encountered and at intervals as directed by the Contracting Officer. At least two field density tests performed in accordance with D 1556 shall be made daily and used as a check of the results obtained with ASTM D 2922/D 3017. ASTM D 2937 shall be used only for soft, fine-grained, cohesive soils. Test results shall be furnished to the Contracting Officer within 24 hours of making the test. When test results indicate that compaction is not as specified, the material shall be removed and replaced or recompacted to meet specification requirements at no additional cost to the Government. Subsequent tests on recompacted area shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.4.1 Subgrade Material Testing

One test per 500 cubic yards to determine the gradation and Atterberg limits of stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM D 422. Limits shall be determined in accordance with ASTM D 4318.

3.4.2 In-Place Densities

3.4.2.1 One test per 697 square meters, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

3.4.2.2 One test per 46.5 square meters, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

3.4.3 Check tests on in-place Densities

If ASTM D 2922 is used, in-place densities shall be checked by ASTM D 1556 as follows:

3.4.3.1 One check test per lift for each 6,968 square meters, or fraction thereof, of each lift of fill or backfill compacted by other than hand-operated machines.

3.4.3.2 One check test per lift for each 464.5 square meters of fill or backfill areas compacted by hand-operated machines.

3.4.4 Optimum Moisture and Laboratory Maximum Density

A moisture/density curve shall be made for each type material or source of material including borrow material to determine the laboratory optimum moisture and maximum density values. One representative test for each type and/or source of fill and backfill, or when any change in material occurs which may affect the optimum moisture or laboratory density. Included with each moisture/density curve will be a determination of the insitu moisture content determined in accordance with ASTM D 2216, Atterberg limits determined in accordance with ASTM D 4318, and a gradation curve determined in accordance with ASTM D 422.

3.4.5 Moisture Contents

The moisture content of material obtained from stockpile(s), excavation(s), or borrow area(s) shall be determined with a minimum of two tests per day per type of material or source of material during stable weather conditions. During unstable weather, additional tests shall be made as required by the Contracting Officer. Moisture content tests shall be made in accordance with ASTM D 2216 and checked for compliance with allowable limits relative to the laboratory optimum moisture. Atterberg limits (ASTM D 4318) and/or particle gradation tests (ASTM D 422) shall be made as required by the Contracting Officer in conjunction with each moisture content test in order to establish similarity with material used to determine the laboratory maximum density. The use of fly ash or other drying agent, approved by the Contracting Officer, to adjust the moisture content of excavated or borrow materials to within acceptable moisture ranges shall be the Contractor's option and shall be made at no additional cost to the Government. The request for approval shall be accompanied with a moisture/density curve developed for the soil in question with the minimum amount of drying agent required to reduce the moisture content from that encountered insitu to the maximum allowed relative to the laboratory optimum moisture. Henceforth, this moisture/density curve with the drying agent incorporated shall be used to determine the maximum laboratory density.

3.4.6 Tolerance Tests for Subgrades

Continuous checks on the degree of finish specified in paragraph: SUBGRADE PREPARATION shall be made during construction of the subgrades.

-- End of Section –

SECTION 02230

CLEARING AND GRUBBING
06/97

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Clearing

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, and rubbish occurring in the areas to be cleared.

1.1.2 Grubbing

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3″ (75 mm) in diameter, and matted roots from the designated grubbing areas.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 CLEARING

Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1-1/2″ (40 mm) or more in diameter and shall be trimmed of all branches the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches. Cuts more than 1-1/2″ (40 mm) in diameter shall be painted with an approved tree-wound paint. Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.2 GRUBBING

Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18″ (.5) meters below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform to the original adjacent surface of the ground.

3.3 TREE REMOVAL

Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots.

3.4 DISPOSAL OF MATERIALS

3.4.1 Materials Other Than Salable Timber

Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations, except for salable timber, shall be removed from the installation and disposed of in an appropriate waste disposal area. .

-- End of Section –

SECTION 02233 (LVN)

GRADED CRUSHED AGGREGATE BASE COURSE (Bituminous Pavement) AND RIGID BASE COURSE (PC Concrete Pavement)

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AAHSTO T 180-93	Moisture-Density Relations of Soils Using a 4.54 kg Rammer and an 457 mm Drop

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS:

C 88-90	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C 117-95	Materials Finer Than 75-um Sieve in Mineral Aggregates by Washing
C 131-89	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C 136-95a	Sieve Analysis of Fine and Coarse Aggregates
D 75-87 (R 1992)	Sampling Aggregates
D 1556-90	Density of Soil in Place by the Sand-Cone Method
D 2167-94	Density and Unit Weight of Soil in Place by the Rubber-Balloon Method
D 2487-93	Classification of Soils for Engineering Purposes
D 2922-91	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3017-88 (R 1993)	Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 4318-94	Liquid Limit, Plastic Limit and Plasticity Index of Soils
E 11-95	Wire-Cloth Sieves for Testing Purposes

1.2 SUBMITTALS

Government review is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. Submittals shall be submitted in accordance with SECTION: SUBMITTAL PROCEDURES.

SD-08 Statement

Testing Laboratory, para. 1.5; G-RE.

Documentation that sampling and testing was performed by a commercial testing laboratory or the Contractor in accordance with paragraph SAMPLING AND TESTING.

Material Source, para. 1.6; G-RE.

Source of material to be used for producing aggregates in accordance with subparagraph: Review of Materials. This shall be submitted with the report below.

SD-09 Reports

Initial Tests, para. 1.5.2.1; G-RE.

Initial test results on aggregate material including sieve analysis, wear test, soundness, liquid limit and plasticity index, and moisture-density relationships in accordance with subparagraph: Initial Testing.

1.3 DEGREE OF COMPACTION

Degree of Compaction is a percentage of the maximum density obtained by the test procedure presented in AASHTO T 180, Method D. This will be abbreviated herein after as percentage of laboratory maximum density.

1.4 EQUIPMENT

All plant, equipment, and tools used in the performance of the work will be subject to review before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.5 SAMPLING AND TESTING

(SD08-G-RE)

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved commercial testing laboratory, or by the Contractor subject to review. If the Contractor elects to establish testing facilities of his own, no work requiring testing will be permitted until the Contractor's facilities have been inspected and approved. The first inspection of the facilities shall be at the expense of the Government and any subsequent inspections required because of failure of the first inspection will be at the expense of the

Contractor. Such costs will be deducted from the total amount due the Contractor. The materials shall be tested to establish compliance with the specified requirements. Copies of test results shall be furnished to the Contracting Officer.

1.5.1 Samples

Samples for material gradation, liquid limit, and plastic limit tests shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.5.2 Tests

1.5.2.1 Initial Test (SD09-G-RE)

One of each of the following tests shall be performed on the proposed material, prior to commencing construction for each source of material: Sieve analysis, wear test, soundness, liquid limit and plasticity index, and moisture-density relationships. Test results shall be submitted to the Contracting Officer prior to commencing construction.

1.5.2.2 Sieve Analyses

Sieve analyses shall be made in conformance with ASTM C 117 and C 136. Sieves shall conform to ASTM E 11.

1.5.2.3 Liquid Limit and Plasticity Index

Liquid Limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.5.2.4 Testing Frequency

Testing frequency for sieve analysis, liquid limit and plasticity index: Results shall verify that the material complies with the specifications. After the initial test, a minimum of one analysis shall be performed for each 1,000 metric tons of material placed, with a minimum of one analysis for each day's placement until the base course is completed. When the source of materials is changed or deficiencies are found, the initial analysis shall be repeated and the material already placed shall be retested to determine the extent of unacceptable material. All in-place unacceptable material shall be replaced.

1.5.2.5 Density Tests

Density shall be measured in the field in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. For the method presented in ASTM D 1556 the base plate as shown in the drawing shall be used. For the method presented in ASTM D 2922 the calibration curves shall be checked and adjusted if necessary using only the sand cone method as described in paragraph: CALIBRATION of the ASTM publication. Tests performed in accordance with ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material

method, as described in paragraph: CALIBRATION of ASTM D 2922, on each different type of material being tested at the beginning of a job and at intervals as directed.

1.5.2.6 Testing Frequency For Density Test

Not less than one test shall be made to determine the field density of the compacted base course for each 836 square meters of each layer of material placed and not less than one test for each day's placement. Also, one test per 28 square meters, or fraction thereof, of each layer of material placed and compacted by hand-operated machines.

1.5.2.7 Soundness Tests

Soundness tests shall be made in conformance with ASTM C 88.

1.5.2.8 Wear Tests

Wear tests shall be made in conformance with ASTM C 131.

1.6 REVIEW OF MATERIAL

(SD08-G-RE)

The source of the material to be used for producing aggregates shall be selected well in advance of the time the material will be required in the work. Tentative review of the source will be based on an inspection by the Contracting Officer. Tentative review of material will be based on tests of samples for the specific job. Final review of both the source and the material will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted base course.

1.7 WEATHER LIMITATION

Base courses shall be placed when the atmospheric temperature is above 2 degrees C. Areas of completed base course that are damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirement.

PART 2 PRODUCTS

2.1 AGGREGATES

Aggregates shall consist of clean, sound, durable particles of crushed stone or crushed gravel, and screenings. The Contractor shall obtain materials that meet the specification and can be used to meet the grade and smoothness requirements specified herein, after all compaction operations have been completed. The aggregates shall be free of silt and clay as defined by ASTM D 2487, vegetable matter, and other objectionable materials or coatings. The portion retained on the 4.75-mm sieve shall be known as coarse aggregate; that portion passing the 4.75-mm sieve shall be known as fine aggregate.

2.1.1 Coarse Aggregates

Coarse aggregates shall be angular particles of uniform density. The coarse aggregate shall have a loss not greater than 24 percent weighted averaged at 5 cycles when tested for soundness in magnesium sulfate in accordance with ASTM C 88. The coarse aggregate shall have a percentage of wear not to exceed 40 after 500 revolutions as determined by ASTM C 131. The percentage of flat and/or elongated particles shall not exceed 20 in the fraction retained on the 12.5-mm sieve and in the fraction passing the 12.5-mm sieve. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the requirements set forth herein. Crushed gravel shall be manufactured from gravel particles, 90 percent of which by weight are retained on the maximum-size sieve listed in Table I. In the portion retained on each sieve specified, the crushed gravel shall contain at least 90 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest midsectional area of the face. When 2 fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces.

2.1.2 Fine Aggregate

Fine aggregate shall be natural sand or angular particles produced by crushing stone or gravel that meets the requirements for wear and soundness specified for coarse aggregate.

2.2 GRADATION REQUIREMENTS

Gradation requirements specified herein shall apply to the completed compacted base course. The aggregates shall have a maximum size of 50-mm and be graded continuously well within the limits specified in Table I. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION OF AGGREGATES

Sieve Designation	Percentage by Weight Passing Square-Mesh Sieve No. 1
50-mm	100
37.5-mm	70-100
25-mm	45-80
12.5-mm	30-60
4.75-mm	20-50
2-mm	15-40
425-um	5-25
75-um	0-10

Liquid limit and plasticity index requirements stated herein shall apply to any aggregate component that is blended to meet the required gradation and also to the aggregate in the completed base course. The portion of the aggregate passing the 0.425-mm sieve shall be either nonplastic or

have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer so as to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.2 PREPARATION OF SURFACE

Immediately prior to placing graded-crushed aggregate base course, the previously constructed underlying surface course shall be cleaned of all foreign substances; if the surface of the underlying material has been damaged after placement or has inadequate compaction or other deviations from this contract specification requirements, such defects shall be repaired immediately prior to placement of this course.

3.3 GRADE CONTROL

During construction, the lines and grades including crown and cross slope indicated for the base course shall be maintained by means of line and grade stakes placed by the Contractor.

3.4 MIXING OF MATERIALS

The coarse and fine aggregates shall be mixed in a stationary plant. Water shall also be added to the aggregate prior to placement at a stationary mixing plant. The amount of water added shall be considerably above optimum moisture. The Contractor shall make such adjustments in mixing procedures or in equipment as may be directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification.

3.5 PLACING

The mixed material shall be placed on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader box when possible as directed by the Contracting Officer. Tracked equipment operated on base course material shall have street tracks. When a compacted layer 150-mm or less in thickness is required, the material shall be placed in a single layer. When a compacted layer in excess of 6″ (150-mm) is required, the material shall be placed in layers of equal thickness. No layer shall exceed 6″ (150-mm) or be less than 3″(80-mm) when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water

content, content, and to insure an acceptable base course. Mixed material shall not be placed on or above frozen material.

3.6 COMPACTION

3.6.1 Requirements

Each layer of aggregate, including shoulders, shall be compacted as specified to produce an average field-measured density, through the full depth, of at least the percent of maximum density obtained in the laboratory as specified below. Water content shall be maintained during the compaction procedure within the range of optimum to saturated. The density shall be determined after the base course has cured to a range of plus 2 percent to minus 2 percent of optimum. Water content shall be determined from laboratory tests as specified in density test procedures listed in paragraph: SAMPLING AND TESTING. In all places not accessible to the rollers, the aggregate material shall be compacted with mechanical tampers.

Graded Crushed Aggregate Base Course	100 percent density
Rigid Base Course	95 percent density

3.6.2 Finishing

The surface of top layer of base course shall be finished after final compaction, by cutting any overbuild to grade and rolling with a steel-wheeled roller. In no case will thin layers of material be added to the top layer of base course to meet grade. If the elevation of top layer of base course is 12.7-mm or more below the grade, the top layer of base shall be scarified to a depth of at least 3”(80-mm), new material shall be added, and the layer shall be blended and recompacted to bring to grade. Adjustments in rolling and finishing procedures shall be made as may be directed to obtain grades, to minimize segregation and degradation of base course material, to adjust the water content, and to insure an acceptable base course. Material found unacceptable shall be removed and replaced, as directed, with acceptable material.

3.7 EDGES OF BASE COURSE

Acceptable material shall be placed along the edges of the base course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 0.30-m width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the base course, as directed.

3.8 SMOOTHNESS TEST

The surface of the top layer shall not deviate more than 3/8”(9.5-mm) when tested with a 5.05 m straightedge applied parallel with and at right angles to the centerline of the area to be paved. Deviations exceeding 3/8”(9.5-mm) shall be corrected as directed. Measurements taken at right angles to the centerline shall be taken at a minimum of 15.24 m intervals.

3.9 THICKNESS CONTROL

The completed thickness of the base course shall be within ½″(12.7-mm) of the thickness indicated. The thickness of the base course shall be measured at intervals providing at least one measurement for at least each 418.1 square meters of base course. The depth measurement shall be made by test holes at least 3″(76.2-mm) in diameter. Where the measured thickness of the base course is more than 3″(12.7-mm) deficient, such areas shall be corrected by excavating to the required depth and replacing with new material. Where the measured thickness of the base course is 3″(12.7-mm) more than indicated, it will be considered as conforming with the requirements plus 3″(12.7-mm), provided the surface of the base course is within 3″(12.7-mm) below established grade and not above the established grade. The average job thickness shall be the average of the job measurements as specified above but within ¼″(6.35-mm) of the thickness indicated.

3.10 MAINTENANCE

The base course shall be maintained in a condition that will meet all specification requirements until accepted.

-- End of Section --

SECTION 02235

LIME-MODIFIED SUBGRADE

PART 1 GENERAL

1.1 APPLICABLE PUBLICATIONS

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS:

C 25-93a	Chemical Analysis of Limestone, Quicklime and Hydrated Lime
C 50-86 (R 1991)	Sampling, Inspection, Packing and Marking of Lime and Limestone Products
C 110-92a	Physical Testing of Quicklime, Hydrated Lime and Limestone
C 136-93	Sieve Analysis of Fine and Coarse Aggregate
C 977-92	Specification for Quicklime and Hydrated Lime for Soil Stabilization
D 422-63 (R 1990)	Particle-Size Analysis of Soils
D 1140-92	Amount of Material in Soils Finer than the No. 200 (75-um) Sieve (R 1971)
D 1556-90	Density of Soil in Place by the Sand-Cone Method
D 1557-91	Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/cu.ft. (2,700 kn-m/cu.m)
D 2166-91	Test Methods for Unconfined Compressive Strength of Cohesive Soil
D 2167-94	Density of Soil in Place by the Rubber-Balloon Method
D 2487-92	Classification of Soils for Engineering Purposes

D 2922-91	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3017-88 (R 1993)	Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 4318-93	Liquid Limit, Plastic Limit and Plasticity Index of Soils
E 11-87	Wire-Cloth Sieves for Testing Purposes

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

T 180-93	Moisture-Density Relations of Soils Using a 4.54 kg Rammer and a 457 mm Drop

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having a "FIO" designation are for information only. The following shall be submitted in accordance with SECTION SUBMITTAL PROCEDURES.

SD-01 Data

Equipment, para. 3.3; G-RE

The equipment, plant, machines and tools used in the performance of work in accordance with paragraph: EQUIPMENT.

SD-08 Statements

Testing Laboratory, para. 3.2; G-RE

Qualification of the testing laboratory, which will be performing all testing in accordance with paragraph SAMPLING AND TESTING DURING CONSTRUCTION.

SD-09 Reports

Test Report, para. 2.1.1; G-RE

SD-13 Certificates

Lime, para. 2.1.1; G-RE

Lime shall be in accordance with paragraph MATERIALS.

Sources, para. 3.2.2; G-RE

Sources from which lime is to be obtained with certified mill results showing the lime meets all the requirements as outlined in paragraph SOURCE.

1.3 DEFINITIONS

1.3.1 Satisfactory Materials

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, GM, SC, SW, SM, ML, CL or CH.

1.3.2 Unsatisfactory Materials

Unsatisfactory materials shall comprise any materials classified by ASTM D 2487 as Pt, OH, OL or MH.

1.3.3 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. Testing required for classifying materials shall be in accordance with D 422, D 1140, D 2487 and D 4318.

1.3.4 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 or AASHTO T 180, Method D, abbreviated hereinafter as percent laboratory maximum density. The test method identified in AASHTO T 180 shall only be appropriate when more than 30% by weight of particles are retained on the ? (19.0-mm) sieve.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Lime (SD09 & SD13-G-RE)

Lime shall be a hydrated or granular quick lime conforming to the following requirements:

2.1.1.1 Hydrated Lime

Hydrated lime for this purpose shall be any hydrated lime product consisting of hydrated lime and insoluble inert material and conforming to the following as to chemical composition and residue:

1)	Available Lime Index as Calcium Hydroxide, $Ca(OH)_2$ Minimum	90%
2)	Residue retained on a 600 um (No. 30) sieve, Maximum	1%
3)	Residue retained on a 75 um (No. 200) sieve, Maximum.	2%

2.1.1.2 Granular Quicklime

Granular quicklime is a calcined material, the major part of which is calcium oxide or calcium oxide in natural association with a lesser amount of magnesium oxide capable of slaking with water. This specification applies specifically to limes made from calcium-type limestones. When tested under the appropriate methods of test, the lime shall conform to the following requirements:

1) Available Lime Index as Calcium Oxide, (CaO) Minimum. Not less than 90%

2) Fineness (Dry Sieve):

   a. Retained on a 16 mm (5/8") Sieve, %5 Maximum

   b. Retained on a 425 um (No. 40) Sieve, %75 Minimum

   c. Retained on a 75 um (No. 200) Sieve, %96 Minimum

3) Residue after slaking (wet sieve):

   a. Retained on a 850 um (No. 20) Sieve, %5.0 maximum

2.1.2 Water

Water shall be clean, fresh and free from injurious amounts of oil, acid, salt, alkali, organic matter and other substances deleterious to the lime or soil-lime mixture, and shall be subject to review.

PART 3 EXECUTION

3.1 RATES OF MATERIALS APPLICATIONS AND DENSITY

3.1.1 Lime Modified Subgrade Application

The Contractor shall construct a working platform for new pavement construction by lime-modifying the subgrade soil. To accomplish this, the Contractor shall incorporate a minimum of 5 percent hydrated lime by weight (based on oven-dry weight of the soil) or a minimum 3.8 percent granular quicklime by weight (based on oven-dry weight of the soil) to the minimum depth shown on the drawings below top of subgrade.

3.1.2 Density

The density of the compacted soil-lime mixture for the full thickness of the modification shall be at least the maximum laboratory density obtained by the test procedure presented in ASTM D 1557 or AASHTO T 180, Method D. The maximum laboratory density shall be determined after the lime and water have been mixed into the subgrade and cured for at least 24 hours.

3.1.2.1 Rigid Pavements Subgrade

Subgrade for rigid pavements shall be compacted to at least 90 percentage laboratory maximum density for the depth below the surface of the pavement shown.

3.1.2.2 Bituminous Pavements Subgrade

Subgrade for bituminous pavements shall be compacted to at least 95 percentage laboratory maximum density for the depth below the surface of the pavement shown.

3.2 SAMPLING AND TESTING DURING CONSTRUCTION

(SD08-G-RE)

Sampling and testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Sampling and testing shall be performed by a commercial testing laboratory or may be performed by the Contractor subject to review. Tests shall be performed at the frequency specified hereinafter. Copies of the test results shall be furnished to the Contracting Officer as soon as tests are performed and in every case prior to placing subsequent construction over the completed lime-modified subgrade.

3.2.1 General

The Contractor shall select the source of lime and perform the initial sampling and testing sufficiently in advance to not delay the work. The Contractor shall control his operations during production and placement of material, so that a working platform will be obtained. All quality control sampling and testing shall be performed by the Contractor in accordance with paragraph: CONTRACTOR QUALITY CONTROL in SECTION: CONSTRUCTION CLAUSES and as specified herein. The Government may perform verification tests for final review of the materials in the completed courses.

3.2.2 Source (SD13-G-RE)

The source from which the lime is to be obtained shall be designated by the Contractor and the Contractor shall furnish certified mill results at least 30 days prior to use of the lime. The certified mill results shall show that the lime meets all requirements specified herein. Lime will be sampled and tested in accordance with the following methods:

1) Chemical Analysis ASTM C25

2) Physical Tests ASTM C110

3.2.3 Samples

Samples of lime shall be in conformance with ASTM C 50. During actual construction, no substitution shall be made in the materials which were used in the verification tests without additional verification testing similar to the original verification tests.

3.2.4 Verification Tests

During construction of the lime-modified subgrade, the Contractor shall verify the application rate and depth of stabilization.

3.2.5 Control Tests

3.2.5.1 Sieve analyses shall be made on sieves conforming to ASTM E 11. Lime shall be tested for the specified chemical requirements in accordance with ASTM C 25.

3.2.5.2 Sieve analysis of soil and soil-lime mixture will be made in conformance with ASTM C 136 on sieves conforming to ASTM E 11.

3.2.5.3 Density-Moisture Determinations

Tests for determination of maximum density and optimum moisture shall be the responsibility of the Contractor in accordance with the requirements stated in paragraph: Degree of Compaction. Samples shall be representative of the materials to be placed. An optimum moisture-density curve shall be obtained for each principal type of material or combination of materials encountered or utilized. Results of these tests shall be the basis of control for compaction. The density-moisture determination shall include Atterberg limits, grain size determinations and specific gravity.

3.2.5.4 Density Control

The Contractor shall adequately control his compaction operations by tests made in accordance with any of the following methods: ASTM D 1556, ASTM D 2167 or ASTM D 2922 and ASTM D 3017 to insure placement of materials within the limits of densities specified. When ASTM D 2922 is used, the calibration curves shall be checked, and adjusted if necessary, using the sand cone method as described in paragraph: CALIBRATION of ASTM D 2922. ASTM D 2922 results in a wet unit weight of soil and when using this method. ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with the density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job, on each different type of material encountered, at intervals as directed by the Contracting Officer. If ASTM D 2922 is used for field density control, there should be at least one test performed according to ASTM D 1556 per every 10 tests performed according to ASTM D 2922 for correlation of test results. One test shall be made for each 840 square meters (1,000 sq. yds.) or less for each layer of specified depth. Additional tests shall be made as necessary. All test results shall be made available to the Contracting Officer. Acceptance tests may be made by the Government for verification of compliance; however, the Contractor shall not depend on such tests for his control of operations. Deficiencies in construction shall be corrected by the Contractor at no additional cost to the Government.

3.3 EQUIPMENT (SD01-G-RE)

The equipment, plant, machines and tools used in the performance of the work covered by this specification shall be approved prior to commencement of work, shall be maintained in a satisfactory working condition at all times, and shall have the capability of producing soil-lime stabilization conforming to these specifications. Sufficient equipment shall be provided to perform the work continuously. Protective equipment apparel and barriers shall be provided to protect the eyes, respiratory system and skin of workers exposed to contact with lime dust or slurry. The Contracting Officer shall have access at any time to all parts of the plant for the purpose of checking the adequacy of the equipment in use, inspecting the operation of the plant, and verifying the weights, proportions and character of materials.

3.3.1 Pulverizing Equipment

The pulverizing equipment shall be self-propelled, 4 wheel drive and operated by a single operator. It shall be capable of pulverizing in a single-pass the existing full depth and 2.44 meters (8 feet) wide. The rotor shall be

capable of up or down cutting. It shall be equipped with tap-in, knock-out, bullet-type teeth, all of which are identical.

3.4 WEATHER LIMITATIONS

No lime shall be applied except when the air temperature is at least 4.44 degrees C (40 degrees F) in the shade and is rising. No lime shall be applied to soils that are frozen or contain frost. If the air temperature falls below 1.67 degrees C (35 degrees F) in the shade completed lime-treated areas shall be protected by approved methods against any detrimental effects of freezing. Uncompacted soil-lime mixture, that is wet by rain so that the average moisture content at the time of compaction exceeds the tolerance specified in the MIXING AND PLACING MATERIALS paragraph, shall be dried by aeration or other approved methods until the moisture content within the specified limits is obtained. Any portion of the completed soil lime treated areas damaged by freezing shall be completely removed and replaced with new soil-lime material in accordance with this specification at no additional cost to the Government.

3.5 DRAINAGE

Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the area to be stabilized or on the pulverized, mixed or partially mixed material.

3.6 PREPARATION OF AREA TO BE MODIFIED

After pavement and subgrade excavation, the area to be modified shall be cleaned of debris. The area shall be capable of withstanding without displacement, the compaction equipment specified for the soil-lime mixture.

3.6.1 In-Place Material To Be Modified

Subgrade shall be shaped to line, grade, and cross section. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade and cross section.

3.7 MIXING AND PLACING MATERIALS

The mixing and placing of materials shall be performed by the following methods:

3.7.1 Mixed In-Place Method

3.7.1.1 Preliminary Scarifying and Pulverizing of Soil

Prior to the application of lime, the soil shall be scarified and pulverized as necessary to a sufficient width and depth to obtain a uniform mixture of soil, lime and water and to form a compacted lime-treated course

conforming to the cross section indicated. Scarification shall be carefully controlled so that the subgrade, subbase, or base course beneath the layer to be treated is not disturbed. After being scarified, the loosened soil shall be pulverized, with care being taken to insure that the depth of pulverizing does not exceed the depth of scarification.

3.7.1.2 Application of Lime

The pulverized material shall be shaped to approximately the cross section indicated. Lime shall be applied to the soil in such a manner and in such quantities so that when uniformly mixed with the soil, the specified lime content is obtained, and a sufficient quantity of lime-treated soil is produced to construct a compacted lime-treated course conforming to the lines, grades and cross section indicated. Lime shall be applied in bulk, in a slurry or from bags. Mechanical spreaders shall be used in applying the bulk lime. Distributors shall be used in applying slurry. If the lime is spread by hand, the bags shall be spotted accurately on the area being modified so that when the bags are opened the lime will be dumped and spread uniformly on the area being processed. No equipment except that used in spreading and mixing shall be allowed to pass over the freshly spread lime or slurry.

3.7.1.3 Initial Mixing

Immediately after the lime has been distributed, the lime and soil shall be mixed. Initial mixing shall be sufficient to alleviate any dusting or wetting of the lime that might occur in the event of wind or rainstorms. However, final mixing shall immediately follow the initial mixing.

3.7.1.4 Water Application and Moist Mixing

After completion of initial mixing and in preparation for final mixing prior to compaction, the moisture content of the mixture will be determined. The moisture in the mixture following final mixing shall not be less than the specified optimum water content based on dry weight of soil and shall not exceed the optimum water content by more than 3 percentage points. During final mixing, water (if required), shall be uniformly applied as needed. Water may be added in increments as large as the equipment will permit; however, such increments of water shall be partially incorporated in the mix to avoid concentration of water near the surface. After the last increment of water has been added, mixing shall be continued until the water is uniformly distributed throughout the full depth of the mixture. Particular care shall be taken to insure satisfactory moisture distribution along the edges of the section.

3.8 LAYER THICKNESS

After final mixing the material shall be compacted in 200 mm (8-inch) maximum lifts. If the minimum density cannot be obtained throughout the entire lift, Contractor will be required to construct the layer in two or more lifts.

3.9 COMPACTION AND FINISHING

3.9.1 Mixed In-Place Material

Prior to compaction, the mixture shall be pulverized so that 60 percent of the soil, by dry weight, exclusive of plus No. 4 gravel or stone, will pass a 4.75 mm (No. 4 sieve). The water content of the soil-lime mixture shall be checked and adjusted if required to obtain a uniform water content for the full depth of layer within the specified limits. The loose material shall then be uniformly compacted to the density specified above.

3.9.2 Final Compaction

During final compaction, the surface shall be moistened, if necessary, and shaped to the required lines, grades and cross section. In places inaccessible to rollers and finishing and shaping equipment, the mixture shall be thoroughly compacted with power tampers to the required density, and shall be shaped and finished by hand methods. Should the surface of the course, for any reason, become rough, corrugated, uneven in texture, or traffic marked prior to completion, such unsatisfactory portions shall be torn up, reworked or replaced as directed, at no additional cost to the Government. Should any portion of the surface, when laid, become water soaked for any reason, that portion shall be torn up at once and aerated until the water content is reduced to within the specified limits and then reshaped and compacted as specified above.

3.10 CONSTRUCTION JOINTS

At the end of each phase of construction, a straight transverse construction joint shall be formed by cutting back into the completed work to form a true vertical face free of loose or shattered material. Material along construction joints not properly compacted shall be removed and replaced with soil lime mixture that is mixed moistened, and compacted in accordance with this specification.

3.11 EDGES OF STABILIZED COURSE

Approved material shall be placed along the edges of the modified course in such quantity as will compact to the thickness of the course being constructed, or, when the course is being constructed in two or more layers, to the thickness of each layer of the course, allowing in each operation at least a 0.305 meters (1-foot) width of the shoulder to be rolled and compacted simultaneously with the rolling and compacting of each layer of the modified course.

3.12 SMOOTHNESS TEST

The surface of a modified layer which is to receive a surfacing layer shall not show any deviations in excess of 9.52 mm (3/8 inch) when tested with a 3.05 meters (10-foot) straightedge applied parallel with the centerline of the area to be paved. Any deviation in excess of this amount shall be corrected by the Contractor by removing material, replacing with new material, or reworking existing material and compacting, as directed.

3.13 THICKNESS CONTROL

The completed thicknesses of the modified course shall be within 12.7 mm (1/2 inch) plus or minus of the thicknesses indicated. The thickness of the modified course shall be measured at intervals in such manner that there will be one depth measurement at least for each 2100 square meters (2500 square yards) of modified course. The depth measurement shall be made by test holes, at least 76.2 mm (3 inches) in diameter through the modified course.

Where the measured thickness of the modified course is more than 12.7 mm (1/2 inch) deficient in thickness, the Contractor shall correct such areas at no additional expense to the Government by scarifying, adding mixture of proper gradation, reblading and recompacting as directed. Where the measured thickness of the modified course is more than 12.7 mm (1/2 inch) thicker than that indicated, it shall be considered as conforming with the specified thickness requirement plus 12.7 mm (1/2 inch). The average job thickness shall be the average of the job measurements determined as specified above but shall be within 6.35 mm (1/4 inch) of the thickness indicated.

3.14 CURING, PROTECTION AND COVER

Immediately after the soil lime area has been finished as specified above, the surface shall be protected against rapid drying for 7 days by moist curing. The modified area shall be protected from freezing during the curing period or until hardened, whichever is longer.

3.14.1 Moist Curing

The area shall be moistened by sprinkling and shall be kept moist for the 7-day curing period unless otherwise directed.

3.15 TRAFFIC

Completed portions of the lime-treated-soil area may be opened immediately to light, local traffic providing the curing membrane is not impaired and to all other traffic after the curing period has elapsed. Heavy equipment shall not be permitted on the area during the curing period. However, the necessary lime and water may be hauled over the completed area with pneumatic-tired equipment with the approval of the Contracting Officer. Finished portions of lime-modified soil that are traveled on by equipment used in constructing an adjoining section shall be protected in such a manner so as to prevent marring or damaging the completed work.

3.16 MAINTENANCE

The modified area shall be maintained in a satisfactory condition until the completed work is accepted. Maintenance shall include immediate repairs of any defects, as determined by the Contracting Officer, that may occur either before or after the lime is applied and shall be repeated as often as may be necessary to keep the area continuously intact. Defects shall be corrected by removing defective material and replacing with new material or by scarifying, adding mixture of proper gradation, reblading and recompacting as directed at no additional cost to the Government. Repairs shall be made in a manner to provide a uniform surface.

-- End of Section --

SECTION 02364

TERMITICIDE TREATMENT MEASURES FOR SUBTERRANEAN TERMITE CONTROL

PART 1 GENERAL

1.1 SUBMITTALS

Government review is required for submittals with a “G-RE” designation; submittals having an “FIO” designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Instructions

Termiticides; FIO.

Manufacturer’s label and Material Safety Data Sheet (MSDS) for termiticides proposed for use.

SD-07 Schedules

Equipment; FIO.

A listing of equipment to be used.

SD-08 Statements

Foundation Exterior; FIO.

Written verification that other site work will not disturb the treatment.

Utilities and Vents; FIO.

Written verification that utilities, vents have been located.

Soil Moisture; FIO.

Soil moisture test result.

Verification of Measurement; FIO.

Written verification that the volume of termiticide used meets the application rate.

SD-09 Reports

Equipment Calibration and Tank Calibration; FIO.

Certification of calibration tests conducted on the equipment used in the termiticide application.

SD-13 Certificates

Qualifications; FIO.

Qualifications and state license number of the termiticide applicator.

SD-14 Samples

Termiticides; FIO.

Termiticide samples obtained during application, upon request.

SD-18 Record

Termiticide Application Plan; GA.

Termiticide application plan with proposed sequence of treatment work with dates and times. The termiticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area/volume treated, amount applied; and the name and state license number of the state certified applicator shall be included.

1.2 QUALIFICATIONS

The Contractor's principal business shall be pest control. The Contractor Shall be licensed and the termiticide applicators certified in the state where the work is to be performed. Termiticide applicators shall also be certified in the U.S. Environmental Protection Agency (EPA) pesticide applicator category which includes structural pest control.

1.3 SAFETY REQUIREMENTS

The Contractor shall formulate, treat, and dispose of termiticides and their containers in accordance with label directions. Use the clothing and personal protective equipment specified on the labeling for use during all phases of the application.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Termiticide material shall be delivered to the site in the original unopened containers bearing legible labels indicating the EPA registration number and manufacturer's registered uses. All other materials to be used on site for the purpose of termite control shall be delivered in new or otherwise good condition as supplied by the manufacturer or formulator.

1.4.2 Storage

Materials shall be stored in designated areas and in accordance with manufacturer's labels. Termiticides and related materials shall be kept under lock and key when unattended.

1.4.3 Handling

Termiticides shall be handled in accordance with manufacturer's labels. Manufacturer's warnings and precautions shall be observed. Materials shall be handled preventing contamination by dirt, water, and organic material. Protect termiticides from sunlight as recommended by the manufacturer.

1.5 INSPECTION

Termiticides shall be inspected upon arrival at the job site for conformity to type and quality in accordance with paragraph TERMITICIDE. Each label shall bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended. Other materials shall be inspected for conformance with specified requirements. Unacceptable materials shall be removed from the job site.

1.6 WARRANTY

The Contractor shall provide a 5-year written warranty against infestations or reinfestations by subterranean termites of the building constructed under this contract. Warranty shall include annual inspections of the buildings.

PART 2 PRODUCTS

2.1 TERMITICIDES

Termiticides shall be currently registered by the EPA. Termiticide shall be selected for maximum effectiveness and duration after application. The selected termiticide shall be suitable for the soil and climatic conditions at the project site.

PART 3 EXECUTION

3.1 TECHNICAL REPRESENTATIVE

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for subterranean termites. They may be present during treatment application.

3.2 SITE PREPARATION

Site preparation shall be in accordance with Sections 02230 CLEARING AND GRUBBING, 02221 EXCAVATION, TRENCHING AND BACKFILLING FOR BUILDINGS, 02921 SEEDING, 02922 SODDING, AND 02930 EXTERIOR PLANTING. Work related to final grades, landscape plantings, foundations, or any other alterations to finished construction which might alter the condition of treated soils, shall be coordinated with this specification.

3.2.1 Ground Preparation

Food sources shall be eliminated by removing debris from clearing and grubbing and post construction wood scraps such as ground stakes, form boards, and scrap lumber from the site, before termiticide application begins.

3.2.2 Verification

Before work starts, the Contractor shall verify that final grades are as indicated and smooth grading has been completed. Soil particles shall be finely graded with particles no larger than 1 inch (25 mm) and compacted to eliminate soil movement to the greatest degree.

3.2.3 Foundation Exterior

The Contractor shall provide written verification that final grading and landscape planting operations will not disturb treatment of the soil on the exterior sides of foundation walls, grade beams, and similar structures.

3.2.4 Utilities and Vents

The Contractor shall provide written verification that the location and identity of HVAC ducts and vents, water and sewer lines, and plumbing have been accomplished prior to the termiticide application.

3.3 SITE CONDITIONS

The following conditions shall determine the time of application.

3.3.1 Soil Moisture

Soils to be treated shall be tested immediately before application. Soil moisture content shall be tested to a minimum depth of 3 inches (75 mm). The soil moisture shall be as recommended by the termiticide manufacturer. The termiticide will not be applied when soil moisture exceeds manufacturer’s recommendations because termiticides do not adhere to the soil particles in saturated soils.

3.3.2 Runoff and Wind Drift

Termiticide shall not be applied during or immediately following heavy rains. Applications shall not be performed when conditions may cause runoff or create an environmental hazard. Applications shall not be performed when average wind speed exceeds 10 miles per hour (16 km per hour). The termiticide shall not be allowed to enter water systems, aquifers, or endanger humans or animals.

3.3.2.1 Vapor Barriers and Waterproof Membranes

Termiticide shall be applied prior to placement of a vapor barrier or waterproof membrane.

3.3.2.2 Utilities and Vents

Prior to application, HVAC ducts and vents located in treatment area shall be turned off and blocked to protect people and animals from termiticide.

3.3.3 Placement of Concrete

Concrete covering treated soils shall be placed as soon as the termiticide has reached maximum penetration into the soil. Time for maximum penetration shall be as recommended by the manufacturer.

3.4 TERMITICIDE TREATMENT

3.4.1 Equipment Calibration and Tank Measurement

Immediately prior to commencement of termiticide application, calibration tests shall be conducted on the application equipment to be used and the application tank shall be measured to determine the volume and contents. These tests shall confirm that the application equipment is operating within the manufacturer’s specifications and will meet the specified requirements. The Contractor shall provide written certification of the equipment calibration test results within 1 week of testing.

3.4.2 Mixing and Application

Formulating, mixing, and application shall be performed in the presence of the Contracting Officer or the technical representative. A closed system is recommended as it prevents the termiticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying termiticides shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.4.3 Treatment Method

For areas to be treated, the Contractor shall establish complete and unbroken vertical and/or horizontal soil poison barriers between the soil and all portions of the intended structure which may allow termite access to wood and wood related products.

3.4.3.1 Surface Application

Surface application shall be used for establishing horizontal barriers. Surface applicants shall be applied as a coarse spray and provide uniform distribution over the soil surface. Termiticide shall penetrate a minimum of 1 inch (25 mm) into the soil, or as recommended by the manufacturer.

3.4.3.2 Rodding and Trenching

Rodding and trenching shall be used for establishing vertical soil barriers. Trenching shall be to the depth of the foundation footing. Width of trench shall be as recommended by the manufacturer, or as indicated. Rodding or other approved method may be implemented for saturating the base of the trench with termiticide. Immediately after termiticide has reached maximum penetration as recommended by the manufacturer, backfilling of the trench shall commence. Backfilling shall be in 6-inch (150 mm) rises or layers. Each rise shall be treated with termiticide.

3.4.4 Sampling

The Contracting Officer may draw from stocks at the job site, at any time and without prior notice, samples of the termiticides used to determine if the amount of active ingredient specified on the label is being applied.

3.5 VERIFICATION OF MEASUREMENT

Once termiticide application has been completed, tank contents shall be measured to determine the remaining volume. The total volume measurement of used contents for the application shall equal the established application rate for the project site conditions. The Contractor shall provide written verification of the measurements.

3.6 CLEAN UP, DISPOSAL, AND PROTECTION

Once application has been completed, the Contractor shall proceed with clean up and protection of the site without delay.

3.6.1 Clean Up

The site shall be cleaned of all material associated with the treatment measures, according to label instructions, and as indicated. Excess and waste material shall be removed and disposed off site.

3.6.2 Disposal of Termiticide

The Contractor shall dispose of residual termiticides and containers off Government property, and in accordance with label instructions and EPA criteria.

3.6.3 Protection of Treated Area

Immediately after the application, the area shall be protected from other use by erecting barricades and providing signage as required or directed.

3.7 CONDITIONS FOR SATISFACTORY TREATMENT

3.7.1 Equipment Calibrations and Measurements

Where results from the equipment calibration and tank measurements tests are unsatisfactory, re-treatment will be required.

3.7.2 Testing

Should an analysis, performed by a third party, indicate that the samples of the applied termiticide contain less than the amount of active ingredient specified on the label, and/or if soils are treated to a depth less than specified or approved, re-treatment will be required.

3.7.3 Disturbance of Treated Soils

Soil and fill material disturbed after treatment shall be re-treated before placement of slabs or other covering structures.

3.7.4 Termites Found Within the Warranty Period

If live subterranean termite infestation or termite damage is discovered during the warranty period, the Contractor shall re-treat the site.

3.8 RE-TREATMENT

Where re-treatment is required, the Contractor shall:

a. Re-treat the soil and/or perform other treatment as necessary for Prevention or elimination of subterranean termite infestation.

b. Repair damage caused by termite infestation.

- End of Section –

SECTION 02510

WATER DISTRIBUTION SYSTEM
04/98

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.

AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA)

AREA-01	(1996) 1996-1997 Manual for Railway Engineering (Fixed Properties) 4 Vol.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1996) Carbon Structural Steel
ASTM A 53	(1997) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM B 88	(1996) Seamless Copper Water Tube
ASTM C 76	(1995a) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 76M	(1996) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM D 1599	(1988; R 1995) Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
ASTM D 1784	(1996) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(1996a) Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(1996a) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2464	(1996a) Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(1996a) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2467	(1996a) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

ASTM D 2564	(1996a) Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2657	(1996) Heat Fusion Joining Polyolefin Pipe and Fittings
ASTM D 2774	(1994) Underground Installation of Thermoplastic Pressure Piping
ASTM D 2855	(1996) Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 2996	(1995) Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
ASTM D 2997	(1995) Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting-Resin) Pipe
ASTM D 3139	(1996a) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D 3839	(1994a) Underground Installation of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe
ASTM F 477	(1995) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 1483	(1993) Oriented Poly(Vinyl Chloride), PVCO, Pressure Pipe

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B1.20.1	(1983; R 1992) Pipe Threads, General Purpose (Inch)
ASME B16.1	(1989) Cast Iron Pipe Flanges and Flanged Fittings
ASME B16.3	(1992) Malleable Iron Threaded Fittings
ASME B16.26	(1988) Cast Copper Alloy Fittings for Flared Copper Tubes
ASME B36.10M	(1996) Welded and Seamless Wrought Steel Pipe

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300	(1992) Hypochlorites
AWWA B301	(1992) Liquid Chlorine
AWWA ANSI/AWWA C104/A21.4	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

AWWA ANSI/AWWA C105/A21.5	(1993) Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA ANSI/AWWA C110/A21.10	(1993) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75# mm through 1200# mm), for Water and Other Liquids
AWWA ANSI/AWWA C111/A21.11	(1995) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA ANSI/AWWA C115/A21.15	(1994) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA ANSI/AWWA C151/A21.51	(1996) Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
AWWA ANSI/AWWA C153/A21.53	(1994; Errata Nov 1996) Ductile-Iron Compact Fittings, 3 In. Through 24 In. (76 mm through 610 mm) and 54 In. through 64 In. (1,400 mm through 1,600 mm) for Water Service Liquids
AWWA C200	(1991) Steel Water Pipe - 6 In. (150 mm) and Larger
AWWA C203	(1991) Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied
AWWA ANSI/AWWA C205	(1995) Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. (100 mm) and Larger - Shop Applied
AWWA C207	(1994) Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm through 3,600 mm)
AWWA ANSI/AWWA C208	(1996) Dimensions for Fabricated Steel Water Pipe Fittings
AWWA C300	(1989) Reinforced Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids
AWWA C301	(1992) Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids
AWWA ANSI/AWWA C303	(1995) Concrete Pressure Pipe, Bar-Wrapped, Steel Cylinder Type
AWWA C500	(1993; C500a) Metal-Sealed Gate Valves for Water Supply Service
AWWA ANSI/AWWA C502	(1994; C502a) Dry-Barrel Fire Hydrants

AWWA C503	(1988) Wet-Barrel Fire Hydrants
AWWA C504	(1994) Rubber-Seated Butterfly Valves
AWWA C509	(1994) Resilient-Seated Gate Valves for Water Supply Service
AWWA C600	(1993) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	(1987) Grooved and Shouldered Joints
AWWA C651	(1992) Disinfecting Water Mains
AWWA ANSI/AWWA C700	(1995) Cold-Water Meters - Displacement Type, Bronze Main Case
AWWA C701	(1988) Cold-Water Meters - Turbine Type, for Customer Service
AWWA ANSI/AWWA C702	(1992) Cold-Water Meters - Compound Type
AWWA ANSI/AWWA C703	(1996) Cold-Water Meters - Fire Service Type
AWWA ANSI/AWWA C704	(1992) Propeller-Type Meters Waterworks Applications
AWWA C706	(1996) Direct-Reading, Remote-Registration Systems for Cold-Water Meters
AWWA ANSI/AWWA C707	(1982; R 1992) Encoder-Type Remote-Registration Systems for Cold-Water Meters
AWWA C800	(1989) Underground Service Line Valves and Fittings
AWWA C900	(1989; C900a) Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution
AWWA C901	(1996) Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. Through 3 In., for Water Service
AWWA C905	(1988) Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 In. Through 36 In.
AWWA C950	(1995) Fiberglass Pressure Pipe
AWWA M23	(1980) Manual: PVC Pipe - Design and Installation

ASBESTOS CEMENT PIPE PRODUCERS ASSOCIATION (ACPPA)

ACPPA-01	(1988) Recommended Work Practices for A/C Pipe

DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA)

DIPRA-01	(1997) Thrust Restraint Design for Ductile Iron Pipe

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	(1997) Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(1995) Installation of Private Fire Service Mains and Their Appurtenances
NFPA 49	(1994) Hazardous Chemicals Data
NFPA 325-1	(1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids
NFPA 704	(1996) Identification of the Fire Hazards of Materials for Emergency Response
NFPA 1961	(1997) Fire Hose

NSF INTERNATIONAL (NSF)

NSF ANSI/NSF 14	(1996) Plastics Piping Components and Related Materials
NSF ANSI/NSF 61	(1997a) Drinking Water System Components - Health Effects (Sections 1-9)

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 21	(1991) White or Colored Silicone Alkyd Paint
SSPC Paint 25	(1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)

1.2 PIPING

This section covers water supply distribution service lines, and connections to building service at a point approximately 1.5 m outside buildings and structures to which service is required. The Contractor shall have a copy of the manufacturer's recommendations for each material or procedure to be utilized available at the construction site at all times.

1.2.1 Distribution Lines 80 mm 3 Inches) or Larger

Piping for water distribution lines 80 mm (3 inches) or larger shall be polyvinyl chloride (PVC) through 900 mm (36 inch) nominal diameter plastic, unless otherwise shown or specified.

1.2.2 Supply Lines 80 mm (3 Inches) or Larger

Piping for water supply lines 80 mm (3 inches) or larger shall be polyvinyl chloride (PVC) plastic, through 900 mm (36 inch) nominal diameter, unless otherwise shown or specified.

1.2.3 Potable Water Lines

Piping and components of potable water systems which come in contact with the potable water shall conform to NSF ANSI/NSF 61.

1.2.4 Plastic Piping System

Plastic piping system components (PVC, polyethylene, thermosetting resin and reinforced plastic mortar pressure) intended for transportation of potable water shall comply with NSF ANSI/NSF 14 and be legibly marked with their symbol.

1.2.5 Excavation, Trenching, and Backfilling

Excavation, trenching, and backfilling shall be in accordance with the applicable provisions of Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein.

1.3 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Instructions

Installation; FIO.

The manufacturer's recommendations for each material or procedure to be utilized.

SD-08 Statements

Waste Water Disposal Method; FIO.

The method proposed for disposal of waste water from hydrostatic tests and disinfection, prior to performing hydrostatic tests.

Satisfactory Installation; FIO.

A statement signed by the principal officer of the contracting firm stating that the installation is satisfactory and in accordance with the contract drawings and specifications, and the manufacturer's prescribed procedures and techniques, upon completion of the project and before final acceptance.

SD-09 Reports

Bacteriological Disinfection; G-RE.

Test results from commercial laboratory verifying disinfection.

SD-13 Certificates

Installation; G-RE.

A statement signed by the manufacturer's field representative certifying that the Contractor's personnel are capable of properly installing the pipe on the project.

Meters; G-RE.

Manufacturer's certificate stating that each meter furnished has been tested for accuracy of registration and compliance with the accuracy and capacity requirements of the appropriate AWWA standard.

1.4 HANDLING

Pipe and accessories shall be handled to ensure delivery to the trench in sound, undamaged condition, including no injury to the pipe coating or lining. If the coating or lining of any pipe or fitting is damaged, the repair shall be made by the Contractor in a satisfactory manner, at no additional cost to the Government. No other pipe or material shall be placed inside a pipe or fitting after the coating has been applied. Pipe shall be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place.

1.4.1 Not Used

1.4.2 Not Used

1.4.3 Miscellaneous Plastic Pipe and Fittings

Polyvinyl Chloride (PVC), Reinforced Thermosetting Resin Pipe (RTRP), and Reinforced Plastic Mortar Pressure (RPMP) pipe and fittings shall be handled and stored in accordance with the manufacturer's recommendations. Storage facilities shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325-1.

PART 2 PRODUCTS

2.1 PIPE

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 Not Used

2.1.2 Plastic Pipe

2.1.2.1 Not Used

2.1.2.2 PVC Plastic Pipe

Pipe, couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B.

a. Pipe Less Than 100 mm (4 inch) Diameter:

(1) Screw-Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 Schedule 80, with joints meeting requirements of 1.03 MPa (150 psi) working pressure, 1.38 MPa (200 psi) hydrostatic test pressure, unless otherwise shown or specified. Pipe couplings when used, shall be tested as required by ASTM D 2464.

(2) Elastomeric-Gasket Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 Schedule 40, with joints meeting the requirements of 1.03 MPa (150 psi) working pressure, 1.38 MPa (200 psi) hydrostatic test pressure, unless otherwise shown or specified, or it may be pipe conforming to requirements of ASTM D 2241, elastomeric joint, with the following applications:

SDR	Maximum Working Pressure MPa	Minimum Hydrostatic Pressure MPa
26	0.689	0.917
21	0.827	1.103
17	1.034	1.379
13.5	1.379	1.834

(3) Solvent Cement Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 or ASTM D 2241 with joints meeting the requirements of 1.03 MPa (150 psi) working pressure and 1.38 MPa (200 psi) hydrostatic test pressure.

b. Pipe 100 through 300 mm (6-12”)Diameter: Pipe, couplings and fittings shall conform to AWWA C900, Class 150, CIOD pipe dimensions, elastomeric-gasket joint, unless otherwise shown or specified.

c. Pipe 350 through 900 mm (8”-36”)Diameter: Pipe shall conform to AWWA C905 unless otherwise shown or specified.

2.1.2.3 Not Used

2.1.7 Copper Tubing

Copper tubing shall conform to ASTM B 88, Type K, annealed.

2.2 FITTINGS AND SPECIALS

2.2.1 PVC Pipe System

a. For pipe less than 100 mm (4 inch) diameter, fittings for threaded pipe shall conform to requirements of ASTM D 2464, threaded to conform to the requirements of ASME B1.20.1 for use with Schedule 80 pipe and fittings; fittings for solvent cement jointing shall conform to ASTM D 2466 or ASTM D 2467; and fittings for elastomeric-gasket joint pipe shall be iron conforming to AWWA ANSI/AWWA C110/A21.10 or AWWA ANSI/AWWA C111/A21.11. Iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA ANSI/AWWA C104/A21.4.

b. For pipe 100 mm (4 inch) diameter and larger, fittings and specials shall be iron, bell end in accordance with AWWA ANSI/AWWA C110/A21.10, 1.03 MPa (150 psi) pressure rating unless otherwise shown or specified, except that profile of bell may have special dimensions as required by the pipe manufacturer; or fittings and specials may be of the same material as the pipe with elastomeric gaskets, all in conformance with AWWA C900. Iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA ANSI/AWWA C104/A21.4. Fittings shall be bell and spigot or plain end pipe, or as applicable. Ductile iron compact fittings shall be in accordance with AWWA ANSI/AWWA C153/A21.53.

2.2.1.1 Dielectric Fittings

Dielectric fittings shall be installed between threaded ferrous and nonferrous metallic pipe, fittings and valves, except where corporation stops join mains. Dielectric fittings shall prevent metal-to-metal contact of dissimilar metallic piping elements and shall be suitable for the required working pressure.

2.3 JOINTS

2.3.1 Plastic Pipe Jointing

2.3.1.1 PVC Pipe

Joints, fittings, and couplings shall be as specified for PVC pipe. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer.

2.4 VALVES

2.4.1 Gate Valves

Gate valves shall be designed for a working pressure of not less than 1.03 MPa (150 psi). Valve connections shall be as required for the piping in

which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve, and shall be opened by turning counterclockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening.

a. Valves smaller than 80 mm (3 inches) shall be all bronze and shall conform to MSS SP-80, Type 1, Class 150.

b. Valves 80 mm (3 inches) and larger shall be iron body, bronze mounted, and shall conform to AWWA C500. Flanges shall not be buried. An approved pit shall be provided for all flanged connections.

c. Resilient-Seated Gate Valves: For valves 80 to 300 mm (3 to 12 inches) in size, resilient-seated gate valves shall conform to AWWA C509.

2.4.2 Rubber-Seated Butterfly Valves

Rubber-seated butterfly valves shall conform to the performance requirements of AWWA C504. Wafer type valves conforming to the performance requirements of AWWA C504 in all respects, but not meeting laying length requirements will be acceptable if supplied and installed with a spacer providing the specified laying length. All tests required by AWWA C504 shall be met. Flanged-end valves shall be installed in an approved pit and provided with a union or sleeve-type coupling in the pit to permit removal. Mechanical-end valves 80 through 250 mm in diameter may be direct burial if provided with a suitable valve box, means for manual operation, and an adjacent pipe joint to facilitate valve removal. Valve operators shall restrict closing to a rate requiring approximately 60 seconds, from fully open to fully closed.

2.4.3 Indicator Post for Valves

Each valve shown on the drawings with the designation "P.I.V." shall be equipped with indicator post conforming to the requirements of NFPA 24. Operation shall be by a wrench, which shall be attached to each post.

2.5 VALVE BOXES

Valve boxes shall be cast iron or concrete, except that concrete boxes may be installed only in locations not subjected to vehicular traffic. Cast-iron boxes shall be extension type with slide-type adjustment and with flared base. The minimum thickness of metal shall be 5 mm. Concrete boxes shall be the standard product of a manufacturer of precast concrete equipment. The word "WATER" shall be cast in the cover. The box length shall adapt, without full extension, to the depth of cover required over the pipe at the valve location.

2.6 VALVE PITS

Valve pits shall be constructed at locations indicated or as required above and in accordance with the details shown. Concrete shall have compressive strength of 21 MPa.

2.7 FIRE HYDRANTS

Hydrants shall be dry-barrel type conforming to AWWA ANSI/AWWA C502 with valve opening at least 125 mm (5 inches) in diameter and designed so that the flange at the main valve seat can be removed with the main valve seat apparatus remaining intact, closed and reasonably tight against leakage and with a breakable valve rod coupling and breakable flange connections located no more than 200 mm above the ground grade. Hydrants shall have a 150 mm (6 inch) bell connection, two 65 mm (2-1/2 inch) hose connections and one 115 mm (4-1/2 inch) pumper connection. Outlets shall have American National Standard fire-hose coupling threads. Working parts shall be bronze. Design, material, and workmanship shall be equal to the latest stock pattern ordinarily produced by the manufacturer. Hydrants shall be painted with 1 coat of red iron oxide, zinc oxide primer conforming to SSPC Paint 25 and 2 finish coats (Brown) of silicone alkyd paint conforming to SSPC Paint 21. Suitable bronze adapter for the 115 mm (4-1/2 inch) [each] outlet, with caps, shall be furnished.

2.8 NOT USED

2.9 MISCELLANEOUS ITEMS

2.9.1 Disinfection

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

2.9.2 Meters

Meters shall be the type and size shown on the drawings or specified. Meters of each of the various types furnished and installed shall be supplied by one manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Cutting of Pipe

Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise recommended by the manufacturer and authorized by the Contracting Officer, cutting shall be done with an approved type mechanical cutter. Wheel cutter shall be used when practicable. Copper tubing shall be cut square and all burrs shall be removed. Squeeze type mechanical cutters shall not be used for ductile iron.

3.1.2 Adjacent Facilities

3.1.2.1 Sewer Lines

Where the location of the water pipe is not clearly defined in dimensions on the drawings, the water pipe shall not be laid closer horizontally than 3 m from a sewer except where the bottom of the water pipe will be at least 300

mm above the top of the sewer pipe, in which case the water pipe shall not be laid closer horizontally than 1.8 m from the sewer. Where water lines cross under gravity-flow sewer lines, the sewer pipe, for a distance of at least 3 m each side of the crossing, shall be fully encased in concrete or shall be made of pressure pipe with no joint located within 900 mm horizontally of the crossing. Water lines shall in all cases cross above sewage force mains or inverted siphons and shall be not less than 600 mm above the sewer main. Joints in the sewer main, closer horizontally than 900 mm (36”)to the crossing, shall be encased in concrete.

3.1.2.2 Water Lines

Water lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.

3.1.2.3 Copper Tubing Lines

Copper tubing shall not be installed in the same trench with ferrous piping materials.

3.1.2.4 Nonferrous Metallic Pipe

Where nonferrous metallic pipe, e.g. copper tubing, crosses any ferrous piping material, a minimum vertical separation of 300 mm shall be maintained between pipes.

3.1.2.5 Structures

Where water pipe is required to be installed within 1 m of existing structures, the water pipe shall be sleeved as required in Paragraph "Casing Pipe". The Contractor shall install the water pipe and sleeve ensuring that there will be no damage to the structures and no settlement or movement of foundations or footings.

3.1.3 Joint Deflection

3.1.3.1 Plastic Pipe Installation

RTRP shall be installed in accordance with ASTM D 3839. RPMP shall be installed in accordance with the manufacturer's recommendations. PE Pipe shall be installed in accordance with ASTM D 2774. PVC pipe shall be installed in accordance with AWWA M23.

3.1.3.2 Piping Connections

Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings to suit the actual conditions. When made under pressure, these connections shall be installed using standard methods as approved by the Contracting Officer. Connections to existing asbestos-cement pipe shall be made in accordance with ACPPA-01.

3.1.3.3 Penetrations

Pipe passing through walls of valve pits and structures shall be provided with ductile-iron or Schedule 40 steel wall sleeves. Annular space between

walls and sleeves shall be filled with rich cement mortar. Annular space between pipe and sleeves shall be filled with mastic.

3.1.3.4 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

3.1.5 Jointing

3.1.5.1 PVC Plastic Pipe Requirements

a. Pipe less than 100 mm (4 inch) diameter: Threaded joints shall be made by wrapping the male threads with approved thread tape or applying an approved lubricant, then threading the joining members together. The joint shall be tightened using strap wrenches to prevent damage to the pipe and/or fitting. To avoid excessive torque, joints shall be tightened no more than one thread past hand-tight. Preformed rubber-ring gaskets for elastomeric-gasket joints shall be made in accordance with ASTM F 477 and as specified. Pipe ends for push-on joints shall be beveled to facilitate assembly and marked to indicate when the pipe is fully seated. The gasket shall be prelubricated to prevent displacement. The gasket and ring groove in the bell or coupling shall match. The manufacturer of the pipe or fitting shall supply the elastomeric gasket. Couplings shall be provided with stops or centering rings to assure that the coupling is centered on the joint. Solvent cement joints shall use sockets conforming to ASTM D 2467. The solvent cement used shall meet the requirements of ASTM D 2564; the joint assembly shall be made in accordance with ASTM D 2855 and the manufacturer's specific recommendations.

b. Pipe 100 through 300 mm diameter: Joints shall be elastomeric gasket as specified in AWWA C900. Jointing procedure shall be as specified for pipe less than 100 mm (4 inch) diameter with configuration using elastomeric ring gasket.

c. Pipe 350 through 900 mm diameter: Joints shall be elastomeric gasket push-on joints made in accordance with AWWA M23.

3.1.5.2 Service Lines Larger than 50 mm (2 Inches)

Service lines larger than 50 mm (2 inches) shall be connected to the main by a tapped saddle, tapping sleeve and valve, service clamp or reducing tee, depending on the main diameter and the service line diameter, and shall have a gate valve. Lines 80 mm (3 inches) and larger may use rubber-seated butterfly valves as specified above, or gate valves.

3.1.5.3 Service Lines for Sprinkler Supplies

Water service lines used to supply building sprinkler systems for fire protection shall be connected to the water distribution main in accordance with NFPA 24.

3.1.6 Setting of Fire Hydrants, Meters, Valves and Valve Boxes

3.1.6.1 Location of Fire Hydrants

Fire hydrants shall be located and installed. Each hydrant shall be connected to the main with a 150 mm (6 inch) branch line having at least as much cover as the distribution main. Hydrants shall be set plumb with pumper nozzle facing the roadway, with the center of the lowest outlet not less than 450 mm above the finished surrounding grade, and the operating nut not more than 1.2 m above the finished surrounding grade. Fire hydrants designated on the drawings as low profile shall have the lowest outlet not less than 450 mm above the finished surrounding grade, the top of the hydrant not more than 600 mm above the finished surrounding grade. Except where approved otherwise, the backfill around hydrants shall be thoroughly compacted to the finished grade immediately after installation to obtain beneficial use of the hydrant as soon as practicable. The hydrant shall be set upon a slab of concrete not less than 100 mm thick and 400 mm square. Not less than 2 cubic meters of free-draining broken stone or gravel shall be placed around and beneath the waste opening of dry barrel hydrants to ensure drainage.

3.1.6.2 Location of Valves

After delivery, valves, including those in hydrants, shall be drained to prevent freezing and shall have the interiors cleaned of all foreign matter before installation. Stuffing boxes shall be tightened and hydrants and valves shall be fully opened and fully closed to ensure that all parts are in working condition. Check, pressure reducing, vacuum, and air relief valves shall be installed in valve pits. Valves and valve boxes shall be installed where shown or specified, and shall be set plumb. Valve boxes shall be centered on the valves. Boxes shall be installed over each outside gate valve unless otherwise shown. Where feasible, valves shall be located outside the area of roads and streets. Earth fill shall be tamped around each valve box or pit to a distance of 1.2 m on all sides of the box, or the undisturbed trench face if less than 1.2 m.

3.1.7 Tapped Tees and Crosses

Tapped tees and crosses for future connections shall be installed where shown.

3.1.8 Thrust Restraint

Plugs, caps, tees and bends deflecting 11.25 degrees or more, either vertically or horizontally, on waterlines 100 mm (4 inches) in diameter or larger, and fire hydrants shall be provided with thrust restraints. Valves shall be securely anchored or shall be provided with thrust restraints to prevent movement. Thrust restraints shall be either thrust blocks or, for ductile-iron pipes, restrained joints.

3.1.9.1 Thrust Blocks

Thrust blocking shall be concrete of a mix not leaner than: 1 cement, 2-1/2 sand, 5 gravel; and having a compressive strength of not less than 14 MPa after 28 days. Blocking shall be placed between solid ground and the hydrant or fitting to be anchored. Unless otherwise indicated or directed, the base and thrust bearing sides of thrust blocks shall be poured directly against undisturbed earth. The sides of thrust blocks not subject to thrust

may be poured against forms. The area of bearing shall be as shown or as directed. Blocking shall be placed so that the fitting joints will be accessible for repair. Steel rods and clamps, protected by galvanizing or by coating with bituminous paint, shall be used to anchor vertical down bends into gravity thrust blocks.

3.1.9.2 Restrained Joints

For ductile-iron pipe, restrained joints shall be designed by the Contractor or the pipe manufacturer in accordance with DIPRA-01.

3.2 HYDROSTATIC TESTS

Where any section of a water line is provided with concrete thrust blocking for fittings or hydrants, the hydrostatic tests shall not be made until at least 5 days after installation of the concrete thrust blocking, unless otherwise approved.

3.2.1 Pressure Test

After the pipe is laid, the joints completed, fire hydrants permanently installed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for 1 hour to a hydrostatic pressure test of 1.38 (200 psi) MPa. Water supply lines designated on the drawings shall be subjected for 1 hour to a hydrostatic pressure test of 1.38 (200 psi) MPa. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, hydrants, and valves shall be carefully examined during the partially open trench test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants and valves discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory. The requirement for the joints to remain exposed for the hydrostatic tests may be waived by the Contracting Officer when one or more of the following conditions is encountered:

a. Wet or unstable soil conditions in the trench.

b. Compliance would require maintaining barricades and walkways around and across an open trench in a heavily used area that would require continuous surveillance to assure safe conditions.

c. Maintaining the trench in an open condition would delay completion of the project.

The Contractor may request a waiver, setting forth in writing the reasons for the request and stating the alternative procedure proposed to comply with the required hydrostatic tests. Backfill placed prior to the tests shall be placed in accordance with the requirements of Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.2.2 Leakage Test

Leakage test shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and during the test the water line shall be subjected to not

less than 1.38 (200 psi) MPa pressure. Water supply lines designated on the drawings shall be subjected to a pressure equal to 1.38 200 psi MPa. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section, necessary to maintain pressure within 34.5 kPa (5 psi) of the specified leakage test pressure after the pipe has been filled with water and the air expelled. Piping installation will not be accepted if leakage exceeds the allowable leakage which is determined by the following formula:

L = 0.0001351ND(P raised to 0.5 power)

L = Allowable leakage in gallons per hour
N = Number of joints in the length of pipeline tested
D = Nominal diameter of the pipe in inches
P = Average test pressure during the leakage test, in psi gauge

Should any test of pipe disclose leakage greater than that calculated by the above formula, the defective joints shall be located and repaired until the leakage is within the specified allowance, without additional cost to the Government.

3.2.3 Time for Making Test

Except for joint material setting or where concrete thrust blocks necessitate a 5-day delay, pipelines jointed with rubber gaskets, mechanical or push-on joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill. Cement-mortar lined pipe may be filled with water as recommended by the manufacturer before being subjected to the pressure test and subsequent leakage test.

3.2.4 Concurrent Hydrostatic Tests

The Contractor may elect to conduct the hydrostatic tests using either or both of the following procedures. Regardless of the sequence of tests employed, the results of pressure tests, leakage tests, and disinfection shall be as specified. Replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the Government.

a. Pressure test and leakage test may be conducted concurrently.

b. Hydrostatic tests and disinfection may be conducted concurrently, using the water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be reaccomplished.

3.3 DISINFECTION

3.3.1 Bacteriological Disinfection

Before acceptance of potable water operation, each unit of completed waterline shall be disinfected as prescribed by AWWA C651. After pressure tests have been made, the unit to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before

introducing the chlorinating material. The chlorinating material shall be either liquid chlorine, calcium hypochlorite, or sodium hypochlorite, conforming to paragraph MISCELLANEOUS ITEMS. The chlorinating material shall provide a dosage of not less than 50 ppm and shall be introduced into the water lines in an approved manner. Polyvinyl Chloride (PVC) pipe lines shall be chlorinated using only the above specified chlorinating material in solution. The agent shall not be introduced into the line in a dry solid state. The treated water shall be retained in the pipe long enough to destroy all non-spore forming bacteria. Except where a shorter period is approved, the retention time shall be at least 24 hours and shall produce not less than 25 ppm of free chlorine residual throughout the line at the end of the retention period. Valves on the lines being disinfected shall be opened and closed several times during the contact period. The line shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period, each fire hydrant on the line shall be opened and closed several times. From several points in the unit, the Contracting Officer will take samples of water in proper sterilized containers for bacterial examination. The commercial laboratory shall be certified by the state's approving authority for examination of potable water. The disinfection shall be repeated until tests indicate the absence of pollution for at least 2 full days. The unit will not be accepted until satisfactory bacteriological results have been obtained.

3.3.2 Lead Residual

Following the bacteriological disinfection and testing, the system shall be flushed with a sufficient velocity of water and sufficient tests performed at each hot and cold water discharge point until no more than 15 ppb lead residuals remain in the system. All tests and samples shall be performed in accordance with state and, if applicable, Federal regulations. Samples for testing are to be collected after a 6 hour continuous period of no flushing, and will be considered first draw samples. The commercial laboratory shall be certified by the state's approving authority for examination of potable water. Lead residual test results shall be submitted to the Contracting Officer. The system will not be accepted until satisfactory bacteriological results and lead residual test results have been obtained. All flushing and testing for lead residuals, including all costs, are the responsibility of the Contractor.

3.4 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

--END OF SECTION—

SECTION 02511

CONCRETE SIDEWALKS, CURBS AND GUTTERS, AND EXTERIOR SLABS

PART I GENERAL

1.1 REFERENCES

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

FEDERAL SPECIFICATION (FED. SPEC.):

TT-S-00227E & Am-3	Sealing Compound: Elastomeric Type, Multi-Component (for Calking, Sealing, and Glazing in Buildings and Other Structures)

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) PUBLICATION:

M 182 (1991 I)	Burlap Cloth made from Jute or Kenaf

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS:

A 185-90a	Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement, 01.04
C 171-92	Sheet Materials for Curing Concrete
C 309-91	Liquid Membrane-Forming Compounds for Curing Concrete
D 1751-83 (R 1991)	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
D 1752-84 (R 1992)	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having a "FIO" designation are for information only. The following shall be submitted in accordance with SECTION: SUBMITTAL PROCEDURES.

SD-13 Certificates

Certificates shall be provided by the contractor certifying specification compliance for the following items:

Burlap and Cotton Mat, 2.1.1; G-RE.

Impervious Sheeting, 2.2.2; G-RE.

Liquid Membrane Curing Compound, 2.2.3; G-RE.

Expansion Joint Filler, 2.3.1; G-RE.

Sidewalk Sealants, 2.3.2; G-RE.

Wire Fabric, 2.4; G-RE-RE.

1.3 PLANT, EQUIPMENT, MACHINES, AND TOOLS

1.3.1 General Requirements

Plant, equipment, machines, and tools used in the work shall be subject to review and shall be maintained in a satisfactory working condition at all times. The equipment shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Use of the equipment shall be discontinued if it produces unsatisfactory results. The Contracting Officer shall have access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

1.3.2 Slip Form Equipment

Slip form paver or curb forming machine, will be approved based on trial use on the job and shall be self-propelled, automatically controlled, crawler mounted, and capable of spreading, consolidating, and shaping the plastic concrete to the desired cross section in one pass.

1.4 CONCRETE

Concrete shall conform to the requirements of SECTION: CAST-IN-PLACE STRUCTURAL CONCRETE except as otherwise specified herein.

PART 2 PRODUCTS

2.1 CONCRETE

Concrete shall have a minimum compressive strength of 27.5 MPa at 28 days.

2.2 CONCRETE CURING MATERIALS

2.1.1 Burlap and Cotton Mat (SD13-G-RE)

AASHTO M 182

2.2.2 Impervious sheeting (SD13-G-RE)

ASTM C 171.

2.2.3 Liquid membrane curing compound (SD13-G-RE)

ASTM C 309, Type 1D or Type 2, Class A or B.

2.3 JOINT MATERIALS

2.3.1 Expansion joint fillers (SD13-G-RE)
ASTM D 1751 or ASTM D 1752 or shall be resin impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.3.2 Sealants (SD13-G-RE)

Sealing compound (joint sealer); elastomeric type, multi-component. Fed. Spec. TT-S-227, Type I, Class B, flow, self-leveling, and of grey color. The sealing compound shall not contain aluminum powder pigment. A primer recommended by the sealant manufacturer shall be furnished and used with all these sealing compounds. The sealer and primer shall be nonstaining when tested as specified in Fed. Spec. TT-S-227.

2.4 WIRE FABRIC (SD13-FIO)

Welded steel wire fabric shall conform to ASTM A 185.

2.5 FORM WORK

Form work shall be designed and constructed to insure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 50 mm nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 3 m. Radius bends may be formed with 19 mm boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 3 m with a minimum of two welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.5.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.5.2 Curb and Gutter Forms

Curb and gutter outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 3 m or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 38 mm benders, for the full height of the curb, cleated together.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to grade and cross section with a maximum deviation of ½"(12.7 mm) plus or minus.

3.1.1 Sidewalk subgrade

The subgrade shall be thoroughly wetted and then compacted with two passes of a 2.22 kN roller. Yielding material deflecting more than ½"(12.7 mm) under the specified roller shall be removed to a depth of not less than 4"(101.6 mm) below subgrade elevation and replaced with an approved granular material. The material shall then be compacted as described above. The completed subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Exterior slab subgrade

Subgrade shall be placed and compacted to conform with applicable requirements of SECTION: PREPARATION OF SUBGRADE FOR ROADWAYS. Base courses, where required, shall be placed and compacted to conform to applicable requirements of SECTION: GRADED CRUSHED AGGREGATE BASE COURSE AND RIGID BASE COURSE.

3.1.3 Curb and gutter subgrade

The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement and shall be placed and compacted. The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter.

3.1.4 Maintenance of subgrade

The subgrade shall be maintained in a smooth, compacted condition, in conformity with the required section and established grade until the concrete is placed. The subgrade or base shall be in a moist condition when concrete is placed. The subgrade or base shall be prepared and protected so as to produce a subgrade free from frost when the concrete is deposited.

3.2 FORM SETTING

Forms shall be carefully set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of three stakes per form placed at intervals not to exceed 1.2 meters. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to insure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks and Exterior Slabs

Forms for sidewalks shall be set with the upper edge true to line and grade with an allowable tolerance of 3 mm in any 3 m long section. After forms are set, grade and alignment shall be checked with a 3.05 m straightedge. Forms shall have a transverse slope of 20 millimeters per meter with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Curbs and Gutters

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished as specified for concrete finishing. Gutter forms shall not be removed while the concrete is sufficiently plastic to slump in any direction.

3.3 SIDEWALK & EXTERIOR SLABS CONCRETE PLACEMENT AND FINISHING

3.3.1 Placement

3.3.1.1 Sidewalk

Concrete shall be placed in the forms in one layer of such thickness that when consolidated and finished the sidewalks will be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a wood float, bull float, or darby, edged and broom finished.

3.3.1.2 Exterior slabs

Concrete shall be placed in the forms in layers of such thickness that when compacted and finished the slab will be of the thickness indicated. After concrete has been placed in the forms, a strike-off shall be used to bring the surface to proper section to be compacted. Concrete 150 mm or less in thickness shall be tamped and consolidated with a suitable wood or metal tamping bar. Concrete more than 150 mm thick shall be consolidated with approved mechanical vibrators.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be finished to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished carefully with an edger having a radius of 3 mm. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing

shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 7.9 mm from the testing edge of a 3.05 m straightedge. Permissible deficiency in section thickness will be up to 6.4 mm.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb and Gutter

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators.

3.4.2 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 13 mm. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

3.4.3 Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.4.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 6.4 mm from the testing edge of a 3.05 m straightedge. Permissible deficiency in section thickness will be up to 6.4 mm.

3.5 SIDEWALK & EXTERIOR SLAB JOINTS

3.5.1 Sidewalk Joints

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 1.5 m on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 3 m or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated.

3.5.2 Exterior Slab Joints

Exterior slab joints shall be placed as specified herein unless otherwise shown on the plans.

3.5.3 Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 3 mm blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

3.5.4 Expansion Joints

Expansion joints shall be formed with 12 mm joint filler strips. Joint filler shall be placed with top edge 6 mm below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 3 mm, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be carefully cleaned and filled with joint sealer.

The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing shall be done so that the material will not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 10 degrees C at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.5.5 Sidewalk and Exterior Slab Reinforcement

Welded steel wire fabric shall be placed in all slabs that are irregular shaped. An irregular shaped slab is one which the length to width ratio is greater than 1.25 and it is not essentially a parallelogram. The welded steel fabric shall be accurately and securely fastened in place with suitable supports and ties at one-half depth of the slab before the concrete is placed.

3.6 CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

3.6.1 Contraction Joints

Contraction joints shall be constructed directly opposite contraction joints in abutting portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 1.5 m nor greater than 4.5 m in length. Contraction joints shall be constructed by means of 3 mm thick separators and of a section conforming to the cross

section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing. The Contractor has the option to saw the contraction joints full depth of the curb and into the gutter 1/4 depth.

3.6.2 Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of abutting portland cement concrete pavement, and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut portland cement concrete pavement, expansion joints at least 12.7 mm in width shall be provided at intervals not exceeding 35 meters. Expansion joints shall be provided in nonreinforced concrete gutter at locations indicated. Expansion joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit with the material specified herein.

3.6.3 Contraction joints and expansion joints abutting Portland cement concrete pavements shall be scaled with the same sealant as the concrete pavement.

Expansion joints and the top 25 mm depth of curb and gutter contraction-joints shall be sealed with joint sealer. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing shall be done so that the material will not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 10 degrees C at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Concrete shall be protected against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Unhardened concrete shall be protected from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Mat Method

The entire exposed surface shall be covered with two or more layers of burlap. Mats shall overlap each other at least 150 mm. The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

3.7.1.2 Impervious Sheeting Method

The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 300 mm when a continuous sheet is not used. The curing medium shall not be less than 450 mm wider than the concrete surface to be cured, and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.7.1.3 Membrane Curing Method

A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 5 square meters per liter for both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed. Necessary precautions shall be taken to insure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed before the concrete in the region of the joint is resprayed with curing compound. The method used for sealing the joint groove shall prevent loss of moisture from the joint during the entire specified curing period. Approved standby facilities for curing concrete pavement shall be provided at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.8 SURFACE EVALUATION

The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 6 mm the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 6mm. All pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Government and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

3.10 SEALING JOINTS

The approximately horizontal sections of expansion joints and the top 25.4 mm depth of contraction-joint openings of gutter shall be sealed with joint sealer. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing shall be done so that the material will not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 10 degrees C, at the time of application of joint-sealing materials. Excess material on exposed surfaces of the concrete shall be removed immediately and exposed concrete surfaces cleaned.

-- End of Section --

SECTION 02531

SANITARY SEWERS
05/98

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.

AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA)

AREA-01	(1996) 1996-1997 Manual for Railway Engineering (Fixed Properties) 4 Vol.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 74	(1996) Cast Iron Soil Pipe and Fittings
ASTM A 123	(1989a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM C 14	(1995) Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C 14M	(1995) Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)
ASTM C 33	(1993) Concrete Aggregates
ASTM C 76	(1995a) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 76M	(1996) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 94	(1996) Ready-Mixed Concrete
ASTM C 150	(1997) Portland Cement
ASTM C 260	(1995) Air-Entraining Admixtures for Concrete
ASTM C 270	(1997) Mortar for Unit Masonry
ASTM C 425	(1996) Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C 443	(1994) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 443M	(1994) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (Metric)

ASTM C 478	(1996) Precast Reinforced Concrete Manhole Sections
ASTM C 478M	(1996) Precast Reinforced Concrete Manhole Sections (Metric)
ASTM C 564	(1995a) Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C 700	(1996) Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
ASTM C 828	(1991, R 1996) Low-Pressure Air Test of Vitrified Clay Pipe Lines
ASTM C 924	(1989) Concrete Pipe Sewer Lines by Low-Pressure Air Test Method
ASTM C 972	(1995) Compression-Recovery of Tape Sealant
ASTM D 412	(1992) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 624	(1991; R 1996) Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 1784	(1996) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2680	(1995a)Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping
ASTM D 2751	(1996) Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 2996	(1995) Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
ASTM D 2997	(1995) Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting-Resin) Pipe
ASTM D 3034	(1994) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 3262	(1996) "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe

ASTM D 3350	(1996) Polyethylene Plastics Pipe and Fittings Materials
ASTM D 3753	(1981; R 1991) Glass-Fiber-Reinforced Polyester Manholes
ASTM D 3840	(1988) "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Fittings for Nonpressure Applications
ASTM F 402	(1993) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F 477	(1995) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 714	(1994) Polyethylene (PE) Plastic pipe (SDR-PR) Based on Outside Diameter
ASTM F 794	(1995a) Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 894	(1995) Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F 949	(1994) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA ANSI/AWWA C105/A21.5	(1993) Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA ANSI/AWWA C110/A21.10	(1993) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75 mm through 1200 mm), for Water and Other Liquids
AWWA ANSI/AWWA C111/A21.11	(1995) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA ANSI/AWWA C115/A21.15	(1994) Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
AWWA ANSI/AWWA C151/A21.51	(1996) Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 49	(1994) Hazardous Chemicals Data
NFPA 325-1	(1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids

NFPA 704	(1996) Identification of the Fire Hazards of Materials for Emergency Response

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-6	(1990) Recommended Practice for the Low-Pressure Air Testing of Installed Sewer Pipe
UBPPA UNI-B-9	(1990; Addenda 1994) Recommended Performance Specification for Polyvinyl Chloride (PVC) Profile Wall Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter (Nominal Pipe Sizes 4-48 inch)

1.2 GENERAL REQUIREMENTS

The construction required herein shall include appurtenant structures and building sewers to points of connection with the building drains 1.5 m outside the building to which the sewer system is to be connected. The Contractor shall replace damaged material and redo unacceptable work at no additional cost to the Government. Excavation and backfilling is specified in Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Backfilling shall be accomplished after inspection by the Contracting Officer. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install the plastic pipe shall be stored in accordance with the manufacturer's recommendation and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-13 Certificates

Portland Cement; FIO.

Certificates of compliance stating the type of cement used in manufacture of concrete pipe, fittings and precast manholes.

PART 2 PRODUCTS

2.1 PIPE

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1.1 PVC Pipe

ASTM D 3034, Type PSM with a maximum SDR of 35, Size 380 mm (15 inch) or less in diameter. ASTM F 949 for corrugated sewer pipes with a smooth interior. UBPPA UNI-B-9 and ASTM F 794, Series 46, for ribbed sewer pipe with smooth interior, size 200 mm (8 inch) through 1200 mm (48 inch) diameters. PVC shall be certified by the compounder as meeting the requirements of ASTM D 1784, cell Class 12454B. The pipe stiffness shall be greater than or equal to 735/D for cohesionless material pipe trench backfills.

2.2 REQUIREMENTS FOR FITTINGS

Fittings shall be compatible with the pipe supplied and shall have a strength not less than that of the pipe. Fittings shall conform to the respective specifications and other requirements specified below.

2.2.2.1 Fittings for PVC Pipe

ASTM D 3034 for type PSM pipe. ASTM F 949 for corrugated sewer pipe with a smooth interior. UBPPA UNI-B-9 and ASTM F 794, Series 46, for ribbed sewer pipe with smooth interior.

2.3 JOINTS

Joints installation shall comply with the manufacturer's instructions. Fittings and gaskets utilized for waste drains or industrial waste lines shall be certified by the manufacturer as oil resistant.

2.3.1 Plastic Pipe Jointing

Flexible plastic pipe (PVC or high density polyethylene pipe) gasketed joints shall conform to ASTM D 3212.

2.4 BRANCH CONNECTIONS

Branch connections shall be made by use of regular fittings or solvent cemented saddles as approved. Saddles for ABS and PVC composite pipe shall conform to Figure 2 of ASTM D 2680; saddles for ABS pipe shall comply with Table 3 of ASTM D 2751; and saddles for PVC pipe shall conform to Table 4 of ASTM D 3034.

2.5 FRAMES AND COVERS

Frames and covers shall be cast iron, ductile iron or reinforced concrete. Cast iron frames and covers shall be as indicated or shall be of type suitable for the application, circular, without vent holes. The frames and covers shall have a combined weight of not less than 181.4 kg (400 pounds). Reinforced concrete frames and covers shall be as indicated or shall conform to ASTM C 478 or ASTM C 478M. The word "Sewer" shall be stamped or cast into covers so that it is plainly visible.

2.6 STEEL LADDER

A steel ladder shall be provided where the depth of a manhole exceeds 36”(1 m). The ladder shall not be less than 406 mm (16 inches) in width, with 19 mm (3/4 inch) diameter rungs spaced 305 mm (12 inches) apart. The two

stringers shall be a minimum 10 mm (3/8 inch) thick and 51 mm (2 inch) wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123.

2.7 CEMENT MORTAR

Cement mortar shall conform to ASTM C 270, Type M with Type II cement.

2.7.1 Portland Cement

Portland cement shall conform to ASTM C 150, Type II for concrete used in concrete pipe, concrete pipe fittings, and manholes and type optional with the Contractor for cement used in concrete cradle, concrete encasement, and thrust blocking. Where aggregates are alkali reactive, as determined by Appendix XI of ASTM C 33, a cement containing less than 0.60 percent alkalies shall be used.]

2.7.2 Portland Cement Concrete

Portland cement concrete shall conform to ASTM C 94, compressive strength of 28 MPa at 28 days, except for concrete cradle and encasement or concrete blocks for manholes. Concrete used for cradle and encasement shall have a compressive strength of 17 MPa minimum at 28 days. Concrete in place shall be protected from freezing and moisture loss for 7 days.

2.8 STRUCTURES

2.8.1 Precast Reinforced Concrete Manhole Sections

Precast reinforced concrete manhole sections shall conform to ASTM C 478, except that portland cement shall be as specified herein. Joints shall be cement mortar, an approved mastic, rubber gaskets, a combination of these types; or the use of external preformed rubber joint seals and extruded rolls of rubber with mastic adhesive on one side.

2.8.2 Glass-Fiber-Reinforced Polyester Manholes

Glass-fiber-reinforced polyester manholes shall conform to ASTM D 3753.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Adjacent Facilities

3.1.1.1 Water Lines

Where the location of the sewer is not clearly defined by dimensions on the drawings, the sewer shall not be closer horizontally than 3 m to a water-supply main or service line, except that where the bottom of the water pipe will be at least 12”(300 mm) above the top of the sewer pipe, the horizontal spacing may be a minimum of 2 m. Where gravity-flow sewers cross above water lines, the sewer pipe for a distance of 3 m on each side of the crossing shall be fully encased in concrete or shall be acceptable pressure pipe with no joint closer horizontally than 1 m to the crossing. The thickness of the concrete encasement including that at the pipe joints shall be not less than 4”(100 mm).

3.1.1.2 Structural Foundations

Where sewer pipe is to be installed within 1 m of an existing or proposed building or structural foundation such as a retaining wall, control tower footing, water tank footing, or any similar structure, the sewer pipe shall be sleeved as specified above. Contractor shall ensure there is no damage to these structures, and no settlement or movement of foundations or footing.

3.1.2 Pipe Laying

a. Pipe shall be protected during handling against impact shocks and free fall; the pipe interior shall be free of extraneous material.

b. Pipe laying shall proceed upgrade with the spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow. Each pipe shall be laid accurately to the line and grade shown on the drawings. Pipe shall be laid and centered so that the sewer has a uniform invert. As the work progresses, the interior of the sewer shall be cleared of all superfluous materials.

c. Before making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers, and adhesives shall be used as recommended by the pipe manufacturer. The joints shall then be placed, fitted, joined, and adjusted to obtain the degree of water tightness required.

d. ABS composite pipe ends with exposed truss and filler material shall be coated with solvent weld material before making the joint to prevent water or air passage at the joint between the inner and outer wall of the pipe.

e. Installations of solvent weld joint pipe, using ABS or PVC pipe and fittings shall be in accordance with ASTM F 402. The Contractor shall ensure adequate trench ventilation and protection for workers installing the pipe.

3.1.2.1 Caulked Joints - NOT USED

3.1.2.2 Trenches

Trenches shall be kept free of water and as dry as possible during bedding, laying, and jointing and for as long a period as required. When work is not in progress, open ends of pipe and fittings shall be satisfactorily closed so that no trench water or other material will enter the pipe or fittings.

3.1.2.3 Backfill

As soon as possible after the joint is made, sufficient backfill material shall be placed along the pipe to prevent pipe movement off line or grade. Plastic pipe shall be completely covered to prevent damage from ultraviolet light.

3.1.2.4 Width of Trench

If the maximum width of the trench at the top of the pipe, as specified in Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, is exceeded for any reason other than by direction, the Contractor shall install, at no additional cost to the Government, concrete cradling, pipe encasement, or other bedding required to support the added load of the backfill.

3.1.2.5 Jointing

Joints between different pipe materials shall be made as specified, using approved jointing materials.

3.1.2.6 Handling and Storage

Pipe, fittings and joint material shall be handled and stored in accordance with the manufacturer's recommendations. Storage facilities for plastic pipe, fittings, joint materials and solvents shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325-1.

3.1.3 Leakage Tests

Lines shall be tested for leakage by low pressure air testing, infiltration tests or exfiltration tests, as appropriate. Low pressure air testing for vitrified clay pipes shall be as prescribed in ASTM C 828. Low pressure air testing for concrete pipes shall be as prescribed in ASTM C 828. Low pressure air testing for PVC pipe shall be as prescribed in UBPPA UNI-B-6. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C 828 and ASTM C 924, after consultation with the pipe manufacturer. Prior to infiltration or exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When the water table is 600 mm or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Contracting Officer. When the Contracting Officer determines that infiltration cannot be properly tested, an exfiltration test shall be made by filling the line to be tested with water so that a head of at least 2’(600 mm) is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be re-established. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by either the infiltration test or exfiltration test shall not exceed 0 mL per 5 mm diameter per 4”(100 m) of pipeline per hour . When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correction, and retesting shall be made at no additional cost to the Government.

3.1.4 Test for Deflection

When flexible pipe is used, a deflection test shall be made on the entire length of the installed pipeline not less than 30 days after the completion of all work including the leakage test, backfill, and placement of any fill, grading, paving, concrete, or superimposed loads. Deflection shall be determined by use of a deflection device or by use of a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. The ball, cylinder, or circular sections shall have a diameter, or minor diameter as applicable, of 92.5 percent of the inside diameter of the pipe, but 95 percent for RPMP and RTRP. A tolerance of plus 0.5 percent will be permitted. The ball, cylinder, or circular sections shall be of a homogeneous material throughout, shall have a density greater than 1.0 as related to water at 4.0 degrees C (39.2 degrees F), and shall have a surface brinell hardness of not less than 150. The device shall be center bored and through bolted with a 6 mm (1/4 inch) minimum diameter steel shaft having a yield strength of 480 MPa (70,000 psi) or more, with eyes at each end for attaching pulling cables. The eye shall be suitably backed with flange or heavy washer; a pull exerted on the opposite end of the shaft shall produce compression throughout the remote end of the ball, cylinder or circular section. Circular sections shall be spaced so that the distance from the external faces of the front and back sections shall equal or exceed the diameter of the circular section. Failure of the ball, cylinder, or circular section to pass freely through a pipe run, either by being pulled through or by being flushed through with water, shall be cause for rejection of that run. When a deflection device is used for the test in lieu of the ball, cylinder, or circular sections described, such device shall be approved prior to use. The device shall be sensitive to 1.0 percent of the diameter of the pipe being measured and shall be accurate to 1.0 percent of the indicated dimension. Installed pipe showing deflections greater than 7.5 percent of the normal diameter of the pipe, or 5 percent for RTRP and RPMP, shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced at no cost to the Government.

3.2 CONCRETE CRADLE AND ENCASEMENT

The pipe shall be supported on a concrete cradle, or encased in concrete where indicated or directed.

3.3 INSTALLATION OF WYE BRANCHES

Wye branches shall be installed where sewer connections are indicated or where directed. Cutting into piping for connections shall not be done except in special approved cases. When the connecting pipe cannot be adequately supported on undisturbed earth or tamped backfill, the pipe shall be encased in concrete backfill or supported on a concrete cradle as directed. Concrete required because of conditions resulting from faulty construction methods or negligence by the Contractor shall be installed at no additional cost to the Government. The installation of wye branches in an existing sewer shall be made by a method which does not damage the integrity of the existing sewer. One acceptable method consists of removing one pipe section, breaking off the upper half of the bell of the next lower section and half of the running bell of wye section. After placing the new section, it shall be rotated so that the broken half of the bell will be at the bottom. The two joints shall then be made with joint packing and cement mortar.

3.4 MANHOLE DETAILS

3.4.1 General Requirements

Manholes shall be constructed of glass-fiber-reinforced polyester, prefabricated plastic, concrete, or precast concrete manhole sections. The invert channels shall be smooth and semicircular in shape conforming to the inside of the adjacent sewer section. Changes in direction of flow shall be made with a smooth curve of as large a radius as the size of the manhole will permit. Changes in size and grade of the channels shall be made gradually and evenly. The invert channels shall be formed directly in the concrete of the manhole base, or shall be built up with brick and mortar, or shall be half tile laid in concrete, or shall be constructed by laying full section sewer pipe through the manhole and breaking out the top half after the surrounding concrete has hardened. Pipe connections shall be made to manhole using water stops, standard O-ring joints, special manhole coupling, or shall be made in accordance with the manufacturer's recommendation. The Contractor's proposed method of connection, list of materials selected, and specials required, shall be approved prior to installation. The floor of the manhole outside the channels shall be smooth and shall slope toward the channels not less than 4″(100 mm) per meter nor more than 8″(200) mm per yard (meter). Free drop inside the manholes shall not exceed 20″(500 mm), measured from the invert of the inlet pipe to the top of the floor of the manhole outside the channels; drop manholes shall be constructed whenever the free drop would otherwise be greater than 20″(500 mm).

3.4.2 Steel Ladder Anchorage

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 6′(1850) mm apart vertically, and shall be installed to provide at least 6″(150 mm) of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.4.3 Jointing, Plastering and Sealing

Mortar joints shall be completely filled and shall be smooth and free from surplus mortar on the inside of the manhole. Mortar and mastic joints between precast rings shall be full-bedded in jointing compound and shall be smoothed to a uniform surface on both the interior and exterior of the manhole. Installation of rubber gasket joints between precast rings shall be in accordance with the recommendations of the manufacturer. Precast rings may also be sealed by the use of extruded rolls of rubber with mastic adhesive on one side.

3.4.4 Setting of Frames and Covers

Unless otherwise indicated, tops of frames and covers shall be set flush with finished grade in paved areas or 2″(50 mm) higher than finished grade in unpaved areas. Frame and cover assemblies shall be sealed to manhole sections using external preformed rubber joint seals that meet the requirements of ASTM D 412 and ASTM D 624, or other methods specified in paragraph Jointing, Plastering and Sealing, unless otherwise specified.

3.4.5 External Preformed Rubber Joint Seals

External preformed rubber joint seals and extruded rolls of rubber with mastic adhesive shall meet the requirements of ASTM D 412 and ASTM C 972 to ensure conformance with paragraph Leakage Tests. The seal shall be multi-section with neoprene rubber top section and all lower sections made of Ethylene Propylene Di Monomer (EPDM) rubber with a minimum thickness of 1.5 mm. Each unit shall consist of a top and a bottom section and shall have mastic on the bottom of the bottom section and mastic on the top and bottom of the top section. The mastic shall be non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole/catch basin and over the lip of the casting. One unit shall seal a casting and up to six, 50 mm adjusting rings. The bottom section shall be 305 mm in height. A 152 mm high top section will cover up to two, 50 mm adjusting rings. A 305 mm high bottom section will cover up to six, 50 mm adjusting rings. Extension sections shall cover up to two more adjusting rings. Each extension shall overlap the bottom section by 50 mm and shall be overlapped by the top section by 50 mm.

3.5 CONNECTING TO EXISTING MANHOLES

Pipe connections to existing manholes shall be made so that finish work will conform as nearly as practicable to the applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping. The connection shall be centered on the manhole. Holes for the new pipe shall be of sufficient diameter to allow packing cement mortar around the entire periphery of the pipe but no larger than 1.5 times the diameter of the pipe. Cutting the manhole shall be done in a manner that will cause the least damage to the walls.

3.6 BUILDING CONNECTIONS

Building connections shall include the lines to and connection with the building waste drainage piping at a point approximately 1.5 m outside the building, unless otherwise indicated. Where building drain piping is not installed, the Contractor shall terminate the building connections approximately 1.5 m from the site of the building at a point and in a manner designated.

3.7 CLEANOUTS AND OTHER APPURTENANCES

Cleanouts and other appurtenances shall be installed as required.

--END OF SECTION—

SECTION 02551 (LW)

ASPHALTIC CONCRETE INTERMEDIATE LEVELING AND SURFACE COURSES (CENTRAL PLANT HOT MIX)

PART 1 GENERAL

1.1. APPLICABLE PUBLICATIONS

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

T 168-91	Sampling Bituminous Paving Mixtures
T 248-84	Reducing Field Samples of Aggregate to Testing Size
T 283-89	Resistance of Compacted Bituminous Moisture to Moisture Induced Damage

ASPHALT INSTITUTE

Manual Series No. 2 (MS-2)	Mix Design Methods For Asphalt Concrete Sixth Edition

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS

C 29-91	Unit Weight and Voids in Aggregate
C 88-90	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C 117-90	Materials Finer than 75-um (No. 200) Sieve in Minera1 Aggregates by Washing
C 127-88	Specific Gravity and Absorption of Coarse Aggregate
C 128-88	Specific Gravity and Absorption of Fine Aggregate
C 131-89	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

C 136-84a	Sieve Analysis of Fine and Coarse Aggregates
C 183-88	Sampling and Acceptance of Hydraulic Cement
C 566-89	Total Moisture Content of Aggregate by Drying
D 75-87	Sampling Aggregates
D 140-88	Sampling Bituminous Materials
D 242-85 (R1990)	Mineral Filler for Bituminous Paving Mixtures
D 1461-85	Test Method for Moisture or Volatile Distillates in Bituminous Paving Mixtures
D1559-89	Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
D 2041-94	Test Method for Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures
D 2172-92	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
D 2726-90	Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
D 3381-92	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
D 4791-89	Flat or Elongated Particles in Coarse Aggregate

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. Submittals shall be submitted in accordance with SECTION 01330.

SD-08 Statements

Testing Laboratory, para. 1.6.1; G-RE.

The following shall be in one transmittal:

Equipment, para. 2.3; G-RE.
Mixing Plant, para. 2.4; G-RE.

SD-09 Reports

The following shall be included in the composition of mixture transmittal:

Composition of Mixture, para.'s 2.2 thru 2.2.3.1; G-RE.
Coarse Aggregate, para. 1.4.2.1.a; G-RE.
Fine Aggregate, para. 1.4.2.1.b; G-RE.
Mineral Filler, para. 1.4.2.1.c; G-RE.

QC PRODUCTION OF AGGREGATE

Aggregate Gradation, para. 1.4.2.2.a; G-RE.
Crushed Particle Test, para. 1.4.2.2.b; G-RE.
Specific Gravity Test, para. 1.4.2.2.c; G-RE.

SD-13 Certificates

The following shall be included in the composition of the mixture transmittal:

Bituminous Material, para. 1.5; G-RE.

1.3 DEFINITIONS

1.3.1 General

Bituminous intermediate and surface course shall consist of fine and coarse aggregates and mineral filler uniformly mixed with hot bituminous material, and placed and compacted on a prepared base course, or intermediate course. All quality control sampling and testing results and reports shall be included in the Contractor's Daily Quality Control Reports.

1.3.2 Aggregates

Aggregates shall consist of crushed stone, crushed gravel, screenings, sand, and mineral filler. The portion of these materials retained on the 4.75 mm (No. 4) sieve shall be known as

coarse aggregate; the portion passing the 4.75 mm (No. 4) sieve and retained on the 75 um (No. 200) sieve, as fine aggregate; and the portion passing the 75 um (No. 200), as mineral filler. The coarse and fine aggregates and mineral filler shall be so graded and of such character that when combined, a blend will be produced that will meet the requirements specified in subsequent paragraphs, entitled AGGREGATE GRADATION and COMPOSITION OF MIXTURE.

1.3.2.1 The total aggregate (coarse aggregate, fine aggregate, and the material passing the 75 um (No. 200) sieve) shall contain not less than 80 percent crushed material for intermediate course and surface course.

1.3.2.2 Coarse aggregates

Coarse aggregates shall consist of clean, sound, durable fragments of crushed stone or crushed gravel meeting the following requirements:

a. Percent of wear shall not exceed 40 after 500 revolutions, as determined in accordance with ASTM C 131.

b. Percentage of loss shall not exceed 24 after five cycles performed in accordance with ASTM C 88, using magnesium sulfate.

c. The dry weight of crushed slag shall not be less than 1,200 Kg/cubic m (75 pcf),as determined in accordance with ASTM C 29.

d. Crushed gravel retained on the 4.75 mm (No. 4) sieve and each coarser sieve shall contain at least 80 percent by weight of crushed pieces having one or more fractured faces with the area of each face equal to at least 80 percent of the smallest midsectional area of piece. When two fractures are contiguous, the angle between planes of fractures shall be at least 30 degrees to count as two fractured faces.

e. Particle shape of crushed aggregates shall be essentially cubical. The quantity of flat and elongated particles in any sieve size shall not exceed 20 percent by weight, when determined in accordance with ASTM D 4791.

1.3.2.3 Fine Aggregate

Fine aggregate shall consist of clean, sound, durable particles including natural sand or crushed stone or gravel that meets requirements for wear and soundness specified for coarse aggregate. Fine aggregate produced by crushing gravel shall have at least 90 percent by weight of crushed particles having two or more fractured faces in the portion retained on the 600 um (No. 30) sieve. This requirement shall apply to the material before blending with natural sand when blending is necessary.

1.3.2.4 Mineral filler shall conform to ASTM D 242 and the following additional requirements. At least 50 percent of the mineral filler shall be hydrated lime, limestone dust or Portland cement. However, in areas where long service has shown that there has been no problem with stripping when the proposed aggregates are used, this additional requirement may be waived by the Contracting Officer when requested in writing.

1.4 SAMPLING AND TESTING OF AGGREGATES

1.4.1 General

Sampling shall be performed in accordance with ASTM D 75 for aggregates and ASTM C 183 for mineral filler, unless otherwise directed. Quality control tests shall be performed at the frequency specified hereinafter. Aggregates shall not be delivered to the job site or used in the production of bituminous mixtures without prior review.

1.4.2 Preconstruction Aggregate Testing

1.4.2.1 Initial tests (SD09-G-RE)

The Contractor shall perform the following tests on the aggregates prior to designing the mix.

a. Coarse aggregate: Wear (abrasion) test, soundness test, gradation test, and specific gravity test. A crushed particle (fractured-faces) test unless the coarse aggregate is crushed quarried rock.

b. Fine aggregate shall be tested to determine compliance with specification requirements and gradation.

c. Mineral filler shall be tested to determine compliance with specification requirements.

1.4.2.2 Quality control tests (SD09-G-RE)

During production, aggregates shall be sampled and tested, as required. The test results reported for these samples will be the basis of review of specific lots of aggregates for the gradation and paving-mixture requirements. Gradation and specific gravity shall not vary significantly. The frequency of testing shall be as follows:

a. One gradation test of aggregate for every 1,000 Metric tons (1,100 tons) of each size of aggregate as it is stockpiled.

b. One crushed particle (fractured faces) test for every 1,000 Metric tons (1,100 tons) of each size of coarse aggregate as it is stockpiled unless the material is crushed quarried rock or unless otherwise approved.
c. One specific gravity test for every 1,000 Metric tons (1,100 tons) of each size grouping of aggregate stockpiled.

1.5. BITUMINOUS MATERIALS
(SD13-G-RE)

Bituminous material shall not be incorporated into the mix without prior review. Bituminous materials to be mixed with mineral aggregates shall conform to the following:

1.5.1 Asphalt Cement

Asphalt cement shall conform to ASTM D 3381, viscosity grade: AC-20. A certified refinery analysis from the proposed source shall be furnished.

1.6 QUALITY CONTROL

1.6.1 General (SD08-G-RE)

All quality control sampling and testing shall be the responsibility of the Contractor in accordance with SECTION: CONTRACTOR QUALITY CONTROL and as specified herein. All sampling and testing shall be performed by a commercial testing laboratory with the capability of performing all the testing specified herein and shall be supervised by a registered professional engineer. The Contractor may elect to establish testing facilities of his own. However the Contractors laboratory shall have the capability of performing all the testing specified herein. No work requiring testing will be permitted until the Contractor's facilities have been inspected and approved. The Contractors testing laboratory shall be supervised by a registered professional engineer. The first inspection of the facilities shall be at the expense of the Government and any subsequent inspections required because of failure of the first inspection will be at the expense of the contractor. Such costs will be deducted from the total amount due the Contractor. The Government may perform verification tests as considered necessary.

PART 2 PRODUCTS

2.1 AGGREGATE GRADATION

Mineral aggregate shall be of such size that the percentage composition by weight, as determined by ASTM C 136 and C 117, will

generally conform to the gradation shown below for the specific course shown on the drawings. Regardless of the gradation chosen by the Contractor, it shall be his responsibility to furnish a combined aggregate which will produce a bituminous mixture meeting all requirements specified herein, particularly those specified in paragraph: COMPOSITION OF MIXTURE and any aggregate gradation which fails to produce a bituminous mixture meeting all requirements specified shall be rejected and replaced with a satisfactory aggregate gradation at no additional cost to the Government, and with no extension of time due to any delay caused by such replacement.

Percentage Passing, by Weight

Sieve Size	Intermediate Course	Surface Course
	19.0 mm (3/4 inch) Max.	12.5 mm (1/2 inch) Max.
25.0 mm (1 inch)	100	--
19.0 mm (3/4 inch)	80-100	100
12.5 mm (1/2 inch)	60-85	90-100
9.5 mm (3/8 inch)	50-75	60-90
4.75 mm (No. 4)	35-55	40-65
2.36 mm (No. 8)	25-40	25-45
1.18 mm (No. 16)	15-30	18-35
600 um (No. 30)	10-20	12-25
300 um (No. 50)	6-15	7-19
150 um (No. 100)	4-12	4-11
75 um (No. 200)	2-7	2-7

Note: The job mix formula may have to fall outside the gradation band shown above in order to meet the test properties of the mixture shown in paragraph: COMPOSITION OF MIXTURE.

2.2 COMPOSITION OF MIXTURE
(SD09-G-RE)

2.2.1 Job-Mix Formula

The bituminous mix design shall be established by a laboratory approved as specified in paragraph: QUALITY CONTROL using the materials and properties specified herein. Certified test results of the job-mix formula and materials shall be submitted for review at least 30 days prior to commencing construction to the Kansas City District, Attention ED-GL. No bituminous mixture shall be produced until the job-mix formula has been approved by the Contracting Officer. The formula will indicate the percentage of each sieve fraction of aggregate, and the percentage of asphalt and temperature of completed mixture when discharged from mixer. The job-mix formula will be allowed the following tolerances.

Aggregate passing 4.75 mm (No. 4) sieve or larger	± 5 percent
Aggregate passing 2.36 mm (No. 8), 1.18 mm (No. 16), 600 um (No. 30), and 300 um (No. 50) sieves	± 4 percent
Aggregate passing 150 um (No. 100) and 75 um (No. 200) sieves	± 2 percent
Asphalt as determined by extraction tests	± 0.25 percent
Temperature of mixing	± 14 degrees C (± 25 degrees F)

The bitumen content and aggregate gradation may be adjusted within the limits of the tables specified herein to improve the paving mixtures, as directed. The percentages of each sieve fraction in the job-mix formula will be restricted to values such that the application of the above-listed tolerances will not cause the limits of the gradation tables to be exceeded.

NOTE: It shall be noted that when the gradation varies appreciably from the single point gradation used in the mix-design, the test properties of the mix will be out of specifications and the mix-design will have to be adjusted or redesigned. This condition can occur even though the gradation meets the tolerances specified above.

2.2.2 Mineral Filler and Hydrated Lime

The mixtures shall contain one percent hydrated lime by weight of the total aggregate, however this maybe waivered as stated in Part 1, paragraph, Mineral filler. The hydrated lime shall be added during, or ahead of, the addition of the asphalt cement. If minus No. 200 material is needed in addition to the one percent hydrated lime to comply with gradation requirements, mineral filler shall be added.

2.2.3 Test Properties of Bituminous Mixtures

The finished mixture shall meet the requirements described below when tested in accordance with ASTM D 1559 and the volumetric properties of compacted paving mixtures as calculated by ASTM procedures using Chapter 4 of the Asphalt Institutes Manual MS-2. The automatic Marshall Hammer may be used when it has be calibrated with a manual hammer. The material for the theoretical specific gravity ASTM D 2041

and the material for the Marshall specimens (pucks) shall be cured at 135 degrees C (275 degrees F) for 2 hours in a closed oven after the mix is produced in the laboratory. Also the plant-produced mixture shall not be tested until the mix is 2 hours old. The mixture shall not be reheated. The above procedure shall be used when the water-absorption as determined by ASTM C 127 and ASTM C 128 of any aggregate in the mixture exceeds 1.25 percent. All samples will be compacted with 50 blows of specified hammer on each side of sample. When bituminous mixture fails to meet the requirements specified below, the paving operation shall be stopped until the cause of noncompliance is determined and corrected.

2.2.3.1 Stability, Flow and Voids

The mixture shall meet the following requirements:

Test Property	Surface Course	Intermediate Course
Stability, minimum	5300 N (1200 lbs)	5300 N (1200 lbs)
Flow, maximum, 0.254 mm (1/100-inch) units	16	16
Voids, total mix, percent (see Note 1)	3-5	3-5
Percent Voids in Mineral Aggregate (VMA) (See Note 2)		
Voids filled with asphalt; percent (VFA)	65-75	65-75
The ratio of minus No. 200 material to % effective asphalt cement based on the weight of the aggregate	0.6-1.2	0.6-1.2

Note 1: The laboratory job mix formula shall have the percent voids in the total mix between 4 and 4.5 percent air voids. The voids in the total mix of the mix produced at the plant shall be continually adjusted to ensure the voids stay near the middle of the range of 3 to 5 percent.

Note 2: The minimum VMA percent shall conform to the requirements specified in Table 5.3 , Chapter 5 of the Asphalt Institute manual MS-2.

To insure that the VMA is not to high, the gradation of the verified mix design behind the paver shall be adjusted to meet the requirements of the VMA as stated in Chapter 5, paragraph Evaluation of VMA Curve of the Asphalt Institute manual MS-2. The asphalt content should be just to the left-hand side of the low point on the VMA versus Asphalt Content percent, not on the Awet@ or right-hand increasing side of the curve.

Note 3: When the absorption is high the mixture will be tender until the asphalt is absorbed into the aggregate. Therefore it may be beneficial to silo the mixture at the plant for a time. This is more important when the truck haul is short.

c. Reduction in strength by saturation with water: The index of retained strength must be greater than 75 percent as determined by AASHTO T 283. Specimens shall be conditioned by freezing and thawing. When the index of retained strength is less than 75, the aggregate stripping tendencies may be countered by the use of hydrated lime or by treating the bitumen with an approved antistripping agent. The hydrated lime is considered as mineral filler and should be considered in the gradation requirements. The amount of hydrated lime or antistripping agent added to bitumen shall be sufficient, as approved, to produce an index of retained strength of not less than 75 percent. No additional payment will be made to the Contractor for addition of antistripping agent required.

d. Extraction test shall be performed using ASTM D 2172 or the "VIRGINIA TEST METHOD FOR DETERMINATION OF ASPHALT CONTENT FROM ASPHALT PAVING MIXTURES BY THE IGNITION METHOD." Designation: VTM 102 attached at the end of this specification section.

2.2.4 Sampling, Testing, and Review of Bituminous Mixtures During Construction:

2.2.4.1 General

Samples of plant mixtures shall be taken to determine conformance to the specified test properties of bituminous mixtures and to determine bitumen content and aggregate gradation. Quality Control sampling and testing shall be performed by the same testing laboratory that established the mix design. The Quality Control laboratory shall be approved as specified in paragraph: QUALITY CONTROL and as specified herein. All tests shall be performed expeditiously and results immediately furnished to the Contractor and Government representatives at the construction site or mixing plant. As a minimum the test results shall be reported on a form similar to the form "ASPHALTIC CONCRETE TEST" attached at the end of this Specification Section. Back

up calculations shall be available at the laboratory and submitted in the project final report. If the mixture is out of specification or near the specified limits, the test report shall contain recommendations of how to correct the mix proportions. Construction operations shall cease when test results are not received and adjustments made within six hours after the mix comes out of the plant. The Government may perform verification tests as considered necessary. Mixtures that do not conform to the specified test properties shall be rejected. No payment will be made to the Contractor for mixtures rejected, for additional retesting, or for pavements or portions of pavement removed.

2.2.4.2 Testing frequency

a. One gradation test of hot bin material for conventional plants, or total aggregate material from the final feed belt for the dryer-drum mixer for dryer-drum plants, for each 500 Metric tons (550 tons) of hot mix produced. A minimum of two tests per day and a maximum of three tests per day during hot mix production will be required.

b. Two gradation tests of hot bin material for conventional plants, or total aggregate material from the final feed belt for the dryer-drum mixer for dryer-drum plants, during trial runs performed 10 days before start of production of paving mixtures. Additional tests may be directed by the Contracting Officer when necessary to adjust the plant.

c. Marshall tests: In order to verify the mix design the first set (3 specimens) of tests shall be taken when the plant has produced approximately 75 Metric tons (82.5 tons) of hot mix. Testing shall be repeated until the tests verify that the hot mix produced meets all the properties specified in paragraph: Test properties of bituminous mixtures. After verification of the mix one set (3 specimens) of tests shall be made for each 300 Metric tons (330 tons) of hot mix produced, except that a minimum of two sets per day and a maximum of four tests per day, shall be made. Test shall be taken from the placed bituminous mixture prior to compaction. Material for the sample shall be taken from the following locations; one each side of the placed bituminous mat and one in the center of the mat. A square pointed shovel shall be used for taking the sample and for evenly laying material back into the disturbed mat.

d. Extraction tests shall be made to determine bitumen content and aggregate gradation at the same frequency specified above for Marshall Tests. Gradation test shall also be made when new aggregate is delivered to the plant.

NOTE: The results of the gradation test is very important in determining how to adjust the mix. After the gradation or the bitumen content has been adjusted to obtain the properties of the mix, this verified mix design becomes the project mix design. The plant settings may have to be adjusted again whenever the gradation of the materials change. When a change is made it shall be reported on the Marshall Test Report form.

e. Paving shall stop and the mixture shall be redesigned whenever any of the following occurs; three consecutive sets of marshall tests show the percent voids in the total mix are less than 3 percent or more than 5 percent; two consecutive sets of marshall tests show the percent voids in the total mix are less than 2 percent; two consecutive marshall tests show the voids filled with asphalt exceed 79 percent.

f. Retained strength tests: One set of tests shall be made for the first day's construction and thereafter whenever there is any change in materials or job-mix formula.

g. Moisture tests: The bituminous mixture shall be sampled and tested for moisture in accordance with ASTM D 1461 each time a gradation test is performed. Tests shall be taken from the placed bituminous mixture prior to compaction. Additional test shall be made when a significant change in the stockpiles occurs such as rain, delivery of new aggregates, or when visual inspections of the mix leaving the plant show segregation of asphalt resulting from escaping water vapor in the prepared mixture.

h. Sampling, testing, and review of bituminous materials: During construction the Contractor shall furnish asphalt samples and certified test analysis for each shipment of material delivered to the project. The Government may perform verification tests as considered necessary. During construction, the Contractor shall furnish samples of each shipment of bituminous material received at the project and the samples will be tested and/or retained by the Government for record purposes until the completion of the contract. Sampling shall be in accordance with ASTM D 140.

2.3 REVIEW OF PLANT, EQUIPMENT, MACHINES, AND TOOLS
(SD08-G-RE)

All equipment used shall be subject to review. Tentative approval of specific items shall be obtained before start of operations. Final approval will be given only after full-scale production has begun. All plant equipment, tools and machines used in the work shall be maintained in a satisfactory working condition at all times.

2.4 MIXING PLANTS
(SD08-G-RE)

Mixing plants shall meet the requirements of the State's Department of Transportion's latest specification in effect when this project contract is awarded to the Contractor, except the temperature of the asphalt shall not exceed 162.8 degrees C (325 degrees F) at anytime and the mixture discharged from the plant shall not exceed 148.9 degrees C (300 degrees F), or shall conform to the requirement hereinafter. The plant may be either a weigh-batch type or a continuous-mixing type of conventional plant or a dryer-drum mixing type plant provided the equipment has demonstrated suitability for producing finished mixtures similar to those required by these specifications. The plant shall have a suitable capacity to accomplish the work. Plants shall conform to subparagraph: Requirements for all plants, except that scale requirements apply only when weight proportioning is used, and in addition, shall conform to subparagraph: Special requirements for batch-mixing plants or special requirements for conventional continuous-mixing plants, below, as applicable.

2.4.1 Requirements for All Plants

These requirements apply to dryer-drum mixing process plants only as specifically referenced hereinafter.

2.4.1.1 Plant scales for any weigh box or hopper shall be of standard make and design, either of the beam or the springless-dial type and shall be sensitive to 0.5 percent of the maximum load required. Beam- type scales shall have a separate beam for each size aggregate, with a single telltale actuated for each beam, and a tare beam for balancing the hopper. Standard test weights accurate to plus or minus 0.1 percent shall be provided for checking plant scales.

2.4.1.2 Equipment for preparation of bituminous material

Tanks for storage of bituminous material shall be capable of heating the material, under effective and positive control at all times, to the temperatures specified herein. Heating shall be accomplished by steam coils, hot oil or electricity. Continuous circulation between storage tank and mixer during the entire operating period shall be provided. Pipelines and other bituminous handling equipment shall be stream-jacketed or otherwise properly insulated to prevent heat loss. The storage-tank capacity shall be sufficient for at least a 1-day run.

2.4.1.3 Feeder for dryer

The plant shall be provided with adjustable mechanical feeders that feed each aggregate individually and in ratios required. Feeders shall have accurate and separate adjustments for proportioning each aggregate to be incorporated into the mix. Gates or other proportioning devices shall have locks for fastening the devices in any desired position. A separate bin or compartment shall be provided for each aggregate to be fed into the dryer.

2.4.1.4 Rotary dryers shall be provided in sufficient numbers to heat and dry the aggregates to the temperature and the moisture content specified herein.

2.4.1.5 Plant screens shall be capable of screening dry aggregate output of the dryers to the sizes required for proportioning into the mix. The screen sizes shall be such as to properly fractionate the aggregates so that the total aggregate mixture may be controlled within the tolerances of the job-mix formula at operating capacity.

2.4.1.6 Bins of sufficient capacity to continuously supply the mixer when it is operating at full capacity shall be provided. The bins shall be divided into at least three compartments, arranged to insure separate and adequate storage of appropriate fractions of the aggregate. Each compartment shall be provided with an overflow pipe of such size and at such location as to prevent any backing up of material into other bins. Approved dry storage shall be provided for mineral filler; and provisions shall be made for accurately weighing or proportioning the mineral filler to the mixtures. Each aggregate bin shall be equipped with mechanical or electrical telltales to indicate when the aggregate in the bin is below the level that will permit accurate proportioning of the aggregate to the mixing unit. Each bin shall be constructed or equipped in such manner that a representative sample of hot aggregate may be readily and safely taken from each bin during plant operations.

2.4.1.7 Bituminous control unit

Satisfactory means, incorporating either weighing, metering, or volumetric measurements, shall be provided to obtain the required percentage of bitumen in the mix within the tolerances specified. When the quantity of bitumen is controlled by metering, provision shall be made whereby the amount of bitumen delivered through meter can be readily checked by weight.

2.4.1.8 Thermometric equipment

An armored thermometer with a range of 93.3 to 204.4 degrees C (200 to 400 degrees F) shall be fixed in the bituminous feed line near the

discharge valve at the mixture unit. The plant shall be further equipped with an approved recording dial-scale, a mercury-actuated thermometer, or an electric pyrometer so placed at the discharge chute of the dryer as to register automatically or indicate the temperature of the heated aggregate.

2.4.1.9 Control of mixing time

Unless otherwise directed, the plant shall be equipped with positive means for governing and maintaining time of mixing constant. Interval of mixing shall be in accordance with subparagraphs: Mixer unit for batch method and Mixer unit for continuous method, specified below.

2.4.1.10 Dust collectors

The plant shall be equipped with dust collectors. Provisions shall be made to waste collected material or to return all or any part of the collected material uniformly to the mixture, as directed.

2.4.2 Special Requirements for Batch-Mixing Plants

2.4.2.1 Weigh box or hopper

Equipment shall include means for accurately weighing each bin size of aggregate in a weigh box or hopper suspended on scales, and these weigh boxes or hoppers shall be ample in size to hold a full batch without running over. The gates on both the bins and hoppers shall be constructed to prevent leakage of aggregate when closed. On manually operated plants, an interlocking device shall be provided to prevent opening more than one gate at a time. On automatic plants designed for simultaneous weighing of all sizes of aggregate, this provision does not apply while the plant is operating under automatic control.

2.4.2.2 Weigh bucket

The bitumen bucket shall have sufficient capacity to hold not less than 10 percent in excess of the weight of the bitumen required for one batch. The bitumen bucket shall be suspended on dial or beam scales equipped with a telltale so that the tare weight of the bucket will be shown for each weighing, and the net weight of the bituminous material will be measured within plus or minus 1 percent of the weight required. Use of a volumetric-metering-type device that will proportion the bitumen into the mix with the above accuracy will be permitted. The bucket shall be so arranged that the heated bituminous material will be delivered in a thin, uniform sheet, or in multiple streams the full width of the mixer, except in the case of a mixer where bituminous material is sprayed.

2.4.2.3 Mixer unit for batch method

The mixer shall be an approved twin-pugmill capable of producing a uniform mixture within job-mix tolerance specified. Batch capacity of the mixer shall be suitable to accomplish the work. The mixer shall have a time lock, accurate within five seconds, to control operation of the complete mixing cycle by locking the weigh-box gate after the mixer is charged until closing of the mixer gate at the completion of the cycle. The time lock shall lock the bitumen bucket throughout the dry-mixing period and shall lock the mixer gate throughout the dry and wet-mixing periods. The dry-mixing period is defined as the interval of time between opening of the weigh-box gate and application of bituminous material and opening of the mixer gate. Control of the time shall be flexible and capable of being set at intervals of not more than 5 seconds throughout cycles up to 3 minutes. A mechanical batch counter shall be installed as part of the timing device and shall be designed to register only the actuation of the bituminous-bucket release and to preclude register of any dry batches, or the register of any material through the operation of pulling bins. If not enclosed, the mixer box shall be equipped with an adjustable hood to prevent loss of mineral filler by dispersion. The clearance of the blades from all fixed parts shall not exceed 19.1 mm (3/4-inch).

2.4.3 Special Requirements for Conventional Continuous-Mixing Plants

2.4.3.1 Gradation control unit

The plant shall include means for accurately proportioning each bin size of aggregate either by weighing or measuring volumetrically. When gradation control is by volume, the unit shall include a feeder mounted under the compartment bins. Each bin shall have an accurately controlled, lockable gate for volumetrically measuring material to be drawn from it. Indicators shall be provided on each gate to show the gate opening in inches.

2.4.3.2 Weight calibration of aggregate feed

The plant shall include means for calibration of gate openings by weight of test samples. The materials fed out of the bins through the individual orifices shall be bypassed to suitable test boxes. The plant shall be equipped to handle conveniently such test samples weighing approximately 181.4 Kg (400 pounds) combined weight of samples from bins, and not less than a 45.4 Kg (100 pounds) sample from any one bin. The size of the sample may be increased to 362.9 Kg (800 pounds) when so directed. A platform scale having sufficient capacity to accurately weigh the samples shall be provided. Mechanical means shall be provided to accurately proportion the mineral filler to the mixing plant.

2.4.3.3 Synchronization of aggregate and bitumen feed

Approved means shall be provided for interlocking control between flow of aggregate from bins and flow of bitumen from meter or other proportioning device.

2.4.3.4 Mixer unit for continuous method shall be of an approved twin-pugmill type capable of producing a uniform mixture within the job-mix tolerances specified. Blades shall be adjustable for angular position on the shafts and reversible to retard the flow of the mix. The mixer shall bear a manufacturer's plate indicating the net volumetric contents of the mixer at the several heights inscribed on a permanent gate and the rate of feed of aggregate per minute of plant-operating speed. Unless otherwise required, determination of mixing time shall be by weight method, using the following formula.

$$\text{Mixing time in seconds} = \frac{\text{pugmill dead capacity in pounds}}{\text{pugmill output in pounds per second}}$$

Weights for the job will be determined by tests made by the Contracting Officer.

2.4.3.5 Discharge hopper

The pugmill shall be equipped with a discharge hopper having a capacity of approximately 910 Kg (1 ton). The hopper shall be equipped with dump gates that permit rapid and complete discharge of the bituminous mixture without segregation.

2.4.4 Requirements for Dryer-Drum Mixing Plants

Dryer-drum mixing plants shall conform to the following requirements. Equipment for preparation of bituminous material; feeder for dryer; thermometric equipment; and safety requirements shall be as specified in paragraph: REQUIREMENT FOR ALL PLANTS.

2.4.4.1 Aggregate supply and control

At least two aggregate storage bins shall be furnished and used to feed at least two separate sizes of aggregate. Each bin shall have the feed rate controlled by a variable speed belt, or a remotely operated gate, calibrated to accurately deliver any specified quantity of material. The feed rate from each bin shall be readily adjustable from the control panel to change aggregate proportions of aggregate from each bin when the combined aggregate delivery is increased or decreased. The combined aggregate belt feeding type dryer-drum shall be equipped with an approved belt scale. The belt scale shall operate automatic

controls which will maintain the established proportion of the bitumen and the total aggregate, with provisions for readily changing the proportions. Approved means shall be provided for storing, metering, and feeding mineral filler as a separate material when a separate mineral filler is necessary.

2.4.4.2 Bituminous control unit

Approved means shall be provided to inject the required percentage of bitumen in the mix within the tolerances provided. Injection shall be so designed and controlled that no detrimental effect takes place form too close contact with dryer flame. Control of the quantity of bitumen injected shall be automatically linked to the aggregate feed scales as specified in the previous subparagraph. Provision shall be made so the amount of bitumen delivered can be checked by weight. Approved steam-jacketing or other insulation for maintaining the required temperature of bitumen in pipelines, meters, spray nozzles, etc., shall be provided. The system shall be capable of maintaining a continuous circulation of bituminous material.

2.4.4.3 Dryer-drum mixer

The dryer-drum mixer shall be an approved unit specially made for such operation by a manufacturer regularly engaged in production of such units and shall be a model which has a satisfactory record of use on previous jobs. Capacity shall be sufficient to supply the work under this contract without delay to any part of the construction operations. The unit shall be capable of effectively heating and drying the mineral aggregate as required and of effectively and completely combining the bitumen and all other materials into a uniform mixture with all aggregate particle thoroughly coated. Approved means shall be provided to maintain a constant rate of rotation of the dryer drum. The unit shall be equipped with automatic burner controls and shall provide approved means for temperature sensing of the bituminous mixture at discharge.

2.4.4.4 Holding bins

An approved holding bin or bins shall be provided to receive the hot bituminous mixture as it discharges from the mixer.

2.5 OTHER EQUIPMENT

2.5.1 Bituminous-Materials Spreaders

Bituminous-materials spreaders shall be the self-propelled type equipped with hoppers, tamping, or vibrating devices, distributing screws, adjustable screeds operated either manually or automatically,

equipment for heating the screeds and equalizing devices. The spreader shall be capable of spreading hot bituminous mixtures without leaving indented areas, tearing, shoving, or gouging and capable of producing a finished surface conforming to the smoothness requirements specified hereinafter. The spreader shall be capable of spreading hot bituminous mixtures without leaving indented areas, tearing, shoving, or gouging and capable of confining edge of strips to true lines without use of stationary side forms and capable of placing the course to the required thickness. If an automatic grade control device is used on the spreader for two-lane paving operations, it shall consist of sensing device for control of one end of the screed and a slope-control mechanism for control of the other end of the screed, or a sensing device on each side of the paving machine. Where the paver is used on multiple paving lanes (more than two paving lanes), sensing devices shall be used on each side of the spreader for control of the screed. The slope-control mechanism shall not be used for grade control in multiple paving lane operations.

2.5.2 Steel-Wheel Rollers

Steel-wheel rollers shall be self-propelled, three-wheel, (two-axle) and tandem (two-axle) types, weighing not less than 9,071.8 Kg (20,000 pounds) each. The three-wheel rollers shall have a minimum weight of 136 Kg per mm of width (300 pounds per inch of width) of rear wheel. Wheels shall be equipped with adjustable scrapers, water tanks, and sprinkling apparatus for keeping the wheels wet; thereby preventing the bituminous mixture from sticking to the wheels. Rollers shall be capable of reversing without backlash and free from worn parts. Roller wheels with flat and pitted areas or protections that leave marks in the pavement will not be permitted. Three-axle tandems will be permitted in lieu of two-axle tandems if approved by the Contracting Officer.

2.5.3 Heavy Pneumatic-Tired Rollers

Heavy pneumatic-tired rollers shall be self-propelled and shall consist of two axles on which are mounted multiple pneumatic-tire wheels in such manner that the rear group of wheels will not follow in the tracks of the forward group but spaced to give essentially uniform coverage with each pass. Axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading. Tires shall be smooth and capable of being inflated to at least 621 KPa (90 p.s.i.) Construction of the roller shall be such that each wheel can be loaded to a minimum of 2,040 Kg (4,500 pounds).

2.5.4 Blowers and Brooms

Blowers and brooms shall be power type and suitable for cleaning the surface to be paved.

2.5.5 Saw and Core Drill

Saw and core drill shall be of the power type. The saw shall be capable of rapidly cutting pavement samples and trimming joints and edges of pavement. The core drill used for obtaining pavement samples shall be equipped with a diamond, tungsten carbide, or other bit capable of rapidly cutting a precision core sample 101.6 mm (4 inches) in diameter.

2.5.6 Small Tools

Small tools shall consist of rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heater for heating small tools, stilt sandals, and other small tools in numbers as required.

PART 3 EXECUTION

3.1 WEATHER LIMITATIONS

Bituminous courses shall be constructed only when the base course or intermediate course is dry and when the weather is not rainy. Unless otherwise directed, asphalt courses shall not be constructed when the temperature of the surface of existing pavement or base course is below 4.4 degrees C (40 degrees F).

3.2 PREPARATION OF SURFACE

3.2.1 Bituminous mixtures shall not be placed with-out ample time to complete spreading and rolling during daylight hours, unless approved satisfactory artificial lighting is provided. Immediately prior to placing the bituminous base or surface course, all loose material, dirt, clay, or other objectionable material shall be removed from the surface.

3.2.2 If the surface of the underlying material has been damaged after placement or has inadequate compaction (soft spots) or other deviations from this contract specification requirements, such defects shall be repaired immediately prior to placement of the bituminous course. Trucks delivering materials shall be routed in a manner to minimize traveling over the subgrade during the placement operation. Paving operations shall be conducted in such a manner to prevent runoff water from being ponded on the subgrade in case of rain.

3.3 GRADE CONTROL

The lines and grades shown on the contract drawings shall be established and maintained by means of line and grade stakes placed at the site of the work by the Contractor in accordance with CONSTRUCTION

CLAUSE: LAYOUT OF WORK. Elevations of bench marks used by the Contractor for controlling pavement operations at site of work will be determined, established, and maintained by the Government. Finished pavement gradelines and elevations shown shall be established and controlled at site of work by the Contractor in accordance with bench mark elevations furnished by the Contracting Officer.

3.4 MIXING

The bituminous mixtures shall be produced in a plant as specified hereinafter.

3.4.1 Conventional Plant

3.4.1.1 Preparation of mineral aggregates

Each component of various-sized aggregates blended in preparation of the bituminous mixture shall be placed and maintained in separate stockpiles. Various-sized aggregates shall be stockpiled to prevent segregation or intermixing. Bulldozers shall not be used for stockpiling aggregates or feeding aggregates to plant. The aggregate shall be fed into the cold elevator by separate mechanical feeders in a manner that will produce an aggregate graded within the requirements of the job mix formulas and tolerances specified. The aggregates shall be heated and thoroughly dried before entering the hot bins. The temperature and moisture content of the aggregate determined as it enters the mixer shall be uniform and such that the temperature and moisture content of the finished mixture will be uniform and within the tolerances specified. The heated and dried aggregates shall be screened and conveyed to separate hot bins ready for mixing with the bituminous material. The aggregate shall be separated into the sizes designated or approved, except that hot aggregate shall be separated into not less than three sizes. Approved dry storage shall be provided for mineral filler.

3.4.1.2 Preparation of bituminous mixtures

Each size of aggregate, prepared as specified hereinbefore, and dry mineral filler shall be accurately weighed or measured and conveyed into the mixer in the proportionate quantities required to meet the job-mix formula. The required amount of asphalt for each batch or calibrated amount for continuous mixing, shall be introduced into the mixer. In batch mixing, after the aggregates and mineral filler have been introduced into the mixer and mixed for not less than 5 seconds, the asphalt shall be added and the mixing continued for not less than 20 seconds and as much longer as may be required to obtain a homogeneous mixture. When a continuous mixer is employed, the mixing

time shall be not less than 25 seconds, and as much longer as may be required to obtain a homogeneous mixture. Additional mixing time when required will be determined by the Contracting Officer. In no case shall the aggregate be introduced into the mixer at a temperature more than (-) 4 degrees C (25 degrees F) above the temperature of the asphalt. The temperature of the asphalt at the time of mixing shall not exceed 163 degrees C (325 degrees F). The temperature of the aggregate and mineral filler in the mixer shall not exceed 177 degrees C (350 degrees F) when the asphalt is added. However, the temperature discharged from the plant shall not exceed 149 degrees C (300 degrees F). The temperatures of both the aggregate and asphalt at the time of mixing and the additional mixing time required shall be as determined by the Contracting Officer. When the mixture is prepared in a twin-shaft pugmill mixer, the volume of the aggregates, mineral filler, and asphalt shall not be so great that the mixture extends above the tips of the mixer blades when the blades are in a vertical position. All overheated and carbonized mixtures or mixtures which foam or show indications of moisture will be rejected. When moisture is detected in the finished mixture, all aggregate in the bins shall be removed immediately and returned to the respective stockpiles.

3.4.1.3 Water content of aggregates

During drying operations, the water content shall be reduced to less than 0.25 percent for aggregate blends with water absorption of 2.5 percent or less, and to less than 0.50 percent for aggregate blends with water absorption greater than 2.5 percent, absorption to be determined by ASTM C 127 and C 128. The water absorption for the aggregate blend shall be the weighted average of the absorption value for the coarse aggregate and the fine aggregate. The water content test shall be conducted in accordance with ASTM C 566. Water content for the blend will be a weighted average based on the composition of the blend.

3.4.2 Dryer-Drum Mixer

3.4.2.1 Preparation of mineral aggregates

The mineral aggregate shall be furnished in at least two separate sized materials. Each component of the various-sized aggregates to be blended in preparation of the bituminous mixture shall be placed in separate stockpiles in such manner that the separate sizes will not be intermixed and that segregation does not take place. Each size shall be stored in a separate bin without mixing, for feeding the dryer-drum mixer. The aggregate shall be fed into the dryer-drum mixer by the equipment previously specified in such manner that will produce a total

aggregate graded within the requirements of the job-mix formula and tolerances specified. Moisture content of the aggregates fed to the dryer-drum mixer shall be as necessary to produce a bituminous mixture meeting all specified requirements.

3.4.2.2 Preparation of bituminous mixture

The aggregates and mineral filler shall be accurately weighed using the specified equipment and conveyed to the dryer-drum mixer in amounts required to conform to the job-mix formula. The required amount of asphalt shall be continuously injected into the dryer-drum mixer with the aggregate in the amount required by the job-mix formula, using the injection and control equipment previously specified. The temperature of the asphalt shall not exceed 163 degrees C (325 degrees F) at any time. The temperature of the bituminous mixture as discharged from the dryer-drum mixer shall not exceed 149 degrees C (300 degrees F). The speed of rotation of the drum, the temperature within the drum and time the mixture is within the drum shall be controlled so as to produce a uniform bituminous mixture without segregation and with all aggregate particles thoroughly coated and conforming to all requirements of these specifications. All overheated and carbonized mixtures shall be rejected. Particular care shall be taken when commencing operations each day to reject any bituminous mixture that does not meet all requirements of these specifications.

3.4.2.3 Moisture test

Absorbed moisture in the aggregate shall be reduced to such a quantity that there is no objectionable segregation of asphalt resulting from escaping water vapor in the prepared mixture. A maximum of 0.5 percent moisture based on weight of the mixture, will be allowed in the mixture when sampled behind the paver and tested in accordance with ASTM D 1461.

3.5 TRANSPORTATION OF BITUMINOUS MIXTURE

The bituminous mixture shall be transported from the mixing plant to the site in trucks having tight, clean, smooth beds coated with a minimum amount of a concentrated solution of hydrated lime and water to prevent adhesion of the mixture to the truck beds. Each load of mixture shall be covered with canvas, or other suitable material of ample size to protect the mixture from the weather and to prevent loss of heat. Deliveries shall be scheduled so that spreading and rolling of all mixture prepared for one day's run can be completed during daylight unless approved adequate artificial lighting is provided. The mixture shall be delivered in such manner that the temperature at the time of dumping into the spreader will be not less than

hereinafter specified. Loads that have crusts of cold, unworkable material or have become wet by rain will be rejected. Hauling over freshly placed material will not be permitted.

3.6 PLACING

Intermediate course, or any layer of surface source shall not be left uncovered by the subsequent course for more than 5 days, weather permitting. Material trucks hauling materials other than asphaltic concrete or tack coat shall not travel on previously constructed layers of asphaltic concrete until the final surface course is constructed.

3.6.1 Surface Preparation of Underlying Course

Prior to placing of the intermediate or surface course, the underlying course shall be cleared of all foreign or objectionable matter with power blowers, power brooms, or hand brooms. A tack coat shall be applied between the intermediate and surface course mixture. The tack coat between layers of recently constructed inter-mediate course, or layers of recently constructed surface course, may have the application rate reduced when specifically approved if the surface of the previously placed layer as approved is entirely free of dust, dirt or other foreign matter which might reduce the bond between the layers of the intermediate or surface course. Tack coat shall not be completely omitted.

3.6.2 Offsetting Joints in Intermediate and Surface Courses

The surface course shall be placed so that longitudinal joints of the surface course will not coincide with joints in the intermediate course by approximately 230 mm (9 inches). Care shall be taken when possible to offset longitudinal joints in a manner that the final surface course joint is in the center of the pavement or on a lane line. Transverse joints in the surface course shall be offset by at least two feet from transverse joints in the intermediate course.

3.6.3 General Requirements for Use of Mechanical Spreader

The range of temperatures of the mixture, when dumped into the mechanical spreader shall be as determined by the Contractor. Asphalt mixtures having temperatures less than 113 degrees C (235 degrees F) when dumped into a mechanical spreader will be rejected. The mechanical spreader shall be so adjusted and its speed so regulated that the surface of the course being placed will be smooth and continuous without tears and pulling, and of such depth that, when compacted, the surface will conform with the cross section, grade, and

contour shown on the drawings. Unless otherwise directed, placing shall begin along the centerline of areas paved on a crowned section or on the high side of areas with a one-way slope, and shall be in the direction of the major traffic flow. The mixture shall be placed in consecutive adjacent strips having a minimum width of 3.05 meters (10 feet), except when edge lanes require strips less than 3.05 meters (10 feet) to complete an area. Each strip placed before a succeeding strip shall be of such length that sufficient heat will be retained to make the strip readily compactible so that a joint can be obtained conforming to the requirements for texture, density, and smoothness specified in the paragraph: JOINTS. The length of any strip to be laid prior to the succeeding strip shall be as directed and may be decreased or increased as dictated by changes in climatic conditions. Longitudinal joints and edges shall be constructed to true line markings. The Contractor shall establish lines parallel to the centerline of the area to be paved and shall place string lines coinciding with established lines for the spreading machine to follow. Number and location of lines shall be as directed. Placing of the mixture shall be as nearly continuous as possible, and the speed of placing shall be adjusted, as directed, to permit proper rolling.

3.6.3.1 Special Procedures to Prevent Segregation

The wings of the spreader hopper shall not be emptied (flipped) between truck loads. The screed auger shall be operated approximately three-fourths (3/4) full and the hopper conveyor shall not be allowed to run out of material.

3.6.4 Special Requirements for Placing Strips Succeeding Initial Strips

In placing each succeeding strip after the initial strip has been spread and compacted as specified hereafter, the screed endgate of the mechanical spreader shall overlap the previously placed strip slightly and shall be 1.25 times thicker than the existing compacted strip in order to produce a smooth compacted joint with the specified density. Mixture placed on the edge of the previously placed strip by the mechanical spreader shall be pushed back (tucked) to the edge of the strip being placed by use of a lute (rake). The pushed back material shall form a ridge on the uncompacted strip along the edge of the previously placed strip. The height of the ridge above the uncompacted strip should be approximately equal to the thickness being allowed for roll down during compaction. Procedures similar to these outlined above shall be used to facilitate getting a smooth joint with density. When the quantity of mixture on the previously placed strip plus uncompacted material in the strip being placed exceeds that required to produce a smooth, dense joint, the excess mixture shall be removed and wasted. Excess material shall not be spread over the uncompacted mat.

3.6.5 Shoveling, Raking, and Tamping After Machine Spreading

A sufficient number of experienced shovelers and rakers shall follow the spreading machine, adding hot mixture and raking the mixtures as required to produce a course that, when completed, will conform to all requirements specified herein. Broadcasting or fanning of mixture over areas being compacted will not be permitted. When segregation occurs in the mixture during placing, the spreading operation shall be suspended until the cause is determined and corrected. Irregularities in alignment of the course left by the mechanical spreader shall be corrected by trimming directly behind the machine. Immediately after trimming, the edges of the course shall be thoroughly compacted by tamping laterally with a lute. Distortion of the course during tamping will not be permitted.

3.6.6 Hand Spreading in Lieu of Machine Spreading

In areas where the use of machine spreading is impractical, the mixture shall be spread uniformly with hot shovels and hot rakes in a loose layer of a thickness that, when compacted, will conform to the required grade and thickness. During hand spreading, each shovelful of mixture shall be carefully placed by turning the shovel over in a manner that will prevent segregation. In no case shall the mixture be placed by throwing or broadcasting from a shovel. The loads shall not be dumped faster than can be properly handled by the shovelers and rakers.

3.7 COMPACTION OF MIXTURE

3.7.1 General

Compaction of the mixture shall be accomplished using a minimum of 2 steel-wheel rollers and a pneumatic-tired roller specified above. Rolling shall begin as soon after placing as mixture will bear roller without undue displacement. Delays in rolling freshly spread mixture will not be permitted. After initial rolling, preliminary tests of crown, grade, and smoothness shall be made by the Contractor under supervision of the Contracting Officer. Before rolling is continued, deficiencies shall be corrected so that finished course will conform to requirements for grade and smoothness specified herein. Further smoothness checks shall be made by the Contractor as directed by the Contracting Officer. After preliminary smoothness tests, rolling shall be continued until density is obtained in all portions of each course of not less than 95 percent of density of laboratory compacted Marshall specimens taken behind the paver.

3.7.2 Density Tests

Density of the compacted mixture of the surface or intermediate course shall be determined by tests made on specimens taken from the compacted course in accordance with the requirements of paragraph: SAMPLING PAVEMENTS. Specimens shall be tested in accordance with the requirements of ASTM D 2726.

3.7.3 Operation of Rollers, Tampers and Vibro Plate Compactors

3.7.3.1 The speed of rollers shall be slow enough at all times to avoid displacement of the hot mixture. Displacement of the mixture resulting from reversing the direction of the roller or from any other cause shall be corrected at once by use of rakes, and fresh mixture shall be applied or removed when necessary. Alternate passes of the roller shall be varied slightly in length. During rolling, the wheels of steel-wheel rollers and plates of vibro plate compactors shall be moistened to prevent adhesion of the mixture to the wheels or plates, but excess water will not be permitted. Tires of heavy pneumatic roller shall be moistened with soapy water when required to prevent mixture from sticking to tires during rolling. Rollers shall not be permitted to stand on finished courses until the courses have thoroughly cooled. The minimum number of rollers shall be adequate to obtain the specified density. Places inaccessible to rollers shall be thoroughly compacted with hot hand-tampers or vibro plate compactors.

3.7.3.2 Unless otherwise directed by Contracting Officer, a pneumatic-tired roller shall be used as an intermediate roller. Longitudinal joints shall be pinched to ensure compaction with the pneumatic-tired roller. The roller shall make at least one complete pass (forward and backward) operated on the hot lane as the intermediate roller. The roller shall be operated with its outside tire as close as possible to the previously placed lane.

3.7.4 Correcting Deficient Areas

Mixtures that become contaminated or are defective shall be removed. Skin patching of an area that has been rolled will not be permitted. Holes the full thickness of the course shall be cut so that the sides are perpendicular and parallel to the direction of traffic and the edges are vertical. Edges shall be sprayed with bituminous materials conforming to the requirements of SECTION: BITUMINOUS TACK COAT. Sufficient fresh paving mixture shall be placed in the holes so that finished surface will conform to the grade and smoothness requirements. The paving mixture shall be compacted to the density specified herein.

3.8 JOINTS

3.8.1 General

Joints between old and new pavements or between successive day's work, or joints that have become cold because of delay, shall be tacked and shall be made carefully to insure continuous bond between old and new sections of the course. All joints shall have the same texture, density, and smoothness as other sections of the course. The tack shall be overlapped onto the previous pavement 25 mm (1 inch) or 50 mm (2 inches). Contact surfaces of previously constructed pavements, curbs, gutters, manholes, etc., shall be tacked. If these surfaces have become coated with dust, sand, or other objectionable material shall be cleaned by brushing or cut back with an approved power saw, as directed. The surface against which new material is to be placed shall be sprayed with a thin, uniform coat of bituminous material conforming to the requirements of SECTION: BITUMINOUS TACK COAT. The material shall be applied far enough in advance of placement of the fresh mixture to insure adequate curing. Care shall be taken to prevent damage or contamination of the sprayed surface.

3.8.2 Transverse Joints

The roller shall pass over the unprotected end of freshly placed mixture only when placing of the course is discontinued or when delivery of mixture is interrupted to the extent that unrolled material may become cold. In all cases, the edge of the previously placed course shall be cut back to expose an even, vertical surface the full thickness of the course. In continuing placement of strip, the mechanical spreader shall be positioned on the transverse joint so that sufficient hot mixture will be spread to obtain a joint after rolling which conforms to the required density and smoothness specified herein. When required, the fresh mixture shall be raked against the joints, thoroughly tamped with hot tampers, smoothed with hot irons and rolled.

3.8.3 Longitudinal Joints

Longitudinal joints in surface course or intermediate course shall be offset as stated in specification paragraph: Offsetting Joints in Intermediate and Surface Courses. Procedures outlined in specification paragraph: Special Requirements for Placing Strips Succeeding Initial Strips shall be followed when making longitudinal joints. Edges of previously placed strips that have cooled or are irregular, honeycombed, poorly compacted, damaged, or otherwise defective, and

unsatisfactory sections of the joint shall be cut back to expose a clean, sound surface for the full thickness of the course as directed. When required, fresh mixtures shall be raked against the joint, thoroughly tamped with hot tampers, smoothed with hot irons and rolled.

3.9 EDGES OF PAVEMENT

Edges of pavement adjacent to the shoulders shall be trimmed neatly to line. Shoulder material not less than 0.3 meters (1 foot) wide shall be placed against and to the full height of the pavement surface as soon as practicable after final rolling has been completed and the pavement has sufficiently hardened.

3.10 PROTECTION OF PAVEMENT

After final rolling of the pavement, no vehicular traffic of any kind shall be permitted until the pavement has cooled and hardened or for at least 6 hours.

3.11 SURFACE REQUIREMENTS

Finished surface of bituminous courses, when tested as specified below shall conform to gradeline and elevations shown and to surface-smoothness requirements specified.

3.11.1 Plan Grade

The grade of the completed surface shall not deviate more than 1.5 mm (0.05 foot) from the plan grade.

3.11.2 Bituminous Intermediate Course

Upon completion of final rolling the surface of the intermediate course, if any, shall be smooth and true to grade and cross section. When a 12-foot straightedge is laid on the surface parallel with the centerline of the paved area or transverse from crown to pavement edge, the surface shall not vary more than 1/4 inch from the straightedge. Surface irregularities exceeding these requirements shall be corrected as directed. Testing for plan-grade conformance and surface smoothness shall be performed by the Contracting Officer immediately after rolling is completed. Tests shall be made at intervals as directed.

3.11.3 Bituminous Surface Course

The surface course, upon completion of final rolling, shall be smooth and true to grade and cross section. When a 3.66 meters (12-foot) straightedge is laid on the surface parallel with the centerline, the surface shall not vary more than 3.2 mm (1/8 inch) from the straightedge. When the 3.66 meters (12-foot) straightedge is laid on the surface transverse to the centerline between the crown and edge of payment, the surface shall not vary more than 6.4 mm (1/4 inch) from the straightedge. Low or defective areas shall be immediately corrected by cutting out the faulty areas with fresh, hot mixture, and compacting the area to conform to the remainder of the pavement. Testing for plan-grade conformance and surface smoothness shall be performed by the Contractor in the presence of a representative of the Contracting Officer immediately after rolling is completed. Tests shall be made at intervals as directed.

3.11.4 Equipment

The Contractor shall furnish and maintain at the site, in good condition, one straightedge for each bituminous paver, for use of the Contracting Officer in testing the finished surface. Straightedges shall be aluminum or other approved lightweight metal and shall have blades of box or box-girder cross section with flat bottom, adequately reinforced to insure rigidity and accuracy. Straightedges shall have handles to facilitate movement on the pavement. Where devices other than straightedges are approved for surface smoothness determination, the Contractor shall furnish and maintain in good condition at the site, one such device for each bituminous paver.

3.12 SAMPLING PAVEMENTS

Samples of finished pavement, including samples that span the longitudinal joints, shall be obtained by the Contractor. A minimum of one test (three cores or sawed samples) shall be taken for each tonnage lot represented by a Marshall test. The three cores or sawed samples shall be taken at locations throughout the tonnage lot. The locations shall not be previously marked. Sample shall be taken at locations determined by the Contracting Officer. Additional samples shall be taken and tested at the start of the paving operations when directed. One-half of the samples shall be cut from longitudinal joints. The Contracting Officer may require additional testing at no additional cost to the Government. The Government may also perform verification tests as considered necessary. Cores shall be at least 101.6 mm (4 inches) in diameter and sawed samples at least 127.0 mm (5 inches) on each side. The samples shall be tested by the Contractor

to determine conformance to density, thickness and, if directed, other specified requirements. All quality control sampling and testing shall be the responsibility of the Contractor in accordance with paragraph SECTION: CONTRACTOR QUALITY CONTROL, specification paragraph: QUALITY CONTROL and as specified herein. Samples of each day's production shall be taken by noon of the following day and results of tests reported to the Contracting Officer by the end of that day. The Contractor shall furnish a power saw or core drill and labor for cutting samples and shall immediately replace the pavement. Sample holes shall have all surfaces tacked. Hot-mix bituminous mix shall be compacted in the sample hole to the satisfaction of the Contracting Officer. The finished surface of the repaired sample hole shall be sealed by mopping with tack coat.

3.13 INSPECTION OF PLANT AND EQUIPMENT

The Contracting Officer shall have access at all times to all parts of the paving plant for checking adequacy of equipment in use, for inspecting operation of plant, verifying weights, proportions, and character of materials, and for checking temperatures maintained in preparation of mixtures. Checks so made shall not relieve the Contractor from performing all work as specified.

ASPHALTIC CONCRETE TEST (Verified Mix Design)

REPORT OF TEST RESULTS

LOT Belt tons

LAB I.D._____ SAMPLE DATE:_____ SAMPLE ID: Hot Mix tons

SUPPLIER:_____ REF. DESIGN MIX:

Sieve Size	Belt Sample	Hot-Mix Sample *	Single Point Job-Mix Formula	Job-Mix Formula Tolerances
3/4"				
1/2"				
3/8"				
No. 4				
No. 8				
No. 16				
No. 30				
No. 50				
No. 100				
No. 200				

EXTRACTION % AC, total mix basis

AGGREGATE TYPE %** AGGREGATE TYPE %**

MARSHALL CHARACTERISTICS
50 Compaction Blows (average of 3 specimens)

	Sample *	Specifications		
Stability, lbs	_____	_____	min	* Uncompacted
Flow, 0.254 mm (1/100 in)	_____	_____	max	Behind Paver
% Voids	_____	3-5		
% VMA	_____	_____		** State whether
% VFA	_____	_____		plant is on total
Density, pcf	_____			mix or total
% Retained Strength Test	_____	75% min retained		aggregate.
% Moisture (Asphaltic Mix)	_____	0.5 max		
Ratio(-) No. 200 to % Asphalt	_____	0.6-1.2		

LOT DENSITY SHALL BE TIED TO THE LOT AND DATE
FORM SHALL BE HAND WRITTEN (TIME OF DELIVERY AND CORRECTION OF MIX IS IMPORTANT)
FORM PREPARED BY KCD EP-GL, DECEMBER 1994

Virginia Test Method
For
Determination of Asphalt Content
From Asphalt Paving Mixtures
By the Ignition Method
Designation: VTM 102 (Revised 25 July 1995)

(NOTE: ** Indicates Revision by Corps of Engineers)

COMPLETE TEST METHODOLOGY

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Virginia Test Method
For
Determination of Asphalt Content
From Asphalt Paving Mixtures
By the Ignition Method
Designation: VTM 102 (Revised 25 July 1995)

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1. **Scope**

1.1 This test method covers the determination of asphalt content of hot-mixed paving mixtures by ignition of the asphalt cement at 538EC (1000EF) in a furnace. The aggregate remaining can be used for sieve analysis using AASHTO Test Method T 30.

1.2 The values stated in metric units are to be regarded as the standard.

1.3 This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. **Referenced Documents**

AASHTO Standards:

T 248	Reducing Field Samples of Aggregate to Testing Size
T 168	Sampling Bituminous Paving Materials
T 30	Mechanical Analysis of Extracted Aggregate

3. **Summary of Test Methods**

3.1 The asphalt in a sample of hot-mix paving material is burned by ignition at 538EC (1000EF). The asphalt content is calculated from the mass of ignited aggregate, moisture content, and temperature compensation for the change in mass of the sample container. The asphalt is expressed as mass percentage of the moisture-free mixtures. This method may not be applicable to mixes containing fibers or ground tire rubber (dry process).

4. **Apparatus**

4.1 A forced air ignition furnace, capable of maintaining the temperature at 650EC (1200EF), with an internal balance thermally isolated from the furnace chamber accurate to 0.1 gram. The balance shall be capable of weighing a 3,500-gram sample in addition to the sample baskets. The furnace shall calculate a temperature compensation factor for the change in weight of the sample baskets and provide for the input of a correction factor for aggregate loss. The furnace shall provide a printed ticket with the initial specimen weight, specimen weight loss, temperature compensation, correction factor, corrected asphalt content (%), test time, and test temperature. The sample chamber dimensions shall be at least 35.6 x 26.7 x 35.6 cm (W x H x D)(14 x 10.5 x 14 in.). A method for reducing furnace emissions shall be provided. The furnace shall provide an audible alarm and indicator light when the sample weight loss does not exceed 0.02 percent of the total sample weight for two consecutive minutes. The furnace door shall be locked until the completion of the test procedure.

Note: The National Center for Asphalt Technology (NCAT) Asphalt Content Tester manufactured by Barnstead/Thermolyne and distributed by QC Resource (800) 296-7171 has been found to be suitable.

4.2 Two tempered stainless steel 2.36 mm (No. 8) mesh or otherwise perforated baskets, dimensions (LxWxH) 26.7 x 26.7 x 5.1 cm (10.5 x 10.5 x 2.0 in. with 5 cm (2 in) support legs. The baskets shall be nested. The baskets shall be provided with screening on the legs to confine the aggregate.

4.3 One stainless steel catch pan, dimensions (LxWxH) of 28.0 x 28.0 x 2.6 cm (11.0 x 11.0 x 1.0 in).

4.4 Oven capable of maintaining 125 $\pm$ 5EC (257$\pm$ 9EF).

4.5 Balance, 8-kg or greater capacity, sensitive to 0.5 g for weighing sample in baskets.

4.6 Safety Equipment: safety glasses or face shield, high temperature gloves, and long sleeve jacket. Additionally, a heat resistant surface capable of withstanding 650EC (1202EF) and a protective cage capable of surrounding the sample baskets shall be provided.

4.7 Miscellaneous Equipment: pan dimensions (LxWxD) 38 x 38 x 5 cm (15 x 15 x 2 in) minimum for transferring samples after ignition, spatulas, bowls, and wire brushes.

5. **Sampling**

5.1 The test sample shall be the end result of quartering a larger sample taken in accordance with VTM-48 (AASHTO T 248 may be used as a guide to quartering.) Note: VTM-48 is a modified version of AASHTO T 168.

5.2 Preparation of Test Specimens:

5.2.1 ** If the mixture is not sufficiently soft to separate with a spatula or trowel, place it in a large flat pan and warm to 125EC ± 5EC (257EF ± 9EF) for 25 minutes. The sample shall be cured as specified in paragraph: Test Properties of Bituminous Mixtures.

5.2.2 The size of the test sample shall be governed by the nominal maximum aggregate size of the mixture and shall conform to the mass requirement shown in Table 1 (Note 1):

Note 1: When the mass of the test specimen exceeds the capacity of the equipment used, the test specimen may be divided into suitable increments, tested, and the results appropriately combined for calculation of the asphalt content (weighted average).

Table 1 Size of Sample

Nominal Maximum Aggregate Size, mm	Sieve Size	Minimum Mass of Sample g
4.75	(No. 4)	1200
9.5	3/8 in.	1200
12.5	1/2 in.	1500
19.0	3/4 in.	2000
25.0	1 in.	3000
37.5	1 1/2 in.	4000

Sample sizes should not be more than 400 g greater than the minimum recommended sample mass. Large samples of fine mixes tend to result in incomplete ignition of the asphalt.

5.2.3 In addition, a test specimen for moisture determination (VTM-49) will be made as deemed necessary. The specimen used for moisture determination may not be used for asphalt content determination.

6. **Calibration**

Two calibration procedures are provided. Either method may be required by the engineer. For mix designs containing RAP, sufficient quantity of RAP should be sampled such that the binder content of the RAP may be

estimated, and to provide for the RAP to be used in the mix calibration. The binder content of the RAP will be estimated from the average of four samples (RAP only) burned in the furnace. The portions of RAP should be obtained using a sample splitter.

Certain aggregate types may result in an unusually high correction factor and erroneous gradation results. Such mixes should be calibrated and tested at a lower temperature, typically 482EC (900EF) or as approved by the Engineer.

6A. Mixture Calibration, Method A

6A.1 This method may be effected by the type of aggregate in the mixture. Accordingly, to optimize accuracy, a calibration factor will be established with the testing of a set of calibration samples for each mix type. This procedure must be performed before any acceptance testing is completed.

6A.2 Two calibration specimens conforming to the mass requirements of Section 5.2.2 shall be prepared at the design asphalt content and at ± 0.5% of the design asphalt content for a total of six specimens. A butter mix shall be prepared at the design asphalt content, mixed and discarded prior to mixing any of the calibration specimens to ensure an accurate asphalt content. Aggregate used for the calibrations specimens shall be sampled from stockpiled material produced in the current construction season. Any method may be used to combine the aggregates; however, an additional "blank"

specimen shall be batched and tested according to AASHTO T 30. The washed gradation shall fall within the JMF (mix design) tolerances.

6A.3 The freshly mixed specimens may be placed directly in the sample baskets. If allowed to cool, the samples must be preheated in a 125EC (257E F) oven for 25 minutes. Do not preheat the sample baskets.

6A.4 Preheat the ignition furnace to 538EC (1000E F). Record the furnace temperature (set point) prior to the initiation of the test. Enter a correction factor of **0.00** in the ignition furnace.

6A.5 Weigh and record the weight of the two sample baskets and catch pan (with guards in place).

6A.6 Place the bottom sample basket in the catch pan. Evenly distribute approximately one half of the calibration specimen in the lower basket taking care to keep the material away from the edges of the basket.

6A.7 Place the upper sample basket on the bottom basket assembly. Evenly distribute the remaining specimen in the top basket. Use a spatula or trowel to level the specimen.

6A.8 Weigh and record the sample, baskets, catch pan, and basket guards. Calculate and record the initial weight of the sample specimen (total weight - the weight of the sample basket assembly).

6A.9 Input the initial weight of the sample specimen in whole grams into the ignition furnace controller. Verify that the correct weight has been entered.

6A.10 Open the chamber door and place the sample baskets in the furnace. Close the chamber door and verify that the sample weight (including the baskets) displayed on the furnace's scale equals the total weight recorded in Section 6.8 within ± 5 g. Differences greater than 5 grams or failure of the furnace scale to stabilize may indicate that the sample baskets are contacting the furnace wall. Initiate the test by pressing the start/stop button. This will lock the sample chamber and start the combustion blower.

A.11 Allow the test to continue until the stable light and audible stable indicator indicates the test is complete. Press the start/stop button. This will unlock the sample chamber and cause the printer to print out the test results.

6A.12 Open the chamber door, remove the sample baskets and allow to cool to room temperature (approximately 30 minutes).

6A.13 Perform a gradation analysis on the residual aggregate as indicated in Section 8.

6A.14 Once all of the calibration specimens have been burned, determine the difference between the actual and measured asphalt contents for each sample. The mix correction factor is the average of the measured differences.

Alternate Calibration Procedure:

6B. **Aggregate Only Calibration, Method B**

6B.1 This method may be effected by the type of aggregate in the mixture. Accordingly, to optimize accuracy, a calibration factor will be established with the testing of a set of calibration samples for each mix type. This procedure must be performed before any acceptance testing is completed.

6B.2 Four blank (aggregate and RAP if applicable) calibration specimens conforming to the mass requirements of Section 5.2.2 shall be prepared to meet the job-mix formula (JMF). Aggregate used for the calibration specimens shall be sampled from stockpiled material produced in the current construction season. Any method may be used to combine the aggregates; however, an additional "blank" specimen shall be batched and tested according to AASHTO T 30. The washed gradation shall fall within the JMF tolerances.

6B.3 Preheat a specimen in a 125EC (257EF) oven for 20 minutes. Thoroughly mix the specimen with a spatula prior to introducing it into the sample baskets.

6B.4 Preheat the ignition furnace to **575EC (1067EF)**. Record the furnace temperature set point prior to the ignition of the test.

6B.4 Enter a correction factor of **0.00** in the ignition furnace.

6B.5 Weigh and record the weight of the two sample baskets and catch pan (with guards in place).

6B.6 Place the bottom sample basket in the catch pan. Evenly distribute approximately one half of the calibration specimen in the lower basket taking care to keep the material away from the edges of the basket.

6B.7 Place the upper sample basket on the bottom basket assembly. Evenly distribute the remaining specimen in the top basket. Use a spatula or trowel to level the specimen.

6B.8 Weigh and record the specimen, baskets, catch pan, and basket guards. Calculate and record the initial weight of the sample specimen (total weight - the weight of the sample basket assembly).

6B.9 Input the initial weight of the sample specimen in whole grams into the ignition furnace controller. Verify that the correct weight has been entered.

6B.10 Open the chamber door and place the sample baskets in the furnace. Close the chamber door and verify that the sample weight (including the baskets) displayed on the furnace's scale equals the total weight recorded in Section 6.8 $\pm$ 5 grams. Differences greater than 5 grams or failure of the furnace scale to stabilize may indicate that the sample baskets are contacting the furnace wall. Initiate the test by pressing the start/stop button. This will lock the sample chamber and start the combustion blower.

6B.11 Specimen to remain in the furnace for: 1200-1500 grams = 40 minutes, 2000-2400 grams = 60 minutes, 3000 grams or more = 75 minutes. The stable light and audible stable indicator may come on after 15-30 minutes; do not stop the test at this time. Press the start/stop button when the furnace timer indicates the appropriate times for the above different sample weights. This will unlock the sample chamber and cause the printer to print out the test results.

6B.12 Open the chamber door, remove the sample baskets and allow to cool to near room temperature (approximately 30 minutes).

6B.13 Perform a gradation analysis on the residual aggregate as indicated in Section 8.

6B.14 The mix calibration factor is calculated as follows:

$$ACA = \frac{EAC_test1 + AC_test2 + AC_test3 + AC_test4}{4}$$

$$\text{Mix Calibration Factor} = ACA - \left(RAC\% \times \frac{\%RAP}{100}\right)^{1}$$

[1] If RAP is used in mix.

where:

ACA = Aggregate Correction Average

AC% = Corrected Asphalt Content for Aggregate Test

RAC% = Average RAP Corrected AC%

6B.15 The calibration should be repeated each time there is a change in the mix design or as requested by the engineer.

7. **Test Procedure**

7.1 Preheat the ignition furnace to 538EC (1000EF). Record the furnace temperature (set point) prior to the initiation of the test.

7.2 Enter the correction factor for the specific mix to be tested as determined in Section 6 in the ignition furnace.

7.3 Weigh and record the weight of the two sample baskets and catch pan (with guards in place).

7.4 Prepare the sample as described in Section 5.2. Place the bottom sample basket in the catch pan. Evenly distribute approximately one half of the specimen in the lower basket taking care to keep the material away from the edges of the basket.

7.5 Place the upper sample basket on the bottom basket assembly. Evenly distribute the remaining specimen in the top basket. Use a spatula or trowel to level the specimen.

7.6 Weigh and record the sample, baskets, catch pan, and basket guards. Calculate and record the initial weight of the sample specimen (total weight - the weight of the sample basket assembly).

7.7 Input the initial weight of the sample specimen in whole grams into the ignition furnace controller. Verify that the correct weight has been entered.

7.8 Open the chamber door and place the sample baskets in the furnace. Close the chamber door and verify that the sample weight (including the baskets) displayed on the furnace's scale equals the total weight recorded

in Section 7.8 ± 5 grams. Differences greater than 5 grams or failure of the furnace scale to stabilize may indicate that the sample baskets are contacting the furnace wall. Initiate the test by pressing the start/stop button. This will lock the sample chamber and start the combustion blower.

7.9 Allow the test to continue until the stable light and audible stable indicator indicate the test is complete. Press the start/stop button. This will unlock the sample chamber and cause the printer to print out the test results.

7.10 Open the chamber door, remove the sample baskets and allow to cool to room temperature (approximately 30 minutes).

8. Gradation

8.1 Allow the specimen to cool to room temperature in the sample baskets.

8.2 Empty the contents of the baskets into a flat pan. Use a small wire sieve brush to ensure that any residual fines are removed from the baskets.

8.3 Perform the gradation analysis according to AASHTO T 30.

9. Report

9.1 ** Always report corrected asphalt content, mix correction factor, temperature compensation factor, total percent loss, sample mass, and test temperature on the laboratory test report.

9.2 ** Show the gradation and extraction test results on the "ASPHALTIC CONCRETE TEST" form specified in paragraph: Sampling, Testing, and Review of Bituminous Mixtures During Construction.

10. Precision and Bias

10.1 Precision and Bias were determined in an NCAT Round-Robin study for surface mixes.

Asphalt Content	Standard Deviation, %	Acceptable Range of Two Test Results, %
Single-Operator Precision	0.04	0.11
Multi-Laboratory Precision	0.06	0.17

Note: These precision statements are based on 4 aggregate types, 4 replicates, and 12 laboratories participating with 0 laboratory results deleted as outlying observations. All 4 aggregates were tested in surface mixes and had relatively low absorption values.

-- End of Section --

SECTION 02630

STORM-DRAINAGE SYSTEM
09/98

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 346/346R	(1990) Standard Specification for Cast-in-Place Nonreinforced Concrete Pipe and Recommendations

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO HB-16	(1996) Standard Specifications for Highway Bridges
AASHTO M 167	(1994) Corrugated Steel Structural Plate, Zinc Coated, for Field Bolted Pipe
AASHTO M 190	(1988) Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 198	(1994) Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
AASHTO M 219	(1992) Aluminum Alloy Structural Plate for Field Bolted Conduits
AASHTO M 243	(1994) Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M 294	(1994) Corrugated Polyethylene Pipe, 305- to 915- mm (12-to 36 in.) Diameter
AASHTO MP6	(1995) Corrugated Polyethylene Pipe 1050 and 1200 mm Diameter

AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA)

AREA-01	(1997) 1997-1998 Manual for Railway Engineering 4 Vol., Volume 1

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 48	(1994a) Gray Iron Castings
ASTM A 123/A 123M	(1997a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 536	(1984; R 1993) Ductile Iron Castings
ASTM A 716	(1995) Ductile Iron Culvert Pipe
ASTM A 742/A 742M	(1995) Steel Sheet, Metallic Coated and Polymer Precoated for Corrugated Steel Pipe
ASTM A 760/A 760M	(1997) Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM A 762/A 762M	(1997) Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM A 798/A 798M	(1997) Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
ASTM A 807	(1996) Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications
ASTM A 849	(1996) Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM A 929/A 929M	(1996) Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
ASTM B 26/B 26M	(1997) Aluminum-Alloy Sand Castings
ASTM B 745/B 745M	(1995) Corrugated Aluminum Pipe for Sewers and Drains
ASTM C 12	(1995) Installing Vitrified Clay Pipe Lines
ASTM C 14	(1995) Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C 14M	(1995) Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)
ASTM C 32	(1993) Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 55	(1997) Concrete Building Brick
ASTM C 62	(1997) Building Brick (Solid Masonry Units Made from Clay or Shale)

ASTM C 76	(1997) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 76M	(1997) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 139	(1997) Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 231	(1997) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 270	(1997a) Mortar for Unit Masonry
ASTM C 425	(1997) Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C 443	(1994) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM C 478M	(1997) Precast Reinforced Concrete Manhole Sections (Metric)
ASTM C 506	(1995a) Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C 506M	(1995a) Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 507	(1995a) Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
ASTM C 507M	(1995a) Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 655	(1995a) Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
ASTM C 700	(1997) Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
ASTM C 789	(1995a) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
ASTM C 828	(1990; R 1996) Low-Pressure Air Test of Vitrified Clay Pipe Lines
ASTM C 850	(1995a) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 ft of Cover Subjected to Highway Loadings

ASTM C 877	(1994) External Sealing Bands for Noncircular Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C 924	(1989; R 1997) Concrete Pipe Sewer Lines by Low-Pressure Air Test Method
ASTM C 1103	(1994) Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
ASTM C 1103M	(1994) Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines (Metric)
ASTM D 1056	(1991) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1171	(1994) Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
ASTM D 1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 1751	(1983; R 1991) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1784	(1997) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2321	(1989; R 1995) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 2922	(1996) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1993) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 3034	(1994) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

ASTM D 3350	(1996) Polyethylene Plastics Pipe and Fittings Materials
ASTM F 477	(1995) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 679	(1995) Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM F 714	(1994) Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
ASTM F 794	(1995a) Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 894	(1995) Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F 949	(1994) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F 1417	(1992) Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Instructions

Placing Pipe; FIO.

Printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

SD-13 Certificates

Resin Certification; G-RE. Pipeline Testing; G-RE. Hydrostatic Test on Watertight Joints; G-RE. Determination of Density; GA. Frame and Cover for Gratings; G-RE.

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.3 NOT USED

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.4.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Concrete Pipe

ASTM C 76M , Class III.

2.1.1.1 Smooth Wall PVC Pipe

ASTM F 679 produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.2 DRAINAGE STRUCTURES

2.2.1 Precast Reinforced Concrete Box

For highway loadings with 600 mm of cover or more or subjected to dead load only, ASTM C 789; for less than 600 mm of cover subjected to highway loading, ASTM C 850.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 27.6 MPa concrete. The concrete mixture shall have

air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 37.5 mm. Air content shall be determined in accordance with ASTM C 231. The concrete covering over steel reinforcing shall not be less than 25 mm thick for covers and not less than 40 mm thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 75 mm between steel and ground. Expansion-joint filler material shall conform to ASTM D 1751, or ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.3.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but in no case shall exceed 19 liters of water per sack of cement. Water shall be clean and free of harmful acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.3.3 Precast Concrete Segmental Blocks

Precast concrete segmental block shall conform to ASTM C 139, not more than 200 mm (8 inches) thick, not less than 200 mm (8 inches) long, and of such shape that joints can be sealed effectively and bonded with cement mortar.

2.3.4 Brick

Brick shall conform to ASTM C 62, Grade SW; ASTM C 55, Grade S-I or S-II; or ASTM C 32, Grade MS. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 10 mm of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.

2.3.5 Precast Reinforced Concrete Manholes

Precast reinforced concrete manholes shall conform to ASTM C 478M . Joints between precast concrete risers and tops shall be [full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure] [made with flexible watertight, rubber-type gaskets meeting the requirements of paragraph JOINTS].

2.3.6 Frame and Cover for Gratings

Frame and cover for gratings shall be cast gray iron, ASTM A 48, Class 35B; cast ductile iron, ASTM A 536, Grade 65-45-12; or cast aluminum, ASTM B 26/B 26M, Alloy 356.OT6. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans.

2.3.7 Joints

2.3.7.1 Flexible Watertight Joints

a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C 443. Factory-fabricated resilient joint materials shall conform to ASTM C 425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 1.35 m (54 inches).

b. Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C 443. Certified copies of test results shall be delivered to the Contracting Officer before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

2.3.7.2 External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C 877.

2.3.7.3 Flexible Watertight, Gasketed Joints

a. Gaskets: When infiltration or exfiltration is a concern for pipe lines, the couplings may be required to have gaskets. The closed-cell expanded rubber gaskets shall be a continuous band approximately 178 mm (7 inches) wide and approximately 10 mm (3/8 inch) thick, meeting the requirements of ASTM D 1056, Type 2 and shall have a quality retention rating of not less than 70 percent when tested for weather resistance by ozone chamber exposure, Method B of ASTM D 1171. Rubber O-ring gaskets shall be 21 mm (13/16 inch) in diameter for pipe diameters of 914 mm (36 inches) or smaller and 22 mm (7/8 inch) in diameter for larger pipe having 13 mm (1/2 inch) deep end corrugation. Rubber O-ring gaskets shall be 35 mm (1-3/8 inches) in diameter for pipe having 25 mm (1 inch) deep end corrugations. O-rings shall meet the requirements of AASHTO M 198 or ASTM C 443. Flexible plastic gaskets shall conform to requirements of AASHTO M 198, Type B.

b. Connecting Bands: Connecting bands shall be of the type, size and sheet thickness of band, and the size of angles, bolts, rods and lugs as indicated or where not indicated as specified in the

applicable standards or specifications for the pipe. Exterior rivet heads in the longitudinal seam under the connecting band shall be countersunk or the rivets shall be omitted and the seam welded. Watertight joints shall be tested and shall meet the test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS.

2.3.7.4 PVC Plastic Pipes

Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer.

2.4 STEEL LADDER

Steel ladder shall be provided where the depth of the manhole exceeds 1.0 m. These ladders shall be not less than 406 mm (16 inches) in width, with 19 mm (3/4 inch) diameter rungs spaced 305 mm (12 inches) apart. The two stringers shall be a minimum 10 mm (3/8 inch) thick and 63 mm (2-1/2 inches) wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123/A 123M.

2.5 DOWNSPOUT BOOTS

Boots used to connect exterior downspouts to the storm-drainage system shall be of gray cast iron conforming to ASTM A 48, Class 30B or 35B. Shape and size shall be as indicated. Finish color shall be Dark Brown.

2.6 HYDROSTATIC TEST ON WATERTIGHT JOINTS

2.6.1 Concrete, Clay, PVC and PE Pipe

A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and nonreinforced concrete pipe shall conform to AASHTO M 198 or ASTM C 443. Test requirements for joints in clay pipe shall conform to ASTM C 425. Test requirements for joints in PVC and PE plastic pipe shall conform to ASTM D 3212.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of other sections included with the contract and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 600 mm to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified. Contractor shall not over excavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 200 mm or 13 mm for each meter of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe.

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor in his performance of shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

3.2.2 Plastic Pipe

Bedding for PVC and PE pipe shall meet the requirements of ASTM D 2321. Bedding, haunching, and initial backfill shall be either Class IB or II material.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Deflection of installed flexible pipe shall not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (%)
Corrugated Steel and Aluminum Alloy	5
Concrete-Lined Corrugated Steel	3
Ductile Iron Culvert	3
Plastic	7.5

Not less than 30 days after the completion of backfilling, the Government may perform a deflection test on the entire length of installed flexible pipe using a mandrel or other suitable device. Installed flexible pipe showing deflections greater than those indicated above shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced at no cost to the Government.

3.3.1 Concrete, Clay, PVC, Ribbed PVC and Ductile Iron Pipe

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.4 JOINTING

3.4.1 Concrete and Clay Pipe

3.4.1.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe shall be bedded to the established gradeline, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

3.4.1.2 Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe

A closely twisted gasket shall be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing shall be in one piece of sufficient length to pass around the pipe and lap at top. This gasket shall be thoroughly saturated with neat cement grout. The bell of the pipe shall be thoroughly cleaned with a wet brush, and the gasket shall be laid in the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe shall be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar shall be inserted in the annular space for the upper two-thirds of the circumference. The gasket shall be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space shall be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. Placing of this type of joint shall be kept at least five joints behind laying operations.

3.4.1.3 Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe

The pipe shall be centered so that the annular space is uniform. The annular space shall be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot shall be cleaned.

a. Diaper Bands: Diaper bands shall consist of heavy cloth fabric to hold grout in place at joints and shall be cut in lengths that extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands shall be rolled and stitched around two pieces of wire. Width of fabric bands shall be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 200 mm apart. Wires shall be cut into lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands shall be accurately centered around lower portion of joint.

b. Grout: Grout shall be poured between band and pipe from the high side of band only, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to ensure a thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side shall be forced out by pouring, and removed.

c. Remainder of Joint: The remaining unfilled upper portion of the joint shall be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind actual laying of pipe. No backfilling around joints shall be done until joints have been fully inspected and approved.

3.4.1.4 Cement-Mortar Tongue-and-Groove Joint

The first pipe shall be bedded carefully to the established gradeline with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe shall be thoroughly cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned with a wet brush; while in horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe shall be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar shall be used to fill the joint completely and to form a bead on the outside.

3.4.1.5 Cement-Mortar Diaper Joint for Tongue-and-Groove Pipe

The joint shall be of the type described for cement-mortar tongue-and-groove joint in this paragraph, except that the shallow excavation directly beneath the joint shall not be filled with mortar until after a gauze or cheesecloth band dipped in cement mortar has been wrapped around the outside of the joint. The cement-mortar bead at the joint shall be at least 15 mm, thick and the width of the diaper band shall be at least 200 mm. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind the actual laying of the pipe. Backfilling around the joints shall not be done until the joints have been fully inspected and approved.

3.4.1.6 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions shall be cut off flush with the inner surface of the pipe. If nonmastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.

3.4.1.7 Flexible Watertight Joints

Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be

inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.4.1.8 External Sealing Band Joint for Noncircular Pipe

Surfaces to receive sealing bands shall be dry and clean. Bands shall be installed in accordance with manufacturer's recommendations.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of reinforced concrete, plain concrete, brick, precast reinforced concrete, precast concrete segmental blocks, prefabricated corrugated metal, or bituminous coated corrugated metal; complete with frames and covers or gratings; and with fixed galvanized steel ladders where indicated. Pipe studs and junction chambers of prefabricated corrugated metal manholes shall be fully bituminous-coated and paved when the connecting branch lines are so treated.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.6 STEEL LADDER INSTALLATION

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 1.83 m (6 feet) vertically, and shall be installed to provide at least 152 mm (6 inches) of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.7 BACKFILLING

3.7.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 150 mm in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 300 mm above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 300 millimeters. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.7.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 150 mm in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 300 mm above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 4 m, whichever is less. After the backfill has reached at least 300 mm above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 150 mm.

3.7.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.7.4 Compaction

3.7.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.7.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

a. Under airfield and heliport pavements, paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.

b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.

c. Under nontraffic areas, density shall be not less than that of the surrounding material.

3.7.5 Determination of Density

Testing shall be the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to review. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017 or ASTM D 2922. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

3.8 PIPELINE TESTING

Lines shall be tested for leakage by low pressure air or water testing or exfiltration tests, as appropriate. Low pressure air testing for vitrified clay pipes shall conform to ASTM C 828. Low pressure air testing for concrete pipes shall conform to ASTM C 924. Low pressure air testing for plastic pipe shall conform to ASTM F 1417. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C 828 or ASTM C 924, after consultation with the pipe manufacturer. Testing of individual joints for leakage by low pressure air or water shall conform to ASTM C 1103M . Prior to exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When the water table is 600 mm or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Contracting Officer. An exfiltration test shall be made by filling the line to be tested with water so that a head of at least 600 mm is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be reestablished. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by the exfiltration test shall not exceed 9 mL per mm in diameter per 100 meters (0.2 gallons per inch in diameter per 100 feet) of pipeline per hour]. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correcting, and retesting shall be made at no additional cost to the Government.

- End of Section –

SECTION 02748

BITUMINOUS TACK AND PRIME COATS
01/98

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 20	(1970) Penetration Graded Asphalt Cement
AASHTO M 81	(1992) Cut-Back Asphalt (Rapid-Curing Type)
AASHTO M 82	(1975) Cut-Back Asphalt (Medium-Curing Type)
AASHTO M 226	(1980) Viscosity Graded Asphalt Cement
AASHTO T 40	(1978; R 1983) Sampling Bituminous Materials

AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)

ASTM D 140	(1993) Sampling Bituminous Materials
ASTM D 946	(1982; R 1993) Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 977	(1991) Emulsified Asphalt
ASTM D 1250	(1980; R 1990) Petroleum Measurement Tables
ASTM D 2026	(1972; R 1993) Cutback Asphalt (Slow-Curing Type)
ASTM D 2027	(1976; R 1992) Cutback Asphalt (Medium-Curing Type)
ASTM D 2028	(1976; R 1992) Cutback Asphalt (Rapid-Curing Type)
ASTM D 2397	(1994) Cationic Emulsified Asphalt
ASTM D 2995	(1993) Determining Application Rate of Bituminous Distributors
ASTM D 3381	(1992) Viscosity-Graded Asphalt Cement for Use in Pavement Construction

1.2 NOT USED

1.3 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals not having a "G-RE" designation are for information only. When used, a designation following the "G-RE" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-09 Reports

Tests

Copies of all test results for bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating compliance with applicable specified requirements, not less than 30 days before the material is required in the work.

SD-18 Records

Waybills and Delivery Tickets

Waybills and delivery tickets, during progress of the work.

1.4 PLANT, EQUIPMENT, MACHINES AND TOOLS

1.4.1 General Requirements

Plant, equipment, machines and tools used in the work shall be subject to review and shall be maintained in a satisfactory working condition at all times.

1.4.2 Bituminous Distributor

The distributor shall have pneumatic tires of such size and number to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. The distributor shall be designed and equipped to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

1.4.3 Power Brooms and Power Blowers

Power brooms and power blowers shall be suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.5 WEATHER LIMITATIONS

Bituminous coat shall be applied only when the surface to receive the bituminous coat is dry. Bituminous coat shall be applied only when the atmospheric temperature in the shade is 10 degrees C 50 degrees F or above and when the temperature has not been below 2 degrees C 35 degrees F for the 12 hours prior to application.

PART 2 PRODUCTS

2.1 TACK COAT

Penetration Grades (ASTM D 946 or AASHTO M 20)

200-300
120-150

Viscosity Grades (ASTM D 3381 or AASHTO M 226, TABLE 1 or 2)

AC 2.5
AC 5

Aged Residue Viscosity Grades (ASTM D 3381 or AASHTO M 226)

AR 1000
AR 2000

The harder grades, 85-100 penetration, AC 10, and AR 4000 viscosity grades, are recommended for airfields. These grades are harder and would be better able to resist uplift pressures causes by jet engines. The other grades may be considered for more general use. The temperature-viscosity relation for the job asphalt should be checked to ensure that a spraying consistency can be achieved in the recommended temperature range of paragraph APPLICATION TEMPERATURE.

c. Either anionic or cationic emulsions can be used for tack. A list of recommended emulsions is as follows:

Anionic Emulsion ASTM D 977

RS-1
MS-1
HFMS-1
SS-1

Cationic Emulsions ASTM D 2397

CRS-1
CSS-1

Grades SS-1h and CSS-1h are made with a harder base asphalt and are recommended for airfields. The other grades can be considered for general use. Grades RS-1, SS-1, and SS-1h are widely used tack materials.

Emulsified asphalt shall conform to ASTM D 977 Grade SS-1.

2.2 PRIME COAT

Cutback asphalt shall conform to ASTM D 2027 or AASHTO M 82, Grade MCj-30 or MC-70.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, all loose material, dirt, clay, or other objectionable material shall be removed from the surface to be treated. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

3.2.1 Tack Coat

Bituminous material for the tack coat shall be applied in quantities of not less than 0.20 liter 0.05 gallon nor more than 0.70 liter per square meter 0.15 gallon per square yard of pavement surface.

3.2.2 Prime Coat

Bituminous material for the prime coat shall be applied in quantities of not less than 0.70 liter 0.15 gallon nor more than 1.80 liters per square meter 0.40 gallon per square yard of pavement surface.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 square mm/sec, 20 and 120 centistokes, kinematic. The temperature viscosity relation shall be furnished to the Contracting Officer.

3.3.2 Temperature Ranges

The viscosity requirements shall determine the application temperature to be used. The following is a normal range of application temperatures:

Emulsions

[SS-1 20-70 degrees C]

Liquid Asphalts

[MC-30 85-190 degrees F]
[MC-70 120-225 degrees F]

Paving Grade Asphalts

Penetration Grades

[200-300 plus 265 degrees F]
[120-150 plus 270 degrees F]

Viscosity Grades

[AC 2.5 plus 270 degrees F]
[AC 5 plus 280 degrees F]

[AR 1000 plus 275 degrees F]
[AR 2000 plus 285 degrees F]

Emulsions

[SS-1 70-160 degrees F]

*These temperature ranges exceed the flash point of the material and care should be taken in their heating.

3.4 APPLICATION

Following preparation and subsequent inspection of the surface, the bituminous coat shall be applied at the specified rate with uniform distribution over the surface to be treated. All areas and spots missed by the distributor shall be properly treated with the hand spray. Until the succeeding layer of pavement is placed, the surface shall be maintained by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, clean dry sand shall be spread to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment shall be permitted within 8 meters 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, building paper shall be spread on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper. Immediately after application, the building paper shall be removed and destroyed.

3.5 CURING PERIOD

Following application of the bituminous material and prior to application of the succeeding layer of pavement, the bituminous coat shall be allowed to cure and to obtain evaporation of any volatiles or moisture. [Prime coat shall be allowed to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course.]

3.6 FIELD QUALITY CONTROL

Samples of the bituminous material shall be tested for compliance with the applicable specified requirements.

3.7 SAMPLING AND TESTING

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

3.7.1 Sampling

The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140 or AASHTO T 40. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the Contracting Officer within 15 days after the award of the contract.

3.7.2 Calibration Test

The Contractor shall furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibration of the bituminous distributor shall be in accordance with ASTM D 2995.

3.7.3 Trial Applications

Before providing the complete bituminous coat, three lengths of at least 30 meters 100 feet for the full width of the distributor bar shall be applied to evaluate the amount of bituminous material that can be satisfactorily applied.

3.7.3.1 Tack Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous tack coat materials shall be applied in the amount of 0.20 liters per square meter. 0.05 gallons per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.3.2 Prime Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous materials shall be applied in the amount of 1.10 liters per square meter. 0.25 gallon per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.4 Sampling and Testing During Construction

Quality control sampling and testing shall be performed as required in paragraph FIELD QUALITY CONTROL.

--END OF SECTION—

SECTION 02921

SEEDING

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.

AGRICULTURAL MARKETING SERVICE (AMS)

AMS-01 (Aug 95) Federal Seed Act Regulations Part 201

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602 (1995a) Agricultural Liming Materials

ASTM D 4972(1995a) pH of Soils

ASTM D 5268(1992; R 1996) Topsoil Used for Landscaping Purposes

ASTM D 5883(1996) Standard Guide for Use of Rotary Kiln Produced Expanded Shale, Clay or Slate (ESCS) as a Mineral Amendment in Topsoil Used for Landscaping and Related Purposes

1.2 SUBMITTALS

Government review is required for submittals with a "G_RE" designation; submittals not having a "IFO designation are for information only. When used, a designation of "G-AE" designation identifies that the Design Build contractor shall review that submittal. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment; G-RE, G-AE
Surface Erosion Control Material
Chemical Treatment Material; G-RE

Manufacturer's literature including physical characteristics, application and installation instructions for equipment, surface erosion control material and chemical treatment material.

Equipment; G-RE

A listing of equipment to be used for the seeding operation.

Delivery; G-RE

Delivery schedule.

Finished Grade and Topsoil

Finished grade status.

Topsoil

Availability of topsoil from the stripping and stock piling operation.

Quantity Check

Bag count or bulk weight measurements of material used compared with area covered to determine the application rate and quantity installed.

Seed Establishment Period

Calendar time period for the seed establishment period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

Maintenance Record; G-RE

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory stand of grass plants.

Application of Pesticide; G-RE

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

SD-04 Samples

Delivered Topsoil

Samples taken from several locations at the source.

Soil Amendments

A 4.5 kg sample.

Mulch

A 4.5 kg sample.

SD-06 Test Reports

Equipment Calibration; G-RE

Certification of calibration tests conducted on the equipment used in the seeding operation.

Soil Test; G-RE

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test

results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-07 Certificates

Seed
Topsoil
pH Adjuster; 0
Fertilizer
Organic Material; 0
Soil Conditioner; 0
Mulch; 0
Pesticide

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

a. Seed. Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

b. Topsoil. Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.

c. pH Adjuster. Calcium carbonate equivalent and sieve analysis.

d. Fertilizer. Chemical analysis and composition percent.

e. Organic Material: Composition and source.

f. Soil Conditioner: Composition and source.

g. Mulch: Composition and source.

h. Pesticide. EPA registration number and registered uses.

1.3 SOURCE INSPECTION

The source of delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Delivered Topsoil

Prior to the delivery of any topsoil, its availability shall be verified in paragraph TOPSOIL. A soil test shall be provided for topsoil delivered to the site.

1.4.1.2 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.3 Pesticides

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

1.4.2 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. The following shall be rejected: open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 40 mm diameter; and topsoil that contains viable plants and plant parts. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

Materials shall be stored in designated areas. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with seeding operation materials.

1.4.4 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.4.5 Time Limitation

Hydroseeding time limitation for holding seed in the slurry shall be a maximum 24 hours.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

State-approved seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS-01 and applicable state seed laws.

2.1.2 Permanent Seed Species and Mixtures

Permanent seed species and mixtures shall be proportioned by weight as follows:

Botanical Name	Common Name	Mixture Percent by Number of Seeds	Percent Pure Live Seed
Lolium ‘Imagine’	‘Imagine’ Fine Blade Rye	30%	96%
Poa pratensis ‘Kentucky’	‘Kentucky’ Fine Blade Bluegrass	35%	96%
Festuca arundinacea ‘Hound Dog 5’	‘Hound Dog 5’ Fine Blade Fescue	35%	96%

2.1.3 Temporary Seed Species

Temporary seed species for surface erosion control or overseeding shall be as follows:

Botanical Name	Common Name	Percent Pure Live Seed
Lolium multiflorum	Annual Ryegrass	95%

2.1.4 Quality

Weed seed shall be a maximum 1 percent by weight of the total mixture.

2.1.5 Seed Mixing

No mixing of seed is allowed. Each seed type shall be sown individually.

2.1.6 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite in accordance with Section 02300 EARTHWORK. When additional topsoil is required beyond the available topsoil from the stripping operation, topsoil shall be delivered and amended as recommended by the soil test for the seed specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1½-inch(40 mm) diameter. Topsoil shall be free from viable plants and plant parts.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite shall not be used.

2.3.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, sulfur, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a 2.36 mm sieve and a minimum 55 percent shall pass through a 0.250 mm sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a 2.36 mm sieve and a minimum 97 percent shall pass through a 0.250 mm sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a 2.36 mm sieve and a minimum 35 percent shall pass through a 0.250 mm sieve.

2.3.2 Fertilizer

It shall be as recommended by the soil test. Fertilizer shall be controlled release commercial grade, free flowing, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.3.3 Nitrogen Carrier Fertilizer

It shall be as recommended by the soil test. Nitrogen carrier fertilizer shall be commercial grade, free flowing, and uniform in composition. The fertilizer may be a liquid nitrogen solution.

2.3.4 Organic Material

Organic material shall consist of either bonemeal, rotted manure, decomposed wood derivatives, recycled compost, or worm castings.

2.3.4.1 Bonemeal

Bonemeal shall be finely ground, steamed bone product containing from 2 to 4 percent nitrogen and 16 to 40 percent phosphoric acid.

2.3.4.2 Rotted Manure

Rotted manure shall be unleached horse, chicken or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials. It shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and be free of stones, sticks, and soil.

2.3.4.3 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, yard trimmings, or other wood waste material that is free of stones, sticks, soil, and toxic substances harmful to plants, and is fully composted or stabilized with nitrogen.

2.3.4.4 Recycled Compost

Compost shall be a well decomposed, stable, weed free organic matter source. Compost shall be derived from food; agricultural or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 10 mm screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 50 mm in length.

2.3.4.5 Worm Castings

Worm castings shall be screened from worms and food source, and shall be commercially packaged.

2.3.5 Soil Conditioner

Soil conditioner shall be sand, super absorbent polymers, calcined clay, or gypsum for use singly or in combination to meet the requirements of the soil test.

2.3.5.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a 2 mm sieve and a minimum 10 percent by weight shall pass a 1.18 mm sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

2.3.5.2 Super Absorbent Polymers

To improve water retention in soils, super absorbent polymers shall be sized and applied according to the manufacturer's recommendations. Polymers shall be added as a soil amendment and be cross-linked polyacrylamide, with an absorption capacity of 250-400 times its weight. Polymers shall also be added to the seed and be a starch grafted polyacrylonitrite, with graphite added as a tacky sticker. It shall have an absorption capacity of 100 plus times its weight.

2.3.5.3 Calcined Clay

Calcined clay shall be granular particles produced from montmorillonite clay calcined to a minimum temperature of 650 degrees C. Gradation: A minimum 90 percent shall pass a 2.36 mm sieve; a minimum 99 percent shall be retained on a 0.250 mm sieve; and a maximum 2 percent shall pass a 0.150 mm sieve. Bulk density: A maximum 640 kilogram per cubic meter.

2.3.5.4 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

2.3.5.5 Expanded Shale, Clay, or Slate (ESCS)

Rotary kiln produced ESCS material shall be in conformance with ASTM D 5883.

2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.4.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.4.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.4.3 Wood Cellulose Fiber (For Hydromulching Only)

Wood cellulose fiber shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

2.4.4 Paper Fiber (For Hydromulching Only)

Paper fiber mulch shall be recycled news print that is shredded for the purpose of mulching seed.

2.5 WATER

Water for this operation will be Government-supplied, source to be the domestic water supply from the Project building or other existing building nearby.

2.6 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification, a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

2.7 SURFACE EROSION CONTROL MATERIAL

Surface erosion control material shall conform to the following:

2.7.1 Surface Erosion Control Blanket

Blanket shall be machine produced mat of wood excelsior formed from a web of interlocking wood fibers; covered on one side with either knitted straw blanket-like mat construction; covered with biodegradable plastic mesh; or interwoven biodegradable thread, plastic netting, or twisted kraft paper cord netting.

2.7.2 Surface Erosion Control Fabric

Fabric shall be knitted construction of polypropylene yarn with uniform mesh openings ¾-inch to 1 inch (19 to 25 mm) square with strips of biodegradable paper. Filler paper strips shall have a minimum life of 6 months.

2.7.3 Surface Erosion Control Net

Net shall be heavy, twisted jute mesh, weighing approximately 8 ounces per lineal foot and 4 feet (1,200 mm) wide with mesh openings of approximately 1 inch (25 mm) square.

2.7.4 Surface Erosion Control Chemicals

Chemicals shall be high-polymer synthetic resin or cold-water emulsion of selected petroleum resins.

2.7.5 Hydrophilic Colloids

Hydrophilic colloids shall be physiologically harmless to plant and animal life without phytotoxic agents. Colloids shall be naturally occurring, silicate powder based, and shall form a water insoluble membrane after curing. Colloids shall resist mold growth.

2.7.6 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

PART 3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Seeding Time

Seed shall be installed from March 20 to May 15 for spring establishment; and from August 25 to October 10 for summer establishment.

3.1.2 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.1.3 Equipment Calibration

Immediately prior to the commencement of seeding operations, calibration tests shall be conducted on the equipment to be used. These tests shall confirm that the equipment is operating within the manufacturer's specifications and will meet the specified criteria. The equipment shall be calibrated a minimum of once every day during the operation. The calibration test results shall be provided within 1 week of testing.

3.1.4 Soil Test

Delivered topsoil, existing soil in smooth graded areas, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection on site shall be random over the entire site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the seed species specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and the placing of topsoil, smooth grading, and compaction requirements have been completed prior to the commencement of the seeding operation.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying pH Adjuster

The pH adjuster shall be applied as recommended by the soil test. The pH adjuster shall be incorporated into the soil to a maximum 4-inch (100 mm) depth or may be incorporated as part of the tillage operation.

3.2.2.2 Applying Fertilizer

The fertilizer shall be applied as recommended by the soil test. Fertilizer shall be incorporated into the soil to a maximum 4-inch (100 mm) depth or may be incorporated as part of the tillage or hydroseeding operation.

3.2.2.3 Applying Soil Conditioner

The soil conditioner shall be as recommended by the soil test. The soil conditioner shall be spread uniformly over the soil a minimum 1-inch (25 mm) depth and thoroughly incorporated by tillage into the soil to a maximum 4-inch (100 mm) depth.

3.2.2.4 Applying Super Absorbent Polymers

Polymers shall be spread uniformly over the soil as recommended by the manufacturer and thoroughly incorporated by tillage into the soil to a maximum 4-inch (100 mm) depth.

3.2.3 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4-inch (100 mm) depth. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 50 mm depth by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1 vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

The prepared surface shall be a maximum 1 inch (25 mm) below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

3.2.4.2 Lawn Area Debris

Debris and stones over a minimum 5/8-inch (16 mm) in any dimension shall be removed from the surface.

3.2.4.3 Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.3.1 Installing Seed

Seeding method shall be drill seeding or hydroseeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be used because of the difficulty in achieving even coverage, unless otherwise approved. Absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

3.3.1.1 Drill Seeding

Seed shall be uniformly drilled to a maximum ½-inch (13 mm) depth and at the rates as shown on Tree Plan Plant Lists, using equipment having drills a maximum 7-inch (175 mm) distance apart. Row markers shall be used with the drill seeder. Half the total rate of seed application shall be drilled in 1 direction, with the remainder of the seed rate drilled at 90 degrees from the first direction. The drilling equipment shall be maintained with half full seed boxes during the seeding operations.

3.3.1.2 Rolling

The entire area shall be firmed with a roller not exceeding 100 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled. Areas seeded with seed drills equipped with rollers shall not be rolled.

3.3.2 Hydroseeding

Seed shall be mixed to ensure broadcast at the rates as shown on Tree Plan Plant Lists. Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified. The time period for the seed to be held in the slurry shall be a maximum 24 hours. Wood cellulose fiber mulch and tackifier shall be added at the rates recommended by the manufacturer after the seed, fertilizer, and water have been thoroughly mixed to produce a homogeneous slurry. Slurry shall be uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled.

3.3.3 Mulching

3.3.3.1 Hay or Straw Mulch

Hay or straw mulch shall be spread uniformly at the rate of 700 pounds per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

3.3.3.2 Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

3.3.3.3 Non-Asphaltic Tackifier

Hydrophilic colloid shall be applied at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. A uniform mixture shall be applied over the area.

3.3.3.4 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations.

3.3.4 Watering Seed

Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1-inch (25 mm) depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.4 SURFACE EROSION CONTROL

3.4.1 Surface Erosion Control Material

Where indicated or as directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material or without deviation to finished grade.

3.4.2 Temporary Seeding

The application rate shall be 4 pounds per 1,000 square feet. When directed during contract delays affecting the seeding operation or when a quick cover is required to prevent surface erosion, the areas designated shall be seeded in accordance with temporary seed species listed under Paragraph SEED.

3.4.2.1 Soil Amendments

When soil amendments have not been applied to the area, the quantity of 1/2 of the required soil amendments shall be applied and the area tilled in accordance with paragraph SITE PREPARATION. The area shall be watered in accordance with paragraph Watering Seed.

3.4.2.2 Remaining Soil Amendments

The remaining soil amendments shall be applied in accordance with the paragraph Tillage when the surface is prepared for installing seed.

3.5 QUANTITY CHECK

For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as a record of the amount used. The amount of material used shall be compared with the total area covered to determine the rate of application used. Differences between the quantity applied and the quantity specified shall be adjusted as directed.

3.6 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

3.6.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

3.6.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately. A pesticide plan shall be submitted.

3.7 RESTORATION AND CLEANUP

3.7.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

3.7.2 Cleanup

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.8 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed. Signage shall be in accordance with Section 10430 EXTERIOR SIGNAGE.

3.9 SEED ESTABLISHMENT PERIOD

3.9.1 Commencement

The seed establishment period to obtain a healthy stand of grass plants shall begin on the first day of work under this contract and shall end 3 months after the last day of the seeding operation. Written calendar time period shall be furnished for the seed establishment period. When there is more than 1 seed establishment period, the boundaries of the seeded area covered for each period shall be described. The seed establishment period shall be coordinated with Sections 02922 SODDING and 02930 EXTERIOR PLANTING. The seed establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

3.9.2 Satisfactory Stand of Grass Plants

Grass plants shall be evaluated for species and health when the grass plants are a minimum 1 inch (25 mm) high.

3.9.2.1 Lawn Area

A satisfactory stand of grass plants from the seeding operation for a lawn area shall be a minimum 20 grass plants per square foot. Bare spots shall be a maximum 6 inches (150 mm) square. The total bare spots shall be a maximum 2 percent of the total seeded area.

3.9.3 Maintenance During Establishment Period

Maintenance of the seeded areas shall include eradicating weeds, insects and diseases; protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

3.9.3.1 Mowing

Lawn Areas: Lawn areas shall be mowed to a minimum 2 inch (50 mm) height when the turf is a maximum 3 inches (75 mm) high. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.9.3.2 Post-Fertilization

The fertilizer shall be applied as recommended by the soil test. A maximum 1 pound per 1,000 square feet of actual available nitrogen shall be provided to

the grass plants. The application shall be timed prior to the advent of winter dormancy and shall be made without burning the installed grass plants.

3.9.3.3 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.9.3.4 Repair or Reinstall

Unsatisfactory stand of grass plants and mulch shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.9.3.5 Maintenance Record

A record of each site visit shall be furnished, describing the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

-- End of Section --

SECTION 02922

SODDING

PART 1 GENERAL

1.1 REFERENCES

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 4972	(1995a) pH of Soils
ASTM D 5268	(1992; R 1996) Topsoil Used for Landscaping Purposes
ASTM D 5883	(1996) Standard Guide for Use of Rotary Kiln Produced Expanded Shale, Clay or Slate (ESCS) as a Mineral Amendment in Topsoil Used for Landscaping and Related Purposes

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having a "IFO" designation are for information only. When used, a designation of "G-AE" designation identifies the Contractor’s Designer of Record will review the submittal. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Equipment.
Chemical Treatment Material.

Manufacturer's literature including physical characteristics, application and installation instructions for equipment and chemical treatment material.

SD-07 Schedules

Equipment.

A listing of equipment to be used for the sodding operation.

SD-08 Statements

Delivery.

Delivery schedule.

Finished Grade and Topsoil.

Finished grade status.

Topsoil.

Availability of topsoil from the stripping and stock piling operation.

SD-09 Reports

Equipment Calibration.

Certification of calibration tests conducted on the equipment used in the sodding operation.

Soil Test

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-13 Certificates

Sod.
Topsoil.
pH Adjuster.
Fertilizer.
Organic Material.
Soil Conditioner.
Pesticide.

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

a. Sod. Classification, botanical name, common name, mixture percentage of species, percent purity, quality grade, field location and state certification.

b. Topsoil. Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.

c. pH Adjuster. Calcium carbonate equivalent and sieve analysis.

d. Fertilizer. Chemical analysis and composition percent.

e. Organic Material: Composition and source.

f. Soil Conditioner: Composition and source.

g. Pesticide. EPA registration number and registered uses.

SD-14 Samples

Delivered Topsoil.

Samples taken from several locations at the source.

Soil Amendments.

A 4.5 kilogram sample.

Temporary Seeding.

Sample of annual seed species and application rate.

SD-18 Records

Quantity Check.

Bag count or bulk weight measurements of material used compared with area covered to determine the application rate and quantity installed. The quantity of sod used shall be compared against the total area installed.

Sod Establishment Period.

Calendar time period for the sod establishment period. When there is more than one sod establishment period, the boundaries of the sodded area covered for each period shall be described.

Maintenance Record.

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory stand of grass plants.

Application of Pesticide.

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

1.3 SOURCE INSPECTION

The sources of sod material and delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Sod

Sod shall be protected during delivery to prevent desiccation, internal heat buildup, or contamination.

1.4.1.2 Delivered Topsoil

Prior to the delivery of any topsoil, its availability shall be verified in paragraph TOPSOIL. A soil test shall be provided for topsoil delivered to the site.

1.4.1.3 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.4 Pesticides

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

1.4.2 Inspection

Sod shall be inspected upon arrival at the job site for conformity to species. Sod shall be checked for visible broadleaf weeds, and a visible consistency with no obvious patches of foreign grasses that exceed 2 percent of the canopy. Sod that is heating up, dry, moldy, yellow, irregularly shaped, torn, or of uneven thickness shall be rejected. Other materials shall be inspected for compliance with specified requirements. Open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1.5-inch (40 mm) diameter; and topsoil that contains viable plants and plant parts, shall be rejected. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

1.4.3.1 Sod

Sod shall be stored in designated areas and kept in a moist condition by watering with a fine mist, and covered with moist burlap, straw, or other covering. Covering shall allow air to circulate, preventing internal heat from building up. Sod shall be protected from exposure to wind and direct sunlight until installed.

1.4.3.2 Other Material Storage

Materials shall be stored in designated areas. Lime and fertilizer shall be stored in cool, dry locations, away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with sod operation materials.

1.4.4 Handling

Sod shall not be damaged during handling. Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.4.5 Time Limitation

Time limitation between harvesting and installing sod shall be a maximum 36 hours.

PART 2 PRODUCTS

2.1 SOD

2.1.1 Sod Classification

Nursery-grown sod shall be provided as classified by applicable state laws. Sod shall be machine cut to a uniform thickness of 1.6 inches (40 mm) within a tolerance of 0.4-inch (10 mm), excluding top growth and thatch. Each individual sod section shall be of a size to permit rolling and lifting without breaking. Irregularly shaped pieces of sod and torn or uneven ends

will be rejected. The sod shall be relatively free of weeds or undesirable plants, stones larger than 2 inches (50 mm) any dimension, woody plant roots and other material detrimental to the development of the turf. Sod anchors shall be as recommended by the sod supplier.

2.1.2 Grass Species

Grass species shall be proportioned as follows:

Botanical Name	Common Name	Mixture Percent
Lolium 'Imagine'	'Imagine' Fine Blade Rye	30%
Poa pratensis 'Kentucky'	'Kentucky' Fine Bluegrass	35%
Festuca arundinacea 'Hound Dog 5'	'Hound Dog 5' Fine Fescue	35%

Weed seed shall not exceed 1 percent. Percent pure live seed equals percent purity multiplied by the quantity of percent germination plus percent hard or sound seed.

2.1.3 Quality

Sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 1 inch (25 mm) in diameter, woody plant roots, and other materials detrimental to a healthy stand of grass plants. Broadleaf weeds and patches of foreign grasses shall be a maximum 2 percent of the sod section.

2.1.4 Thickness

Sod shall be machine cut to a minimum 1.4-inch (35 mm) thickness. Measurement for thickness shall exclude top growth and thatch.

2.1.5 Anchors

Sod anchors shall be as recommended by the sod supplier.

2.1.6 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite. When additional topsoil is required beyond the available topsoil from stripping operation, topsoil shall be delivered and amended as recommended by the soil test for the sod species specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash, or other material over a maximum 1.5-inch (40 mm) diameter. Topsoil shall be free from viable plants and plant parts.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material, and soil conditioners meeting the following requirements. Vermiculite shall not be used.

2.3.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a No. 8 (2.36 mm) sieve and a minimum 55 percent shall pass through a No. 60 (0.250 mm) sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a No. 8 (2.36 mm) sieve and a minimum 97 percent shall pass through a No. 60 (0.250 mm) sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a No. 8 (2.36 mm) sieve and a minimum 35 percent shall pass through a No. 60 (0.250 mm) sieve.

2.3.2 Fertilizer

Fertilizer composition shall be as recommended by the soil test. Fertilizer shall be controlled release commercial grade, free flowing, uniform in composition, and consist of a 3:4:1 nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.3.3 Nitrogen Carrier Fertilizer

Composition shall be as recommended by the soil test. Nitrogen carrier fertilizer shall be commercial grade, free flowing, and uniform in composition. The fertilizer may be a liquid nitrogen solution.

2.3.4 Organic Material

Organic material shall consist of either bonemeal, rotted manure, decomposed wood derivatives, recycled compost, or worm castings.

2.3.4.1 Bonemeal

Bonemeal shall be finely ground, steamed bone product containing from 2 to 4 percent nitrogen and 16 to 40 percent phosphoric acid.

2.3.4.2 Rotted Manure

Rotted manure shall be unleached horse, chicken or cattle manure containing a maximum 25 percent by volume straw, sawdust, or other bedding materials. Manure shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and be free of stones, sticks, and soil.

2.3.4.3 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, yard trimmings, or other wood waste material free of stones, sticks, soil, and toxic substances harmful to plants, fully composted or stabilized with nitrogen.

2.3.4.4 Recycled Compost

Compost shall be a well decomposed, stable, weed free organic matter source. Compost shall be derived from food; agricultural or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 10 mm screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent or less by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches (50 mm) in length.

2.3.4.5 Worm Castings

Worm castings shall be screened from worms and food source, and shall be commercially packaged.

2.3.5 Soil Conditioner

Soil conditioner shall be sand, super absorbent polymers, calcined clay, or gypsum for use singly or in combination to meet the requirements for topsoil.

2.3.5.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10 (2 mm) sieve and a minimum 10 percent by weight shall pass a No. 16 (1.18 mm) sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

2.3.5.2 Super Absorbent Polymers

To improve water retention in soils, super absorbent polymers shall be sized and applied according to the manufacturer's recommendations. Polymers shall be added as a soil amendment and be cross-linked polyacrylamide with an absorption capacity of 250-400 times its weight.

2.3.5.3 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

2.3.5.4 Expanded Shale, Clay, or Slate (ESCS)

Rotary kiln produced ESCS material shall be in conformance with ASTM D 5883.

2.4 WATER

Water for this operation will be Contractor-supplied; When available the contractor may use the Governments domestic water supply from the nearest hydrant or other existing building nearby. It is the Contractor’s responsibility to get the water to the site.

2.5 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification, a soil fumigant shall

have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

PART 3 EXECUTION

3.1 INSTALLING SOD TIME AND CONDITIONS

3.1.1 Sodding Time

Sod shall be laid in the areas indicated and shall be placed in accordance with ASPA-01. The time limitation between harvesting and placing sod shall be 36 hours. Sod that has become dry, moldy or yellow from heating will be rejected. The area to be sodded shall be wetted to a minimum depth of 2 inches (50 mm). On long slopes sod shall be laid at right angles to slopes. In ditches, sod shall be laid at right angles to the flow of water. When required, the sod shall be anchored by placing anchors a minimum distance of 2 feet on center with a minimum of 2 anchors per sod section. Air pockets shall be eliminated and a true and even surface shall be provided by tamping or rolling the sod in place. Displacement of the sod shall be assured by knitting of sod to the soil. Frayed edges shall be trimmed and holes or missing corners shall be patched.

3.1.2 Sodding Conditions

Sodding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, excessive cold, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the sodding operations, proposed alternate times shall be submitted for approval.

3.1.3 Equipment Calibration

Immediately prior to the commencement of sodding operations, calibration tests shall be conducted on the equipment to be used. These tests shall confirm that the equipment is operating within the manufacturer's specifications and will meet the specified criteria. The equipment shall be calibrated a minimum of once every day during the operation. Provide calibration test results within one week of testing.

3.1.4 Soil Test

Delivered topsoil, existing soil in smooth graded areas, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection on site shall be random over the entire site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the sod species specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

Prior to the commencement of the sodding operation, the Contractor shall verify that finished grades are as indicated on drawings; the placing of topsoil, smooth grading, and compaction requirements have been completed.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying pH Adjuster

The pH adjuster shall be applied at the rate recommended by the soil test. The pH adjuster shall be incorporated into the soil to a maximum 4-inch (100 mm) depth or may be incorporated as part of the tillage operation.

3.2.2.2 Applying Fertilizer

The fertilizer shall be applied at the rate recommended by the soil test. Fertilizer shall be incorporated into the soil to a maximum 4-inch (100 mm) depth or may be incorporated as part of the tillage or hydroseeding operation.

3.2.2.3 Applying Soil Conditioner

The soil conditioner shall be as recommended by the soil test. The soil conditioner shall be spread uniformly over the soil a minimum 1-inch (25 mm) depth and thoroughly incorporated by tillage into the soil to a maximum 4-inch (100 mm) depth.

3.2.2.4 Applying Super Absorbent Polymers

Polymers shall be spread uniformly over the soil as recommended by the manufacturer and thoroughly incorporated by tillage into the soil to a maximum 2 inches (50 mm) deep prior to placement of sod.

3.2.3 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4 inches (100 mm) deep. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1-vertical, the soil shall be tilled to a minimum 2 inches (50 mm) deep by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1-vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

The prepared surface shall be a maximum 1 inch (25 mm) below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be rolled and completed with a light raking to remove from the surface debris and stones over a minimum 5/8-inch (16 mm) in any dimension.

3.2.4.2 Protection

Areas within the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing sod, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Areas shall be sodded as indicated. Adequate soil moisture shall be ensured prior to sodding by spraying water on the area to be sodded and wetting the soil to a maximum 1-inch (25 mm) depth.

3.3.1 Installing Sod

Rows of sod sections shall be placed parallel to and tightly against each other. Joints shall be staggered laterally. The sod sections shall not be stretched or overlapped. All joints shall be butted tight. Voids and air drying of roots shall be prevented. Sod sections shall be laid across the slope on long slopes. Sod sections shall be laid at right angles to the flow of water in ditches. Sod sections shall be anchored on slopes steeper than 3-horizontal-to-1-vertical. Anchoring may be required when surface weight or pressure upon placed sod sections is anticipated to cause lateral movement. Sod anchors shall be placed a minimum 2 feet (600 mm) on center with a minimum 2 anchors per sod section.

3.3.2 Finishing

Displacement of the sod shall be prevented by tamping or rolling the sod in place and knitting the sod to the soil. Air pockets shall be eliminated and a true and even surface shall be provided. Frayed edges shall be trimmed, and holes or missing corners shall be patched with sod.

3.3.3 Rolling

The entire area shall be firmed with a roller not exceeding 100 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1-vertical shall not be rolled.

3.3.4 Watering Sod

Watering shall be started immediately after completing each day of installing sod. Water shall be applied at least 7 times per week to supplement rainfall, at a rate sufficient to ensure moist soil conditions to a minimum depth of 1 inch (25 mm). Run-off, puddling, and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or plant material shall be prevented.

3.4 TEMPORARY SEEDING

The application rate shall be 0.04 kilograms per square meter. When directed during contract delays affecting the sodding operation or when a quick cover is required to prevent surface erosion, the areas designated shall be seeded with annual seed in accordance with Section 02921 SEEDING.

3.4.1 Soil Amendments, Tillage and Watering

When soil amendments have not been applied to the area, the quantity of 2 of the required soil amendments shall be applied and the area tilled in accordance with paragraph SITE PREPARATION. The area shall be watered in accordance with paragraph Watering Sod as required.

3.4.2 Remaining Soil Amendments

The remaining soil amendments shall be applied in accordance with the paragraph Tillage when the surface is prepared for installing sod.

3.5 QUANTITY CHECK

For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as a record of the amount used. The amount of the material used shall be compared with the total area covered to determine the rate of application. The quantity of sod used shall be compared against the total area established with sod. Differences between the quantity applied and the quantity specified shall be adjusted as directed.

3.6 APPLICATION OF PESTICIDE

When application of a pesticide or fungicide becomes necessary to remove a pest or disease, a pesticide or fungicide treatment plan shall be submitted and coordinated with the installation pest management program.

3.6.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

3.6.2 Application

A state certified applicator shall apply required pesticides or fungicides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide or fungicide label. A closed system is recommended as it prevents the pesticide or fungicide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.7 RESTORATION AND CLEANUP

3.7.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the sodding operation shall be restored to original condition at Contractor's expense.

3.7.2 Cleanup

Excess and waste material shall be removed from the sodded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.8 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the sodding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed. Signage shall be in accordance with Section 10430 EXTERIOR SIGNAGE.

3.9 SOD ESTABLISHMENT PERIOD

3.9.1 Commencement

The sod establishment period to obtain a healthy stand of grass plants shall begin on the first day of work under this contract and shall end 3 months after the last day of sodding operation. Written calendar time period shall be furnished for the sod establishment period. When there is more than 1 sod establishment period, the boundaries of the sodded area covered for each period shall be described. The sod establishment period should be coordinated with Section 02921 SEEDING. The sod establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

3.9.2 Satisfactory Stand of Grass Plants

Grass plants shall be evaluated for species and health. A satisfactory stand of grass plants from the sodding operation shall be living sod uniform in color and leaf texture. Bare spots shall be a maximum 2 inches (50 mm) square. Joints between sod pieces shall be tight and free from weeds and other undesirable growth.

3.9.3 Maintenance During Establishment Period

Maintenance of the sodded areas shall include eradicating weeds, insects and diseases; protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

3.9.3.1 Mowing

Sodded areas shall be mowed to a minimum 2-inch (50 mm) height when the turf is a maximum 3-inch (75 mm) height. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.9.3.2 Post-Fertilization

The fertilizer shall be applied as recommended by the soil test. A maximum 1 pound per 1,000 square feet of actual available nitrogen shall be provided to the grass plants. The application shall be timed prior to the advent of winter dormancy and shall be made without burning the installed grass plants.

3.9.3.3 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.9.3.4 Repair

Unsatisfactory stand of grass plants shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.9.3.5 Maintenance Record

A record of each site visit shall be furnished which describes the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

-- End of Section --

SECTION 02930

EXTERIOR PLANTING

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.

AMERICAN NURSERY AND LANDSCAPE ASSOCIATION (ANLA)

ANLA ANSI/ANLA Z60.1	(1996) Nursery Stock

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A300	(1995) Tree Care Operations - Trees, Shrubs and other Woody Plant Maintenance

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 4972	(1995a) pH of Soils
ASTM D 5268	(1992; R1996) Topsoil Used for Landscaping Purposes
ASTM D 5883	(1996) Standard Guide for Use of Rotary Kiln Produced Expanded Shale, Clay or Slate (ESCS) as a Mineral Amendment in Topsoil Used for Landscaping and Related Purposes

1.2 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals having a "IFO" designation are for information only. When used, a designation of "G-AE" designation that the Contractor’s Designer of record will review the submittal. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Chemical Treatment Material.

Manufacturer's literature including physical characteristics, application and installation instructions for chemical treatment material.

SD-04 Drawings

Shop Drawings.

Scale drawings defining areas to receive plant materials. Refer to prototypical Landscape Plans on Sheet LP1.

SD-07 Schedules

Equipment.

A listing of equipment to be used for the planting operation.

SD-08 Statements

Delivery.

Delivery schedule.

Finished Grade, Topsoil and Underground Utilities.

Finished grade status; location of underground utilities and facilities; and availability of topsoil from the stripping and stock piling operation.

SD-09 Reports

Soil Test.
Percolation Test.

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-13 Certificates

Plant Material.
Topsoil.
pH Adjuster.
Fertilizer.
Organic Material.
Soil Conditioner.
Organic Mulch.
Pesticide.

Prior to delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following.

a. Plant Material: Classification, botanical name, common name, size, quantity by species, and location where grown.

b. Topsoil: Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.

c. pH Adjuster: Sieve analysis and calcium carbonate equivalent.

d. Fertilizer: Chemical analysis and composition percent.

e. Organic Material: Composition and source.

f. Soil Conditioner: Composition and source.

g. Organic Mulch: Composition, source, and treatment against fungi growth.

h. Pesticide. EPA registration number and registered uses.

SD-14 Samples

Delivered Topsoil.

Samples taken from several locations at the source.

Soil Amendments.

A 10-pound (4.5 kilogram) sample.

Mulch.

A 10-pound (4.5 kilogram) sample.

SD-18 Records

Plant Establishment Period.

Calendar time period for the plant establishment period. When there is more than one establishment period, the boundaries of the planted areas covered for each period shall be described.

Maintenance Record.

Maintenance work performed, quantity of plant losses, and replacements; and diagnosis of unhealthy plant material.

Application of Pesticide.

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

SD-19 Operation and Maintenance Manuals

Maintenance Instructions.

Instruction for year-round care of installed plant material.

1.3 SOURCE INSPECTIONS

The nursery or source of plant material and the source of delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Plant Material Identification

Plant material shall be identified with attached, durable, waterproof labels and weather-resistant ink, stating the correct botanical plant name and size.

1.4.1.2 Protection During Delivery

Plant material shall be protected during delivery to prevent desiccation and damage to the branches, trunk, root system, or earth ball. Branches shall be protected by tying-in. Exposed branches shall be covered during transport.

1.4.1.3 Delivered Topsoil

Prior to the delivery of any topsoil, the availability of topsoil shall be verified in paragraph TOPSOIL. A soil test shall be provided for delivered topsoil.

1.4.1.4 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.5 Pesticide Material

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration number and the manufacturer's registered uses.

1.4.2 Inspection

Plant material shall be well shaped, vigorous and healthy with a healthy, well branched root system, free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement or abrasion. Plant material shall be checked for unauthorized substitution and to establish nursery grown status. Plant material showing desiccation, abrasion, sun-scald injury, disfigurement, or unauthorized substitution shall be rejected. The plant material shall exhibit typical form of branch to height ratio; and meet the caliper and height measurements specified. Plant material that measures less than specified, or has been poled, topped off or headed back, shall be rejected. Container-grown plant material shall show new fibrous roots and the root mass shall retain its shape when removed from the container. Plant material with broken or cracked balls; or broken containers shall be rejected. Other materials shall be inspected for compliance with paragraph PRODUCTS. Open soil amendment containers or wet soil amendments shall be rejected. Topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material larger than 1.5-inch (40 mm) diameter shall be rejected. Topsoil that contains viable plant material and plant parts shall be rejected. Unacceptable material shall be removed from the jobsite.

1.4.3 Storage

1.4.3.1 Plant Material Storage

Plant material not installed on the day of arrival at the site shall be stored and protected in designated areas. Plant material shall not be stored longer than 30 days. Plant material shall be protected from direct exposure to wind and sun. All plant material shall be kept in a moist condition by watering with a fine mist spray until installed.

1.4.3.2 Other Material Storage

Storage of other material shall be in designated areas. Soil amendments shall be stored in dry locations and away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with planting operation material.

1.4.4 Handling

Plant material shall not be injured in handling. Cracking or breaking the earth ball of balled and burlapped plant material shall be avoided. Plant material shall not be handled by the trunk or stems. Materials shall not be dropped from vehicles into plant pits, or from any height.

1.4.5 Time Limitation

Except for container-grown plant material, the time limitation from digging to installing plant material shall be a maximum 90 days. The time limitation between installing the plant material and placing the mulch shall be a maximum 24 hours.

1.5 WARRANTY

Furnished plant material shall have a warranty for plant growth to be in a vigorous growing condition for a minimum 12-month period. A minimum 12-month calendar time period for the warranty of plant growth shall be provided regardless of the contract time period. When plant material is determined to be unhealthy in accordance with paragraph PLANT ESTABLISHMENT PERIOD, it shall be replaced once under this warranty.

PART 2 PRODUCTS

2.1 PLANT MATERIAL

2.1.1 Plant Material Classification

The plant material shall be nursery grown stock conforming to ANLA ANSI/ANLA Z60.1 and shall be the species specified.

2.1.2 Plant Schedule

The Plant Schedule shall provide botanical names as included in one or more of the publications listed under "Nomenclature" in ANLA ANSI/ANLA Z60.1. In case of any discrepancy between the Plant Schedule and the actual Planting Plan, the Planting Plan shall govern.

2.1.3 Substitutions

Substitutions will not be permitted without written request and approval from the Contracting Officer.

2.1.4 Quality

Well shaped, well grown, vigorous plant material having healthy and well branched root systems in accordance with ANLA ANSI/ANLA Z60.1 shall be provided. Plant material shall be provided free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement and abrasion. Plant material shall be free of shock or damage to branches, trunk, or root systems, which may occur from the digging and preparation for shipment, method of shipment, or shipment. Plant quality is determined by the growing conditions; method of shipment to maintain health of the root system; and growth of the trunk and crown as follows.

2.1.5 Growing Conditions

Plant material shall be native to or well-suited to the growing conditions of the project site. Plant material shall be grown under climatic conditions similar to those at the project site.

2.1.6 Method of Shipment to Maintain Health of Root System

2.1.6.1 Balled and Burlapped (BB) Plant Material

Ball size and ratio shall be in accordance with ANLA ANSI/ANLA Z60.1. The ball shall be of a diameter and depth to encompass enough fibrous and feeding root system necessary for the full recovery of the plant. The plant stem or trunk shall be centered in the ball. All roots shall be clean cut at the ball surface. Roots shall not be pulled from the ground. Before shipment the root ball shall be dipped in gels containing mycorrhizal fungi inoculum. The root ball shall be completely wrapped with burlap or other suitable material and securely laced with biodegradable twine.

2.1.6.2 Balled and Potted (Pot) Plant Material

Ball size and ratio shall be in accordance with ANLA ANSI/ANLA Z60.1. The ball shall be of a diameter and depth to encompass enough fibrous and feeding root system necessary for the full recovery of the plant. Removal shall be done by hand digging or mechanical devices. The plant stem or trunk shall be centered in the ball. All roots shall be clean cut at the ball surface. Roots shall not be pulled from the ground. Before shipment the root ball shall be dipped in gels containing mycorrhizal fungi inoculum. Container shall be used to retain the ball unbroken. Container shall be rigid to hold ball shape and protect root mass during shipping.

2.1.6.3 Container-Grown (C) Plant Material

Container size shall be in accordance with ANLA ANSI/ANLA Z60.1. Plant material shall be grown in a container over a duration of time for new fibrous roots to have developed and for the root mass to retain its shape and hold together when removed from the container. Container-grown plant material shall be inoculated with mycorrhizal fungi during germination in the nursery. Before shipment the root system shall be dipped in gels containing mycorrhizal fungi inoculum. The container shall be sufficiently rigid to hold ball shape and protect root mass during shipping.

2.1.6.4 Deciduous Trees

A height to caliper relationship shall be provided in accordance with ANLA ANSI/ANLA Z60.1. Height of branching shall bear a relationship to the size and species of tree specified and with the crown in good balance with the trunk. The trees shall not be "poled" or the leader removed.

a. Single stem: The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

b. Multi-stem: All countable stems, in aggregate, shall average the size specified. To be considered a stem, there shall be no division of the trunk which branches more than 150 mm from ground level.

c Specimen: The tree provided shall be well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

2.1.6.5 Deciduous Shrubs

Deciduous shrubs shall have the height and number of primary stems recommended by ANLA ANSI/ANLA Z60.1. Acceptable plant material shall be well shaped, with sufficient well-spaced side branches, and recognized by the trade as typical for the species grown in the region of the project.

2.1.6.6 Evergreen Plant Material

Evergreen plant material shall have the height-to-spread ratio recommended by ANLA ANSI/ANLA Z60.1. Acceptable plant material shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

2.1.6.7 Broadleaf Evergreen Plant Material

Broadleaf evergreen plant material shall have the height-to-spread ratio recommended by ANLA ANSI/ANLA Z60.1. Acceptable plant material shall be well shaped and recognized by the trade as typical for the variety grown in the region of the project.

2.1.7 Plant Material Size

Plant material shall be furnished in sizes indicated. Plant material larger in size than specified may be provided at no additional cost to the Government.

2.1.8 Plant Material Measurement

Plant material measurements shall be in accordance with ANLA ANSI/ANLA Z60.1.

2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite. When additional topsoil is required beyond the available topsoil from the stripping operation, topsoil shall be delivered and amended as recommended by the soil test for the plant material specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1.5-inch (40 mm) diameter. Topsoil shall be free from viable plants and plant parts.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite is not recommended.

2.3.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a 2.36 mm sieve and a minimum 55 percent shall pass through a 0.25 mm sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a 2.36 mm sieve and a minimum 97 percent shall pass through a 0.25 mm sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a 2.36 mm sieve and a minimum 35 percent shall pass through a 0.25 mm sieve.

2.3.2 Fertilizer

Fertilizer shall be applied as recommended by the soil test. Fertilizer shall be controlled release commercial grade; free flowing, pellet or tablet form; uniform in composition; and consist of a nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.3.3 Organic Material

Organic material shall consist of either bonemeal, peat, rotted manure, decomposed wood derivatives, recycled compost, or worm castings.

2.3.3.1 Bonemeal

Bonemeal shall be a finely ground, steamed bone product containing from 2 to 4 percent nitrogen and 16 to 40 percent phosphoric acid.

2.3.3.2 Rotted Manure

Rotted manure shall be unleached horse, chicken, or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials. Manure shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and shall be free of stones, sticks, and soil.

2.3.3.3 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, or other wood waste material free of stones, sticks, and toxic substances harmful to plants, and stabilized with nitrogen.

2.3.3.4 Recycled Compost

Compost shall be a well decomposed, stable, weed free organic matter source. It shall be derived from food, agricultural, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 3/8-inch (10 mm) screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent or less by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches (50 mm) in length.

2.3.3.5 Worm Castings

Worm castings shall be screened from worms and food source and shall be commercially packaged.

2.3.4 Soil Conditioner

Soil conditioner shall be sand, super absorbent polymers, calcined clay, or gypsum for single use or in combination to meet topsoil requirements for the plant material specified.

2.3.4.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a 1/16-inch (2 mm) sieve and a minimum 10 percent by weight shall pass a 1/32-inch (1.18 mm) sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

2.3.4.2 Super Absorbent Polymers

To improve water retention in soils, super absorbent polymers shall be sized according to manufacturer's recommendations. Polymers shall be added as a soil amendment and be cross-linked polyacrylamide with an absorption capacity of 250-400 times its weight.

2.3.4.3 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

2.3.4.4 Expanded Shale, Clay, or Slate (ESCS)

Rotary kiln produced ESCS material shall be in conformance with ASTM D 5883.

2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region. Rotted manure is not recommended to be used as a mulch because it would encourage surface rooting of the plant material and weeds.

2.4.1 Organic Mulch

Organic mulch materials shall be native to the project site and consist of cotton seed hulls.

2.4.1.1 Cotton Seed Hulls

Local or regional cotton seed hull material shall be treated to retard the growth of mold and fungi. Cotton seed hulls shall be free of chunks or blocks over 1 inch (25 mm) in size, and shall be free of weed seed.

2.5 WOOD STAKING MATERIAL

Wood stakes shall be hardwood or fir; rough sawn; free from knots, rot, cross grain, or other defects that would impair their strength.

2.5.1 Bracing Stake

Wood bracing stakes shall be a minimum 2 inches x 2 inches (50 x 50 mm) square and a minimum 8 feet (2,400 mm) long with a point at one end. Stake shall be set without damaging root ball.

2.5.2 Wood Ground Stakes

Wood ground stakes shall be a minimum of 2 inches by 2 inches (50 x 50 mm) square and a minimum 30 inches (750 mm) long with a point at one end.

2.6 METAL GUYING AND EDGING MATERIAL

Metal guying material shall be aluminum or steel consisting of recycled content made for holding plant material in place.

2.6.1 Guying Material

Metal guying material shall be a minimum 12 gauge wire. Multi-strand cable shall be woven wire. Guying material tensile strength shall conform to the size of tree to be held firmly in place.

2.6.2 Metal Edging Material

Metal edging material used to separate planting bed areas from turf areas shall be 14 gauge minimum thickness x 4 inch (100 mm) height and in lengths no less than 10 feet (3,048 mm). Edging material shall be held in place with no fewer than 3 stakes per 10 foot (3,048 mm) length. Stakes shall be manufactured from the same material as the edging and shall be specifically designed for the purpose of anchoring edging material to the soil. Edging stakes shall be approximately 14 inches (356 mm) to 18 inches (457 mm) long. Both edging and edging stakes shall be coated with rust-inhibitive paint.

2.7 PLASTIC TREE PROTECTION MATERIAL

2.7.1 Chafing Guard

Plastic chafing guards shall be used to protect tree trunks from potential damaged caused by routine landscape maintenance operations such as mowing and string trimming. The material shall be the same color throughout the project site. Length (height from base of trunk upward) shall be a minimum 1.5 times the circumference of the plant trunk at its base.

2.8 RUBBER GUYING MATERIAL

Rubber chafing guards, consisting of recycled material, shall be used to protect tree trunks. The material shall be the same color throughout the project. Length shall be a minimum 1.5 times the circumference of the plant trunk at its base. Rubber guying material shall be such that it will prevent metal guying material from cutting into trunk of tree for 2 years following planting.

2.9 FLAG

Plastic flag material shall be used on guying material. It shall be a minimum 6 inches (150 mm) long. Tape color shall be consistent and visually complimentary to the entire project area. The tape color shall meet pedestrian visual safety requirements for day and night.

2.10 WATER

For this operation, water will be Contractor-supplied; We available the Contractor can access the Government’s domestic water supply from the nearest hydrant, or other existing building nearby. Water shall not contain elements toxic to plant life.

2.11 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

PART 3 EXECUTION

3.1 INSTALLING PLANT MATERIAL TIME AND CONDITIONS

3.1.1 Deciduous Plant Material Time

Deciduous plant material shall be installed from September 20 to June 1.

3.1.2 Evergreen Plant Material Time

Evergreen plant material shall be installed from March 1 to June 15, and from September 1 to December 1.

3.1.3 Plant Material Conditions

Planting operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted for approval.

3.1.4 Tests

3.1.4.1 Percolation Test

Test for percolation shall be done to determine positive drainage of plant pits and beds. A positive percolation shall consist of a minimum 1 inch (25 mm) per 3 hours; when a negative percolation test occurs, a shop drawing shall be submitted indicating the corrective measures.

3.1.4.2 Soil Test

Delivered topsoil, excavated plant pit soil, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection onsite shall be random over the entire site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the plant material specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade, Topsoil and Underground Utilities

The Contractor shall verify that finished grades are as indicated on drawings, and that the placing of topsoil, the smooth grading, and the compaction requirements have been completed in accordance with Section 02300 EARTHWORK, prior to the commencement of the planting operation. The location of underground utilities and facilities in the area of the planting operation shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.2.2 Layout

Plant material locations and bed outlines shall be staked on the project site before any excavation is made. No tree shall be located closer than 4½ feet from any walk or closer than 5 feet from any driveway or street curb. Plant material locations may be adjusted to meet field conditions.

3.3 EXCAVATION

3.3.1 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments to plant material location, type of plant and planting method shall be submitted for approval.

3.3.2 Turf Removal

Where the planting operation occurs in an existing lawn area, the turf shall be removed from the excavation area to a depth that will ensure the removal of the entire root system.

3.3.3 Plant Pits

Plant pits for ball and burlapped or container plant material shall be dug to a depth equal to the height of the root ball as measured from the base of the ball to the base of the plant trunk. Plant pits shall be dug a minimum 50 percent wider than the ball or root system to allow for root expansion. Plant pit sides which have been compacted smooth by the excavation process shall be thoroughly scarified by shovel to eliminate the smooth compacted condition and allow for easy root penetration.

3.4 INSTALLATION

3.4.1 Setting Plant Material

Plant material shall be set plumb and held in position until sufficient soil has been firmly placed around root system or ball. In relation to the surrounding grade, the plant material shall be set even with the grade at which it was grown.

3.4.2 Backfill Soil Mixture

The backfill soil mixture may be a mix of topsoil and soil amendments suitable for the plant material specified. When practical, the excavated soil from the plant pit that is not amended provides the best backfill and shall be used.

3.4.3 Backfill Procedure

Prior to backfilling, all metal, wood, synthetic products, or treated burlap devices shall be removed from the ball or root system avoiding damage to the root system. The backfill procedure shall remove air pockets from around the root system. Additional requirements are as follows.

3.4.3.1 Balled and Burlapped Plant Material

Biodegradable burlap and tying material shall be carefully opened and folded back from the top a minimum a depth from the top of the root ball. Backfill mixture shall be added to the plant pit in 6-inch (150 mm) layers with each layer carefully tamped.

3.4.3.2 Container-Grown Potted Plant Material

The plant material shall be carefully removed from containers that are not biodegradeable. Prior to setting the plant in the pit, a maximum 3 depth of the root mass, measured from the bottom, shall be spread apart to promote new root growth. For plant material in biodegradable containers the container shall be split prior to setting the plant with container. Backfill mixture shall be added to the plant pit in 6-inch (150 mm) layers with each layer carefully tamped.

3.4.3.3 Earth Berm

An earth berm, consisting of backfill soil mixture, shall be formed with a minimum 4-inch (100 mm) height around the edge of the plant pit to aid in water retention and to provide soil for settling adjustments.

3.4.4 Plant Bed and Edging

Plant material shall be set in plant beds according to the drawings. Backfill soil mixture shall be placed on previously scarified subsoil to completely surround the root balls, and shall be brought to a smooth and even surface, blending to existing areas. Earth berms shall be provided. Polymers shall be spread uniformly over the plant bed and in the planting pit as recommended by the manufacturer and thoroughly incorporated into the soil to a maximum 4-inch (100 mm) depth. Edging (steel) to separate planting bed areas from turf areas shall be installed as shown on Drawings, with top of edger 1 inch (25 mm) above the (post-sodded or post-seeded) finish grade of adjacent turf areas. All curved edger shapes shown on the Plan shall be created on site by ensuring that edging is installed with smooth-flowing lines.

3.4.5 Watering

Plant pits and plant beds shall be watered immediately after backfilling, until completely saturated.

3.4.6 Staking and Guying

Staking of trees will be required as shown in the Drawings. It is recommended that trees remain staked for no less than one year and no more than two years from the time of planting, and that Government personnel periodically check tree guys following the Contractor=s plant establishment period to insure they are not cutting into tree trunks or branches, and to loosen wires immediately when a cutting condition is discovered.

3.4.6.1 Two Bracing Stakes

Trees from 6 to 8 feet (1,800 to 2,400 mm) height and larger shall be firmly anchored in place with 2 bracing stakes placed on opposite sides. Bracing stakes shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly between the stakes with a double strand of guying material. The guying material shall be firmly anchored at a minimum 1/2 tree height. Rubber guying material shall be used to protect the tree trunk when metal is the guywiring material.

3.4.7 Flags

A flag shall be securely fastened to each guy line equidistant between the tree and the stake. The flag shall be visible to pedestrians.

3.5 FINISHING

3.5.1 Plant Material

Prior to placing mulch, the installed area shall be uniformly edged to provide a clear division line between the planted area and the adjacent turf area, shaped as indicated (see 3.4.5 above). The installed area shall be raked and smoothed while maintaining the earth berms.

3.5.2 Placing Mulch

The placement of mulch shall occur a maximum 48 hours after planting. Mulch, used to reduce soil water loss, regulate soil temperature and prevent weed growth, shall be spread to cover the installed area with a minimum 2½-inch (62 mm) uniform thickness. Mulch shall be kept out of the crowns of shrubs, ground cover, and vines and shall be kept off buildings, sidewalks and other facilities.

3.5.3 Pruning

Pruning shall be accomplished by trained and experienced personnel. The pruning of trees shall be in accordance with ANSI A300. Only dead or broken material shall be pruned from installed plants. The typical growth habit of individual plant material shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth will not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off."

3.6 MAINTENANCE DURING PLANTING OPERATION

Installed plant material shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed to prevent desiccation and shall continue until the plant establishment period commences. Installed areas shall be kept free of weeds, grass, and other undesired vegetation. The maintenance includes maintaining the mulch, watering, and adjusting settling.

3.7 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

3.7.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

3.7.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.8 RESTORATION AND CLEANUP

3.8.1 Restoration

Turf areas, pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractor's expense.

3.8.2 Cleanup

Excess and waste material shall be removed from the installed area and shall be disposed offsite. Adjacent paved areas shall be cleared and cleaned thoroughly.

3.9 PLANT ESTABLISHMENT PERIOD

3.9.1 Commencement

Upon completion of the last day of the planting operation, the plant establishment period for maintaining installed plant material in a healthy

growing condition shall commence and shall be in effect for the remaining contract time period, not to exceed 12 months. Written calendar time period shall be furnished for the plant establishment period. When there is more than one plant establishment period, the boundaries of the planted area covered for each period shall be described. The plant establishment period shall be coordinated with Sections 02921 SEEDING and 02922 SODDING. The plant establishment period shall be modified for inclement weather shut down periods, or for separate completion dates for areas.

3.9.2 Maintenance During Establishment Period

Maintenance of plant material shall include straightening plant material, straightening stakes; tightening guying material; correcting girdling; supplementing mulch; pruning dead or broken branch tips; maintaining plant material labels; watering; eradicating weeds, insects and disease; post-fertilization; and removing and replacing unhealthy plants.

3.9.2.1 Watering Plant Material

The plant material shall be watered as necessary to prevent desiccation and to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is estimated to be the equivalent of 1 inch (25 mm) of absorbed water per week, delivered in the form of rain or augmented by watering. Run-off, puddling and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or existing plant material shall be prevented.

3.9.2.2 Weeding

Grass and weeds in the installed areas shall not be allowed to reach a maximum 3-inch (75 mm) height before being completely removed, including the root system.

3.9.2.3 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.9.2.4 Post-Fertilization

The plant material shall be topdressed at least once during the period of establishment with controlled release fertilizer, reference paragraph SOIL AMENDMENTS. Apply at the rate of 3 pounds per 10 square yards of plant pit or bed area. Dry fertilizer adhering to plants shall be flushed off. The application shall be timed 2 months or more prior to the advent of winter dormancy.

3.9.2.5 Plant Pit Settling

When settling occurs to the backfill soil mixture, additional backfill soil shall be added to the plant pit or plant bed until the backfill level is equal to the surrounding grade. Serious settling that affects the setting of the plant in relation to the maximum depth at which it was grown requires replanting in accordance with paragraph INSTALLATION. The earth berm shall be maintained.

3.9.2.6 Maintenance Record

A record shall be furnished describing the maintenance work performed, the quantity of plant losses, diagnosis of the plant loss, and the quantity of replacements made on each site visit.

3.9.3 Unhealthy Plant Material

A tree shall be considered unhealthy or dead when the main leader has died back, or up to a maximum 25 percent of the crown has died. A shrub shall be considered unhealthy or dead when up to a maximum 25 percent of the plant has died. This condition shall be determined by scraping on a branch an area 1/16-inch (2 mm) square, maximum, to determine if there is a green cambium layer below the bark. The Contractor shall determine the cause for unhealthy plant material and shall provide recommendations for replacement. Unhealthy or dead plant material shall be removed immediately and shall be replaced as soon as seasonal conditions permit.

3.9.4 Replacement Plant Material

Unless otherwise directed, plant material shall be provided for replacement in accordance with paragraph PLANT MATERIAL. Replacement plant material shall be installed in accordance with paragraph INSTALLATION, and recommendations in paragraph PLANT ESTABLISHMENT PERIOD. Plant material shall be replaced in accordance with paragraph WARRANTY. An extended plant establishment period shall not be required for replacement plant material.

3.9.5 Maintenance Instructions

Written instructions shall be furnished containing drawings and other necessary information for year-round care of the installed plant material; including, when and where maintenance should occur, and the procedures for plant material replacement.

-- End of Section --

DIVISION 3 – CONCRETE

THRU

DIVISION 12 – FURNISHINGS

NO EDITED GUIDE SPECIFICATIONS PROVIDED BY THE GOVERNMENT

DIVISION 13 – SPECIAL CONSTRUCTION

EDITED GUIDE SPECIFICATIONS PROVIDED BY THE GOVERNMENT

13280 Asbestos Abatement

SECTION 13280

ASBESTOS ABATEMENT
07/01

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.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z9.2	(1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
ANSI Z87.1	(1989; Errata; Z87.1a) Occupational and Educational Eye and Face Protection
ANSI Z88.2	(1992) Respiratory Protection

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 732	(1995) Aging Effects of Artificial Weathering on Latex Sealants
ASTM D 522	(1993a) Mandrel Bend Test of Attached Organic Coatings
ASTM D 1331	(1989; R 1995) Surface and Interfacial Tension of Solutions of Surface-Active Agents
ASTM D 2794	(1993; R 1999el) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 4397	(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM E 84	(2000a) Surface Burning Characteristics of Building Materials
ASTM E 96	(2000) Water Vapor Transmission of Materials
ASTM E 119	(2000) Fire Tests of Building Construction and Materials
ASTM E 736	(1992) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

ASTM E 1368	(2000) Visual Inspection of Asbestos Abatement Projects

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 61	National Emissions Standards for Hazardous Air Pollutants
40 CFR 763	Asbestos
42 CFR 84	Approval of Respiratory Protective Devices
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7	(1990) Compressed Air for Human Respiration
CGA G-7.1	(1997) Commodity Specification for Air

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90/018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance
EPA 340/1-90/019	(1990) Asbestos/NESHAP Adequately Wet Guidance
EPA 560/5-85-024	(1985) Guidance for Controlling Asbestos-Containing Materials in Buildings

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(1999) Methods of Fire Tests for Flame-Resistant Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub No. 84-100	(1984; Supple 1985, 1987, 1988 & 1990) NIOSH Manual of Analytical Methods

UNDERWRITERS LABORATORIES (UL)

UL 586	(1996; Rev thru Aug 1999) High-Efficiency, Particulate, Air Filter Units

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT, AIR AND ASBESTOS COMPIANCE SECTION

28-50	(1999) Asbestos Control Regulations

1.2 DEFINITIONS

a. Adequately Wet: A term defined in 40 CFR 61, Subpart M, and EPA 340/1-90/019 meaning to sufficiently mix or penetrate with liquid to prevent the release of particulate. If visible emissions are observed coming from asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.

b. Aggressive Method: Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact asbestos-containing material (ACM).

c. Amended Water: Water containing a wetting agent or surfactant with a surface tension of at least 29 dynes per square centimeter when tested in accordance with ASTM D 1331

d. Asbestos: Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophylite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

e. Asbestos-Containing Material (ACM): Any materials containing more than one percent asbestos.

f. Asbestos Fiber: A particulate form of asbestos, 5 micrometers or longer, with a length-to-width ratio of at least 3 to 1.

g. Authorized Person: Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

h. Building Inspector: Individual who inspects buildings for asbestos and has EPA Model Accreditation Plan (MAP) "Building Inspector" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

i. Certified Industrial Hygienist (CIH): An Industrial Hygienist certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.

j. Class I Asbestos Work: Activities defined by OSHA involving the removal of thermal system insulation (TSI) and surfacing ACM.

k. Class II Asbestos Work: Activities defined by OSHA involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos - containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic. Certain "incidental" roofing materials such as mastic, flashing and cements when they are still intact are excluded from Class II asbestos work. Removal of small amounts of these materials which would fit into a glovebag may be classified as a Class III job.

l. Class III Asbestos Work: Activities defined by OSHA that involve repair and maintenance operations, where ACM, including TSI and surfacing ACM, is likely to be disturbed. Operations may include drilling, abrading, cutting a hole, cable pulling, crawling through tunnels or attics and spaces above the ceiling, where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.

m. Class IV Asbestos Work: Maintenance and custodial construction activities during which employees contact but do not disturb ACM and activities to clean-up dust, waste and debris resulting from Class I, II, and III activities. This may include dusting surfaces where ACM waste and debris and accompanying dust exists and cleaning up loose ACM debris from TSI or surfacing ACM following construction.

n. Clean room: An uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

o. Competent Person: In addition to the definition in 29 CFR 1926, Section .32(f), a person who is capable of identifying existing asbestos hazards as defined in 29 CFR 1926, Section .1101, selecting the appropriate control strategy, has the authority to take prompt corrective measures to eliminate them and has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

p. Contractor/Supervisor: Individual who supervises asbestos abatement work and has EPA Model Accreditation Plan "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

q. Critical Barrier: One or more layers of plastic sealed over all openings into a regulated area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a regulated area from migrating to an adjacent area.

r. Decontamination Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

s. Demolition: The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

t. Disposal Bag: A 0.15 mm 6 mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926, Section .1101, used for transporting asbestos waste from containment to disposal site.

u. Disturbance: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in 1 standard sized glovebag or waste bag, not larger than 1.5 m 60 inches in length and width in order to access a building component.

v. Equipment Room or Area: An area adjacent to the regulated area used for the decontamination of employees and their equipment.

w. Employee Exposure: That exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.

x. Fiber: A fibrous particulate, 5 micrometers or longer, with a length to width ratio of at least 3 to 1.

y. Friable ACM: A term defined in 40 CFR 61, Subpart M and EPA 340/1-90/018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix A, Section 1, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent, as determined by a method other than point counting by PLM, the asbestos content is verified by point counting using PLM.

z. Glovebag: Not more than a 60 by 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.

aa. High-Efficiency Particulate Air (HEPA) Filter: A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

bb. Homogeneous Area: An area of surfacing material or thermal system insulation that is uniform in color and texture.

cc. Industrial Hygienist: A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards.

dd. Intact: ACM which has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix. Removal of "intact" asphaltic, resinous, cementitious products does not render the ACM non-intact simply by being separated into smaller pieces.

ee. Model Accreditation Plan (MAP): USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763, Subpart E, Appendix C.

ff. Modification: A changed or altered procedure, material or component of a control system, which replaces a procedure, material or component of a required system.

gg. Negative Exposure Assessment: A demonstration by the Contractor to show that employee exposure during an operation is expected to be consistently below the OSHA Permissible Exposure Limits (PELs).

hh. NESHAP: National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61, Subpart M.

ii. Nonfriable ACM: A NESHAP term defined in 40 CFR 61, Subpart M and EPA 340/1-90/018 meaning any material containing more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix A, Section 1, Polarized Light Microscopy, that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.

jj. Nonfriable ACM (Category I): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90/018 meaning asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos as determined using the method specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

kk. Nonfriable ACM (Category II): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90/018 meaning any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos, as determined using the methods specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy, that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

ll. Permissible Exposure Limits (PELs):

(1) PEL-Time weighted average(TWA): Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8 hour time weighted average (TWA), as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.

(2) PEL-Excursion Limit: An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.

mm. Regulated Area: An OSHA term defined in 29 CFR 1926, Section .1101 meaning an area established by the Contractor to demarcate areas where Class I, II, and III asbestos work is conducted; also any adjoining area where debris and waste from such asbestos work accumulate; and an area within which airborne concentrations of

asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limit.

nn. Removal: All operations where ACM is taken out or stripped from structures or substrates, and includes demolition operations.

oo. Spills/Emergency Cleanups: Cleanup of sizable amounts of asbestos waste and debris which has occurred, for example, when water damage occurs in a building, and sizable amounts of ACM are dislodged. A Competent Person evaluates the site and ACM to be handled, and based on the type, condition and extent of the dislodged material, classifies the cleanup as Class I, II, or III. Only if the material was intact and the cleanup involves mere contact of ACM, rather than disturbance, could there be a Class IV classification.

pp. Surfacing ACM: Asbestos-containing material which contains more than 1% asbestos and is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

qq. Thermal system insulation (TSI) ACM: ACM which contains more than 1% asbestos and is applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain or water condensation.

rr. Transite: A generic name for asbestos cement wallboard and pipe.

ss. Worker: Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926, Section .1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation required by 40 CFR 763, Subpart E, Appendix C, if required by the OSHA Class of work to be performed or by the state where the work is to be performed.

tt. VAT: Vinyl Asbestos Tile.

1.3 DESCRIPTION OF WORK

The work covered by this section includes the removal of asbestos-containing materials (ACM) and describes procedures and equipment required to protect workers and occupants of the regulated area from contact with airborne asbestos fibers and ACM dust and debris. Activities include OSHA work operations involving ACM. The work also includes containment, storage, transportation and disposal of the generated ACM wastes. More specific operational procedures shall be detailed in the required Accident Prevention Plan and its subcomponents, the Asbestos Abatement Plan and Activity Hazard Analyses required in paragraph SAFETY AND HEALTH PROGRAM AND PLANS.

1.3.1 Abatement Work Tasks

The specific ACM to be abated prior to demolition is identified on the tables attached to this Specification. For the purpose of this project ACM materials are, but not limited to VAT, linoleum floor covering, and insulating paper behind the light bulb is backed with asbestos. Most of the fixtures are in the kitchens, but some are also be in the hallways.

The asbestos backing is dull silver on the bulb side and cardboard looking on the backside. More modern types look like fiberglass. It is shiny like aluminum foil and the backing is thick and looks like fiberglass. The abatement contractor shall remove the globe, disconnect the fixture and drop it in an asbestos bag. It is almost impossible to remove the paper separately.

1.3.2 Unexpected Discovery of Asbestos

For any previously untested building components suspected to contain asbestos and located in areas impacted by the work, the Contractor shall notify the Contracting Officer (CO) will have the Installation Environmental Office test the suspected materials

1.4 SUBMITTALS

Government review is required for submittals with a "G-RE" designation; submittals not having a "FIO" designation are for information only. When used, a designation of "G-AE" identifies the Contractor’s Designer of Record will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Data

Asbestos Hazard Abatement Plan; G-RE

Contractor’s Asbestos Abatement Plan and Accident Prevention Plan.

Respiratory Protection Program; G-RE

Records of the respirator program.

Cleanup and Disposal; G-RE

Waste shipment records. Weigh bills and delivery tickets shall be furnished for information only.

Detailed Drawings; G-RE

Descriptions, detail project drawings, and site layout to include work site containment area techniques decontamination units other temporary waste storage facility, location of temporary utilities (electrical, water, sewer) and boundaries of each regulated area.

Materials and Equipment; G-RE

Manufacturer's catalog data for all materials and equipment to be used in the work, including brand name, model, capacity, performance characteristics and any other pertinent information. Test results and certificates from the manufacturer of encapsulants substantiating compliance with performance requirements of this specification. Material Safety Data Sheets for all chemicals to be used onsite in the same format as implemented in the Contractor's HAZARD COMMUNICATION PROGRAM.

Data shall include, but shall not be limited to, the following items:

a. Vacuum cleaning equipment

b. Air monitoring equipment

c. Respirators

d. Personal protective clothing and equipment

e. Duct Tape

f. Disposal Containers

g. Sheet Plastic

h. Wetting Agent

(1) Amended Water
(2) Removal encapsulant

i. Prefabricated Decontamination Unit

j. Other items

k. Chemical encapsulant

l. Material Safety Data Sheets (for all chemicals proposed)

Qualifications; G-RE

A written report providing evidence of qualifications for personnel, facilities and equipment assigned to the work.

Training Program G-RE

A copy of the written project site-specific training material as indicated in 29 CFR 1926, Section.1101 that will be used to train onsite employees. The Contractor’s Designated IH and Competent Person shall sign the training document.

Medical Requirements; G-RE

Physician's written opinion.

Encapsulants; G-RE

Certificates stating that encapsulants meet the applicable specified performance requirements.

SD-06 Test Reports

Exposure Assessment and Air Monitoring; G-RE

Initial exposure assessments, negative exposure assessments, air-monitoring test results and documentation.

Licenses, Permits and Notifications; GRE

Licenses, permits, and notifications.

Air Monitoring Test Results; G-RE

Air monitoring methods (personal, environmental).

SD-07 Certificates

Vacuum, Filtration Equipment; ,

Manufacturer's certifications showing compliance with ANSI Z9.2 for:

a. Vacuums.

b. Water filtration equipment.

c. Other equipment required to contain airborne asbestos fibers.

1.5 QUALIFICATIONS

1.5.1 Written Qualifications and Organization Report

The Contractor shall furnish a written qualifications and organization report providing evidence of qualifications of the Contractor, Contractor's Project Supervisor, Designated Competent Person, supervisors and workers; Designated IH (person assigned to project and firm name); independent testing laboratory (including name of firm, principal, and analysts who will perform analyses); all subcontractors to be used including disposal transportation and disposal facility firms, subcontractor supervisors, subcontractor workers; and any others assigned to perform asbestos abatement and support activities. The report shall include an organization chart showing the Contractor's staff organization for this project by name and title, chain of command and reporting relationship with all subcontractors. The report shall be signed by the Contractor, the Contractor's onsite project manager, Designated Competent Person, Designated IH, designated testing laboratory and the principals of all subcontractors to be used. The Contractor shall include the following statement in the report: "By signing this report I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and the federal, state and local requirements specified in paragraph SAFETY AND HEALTH PROGRAM AND PLANS for those asbestos abatement activities that they will be involved in."

1.5.2 Specific Requirements

The Contractor shall designate in writing, personnel meeting the following qualifications:

a. Designated Competent Person: The name, address, telephone number, and resume of the Contractor's Designated Competent Person shall be provided. Evidence that the full-time Designated Competent Person

is qualified in accordance with 29 CFR 1926, Sections .32 and .1101, has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and is experienced in the administration and supervision of asbestos abatement projects. The Designated Competent Person shall be responsible for compliance with applicable federal, state and local requirements, the Contractor's Accident Prevention Plan and Asbestos Hazard Abatement Plan. The Designated Competent Person shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Contractor shall submit evidence that this person has a minimum of 5 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements. The Designated Competent Person shall be onsite at all times during the conduct of this project.

b. Designated Industrial Hygienist: The Contractor shall provide for government review the name, address, telephone number, resume and other information specified below for the Industrial Hygienist (IH) selected to prepare the Contractor's Asbestos Hazard Abatement Plan, prepare and perform training, direct air monitoring and assist the Contractor's Competent Person in implementing and ensuring that safety and health requirements are complied with during the performance of all required work. The Designated IH shall be a person who has EPA Model Accreditation Plan (MAP) "Project Designer" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and has a minimum of 5 years of comprehensive experience in planning and overseeing asbestos abatement activities. The Designated IH shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Designated IH shall be completely independent from the Contractor according to federal, state, or local regulations; that is, shall not be a Contractor's employee or be an employee or principal of a firm in a business relationship with the Contractor negating such independent status. A copy of the Designated IH's current valid certification shall be included. The Designated IH shall visit the site at least once per day for the duration of asbestos activities and shall be available for emergencies. In addition, the Designated IH shall prepare, and the Contractor shall submit, the name, address, telephone numbers and resumes of additional IH's and industrial hygiene technicians (IHT) who will be assisting the Designated IH in performing onsite tasks. IHs and IHTs supporting the Designated IH shall have a minimum of 2 years of practical onsite asbestos abatement experience. The formal reporting relationship between the Designated IH and the support IHs and IHTs, the Designated Competent Person, and the Contractor shall be indicated.

c. Asbestos Abatement Workers: Asbestos abatement workers shall meet the requirements contained in 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and other applicable federal, state and local requirements. Worker training documentation shall be provided as

required on the "Certificate of Workers Acknowledgment" in this paragraph.

d. Worker Training and Certification of Worker Acknowledgment: Training documentation will be required for each employee who will perform OSHA Class II, asbestos abatement operations. Such documentation shall be submitted on a Contractor generated form titled "Certificate of Workers Acknowledgment", to be completed for each employee in the same format and containing the same information as the example certificate at the end of this section. Training course completion certificates (initial and most recent update refresher) required by the information checked on the form shall be attached.

e. Physician: The Contractor shall provide the name, medical qualifications, address, telephone number and resume of the physician who will or has performed the medical examinations and evaluations of the persons who will conduct the asbestos abatement work tasks. The physician shall be currently licensed by the state where the workers will be or have been examined, have expertise in pneumoconiosis and shall be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1926, Section .1101 and paragraph MEDICAL REQUIREMENTS. The physician shall be familiar with the site's hazards and the scope of this project.

f. First Aid and CPR Trained Persons: The names of at least 2 persons who are currently trained in first aid and CPR by the American Red Cross or other approved agency shall be designated and shall be onsite at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030 and shall be included in the Contractor's Bloodborne Pathogen Program. These persons may perform other duties but shall be immediately available to render first aid when needed. A copy of each designated person's current valid First Aid and CPR certificate shall be provided.

g. Independent Testing Laboratory: The Contractor shall provide the name, address and telephone number of the independent testing laboratory selected to perform the sample analyses and report the results. The testing laboratory shall be completely independent from the Contractor as recognized by federal, state or local regulations. Written verification of the following criteria, signed by the testing laboratory principal and the Contractor, shall be submitted:

(1) Phase contrast microscopy (PCM): The laboratory is fully equipped and proficient in conducting PCM of airborne samples using the methods specified by 29 CFR 1926, Section .1101, OSHA method ID-160, the most current version of NIOSH Pub No. 84-100 Method 7400, the laboratory is currently judged proficient (classified as acceptable) in counting airborne asbestos samples by PCM by successful participation in each of the last 4 rounds in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program; the names of the selected microscopists who will analyze airborne samples by PCM with

verified documentation of their proficiency to conduct PCM analyses by being judged proficient in counting samples as current participating analysts in the AIHA PAT Program, and having successfully completed the Asbestos Sampling and Analysis course (NIOSH 582 or equivalent) with a copy of course completion certificate provided; when the PCM analysis is to be conducted onsite, documentation shall be provided certifying that the onsite analyst meets the same requirements.

(2) Polarized light microscopy (PLM): The laboratory is fully equipped and proficient in conducting PLM analyses of suspect ACM bulk samples in accordance with 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for bulk asbestos analysis and will use analysts (names shall be provided) with demonstrated proficiency to conduct PLM to include its application to the identification and quantification of asbestos content.

h. Disposal Facility, Transporter: The Contractor shall provide written evidence that the landfill to be used is approved for asbestos disposal by the state regulatory agencies. Copies of signed agreements between the Contractor (including subcontractors and transporters) and the asbestos waste disposal facility to accept and dispose of all asbestos containing waste generated during the performance of this contract shall be provided. Qualifications shall be provided for each subcontractor or transporter to be used, indicating previous experience in transport and disposal of asbestos waste to include all required state and local waste hauler requirements for asbestos. The Contractor and transporters shall meet the DOT requirements of 49 CFR 171, 49 CFR 172, and 49 CFR 173 as well as registration requirements of 49 CFR 107 and other applicable state or local requirements. The disposal facility shall meet the requirements of 40 CFR 61, Sections .154 or .155, as required in 40 CFR 61, Section .150(b), and other applicable state or local requirements.

1.6 REGULATORY REQUIREMENTS

In addition to detailed requirements of this specification, work performed under this contract shall comply with EM 385-1-1, applicable federal, state, and local laws, ordinances, criteria, rules and regulations regarding handling, storing, transporting, and disposing of asbestos waste materials. This includes, but is not limited to, OSHA standards, 29 CFR 1926, especially Section .1101, 40 CFR 61, Subpart M and 40 CFR 763. Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply. The following state and local laws, rules and regulations apply: State of Kansas Asbestos Control Regulations 28-50-1 through 14.

1.7 SAFETY AND HEALTH PROGRAM AND PLANS

The Contractor shall develop and submit a written comprehensive site-specific Accident Prevention Plan at least 10 days prior to the preconstruction conference. The Accident Prevention Plan shall address

requirements of EM 385-1-1, Appendix A, covering onsite work to be performed by the Contractor and subcontractors. The Accident Prevention Plan shall incorporate an Asbestos Hazard Abatement Plan, and Activity Hazard Analyses as separate appendices into 1 site specific Accident Prevention Plan document. Any portions of the Contractor's overall Safety and Health Program that are referenced in the Accident Prevention Plan, e.g., respirator program, hazard communication program, confined space entry program, etc., shall be included as appendices to the Accident Prevention Plan. The plan shall take into consideration all the individual asbestos abatement work tasks The plan shall be prepared, signed (and sealed, including certification number if required), and dated by the Contractor's Designated IH, Competent Person, and Project Supervisor.

1.7.1 Asbestos Hazard Abatement Plan Appendix

The Asbestos Hazard Abatement Plan appendix to the Accident Prevention Plan shall include, but not be limited to, the following:

a. The personal protective equipment to be used;

b. The location and description of regulated areas including clean and dirty areas, and decontamination unit ;

c. Initial exposure assessment in accordance with 29 CFR 1926, Section .1101;

d. Level of supervision;

e. Method of notification of other employers at the worksite;

f. Abatement method to include containment and control procedures;

g. Interface of trades involved in the construction;

h. Sequencing of asbestos related work;

i. Storage and disposal procedures and plan;

j. Type of wetting agent and asbestos encapsulant to be used;

k. Air monitoring methods (personal, environmental);

l. Bulk sampling and analytical methods (if required);

m. A detailed description of the method to be employed in order to control the spread of ACM wastes and airborne fiber concentrations;

n. Fire and medical emergency response procedures;

o. The security procedures to be used for all regulated areas.

1.7.2 Activity Hazard Analyses Appendix

Activity Hazard Analyses, for each major phase of work, shall be submitted and updated during the project. The Activity Hazard Analyses format shall be in accordance with EM 385-1-1 (Figure 1-1). The analysis shall define the activities to be performed for a major phase of work, identify the

sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the Activity Hazard Analyses has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the onsite Government representatives. The Activity Hazard Analyses shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations.

1.8 PRECONSTRUCTION CONFERENCE AND ONSITE SAFETY

The Contractor and the Contractor's Designated Competent Person, Project Supervisor, and Designated IH shall meet with the Contracting Officer prior to beginning work at a safety preconstruction conference to discuss the details of the Contractor's submitted Accident Prevention Plan to include the Asbestos Hazard Abatement Plan and Activity Hazard Analyses appendices. Deficiencies in the Accident Prevention Plan will be discussed and the Accident Prevention Plan shall be revised to correct the deficiencies and resubmitted for acceptance. Any changes required in the specification as a result of the Accident Prevention Plan shall be identified specifically in the plan to allow for free discussion and acceptance by the Contracting Officer, prior to the start of work. Onsite work shall not begin until the Accident Prevention Plan has been accepted. A copy of the written Accident Prevention Plan shall be maintained onsite. Changes and modifications to the accepted Accident Prevention Plan shall be made with the knowledge and concurrence of the Designated IH, the Project Supervisor, Designated Competent Person, and the Contracting Officer. Should any unforeseen hazard become evident during the performance of the work, the Designated IH shall bring such hazard to the attention of the Project Supervisor, Designated Competent Person, and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, all necessary action shall be taken by the Contractor to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Once accepted by the Contracting Officer, the Accident Prevention Plan, including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses will be enforced as if an addition to the contract. Disregarding the provisions of this contract or the accepted Accident Prevention Plan will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

1.9 SECURITY

Lockable doors shall be provided for each regulated area. A log book shall be kept documenting entry into and out of the regulated area. Entry into regulated areas shall only be by personnel authorized by the Contractor and the Contracting Officer. Personnel authorized to enter regulated areas shall be trained, be medically evaluated, and wear the required personal protective equipment for the specific regulated area to be entered.

1.10 MEDICAL REQUIREMENTS

Medical requirements shall conform to 29 CFR 1926, Section .1101.

1.10.1 Medical Examinations

Before being exposed to airborne asbestos fibers, workers shall be provided with a medical examination as required by 29 CFR 1926, Section .1101 and

other pertinent state or local requirements. This requirement shall have been satisfied within the last 12 months.

1.10.2 Medical and Exposure Records

Complete and accurate records shall be maintained of each employee's medical examinations, medical records, and exposure data, as required by 29 CFR 1910, Section .1910.1020 and 29 CFR 1926, Section .1101 for a period of 30 years after termination of employment. Records of the required medical examinations and exposure data shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health (OSHA) or authorized representatives of the employee and an employee's physician upon request of the employee or former employee. A copy of the required medical certification for each employee shall be maintained on file at the worksite for review, as requested by the Contracting Officer or the representatives.

1.11 TRAINING PROGRAM

1.11.1 General Training Requirements

The Contractor shall establish a training program as specified by EPA Model Accreditation Plan (MAP), training requirements at 40 CFR 763, Subpart E, Appendix C, OSHA requirements at 29 CFR 1926, Section .1101(k)(9), and this specification. Contractor employees shall complete the required training for the type of work they are to perform and such training shall be documented and provided to the Contracting Officer as specified in paragraph QUALIFICATIONS.

1.11.2 Project Specific Training

Prior to commencement of work, each worker shall be instructed by the Contractor's Designated IH and Competent Person in the following project specific training:

a. The hazards and health effects of the specific types of ACM to be abated;

b. The content and requirements of the Contractor's Accident Prevention Plan to include the Asbestos Hazard Abatement Plan and Activity Hazard Analyses and site-specific safety and health precautions;

c. Hazard Communication Program;

d. Hands-on training for each asbestos abatement technique to be employed;

e. Heat and/or cold stress monitoring specific to this project;

f. Air monitoring program and procedures;

g. Medical surveillance to include medical and exposure record-keeping procedures;

h. The association of cigarette smoke and asbestos-related disease;

i. Security procedures;

j. Specific work practice controls and engineering controls required for each Class of work in accordance with 29 CFR 1926, Section .1101.

1.12 RESPIRATORY PROTECTION PROGRAM

The Contractor shall establish in writing, and implement a respiratory protection program in accordance with 29 CFR 1926, Section .1101, 29 CFR 1910, Section .134, ANSI Z88.2, CGA G-7, CGA G-7.1. The Contractor shall establish minimum respiratory protection requirements based on measured or anticipated levels of airborne asbestos fiber concentrations encountered during the performance of the asbestos abatement work. The Contractor's respiratory protection program shall include, but not be limited to, the following elements:

a. The company policy, used for the assignment of individual responsibility, accountability, and implementation of the respiratory protection program.

b. The standard operating procedures covering the selection and use of respirators. Respiratory selection shall be determined by the hazard to which the worker is exposed.

c. Medical evaluation of each user to verify that the worker may be assigned to an activity where respiratory protection is required.

d. Training in the proper use and limitations of respirators.

e. Respirator fit-testing, i.e., quantitative, qualitative and individual functional fit checks.

f. Regular cleaning and disinfection of respirators.

g. Routine inspection of respirators during cleaning and after each use when designated for emergency use.

h. Storage of respirators in convenient, clean, and sanitary locations.

i. Surveillance of regulated area conditions and degree of employee exposure (e.g., through air monitoring).

j. Regular evaluation of the continued effectiveness of the respiratory protection program.

k. Recognition and procedures for the resolution of special problems as they affect respirator use (e.g., no facial hair that comes between the respirator face piece and face or interferes with valve function; prescription eye wear usage; contact lenses usage; etc.).

l. Proper training in putting on and removing respirators.

1.12.1 Respiratory Fit Testing

A qualitative or quantitative fit test conforming to 29 CFR 1910, Section 134 shall be conducted for each Contractor worker required to wear a respirator, and for the Contracting Officer and authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test shall be performed for each worker wearing a negative-pressure respirator prior to initially wearing a respirator on this project and anually thereafter. The qualitative fit tests may be used only for testing the fit of half-mask respirators where they are permitted to be worn, or of full-facepiece air purifying respirators where they are worn at levels at which half-facepiece air purifying respirators are permitted. If physical changes develop that will affect the fit, a new fit test for the worker shall be performed. Functional fit checks shall be performed by employees each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.12.2 Respirator Selection and Use Requirements

The Contractor shall provide respirators, and ensure that they are used as required by 29 CFR 1926, Section .1101 and in accordance with the manufacturer's recommendations. Respirators shall be jointly approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (MSHA/NIOSH), or by NIOSH, under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type shall be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered. Recommendations made by the Contractor's Designated IH to downgrade respirator type shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person in consultation with the Designated IH, shall have the authority to take immediate action to upgrade or downgrade respiratory type when there is an immediate danger to the health and safety of the wearer.

1.12.3 Class II Work

The Contractor shall provide an air purifying respirator, other than a disposable respirator, equipped with high-efficiency filters whenever the employee performs Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment .

1.12.4 Sanitation

Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

1.13 HAZARD COMMUNICATION PROGRAM

A hazard communication program shall be established and implemented in accordance with 29 CFR 1926, Section .59. Material safety data sheets (MSDSs) shall be provided for all hazardous materials brought onto the worksite. One copy shall be provided to the Contracting Officer and 1 copy shall be included in the Contractor's Hazard Communication Program.

1.14 LICENSES, PERMITS AND NOTIFICATIONS

1.14.1 General Legal Requirements

Necessary licenses, permits and notifications shall be obtained in conjunction with the project's asbestos abatement, transportation and disposal actions and timely notification furnished of such actions as required by federal, state, regional, and local authorities. The Contractor shall notify the Kansas Department of Health and Environment, bureau of Air and Radiation, asbestos Control Section and the Contracting Officer in writing, at least 10 days prior to the commencement of work, in accordance with 40 CFR 61, Subpart M, and state and local requirements to include the mandatory "Notification of Demolition and Renovation Record" form and other required notification documents. Notification shall be by Certified Mail, Return Receipt Requested. The Contractor shall furnish copies of the receipts to the Contracting Officer and DIS Environmental Division, in writing, prior to the commencement of work. For licenses, permits, and notifications that the Contractor is responsible for obtaining, the Contractor shall pay any associated fees or other costs incurred.

1.15 PERSONAL PROTECTIVE EQUIPMENT

Complete sets of personal protective equipment shall be made available to the Contracting Officer and authorized visitors for entry to the regulated area. Contracting Officer and authorized visitors shall be provided with training equivalent to that provided to Contractor employees in the selection, fitting, and use of the required personal protective equipment and the site safety and health requirements. Contractor workers shall be provided with personal protective clothing and equipment and the Contractor shall ensure that it is worn properly. The Contractor's Designated IH and Designated Competent Person shall select and approve all the required personal protective clothing and equipment to be used.

1.15.1 Respirators

Respirators shall be in accordance with paragraph RESPIRATORY PROTECTION PROGRAM.

1.15.2 Whole Body Protection

Personnel exposed to airborne concentrations of asbestos that exceed the PELs, or for all OSHA Classes of work for which a required negative exposure assessment is not produced, shall be provided with whole body protection and such protection shall be worn properly. The Contractor's Designated IH and Competent Person shall select and approve the whole body protection to be used. The Competent Person shall examine work suits worn by employees at least once per work shift for rips or tears that may occur during performance of work. When rips or tears are detected while an employee is working, rips and tears shall be immediately mended, or the work suit shall be immediately replaced. Disposable whole body protection shall be disposed of as asbestos contaminated waste upon exiting from the regulated area. Reusable whole body protection worn shall be either disposed of as asbestos contaminated waste upon exiting from the regulated area or be properly laundered in accordance with 29 CFR 1926, Section .1101. Whole body

protection used for asbestos abatement shall not be removed from the worksite by a worker to be cleaned. Recommendations made by the Contractor's Designated IH to downgrade whole body protection shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person, in consultation with the Designated IH, has the authority to take immediate action to upgrade or downgrade whole body protection when there is an immediate danger to the health and safety of the wearer.

1.15.2.1 Coveralls

Disposable-breathable coveralls with a zipper front shall be provided. Sleeves shall be secured at the wrists, and foot coverings secured at the ankles.

1.15.2.2 Work Clothing

Cloth work clothes for wear under the protective coverall, and foot coverings, shall be provided when work is being conducted in low temperature conditions. Cloth work clothes shall be either disposed of as asbestos contaminated waste or properly laundered in accordance with 29 CFR 1926, Section .1101.

1.15.2.3 Gloves

Gloves shall be provided to protect the hands. Where there is the potential for hand injuries (i.e., scrapes, punctures, cuts, etc.) a suitable glove shall be provided and used.

1.15.2.4 Foot Coverings

Cloth socks shall be provided and worn next to the skin. Footwear, as required by OSHA and EM 385-1-1, that is appropriate for safety and health hazards in the area shall be worn. Rubber boots shall be used in moist or wet areas. Reusable footwear removed from the regulated area shall be thoroughly decontaminated or disposed of as ACM waste. Disposable protective foot covering shall be disposed of as ACM waste. If rubber boots are not used, disposable foot covering shall be provided.

1.15.2.5 Head Covering

Hood type head covering shall be provided. In addition, protective head gear (hard hats) shall be provided as required. Hard hats shall only be removed from the regulated area after being thoroughly decontaminated.

1.15.2.6 Protective Eye Wear

Eye protection provided shall be in accordance with ANSI Z87.1.

1.16 HYGIENE FACILITIES AND PRACTICES

The Contractor shall establish a decontamination area for the decontamination of employees, material and equipment. The Contractor shall ensure that employees enter and exit the regulated area through the decontamination area.

1.16.1 Shower Facilities

Shower facilities, when provided, shall comply with 29 CFR 1910, Section .141(d)(3).

1.16.2 Single Stage Decontamination Area

A decontamination area (equipment room/area) shall be provided for Class II asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment produced before the operation. The equipment room or area shall be adjacent to the regulated area for the decontamination of employees, material, and their equipment which is contaminated with asbestos. The equipment room or area shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area. Surfaces of the equipment room shall be wet wiped 2 times after each shift. Materials used for wet wiping shall be disposed of as asbestos contaminated waste.

1.16.3 Lunch Areas

The Contractor shall provide lunch areas in which the airborne concentrations of asbestos are below 0.01 f/cc.

1.16.4 Smoking

Smoking, if allowed by the Contractor, shall only be permitted in designated areas approved by the Contracting Officer.

1.17 REGULATED AREAS

All Class II, asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Access to regulated areas shall be limited to authorized persons. The Contractor shall control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

1.18 WARNING SIGNS AND TAPE

Warning signs and tape printed shall be provided at the regulated boundaries and entrances to regulated areas. The Contractor shall ensure that all personnel working in areas contiguous to regulated areas comprehend the warning signs. Signs shall be located to allow personnel to read the signs and take the necessary protective steps required before entering the area. Warning signs, shall be in vertical format conforming to 29 CFR 1910 and 29 CFR 1926, Section .1101, a minimum of 500 by 350 mm 20 by 14 inches, and displaying the following legend in the lower panel:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

Spacing between lines shall be at least equal to the height of the upper of any two lines.

1.19 WARNING LABELS

Warning labels shall be affixed to all asbestos disposal containers used to contain asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements are acceptable. Warning labels shall conform to 29 CFR 1926, Section .1101 and shall be of sufficient size to be clearly legible displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

1.20 TOOLS

Vacuums shall be leak proof to the filter, equipped with HEPA filters, of sufficient capacity and necessary capture velocity at the nozzle or nozzle attachment to efficiently collect, transport and retain the ACM waste material. Power tools shall not be used to remove ACM unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation capture and collection system, or has otherwise been approved for use by the Contracting Officer. Residual asbestos shall be removed from reusable tools prior to storage and reuse. Reusable tools shall be thoroughly decontaminated prior to being removed from regulated areas.

1.21 RENTAL EQUIPMENT

If rental equipment is to be used, written notification shall be provided to the rental agency, concerning the intended use of the equipment, the possibility of asbestos contamination of the equipment and the steps that will be taken to decontaminate such equipment. A written acceptance of the terms of the Contractor's notification shall be obtained from the rental agency.

1.22 AIR MONITORING EQUIPMENT

The Contractor's Designated IH shall approve air-monitoring equipment to be used to collect samples.

1.23 EXPENDABLE SUPPLIES

1.23.1 Duct Tape

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container shall be provided.

1.23.2 Disposal Containers

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers shall be provided for ACM wastes as required by 29 CFR 1926 Section .1101 .

1.23.3 Disposal Bags

Leak-tight bags, 0.15 mm 6 mil thick, shall be provided for placement of asbestos generated waste.

1.23.4 Sheet Plastic

Sheet plastic shall be polyethylene of 0.15 mm 6 mil minimum thickness and shall be provided in the largest sheet size necessary to minimize seams Film shall be clear and conform to ASTM D 4397, except as specified below:

1.23.5 Amended Water

Amended water shall meet the requirements of ASTM D 1331.

1.23.6 Leak-tight Wrapping

Two layers of 0.15 mm 6 mil minimum thick polyethylene sheet stock shall be used for the containment of removed asbestos-containing components or materials too large to be placed in disposal bags . Upon placement of the ACM component or material, each layer shall be individually leak-tight sealed with duct tape.

1.24 MISCELLANEOUS ITEMS

A sufficient quantity of other items, such as, but not limited to: scrapers, brushes, brooms, staple guns, tarpaulins, shovels, rubber squeegees, dust pans, other tools, scaffolding, staging, enclosed chutes, wooden ladders, lumber necessary for the construction of contaminants, UL approved temporary electrical equipment, material and cords, ground fault circuit interrupters, water hoses of sufficient length, fire extinguishers, first aid kits, portable toilets, logbooks, log forms, markers with indelible ink, spray paint in bright color to mark areas, project boundary fencing, etc., shall be provided.

2 PRODUCTS (NOT USED)

3 EXECUTION

3.1 GENERAL REQUIREMENTS

Asbestos abatement work tasks shall be performed as shown on the detailed plans as summarized in paragraph DESCRIPTION OF WORK and the Contractor's Accident Prevention Plan, Asbestos Hazard Abatement Plan, and the Activity Hazard Analyses. The Contractor shall use the engineering controls and work practices required in 29 CFR 1926, Section .1101(g) in all operations regardless of the levels of exposure. Personnel shall wear and utilize

protective clothing and equipment as specified. The Contractor shall not permit eating, smoking, drinking, chewing or applying cosmetics in the regulated area. Personnel of other trades, not engaged in asbestos abatement activities, shall not be exposed at any time to airborne concentrations of asbestos unless all the administrative and personal protective provisions of the Contractor's Accident Prevention Plan are complied with. Power to the regulated area shall be locked-out and tagged in accordance with 29 CFR 1910, and temporary electrical service with ground fault circuit interrupters shall be provided as needed. Temporary electrical service shall be disconnected when necessary for wet removal.

3.2 PROTECTION OF ADJACENT WORK OR AREAS TO REMAIN

Asbestos abatement shall be performed without damage to or contamination of adjacent work or area. Where such work or area is damaged or contaminated, as verified by the Contracting Officer using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the Government, as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, work shall stop in all effected areas immediately and the spill shall be cleaned. When satisfactory visual inspection and air sampling analysis results are obtained and have been evaluated by the Contractor's Designated IH and the Contracting Officer, work shall proceed.

3.3 BUILDING VENTILATION SYSTEM AND CRITICAL BARRIERS

Building ventilating systems supplying air into or returning air out of a regulated area shall be isolated by airtight seals to prevent the spread of contamination throughout the system. Air-tight critical barriers shall be installed on building ventilating openings located inside the regulated area. Critical barriers shall be installed as shown on drawings.

3.4 METHODS OF COMPLIANCE

3.4.1 Mandated Practices

The Contractor shall employ proper handling procedures in accordance with 29 CFR 1926 and 40 CFR 61, Subpart M, and the specified requirements. The specific abatement techniques and items identified shall be detailed in the Contractor's Asbestos Hazard Abatement Plan including, but not limited to, details of construction materials, equipment, and handling procedures. The Contractor shall use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters to collect debris and dust containing ACM.

b. Wet methods or wetting agents to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup; except where it can be demonstrated that the use of wet methods is unfeasible due to, for example, the creation of electrical hazards, equipment malfunction, and in roofing.

c. Prompt cleanup and disposal in leak-tight containers of wastes and debris contaminated with asbestos.

d. Inspection and repair of polyethylene in work and high traffic areas.

e. Cleaning of equipment and surfaces of containers filled with ACM prior to removing them from the equipment room or area.

3.4.2 Control Methods

The Contractor shall use the following control methods to comply with the PELs:

a. Isolation of processes producing asbestos dust;

b. Use of other work practices and engineering controls;

3.4.3 Unacceptable Practices

The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

b. Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

c. Dry sweeping, shoveling, or other dry clean-up of dust and debris containing ACM.

d. Employee rotation as a means of reducing employee exposure to asbestos.

3.4.4 Class II Work

In addition to the requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

a. A Competent Person shall supervise the work.

3.4.5 Specific Control Methods for Class II Work

In addition to requirements of paragraph Class II Work, Class II work shall be performed using the following methods:

3.4.6 Cleaning After Asbestos Removal

After completion of all asbestos removal work, surfaces from which ACM has been removed shall be wet wiped or sponged clean, or cleaned by some equivalent method to remove all visible residue.

3.5 FINAL CLEANING AND VISUAL INSPECTION

Upon completion of abatement, the regulated area shall be cleaned Upon completion of the cleaning, the Contractor shall conduct a visual pre-inspection of the cleaned area in preparation for a final inspection and recleaning, as necessary. Upon completion of the final cleaning, the Contractor and the Contracting Officer shall conduct a final visual inspection of the cleaned regulated area in accordance with ASTM E 1368 and document the results . If the Contracting Officer rejects the clean regulated area as not meeting final cleaning requirements, the Contractor shall reclean as necessary and have a follow-on inspection conducted with the Contracting Officer. Recleaning and follow-up reinspection shall be at the Contractor's expense.

3.6 EXPOSURE ASSESSMENT AND AIR MONITORING

3.6.1 General Requirements For Exposure

Exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed in accordance with 29 CFR 1926, Section .1101, the Contractor's air monitoring plan, and as specified. Personal exposure air monitoring (collected at the breathing zone) that is representative of the exposure of each employee who is assigned to work within a regulated area shall be performed by the Contractor's Designated IH. Breathing zone samples shall be taken for at least 25 percent of the workers in each shift, or a minimum of 2, whichever is greater. Air monitoring results at the 95 percent confidence level shall be calculated as shown in Table 2 at the end of this section. Aabatement environmental air monitoring shall be performed by the Contractor's Designated IH] . Environmental air monitoring shall be performed using NIOSH Pub No. 84-100 Method 7400 (PCM) environmental air monitoring shall be conducted at a sufficient velocity and duration to establish the limit of detection of the method used at 0.005 f/cc. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. Results of breathing zone samples shall be posted at the job site and made available to the Contracting Officer. The Contractor shall maintain a fiber concentration inside a regulated area less than or equal to 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement. If fiber concentration rises above 0.1 f/cc, work procedures shall be investigated with the Contracting Officer to determine the cause. At the discretion of the Contracting Officer, fiber concentration may exceed 0.1 f/cc but shall not exceed 1.0 f/cc expressed as an 8-hour TWA. The Contractor's workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as averaged over a sampling period of 30 minutes. Should either an environmental concentration of 1.0 f/cc expressed as an 8-hour TWA or a personal excursion concentration of 1.0 f/cc expressed as a 30-minute sample occur inside a regulated work area, the Contractor shall stop work immediately, notify the Contracting Officer, and implement additional engineering controls and work practice controls to reduce

airborne fiber levels below prescribed limits in the work area. Work shall not restart until authorized by the Contracting Officer.

3.6.2 Initial Exposure Assessment

The Contractor's Designated IH shall conduct an exposure assessment immediately before or at the initiation of an asbestos abatement operation to ascertain expected exposures during that operation. The assessment shall be completed in time to comply with the requirements which are triggered by exposure data or the lack of a negative exposure assessment, and to provide information necessary to assure that all control systems planned are appropriate for that operation. The assessment shall take into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the Contractor which indicate the levels of airborne asbestos likely to be encountered on the job.

3.6.3 Negative Exposure Assessment

The Contractor shall provide a negative exposure assessment for the specific asbestos job which will be performed. The negative exposure assessment shall be provided within 10 days of the initiation of the project and conform to the following criteria:

a. Objective Data: Objective data demonstrating that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the PEL-TWA and PEL-Excursion Limit under those work conditions having the greatest potential for releasing asbestos.

b. Prior Asbestos Jobs: Where the Contractor has monitored prior asbestos jobs for the PEL and the PEL-Excursion Limit within 12 months of the current job, the monitoring and analysis were performed in compliance with asbestos standard in effect; the data were obtained during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the Contractor's current operations; the operations were conducted by employees whose training and experience are no more extensive than that of employees performing the current job; and these data show that under the conditions prevailing and which will prevail in the current workplace, there is a high degree of certainty that the monitoring covered exposure from employee exposures will not exceed the PEL-TWA and PEL-Excursion Limit.

c. Initial Exposure Monitoring: The results of initial exposure monitoring of the current job, made from breathing zone air samples that are representative of the 8-hour PEL-TWA and 30-minute short-term exposures of each employee. The monitoring covered exposure from operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.

3.6.4 Air-Monitoring Results and Documentation

Air sample fiber counting shall be completed and results provided within 24 hours (breathing zone samples), and 24 hours (environmental monitoring) after completion of a sampling period. The Contracting Officer shall be notified immediately of any airborne levels of asbestos fibers in excess of established requirements. Written sampling results shall be provided within 5 working days of the date of collection. The written results shall be signed by testing laboratory analyst, testing laboratory principal and the Contractor's Designated IH. The air sampling results shall be documented on a Contractor's daily air monitoring log. Copies of results of all air monitoring shall be forwarded to the DIS Environmental Division. The air monitoring log shall contain the following information for each sample:

a. Sampling and analytical method used;

b. Date sample collected;

c. Sample number;

d. Sample type: BZ = Breathing Zone (Personal), E = Environmental,

e. Location/activity/name where sample collected;

f. Sampling pump manufacturer, model and serial number, beginning flow rate, end flow rate, average flow rate (L/min);

g. Calibration date, time, method, location, name of calibrator, signature;

h. Sample period (start time, stop time, elapsed time (minutes);

i. Total air volume sampled (liters);

j. Sample results (f/cc

k. Laboratory name, location, analytical method, analyst, confidence level. In addition, the printed name and a signature and date block for the Industrial Hygienist who conducted the sampling and for the Industrial Hygienist who reviewed the daily air monitoring log verifying the accuracy of the information.

3.7 CLEARANCE CERTIFICATION

When asbestos abatement is complete, ACM waste is removed from the regulated areas, and final clean-up is completed, the Contracting Officer will certify the areas as safe before allowing the warning signs and boundary warning tape to be removed. The Contractor and the Contracting Officer shall visually inspect all surfaces for residual material or accumulated debris. The Contractor shall reclean all areas showing dust or residual materials. The Contracting Officer will certify in writing that the area is safe before unrestricted entry is permitted.

3.8 CLEANUP AND DISPOSAL

3.8.1 Title to ACM Materials

ACM material resulting from abatement work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified and in accordance with applicable federal, state and local regulations.

3.8.2 Collection and Disposal of Asbestos

All ACM waste shall be collected and including contaminated wastewater filters, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing, shall be collected and placed in leak-tight containers such as double plastic bags sealed double wrapped polyethylene sheet ; sealed fiberboard boxes ; or other approved containers. Waste within the containers shall be wetted in case the container is breached. Asbestos-containing waste shall be disposed of at an EPA, state and local approved asbestos landfill. For temporary storage, sealed impermeable containers shall be stored in an asbestos waste load-out unit or in a storage/transportation conveyance (i.e., dumpster, roll-off waste boxes, etc.) in a manner acceptable to and in an area assigned by the Contracting Officer. Procedure for hauling and disposal shall comply with 40 CFR 61, Subpart M, state, regional, and local standards.

3.8.3 3.8.3 Scale Weight Measurement

Scales used for measurement shall be public scales. Weighing shall be at a point nearest the work at which a public scale is available. Scales shall be standard truck scales of the beam type; scales shall be equipped with the type registering beam and an "over and under" indicator; and shall be capable of accommodating the entire vehicle. Scales shall be tested, approved and sealed by an inspector of the State of Kansas. Scales shall be calibrated and resealed as often as necessary and at least once every three months to ensure continuous accuracy. Vehicles used for hauling ACM shall be weighed empty daily at such time as directed and each vehicle shall bear a plainly legible identification mark.

3.8.4 3.8.4 Weigh Bill and Delivery Tickets

Copies of weigh bills and delivery tickets shall be submitted to the Contracting Officer during the progress of the work. The Contractor shall furnish the Contracting Officer scale tickets for each load of ACM weighed and certified. These tickets shall include tare weight; identification mark for each vehicle weighed; and date, time and location of loading and unloading. Tickets shall be furnished at the point and time individual trucks arrive at the worksite. A master log of all vehicle loading shall be furnished for each day of loading operations. Before the final statement is allowed, the Contractor shall file with the Contracting Officer certified weigh bills and/or certified tickets and manifests of all ACM actually disposed by the Contractor for this contract.

3.8.5 Asbestos Waste Shipment Record

The Contractor shall complete and provide the Contracting Officer and the DIS Environmental Division final completed copies of the Waste Shipment Record for all shipments of waste material as specified in 40 CFR 61, Subpart M and other required state waste manifest shipment records, within 3 days of delivery to the landfill. Each Waste Shipment Record shall be signed and dated by the Contractor, the waste transporter and disposal facility operator.

TABLE 2

FORMULA FOR CALCULATION OF THE 95 PERCENT CONFIDENCE LEVEL
(Reference: NIOSH 7400)

Fibers/cc(01.95 percent CL) = X + (X) * (1.645) * (CV)

Where: X = ((E)(AC))/((V)(1000))

E = ((F/Nf) - (B/Nb))/Af

CV = The precision value; 0.45 shall be used unless the analytical laboratory provides the Contracting Officer with documentation (Round Robin Program participation and results) that the laboratory's precision is better.

AC = Effective collection area of the filter in square millimeters

V = Air volume sampled in liters

E = Fiber density on the filter in fibers per square millimeter

F/Nf = Total fiber count per graticule field

B/Nb = Mean field blank count per graticule field

Af = Graticule field area in square millimeters

TWA = C1/T1 + C2/T2 = Cn/Tn

Where: C = Concentration of contaminant

T = Time sampled.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ CONTRACT NO. _____
PROJECT ADDRESS _____
CONTRACTOR FIRM NAME _____
EMPLOYEE'S NAME _____,_____,_____,
(Print) (Last) (First) (MI)

Social Security Number: _____-_____-_____,

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH TYPES OF LUNG DISEASE AND CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NONSMOKING PUBLIC.

Your employer's contract for the above project requires that you be provided and you complete formal asbestos training specific to the type of work you will perform and project specific training; that you be supplied with proper personal protective equipment including a respirator, that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you. The Contractor's Designated Industrial Hygienist will check the block(s) for the type of formal training you have completed. Review the checked blocks prior to signing this certification.

FORMAL TRAINING:
_____ a. For Competent Persons and Supervisors: I have completed EPA's Model Accreditation Program (MAP) training course, "Contractor/Supervisor", that meets this State's requirements.

b. For Workers:
_____ (1) For OSHA Class I work: I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
_____ (2) For OSHA Class II work (where there will be abatement of more than one type of Class II materials, i.e., roofing, siding, floor tile, etc.): I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
(3) For OSHA Class II work (there will only be abatement of one type of Class II material):
_____ (a) I have completed an 8-hour training class on the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls of 29 CFR 1926, Section .1101(g) and hands-on training.
_____ (b) I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
_____ (4) For OSHA Class III work: I have completed at least a 16-hour course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, Section .92(a)(2) and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101, and hands-on training.

_____ (5) For OSHA Class IV work: I have completed at least a 2-hr course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, (a)(1), and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101(g) and hands-on training.

_____ c. Workers, Supervisors and the Designated Competent Person: I have completed annual refresher training as required by EPA's MAP that meets this State's requirements.

PROJECT SPECIFIC TRAINING:
_____ I have been provided and have completed the project specific training required by this Contract. My employer's Designated Industrial Hygienist and Designated Competent Person conducted the training.

RESPIRATORY PROTECTION:
_____ I have been trained in accordance with the criteria in the Contractor's Respiratory Protection program. I have been trained in the dangers of handling and breathing asbestos dust and in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair and contact lens use policy of my employer.

RESPIRATOR FIT-TEST TRAINING:
_____ I have been trained in the proper selection, fit, use, care, cleaning,maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in the Contractor's Respiratory Program and have received a satisfactory fit. I have been assigned my individual respirator. I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time.

MEDICAL EXAMINATION:
_____ I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests, and may have included an evaluation of a chest x-ray. A physician made a determination regarding my physical capacity to perform work tasks on the project while wearing personal protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's Industrial Hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

_____ were no limitations to performing the required work tasks.
_____ were identified physical limitations to performing the required work tasks.

Date of the medical examination _____

Employee Signature _____ date _____
Contractor's Industrial
Hygienist Signature _____ date _____

Square Footage VAT Floor Tile Abatement
Floor Plans in Housing Area 17 (Delaware Village)

Type 80 room designation	Type 80 - SF		Slab ACM sf	Total Slab area all 18
abated	236.30		236.30	
Utility/laundry room	40.00		40.00	
Living room	252.00			
Master bedroom	194.75			
Bedroom 2	145.90			
Bedroom 3	155.88			
Bedroom 4				
Landings	18.00			
Powder room	21.25	friable	21.25	
Master bath	35.00	friable		
Bath	45.80	friable		
Crawlspace	No ACM			
Outside storage room	No ACM			
Max sf of ACM per unit	1,042.83		**297.55**	**5,355.90**
Total SF per unit	1,144.88			
Total ACM sf ALL 18 Units	**18,771.00**			
remove vinyl asbestos tile	(VAT), where it has been installed over the concrete slabs			
leave it elsewhere In the units	Mastic does not need to be abated prior to building demolition			

Type 81 room designation	Type 81- SF		Slab ACM sf	Total Slab area all 25
Dining room/kitchen/hall	239.20			
Utility/laundry room	40.00			
Living room	252.00		252.00	
Master bedroom	226.50			
Bedroom 2	152.00			
Bedroom 3	144.00			
Bedroom 4				
Landings	44.20			
Powder room	20.50	friable		
Master bath	44.00	friable		
Bath	44.20	friable		
Crawlspace	No ACM			
Outside storage room	No ACM			
		25 units		
Max sf of ACM per unit 81	1,097.90		**252.00**	**6,300.00**
Total SF in unit	1,206.60			
Total ACM sf All 25 units	**27,448.00**			
remove vinyl asbestos tile	(VAT), where it has been installed over the concrete slabs			
leave it elsewhere In the units	Mastic does not need to be abated prior to building demolition			

Square Footage VAT Floor Tile Abatement
Floor Plans in Housing Area 17 (Delaware Village)

Type 79 room designation	Type 79 -SF		Slab ACM sf	Total Slab area all 12
Dining room/kitchen/hall	293.00		293.00	
Utility/laundry room	42.10		42.10	
Living room	180.00		180.00	
Master bedroom	227.90			
Bedroom 2	142.70			
Bedroom 3	137.00			
Landings	41.30			
Storage room	22.30			
Powder room	23.60	friable	23.60	
Master bath	35.30	friable		
Bath	57.10	friable		
Crawlspace	No ACM			
Outside storage room	No ACM			
		12 units		
Max possible ACM	1,086.30		**538.70**	**6,464.40**
Total SF in unit	1,202.30			
Total ACM sf All 12 units	**13,036.00**			
Type 73 room designation	**Type 73 -SF**		**Slab ACM sf**	**Total Slab area all 4**
Living room		1st floor =	806.00	
Kitchen				
Dining room/hall				
Utility room				
Master bedroom				
Bedroom 2				
Bedroom 3				
Landings				
Closet (upstairs)				
Powder room	150.00	friable ACM		
Master bath				
Bath				
Outside storage room	No ACM			
		4 units		
Max possible ACM	806.00		**806.00**	**3,224.00**
Total SF in unit	1,612.00			
Total ACM sf all 4 units	**3,224.00**			
remove vinyl asbestos tile	(VAT), where it has been installed over the concrete slabs			
leave it elsewhere In the units	Mastic does not need to be abated prior to building demolition			

Square Footage VAT Floor Tile Abatement
Floor Plans in Housing Area 17 (Delaware Village)

Type 77 room designation	Type 77- SF		Slab ACM sf	Total Slab area all 9
Living room	214.50		214.50	
Dining room	109.40		109.40	
Kitchen	113.40		113.40	
Laundry room/hall/landing	77.13		77.13	
Master bedroom	180.70		180.70	
Bedroom 2	176.30			
Bedroom 3	127.00			
Bedroom 4				
Landings				
Hall/Storage room	64.17			
Master bath	36.20	friable		
Bath	43.60	friable		
Crawlspace	No ACM			
Outside storage room	No ACM			
		9 units		
Max possible ACM	1,062.60		**695.13**	**6,256.17**
Total SF in unit	1,142.40			
Total ACM sf all 9 units	**9,563.40**			
Type 78 room designation	**Type 78 - SF**		**Slab ACM sf**	**Total Slab Area all 18**
Living/dining room	330.80		330.80	
Kitchen	109.70		109.70	
Utility/laundry room	39.40		39.40	
Storage	22.30		22.30	
Hall	89.00		89.00	
Master bedroom	195.40			
Bedroom 2	114.00			
Bedroom 3	129.50			
Bedroom 4	100.90			
Hall	46.40			
Powder room	19.60	friable	19.60	
Master bath	33.20	friable		
Bath	38.00	friable		
Crawlspace	No ACM			
Outside storage room	No ACM			
		18 units		
Max possible ACM	1,177.40		**610.80**	**10,994.40**
Total SF in unit	1,268.20			
Total ACM sf all 18 units	**21,193.20**			
TOTAL FLOOR SLAB TILE ABATEMENT SF all-86 units				**38,595**
Total ACM sf all 86 units	**93,235.60**			

Square Footage for Friable Asbestos Abatement
for floor plans in Housing Area 17 (Delaware Village)

6/19/2002

Type 73 room designation	Type 73 SF		POTENTIAL FRIABLE SF	TOTAL FRIABLE AREA
Powder room			150.00	Estimate for 3 rooms
Master bath				
Bath				
		4 units		
Max SF of friable ACM/unit	-		150.00	600.00
Total Friable ACM for ALL 4 units of Type 73				**600.00**

Type 77 room designation	Type 77 SF		POTENTIAL FRIABLE SF	TOTAL FRIABLE AREA
Master bath	36.20		36.20	
Bath	43.60		43.60	
		9 units		
Max SF of friable ACM/unit			79.80	
Total Friable ACM for ALL 9 units of Type 77				**718.20**

Type 78 room designation	Type 78 SF		POTENTIAL FRIABLE SF	TOTAL FRIABLE AREA
Powder room	19.60		19.60	
Master bath	33.20		33.20	
Bath	38.00		38.00	
		18 units		
Max SF of friable ACM/unit			90.80	
Total Friable ACM for ALL 18 units of Type 78				**1,634.40**

Type 79 room designation	Type 79 SF		POTENTIAL FRIABLE SF	TOTAL FRIABLE AREA
Powder room	23.60		23.60	
Master bath	35.30		35.30	
Bath	57.10		57.10	
		12 units		
Max SF of friable ACM/unit			116.00	
Total Friable ACM for ALL 12 units of Type 79				**1,392.00**

Square Footage for Friable Asbestos Abatement
for floor plans in Housing Area 17 (Delaware Village)

6/19/2002

Type 80 room designation	**Type 80 SF**		**POTENTIAL FRIABLE SF**	**TOTAL FRIABLE AREA**
Powder room	21.25		21.25	
Master bath	35.00		35.00	
Bath	45.80		45.80	
		18 units		
Max SF of friable ACM/unit			102.05	1,836.90
Total Friable ACM for ALL 18 units of Type 80				**1,836.90**
Type 81 room designation	**Type 81 SF**		**POTENTIAL FRIABLE SF**	**TOTAL FRIABLE AREA**
Utility/laundry room	40.00		40.00	*only found in 2 cases
Powder room	20.50		20.50	
Master bath	44.00		44.00	
Bath	44.20		44.20	
		25 units		
Max SF of friable ACM/unit			148.70	
Total Friable ACM for ALL 25 units of Type 81				**3,717.50**
TOTAL FRIABLE ABATEMENT AREA (SF) all 86 units				**7,391.30**

DIVISION 14 – CONVEYING SYSTEMS

NO EDITED GUIDE SPECIFICATIONS PROVIDED BY THE GOVERNMENT

DIVISION 15 – MECHANICAL

EDITED GUIDE SPECIFICATIONS PROVIDED BY THE GOVERNMENT

15776 Water Source Heat Pumps
15777 Close Loop Ground Couple Heat Exchangers

SECTION 15776

WATER SOURCE HEAT PUMPS

PART 1 – GENERAL

1.1 SCOPE: Work covered in this section includes furnishing all plant, labor, equipment, materials, and transportation necessary for installation of water source heat pumps required in this Project.

1.2 APPLICABLE PUBLICATIONS: The publications listed below form a part of this section to the extent referenced. The publications are referred to in the text by basic designation only.

1.2.1 Federal Specifications:

F-F-300B	Filter, Air-Conditioning: Viscous-Impingement and Dry Types, Cleanable
F-F-310B	Filter, Air Conditioning: Viscous-Impingement and Dry Types, Replaceable
BB-F-1421B	Fluorocarbon Refrigerants.
CC-M-18707A	Motors, Alternating Current, Fractional and Integral Horsepower (500 hp and Smaller)

1.2.2 Anti-Friction Bearing Manufacturer’s Association (AFBMA) Standards:

9-78.1.1	Load Ratings and Fatigue Life for Ball Bearings

1.2.3 Air Movement and Control Association (AMCA) Standards:

210-74.1	Laboratory Methods of Testing Fans for Rating Purposes
300-67	Test Code for Sound Rating Air Moving Devices

1.2.4 American National Standards Institute (ANSI) Standards:

B31.5-83	Refrigeration Piping

1.2.5 Air Conditioning and Refrigeration Institute (ARI) Standards:

210/240-84	Unitary Air Conditioning and Air-Source Heat Pump Equipment
520-78.1	Positive Displacement Refrigerant Compressors, Compressor Units, and Condensing Units
320	Water Source Heat Pumps

1.2.6 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)Standards:

15-78	Safety Code for Mechanical Refrigeration

1.2.7 American Society for Testing and Materials (ASTM) Publications:

A505-78	Steel Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled
A506-73 (R1980)	Steel Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, Regular Quality
A525-83	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
A526/A526M-85	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
B75-84	Seamless Copper Tube
B209-84	Aluminum and Aluminum-Alloy Sheet and Plate
B234-85	Aluminum-Alloy Drawn Seamles Tubes for Condensers and Heat Exchangers
D3350	Polyethylene Plastics Pipe and Fittings Materials

1.2.8 International Association of Plumbing and Mechanical Officials (IAPMO) Publication:

Uniform Plumbing Code (UPC) – 1982 Edition

1.2.9 National Fire Protection Association (NFPA) Standards:

70-87	National Electrical Code
90A-85	Installation of Air Conditioning and Ventilating Systems
90B-84	Installation of Warm Air Heating and Air Conditioning

1.2.10 Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Standards:

1985	HVAC Duct Construction Standards - Metal and Flexible

1.2.11Underwriters Laboratories (UL) Publications:

303-80	Refrigeration and Air Conditioning Condensing and Compressor Units; July 12, 1984
465-78	Central Cooling Air Conditioners; July 11, 1984
559-85	Heat Pumps; June 19, 1985
873-79	Temperature-Indicating and Regulating Equipment; May 21, 1984
900-77	Test Performance of Air Filter Units; May 14, 1983
984-84	Hermetic Refreigerant Motor-Compressors; June 14, 1984
998-80	Humidifiers; June 25, 1985
1096-81	Electric Central Air Heating Equipment; August 13, 1984

1.2.12 International Ground Source Heat Pump Association

IGSHPA Installation Manual(s)

1.3 SUBMITTALS:

Government review is required for submittals with a "G-RE" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL DESCRIPTIONS:

SD-13: G-RE List of Materials: The Contractor shall submit a certified list of materials or manufacturer’s descriptive literature for all major materials proposed for use in work under this section.

SD-06: G-RE Installation, Operation, and Maintenance Instructions: The Contractor shall submit manufacturer’s written installation, operation, and maintenance instructions.

SD-01: G-RE Shop Drawings: The Contractor shall submit shop drwings of the proposed installation of heat pump equipment including connections to piping, controls, ductwork, and electrical power.

SD-13 G-RE The Contractor shall submit copies of the manufacturer’s written warranty for all heat pump equipment.

PART 2 – PRODUCTS

2.1 MATERIALS: Materials furnished under this section shall be standard products of manufacturers regularly engaged in the production of the items and the most current design which conforms to the requirements specified.

2.2 HEAT PUMPS: Provide factory-assembled and tested packaged water-source heat pumps as indicated, consisting of cabinet; sealed refrigerant circuit including compressor, rerigerant to water heat exchanger, refrigerant to air heat exchanger (coil), and reversing valve; evaporator fans; hot water generator and refrigeration and temperature controls. Provide capacities and electrical characteristics as scheduled. Units shall be designed for use with ground loop heat pump systems.

2.2.1 Cabinet:

2.2.1.1 Provide manufacturer’s standard galvanized steel or aluminum casing for ducted models. Provide cabinet type as scheduled. Provide access panels for inspection and access to internal parts. Insulate cabinet with minimum ½-inch thick, 1.5-pcf density fiberglass insulation. Provide knockouts for electrical and piping connections. Provide condensate drain connection. Provide with integral filter rack or field-built filter rack to provide for easy filter replacement from front of unit. Cabinet shall be constructed with compartments, so that compressor, reversing valve, and water coil are out of air stream. Supplemental electric heater shall mount to unit discharge.

2.2.1.2 Contractor shall furnish embossed metal instruction plate permanently attached to each heat pump cabinet stating filter size and detailed filter changing procedure.

2.2.2 Evaporator Fans: Provide centrifugal type, direct drive fans with permanently lubricated motors.

2.2.3 Heat Exchangers: Provide insulated refrigerant to water heat exchangers of coaaxial type, with inner copper water tube and outer steel refrigerant tube. Test and rate heat exchanger for 450-psi refrigerant working pressure.

2.2.4 Reversing Valve: Provide 4-way solenoid activated refrigerant reversing valve designed for fail-safe in heating position.

2.2.5 Compressor: Provide hermetic type compressor, installed on spring or rubber in shear vibration isolators and enclosed in acoustically treated enclosure. Provide high and low temperature cutouts and compressor motor overload protection. Provide capability to reset compressor lockout circuit at either remote thermostat or circuit breaker. Units over 15,000 BtuH shall have discharge muffler.

2.2.6 Internal Refrigerant Piping: Provide hard-drawn temper Type ACR copper tube with wrought-copper fittings and brazed joints.

2.2.7 Thermostats: Indoor thermostats shall be combination heating and cooling auto changeover type complete with subbase and shall conform to UL 873. Thermostats shall have a mode switch for OFF – COOL – HEAT, a fan switch for ON – AUTO, separate temperature setting indicators for heating and cooling modes. Two-stage heat required for units with electric heaters, and shall activate electric heat as second stage heater. Thermostats shall have low temperature setting 10 degrees F below setpoint for unoccupied control, momentary reset for 2-hour override. Outside air stat to lock out electric heat above 35 degrees F.

2.2.8 Ratings: Minimum efficiency ratings shall be 14.0 EER and 3.2 cop, in accordance with AAI 330 ratings.

2.2.9 Filters: Provide manufacturer’s standard fiberglass throw-away type filters in return air stream.

2.2.10 Accessories: Isolation valves, pressure compensating automatic flow control valves, expansion valve, cycle protection, and internal vibration isolation. Domestic hot water generator heat exchanger built in, with DHWW circuit pump and control circuit and connections.

2.3 ELECTRIC HEATER: Supplementary electric heaters may be used for operating conditions below 10 degrees F only. Ground loop shall be designed to provide all heat requirements plus 10 percent for outdoor conditions 10 degrees F and above.

2.4 HWG: Hot Water Generator which utilizes excess heat during cooling, and aid hot water generation at units COP rating in heating mode. Unit shall have a built-in water-to-refrigerant heat exchanger to eliminate field tie-in to refrigerant circuit. Unit shall include recirculation pump and controls, piped to water heater per manufacturer’s instructions. Set control for 140 degrees F and domestic heater for 130 degrees F. Provide backflow preventer at connection to domestic water service for ground loop systems.

PART 3 – EXECUTION

3.1 INSPECTION:

3.1.1 General: Examine areas and conditions under which water-source heat pumps are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF WATER-SOURCE HEAT PUMPS:

3.2.1 General: Install water-source heat pumps in acordance with manufacturer’s installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer’s recommended clearances.

3.2.2 Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer’s wiring diagram submittal to Electrical Installer.

3.2.3 Verify that electrical wiring installation is in accordance with manfuacturer’s submittal and installation requirements of Division 16 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.2.4 Ductwork: Refer to Section “LOW PRESSURE STEEL DUCTWORK.” Connect supply and return ducts to heat pumps with flexible duct connections. Provide transitions to exactly match unit duct connection size.

3.2.5 Ground Loop Piping Insulation: Ground loop piping above grade shall be insulated.

3.2.6 Drain Piping: Connect heat pump drain pan to nearest indirect waste connection as indicated on Plumbing Plans.

3.2.7 Ground Loop Piping: See Section 15777 “CLOSED LOOP GROUND COUPLED HEAT EXCHANGERS.”

3.3 FIELD QUALITY CONTROL:

3.3.1 General: Start up water-source heat pumps in accordance with manufacturer’s start-up instructions. Test controls and demonstrate compilance with requirements. Replace damaged or malfunctionoing controls and equipment. Schedule training with Owner; provide at least 7-day notice to Contracting Officer of training date.

3.4 SPARE PARTS:

3.4.1 General: Furnish to Owner, with receipt, the following spare parts for each water-source heat pump: 2 sets filters for each unit.

3.5 **ELECTRIC HEATERS:** Electric heaters shall be installed in accordance with Unit Manufacturer’s recommendations and controlled as a second stage of heating.

3.6 **TESTING, ADJUSTING, AND BALANCING:** Heat pumps shall be tested and balanced as specified in Section “LOW PRESSURE STEEL DUCTWORK.”

SECTION 15777

CLOSED LOOP GROUND COUPLED HEAT EXCHANGERS

PART 1 – GENERAL

1.1 SCOPE: Work covered in this section includes all labor, equipment. materials, and transportation necessary for the following:

1.1.1 Bore Holes

1.1.2 Bore Hole Loop

1.1.3 Bore Hole Grouting

1.1.4 Ground Loop

1.1.5 Debris Purging and Flushing

1.1.6 Ground Loop Fill

1.1.7 Permits and Inspections: The contractor shall obtain and pay for necessary Base, Municipal, State, and Water Board inspections and permits, and make such tests as are called for by regulations of such authorities. These tests shall be made in the presence of the authorized representatives of such authorities.

1.2 APPLICABLE PUBLICATIONS: The publications listed below form a part of this section to the extent referenced. The publications are referred to in the text by basic designation only.

1.2.1 American Society for Testing and Material (ASTM) publications:

ASTM D-2666	Standard Specification for Polybytylene (PB) Plastic Tubing
ASTM D-2513	Dimensional Specifications
ASTM F-714	Dimensional Specifications
ASTM D-3350	Polyethylene Plastic Pipe and Fittings Materials
ASTM D-1693	Condition C-Environmental Stress Crack Resistance, Hrs.
ASTM D-1248	Polyethylene Plastics Molding and Extrusions Materials
ASTM D-2837	Hydrostatic Design Basis
ASTM D-2581	Specification for Polybutylene Plastics Molding and Extrusion Materials

1.2.2 International Association of Plumbing and Mechanical Officials (IAPMO) Publication.
Uniform Plumbing Code (UPC); 1994 Edition

1.2.3 International Ground Source Heat Pump Association (IGSHPA) Closed Loop/Ground Source Heat Pump System Installation Manuals.

1.3 QUALITY ASSURANCE:

1.3.1 The loop contractor shall have a certified installer (technician) trained by IGSHPA or an IGSHPA certified manufacturer's training program.
1.3.2 Ground heat exchanger fabricators shall have completed a heat fusion school in which each participant has performed a heat fusion procedure under the direct supervision of a IGSHPA Association certified Heat Fusion Technician or DOT certified heat fusion technician.

1.3.3 The system shall be the product of firms regularly engaged in the business of providing equipment earth coupled ground loop.

1.3.4 All local and state laws and ordinances as they pertain to buried pipe systems shall be strictly followed or a variance obtained.

1.3.5 Contractor shall submit references for minimum of (3) installations of similar or larger size.

1.4 SUBMITTALS:

Government review is required for submittals with a "G-RE" designation, submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL DESCRIPTIONS:

SD-01: G-RE: Manufacturer's Data: Submit manufacturer's specifications and
installation instructions on each component of the system.

SD-01: G-RE: Shop Drawings: Indicate layout. construction, sizes, jointing,
fastening, anchors, wiring, piping and miscellaneous accessories in detail.

SD-13: G-RE: Provide copy of technician's certification. Provide copy of latest IGSHPA manuals. Provide copy of all test to Contracting Officer.

SD-13: G-RE: Contractor shall submit references for minimum of (3) installations of similar or larger size.

PART 2 – PRODUCTS

2.1 GROUND HEAT EXCHANGER MATERIALS:

2.1.1 Acceptable pipe materials for the underground buried portion of the ground heat exchanger are polyethylene or polybutylene.

2.1.2 The pipe and fittings of the buried system shall be warranted by the manufacturer for ground source heat pump service.

2.1.3 Provide information permanently marked on the pipe which will allow the pipe to be properly identified.

2.1.4 Specification of polyethylene pipe will be by cell classification number. The specification for PE pipe shall be as follows:

a. Pipe shall be manufactured with dimensional specifications of ASTM D-2513 or F-714, as appropriate.
b. Cell classification defined by ASTM-3350 of ######Z.
c. The resin shall exhibit not more than 20Z failures (F 20%) when tested for 192 hours or more under ASTM D-1693, Condition C.

2.1.5 The minimum cell classification number acceptable for polyethylene pipe shall be PE345434C or PE355434C when tested under ASTM D-3350.

2.1.6 Specification for polybutylene pipe furnished under this specification shall be manufactured in accordance with ASTM D-2581. The material shall be:

2.1.6.1 Either Class B (general purpose and dielectric, in colors) or Class C (weather resistant, black in color containing not less than 2% carbon black.).

2.1.6.2 Type II (density, 0.91 to 0.92 g/cm).
2.1.6.3 Grade 1 (flow rate 0.25 to 0.75 g/10 min).
2.1.6.4 For fusible pipe, dimensional standards are given by ASTM D2666 and D3000.

2.2 PIPE JOINING METHOD:

2.2.1 The only acceptable method for joining buried pipe is by heat fusion process. No other method is acceptable.

2.2.2 Polyethylene pipe joints shall be by the butt and socket fusion.

2.2.3.1 Polybutylene pipe joints shall be by the socket fusion method.

2.2.4 Follow the pipe manufacturer's recommendation for joining pipe.

2.3 GROUTING MATERIALS - ACCEPTABLE MANUFACTURERS:

2.3.1 Economy Mud Product, Houston, TX., Econoplug Grout

2.3.2 Black Hills Betonite Company, Mills. WY.; Black Hills Grout

2.3.3 American Colloid Company. Arlington Hts., IL.; Volclay Grout

2.4 GROUTING MATERIALS:

2.4.1 Grouting Materials: Bentonite Based Slurry.

2.4.2 Use high-solid clay bentonite grout.

2.4.3 Provide bentonite-water mixture of at least 20Z bentonite by weight of water.

2.4.4 Grout shall have a permeability of less than 1X10-7 cm/sec.

2.5 DRILLING FLUIDS:

2.5.1 Drilling fluid shall be a fresh-water based mud.

2.5.2 Non-dissolved fluid additives shall be bentonite.

2.5.3 Drilling-fluid properties shall be maintained within the following limits using test procedures conforming to APIRP 138:

a. Weight (fluid density) - limits: 70-85 lb/cu. ft.
b. Viscosity limits: 32-40.
c. Filtration limits: 3/32 in., with maximum 20 cc water loss.

d. Sand-content (solids larger than 200 mesh) - limits: 2-4% by volume.

PART 3 – EXECUTION

3.1 DRILLING METHODS:

3.1.1 Use the hydraulic rotary or hollow-stem auger method for drilling 4" diameter holes. Provide 200' bore per nominal ton as indicated.

3.2 TRENCHING METHODS:

3.2.1 Use the chain excavator method for trenching of horizontal header piping trenches.

3.2.2 Where murky or sandy conditions exist, use a pipe guide mounted on the trenching boom to guide pipe into bottom of trench as it is excavated.

3.2.3 Where trenches intersect, insert and wedge 2x6 dams at previously dug trenches to prevent dirt from entering previously dug trenches.

3.3 BORE HOLE LOOP INSTALLATION:

3.3.1 Assemble each loop, laid out straight
.
3.3.2 Tape each bore hole loop to prevent spring back friction during loop insertion.

3.3.3 Insert loop pipe into bore hole, tape scrap steel billet reinforcing steel to the ends of the loop to offset buoyancy of pipe.

3.3.4 Test each loop section using water at a minimum pressure of 40 psi. Maintain pressure on piping section for a minimum of 24 hrs. with no loss of water.

3.4 TRENCH INSTALLATION:

3.4.1 Remove all debris and rocks from bottom of trenches immediately after trenching operations.

3.4.2 Remove debris and rocks with long handled tongs.

3.4.3 Inspect trench to ensure that all debris is removed.

3.4.4 Remove all rocks from edge of trench and top of spoils piles to prevent damage to piping during backfilling operations.

3.4.5 Install pipe after testing on a sand bed, backfill around pipe with sand to 2" above pipe. Complete backfilling with spoil material excavated from trench.

3.4.6 Compact backfill using hand compaction methods in maximum of 8" lifts.

3.4.7 No water jetting of backfill will be permitted.

3.4.8 Before trenches are closed, verify that all header pipes are properly fabricated and installed. Test entire ground loop with water at pressure of 40 PSI, for minimum of 24 hours without loss of water pressure.
3.4.9 Measure pressure drop at inlet and outlet of each paralleled floor header to determine pressure difference, compare to calculated values. Thi s test wi 11 be performed in accordance with manufacturer's recommendations.

Submit the test information in tabular form for review by the contracting officer.

3.5 GROUTING METHODS:

3.5.1 Use grout pipe method to install grout materials in bore hole.

3.5.2 Place grout in one continuous operation, keep grout pipe submerged in grout and full of grout during grouting operations.

3.5.3 Gradually remove grout pipe as annular space in hole is filled.

3.5.4 If grouting operation is suspended temporarily, flush grout from delivery system with a volume of water equal to that of the pump and the grout pipe to remove grout residue. Resubmerge grout pipe and continue grouting operations.

3.6 FLUSHING AND PURGING OF LOOP PIPING:

3.6.1 Flush debris from piping and purge air from loop system.

3.6.2 Pump sufficient water through the pipe loop in sections, as required to produce a flushing velocity of 2 feet per second.

3.6.3 Submit a schedule indicating the contractor's intended flushing rates to the contracting officer for review.

3.6.4 Provide auxiliary pumps, as required, to accomplish the indicated flow rate for flushing and purging.

3.6.5 The entire heat pump and ground loop system shall be filled with 25% by volume propylene glycol solution after flushing is complete. The system shall be circulated for 24 hours and then tested. The Contractor shall notify the Contracting Officer or authorized representative a minimum of 24 hours prior to performing the test.

3.6.6 Pressurize the system to 30 psi. Run the circulating pump continuously for 48 hours. Check the static pressure, if less than 30 psi. remove air from system and repressurize to 30 psi, and repeat the test. Notify the Contracting Officer or Authorized Representative 24 hours prior to performing each test.

DIVISION 16 – ELECTRICAL

NO EDITED GUIDE SPECIFICATIONS PROVIDED BY THE GOVERNMENT

ATTACHMENT 1

AE DESIGN GUIDE

ARCHITECT-ENGINEER INSTRUCTION MANUAL

FOR
DESIGN OF MILITARY PROJECTS

PREPARED BY
U.S. ARMY ENGINEERING DISTRICT
CORPS OF ENGINEERS
KANSAS CITY

April 1995

ARCHITECT-ENGINEER INSTRUCTION MANUAL

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GENERAL INSTRUCTIONS

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CHAPTER 1

GENERAL INSTRUCTIONS

1. OBJECTIVE OF MANUAL. The objective of this manual is to instruct the Architect-Engineer (A-E) on the standards, policies, and basic requirements to be used in the preparation of design analyses, drawings, cost estimates, and specifications for Military Construction projects assigned to the U.S. Army Engineer District, Kansas City (the District). The A-E must be thoroughly familiar with the contents of this manual and with the whole system of instructional guides to efficiently design a military project for the District.

2. DESIGN CRITERIA, REGULATIONS, MANUALS AND STANDARDS. All facilities shall be designed in accordance with this Manual; the Corps of Engineers Manual entitled "General Safety Requirements", EM 385-1-1; the U.S. Department of Labor Safety and Health Regulations (OSHA Standards); and the Architectural and Engineering Instructions Design Criteria (CEMP-E) and other criteria as defined in the scope of work. The scope for each project may contain and/or reference specific instructions or criteria which will take precedence over this manual.

3. DESIGN PHASES. Project scope, requirements, and criteria are described in the Project Development Brochure (PDB) for Army Projects or in the Requirements and Management Plan (RAMP) for Air Force Projects. The drawings, design analysis, specifications, and cost estimate for each design phase shall be prepared in accordance with instructions contained within the appropriate chapters of this manual and the scope of work.

4. ESTIMATES. The A-E shall follow the Estimating Guide in this manual.

5. SCOPE AND SCHEDULE OF CONTRACT SERVICES. The specific requirements for a project will be defined in the scope of work. A-E contracts with this District normally provide for one or more of the following: (1) studies, (2) concept design, (3) preliminary design, and (4) final design. A-E contracts may contain optional provisions, such as a value engineering review, checking of shop drawings, preparing as-built drawings, or providing engineering services during construction. Occasionally, A-E contracts are for special services such as preparation of master planning studies or special reports. It is essential that all documents required in a submittal including required design analyses and cost estimates, be submitted at one time. Care will be exercised in the scheduling of completion dates to assure compliance with the above. The incremental submittal of segments of the required documents at any phase (i.e., concepts, preliminaries, finals) is not acceptable, except when specifically authorized in writing. It is the A-E's responsibility to complete, coordinate, and thoroughly check design documents according to the agreed-upon contract schedules.

6. REVIEW PROCEDURES. Design verification requires review to a degree commensurate with the complexity of the project. Submittals and reviews may be required at any of the various

phases. Such review will not relieve the A-E from performing all contract requirements, except as may be waived by written instruction. The scope of work indicates the specific submittals required. All data prepared by the A-E will be reviewed by the District for conformance with contract requirements; however, it is important that before submission the A-E review its design and carefully check and coordinate all elements thereof to ensure that the design is clear, consistent and complete. District comments will be entered into the Automated Review Management System (ARMS) for use by the A-E. The A-E will comply with all comments noted, except as provided below, making the necessary corrections on the original documents. If, during the correction of data, a difference of opinion develops concerning the marked corrections, or if there are any additional changes found necessary by the A-E, the A-E shall contact the project manager via telephone and discuss these differences. If the A-E has made changes other than those necessary to comply with review comments or there are still District comments which are not complied with, the A-E will annotate the "District Comments" in the manner indicated below. The notes will fully explain the reasons for non-compliance. In the event that the District agreed to withdraw or partially change a comment, the annotation will indicate the telecon date and who at the District agreed to the non-compliance (i.e., Ceramic tile in lieu of resilient flooring provided for Toilet No. 2, because . . . per telecon . . . date . . . between Smith and Peters).

7.AUTOMATED REVIEW MANAGEMENT SYSTEM (ARMS). The District uses the Automated Review Management System (ARMS). ARMS allows for A-E responses to review comments that have been entered into the system. The ARMS program operates on all MS DOS compatible microcomputers. The A-E will be given a copy of the program to incorporate all responses to the design review comments. The review comments and responses will be made part of subsequent design analysis submittals. Use of the system is described in the ARMS User Manual.

8. AUSTERITY IN DESIGN. All military design and construction shall be performed consistent with the principles of maximum economy. Materials and finishes shall result in minimum maintenance and first cost. Efforts shall be made to produce aesthetically pleasing structures, especially for buildings housing administration, housing, community, or morale activities. This embraces use of suitable facing materials to provide a more pleasing appearance, including use of picture windows, overhangs, architectural treatment of main entrances, and other measures. The basic concept is to achieve pleasing appearance with due consideration to economy of design and without resort to purely decorative features. This improved appearance concept does not apply to industrial type buildings located in industrial areas. Energy conservation and value engineering are also important design considerations. Where there is a difference of opinion concerning "Design Choice" it is District policy not to change the design, unless it is not acceptable for valid and specific reasons.

9. USE OF COMPUTER-AIDED ANALYTICAL PROGRAMS. The District encourages use of Computer-Aided Analytical Programs whenever this will result in cost reductions and/or improved design. These instructions establish procedures to facilitate monitoring of such use to assure that designs consistent with conventional methods and Corps standards are attained, and that maximum benefits are realized from system integration and data feedback.

9.1 Identification of Programs. The A-E shall furnish write-ups or identification of programs which the firm intends to use on major features of the work as part of its preliminary or concept submittal. The write-up shall contain sufficient detail so that the general method of solution and problem limitations may be identified and test problem data may be assembled for trial runs by the District if desired. When programs not otherwise identified are implemented while the work is in progress, output listings shall include enough input data and intermediate results to afford manual checks on the final results.

9.2 Data Files. Unless otherwise specified, data files used for final computations shall be retained by the A-E for the life of the construction contract. These materials shall be available to the District, without additional cost, at any time during said period.

9.3 Special Conditions.

9.3.1 When earthwork designs are processed by computer, plotted cross sections shall not be furnished except to clarify the structural or geometric arrangement of the proposed installation.

9.3.2 When plotted cross sections are not used to prepare quantity estimates, the A-E shall note in the outline and final specifications that plotted cross sections are not available for the bidder's inspection.

9.4 District Approval. The District's approval of any computer program or acceptance of computed results shall not relieve an A-E of any responsibility for accuracy of data or technical validity of assumptions and formula used.

10. SAFETY. All work shall include the necessary features required to produce a facility in which safety has been incorporated so as to conform to the established safety codes and regulations. Particular attention shall be given to such safety features as snowguards, windscreens, mechanical equipment guards, stairway head clearances, handrails, access hatches, ladder cages, fixed ladders, and non-slip treads. In addition to the CE Safety Manual EM 385-1-1 and OSHA Standards, all U.S. Army Materiel Command work shall be in compliance with AMC Regulation 385-100.

11. PUBLIC RELEASE OF INFORMATION. Any inquiries regarding a specific project shall be referred to the District Public Affairs Office, for an answer. The A-E shall not publicize nor release in any manner information or data in regard to projects on which it may be working or negotiating with this office, nor discuss prior to public release by this office, a project, any future program, or any planning with anyone not directly concerned with the design of the project.

12. REAL ESTATE. The A-E will at all times zealously guard against discussing real estate problems with property owners. Any real estate matters of a controversial or merely of an informative nature shall be directed to the project manager by either the property owner or the A-E

for solution or answer.

13. CLASSIFIED INFORMATION. Classified information obtained from this office will be treated in accordance with DD Form 254 and regulations specified in the contract concerning the protection of classified material. All such data shall be returned to this office on completion of design and prior to finalization of contract.

14. FEDERAL, STATE AND LOCAL POLLUTION ABATEMENT CRITERIA AND ENVIRONMENTAL PERMITS. The A-E shall be responsible for ensuring that the project is in full compliance with all applicable Federal, State and local environmental laws and regulations including but not limited to: National Environmental Policy Act (NEPA), Clean Water and Clean Air Acts, Endangered Species Act, Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response Compensation and Liability Act (CERCLA), i.e., Superfund, etc. Specific responsibilities of the A-E are described in the scope of work.

15. CERTIFICATION OF ENVIRONMENTAL ACTION COMPLIANCE. Each U.S. Army Engineer District is charged with the responsibility of protecting the public interest in the waters of the United States, including wetlands. This is accomplished through a Department of the Army permit program. Under this program, the discharge of dredged or fill material into waters of the United States, which includes lakes, streams, rivers, and wetlands, requires prior authorization from the U.S. Army Engineer Districts under Section 404 of the Clean Water Act (33 USC 1344). Also, any work or structures in, over, or under a navigable water of the United States requires prior authorization from the U.S Army Engineer Districts under Section 10 of the Rivers and Harbors Act of 1899 (33 USC 401). (Navigable water of the U.S. in the Kansas City District include the Missouri, Kansas, Osage, Gasconade, Lamine, Grand and Blue Rivers, and the Lake of the Ozarks.) Federal regulations require that a Department of the Army permit be issued by the U.S. Army Engineer Districts prior to the initiation of any construction on the portion of a proposed activity which is within the U.S. Army Engineers District's regulatory jurisdiction. Therefore, it is imperative that early contact be made with the appropriate U.S. Army Engineer District Regulatory Branch for activities that involve any waters of the United States, including wetlands, to determine if a Department of the Army permit will be required. Additionally, Section 404(b)(1) of the Clean Water Act requires the following sequencing steps to be followed when a Section 404 activity is proposed in a water of the U.S.: (1) alternatives must be examined to determine if the activity can be moved completely out of the water of the U.S. (avoid); (2) then alternatives must be examined to determine if the activity can be redesigned to reduce the impact to the water of the U.S. (minimize); (3) after completing both of the above steps, appropriate mitigation must be provided to mitigate for filling a water of the U.S. (mitigate). Appropriate U.S. Army Engineer District Regulatory Branches should be available to furnish guidance and advice on meeting all Department of the Army requirements under the above mentioned acts.

16. ENGINEERING INSPECTIONS/FIELD VISITS.

16.1 Visits to the Construction Site. Many projects contain features which must be built exactly as designed. Any changes to accommodate field conditions can result in the feature not

adequately performing its required function. Any such changes should only be made at the direction of the designers, and may necessitate a visit to the construction site by the designer during critical construction periods. The purpose of the visits shall be to inspect the project features to verify how field conditions compare with expected conditions, to observe conditions not fully covered in the design, and to assist field personnel in interpreting plans and specifications. The time and number of these field visits are dependent upon the project and shall be addressed in the scope of work for Title II services.

16.2 Critical Construction Features. The A-E shall identify in the specifications critical construction features of the work and require the construction Contractor to detail the construction activities on these features separately on Critical Path Method (CPM) or bar charts. The specifications shall require the construction Contractor to submit for review and approval sufficient submittals to assure that the critical requirements have been adequately addressed. In addition, the A-E shall prepare instructions to the field for those elements of the design that must be built as designed or that require designer approval for changes to accommodate field conditions. These instructions must describe those critical features and construction procedures that should be viewed by the designer. These instructions are to be submitted in draft form with the prefinal design review submittal and submitted in final form with the final, ready-to-advertise submittal.

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PRESENTATION OF DATA

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CHAPTER 2

PRESENTATION OF DATA

1. GENERAL. The standards for data presentation contained in this chapter shall be used in the preparation of all documents. If the format for a document is not prescribed herein, the format chosen by the designer must be approved by the District. Each volume of drawing data required by this manual to be submitted shall be adequately titled and dated. The name of the submittal phase, including percentage completed, shall be printed or otherwise marked on the cover sheet. Drawing sheets shall be consecutively numbered and indexed so that specific items of information can be easily located and referenced.

2. REFERENCE DOCUMENTS.

2.1 American National Standards Institute, Inc. Standards.

ANSI X32.2.4 Graphic Symbols for Heating, Ventilation and Air Conditioning (R1953).

ANSI Y32.2 Graphic Symbols for Electrical and Electronics Diagrams 1975

ANSI Y32.4 Graphic Symbols for Plumbing Fixtures for Diagrams Used in Architecture and Building Construction 1977.

ANSI Y32.7 Graphic Symbols for Railroad Maps and Profiles 1972.

ANSI Z32.2.3 Graphical Symbols for Pipe Fittings, Valves and Piping (R1952).

ANSI 172 Fire-Protection Symbols for Architectural and Engineering Drawings 1980.

2.2 Department of the Air Force Regulation.

AFR 89-1 Design and Construction Management

2.3 Department of the Army Engineer Manual.

EM 1110-1-1807 Standards Manual for US Army Corps of Engineers Computer-Aided Design and Drafting Systems

2.4 Instrument Society of America.

ISA-S5.1-1978	Instrumentation Symbols and Identification.
For updates:	American National Standards Institute 11 West 42nd Street New York, NY (212) 642-4900

2.5 Military Specification.

MIL-M-9868C	Microfilming of Engineering Documents 35mm, Requirement for

2.6 Military Standard.

MIL-STD-12C	Abbreviations for Use on Drawings, Specifications, Standards, and in Technical Documents, 15 June 1968.

3. DRAWING FORMAT.

3.1 Multiple Volumes. For designs that consist of more than 250 drawings, the drawing sheets shall be broken into volumes having 200 or fewer sheets per volume. However, the drawings for one facility shall not be divided between volumes. If there are more than 250 site development drawings, they should be broken into volumes of no more than 200 sheets, but they shall not be broken within a discipline. A separate cover sheet (with volume identification), index sheet, site development sheet and general legend sheets are required for each volume of drawings.

3.2 Grouping. A building or individual facility design shall be grouped in the design drawing package so that a single building may be withdrawn by deleting a consecutive block of sheets. Conversely, it shall be possible for the District to add a building to the bid package, if necessary.

3.3 Details. Typical sheets of standard details uniformly used on all buildings are acceptable. Sheets of standard details shall be prepared so that they can be reused if the design package must be divided into separate construction packages.

3.3.1 Each typical detail drawing sheet shall be limited to a particular design discipline. Standard detail sheets shall be organized by discipline as other drawing sheets.

3.3.2 Schedules and details peculiar to one facility shall not be shown in the standard details but with the group of drawings for the facility to which they pertain.

3.3.3 Arrangement of details on sheet shall be such that crowding of details to limit the

number of drawings in the set shall not be permitted. Extra sheets only partially filled shall be used if necessary in lieu of placing details on inappropriate sheets. Not less than 8 inches of clear space will be left above the title block.

3.3.4 Detailing shall be complete. Unnecessary or extensive details of standard products or items that are adequately covered by specifications, except installation details, shall not be included on drawings.

3.4 Designation. The A-E shall maintain control in packaging contract drawings by providing an easy reference to all drawings within a discipline. The drawing package shall be divided according to facility or system. The divisions proposed herein shall be utilized.

Discipline Designation	Discipline
T	General (i.e.,Index)
C	Civil
L	Landscaping
CE	Exterior Electrical
CM	Exterior Mechanical
A	Architectural
S	Structural
P	Plumbing and Process Piping
H	Environmental
M	Mechanical
FP	Fire Protection
E	Electrical
B	Communications
I	Instrumentation and Control
G	Geotechnical

If all of the drawings and details for small buildings can be consolidated and completely shown on one or two sheets, the symbol for the major discipline shall be selected in order to properly arrange the sheets in the package.

3.5 Drawing Layout. Printed drawings shall be bound on the left to permit mounting in a vertical map file. Adequate binding space shall be provided on the left side so that information placed near the border is convenient to read. Details shall be reasonably spaced on a drawing sheet and shall be arranged in a consecutive sequence. Associated details shall be separated from other groups of details and identified with a title, e.g., "Concrete Masonry Details." Orientation of plans shall be consistent, with north arrow pointed toward the top of the sheet or towards the left when necessary. When more than one plan is shown on a sheet the north arrow of each of these plans shall be oriented in the same direction.

3.6 Scales. Scales shall be selected to avoid overcrowded and cluttered conditions on the

drawings. Where necessary to maintain proper scale, drawings of large structures shall be placed on two or more sheets with appropriate key plans and match lines provided on these sheets. Reduction of the following scales or use of unusual scales shall be avoided. The letter scale notation (i.e. 3/4" = 1' 0") shall be indicated under the title of each plan, elevation, section, and detail.

*Site Plans for all disciplines - 1" = 30'

To avoid a crowded condition it may be necessary to use 1" = 20' or 1" = 10' profiles, details, and sections, as appropriate, for clarity.

**Floor Plans for all disciplines - 1/4" = 1' 0"

For large, open structures, a 1/8" = 1' 0" scale may be used, with congested areas such as toilet rooms, mechanical rooms, etc., being blown-up to 1/2" = 1' 0".

Reflected Ceiling Plans - 1/8" or 1/4" = 1' 0"

Roof Plan - 1/8" or 1/4" = 1' 0"

**Exterior Elevations and Cross Sections - 1/8" or 1/4" = 1' 0"

Interior Elevations - 1/4" = 1' 0"

Wall Sections - 1-1/2" or 3/4" = 1' 0"

Stair Details - 3/4" = 1' 0"

Other Details - shall be of sufficient size to clearly delineate the condition.

* Note: The scale shown is desired. Site plans shall be drawn at the scale of the survey data, when survey data is Government-furnished.

** Note: Scale of these items shall be the same.

3.7 Graphic Scale. A graphic scale for each of the different scales used on a drawing shall be placed on the drawing in an area approximately 5 inches wide immediately to the left of the title block.

3.8 Lines. Lines shall be opaque and of uniform width for each type of line. The degree of darkness (opacity) shall be the same regardless of the type of line. Adjustment of the line width shall be used to obtain required variations known as weight, density, or gage. Generally, four widths of lines will be used; i.e., thin, medium, thick, and extra thick. These lines shall have widths in the proportion 1:2:4:6, and the appropriate widths shall be governed by the size and style of the drawing, always reflecting the more important features more prominently than the secondary or

related features.

3.9 Lettering. Lettering shall be all capitals of single stroke commercial gothic style. Stroke opacity shall be the same as line work for the same medium used. Lettering may be either freehand or mechanical. Minimum height shall be 1/8 inch. Particular care shall be given to permit half-size reduction with character definition such that drawings may be reduced to 35mm film and blown back full size or half-size through four generations by microreproduction processes without showing evidence of filled-in loops or leaching of lettering. Vertical lettering is preferred; however, inclined lettering may be used, provided the angle of inclination is uniform. When making alterations or additions to existing drawings, special care shall be exercised to follow the same style and size of lettering, line work, and all other conventions on the drawings for uniformity. Lettering created by a CADD system shall be in accordance with EM 1110-1-1807, Standards Manual for US Army Corps of Engineers CADD Systems.

3.10 Dimensioning. Dimensions must be complete, accurate and fully coordinated for all phases of the design. Dimensions should be to points easily measurable in the construction, and should be laid out 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 should be to nominal face of masonry and to jambs of opening.

4. SEQUENCE OF DRAWINGS.

4.1 Cover Sheet. The first sheet of each volume in a project shall be a cover sheet. The cover sheet shall include, as a minimum, the project title, project number, location, base map and execution year. The base map shall indicate the location of the project site. A space for the contract number should also be allocated on the cover sheet. The number and date of the Invitation for Bids (IFB) or Request for Proposals (RFP) is usually inserted here just prior to advertisement.

4.2 Index.

4.2.1 In general, the second sheet shall provide an index of sheets. The drawing index shall be included with each volume of drawings and shall be an index of all drawing sheets in all volumes. The drawing index shall identify by reference number, date and title each sheet within the set of drawings and list the number of sheets in each discipline group. The drawing index shall precede the site development drawings and each facility package. Designers shall provide sufficient spaces within the format for discipline and multiple building designation and separation, and for possible addition of drawings. For small sets of drawings, the index may be placed on the cover sheet. Sequence numbers shall not be used on projects unless directed by the District. Sequence numbers should be considered when there is more than one building in the project.

4.2.2 A signature block will be furnished by the District. This signature block shall be

placed on the index sheet located directly to the left of the title block and signed by the appropriate representative of the A-E firm prior to the project advertisement for bids.

4.3 Legend Sheets.

4.3.1 A legend sheet will be provided to the A-E firm on a diskette. Symbols shown shall be used to depict all work items. Symbols which conflict with those on the legend sheet shall not be used. Additional symbols, properly identified, that are necessary to depict any additional work items shall be added to this sheet. Appropriate portions from this sheet shall be used on small projects not requiring a separate legend sheet. The legend sheet should follow the index sheet. Color shall not be used to indicate concrete or any other symbol.

4.3.2 Individual discipline legends may be used and should be located on the first sheet of this group. If the complete legend sheet is also retained, add the note: "See Drawing, Sheet _____, supplemental legend."

4.3.3 When adapting HQUSACE Standard Plans which contain an existing legend sheet and/or legends on individual drawings, these legends shall be retained for those standard drawings only.

4.4 Abbreviations and Symbols. Abbreviations and symbols in MIL-STD-12C, and ANSI X32.2.4, Y32.2, Y32.4, Y32.7, and Z32.2.3 shall be used. Generally accepted professional standards are acceptable. When previously prepared drawings are site adapted, symbols may be altered to conform to those already in use. The triangular (delta) symbol shall not be used on any design; this symbol shall be used to designate revisions on drawings. An abbreviation sheet is available from the District on a diskette. Abbreviations shown on this sheet shall be used to describe all work items. Additional word abbreviations, not found on the abbreviation sheet but necessary to describe the work, shall be properly identified and incorporated with the other standard word abbreviations.

4.5 Site Plans.

4.6 Pavement.

4.7 Buildings (each set of building drawings shall be separate). For each building:

4.7.1 Architectural and Structural.

4.7.2 Utilities.

Sanitary Sewers and Waterlines and Sewer and Water details.
Gas Distribution or Steam Distribution and details.
Electrical Distribution and details.

4.7.3 Mechanical.

4.7.4 Electrical.

5. DRAWING MEDIA.

5.1 Original Drawing Sheets. Original drawing sheets shall be prepared on mylar polyester film furnished by the District. Only ink shall be used. The size of all drawings shall be size "F", 30 inches by 42 inches, with trim lines 28 inches by 40 inches, except in the case of OMA projects, where 24 inches by 36 inches drawings are requested. Printed formats on mylar are available from the District. Commercially available title blocks, north arrows, symbols, etc., similar to decals which adhere to drawings are not acceptable. Reproducible drawings shall also be mylar polyester film, 0.004-inch thick matte finished on both sides. Ammonia developed mylars and plastic-coated paper reproducibles are unacceptable. Reproducible drawings shall be wash-off mylars, except when reproducing continuous tone subjects, such as aerial photographs, renderings, etc., which shall be fixed line mylar.

5.2 Study Drawings and Sketches. Study drawings and sketches shall be prepared, when possible, on size "F" drawings, 30 inches x 42 inches, with the title block altered to permit the signature desired.

5.3 Drawings and Details. All drawings larger than 8-1/2 inches by 11 inches shall be suitable for half size reduction unless instructed otherwise. Reproduction processes for half size reduction do not accommodate shading in any form; therefore, shading will not be permitted on reproducible materials.

6. USE OF COMPUTER-AIDED DESIGN AND DRAFTING (CADD) SYSTEMS.

6.1 Requirements. Computer-Aided Design and Drafting (CADD) may or may not be required for a project. CADD will be the option of the government. If CADD is required, the A-E shall be responsible for delivering the drawings in the latest available version of Intergraph Corp., Microstation native format (.dgn), adhering to EM 1110-1-1807, Standards Manual for the US Army Corps of Engineers Computer-Aided Design and Drafting (CADD) Systems.

6.2 Files. When CADD is required, the A-E shall be responsible for returning to the District, either electronic files created by the A-E or files modified from existing source material supplied by the District. All electronic files shall be fully compatible with the latest version of Intergraph Corp., Microstation native format (.dgn). The CADD data shall be delivered on a 2.3 gigabyte tape cartridge with all data being copied to the tape using Intergraph Corp. CLIX Version 7.0 operating system 'scpio' command. A reproducible mylar or vellum "hard" copy in full-size shall be delivered with the electronic files.

6.3 Translation. The District will not be involved in any translation process. The District will only accept the final product suitable for full operation on the target system.

6.4 Standards. The drawing standards used shall comply with the Standards Manual for U.S. Army Corps of Engineers Computer-Aided Design and Drafting (CADD) System, EM 1110-1-1807, Parts 1 through 4. A-E's under contract will be provided a copy of the manual and a set of 5 1/4 inch diskettes containing the cell libraries, user commands, and font libraries as referenced by the manual. In addition to the above, a 5 1/4 inch diskette containing the District Master Cell library, Font library and Seed file will be provided to the A-E. This is to be used as a supplement to EM 1110-1-1807 and will assist the A-E in complying with specific requirements of the District.

7. PHOTOGRAPHS. Photographs of existing site and work areas should be made. When photographs are used on drawings to better illustrate existing conditions, they shall be a minimum size of 4" x 5", maximum 8" x 10," and shall be half-tone on positive film using an 85 line per inch screen. The positive half-tone film shall be printed on mylar and title added to orient photo with plan. All photo prints and negatives shall accompany final submittal of design drawings.

8. STANDARD PLANS. Standard plans and/or fully developed project plans, prepared by others, furnished for adaptation to another site, shall be carefully reviewed for technical adequacy, for conformance to criteria furnished, which may in some instances supersede data on the standard plans, and shall be corrected as required. When errors or deficiencies are found in the Definitive or Standard Plans, complete details with recommendation of corrective action necessary shall be reported by letter or form card, if available. Complete adaptation to the site and for connections to utilities at that site will be required. A polyester film reproducible of all Standard Plans and/or site adaptation plans will be furnished by the District. In the event that a good reproducible cannot be obtained, the District will furnish the A-E a print from which he shall prepare a new drawing. When Standard Plans are used, nonapplicable details will be deleted by erasure or eradication, rather than crossed out.

9. TITLE BLOCKS. Lettering in all title blocks shall be mechanical lettering and shall be in ink. The general project title shall be as assigned by the District prior to the first submittal and shall be shown in the title block of newly prepared drawings as directed by the District. Specific sheet titles shall indicate the actual contents of the data on the drawings. Alphabetical designations after the sheet number shall only be used when adding a drawing by amendment and/or modification. Each drawing for the particular facility shall be designated by the discipline designation and sheet number, i.e., E-6 is the sixth Electrical drawing. Cross-referencing shall be accomplished using sheet reference numbers. Each drawing shall be initialed by the designer, drafter, checker and the submitter. Assignment of drawing numbers provided by the District will be made prior to or during the concept review.

9.1 Site Adapted Drawings. The title blocks for site adapted drawings shall have all references to the previous project deleted from the title and revision block. If deletions are extensive, a new

title block and revision block may be cut in, using the same material as the drawing. Delete all amendment and modification notations and symbols throughout the drawings. A note similar to the one below shall be shown above the title block, indicating the project from which the drawing has been site adapted.

THIS DRAWING ADAPTED FROM FORT RILEY, KS
TACTICAL EQUIPMENT SHOP, PN 410
CONTRACT DACA41-90-C-0120

9.2 Standard Plans. Do not make any changes or deletions within the title block and revision block. Add the adaption notation, using the triangle symbol, in the revision block, i.e., 'Adapted for Fort Riley, KS.' The site name, location, title of project, line item number, drawing number, date and sheet number shall be placed above the title block, as shown below. Alternate location is to the left and near the title block. Leave a space for the contract number, which will be added by the District.

FORT RILEY, KS		
	TACTICAL EQUIPMENT SHOP PN 410	
DWG NO AW 78-12-01		SHEET E-4
JAN 1994		DACA41-94-C-0126

10. DRAWING CHECKING. A thorough interference and coordination check for technical adequacy and dimensional accuracy shall be made by the A-E of the architectural, structural, mechanical, and electrical plans, of all buildings, together with all plans for exterior work before releasing for printing. Drawings shall further be checked against the completed specifications for inclusion of all details of construction, locations, sizes, gages, types, etc., of materials, equipment and facilities, referenced in the specifications.

11. DRAFTING TECHNIQUES.

11.1 Responsibility. THE A-E SHALL BE RESPONSIBLE FOR THE PREPARATION OF ALL ORIGINAL DRAWINGS THAT CAN OR WILL BE REPRODUCED LITHOGRAPHICALLY AT ONE-HALF THE ORIGINAL SCALE. Any drawings not found acceptable for half-scale reproduction will be returned to the A-E for corrective action. Therefore, the following instructions must be followed if clear legible drawings are to be obtained.

11.2 Workmanship. The quality of graphic workmanship must be maintained in all forms of drafting fundamentals. Ink linework and lettering shall be of sharp, crisp strength and able to withstand half-scale reproduction without image fade-out. Care should be taken to use a mylar polyester film that will readily take ink and from which ink will not flake off. Only high density waterproof ink specially formulated for mylar polyester film will be acceptable. Latex based inks

are not acceptable. Pencil, including plastic lead, will not be used or accepted.

11.2.1 All lines, lettering, cross-hatching, key maps and photos are to be drawn or placed on the front side of format. IN NO CASE SHOULD THE BACK SIDE OF FORMAT BE USED AS A WORKING SURFACE. ADHESIVE APPLIQUE FILMS ARE UNACCEPTABLE (requirement for half-scale reproduction camera work).

11.2.2 Where possible, the direction of the north arrow will be oriented towards the top or left side of the drawing. When more than one is showing on a sheet, or when several sheets show the same area, such as key map, grading and drainage, utilities, location plans and vicinity map, the north arrow of each of these plans will be oriented in the same direction.

11.2.3 To facilitate the location of project elements and the coordination of the various disciplines' drawings, all plans shall indicate a column line or blank grid. All floor plans except structural plans, shall show room numbers.

11.2.4 Appropriate key plans and match lines shall appear on segmented drawings. Key plans shall be used not only to relate large scale plans to total floor plans, but also to relate individual buildings to complexes of buildings. Key plans shall be drawn in a convenient location and have the same orientation as the segmented plan. The relative location of the represented plan area shall be indicated by crosshatching.

11.2.5 Building elevations shall be drawn on the sheet so that the main, normally the front, elevation is located in the lower left corner of the sheet. The elevation drawings shall be placed on the sheet in a clockwise sequence from the main elevation if all elevations can be drawn on one sheet.

11.2.6 Sight direction symbols shall be shown on site drawings and floor plans.

11.2.7 When new work is being added to existing facilities, the new work shall be clearly distinguished from existing features.

11.2.8 The District will furnish the A-E with the drawings to be used for site adapted projects. These drawings shall be used to the maximum extent possible. The title blocks shall be as stated in Paragraph: Title Blocks.

11.2.9 Avoid notes such as "see architectural" or "see structural." Always refer to a specific detail and sheet.

11.2.10 Keep the number of drawings to a minimum. Plan what will be on each sheet and combine where possible. On small projects, architectural, mechanical, or electrical site and roof plans can often be combined on one sheet.

11.2.11 Avoid match lines where possible.

11.2.12 All wall sections should be shown at relative elevations to each other on the same sheet.

11.2.13 Avoid ambiguity in notes. Notes may be placed on drawings to reduce the amount of repetitive drafting, provided that clarity is not lost and notes do not become ambiguous. General notes should be placed at the right-hand side of the sheet and, if possible, should be located on the first sheet in each set of civil, architectural, structural, mechanical and electrical drawings. Abbreviations should be avoided in notes as well as references to design criteria.

11.2.14 Avoid references to third parties. Only the "Contractor" and the "Contracting Officer" should be used. The terms "other", "owner", "engineer," etc., and references solely to the subcontractor or any other third party shall not be used on drawings.

11.2.15 The terminology used on drawings shall match that of contract specifications. The specification requirements may not be binding if terminology used on drawings and in the specifications are not consistent. Trade names and manufacturer's descriptions should be avoided in describing drawing notes.

11.2.16 The A-E will furnish the signed original mylar drawings. The drawings are the property of the U.S. Government.

12. REVISIONS TO DRAWINGS.

12.1 General. No changes shall be made after advertisement unless authorized by the District for inclusion in an amendment. Prior to changing any drawings issued for bids, reproducible file copies shall be made. After making the record reproducible, any "clouds" from a previous change shall be removed so that only the latest revision is emphasized.

12.2 Revision Identification. The triangular symbol is reserved for annotating revisions to the original drawings during advertisement. This symbol shall not be used otherwise. The triangle shall be placed on the drawing near each revision and a black grease pencil "cloud" drawn on the back of the sheet around the change and the triangle. In the case of CADD drawings, the cloud shall be placed on a separate level.

12.3 During Advertisement. During the advertising period, the triangles shall contain a numeric character corresponding to the amendment, i.e., amendment 2 changes shall be noted as 2.

12.4 After Contract Award. After contract award, modification changes shall be made using the modification designation, i.e., modification P00006 shall be noted as P-6.

12.5 Revision Annotation. Revised drawings shall carry a simple statement such as "AM.

No._____ deleted wall." Revisions to drawings reflecting written descriptive amendments and amendment sketches shall be described as "Revised to conform to AM. No. _____." The revision notation shall include the final subscript number. The A-E shall neither date nor sign in the revision block.

12.6 Amendment or Revision Sketches. The practice of issuing amendment or revision sketches or descriptive changes in lieu of revised drawings during advertisement is discouraged and shall be used only when time is of the essence and approved by the Project Manager. If permitted, descriptive changes and/or sketches must be complete. The original drawing shall be revised to incorporate the sketch data and reissued to Contractor and Construction Division after contract award. Conventions for describing revisions will include marking the area of the drawings with a "cloud" around the area revised, so that the area can be easily located and describing the change in the revision block.

CHAPTER 3

SITE DESIGN

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CHAPTER 3

SITE DESIGN

1. GENERAL. Site design includes all the siting requirements for the location and layout of a construction project. The image of a military installation is largely determined by the design character and siting of its buildings. Therefore, site design excellence is a prime goal for all military construction projects. To achieve this goal designers must seek to improve appearance and function of military projects by enhancing natural site assets; compatibly relating the natural and built environment; establishing an orderly organization of activities, circulation and open space; and achieving a consistent architectural character while promoting energy conservation and reducing maintenance.

2. INSTALLATION STANDARDS. The A-E shall use the Installation Master Plan and Design Guides when they are available and applicable. These documents establish specific design criteria and outline programs with which to implement improvements in the visual environment.

3. PLANS REQUIRED. Any or all of the following plans may be required to show the complete design requirements:

3.1 Concept Plans.

3.1.1 Location Plan

3.1.2 Site Plan

3.2 Final Plans.

3.2.1 Vicinity Map

3.2.2 Location Plan

3.2.3 Site Plan

3.2.4 Removal Plan

3.2.5 Landscape Plan

3.2.6 Landscape Details

3.2.7 Erosion Control Plan

3.2.8 Irrigation Plan and Details

3.2.9 Utility Plan

3.2.10 Grading and Storm Drainage Plan

4. DESCRIPTION OF PLANS.

4.1 Vicinity Map. A Vicinity Map consists of a small scale drawing of the project location, similar to a road map.

4.2 Location Plan. A Location Plan consists of a small scale drawing showing the Government property or reservation limit with the construction project site shown. The drawing shall show the facility approved Contractor access and haul routes, load limits on any bridges along haul routes, and the designated waste and/or borrow areas.

4.3 Site Plan. The Site Plan shall show all the site design and layout information necessary to field locate the buildings, drives, walks, roads, and all other appurtenances to be constructed on the project. The information shall be complete to the extent that every constructed item above and below the ground will be located by dimensions or coordinates. Site Plans shall be a scale of 1 inch equals 30 feet (1" = 30'). Other scales must be approved by the District. The Site Plan, prior to adding the dimensions, should serve as the base sheet to provide reproducible drawings for the Utilities Plan, the Grading and Drainage Plan, and the Landscape Plan. The Site Plan shall show all existing physical features and utilities within and adjacent to the work site that will remain after the proposed construction has been completed. Whenever the Site Plan occupies more than one sheet of drawings, a Key Plan shall be included.

4.4 Removal Plan. The removal plan will show the existing physical condition of the site before construction. The physical features usually include field survey information such as the above and below ground utilities; buildings, drives, roads and parking areas, walks, trees and tree sizes, shrubs, and other vegetation; and such facilities as retaining walls, athletic facilities, etc. Each physical feature to be removed shall be as indicated on the standard legend sheet and properly noted to be removed, to remain, or to be relocated.

4.5 Landscape Plan. A Landscape Plan showing trees, shrubs, ground covers, seeded and sodded areas, shall be prepared by the A-E. All unsurfaced ground areas disturbed by construction within the project limits shall be seeded and/or sodded. Seed mixes, rates, and fertilizer shall be obtained by the A-E from any of the following sources: County University Extension Services, USDA Soil Conservation District, Local Base or Post Agronomist. Criteria for design are: TM 5-803-13 (AFM 126-8). Specification for topsoiling are covered in the guide specification sections: "Grading", and "Excavation and Filling and Backfilling for Buildings".

4.6 Landscape Details. A standard Landscape Detail sheet will be furnished by the A-E. The A-E shall provide designs and details as necessary for other site furnishings and accessories that may be required for the project.

4.7 Erosion Control Plan. An erosion control plan and specification shall be prepared by the A-E showing berms and dikes, retention or detention ponds, silt fences and temporary seeded areas if determined to be necessary for the specific project.

4.8 Irrigation Plan and Specification. The Irrigation Plan and specifications shall be prepared by the A-E unless otherwise directed by the scope of work. The Irrigation Plan prepared by the A-E shall designate the trees, shrubs, ground covers, and lawn areas to be irrigated. The detailed irrigation system plan showing head locations, distribution lines and sizes, controller location, valve locations and sizes, etc., shall be Contractor designed in accordance with specifications prepared by the A-E. Drip irrigation systems are not allowed. These items, including design calculations, shall be submitted for approval to the District after the project is under construction.

5. SURVEY REQUIREMENTS. A field survey for design of the project shall be furnished by the District or by the A-E as directed by the scope of work. The survey requirements are as follows:

5.1 District Furnished Survey. The District will furnish to the A-E the engineering and topographic surveys for use on the project. The A-E shall review these surveys and perform onsite investigations to field check for as-built conditions as may be required. This verification shall also include field checking areas adjacent to the project site with recent construction, i.e., utilities and grading. The A-E shall promptly notify the District if additional surveys are needed.

5.2 Architect-Engineer Furnished Survey.

5.2.1 General. The A-E shall perform all engineering and topographic surveys for this project. The original surveys and field notes are District property and shall be furnished to the District. The following are minimum survey requirements for this project.

5.2.2 Horizontal and Vertical Control. Standard ground control survey methods shall be used to prepare surveys. Surveys shall incorporate basic control for which positions have been established, consisting of existing triangulation, traverse station monuments, markers and bench marks referenced to national datums (National Vertical Datum or North American Datum). The name and year of the national datum shall be shown on the survey map (NAD27, NAD83, NVD27, NVD89). The horizontal positions of project control shall be computed on the State Plane Coordinate System unless directed to establish a local system. The use of these control stations and bench marks by the A-E shall be fully documented on the survey and in the field notebooks. All benchmarks set shall be referenced to mean-sea-level datum (NVD29 and NVD 89) and described fully in the field notes and on the map. Show the combination factor used in the reduction to State Plane (scale factor x sea level factor).

5.2.3 Equipment and Use. Vertical control shall be established with spirit or self-leveling instruments. Trigonometric leveling or "total stations" shall not be used in setting vertical control or in determining the elevation of critical items such as floors, foundations, runways or taxiways, drainage structures, and utility lines. Horizontal control shall be established with equipment capable of producing the accuracies specified below.

5.2.4 Accuracy. The project survey shall meet or exceed the horizontal and vertical accuracy criteria as defined by the Standards of Accuracy and General Specifications of Geodetic Control Surveys established by the U.S. Department of Commerce. Horizontal control position of this survey and/or monumentation shall be within Third Order, Class I accuracy. The closing error of control leveling of this survey and/or monumentation shall not exceed 0.05 ft. times square root of M, where M is the miles of leveling. Computations for all control stations and bench marks shall be furnished to the District. Topographic mapping at any scale shall meet or exceed the criteria defined by the National Standards for Map Accuracy.

5.2.5 Limits and Scale. The survey shall cover the entire project area, and beyond, to include any requirements for connections to utilities, roadways, grading, and drainage. The scale of the survey shall be 1 inch = 30 feet (1" = 30').

5.2.6 Project Site Survey. The survey shall show all natural and manmade features to include all utilities above and below ground indicating types, sizes, depths, invert elevations, etc. Show all trees by species, diameter, and location. Show all infrastructure at a level of detail appropriate for the mapping scale and accuracy. Plot all ground shots to the nearest 0.1 foot and all hardened surfaces to the nearest 0.01 foot. Show all bench marks and other control points with elevations. Also, establish and show coordinate locations for key permanent points, i.e., streets intersections and corners of structures, and the control traverse of the survey.

6. PARKING LAYOUT shall be designed in accordance with TM 5-803-5 and the Uniform Federal Accessibility Standards.

7. COMBINING PLANS. Some combinations of site plans on a drawing sheet may be made when plans have relatively small amounts of data which can be legibly combined with another plan. The Location Plan and Vicinity Map may be combined on the cover sheet with the index, or placed on the same sheet as the Site Plan. The Site Plan and the Utilities Plan may be combined as one plan with the approval of the District, or they may appear as separate plans on the same sheet of drawings. Under no circumstances shall the Site Plan be combined as one plan with the Grading and Drainage Plan, although they may appear on the same sheet of drawings. Projects having little or no existing facilities to be removed may not require a separate site preparation plan, and the small amount of removals can be shown on the Site Plan.

8. WASTE AND BORROW AREAS. Unless specifically instructed otherwise by this office, the A-E shall determine the waste and/or borrow sites for the project in conjunction with the installation. Any waste or borrow area located on Government lands shall be clearly identified on a Location Plan and labeled in a manner which indicates the material acceptable for borrow or waste. The sites shall be selected to meet all existing regulations for pollution control and environmental quality as established by the City, County, State, and Federal Governmental agencies. Each waste area shall be checked for type of materials which may, or may not, be disposed in the area.

9. FENCING. Whenever a project requires that a fence be constructed along the Government

property line, the A-E shall show the limits of the fencing on the Site Plan, or if necessary to obtain complete clarity, on a separate drawing. All fences will be installed along the Government property line in such a way that no part of the fence, including apron and post foundations, encroaches on the adjoining property. Apron slant will be as directed; however, in no case will it extend beyond the Government property line. A detail shall be included on the drawings showing the relationship of the corner and line posts in reference to the property line. Corner posts will be set with concrete foundation tangent to property lines.

10. OUTDOOR SPORTS FACILITIES shall be designed in accordance with TM 5-803-10, AFR 88-33.

11. CONTRACTOR'S ACCESS AND HAUL ROUTES. Show on the location plan all access gates and routes to be used by the Contractor. Coordinate with the installation and the District.

12. CONTRACTOR'S STAGING AREA AND PARKING. Show areas for Contractor storage, temporary fencing, sheds, and parking for subcontractors and their employees if this information is available during design. Coordinate with the installation and the District.

13. WORK BY OTHERS. Any work, be it construction, relocation, and/or removal, shown on the drawings, which is not existing but to be performed by others shall be identified on the Site Plan, Site Preparation, Utilities and/or Grading and Drainage Plans as "N.I.C." (for "Not in Contract"). Note on each drawing that there is information on the drawings for work which is not in the contract.

14. DESIGN ANALYSIS. The design analysis shall specifically address concerns with energy efficiency in the areas of site layout, exposure, use of plant materials, and landforms to mitigate the adverse effects of climatic conditions and how exterior conservation efforts correlate with the approaches taken for the interior. The major portions of the conceptual analysis requires the approval of this office during the initial stages of the design. The design analysis shall describe layout conditions, landscape or planting problems, and turf considerations. Special attention shall be directed towards adverse soil conditions, climate, restricted use of water and erosion problems, plant materials, and turf types. See chapter: Design Analysis.

CHAPTER 4

FOUNDATIONS AND MATERIALS

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CHAPTER 4

FOUNDATIONS AND MATERIALS

1. GENERAL. Preliminary and final soils reports, complete with soil boring logs, will be furnished by the District unless instructed otherwise in the scope of work.

2. DESIGN ANALYSIS. The soil report provided by the District shall be included in the design analysis.

3. DRAWINGS. The following items shall be included in the drawings.

3.1. Location of Borings. Location of borings shown in the soils report shall be transferred to the site plan required by the chapter: Pavement Geometry, Grading, Drainage and Other Civil of this document.

3.2. Boring Logs (provided by the District).

3.3. Boring Log Legend (provided by the District).

CHAPTER 5

PAVEMENT, BASE, SUBBASE & JOINT DESIGN & TRAFFIC ANALYSIS

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CHAPTER 5

PAVEMENT, BASE, SUBBASE & JOINT DESIGN & TRAFFIC ANALYSIS

1. TYPICAL PAVEMENT AND ROAD SECTIONS. The A-E shall provide the following:

1.1 Traffic Summary. Summary of composition and volume of anticipated traffic using new pavements.

1.2 Design Calculations. Rigid and flexible pavement design calculations shall be furnished by the District unless otherwise instructed.

1.2.1 Pavement cross sections based on sketches provided with pavement design.

1.2.2 Pavement details showing interface between new and existing pavements and new pavements of different sections.

1.2.3 Pavement joint layout plans shall be furnished by the District unless otherwise instructed. The A-E shall provide plan views of all paved areas showing dimensions of lot, building footprint, door locations and locations of any protrusions into paved areas. Plan shall be at a scale of 1" = 10'.

1.2.4 Use District standard detail drawings for concrete pavement joint details.

Subdrain Details
Road Pavement Joint Details (with poured joint sealant)
Road Pavement Joint Details (with preformed joint seal)

2. PAVEMENT DESIGN CRITERIA.

2.1 Department of the Army and Air Force Technical Manuals.

TM 5-820-2 88-5, Chap 2	Drainage and Erosion Control, Subsurface Drainage Facilities for Airfield Pavements (Mar 79)
TM 5-822-2 88-7, Chap 5	General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas (July 87)
TM 5-822-5 88-7, Chap 3	Pavements Design for Roads, Streets Walks, and Open Storage Areas (Jun 92)
TM 5-822-7 88-6, Chap 8	Standard Practice for Concrete Pavements (Aug 87)

2.2 Department of the Army Technical Manuals.

TM 5-822-8 Bituminous Pavement, Standard Practice (Jul 87)

2.3 Roads and Parking Areas. Design shall be provided by the District unless otherwise directed. A particular type of pavement may be required based on anticipated types of vehicular traffic or other considerations.

CHAPTER 6

PAVEMENT GEOMETRY, GRADING, DRAINAGE AND OTHER CIVIL

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CHAPTER 6

PAVEMENT GEOMETRY, GRADING, DRAINAGE AND OTHER CIVIL

1. GENERAL. The instructions in this chapter provide guidance for the design criteria to be used and for the scope and content of the design documents required for each phase of the design. Items covered in this section include pavements, grading, drainage, railroads, fencing, storage tank enclosures, and traffic signage.

2. DESIGN CRITERIA. For a detailed listing of additional applicable design criteria, see the scope of work. All designs for airfields, railroads, and roadway projects shall be forwarded to the Transportation System Mandatory Center of Expertise (TSMCX) for review per ER 1110-34-1.

3. PRE-CONCEPT OR PROJECT DEFINITION DESIGN.

3.1 Drawings. Drawings shall contain, as a minimum, a location plan for a conceptual layout design of the storm drain system or culverts. The storm drain requirements may be shown on a composite utility plan for this phase of design. The site plan shall indicate type of pavement (Concrete, Bituminous or Gravel).

3.2 Design Analysis. The design analysis shall include a preliminary pavement design provided by the District. Storm Drainage will not require any calculation to support the sizes. A statement shall be provided on the capacity of the existing system to accept additional flow. Indicate if concrete curb and gutter will be used. The design analysis shall indicate pipe size that will be used for the cost estimate and a rough estimate of earthwork quantities. The design analysis shall state if borrow material is available on site. The design analysis shall indicate approximate amount of fill under buildings and roads. Minimum and/or maximum grades (% slope) will be stated.

4. CONCEPT OR PRELIMINARY DESIGN.

4.1 Drawings. Drawings shall contain, as a minimum, the following:

4.1.1 Site Grading Plan shall be at a scale of 1" = 20’ or 1" = 30, using the basic site plan layout (without siting notes and dimensions) showing the following:

4.1.1.1 Existing utilities to remain.

4.1.1.2 Existing grading contours. Tentative finished floor elevations of new buildings should be shown.

4.1.1.3 Uniform grades shall be labeled using slope arrows.

4.1.1.4 Proposed new culverts, storm drains, and subdrains with tentative sizes.

4.1.1.5 The A-E shall edit the following notes accordingly and add to the Grading Plan.

4.1.1.5.1 All elevations are _____ plus elevation shown unless otherwise indicated. Elevations refer to Mean Sea Level Datum.

4.1.1.5.2 Existing contours were interpolated from a topographic survey made _____. (Give Date)

4.1.1.5.3 Bench Mark. (Give location, description, and elevation.)

4.1.1.6 Show flow lines.

4.1.1.7 Location of borings.

4.1.2 Plan and profiles for all new roads, streets, and railroads, with horizontal curve information. Profile shall show all utilities existing and new. Plans shall be at a scale of 1 inch equals 30 feet (1" = 30'). Other scales must be approved by the District.

4.1.3 Two grading sections through each building, embankment, or road showing existing and finished grade lines.

4.2 Design Analysis. For a general discussion of format and scope, see chapter: Design Analysis. The following items, as a minimum, should be included (when applicable) under the chapter for Civil.

4.2.1 List of applicable criteria.

4.2.2 Summary of composition and volume of anticipated train traffic using new railroad tracks along with wheel loadings used to design the track structure.

4.2.3 Railroad track analysis calculations used to determine minimum rail weight, tie plate size, size and spacing of ties, depth of ballast and subballast, and depth of compacted subgrade.

4.2.4 Drainage area map showing the boundaries of specific drainage areas tributary to their respective drain inlets or culverts.

4.2.5 Storm run-off calculations for each drainage area.

4.2.6 Preliminary pipe sizing calculations.

4.2.7 All earthwork quantity calculations and a summary table with a discussion of the earthwork balancing.

4.2.8 Summary of composition and volume of anticipated traffic on roads, streets, open storage areas and parking areas.

4.2.9 Pavement design calculations provided by the District.

5. FINAL DESIGN. In general, the final design documents must include sufficient information for bidding and construction of the project. Specific requirements for plans, specifications, and design analysis are given below.

5.1 Drawings. Generally, the corrected and approved concept plans may be used as the basis for the final plans; however, all details necessary for bidding and complete construction must be included. The following information is required (when applicable) in addition to the previously stated requirements for concept plans.

5.1.1 New grading contours shall be provided on the site grading plan. New spot elevations shall be provided at the corners of buildings and parking areas, top of curb, changes in grade, etc.

5.1.2 Profiles of all new storm drains, subdrains, and culverts showing new and existing grades, pipe diameters and lengths, pipe slopes, invert elevations, top of grade elevations, top of man hole elevations, etc. Class and gage of all storm drain pipes should be provided.

5.1.3 Details of all storm drain and subdrain structures.

5.1.4 Storm drain and subdrain structure schedules showing A, B, C, and D dimensions of all structures.

5.1.5 Grading sections through new buildings and parking areas showing finished and existing grades, pavements, spot elevations, dimensions, slope percentage, ditches, etc.

5.1.6 Grading sections at significant events (intersections, utility crossings, bridges) NTE 100-foot intervals along major roads, streets, and railroads.

5.1.7 Chainlink fence details.

5.1.8 Traffic Signing and Striping Details.

5.1.9 A grading plan with finished contours or a plan and profile with complete horizontal and vertical curve data. Plan and profile drawing shall also show existing contours for bidding earthwork quantities.

5.2 District Standard Detail Drawings. A list of available standard detail drawings will be provided in the scope of work and will be furnished to the A-E upon request.

5.3 Design Analysis. In addition to the items required for concept or preliminary design, as a minimum, include (when applicable) design frost depth and the following:

5.3.1 Tabulation of capacities of new storm drains and culverts including: diameter and slope of storm drain pipes, design storm discharge and velocity for each storm drain pipe, maximum discharge capacity of each storm drain pipe, headwater depth of each culvert during design storm discharge.

5.3.2 Hydraulic capacity calculations for each new curb and area inlet.

5.3.3 Anticipated service life of all allowable storm drain pipe materials. Discussion of corrosion design for corrugated metal pipe shall include the soil Ph and resistivity used, anticipated service life of uncoated metal pipe and additional life provided by any required non-metallic coatings and paving.

5.3.4 Discussion of watertight joint requirements for storm drains. The A-E shall determine whether watertight joints are required for new storm drains.

5.4 Specifications. For a detailed explanation of the use of guide specifications see chapter: Specifications.

6. QUANTITIES. Earthwork computations shall be furnished to the District with project plans for checking purposes. The substantiating data to be furnished shall include a marked-up contour plan showing the exact location and the cross sections taken. These instructions are applicable to all graded areas including roads and parking areas where they are not specifically set out by separate cross sections on designated stationing. Additional data will be furnished as follows: Shrinkage factor, material obtained from building excavation material required for building fills, unsuitable material (estimated when required) and borrow. The A-E shall retain, in his files, the detailed computation sheets covering quantities paid for on unit price basis for all items pertaining to paving, drainage, etc., until the construction is completed. These computation sheets will be prepared in a legible form with identifying markings (drawing numbers, etc.) so that they may be easily reviewed. The computation sheets will be made available to the District upon request.

7. GRADING.

7.1 General. Positive drainage shall be provided for all areas and existing drainageways shall be utilized to the extent possible. It is desirable to direct drainage away from buildings to curb and gutter or road ditches. Swales between buildings and parking areas or roads shall be avoided, if possible. Parking areas shall be graded such that storm water is directed off to the sides, with curbs and gutter to control drainage, and not down the center of the parking area, where possible. Required excavation and embankment quantities shall be balanced to the extent possible without compromising the design. Special attention shall be given to sidewalks that are on the north (shaded) side of the building. These walks should be designed to ensure a freeze/thaw cycle does not result in the formation of ice on the walk. Ice on walks should be a safety consideration for all areas.

7.2 Design Criteria.

7.2.1 Department of the Army and Air Force Technical Manuals.

TM 5-822-2 - General Provisions and Geometric Design for Roads, Streets,
88-7, Chap 5 - Walks, Open Storage Areas (July 87)

7.2.2 Handicapped Standards.

Uniform Federal Accessibility Standards (1984)

7.3 Additional Criteria Limits.

7.3.1 Transverse Parking Area Grades:

7.3.1.1 Desirable minimum of 2 percent.

7.3.1.2 Absolute minimum of 1.5 percent for flexible pavement and 1 percent for rigid pavement.

7.3.1.3 Desirable maximum of 8 percent.

7.3.2 Longitudinal Parking Area Grades:

7.3.2.1 Desirable maximum of 4 percent.

7.3.2.2 Absolute maximum of 15 percent, 8-1/2 percent for handicapped use.

7.3.3 Ramp Grades:

7.3.3.1 Desirable maximum of 7 percent.

7.3.3.2 Absolute maximum of 10 percent for short distances only.

7.3.4 Gutter Grades:

7.3.4.1 Desirable minimum of 0.8 percent.

7.3.4.2 Absolute minimum of 0.5 percent.

7.3.5 Longitudinal Walk Grades:

7.3.5.1 Maximum of 15 percent in non-freezing climates.

7.3.5.2 Maximum of 10 percent in freezing climates.

7.3.5.3 Handrails shall be required when gradients are 10 percent or greater.

7.3.5.4 Maximum of 8.33 percent for handicapped accessible walks. See Uniform Federal Accessibility Standards for additional requirements.

7.3.6 Grades Away From Building:

7.3.6.1 Desirable minimum of 5 percent for 10 feet.

7.3.6.2 Desirable maximum of 10 percent for 10 feet.

7.3.7 Overlot Grades:

7.3.7.1 Minimum 1 percent for cohesionless sandy soils.

7.3.7.2 Minimum 2 percent for cohesive soils or turfed areas.

7.3.8 Minimum grade of 0.3 percent for channelized flow.

7.3.9 Ditch widths:

7.3.9.1 Absolute minimum of 4 feet.

7.3.9.2 Desirable minimum of 8 feet.

7.3.10 Maximum front slopes of 1V on 4H.

7.3.11 Maximum back slopes of 1V on 3H.

7.3.12 Bottom of ditches shall be a minimum of 0.3 feet below the bottom of adjacent pavement courses.

7.3.13 Provide a minimum drop of 6 to 8 inches at all personnel doors without structural stoops.

7.3.14 The use of steps in walks will be avoided whenever possible. The use of single riser steps is especially discouraged. When steps are unavoidable, they should have at least three risers and will be provided with handrails.

7.3.15 Double purpose walks are a combination of a straight curb and a concrete walk. There use shall be limited to area where the drainage flows away from the curb line or gutter. Details are attached to the concrete walk specification.

8. DRAINAGE.

8.1 Design Criteria.

8.1.1 Department of the Army and Air Force Technical Manuals.

TM 5-820-1 - Surface Drainage Facilities for Airfields and Heliports (Aug 87)
88-5, Chap 1

TM 5-820-4 - Drainage for Areas Other Than Airfields (Oct 83)
88-5, Chap 4

8.1.2 Department of the Army Technical Manuals.

TM 5-820-3 - Drainage and Erosion Control, Structures for Airfields and …. Helip

8.1.3 Engineer Manuals.

EM 1110-2-2902 - Conduits, Culverts, and Pipes (Mar 69)

8.2 Storm Run-off. Determination of storm run-off shall be in accordance with the method presented in TM 5-820-1/AFM 88-5, Chapter 1 or TM 5-820-4/AFM 88-5, Chapter 4. Sizing of storm drainage systems for developed portions of military installations such as administrative, industrial, and housing areas as well as roadway culverts shall be based on rainfall of 10-year frequency. Sizing of culverts beneath railroad tracks shall be based on rainfall of 25-year frequency. Drainage for non-developed areas of military airfields shall be based on rainfall of 2-year frequency. Protection of military installations against floodflow originating from areas exterior to the installation will normally be based on 25-year or greater rainfall, depending on operational requirements, cost-benefit considerations, and nature and consequences of flood damage resulting from the failure of protective works. Potential damage or operational requirements may warrant a more severe criterion.

8.3 Storm Drainage System Layout. The storm drainage system shall be designed so as to minimize the number of drainage structures required. Structures shall be located at all changes in direction of storm drain line, at the intersection of two or more storm drain lines, and where required to intercept rainfall runoff. The distance between drainage structures will be not more than approximately 300 feet for conduits with a minimum dimension smaller than 30 inches. Storm drain lines shall be located outside of paved areas to the extent possible. Under no circumstance shall storm drain lines be located beneath buildings. Existing storm drain lines located beneath proposed new building sites shall be relocated around the building. Curb inlets shall be spaced along two-lane roads so that the width of flooded areas does not exceed half the lane width. Where possible, a minimum drop of 0.2 feet between inverts of equal diameter storm drain pipes shall be provided at the centerline of drainage structures. Where storm drain pipes are of different diameters, the pipe

crowns shall be matched at the centerline of drainage structures.

8.4 Roof Drain Outfall Lines. Roof drain outfall lines (beyond 5 feet from the building) shall be of the same materials as the exterior storm drainage system. Minimum diameters shall be 12 inches for lengths over 50 feet and 8 inches for lengths under 50 feet. In addition, the diameter shall be at least 2 inches larger than the diameter of the line as it leaves the building. If a cleanout is not provided between the building and 5-foot line, one shall be provided just outside the 5-foot line if the line leaving the building is smaller than 12 inches. If the line leaving the building is 12 inches or larger, a manhole shall be provided just outside the 5-foot line. All changes in direction of outfall lines shall occur at storm drain structures except that cleanouts may be used in lines smaller than 12 inches. Roof drain outfall lines smaller than 12 inches may be tapped directly into storm drain lines by matching pipe centerlines if the diameter of the pipe being tapped is at least twice that of the roof drain outfall line and has sufficient capacity to handle the additional discharge. All outfall lines 12 inches and larger shall be considered part of the storm drainage system.

8.5 Storm Drain Pipe. Several factors should be considered in selecting the type of pipe to be used in construction. The factors include strength under either maximum or minimum cover being provided, pipe bedding and backfill conditions, anticipated loadings, length of pipe sections, ease of installation, resistance to corrosive action by liquids carried or surrounding soil materials, suitability of jointing methods, provisions for expected deflection without adverse affects on the pipe structure or joints, and cost of maintenance. Durability requirements of pipe materials shall be based on a design service life of 50 years unless additional design life can be justified. The service life of corrugated metal pipe shall be the sum of the lives of the nonmetallic protective coating, the metallic protective coating, and the basic metal pipe. The life of the basic metal pipe and metallic protective coating shall be the time to first perforation as determined using the California Chart (California Division of Highways Test Method 643-B). Always specify RCP under runways.

9. RAILROADS.

9.1 Design Criteria.

9.1.1 Department of the Army and Air Force Technical Manuals.

TM 5-850-2 - Railroad Design and Construction at Army and Air Force 88-7, Chap 2 - Installations (July 80), with Change 1 (Dec 89)

TM 5-627 - Maintenance of Trackage (Jan 74)

TM 5-628 - Handbook of Railroad Tract Standards (Apr 91)

9.1.2 Department of the Army Technical Manuals.

TM 5-370 - Railroad Construction (Sep 70)

9.1.3 American Railway Engineering Association (AREA) Publication.
Manual for Railway Engineering

9.2 Additional Criteria Limits.

9.2.1 New rails shall be 115-lb RE section. Relayer rail shall be 132-lb, 136-lb, 115-lb, 130-lb, or 133-lb.

9.2.2 Standard No. 8 turnouts or No. 10 turnouts for track required to handle 89 foot cars.

9.2.3 Turnouts shall not be permitted on curved track with horizontal or vertical curves.

9.2.4 Degree of curvature on running track.

9.2.4.1 Desirable maximum of 8 degrees.

9.2.4.2 Absolute maximum of 10 degrees.

9.2.5 Degree of curvature on access track.

9.2.5.1 Desirable maximum of 12 degrees.

9.2.5.2 Absolute maximum of 14 degrees.

9.2.6 Desirable maximum grade shall be 1 percent. Grades steeper than 1.5 percent are subject to approval and will require submittal of written justification.

9.2.7 Bank slopes of 1V on 2H maximum except where slopes are maintained by mowing a 1V on 3H maximum shall be used. Steeper cut slopes in rock are permitted, but are subject to approval.

9.2.8 Minimum ditch width of 8 feet.

9.2.9 Cuts or fills greater than 30 feet require soil and bank stabilization analysis.

9.3 Minimum Rail Section. Determination of minimum rail section shall be in accordance with Chapter 22, Part 3, Para 3.1, Appendix 1 of the AREA Manual.

9.4 Influence Curve. Using the design wheel configuration and loading the master influence curve provided in Chapter 22, Part 3 of the AREA Manual, the following shall be determined from Chapter 22, part 3, Para 3.2, Appendix II of the AREA Manual:

9.4.1 Maximum Track Depression. The maximum allowable track depression shall be 0.25 inches.

9.4.2 Maximum Bending Moment.

9.4.3 Maximum Flexural Stress in the Rail.

9.4.4 Maximum Intensity of Pressure Against the Underside of the Rail.

9.4.5 Maximum Rail Seat Load.

9.5 Tie Bearing Area. Determination of effective bearing area of tie shall be in accordance with Chapter 22, Part 3, Para 3.2, Appendix II of the AREA Manual.

9.6 Tie Flexural Stress. Determination of maximum flexural stress in the Tie shall be in accordance with Chapter 22, Part 3, Para 3.2, Appendix II of the AREA Manual. The maximum allowable flexural stress in a wood tie shall be 1100 psi.

9.7 Crushing Strength of Tie. The maximum allowable crushing strength of a softwood tie shall be 250 psi and the maximum allowable crushing strength of a hardwood tie shall be 400 psi.

9.8 Determination of Minimum Depth of Ballast. The minimum depth of ballast shall be determined in accordance with Chapter 22, Part 3, Para 3.3 of the AREA Manual. The maximum allowable intensity of pressure on the subgrade shall be 20 psi, unless the maximum allowable soil bearing pressure of the existing soils is less, in which case the maximum allowable soil bearing pressure shall be used. The maximum intensity of pressure on the ballast shall be 65 psi for wood ties. The Government will provide guidance on the rail support modulus for each project.

10. FENCING DESIGN CRITERIA. Contact the District for high security type chain link fencing requirements. Some documents may require a security clearance to obtain access to the criteria.

11. FUEL STORAGE TANK ENCLOSURES DESIGN CRITERIA.

11.1 Department of the Army Technical Manuals.

TM 5-848-2 - Handling of Aircraft and Automotive Fuels

11.2 National Fire Protection Association (NFPA) Publication.

NFPA 30 - Flammable and Combustible Liquids Code.

12. TRAFFIC SIGNAGE DESIGN CRITERIA. Unless otherwise directed, traffic signage shall be provided for all new roads. The A-E shall address traffic signage with the facility user. American National Standards Institute (ANSI) Standards:

D6. 1-1988 - Manual on Uniform Traffic Control Devices for Streets and Highways

CHAPTER 7

WATER AND WASTEWATER FACILITIES

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CHAPTER 7

WATER AND WASTEWATER FACILITIES

1. GENERAL. Items covered in this section include water supply and distribution systems, water treatment plants, outside fire protection, water supply for interior fire protection, sanitary sewage systems, industrial wastewater systems, pumping stations for water and wastewater and sprinkler irrigation systems.

2. DESIGN CRITERIA. For a detailed listing of applicable design criteria, see the scope of work.

3. COMPLIANCE WITH STATE OR FEDERAL WATER QUALITY STANDARDS. Effluent from treatment plants must comply with appropriate State and Federal water quality standards. See paragraph: Federal, State and Local Pollution Abatement Criteria and Environmental Permits, chapter: General Instructions.

4. PROJECT DEFINITION (PD) DESIGN (AIR FORCE ONLY).

4.1 Drawings. Drawings shall contain, as a minimum, the following:

4.1.1 The basic site layout including all existing utilities (i.e., water, sewer, gas, electrical, etc.) shall be provided.

4.1.2 All proposed utilities shall be indicated at their proposed locations including tentative sizes. Utilities shall be shown from their tie-in point with existing up to within the 5-foot line.

4.1.3 All potential interferences with utility routings including any existing infrastructure which may pose an obstacle.

4.2 Design Analysis. See chapter: Design Analysis for a general discussion of format and scope of the design analysis. As a minimum, the following should be included in the PD design submittal:

4.2.1 A tabulation of criteria and design analysis for the basis of design of all utilities systems, and/or components thereof. Provide a narrative description of all system design and the rationale for such proposal.

4.2.2 The A-E shall determine the adequacy of the water distribution system for fire protection by contacting the Fire Department having jurisdiction to obtain fire hydrant flow test results for locations pertinent to the site. Should this information prove unobtainable, the A-E shall promptly contact the District.

4.2.3 A separate section shall be included in the Design Analysis including the listing of unresolved items or criteria required to complete the final design. These issues shall be presented

by the A-E at the PD review in order to facilitate expeditious resolution.

5. CONCEPT OR PRELIMINARY DESIGN.

5.1 Drawings. Drawings shall contain, as a minimum, the following:

5.1.1 Water Distribution and Sewage Collection Systems (including building services). Using the basic site plan layout (without siting notes and dimensions) show the following:

5.1.1.1 Existing Utilities.

5.1.1.2 Proposed new lines with tentative sizes.

5.1.1.3 Proposed valves (including PIVs), lift station and manhole locations.

5.1.1.4 Proposed fire hydrant locations.

5.1.2 Water Supply Lines, Trunk or Outfall Sewers and Long Force Mains. Develop separate layout sheet showing:

5.1.2.1 Proposed routing and tentative sizes.

5.1.2.2 Existing utilities and aboveground features which could affect construction.

5.1.2.3 Show proposed locations for manholes, relief valves, blowoffs, isolation valves, etc.

5.1.2.4 For off-base portions show sufficient information to define the right-of-way required.

5.1.3 Pumping Stations.

5.1.3.1 Include a site plan showing structure location and exterior piping.

5.1.3.2 Include a floor plan of structures showing equipment layout and single line piping with tentative sizes.

5.1.3.3 Provide one section through structure showing pertinent elevations.

5.1.4 Water and Wastewater Treatment Plants.

5.1.4.1 Provide a site plan showing major unit treatment items and their

relationship to existing facilities. Include exterior yard piping (new and existing). For clarity, do not show site dimensions, siting notes or topographic contours on this drawing.

5.1.4.2 Include drawings showing schematic flow diagrams of the following:

Process flow
Solids handling
Chemical feed
Service water

5.1.4.3 Include a hydraulic profile.

5.1.4.4 For all buildings, include a floor plan showing equipment layout and single line piping with tentative sizes.

5.1.4.5 Provide at least one section through each structure showing pertinent elevations and pipe locations.

5.2 Design Analysis. For a general discussion of format and scope, see chapter: Design Analysis. The following items, as a minimum, should be included (when applicable) under the chapter for Water and Wastewater.

5.2.1 Water Supply.

5.2.1.1 List of applicable criteria.

5.2.1.2 Description of water source.

5.2.1.3 Design demands, pressures and required pumping heads.

5.2.1.4 Pump types, capacities and horsepower.

5.2.1.5 Listing of allowable pipe materials.

5.2.1.6 Well capacities and geologic data on water bearing formation.

5.2.1.7 Chemical analyses of water proposed for use.

5.2.1.8 Preliminary calculations necessary to support equipment and piping sizes.

5.2.1.9 Description of operating sequence and controls.

5.2.2 Water Storage.

5.2.2.1 List of applicable criteria.

5.2.2.2 Available and required storage.

5.2.2.3 Storage tank type, capacity and elevation.

5.2.2.4 Insulation and/or heating requirements, particularly dedicated fire water storage.

5.2.2.5 Controls and operating sequence.

5.2.2.6 Preliminary calculations necessary to support tank sizing.

5.2.3 Water Treatment.

5.2.3.1 List of applicable criteria.

5.2.3.2 Raw water quality (Chemical Analyses) and required finished water quality.

5.2.3.3 Required flow-through rate.

5.2.3.4 Type, size, and capacity of equipment required.

5.2.3.5 Pump types, capacity and horsepower.

5.2.3.6 Controls, instrumentation and proposed operating sequence.

5.2.3.7 Chemical type and dosages required.

5.2.3.8 Proposed disposal method for backwash water and chemical sludges.

5.2.3.9 All calculations necessary to support treatment plant capacity, equipment sizing, chemical dosages, etc.

5.2.4 Water Distribution Systems (Including Building Services and Non-Potable Fire Mains).

5.2.4.1 List of applicable criteria.

5.2.4.2 Peak and average domestic demands.

5.2.4.3 Fire flow required.

5.2.4.4 Available flow and residual pressures.

5.2.4.5 Listing of allowable pipe materials.

5.2.4.6 Preliminary calculations necessary to support pipe sizing, fire demands, domestic demands, etc.

5.2.5 Sewage and Industrial Wastewater Collection Systems (Including Building Services).

5.2.5.1 List of applicable criteria.

5.2.5.2 Average and peak contributing flows.

5.2.5.3 Capacity of existing system.

5.2.5.4 Special requirements of industrial wastewater systems including pretreatment.

5.2.5.5 Listing of allowable pipe materials.

5.2.5.6 Preliminary calculations used to develop peak and average flows.

5.2.6 Pumping Stations For Potable Water and Fire Water Systems.

5.2.6.1 List of applicable criteria.

5.2.6.2 Average, extreme peak and minimum flows.

5.2.6.3 Proposed pumping rates.

5.2.6.4 Pump types, capacity, head and horsepower.

5.2.6.5 Controls and operating sequence.

5.2.6.6 Discharge main materials and sizing.

5.2.6.7 Preliminary calculations used in determining flow rates and pumping heads.

5.2.6.8 Preliminary hydraulic transient (surge) analysis, if specified in the scope of work.

5.2.7 Wastewater Treatment Plants (Sewage and Industrial).

5.2.7.1 List of applicable design criteria.

5.2.7.2 Applicable State and/or Federal water quality and/or effluent

standards.

5.2.7.3 Complete lab analysis of wastewater to be treated.

5.2.7.4 Design flow rates.

5.2.7.5 Special requirements for industrial wastewater treatment (or pretreatment facilities), i.e. acid and/or oily wastewaters.

5.2.7.6 Cost effective analysis (life cycle cost) as required by Chapter 5, TM 5-814-3.

5.2.7.7 Narrative description of proposed unit processes including capacities.

5.2.7.8 Anticipated effluent quality.

5.2.7.9 Narrative description of instrumentation and controls.

5.2.7.10 Calculations necessary to support cost effective analysis, equipment sizing, design flow rates, etc.

5.2.8 Aqueous Film Forming Foam (AFFF) Wastewater Facilities.

5.2.8.1 List of applicable criteria.

5.2.8.2 Design flow rates.

5.2.8.3 Narrative description of the system including wastewater storage and diverter facilities.

5.2.8.4 Listing of allowable pipe materials.

5.2.8.5 Calculations supporting hydraulic design of the drainage system and tank sizing.

5.2.9 Sprinkler Irrigation Systems.

5.2.9.1 List of applicable criteria and/or design standards.

5.2.9.2 Precipitation rates.

5.2.9.3 Narrative description of the system including special requirements for trickle systems.

5.2.9.4 Listing of allowable pipe materials.

5.2.9.5 Preliminary calculations of total flow and pressure requirements.

5.2.10 Additional Requirements.

5.2.10.1 Sewers. Contact user to determine if sewers in the area are overloaded. Verify system capacity if sewers are known to be overloaded or if large sewage flows will be generated by the new facility. Do not route wastewater, other than domestic sewage, to the sanitary sewage system without adequate pretreatment and/or verification of compatibility with the existing treatment system. Exterior building service lines shall be 6-inch minimum diameter and 8-inch minimum diameter beyond the first manhole. Shut-off valves for raw sewage or sludge shall not be gate valves. Small lift stations (100 gpm to 300 gpm) should be of the submersible pump type with plug and check valves in a separate valve manhole. Where flows indicate pump capacities substantially below 100 gpm, consideration should be given to use of a submersible, grinder-type pump station (duplex) with shut-off and check valves located in the wet well. Force mains for grinder pump stations shall be 2-inch through 3-inch diameter. Wet wells and valve manholes shall be precast or cast-in-place concrete.

5.2.10.2 Oil/Water Separator. Wastewater streams containing petroleum products, or the potential thereof, shall be pretreated prior to discharge into the sanitary sewer system. An oil/water separator shall be provided for pretreatment, consisting of gravity separation of oil, grease, and settleable solids. The separator shall be located outside of the building and shall be of the pre-packaged (pre-manufactured) type suitable for the application. Cylindrical oil/water separators should not be used unless approved by the installation because of increased difficulties in operation and maintenance. Uncovered oil/water separators are preferred if there are no climate or air pollution constraints. If a waste oil storage tank is required, the tank shall be double-walled if it is buried. The pre-packaged unit shall be designed to provide adequate volume for grit settling and removal of accumulated grit. Consideration shall also be given to cathodic protection, surface and interior coating requirements, and the combined structural liveloads and deadloads which the unit will be subjected. The pre-packaged separator and the waste oil storage tank shall be a Steel Tank Institute (STI) tank and be fabricated, inspected, and tested in accordance with Underwriters Laboratories, Inc. (UL-58). Steel tanks shall be installed underground in accordance with NFPA Standard 30 unless otherwise required. The waste oil storage tank shall be equipped with an overfill alarm and leak detection monitoring system for the annular space between the tank walls. The leak detection monitor shall be supervised to a panel located within a nearby facility. The overfill alarm shall be connected to an audible alarm located adjacent to the tank. The A-E shall determine (with input from the User) whether a waste oil storage tank shall be provided with the separator. The following parameters shall be used for the pre-packaged oil/water separator design:

> The oil/water separator shall be designed for the maximum flow capable of flowing into the separator. Design temperatures of the oil-in-water mixture will be based on expected values (5 to 25 degrees C. typical) and an ambient air temperature range for the installation. The specific gravity(ies) of the oils and grease will range from .90 to .95. The total oil and grease concentration will range from 1000 to 2000 milligrams per liter (mg/l) unless existing data is available. The effluent requirements should be based on regulatory criteria. The separator

should be capable of achieving an effluent of 10 mg/l for oil droplets greater than 60 microns in diameter.

5.2.10.3 Septic Tank and Leach Field Systems. Septic tank and leach field systems shall be designed in accordance with TM 5-814-3 (AFM 88-11, Chapter 3) and applicable state or local standards. The A-E shall perform percolation tests at the exact site of the leach field. Any change in location will require new percolation tests.

5.2.10.4 Fire Flow Requirements. Determine Fire Flow requirements in accordance with the guidance contained in the scope of work.

5.2.10.5 Fire Hydrants shall be provided in accordance with all requirements as set forth in MIL-HDBK-1008. All fire hydrants shall be color coded as required by the user.

5.2.10.6 Waterlines and Force Mains. For design of waterlines and force mains use maximum Hazen-Williams "C" value of 130 for plastic pipe and 120 for other pipe materials.

5.2.10.7 Aqueous Film Forming Foam (AFFF) Wastewater Facilities shall be designed to handle by gravity flow the maximum flow rate and contain the maximum volume of wastewater including the water flow after AFFF concentrate is exhausted. The system shall not receive domestic sewage. Normal industrial wastewater flows shall not pass through the storage tank. AFFF wastewater shall be diverted to the storage tank automatically when fire suppression system is activated. No gravity drain shall be provided from the storage tank.

5.2.10.8 Sprinkler Irrigation Systems shall be Contractor designed or as otherwise directed in the scope of work. The system shall be completely underground, automatically operated by a central sprinkler controller, and capable of providing complete coverage over the area to be irrigated. Irrigation system design shall minimize the application of water to roads, drives, and walks. Water shall not be sprayed on buildings. Heads in turfed or seeded areas shall be either pop up spray or rotary impact type, dependent upon the size of the area to be irrigated. Precipitation rates shall be approximately equal between part circle and full circle heads when valved together. Irrigation system shall be capable of applying an equivalent of 2-inches of precipitation per week (or as otherwise indicated in the scope of work), over the area to be irrigated while operating during non-daylight hours. Areas containing trees, shrubs or ground cover requiring only a limited volume of water, and not readily covered by the sprinkler irrigation system shall have water supplied by a trickle or drip irrigation system valved separately from other areas.

5.2.10.8.1 Head spacing shall not exceed the manufacturer's recommendations for winds in excess of 10 mph. The A-E shall require the Contractor to submit design calculations for review. The Contractor shall also provide design drawings that include head spacing, system layout, pipe size, arrangement, pressures and patterns.

5.2.10.8.2 A reduced pressure principle backflow preventer shall be installed between the irrigation system and the potable water system, either in a mechanical room, or outside, on an aboveground concrete pad. Provide a self-draining, freezeproof shut-off

valve ahead of the backflow preventer when the irrigation system is located outside. A strainer shall be installed upstream of the backflow preventer with a screening element compatible with the emitters or sprinkler heads used and as recommended by the manufacturer. Vacuum breakers shall not be used in lieu of the reduced pressure principle backflow preventer.

5.2.10.8.3 Low points in the irrigation system shall be equipped with automatic drain valves to protect the system from freezing. The system shall also be equipped with an air connection to blow the water out of the system at the end of the season.

5.2.10.8.4 The system shall consist of standard, commercially available components so that at least three manufacturers can furnish the equipment. The components shall be products of manufacturers regularly engaged in the manufacture of such items and shall essentially duplicate those that have been in satisfactory operation for at least two years.

6. FINAL DESIGN. In general, the final design documents must include sufficient information for bidding and construction of the project. Specific requirements for plans, specifications, and design analysis are given below.

6.1 Drawings. Generally, the corrected and approved concept plans may be used as the basis for the final plans; however, all details necessary for bidding and complete construction must be included. The following information is required in addition to the previously stated requirements for concept plans.

6.1.1 Water Distribution and Sewage Collection Systems.

6.1.1.1 Profiles of all gravity sewers, waterlines and sewage force mains. Profiles may be omitted for short waterlines unless necessary to assure adequate cover or avoid interference with other underground facilities.

6.1.1.2 Indicate existing pipe material where new lines connect. Indicate type of connection and elevation.

6.1.1.3 Location of all valves, fire hydrants and similar appurtenances.

6.1.1.4 Appropriate water and sewer details.

6.1.1.5 For railroad or airfield pavement crossings, indicate installation method (open cut, boring, jacking, etc.).

6.1.1.6 Where lift stations are required, provide appropriate details showing piping required, pumps, valves and accessories. Include at least one section showing all required elevations.

6.1.1.7 For pavement cuts, show type of pavement to be removed and replaced.

6.1.2 Water Supply Lines, Outfall Sewers, Long Force Mains.

6.1.2.1 Include survey ties and/or bearings.

6.1.2.2 Include stationing in both plan and profile.

6.1.2.3 Show contours in plan.

6.1.2.4 Add appropriate notes, details, etc., for railroad and airfield pavement crossings.

6.1.3 Water and Wastewater Treatment Plants.

6.1.3.1 Complete equipment layout showing all required piping, valves, meters, pumps, etc. Show double line piping on all sizes 3 inches and larger.

6.1.3.2 Sufficient sections and details to permit construction.

6.1.3.3 Provide equipment schedules showing capacity, head, etc., for major items of equipment.

6.1.4 AFFF Wastewater Facilities.

6.1.4.1 Profiles of all gravity lines.

6.1.4.2 Appropriate details.

6.1.5 Sprinkler Irrigation Systems.

6.1.5.1 Sprinkler irrigation plan shall designate the trees, shrubs, bushes, ground cover, and lawn area to be irrigated. Provide flow and pressure requirements.

6.1.5.2 Appropriate details.

6.2 Specifications. For a detailed explanation of the use of guide specifications, see chapter: Specifications.

6.3 Design Analysis. For format and general scope, see chapter: Design Analysis. For mechanical items such as pumps, treatment equipment, etc., provide a listing of at least three manufacturers whose equipment will perform the desired function. In addition to the items required for concept or preliminary design the following items should be included.

6.3.1 AFFF Wastewater Facilities. Provide narrative and calculations pertinent to ultimate disposal (i.e. sewage treatment plant) such as maximum flow rate to the treatment facility.

6.3.2 Sprinkler Irrigation Systems. Provide complete flow and pressure calculations.

6.3.3 Water and Wastewater Treatment Facilities. Provide complete narrative and calculations describing pilot testing.

6.3.4 Pumping Stations For Potable Water and Fire Water Systems. Provide complete hydraulic transient (surge) analysis if specified in the scope of work.

6.3.5 Non-Government Facilities. Where water supply and/or wastewater treatment utilize non-government facilities, provide documentation showing coordination.

6.3.6 Other Documentation. Provide copies of pertinent correspondence and conversation summaries.

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CHAPTER 8

ARCHITECTURAL DESIGN

1. DESIGN EXCELLENCE. Excellence in architectural design is a primary goal for all military construction projects. Reaching this goal requires a commitment to architectural quality, and to design that is sensitive both to the surrounding community and to the specific needs of the building's users. Attention shall be given to functional requirements, an aesthetic solution compatible with the local environment, interior and exterior detail, siting, and energy efficiency and economy of design including life cycle cost. New facilities shall be harmonious with those existing facilities that are considered to be architecturally appropriate. It should be recognized that quality design does not imply added expense, and can often provide savings in operating, maintenance, and construction costs. Materials shall be selected and used with proper consideration for constructibility, durability and maintainability. Design decisions and material selections must have the supporting data necessary to justify the design adopted.

2. DESIGN CRITERIA. The design of buildings shall be in accordance with the instructions contained in this Chapter and in other applicable chapters of the A-E Instruction Manual. In addition, Corps of Engineers Guide Specifications and Technical Manuals, Using Service criteria publications, and the scope of work, all include applicable design criteria. Applicable requirements shall be incorporated from recognized national standards including the National Fire Codes, Life Safety Code, Occupational Safety and Health Standards (OSHA), and the Uniform Building Code. Applicable manuals covering specific buildings, equipment, or materials will be cited in the scope of work.

3. COMPLETE DESIGN. Since the designer has little chance to actively inspect the construction, and due to the undesirability of making changes after contract award, it is imperative that all items required in the construction, including minor fixtures and refinements, be included in the design. The design shall include sufficient detail to completely describe and locate all fixtures and accessories, and phases of the construction.

3.1 Interior Building Signage. Provide interior building signage as required by the scope of work.

3.2 Special Ventilation. The use of louvers, or door undercuts of a maximum of 1 inch, to provide adequate ventilation in janitor's closets, telephone rooms, toilets, and other similar rooms, may be permissible in some cases, if allowed by fire protection criteria.

3.3 Toilet Room Accessories. All toilet room accessories shall be provided for and located in the contract documents. Provide soap dispenser with metal container in public toilets, using powder type in shops and liquid type elsewhere. Use basin mounted dispensers where counter mounted lavatories are provided. Use accessory types as listed in current guide specification. Accessory types and mounting for handicapped use shall be in accordance with the Uniform Federal Accessibility Standards and the Americans with Disabilities Act (ADA).

3.4 Addition or Alteration Projects. For Addition or Alteration projects, As-Built drawings must be obtained from the appropriate office at the military installation. The As-Built drawings must be carefully compared with the construction in place and shall be revised as necessary to ensure that they are accurate and up to date. If needed to illustrate existing conditions, selected sheets of As-Built drawings may be included in the contract documents for information purposes only. The use of photographs to show existing conditions is strongly encouraged. The photographs must be of sufficient size and clarity to provide meaningful information.

4. DESIGN FOR SAFETY.

4.1 General Safety. Applicable provisions of the OSHA Standards shall be incorporated into the design where not inconsistent with Army or Air Force safety criteria. In cases of conflict, the standards in the Army or Air Force safety criteria take precedence. Questions on applicability should be referred to the District for resolution.

4.1.1 Stairs. Exterior stairs shall be provided with 6 inch wide safety treads. Interior stairs shall be provided with 3 inch wide safety nosings or safety treads. Stairs shall be properly proportioned, and shall have adequate clearances, in accordance with OSHA Standards, and NFPA 101, Life Safety Code.

4.1.2 Guards and Handrails. Guards and handrails shall be provided for all stairs having three or more risers, and for elevated platforms. No flight of stairs shall have an unbroken vertical rise of more than 12 feet (6 feet for handicapped). Toeboards will be provided at stairwells, catwalks, and elevated platforms to comply with OSHA standards.

4.2 Safety and Fire Protection. Safety and fire protection shall be an integral part of every building design. Recognized codes and accepted safety standards shall be followed for the design of all facilities. Of the various codes and safety standards, the National Fire Protection Association's "Life Safety Code" (NFPA document 101) shall take precedence. All applicable requirements of the Life Safety Code shall be incorporated into the design. Special attention shall be given to the application of fire codes as they relate to Life Safety. Features of Fire Protection such as area separation walls, smoke stop barriers, fire extinguisher cabinets, and exiting requirements must be clearly defined and coordinated. See Fire Protection chapter for additional requirements.

4.2.1 Features of Fire Protection. Features of fire protection, such as partitions or doors, shall be coordinated and provided to protect property and inhabitants from the hazards of fire occurrence. These features shall especially address the isolation of hazardous spaces or materials, the protection of egress components, and the coordination of such features with other (e.g. security) unusual functions connected with them. All such components of the fire protection shall be clearly indicated in the contract and review documents.

4.2.2 Exiting for Inhabitants. Emergency exits, equipped with exit devices, shall be provided for personnel safety in hazardous areas and places of public assembly. Design of these exits must facilitate rapid egress in accordance with the requirements of NFPA 101, Life Safety Code.

4.2.3 Special Coordination. The interrelationship between the requirements for Fire Protection, Life Safety, Tempest Shielding, Sound Control and Physical Security must be carefully studied. For example, individual doors that will satisfy more than a single requirement are generally not available. This can often mean that multiple doors in about the same location are necessary to cover any group of differing requirements, and unless they are correctly placed, can in turn interfere with one another's operation.

5. DESIGN FOR THE PHYSICALLY HANDICAPPED. Design features to accommodate the physically handicapped shall be in accordance with the Uniform Federal Accessibility Standards and ADA. The Using Service determines the applicability and scope of special design features based on their analysis of potential handicapped use. The designer must be sensitive to the special needs of the physically handicapped, and should actively promote the incorporation of accommodating features into the design.

6. DESIGN FOR ENERGY CONSERVATION.

6.1 Energy Conservation. Energy conservation shall be considered in the orientation and layout of all new buildings. All projects shall be designed to take advantage of solar energy when directed in the scope of work. Economic studies shall evaluate solar energy in accordance with Engineering Technical Letter (ETL) 1110-3-332. Solar systems shall be used where they will be cost effective over a 25-year life.

6.2 Weather Protection. Protection from the effects of weathering and the differences in interior and exterior environmental conditions, shall be an integral part of the design for all buildings. Particular attention should be given to areas heated to 68 degrees F for comfort. The elimination of frost and condensation must be fully accomplished.

6.2.1 Entrance Vestibules. Vestibules shall be provided at all main entrances and at frequently used secondary entrances. Vestibule length should be at least 2'-0" longer than the door width unless a greater length is required to accommodate the physically handicapped. Whenever possible, provide a longer vestibule length, offset alignment of the doorways, and other features which will minimize the possibility of both sides of the vestibule being "open" at the same time. This will better limit direct air infiltration through the vestibule. Recessed floor mats should be considered at entrances.

6.2.2 Exterior Entry/Exit Doors. Doors in exterior openings should generally be metal, 1-3/4 inches thick, and insulated. Metal doors shall be installed in metal frames. Wood doors, 2-1/4 inches thick, may be used for chapels, clubs, and similar buildings if desired for architectural treatment. Wood doors must be protected from weather exposure. Weatherstripping shall be provided for all exterior doors and thresholds. Double doors should be provided with a mullion or an astragal. Provide an appropriate means of eliminating the possibility that wind could catch and swing an unlatched door, to the point of damaging the door, door hardware, or exterior wall. Do not assume that a door closer will accomplish this. Entry/Exitways should be recessed or provided with wind screens whenever possible.

6.2.3 Stoops at Exterior Entry/Exit Doors. Where accumulated ice and snow could impede the opening of an exterior door, the platform stoop should be located approximately 6 inches lower than floor level. The step may be eliminated if overhead protection is sufficient to prevent accumulations of ice and snow. At entrances for the physically handicapped and at required fire exits, the step will be eliminated and overhead protection provided, and special attention will be given to wind screening.

6.2.4 Prime Windows. Prime windows shall be of a quality which satisfies all energy conservation requirements. In areas with winter design temperatures below 15 degrees F, windows in new buildings heated to 65 degrees F shall have double glazing, air infiltration rates less than 0.25 cfm, and resistance to condensation on interior surfaces. If metal windows are to be used they should have thermal break frames.

6.2.5 Louvers Through Exterior Walls. Louvers must be of a stormproof type. In areas subject to high winds, use two louvers or a louver with adjustable damper. Louvers greater than 4 feet wide will require a mullion. Do not place louvers where they are directly exposed to severe wind conditions.

6.2.6 Joint Sealing. The design of caulked and sealed joints shall be in accordance with TM 5-805-6 and Guide Specification 07920. Caulked joints should be avoided on the interior of buildings. Where interior caulking is required in painted surfaces, a paintable caulking shall be specified.

7. DESIGN FOR LOW MAINTENANCE. Maintenance is a substantial factor in the ultimate cost of a building and must be considered in the design. The majority of military facilities, and especially dormitories, recreation facilities, and shops, will receive rough usage in excess of that contemplated in normal commercial practice. Buildings must be designed to withstand rough usage with a minimum of maintenance.

7.1 Selection of Interior Doors. Metal doors shall be used at interior locations subject to above normal humidity, dampness, or damage, and where fire-rated assemblies are required. Doors fabricated of stainless steel, aluminum, or other special materials shall be used at interior locations (sterilizing rooms, washracks, etc.) subject to excessive humidity or dampness. Natural finish, flush, solid core wood doors shall be used in locations where appearance is important, and the functional requirements are not above normal. Generally such doors should be of Stain grade, hardwood veneer. Plastic laminate faced doors may also be appropriate for some projects. Hollow core doors may be used only when so directed.

7.2 Protecting Partition Finishes. External tile corners in kitchen areas shall be protected with rigidly attached stainless steel corner guards. Guards shall also be provided at corners in all buildings where wheeled or cart traffic is anticipated. Bumper rails may be required where cart traffic is severe. Guards and rails, either metal or plastic, should be provided at locations where hard use and damage are expected. Bullnose masonry units shall be used wherever possible at vertical corners of interior partitions, except at door and window jambs, to reduce chipping.

7.3 Concrete Masonry. Lightweight concrete masonry units shall not be used where exposed to the weather. Use only standard weight concrete masonry in such locations, and carefully plan and describe how the material used will be protected from the effects of moisture absorption from exposure to the weather. Several of the military installations have very specific criteria about what methods are acceptable to them. The use of exposed or painted concrete masonry surfaces shall be kept to maintenance, shop, mechanical and janitor closet type areas.

7.4 Partition Stiffness. Interior nonbearing masonry partitions containing hinged doors shall be a minimum of 6 inches thick. Adequate provisions must be made for the installation of "wall-hung" fixtures. Generally, this will include special mounting plates, floor mounted fixture carriers, and/or increased partition thickness. Special supporting members shall also be included in every partition which is to carry the weight of an equipment item, or similar extra load.

7.5 Access to the Roof. A roof access hatch shall be provided to facilitate roof inspection and the maintenance of roof mounted equipment. The hatch may be omitted on structures with no roof mounted equipment and with sloping roofs, when specific approval is requested and granted.

7.6 Ceilings Exposed to Unusual Conditions. Where ceilings will be exposed to unusual amounts of moisture, humidity, or other potentially damaging conditions, provide materials and assemblies able to endure these conditions.

7.7 Floors Exposed to Unusual Conditions. Where flooring will be exposed to unusual and potentially damaging conditions, provide materials and assemblies able to endure these conditions. Acid resistant floors shall be either ceramic tile or quarry tile with furan-resin grout as required by the guide specifications.

8. NOISE CONTROL. Noise Control shall be considered in all building designs. Both internal and external sound shall be controlled. Where possible, use should be made of building orientation, room arrangement, etc., to reduce noise problems. Conventional building materials should generally be used for sound suppression. The services of an acoustical consultant should be utilized where noise control problems are severe. Special construction to reduce aircraft noise shall be in accordance with current Army or Air Force policy as applicable.

9. BUILDING INSULATION.

9.1 General. Insulation materials shall be used to create the optimum degree of energy efficiency within criteria. Placement of insulation shall be clearly thought through and identified. Use detailing which allow discontinuous planes of insulation to lap one another. Structural beams and columns, window mullions, etc., shall be insulated to prevent excessive condensation and frost. All uses of insulation shall include a careful analysis of the control of moisture vapor. Metal roofing is particularly likely to reach temperatures which can condense uncontrolled moisture vapor and lead to serious damage to the facility.

9.2 Quantity of Insulation. Required U-values for building elements shall be in accordance with current Army and Air Force criteria. U-value calculation shall be included in the design

analysis. The R-value of insulation shall be indicated on the drawings.

9.3 Acceptable Fire Characteristics of Insulating Materials. Current regulations require that unprotected insulating materials have a flame spread rating of 75 or less and a smoke development rating of 150 or less. Cellular plastic insulations do not generally meet these requirements, and may only be used as permitted by Chapter 9 of the Architectural and Engineering Instructions, Design Criteria. The visible facing of exposed insulation should be unmarked and must meet the flame spread and smoke developed requirements for interior finishes.

9.4 Insulating Walls. The preferred methods for insulating exterior building walls are to use rigid insulation in the cavity of masonry walls, or blanket insulation on furring or between stud framing. Loose fill insulation will not provide acceptable insulating values.

9.5 Insulating Roofs. The preferred method for insulating the roof of a building is to place the insulation on the structural roof deck. Insulation at the ceiling line is sometimes permitted where there is nothing located above the insulation that would be adversely affected by temperature extremes, but the designer must request approval of this choice as early in the design process as possible, and there are very few situations where it has any advantage.

9.6 Insulating at the Building Perimeter. Perimeter insulation shall be provided for all heated buildings. Thickness shall be 2 inches. Insulation should be placed on the inside face of the foundation, extending down to top of footing or to design frost depth, whichever is less.

10. ROOFING.

10.1 Selection of Appropriate Roofing Systems. Consideration of the most appropriate roofing materials and systems must occur early in the design process. In general, where building size and configuration allow, roofing systems other than built-up roofing should be considered first. There are special requirements for using these roofing systems, and for using them at different locations, or between Army and Air Force work. These special requirements can involve such things as placement or type of insulation, the form of the subdeck required for the type of roofing, slope minimums and maximums, and other features which will impact the appearance and structure of the facility. The designer should review the Guide Specifications for each kind of roofing he is considering, at the earliest appropriate time, to determine how such requirements will impact the design.

10.1.1 Shingle Systems. For economy, asphalt strip shingles are recommended on buildings where size or configuration allow for simple roofs of appropriate slope. Slopes of 4-inches on 12-inches or greater are preferred, but slopes as low as 2-inches on 12-inches may be used with self-sealing shingles using application methods recommended by the shingle manufacturer.

10.1.2 Metal Standing Seam Systems. Metal standing seam concealed fastener roofing systems may be used, especially where high roofing reliability is required. Slopes of 2-inches on 12-inches or greater are preferred, but lower slopes may be permitted where dictated by the building design.

10.1.3 Single-ply Systems. Single-ply elastomeric roof systems can be considered for use in some locations, and for some kinds of building types. However the governing criteria for single-ply roof systems must be determined for each individual project. Consequently, they and sprayed-on membranes shall be considered only where they will provide a significant advantage, based on the building design, where specifically requested by the using service, and when specific approval is requested and granted. Primary roof slopes shall be 1/2-inch per foot minimum.

10.1.4 Built-up Systems. Where built-up roofing is used, the primary roof slope shall be 1/2 inch per foot. The structural roof deck shall be sloped to provide the primary roof slope. Secondary slope in valleys shall be at least 1/4 inch per foot. Tapered insulation or light weight fill may be used to provide the secondary slope. Where wet fill material is used, venting must be provided to permit drying out of the fill material. The specifications for built-up roofing include a variety of special requirements designed to improve the quality of the installed roofing. These requirements include increased Contractor quality control, and make the roofing system manufacturer responsible for part of the work.

10.2 Roof Drainage. The roof drainage system shall be designed to minimize leaks to the interior of the building, and to minimize damage due to winter freezing. There are special requirements for acceptable roof drainage systems at different locations, or between Army and Air Force work. Generally a perimeter drainage system with exterior downspouts will be the most satisfactory, but the designer must request approval of his choice of roof drainage system as early in the design process as possible.

10.3 Roof Parapets. The use of parapets shall be eliminated where possible. Parapets have contributed to premature roofing failures due to the action of ice against the flashings.

11. USE OF GUIDE SPECIFICATIONS.

11.1 Guide Specifications. Guide Specifications are prepared by the Corps to achieve the maximum uniformity in contract specifications. The guide specifications describe the type and quality of material and installation normally acceptable for Corps construction, and often represent specific agreement between the Corps and the applicable industry. The technical provisions of the guide specifications should not be changed without justification. Optional materials shall be retained unless there is a requirement to match existing construction or the optional materials will not meet performance requirements.

11.2 Details and Descriptions. Complete descriptions including specific size, gauge, and configuration are included in the guide specifications for a wide variety of items. The designer must be familiar with the guide specification requirements in order to provide details fully coordinated with the specification descriptions. Terminology used on the drawings shall be the same as used in the guide specifications. Where it is desirable to detail at variance with the standard provisions of the guide specifications, the specifications must be revised to coordinate with the details.

11.3 New Guide Specifications. New guide specifications shall be edited for site-adaptation projects. Use of the Standard Specification, if furnished with the Standard Drawings, shall be

limited to those specialty type items not covered in the regular sections of guide specifications.

11.4 Specifications for New Items. When the A-E prepares specifications for items which do not have HQUSACE guide specifications, the specification shall be formatted in the HQUSACE standard format. The A-E must take extra care in the preparation of new specifications to insure that the specification is non-proprietary, yet provides complete information on the product and its installation.

12. MISCELLANEOUS REQUIREMENTS.

12.1 Control Joints. Control joints in masonry walls shall be extended through the applied finish. To prevent shrinkage cracking, plastered surfaces shall be provided with control joints at corners and at other designated intervals given in the guide specifications. Control joints shall be located on the plans and indicated on elevations.

12.2 Interior Waterproofing. Provide membrane waterproofing in the floors of gang toilet rooms located above inhabited spaces. Ceramic tile shower floors shall be installed over nonferrous shower pan. For Air Force projects, the specific provisions of Military Handbook 1190, "Facility Planning and Design Guide," shall be followed. Shower walls shall be adequately waterproofed.

12.3 Door Swing. The swing of doors shall be coordinated to prevent interference between doors or with the flow of traffic.

12.4 Ventilation. Provide fixed wall louvers, roof ventilators, or other devices to provide ventilation for spaces not fully controlled by the facility air-handling system. Coordinate with mechanical to assure that louvers with the same appearance are specified throughout.

12.5 Flashings. Flashing shall be carefully integrated into the final design. The sections and details shall show properly designed flashing at all locations where consistent with good practice and as required by the guide specifications. Flashing must be designed with turnups to divert water to the wall exterior. Where interior finish is exposed masonry, window sills should be of two-piece construction with the flashing turned up in the joint. Flashing shall project a minimum of 4 inches beyond jambs into the masonry. Building expansion joints must be carefully and thoroughly detailed. Details should be provided for flashing joints where required.

12.6 Exterior Face Brick. Exterior face brick shall extend to two or three courses below grade. Coordinate brick ledge and finished grade.

12.7 Overhead Coiling Steel Doors. Because of vibration, thermal insulating, noise insulating, and infiltration characteristics, overhead coiling steel doors shall not be used in exterior openings of occupied buildings, such as administrative or housing facilities.

13. ARCHITECTURAL DRAWINGS.

13.1 Drawing Scale. Architectural work shall be drawn at the scales noted in chapter:

Presentation of Data. Other scales may be used only by written authorization from the District. All disciplines should use the same scale for plan sheets.

13.2 Legends. Standard material symbols to be used on the drawings shall be those as indicated on the Legend Sheet. Additional material symbols should be added to the Legend Sheet as needed for each project.

13.3 North Arrows. North arrows shall be oriented the same on all plan sheets and on all disciplines.

13.4 Repetitive Drafting. To reduce repetitive drafting, portions of wall sections, etc., may be shown in outline if the information is presented elsewhere at a larger scale. For items such as folding partitions, where the installation detail will vary depending on the product approved, detailing on the contract drawings should be kept diagrammatic or generic, and should indicate the information necessary to integrate these items into the rest of the construction. Repetition in detailing should generally be avoided. Details that simply illustrate totally standardized items or procedures should be omitted.

13.5 Area Tabulation. The first Architectural Plan Sheet shall include a square footage area tabulation for new building.

13.6 Modular Design. Modular Design practices shall be followed in the design of all masonry buildings. Modular dimensions shall be based on the structural (backup) wythe and figured to whole or half-unit lengths (in increments of 8 inches) in order to reduce on-site cutting of masonry. Units less than 8 inches long shall be avoided. Brick veneer masonry coursing will normally start 5-1/3 to 8 inches below the floor line.

13.7 Symbols. The Room and Door Numbering system shall be consistent for all buildings designed under any one contract. Where plans are site-adapted, the symbols need not be changed to the District standards, except those related to the identification of amendments and modifications to a contract. The standard symbols for Amendments or Modifications (see chapter: Presentation of Data) to the contract shall not be used for any other purpose and care must be taken to avoid using even similar appearing but technically different symbols. Room numbering shall start at the main entrance and proceed clockwise around functional areas.

13.8 Schedules. Schedules for room finish, doors, etc., shall be clear and complete. As many columns as necessary should be provided in order to present the essential information. The "Remarks" column should not be used as a substitute for an information column. Normally a single item should be presented on each schedule line. Category group scheduling will be permitted only for buildings with a large percentage of repetitive rooms. Other scheduling methods as standard with the A-E may be used if approved by written authorization through the District.

13.9 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.

13.10 Dimensions. Dimensions must be complete, accurate and fully coordinated for all phases of the design. Dimensions should be to points easily measurable in the construction, and should be laid out to eliminate refiguring in the field. Dimensions should be tied-in to column lines, etc., to facilitate checking. For masonry construction, dimensions should be to nominal face of masonry and to jambs of openings. Dimensions on CADD Drawings shall be accurate to within 1/8".

13.11 Facility Elevation. The elevation of the first floor shall be indicated as 100'-0". Elevation for other floors, footings, etc., shall be related to this figure. Sea level elevations shall not be shown on the building drawings. Elevations of the first floor above sea level shall be shown on the grading plan.

13.12 Access to Utilities. Utilities within the building, such as piping, ductwork, electrical work, etc. should be concealed to the maximum extent possible in finished areas. The clear space above ceilings and the size of chases must be carefully figured to accommodate piping slopes and connections, ductwork crossovers, and similar situations. Access must be provided to valves, cleanouts, etc. Space provided for utilities system must be adequate but should not be excessive. Avoid locating mechanical and electrical rooms near entrances. Exterior equipment and dumpsters shall be hidden behind screen walls. Mechanical and electrical rooms shall be located on grade with access directly to the outside.

13.13 Reflected Ceiling Plans. Reflected Ceiling Plans shall be provided for all large or significant acoustic tile ceiling areas, and for lobbies, waiting rooms, conference rooms, Commander's office, etc., regardless of ceiling material. Reflected plans shall show the ceiling tile layout where applicable and all light fixtures, air diffusers, grilles, registers, 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. Fire rated walls and wall heights shall be shown on the reflected ceiling plans.

13.14 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.

14. DESIGN ANALYSIS. The design analysis shall follow the format described in the chapter titled "Design Analysis" of this manual. The design analysis shall address the following items, as applicable.

14.1 General Parameters.

14.1.1 The purposes, functions, and capacities of the facility.

14.1.2 The desired image or visual appearance of the exterior and interiors of the building, and how this facility coordinates with the image criteria of the installation on which it will

be constructed.

14.1.3 The number of personnel to use facility; military, civilian, and visiting personnel.

14.1.4 The type of activities, equipment, and vehicles involved.

14.1.5 The anticipated life of the functions to be accommodated.

14.1.6 The type and method of construction; permanent, temporary, or relocatable.

14.2 Functional and Technical Requirements.

14.2.1 Functional areas, occupant capacities, and allocation, including a functional relationship matrix.

14.2.2 All items of equipment, required.

14.2.3 Occupational safety and health.

14.2.4 Handicapped accessibility, and provision of blind vending areas operated by state agencies.

14.2.5 Energy conservation including solar energy applications and energy budget goals.

14.2.6 Sound and vibration control.

14.2.7 Interior parking and service areas.

14.2.8 Physical security; lock and keying, intrusion-detection, alarms, restricted access areas, interior guard/canine support, and ties to local authorities.

14.2.9 Signage; directional, informational, and motivational.

14.2.10 Selection of exterior and interior finishes and materials.

14.2.11 Moisture Vapor Control.

14.3 Design Objectives and Provisions.

14.3.1 Adaptation of the building to the size, shape, and orientation of the site to include benefit from natural warming and cooling effects afforded by the site.

14.3.2 Organization of functional spaces to establish workable adjacency relationships.

14.3.3 Building layout to establish convenient circulation flows during normal operation and emergency evacuation activities, for materials, equipment, services, and people.

14.3.4 Grouping spaces into sound-compatible zones and protective construction zones, e.g., for fire, storm, and fallout.

14.3.5 Space layout compatible with modular (structural and environmental) support systems.

14.3.6 Type of construction materials, architectural systems, and finishes to include basis for selection.

14.3.7 Building expandability/changeability.

14.3.8 Physical security.

14.3.9 Barrier-free design.

14.3.10 Energy conservation (passive, insulation, orientation).

14.3.11 Acoustical design.

14.3.12 Moisture vapor condensation design.

14.3.13 Composition of masses and spaces architectural compatibility and architectural details to reflect the desired image, and the scale and nature of the activities involved.

14.3.14 Perception of the building details and volumes. (Specific provisions made, e.g., an identifiable sequence of viewing positions for experiencing the architectural and interior design.)

14.3.15 Enhancement of materials and systems maintenance and operation.

14.3.16 Economy of building construction, operation, and maintenance: life-cycle cost effectiveness.

14.4 Coordination with Installation or Outside Agencies.

14.4.1 Physical security support.

14.4.2 Blind vending operations.

14.4.3 Occupational safety and health, as required.

14.4.4 Government furnished equipment.

14.4.5 Make-up of signage.

14.4.6 Operations and maintenance support.

14.5 Calculations.

14.5.1 Net room areas, occupant capacity and gross building areas. (Categorize areas and capacities under the titles of "Operational Space Requirements", "Administrative Space Requirements", "Storage Space Requirements", and "Support Space Requirements".)

14.5.2 U-values for each wall, window, door, or roof type studied or selected.

14.5.3 Ratio of exterior window and room area, if applicable.

14.5.4 Acoustics, if applicable.

14.6 Sketches. All sketches presented to the user during the project definition phase of design shall be reduced to 8-1/2" by 11" and included in this design analysis to document the design options evaluated during the design process.

15. PRE-CONCEPT (PC) DESIGN (ARMY) OR PROJECT DEFINITION (PD) DESIGN (AIR FORCE). PC/PD design shall be completed in two phases.

15.1 Phase 1. The first phase is the conceptual phase and shall involve the development of program information, functional relationship bubble diagrams, flow diagrams, free hand one line concept site and floor plan sketches and freehand one-line concept elevations. The conceptual phase is the innovative/discovery phase of the architectural process. Freehand one-line concept site and floor plan schemes will be developed and presented to the customer for comment and approval. The presentation shall include a list of pro's and con's on each of the presented site and floor plan schemes and the presenter shall discuss the design intent, desired image, materials, and architectural compatibility of each scheme. This step provides the customer an opportunity to confirm the program, budget, and functional relationships and allows the customer to buy in to the design solutions presented.

15.2 Phase 2. The second phase shall be further refinement of the design solution and shall include building cross sections, typical interior and exterior wall sections, scaled two-line floor plans and elevations, special features plan (fire protection, security, etc.) and a perspective. Floor plans need to indicate overall control dimensions, room names and numbers, general notes, north arrows and a gross area tabulation. All sketches presented to the customer during the first phase of the project definition design shall be included in the Design Analysis along with the meeting minutes and a functional relationship matrix.

16. CONCEPT DESIGN (ARMY) OR EARLY PRELIMINARY DESIGN (AIR FORCE).

16.1 Drawings.

16.1.1 Floor plans shall be double-line drawings showing the functional arrangement, location of all openings and fixtures, and control dimensions. The plans shall indicate door swing and window type; however, door and window schedules are not required. North arrow shall be shown on each floor plan. The first plan sheet shall include a gross area tabulation for the building. A-E suggestions for plan improvement shall be fully shown and justified in the preliminary documents. For large buildings that require the floor plans to be divided into areas, provide a double line Composite Floor Plan of the entire building, drawn at the largest scale practicable to include the entire building or floor level on a single sheet. Include:

Overall and Control dimensions
Match Lines for combining individual portions of floor plans
Room Names and Numbers
Structural Column or Bay Indicators
Wall and Building section cuts
Door Swings
Square Footage
General Notes

Also provide a Key Plan at a uniform location on all Floor Plan sheets which shows the interrelationships between the building portions. When dimensioning, use arrowheads, not dots or slashes. Where major structural elements are included as parts of architectural detailing, do

not indicate sizes. These elements should all be fully defined as part of the structural design documents.

16.1.2 Provide four building elevations to show the general appearance and architectural treatment. Elevations shall be dimensioned to show story height, total height, and relation to grade.

16.1.3 One building cross section shall be included to show general framing method and height of ceilings and partitions. Identify materials used and necessary dimensions.

16.1.4 Drawings shall include at least two typical wall sections drawn to scale of 3/4" = 1'-0" showing vertical control dimensions and with all materials labeled. The sections should normally be cut through doors, windows, and other critical wall sections. Additional details shall be included when necessary to illustrate important or unusual features. All horizontal dimensions shall occur on the plans and vertical dimensions on the sections and elevations.

16.1.5 A perspective drawing shall be included when so required by the special instructions.

16.1.6 Features of Fire Protection, their ratings, and the hazards requiring them, shall be clearly indicated. 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.

16.1.7 Major elements of mechanical and electrical equipment, affecting space allocation, shall be shown on the architectural plan to the extent practicable. Separate mechanical and electrical drawings shall be prepared when necessary to avoid crowding architectural drawings to the extent they would be difficult to read. When applicable, Government-furnished, Contractor-installed, or Government-furnished and installed items shall be shown.

16.1.8 For Addition or Alteration projects, new work and removal work should be shown on separate drawings. The type and the scope of work intended, shall be clear from an inspection of the documents.

16.2 Design Analysis. The Design Analysis shall be as complete as the design stage permits with emphasis on the following:

16.2.1 A statement indicating the basic criteria to be applied to the design including type of construction (noncombustible, etc.), category of construction (permanent, etc.), major fire protection and exit requirements, etc.

16.2.2 A description of materials for all major building components and of all interior and exterior finishes. The description of materials must include type of exterior wall construction, room finish schedule, window types, panel materials, etc. For Air Force projects, the description of

materials should follow the continuity of Military Handbook 1190, Facility Planning and Design Guide. The description of finishes may be presented in schedule form.

16.2.3 A list of items on which additional criteria, clarification, or guidance is required.

16.2.4 The written presentation must include the designer's reasons for selecting specific materials, plan solutions, architectural compatibility, and architectural treatment in all cases in which the reason for selection is not obvious.

16.2.5 Site Adaptation of standard drawings shall include the following in the design analysis.

16.2.5.1 An outline of the selections made where the standards permit the designer a choice of design or material.

16.2.5.2 An outline of items on the standard that do not conform to current criteria or to the design instructions, and suggested methods for changing the standards.

16.2.5.3 An outline of errors found in the standards and suggested methods for correction.

16.2.5.4 An outline of improvements the designer feels should be made to the standards, with full explanation and justification.

17. FINAL DESIGN.

17.1 Drawings. The drawings shall be complete, thoroughly checked, and coordinated. Previous comments and applicable criteria changes shall have been incorporated into the design. For Addition or Alteration projects, new work and removal work should be shown on separate drawings. The contract drawings shall fully describe the type and the scope of work required. The final form of the contract documents shall make it possible for bidders to evaluate working conditions and to estimate quantities from an inspection of the documents. It shall not be necessary for bidders to visit the worksite to make such evaluations. 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. Where major structural elements are included as parts of architectural detailing, do not indicate sizes. These elements must be fully defined in the structural design documents. For large buildings that require the floor plans to be divided into areas, provide a double line Composite Floor Plan of the entire building, drawn at the largest

scale practicable to include the entire building or floor level on a single sheet. Include:

Overall and Control dimensions
Match Lines for combining individual portions of floor plans
Room Names and Numbers
Structural Column or Bay Indicators
Wall and Building section cuts
Door Swings
Square Footage
General Notes

Also provide a Key Plan at a uniform location on all Floor Plan sheets which shows the interrelationships between the building portions. In addition to the Composite Floor Plan provide an additional, separate, (composite type) floor plan which makes an accurate presentation of the various Fire Protection features and functions, and shows the interrelationships between them.

17.2 Design Analysis. The Design Analysis shall include the basic information presented in the previous submittal, corrected to reflect changes in tense, and 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 project specifications. The final design analysis shall be written in the past tense.

17.3 Specifications. The specifications shall be complete and fully coordinated with the drawings.

CHAPTER 9

INTERIOR DESIGN

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CHAPTER 9

INTERIOR DESIGN

1. DESIGN EXCELLENCE. Excellence in interior design is a primary goal for all military construction projects. Attention shall be given to economy of design including life cycle costs and functional requirements. It should be recognized that quality design does not imply added expense, and can often provide savings in operating, maintenance, and construction costs.

2. DESIGN CRITERIA. The design of buildings shall be in accordance with the instructions contained in this chapter and in other applicable chapters of the A-E Instruction Manual. In addition, Corps of Engineers Guide Specifications and Technical Manuals, Using Service criteria publications, and the scope of work, all include applicable design criteria. Applicable requirements shall be incorporated from recognized national standards including the National Fire Codes, Life Safety Code, Occupational Safety and Health Standards (OSHA), and the Uniform Building Code. Applicable manuals covering materials will be cited in the scope of work.

3. FINISH, COLOR, AND FURNISHING SELECTION. All work shall be performed by an Interior Design professional in accordance with current and generally recognized design principles and shall comply with ER 1110-345-122 Engineering and Design - Interior Design. Careful consideration shall be given to the aesthetics, function, maintainability, and quality of each selection.

4. BUILDING RELATED INTERIOR DESIGN.

4.1 Technical Requirements.

4.1.1 Includes the selection and coordination of interior and exterior materials and finishes, including color, texture, and pattern.

4.1.2 Considerations in this project include structural finish, color, prewired workstations (for Air Force and Army facilities), window treatment (with the exception of drapery) and other items which are permanently attached to, or are integral to the building. The Project Development Book (PDB) will define whether or not prewired workstations are required.

4.1.3 Exterior color guidance shall be obtained from the user and incorporated into the design. If an Exterior Master Plan is available for the installation, it shall be utilized.

4.1.4 Limit the number of similar colors for each material.

4.1.5 New finishes and colors shall be compatible with existing colors and finishes where they occur in areas that are adjacent to occupied areas. More flexibility in color and finish selections can be exercised in areas not adjacent to existing occupied areas. Where it is imperative that existing materials be matched closely, include both a "color range" for the Contractor to prepare his bid, and the requirement to match the existing materials for the actual construction process.

4.1.6 Basic space planning for anticipated furniture and equipment requirements in conjunction with the functional layout of the building design and such requirements as life safety, privacy, lighting, ventilation, and handicapped accessibility.

4.1.7 Color, texture, and pattern for all exterior and interior finishes shall be specified for all projects either on the Finish Schedule located in the Drawings or in the Guide Specification entitled Exterior/Interior Design Schedule.

4.1.8 All carpet shall conform to applicable design criteria. Carpet tile shall be specified where electrical power and/or communications is accessed from the floor. Carpet in highly trafficked areas shall be of a loop construction.

4.1.9 Uniformity of window covering color and material shall be maintained to the maximum extent possible within a building.

4.1.10 Colors selected for use in UEPH sleeping rooms shall be psychologically beneficial to the long term occupant.

4.1.11 Panel supported workstations acquired with MCP (MILCON) funds shall be referred to as "Prewired Workstations." Prewired workstation design shall be a part of the construction bid documents and shall conform to ETL 90-2, General Policy for Prewired Workstations and Systems Furniture. (Disregard all information pertaining to ergonomic seating. Ergonomic seating cannot be purchased with MCP funds.) Workstation layout shall be coordinated with the communication and electrical design of the building. Placement of wall switches, thermostats, and all other miscellaneous wall installed items shall be coordinated with the appropriate discipline in order to eliminate conflicts with prewired workstations. Workstation design shall conform to all fire protection, bio-environmental, security, and safety requirements specified in Military Handbook 1190, "Facility Planning and Design Guide," the Uniform Federal Accessibility Standards, and the Americans with Disabilities Act (ADA).

4.2 Submittal Requirements. Submittal requirements for medical facilities will be provided on a project specific basis. All other facility submittals shall be as follows:

4.2.1 Project Definition (PD) Design Submittal:

4.2.1.1 Design Analysis. The design analysis shall follow the format described in the chapter titled "Design Analysis" of this manual. The design analysis shall contain a description of applied finishes and an explanation of the desired image or visual appearance of the interior of the facility.

4.2.1.2 Furniture Footprint. A furniture footprint indicating proposed furniture layout should be provided in critical areas. All furnishings with the exception of MCP funded prewired workstations shall not be considered part of the construction contract and shall be indicated as such on the drawings by the use of a dashed line. If prewired workstations are a part of the contract, a layout shall be blocked on 1/4" scale plans and individual components clarified on 1/2" plan view drawings. Components shall be labeled to fully illustrate workstation design.

4.2.1.3 Plans and Elevations of special decorative features, built-in furnishings, and other enhancements into the building.

4.2.1.4 Coordination of interior components, lighting, acoustical, electrical and mechanical elements.

4.2.1.5 Plans and Elevations of Typical Prewired Workstations. (Where required). Typical prewired workstations shall be shown in plan and elevation at 1/2 inch scale. Components shall be labeled and a legend shall accompany the drawings which clearly identifies all components and sizes. The quantity of typicals should be minimized. It is recommended that each workstation type be assigned a code (A typ., B typ.,) and that codes be referenced on the layout rather than drawing workstations in repetition. In some instances, variations to typicals will need to be developed as a result of column placement, etc. These variations can be referenced on the plan as being similar to typicals and shall be coded with a designation (A sim., B sim.). The variations should be clearly indicated on the drawings. Clarify all ways the workstation is different from the typical.

4.2.1.6 Color Boards and Legends. (Where required). Color boards shall show actual samples of all proposed exterior and interior structural finishes. A color board legend shall accompany the board and shall clearly identify all finishes. Clarification of finish placement will be required when more than one color of a single finish is proposed. Include prewired workstation finishes and fabric samples where applicable. Color boards shall be 8 1/2" x 11" in size and provided in a three ring notebook or 17" x 22" foam core, whichever the client prefers.

4.2.2 Early Preliminary Submittal:

4.2.2.1 Design Analysis. The design analysis shall follow the format described in the chapter titled "Design Analysis" of this manual. The design analysis shall contain a description of applied finishes and an explanation of the desired image or visual appearance of the interior of the facility.

4.2.2.2 Furniture Footprint. A furniture footprint indicating proposed furniture layout shall be incorporated into the drawings. All furnishings with the exception of MCP funded prewired workstations shall not be considered part of the construction contract and shall be indicated as such on the drawings by the use of dashed lines. If prewired workstation are included in the contract, a layout will be required at 1/4" scale. Panel placement shall be shown and electrical, communications, and EDP outlet placement shall be clearly indicated. Typical workstations shall be coded (A typ., A sim.) on these sheets rather than drawing all components in repetition.

4.2.2.3 Interior Finish Schedule.

4.2.2.4 Plans and Elevations of special decorative features, built-in furnishings, and other enhancements into the building.

4.2.2.5 Coordination of interior components, lighting, acoustical, electrical,

and mechanical elements.

4.2.2.6 Plans and Elevations of Typical Prewired Workstations. Typical prewired workstations shall be shown in plan and elevation at 1/2 inch scale. Components shall be labeled and a legend shall accompany the drawings which clearly identifies all components and sizes. The quantity of typicals should be minimized. It is recommended that each workstation type be assigned a code (A typ., B typ.) and that codes be referenced on the layout rather than drawing workstations in repetition. In some instances, variations to typicals will need to be developed as a result of column placement, etc. These variations can be referenced on the plan as being similar to typicals and shall be coded with a designation (A sim., B sim.). The variations should be clearly indicated on the drawings. Clarify all ways the workstation is different from the typical.

4.2.2.7 Color Boards and Legends. (Where required.) Color boards shall show actual color samples of all proposed exterior and interior structural finishes. A color board legend shall accompany the board and shall clearly identify all finishes. Clarification of finish placement will be required when more than one color of a single finish is proposed. Include prewired workstation finishes and fabric samples where applicable. Color boards shall be 8 1/2" x 11" in size and provided in a three ring notebook.

4.2.2.8 Users Brochure. A Users brochure will be required for selected projects.

4.2.3 Final Submittal:

4.2.3.1 Design Analysis. The design analysis shall follow the format described in the chapter titled "Design Analysis" of this manual. The design analysis shall contain a description of applied finishes and an explanation of the desired image or visual appearance of the interior of the facility.

4.2.3.2 Furniture Footprint. A furniture footprint indicating proposed furniture layout for critical areas shall be incorporated into drawings. All furnishings (with the exception of MCP funded prewired workstations) shall not be considered a part of the construction contract and shall be indicated as such on the drawings by the use of dashed lines. If prewired workstations are a part of the contract, a prewired workstation layout will be required to be shown at 1/4" scale. Panel placement shall be shown and electrical, communications, and EDP outlet placement shall be clearly indicated. Typical workstations shall be coded (A typ., A sim.) on these sheets rather than drawing all components in repetition.

4.2.3.3 Interior Finish Schedule.

4.2.3.4 Plans and Elevations of special decorative features, built-in furnishings, and other enhancements into the building.

4.2.3.5 Coordination of interior components, lighting, acoustical, electrical, and mechanical elements.

4.2.3.6 Plans and Elevations of Typical Prewired Workstations. Typical prewired workstations shall be shown in plan and elevation at 1/2 inch scale. Components shall be labeled and a legend shall accompany the drawings which clearly identifies all components and sizes. The quantity of typicals should be minimized. It is recommended that each workstation type be assigned a code (A typ., B typ.) and that codes be referenced on the layout rather than drawing workstations in repetition. In some instances, variations to typicals will need to be developed as a result of column placement, etc. These variations can be referenced on the plan as being similar to typicals and shall be coded with a designation (A sim., B sim.). The variations should be clearly indicated on the drawings. Clarify all ways the workstation is different from the typical. It is necessary that documents be complete to ensure an accurate bid package.

4.2.3.7 Color boards and Legends. Color boards shall show actual samples of all proposed exterior and interior structural finishes. A color board legend shall accompany the board and shall clearly identify all finishes. Clarification of finish placement will be required when more than one color of a single finish is proposed. Include prewired workstation finishes and fabric samples where applicable. Color boards either shall be 8 1/2" x 11" in size and provided in a three ring notebook or 17" x 22" foam core, whichever is preferred by the client.

4.2.3.8 Guide Specifications. Guide Specifications shall be used by the A-E to achieve the maximum uniformity in contract specifications. The guide specifications describe the type and quality of material and installation normally acceptable for Corps construction. The technical provisions of the guide specifications should not be changed without justification. The A-E shall use Guide Specifications for all applicable sections to include all finishes, window treatments, and prewired workstations. Care shall be taken to insure specification is not proprietary, yet specifies a quality product.

4.2.3.9 Users Brochure. A users brochure will be required for selected projects.

4.2.4 Revised Final Submittal:

4.2.4.1 Revised color boards, legends, photos, and negatives reflecting all changes required as a result of final review.

4.2.4.2 Revised furniture footprint, interior details, elevations, typical prewired workstations, guide specifications, and design analysis.

4.2.4.3 A users brochure will be required for selected projects.

4.2.4.4 Revised interior finish schedule.

5. FURNITURE RELATED INTERIOR DESIGN.

5.1 Technical Requirements.

5.1.1 The A-E is to provide a furnishing design which includes all services and

information necessary for a complete furnishings package for the facility. The designer shall insure that the furniture related and building related design schemes are congruous.

5.1.2 Quality, function, aesthetics, comfort and safety should be considered in the selection of furnishings.

5.1.3 Items to be covered in the furnishings package include furniture, art work, plants and planters, and draperies.

5.1.4 Furniture will be selected from Unicor-Federal Prison Industries (FPI), GSA Stock Catalog, and GSA Supply Schedules (Single and Multiple Award), whenever possible.

5.1.5 Communication and electrical requirements for the facility shall be considered and coordinated with the furnishings layout.

5.1.6 Panel supported workstations acquired with O & M 3400 (NON-MILCON) funds are termed "Systems Furniture." The design of systems furniture shall comply with ETL 90-2, General Policy for Prewired Workstations and Systems Furniture, and Federal Acquisition Regulations. Specific information pertaining to design procedure shall be obtained from the District. The placement of Non-MILCON funded systems shall be shown on construction contract drawings by the use of dashed lines to insure coordination with the building electrical design.

5.2 Submittal Requirements.

5.2.1 Submittal requirements for review and approval, shall be presented in notebook form in a way which organizes the required items in a logical manner.

5.2.2 Submittals shall contain an index. The submittal shall be tabbed according to index headings.

5.2.3 Project name and location shall be clearly labeled on the project binder spine and front panel.

5.2.4 Furnishing items shall be arranged in alphabetical order by location code.

5.2.5 Each furnishing illustration sheet should precede the order form for that item.

5.2.6 Half-sized composite floor plan(s) shall be included in the package for reference, showing furniture placement.

5.2.7 The A-E shall provide a Furnishing Source Sheet. The list should include manufacturer's name, address, phone number, FSC Group, contract number, contract expiration date, and MOL. If there is a separate Contractor, list also that name, address, and phone number.

5.2.8 Individual room plans shall be provided showing 1/4" furniture layouts, coded to an itemized listing of furnishings. Drawings shall show proper placement and scale.

5.2.9 Actual samples of furniture and accessory finishes shall be included in binder(s).

5.2.10 Cost estimate shall be provided which shows itemized quantities and totals including any freight and/or installation costs.

CHAPTER 10

STRUCTURAL

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CHAPTER 10

STRUCTURAL

1. GENERAL. The instructions in this chapter provide guidance for the scope and content of the structural portion of the design documents required for each phase of the design. The structural design criteria to be used is contained in the Kansas City District Structural Design Controlling Criteria (SDCC) document. The structural design, including the resulting design documents, shall conform to the instructions set forth below, as supplemented by instructions and criteria contained in the project specific scope of work and the SDCC, with the SDCC controlling in cases of conflict.

2. PROJECT DEFINITION (AIR FORCE PROJECTS) or PRE-CONCEPT (ARMY PROJECTS). Normally, the Project Definition or Pre-Concept design submittal is typically an approximate 10% design submittal and will consist of a design analysis and drawings. Structural drawings are required only when the project contains complex or unusual structural features which impact either the appearance or the cost of the project.

2.1 Project Definition/Pre-Concept, Design Analysis. Design analysis shall be developed in accordance with ER 1110-345-700, the instructions in chapter: Design Analysis, and as a minimum the specific content shall be essentially as outlined below.

2.1.1 GENERAL. A Statement identifying the design as one of the following: (Specific requirements for each category of design are contained in paragraph: Final Design Analysis.)

2.1.1.1 An original design.

2.1.1.2 A site adaptation of an OCE standard design.

2.1.1.3 A site adaptation of a previous design.

2.1.1.4 A rehabilitation of an existing structure.

2.1.2 STRUCTURAL SYSTEM. Description of the structural system for original designs. A general description of the structural system for the building/structure including seismic considerations should be given with reasons for selection of the system used and including cost comparisons. Additionally, for all medical facilities, provide a comparative cost study of at least three (3) apparent competitive systems, taking into account mechanical, electrical, and other features which vary between systems. For site adaptations of standard or other existing designs or for rehabilitation of an existing structure, describe the proposed design changes necessary for adapting the existing design to the immediate project's site conditions, including changes resulting from loading, climatic and soil conditions at the new site and/or updating for conformance to current criteria.
All principal elements of the structural system selected shall be described. Typically, these may

include:

2.1.2.1 *Roof and Floor System*. General method of framing and type of deck including options. Cost comparisons shall be furnished to justify system selected. Address the type, span to depth ratios and classification of the diaphragm. Address features which impact the layout of the structural framing, such as standing seam metal roofing.

2.1.2.2 *Walls and Partitions*. Describe composition and general range of thicknesses, seismic design when used, method of providing lateral support for the partitions, and location of load bearing and shear walls.

2.1.2.3 *Foundation System*. Foundation design data or assumptions and description of type of foundation system to be used for the buildings and/or structures. For example, whether spread footings, continuous footings with concrete foundation walls, piling or drilled piers with concrete grade beams are used, existence of foundation tie beams, etc. Address concrete slab-on-grade floors, locations where used, whether capillary water barrier is required, and the general arrangement, approximate spacing and types of crack control joints.

2.1.3 DESIGN CRITERIA. A list of design criteria references such as U.S. Army Corps of Engineers Technical Instructions, Department of the Army Technical Manuals, ACI Standards, AISC Specifications, etc. which are applicable to the immediate project.

2.1.4 DESIGN LOADS. A list of structural design loads and conditions comprised of, but not limited to the following:

2.1.4.1 Structure dead loads.

2.1.4.2 Roof live loads and snow load parameters.

2.1.4.3 Floor live loads, identifying each loading with usage and the room or space where used. For "heavy-duty" slab-on-grade floors subjected to wheel loads, identify the type and size of vehicles plus the maximum wheel or axle load. If only human occupancy loads are anticipated, so state. Truck loads for the design of the truck loading docks.

2.1.4.4 Basic wind loading parameters.

2.1.4.5 Seismic design parameters.

2.1.4.6 Foundation design criteria, including the design depth for footings, allowable soil bearing pressure, equivalent fluid densities (or lateral earth pressure coefficients) for the design of earth retaining structures and building components, modulus of subgrade reaction, and any other pertinent data derived from the recommendations of the Preliminary Foundation Analysis, a copy of which shall be included as an Appendix to the design analysis.

2.1.5 DESIGN DATA. A list of structural materials, together with the stress grades an/or ASTM designations, as applicable, for timber, structural steel, concrete, and reinforcing steel; the series for steel joists; and identification of the proposed use of each material in each building structure, including allowable soil properties (with source notation). Where precast concrete structural units are proposed as part of the design, the A-E shall attest to their availability by providing the documentation described in paragraph: Final Design Submittal, subparagraph: Availability of Precast Concrete Units.

2.1.6 DESCRIPTION OF MISCELLANEOUS/UNUSUAL DESIGN FEATURES. Those which might be controversial should be clearly presented in such a manner that definite approval can be given. Where applicable to the immediate project, include a description of each of the following design features:

2.1.6.1 The proposed system for resisting lateral forces (wind and earthquake) and transferring them to the ground, whether diaphragms, shear walls, braced or moment resisting frame, etc.

2.1.6.2 The proposed treatment of any unusual structural features or unique solutions to structural problems.

2.1.6.3 Measures taken to compensate for expansion/contraction and crack control.

2.1.6.4 Identification of any major vibrating elements and measures taken to isolate them.

2.1.7 A list of criteria needed to continue and complete final design.

2.1.8. Structural computations shall be developed only to the extent of determining preliminary sizing and spacing of structural components necessary for preparation of the project construction cost estimate and for coordination with the designs of other disciplines.

2.2 Project Definition/Pre-Concept, Structural Drawings. Structural drawings at this stage are required only when the structural design includes unique or complex features which impact the visual appearance of the project or add significant structural costs beyond those considered normal for the type of project designed.

3. CONCEPT DESIGN . Normally, the concept design submittal is typically an approximate 35% design submittal and will consist of a design analysis, calculations, and drawings, plus a list of the guide specification sections proposed for inclusion in the final design. If a standard design or other existing design is being site-adapted, a statement of the proposed design changes and drawing revisions necessary to meet the immediate project conditions shall be provided.

3.1 Concept Design, Design Analysis. The design analysis shall include all items included in

the Project Definition/Pre-Concept submittal expanded as necessary to reflect the current stage of the project, any revisions necessitated by comments on the Project Definition/Pre-Concept submittal, and as a minimum the following additional items:

3.1.1 Calculations for determine building/structure design loads, including all dead loads, roof and floor(s) live loads. Determination of snow loads, including rain-on-snow, drift, and sliding snow loads as applicable.

3.1.2 Calculations of seismic loads and main force resisting system wind loads and comparison thereof to determine which controls in each major direction of the building or structure. Description of method of providing lateral stability for the proposed structural system to meet these seismic and/or wind loads with sufficient calculations to verify adequacy of the proposed method.

3.1.3 Calculations for typical roof, floor(s) and foundation members as applicable for the structural system proposed to be used.

3.1.4 Structural connections used to fasten the major structural components of the basic structural system (both vertical and lateral) can either be narratively described or supported by sketches.

3.1.5 Sufficient calculations and sketches to support structural quantities used for the Code B construction cost estimate.

3.2 Concept Design, Structural Drawings.

3.2.1 For Original Designs, show structural roof and floor framing by wall sections and partial framing plans in sufficient detail to indicate type of framing, estimated overall depth, and spacing of all structural members. Type of foundations and their approximate elevations shall be shown, although structural members and footings are not to be designed beyond the requirements for estimates and coordination with mechanical and electrical requirements. The location of all columns must be shown. Proposed treatment of cantilever footings, combined footings, and all other complex details shall be shown on concept drawings as an aid to the estimator.

3.2.2 For Site Adaptations of existing designs, list the titles and drawing numbers of the standard or other existing drawings with the basic revisions proposed.

3.2.3 For All Designs. Structural drawings to be included in the concept submittal shall consist, as a minimum, the following:

3.2.3.1 If available, show the logs of exploratory drill holes and their location together with relative vertical elevation of building footings.

3.2.3.2 Foundation plan showing footings, piling, and column locations as

applicable.

3.2.3.3 Floor and roof framing plans.

3.2.3.4 Typical framing elevations and cross section.

3.2.3.5 For masonry construction, show proposed control joints, bond beams, and joint reinforcing on wall elevations.

4. FINAL DESIGN. The Final Design submittal is typically an approximate 95% or 100% design submittal and shall include a final design analysis, final calculations, final drawings, and specifications all as described below.

4.1 Final Design, Design Analysis. The design analysis shall include all items included in the Concept submittal expanded as necessary to reflect the current stage of the project, any revisions necessitated by comments on the Concept submittal, and as a minimum the following additional items. Complete checked calculations are required for Original Designs and a checked Comparative Analysis for Site Adaptation as outlined below.

4.1.1 Site Adaptation Design of OCE Standard Drawings. It is not necessary to develop complete structural calculations for a site adaptation, because the adapted design is presumed to be correct for the conditions for which it was designed. Site adaptations always involve some changes in design conditions, such as length or spacing of beams, exterior wall construction, actual live loads, and foundation conditions. A comparative analysis for site adaptations is required in lieu of complete calculations. The analysis will identify the previous design being copied, enumerate the structural differences and provide sufficient computations to justify the differences. Include the original design calculations in the design analysis.

4.1.2 Site Adaptation of Previous Design. The A-E shall verify that the previous design is adequate for the new roof live load, wind and seismic loadings and for the changed site conditions. A new foundation design shall be prepared. A new design analysis shall be submitted containing all the pertinent information and calculations from the original design analysis plus all the new information and calculations required above.

4.1.3 Rehabilitation of an Existing Structure. The A-E shall incorporate into the final design analysis any structural design and/or investigation associated with the alterations to the existing mechanical/electrical systems. Where applicable, the following specific items shall be addressed:

4.1.3.1 Verification of the adequacy of supports for new or altered equipment, ducts, and piping, including the design and details of new supports when necessary.

4.1.3.2 Investigation of the existing building structure for capability of supporting any increased loading, including design and details for strengthening the structure when

necessary.

4.1.3.3 For any new openings which must be cut through existing structural concrete walls, floors, or roof, the selection of opening locations which are least likely to affect the integrity of the existing structure. Calculations as necessary to verify the adequacy of the altered structure shall be provided. When the existing structure is adversely affected by new openings, the design and details for the necessary strengthening shall be provided.

4.1.4 Original Design Computations shall be prepared by an experienced structural engineer and shall include an investigation of loading, (gravity, wind, seismic, blast and/or radiation, and allowance for future loads, etc.) shear, moment, stress analysis diagram, uplift, stability and deflection calculations. The computations are to be presented in a logical, systematic manner with all assumptions and conclusions clearly identified. Basic assumptions of loads, working stresses, and methods of analysis must appear in the calculations; these assumptions must be applied consistently to a given problem. Similar beams, columns, or connections may be grouped by designing the largest member of connection in the group, but every individual slab, beam, column, footing, connection or other structural member or structural consideration indicated by the plans shall be accounted for by pertinent calculations, statement or reasoning, or reference to source. Design formulas and equations shall be written out in symbols the first time each is used, before the numerical values are supplied. Design formulas and equations shall also be referenced to the appropriate codes and/or text (except for commonly used, widely accepted formulas). All calculations shall be accurate and carried to an appropriate level of precision. All answers shall be identified by dimensional units. Complete design calculations shall be required for all original designs. The calculations shall be presented in a clear and legible form, incorporating a title page, table of contents, and a tabulation showing all design loads and conditions. Pages shall be numbered consecutively and identified in the table of contents. Cross referencing shall be clear. The source of loading conditions, formulas, and references will be identified. Superseded areas of computations must be ruled out. All computations shall be given a complete numerical and theoretical check within the designer's office. Calculation sheets shall carry the names or initials of the designer and the checker, and the dates of calculations and checking. No portion of a design calculations shall be computed and checked by the same individual.

4.1.5 Calculations Made by Programmable Pocket or Desk Calculators. When programmable pocket or desk calculators are used, sufficient information shall be provided so that a reviewer can reproduce the steps with a non-programmable calculator. For simple cases where one or more formulas are solved, writing down the formulas in symbol form with explanations of all symbols, or giving one long-hand example will generally be sufficient information. In more complicated cases, such as continuous beam or frame analysis, complete explanations and supplemental diagrams and sketches shall be provided. Simply including output tapes without explanation will not be acceptable.

4.1.6 Computer Calculations Submittals. All applicable input and output data shall be included in readable printed form as part of the design calculations. Continuous paper such as that used in computer terminals shall be cut into individual pages and shall not be submitted in a

continuous roll form. Since all such data is part of the design calculations and therefore will be reviewed, it shall be presented in such a manner that it can easily be interpreted by any reviewer that has a knowledge of structural analysis and design. In order to ensure reviewability, all input and output data shall include as a minimum the following requirements. Features listed below which are not automatically generated by the program shall be added by hand.

4.1.6.1 A brief synopsis of the computer program(s) stating required input, method of solution, approximations used, codes and specifications used, output generated, extent of previous usage or certification of the program(s), and program author(s). Generalized flow chart(s) may be used to supplement description of solution process, if desired.

4.1.6.2 Identification by number, indexing and cross- referencing of all calculation sheets, including supplemental long-hand calculation sheets.

4.1.6.3 Fully identified, dimensioned, and annotated diagrams of each member or structure being considered. A separate diagram shall be provided for each load case, such as dead plus live, dead plus wind, etc.

4.1.6.4 Clear identification and printing of all input and output values including intermediate values, if such values are necessary for evaluation of the submittal.

4.1.7 Availability of Precast Concrete Units. Where precast concrete units of particular cross section(s) and concrete strength become a part of the structural design, verification of their availability from precast producers in the project vicinity shall be documented. Acceptable documentation consists of letters from the producers or a written statement by the A-E identifying the name and address of the precaster(s), description of units and concrete strength(s) available, date when availability was verified, and name of A-E's staff member who obtained the verification.

4.1.8 Identification of Pre-Engineered Metal Building Used for Design. For designs which include a pre-engineered metal building, the complete identification (manufacturer, building type, eave height, loading designation) of the particular building used for foundation design shall be provided.

4.2 Final Design, Structural Drawings. Final drawings shall be complete and accurate, fully reflecting the design. Except as indicated below for pre-engineered metal buildings and other structures to be contractor designed, the drawings shall be complete with all plan views, sections, details, schedules, diagrams, and notes necessary for the bidding and construction of the project. For structural steel framing, the drawings shall meet the requirements for design drawings set forth in the AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings. For structural concrete, the drawings shall conform to the standards for engineering (design) drawings set forth in the ACI Detailing Manual-1980 (SP-66). Additionally, those items described below which are applicable to the design shall be incorporated in the drawings.

4.2.1 Grid Systems, Dimensions, and Floor Elevations.

4.2.1.1 Grid System. Each foundation plan, floor plan, and other structural plan shall have an alpha-numeric grid system aligned with the columns, or with load bearing and non-load bearing walls, as applicable. The same grid system shall be used for all plan views.

4.2.1.2 Dimensions. Each 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 buildings and structures. Modular dimensioning shall not be used on structural drawings.

4.2.1.3 Finish Elevation of the first floor shall be used as the reference elevation for the building or structure and elevations for other floors, foundations, and roofs shall be referenced to this basic elevation. This elevation shall be coordinated with the other design disciplines and indicated as 100’-0" in IP units or 10000 in metric.

4.2.2 Plan Views.

4.2.2.1 Foundation Plan shall show the size and location of all foundation elements, such as foundation walls, grade beams, piers, footings, piles and pile caps, drilled piers, and/or foundation drains, which are included in the design. Elevations for footings, pile caps and foundation drains shall be indicated on the plan. See subsequent paragraphs: "Schedules and Diagrams" and "Notes" for other data to be included on the foundation drawing.

4.2.2.2 Floor Slab Plan for building slabs-on-grade and exterior 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 drain trenches, equipment bases, and/or recessed slab areas which affect the slab design. Also, indicate whether slabs are placed over vapor barrier and capillary water barrier.

4.2.2.3 Framing Plans. A separate framing plan shall be provided for each structural floor and roof. Plans shall show the size, spacing, and location of all floor/roof framing members, their supporting columns or walls, and all auxiliary members such as bracing, bridging, and sag rods. Also, the size and location of all major openings through floors and roofs shall be shown. See subsequent paragraphs: "Schedules and Diagrams" and "Notes" for additional data to be placed on framing plans.

4.2.3 Elevation Views, Sections, and Details necessary to fully illustrate the structural system design shall be provided. All members, elements and connections that are a part of the main vertical and/or lateral force resisting system must be completely detailed. Some requirements peculiar to the various structural materials are described below.

4.2.3.1 Structural Concrete. Include elevation views as necessary, plus sections and details to show the outlines of concrete cross-sections, reinforcing bar arrangements, concrete cover for rebars, installation of embedded items, and joint construction. All lap splice and

embedment lengths for reinforcing bars shall be clearly indicated on the drawings.

4.2.3.2 Slabs-on-Grade. A sill detail for each foundation condition at exterior and interior doors shall be provided, and may be shown on the architectural door details. For heavy-duty slabs, joint details conforming to TM 5-809-12 shall be shown on the drawings. These details shall be added to the final drawings, as appropriate.

4.2.3.3 Foundation Drains shall be shown on the views which portray the foundation construction.

4.2.3.4 Masonry. Brick expansion joints shall be located and identified on plan or elevation views. Where brick expansion joints do not follow a continuous vertical line, the expansion joints shall be shown on elevation views. Horizontal brick expansion joints shall be shown on elevation views. Structural masonry wall elevations shall be included to clarify the construction requirements for masonry reinforcement, especially the reinforcement around wall openings. Elevations of all masonry walls showing all openings, lintels, bond beams, horizontal and vertical reinforcement, wall stiffeners, and control joints shall be shown on the structural drawings, including horizontal and vertical dimensions of wall panels, openings, etc. Elevations shall indicate all portions of the masonry wall that are piers or columns as defined in TI 809-04, and indicate the required details. The minimum scale for masonry wall elevations shall be ... = 1 -0 (1:50 for metric jobs). Details applicable to the immediate project shall be shown on the structural drawings. Listed below are some frequently required masonry details, most of which are shown in TM 5-809-3 and TI 809-04. Details may be extracted from these sources as required and incorporated in the final drawings. Electronic CADD versions of some of the typical masonry details are available via the TECHINFO internet site http://www.hnd.usace.army.mil/techinfo/. All details shall be selected and fully edited to reflect the specific requirements of the immediate project. Supplemental details shall be added as necessary to complete the design.

Masonry Details Frequently Used

Typical Control Joint (CJ).
Typical Brick Expansion Joint (BEJ).
Control Joint at Bond Beam.
Bond Beam Corner Reinforcement.
Seismic Reinforcement Around Wall Openings.
Wall Stiffeners Details for l- and/or 2-bar stiffeners.
Doweled or Other Connection of Masonry to Foundation, Floor, Roof or Bond Beam.
Bond Beam (or Steel) Lintels.
Column and/or pier reinforcing detail.
Lateral Support Detail for Tops of Masonry Partitions. (Plan location of lateral supports must be shown elsewhere, preferably on the Architectural reflected ceiling plan.)

4.2.3.5 Structural Steel, Steel Joists, and Steel Decking. The detailing of structural steel framing, including connections, shall be complete. All weld types, weld sizes,

bolting layouts, bolt sizes, connection plates and members sizes and locations and stiffener plates sizes and locations shall be shown. Elevations of steel frames used in the lateral load resisting system shall be shown on the contact drawings. When AISC standard connections are used, at least one typical connection detail identifying the AISC type of connection and all connecting materials shall be shown on the drawings. All special and non-standard connections shall be fully detailed. Also, 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 be detailed. 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.

4.2.4 Schedules and Diagrams.

4.2.4.1 On the Foundation Plan. A footing schedule, or column and footing schedule, which indicates the column loads, column sizes, footing sizes and reinforcing, and actual footing contact pressures shall be included. Where load bearing walls are used to support roof and/or floor loads, footing loads per lineal foot of load bearing wall shall be tabulated for each condition.

4.2.4.2 On Framing Plans. For concrete framing, beam and column schedules shall conform to the requirements of the ACI Detailing Manual. For structural steel framing, provide a column schedule complete with design loads at splices 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.

4.2.4.3 Load Diagrams. The required joist loading diagrams for both upward and downward loading, computed in accordance with the Loading Criteria General Requirements and Specific Requirements paragraphs of the Kansas City District Structural Design Controlling Criteria (SDCC) document, must be shown on the Contract Drawings. All concentrated loads shall also be shown on the joist loading diagrams. Additionally, where floors or roofs are framed with steel joists, a note on each framing plan shall state: "The Contractor shall coordinate the location and spacing of steel joists and bridging with all other related work. He shall provide extra joists as necessary to clear mechanical and electrical equipment without exceeding the joist spacing shown, and at no additional cost to the Government."

4.2.5 Notes. The drawings shall contain in the General Notes a list of the design loading criteria, a list of actual design loads, a list of the strengths of the engineering materials used, the design soil values and any other data that would be pertinent to remodeling and/or future additions. Also, a description of the building structural system shall be given so that the construction contractor will know when the building is self supporting.

4.2.6 Pre-Engineered Metal Buildings. The foundation and floor slab shall be completely illustrated on the drawings. Superstructure steel framing shall be shown only to the extent necessary to define the location and sizes of any members normally not furnished by a metal building manufacturer, such as special framing at doors, supports for roof supported mechanical

equipment, or auxiliary framing at roof openings. See the Kansas City District Structural Design Controlling Criteria (SDCC) document for additional information and requirements.

4.2.7 Standing Seam Metal Roofing System with Concealed Fasteners. See the Kansas City District Structural Design Controlling Criteria (SDCC) document for requirements.

4.2.8 Baghouses, Elevated Water Tanks, and other structures which are likely to be Contractor designed or redesigned. For such structures, the drawings shall provide:

4.2.8.1 A drawn-to-scale graphical representation of the completed structure, including any dimensional requirements or limitations.

4.2.8.2 Complete drawings of the foundations and, where applicable, of the aboveground supports.

4.2.8.3 A tabulation of all loading and other criteria which the Contractor is to use for design or completion of design.

4.2.8.4 A statement of the design codes and material designations and strengths to be employed in the Contractor's design.

4.3 Final Design, Specifications. Specifications for final design shall be prepared in accordance with the instructions in chapter: Specifications.

4.3.1 Fly Ash. All references to fly ash shall remain in each concrete specification, regardless of project size. If fly ash is not desired for a technical reason, other than availability or cost, the technical backup must be detailed in the Design Analysis.

4.3.2 Requirements for editing U.S. Army Corps of Engineers Guide Specifications, including instructions for changes, are provided in the Kansas City District Structural Design Controlling Criteria (SDCC) document.

CHAPTER 11

MECHANICAL

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CHAPTER 11

MECHANICAL

1. GENERAL. This chapter covers general instructions for the design of plumbing, heating, ventilation, air conditioning, refrigeration, gas distribution, heat distribution, fuel storage and other miscellaneous items described hereinafter. Mechanical designs shall be economical, maintainable and energy conservative with full consideration given to the functional requirements and planned life of the facility. Consideration shall also be given to heat reclamation, outside air usage and other energy conservation measures for mechanical systems. Additional criteria, in addition to specific references, are included in the scope of work. Design shall be in accordance with the latest HQUSACE AEI and all applicable technical manuals, technical letters, etc.

1.1 Heating.

1.1.1 Hot water systems at Whiteman AFB and hot water systems having snow melting coils, combustion air, preheat, or makeup air coils with an entering air temperature of 40 degrees F, or lower, shall employ an ethylene glycol solution. Strength of the solution shall be in accordance with the design temperature and the recommendations of the current ASHRAE Handbooks. Circulating pumps, converters, radiators, etc., shall be increased in their size and capacity to handle ethylene glycol solution. System makeup shall be by means of a pipe-mounted hand-operated vane-type pump located over a solution mixing drum. Include a note on the drawings or a paragraph in the specs requiring final fill to be by actual measurement and that the ethylene glycol is to be Contractor furnished. A preferred option to using ethylene glycol in preheat, combustion air or makeup air coils is to provide these coils with continuous water flow. Coils shall be integral face and bypass type with single pass water side circuiting.

1.1.2 Steam distributing nonfreeze-type coils shall be used for combustion air, makeup air, or preheat coils, in steam systems.

1.1.3 Boilers shall be sized in accordance with TM 5-810-1 and space requirements.

1.1.4 Boiler piping shall be detailed on the drawings.

1.1.5 In buildings heated by radiators, indicate on the drawings the mounting height from bottom of radiator cover to floor. Height shall be coordinated with installation of electrical outlets to prevent any interferences. Where necessary to clear electrical receptacles, fin-tube radiators will be installed with the bottom of the radiator cover 16 inches above the floor, space permitting. Space allocation shall be carefully coordinated with architectural design where radiation is installed in toilet rooms.

1.1.6 Design of boiler connection and auxiliary equipment shall conform to the requirements of ASME Boiler Code, where applicable.

1.2 Fuels.

1.2.1 Refer to TM 5-848-2/AFM 88-12, Chapter 2 for design of fuel facilities.

1.2.2 All Federal, State, and local air, water, and land pollution regulations will be met. A report of this will be made in the Design Analysis. This includes such items as coal pile run-off, fugitive dust, oil spillage, hydrocarbon emissions, etc.

1.3 Mechanical Room Space Requirements. Determine that rooms are of sufficient size and have headroom to accommodate specified equipment. Ample space shall be provided for entry, servicing, and maintenance. Provisions for installation and future replacement of equipment shall be coordinated with the architectural design. Space provided in rooms for service and/or replacement of coils, tubes, motors, and other equipment items shall be dimensioned on the drawings. Door and window arrangements, sidewalks, and access roads shall be designed to facilitate such service. Piping connections to converter, hot water generators, water chillers, and all other equipment containing tube bundles shall be arranged to facilitate removal of tube bundles without disassembling piping. Arrangement shall be coordinated with electrical work to provide dedicated space for location of panels, conduit, switches, etc. Clearance required by NEC above and in front of electrical panels shall be provided.

1.4 Chimneys and Stacks. Stack height and size requirements shall be in accordance with TM 5-810-1, and Federal, State and local EPA regulations.

1.5 Ventilation. All ventilation systems shall be designed to conform to the requirements of NFPA Standards Nos. 90A, 90B, and 91.

1.6 Air Conditioning.

1.6.1 All air conditioning systems shall be designed to conform to NFPA Standards Nos. 90A and 90B.

1.6.2 Chilled water systems at Whiteman AFB shall employ an ethylene glycol solution. Strength of the solution shall be in accordance with the winter design temperature and the recommendations of the current ASHRAE Handbooks. Circulating pumps, chillers, and coils shall be increased in their size and capacity to handle the ethylene glycol solution. System make-up shall be by means of a pipe-mounted, hand-operated vane type pump located over a solution mixing drum. Include a note on the drawings or a paragraph in the specifications requiring final fill to be by actual measurement and that the ethylene glycol is to be Contractor-furnished.

1.7 Controls. Controls shall be in accordance with TM 5-815-3.

1.8 Gas Fitting.

1.8.1 Gas piping inside the building shall be designed in accordance with TM 5-810-6/AFM 88-8, Chapter 5, ANSI Z223.1 and NFPA 58. Gas piping will be indicated on the plumbing plan.

1.8.2 L.P. gas systems shall comply with ANSI Z223.1 and NFPA 58.

1.9 Gas Distribution Systems. Gas distribution systems shall be designed in accordance with TM 5-848-1/AFM 88-12, Chapter 1.

1.10 Steam and High Temperature Hot Water Distribution Systems.

1.10.1 Heat distribution systems shall be designed wherever possible with expansion loops, bends, and offsets, instead of expansion joints to reduce maintenance and eliminate manholes in underground lines.

1.10.2 Provide shutoff valves on both supply and return lines together with a drip trap for each building and branch mains. Valves shall be installed on building side of drip trap to prevent freezing in case of building deactivation. Heat distribution lines shall terminate within the building wall.

1.10.3 Branch takeoffs from mains shall be at points of minimum movement and expansion (i.e., near anchors or at center of expansion loops).

1.11 Air Pollution Control. Air pollution control shall be incorporated in ALL design, as applicable, from Federal, State, and local regulations and Standards, and as specifically instructed for the project. The most stringent of all regulations and standards, whether Federal, state, local, Using Service, or special instructions, shall be implemented into the design.

1.12 Seismic Design Requirements for Mechanical Piping and Equipment shall be in accordance with TM 5-809-10/AFM 88-3, Chap. 13.

2. PROJECT DEFINITION DESIGN (AIR FORCE PROJECTS ONLY).

2.1 Design Analysis shall consist of a narrative of the proposed mechanical systems. The narrative shall include an estimate of the heating and cooling loads and a preliminary selection of the type and size of mechanical equipment. The preliminary equipment selection shall be used to ensure adequate mechanical equipment room size and a reasonably accurate mechanical system cost estimate.

2.2 All Exterior Utilities shall be indicated on a drawing. This drawing shall indicate all new utilities, including tie-in points, and existing utilities which are to be removed or abandoned.

3. PRELIMINARY DESIGN (AIR FORCE PROJECTS ONLY).

3.1 Drawings. Floor plans of the mechanical systems shall be developed sufficiently to permit a meaningful evaluation of the proposed systems. See the Final Design paragraph for specific drawing requirements.

3.2 Design Analysis. A draft of the final design analysis will be prepared and will include the information required for the Final Design Analysis.

4. CONCEPT DESIGN (ARMY PROJECTS ONLY).

4.1 Drawings. Show on architectural drawings, plumbing fixtures and all major items of mechanical equipment, including boilers, boiler room equipment, equipment layout, air handling units, etc., as required, to determine proper space allocation within the intent of the architectural layout requirements. Separate mechanical drawings shall be prepared. Separate large scale mechanical plans may be necessary to show complex systems and/or functional diagrams. Basic design calculations must be made to determine selection of major items or equipment and/or systems for purposes of functional adequacy, location, space allocation, and estimating. Air distribution systems may be indicated using single line ducts.

4.2 Design Analysis.

4.2.1 The Design Analysis shall carry a complete narrative on the following items: criteria listing for basis of design; design conditions for basis of design; type of system; kind of equipment; outline of control description (if not on drawings); description and justification for connection to existing systems; and general calculations for determination of capacity of systems and/or major items of equipment. The Design Analysis shall also include air pollution control, listing of all regulations and criteria, interpretations, and work required for conformation thereto. List all required equipment with description of operation. Design shall be sufficiently complete to allow thorough review, not only by the District Office, but by the Using Agency and EPA.

4.2.2 Design statements and calculations shall be given in sufficient detail to enable the reviewing authority to get a clear picture and understanding of all included work so that approval will be specific.

4.2.3 Certain projects will require special design considerations to cover items unique to the individual case and full coverage of these items should be included in the Design Analysis.

5. FINAL DESIGN.

5.1 Drawings.

5.1.1 Design will be an extension of the concept submittal, incorporating all approved comments and any revised criteria, as directed by the District. All conflicts, lack of specific criteria, and/or direction, inconsistencies, ambiguities, and lack of thorough understanding of the nature and scope of work shall be resolved prior to starting final design work.

5.1.2 Do not show all mechanical phases on one floor plan unless nonconflicting. Plans, elevations, and sections shall be developed sufficiently to insure that major equipment items, piping, and ductwork cause no interference with structural members, electrical equipment, etc. Ducts shall be shown double line to indicate the full width of the ducts. All ductwork and piping shall be concealed or furred-in in housing, recreational, school, and administrative buildings, and in medical facilities except in equipment, utility, storage, boiler, and other rooms of this nature. Care shall be exercised that no heating or plumbing piping or ducts are located over transformers, panelboard, or other electrical equipment. For buildings where future expansion is contemplated, run piping, ducts, etc., where there will be a minimum of future revisions.

5.1.3 Provide sufficient details, control diagrams, sequence of control operation description, air flow diagrams, schedules, riser diagrams, piping diagrams and isometrics, etc., as necessary for a thorough design. Heating plans or schedules shall have necessary notes indicating entering air temperature, steam pressure, entering and leaving hot water temperature, mounting height and/or other information required to enable the Contractor to make proper selection of radiation, unit heaters, heating coils, or other equipment. The entering air temperature for sizing fin-tube radiation and unit heaters shall be the room design temperature.

5.1.4 Coordinate the plans with the specification and design analysis. Coordinate with architectural design for provision of access panels for all concealed valves, traps and air vents, etc.

5.1.5 Requirements for pipe sleeves and other openings as necessary for pipe, duct, and equipment penetrations through walls, floors, ceilings, and roofs shall be carefully coordinated with architectural and structural drawings and specifications.

5.1.6 In runs of pipe 50 feet and longer, or in shorter runs where required, indicate on project plans the location of all anchors, bends, loops, and expansion joints, to adequately limit and provide for pipe expansion. Do not use expansion joints in piping unless absolutely necessary and justified.

5.1.7 Where electrical apparatus and wiring are installed in hazardous area, as defined by Article 500 of the National Electrical Code, a note shall be shown on the mechanical drawings reading "See Electrical Drawings for hazardous area classification."

5.1.8 Indicate by means of light lines, the outline of all electrical panels and switchgear in the mechanical equipment and boiler rooms to eliminate the possibility of equipment interferences.

5.1.9 Location of ceiling diffusers, grilles, and registers shall be coordinated with electrical and architectural design to be included in the reflected ceiling plan.

5.1.10 Gas piping shall be shown on plumbing drawings. Gas distribution (external beyond 5-foot line) shall be shown on civil drawings.

5.1.11 The location of existing exterior utilities shall be thoroughly checked and indicated on plans and profiles to prevent interference with new utilities.

5.1.12 Detailed HVAC system sequence of control, schematics and diagrams are required to be placed on drawings.

5.2 Design Analysis.

5.2.1 The final design analysis shall be complete for every item of every system covered in the design, and will include, but not be limited to, the following:

5.2.1.1 List of design criteria.

5.2.1.2 Design conditions.

5.2.1.3 Type, selection, and capacity of system and kind of equipment, with operation description.

5.2.1.4 Basis of equipment and material selections.

5.2.1.5 List of manufacturer's make, model, and capacity (three required) for typical manufacturer's products, which may be supplied for each major item of equipment including selection of one used for space determination and capacity and efficiency ratings.

5.2.1.6 Control and operation description, with diagrams if not placed on drawings.

5.2.1.7 Complete design calculations and computations for all systems, including energy conservation measures considered, such as:

5.2.1.7.1 Plumbing. Determination of number of fixtures, cold water demand, hot water demand, pipe material selection, pipe sizing, equipment selection, etc.

5.2.1.7.2 Heating. Heat loss calculations, radiator sizing and selection, boiler sizing and selection, equipment and pipe sizing, pipe expansion considerations, etc.

5.2.1.7.3 Ventilation. Calculations, duct sizing, equipment sizing and selection, etc.

5.2.1.7.4 Air Conditioning. Cooling load calculations, total requirements, psychometric charts, basis and calculations of sizing and selecting compressors, equipment, systems, piping, etc.

5.2.1.7.5 Refrigeration. Load calculations, total requirements, selection and sizing of equipment and piping, etc.

5.2.1.7.6 Steam and High Temperature Water Distribution. Percolation tests for conduit determination, pressure drops, pipe sizing, expansion calculations, system justification, if required, system hydraulics, routing justification, load and flow calculations, zone control, etc.

5.2.1.7.7 Gas Distribution. Total loads, pressure drops, operating pressures, pipe sizing, system loading, justification, etc.

5.2.1.7.8 Air Pollution Control. Contaminant removal calculations, equipment selection, type of contaminant and removal requirements, Federal, State, and local regulation analysis, EPA testing requirements, justification for type of equipment, operational requirements, etc.

5.2.1.7.9 Fire Protection. Complete determination of requirements and design calculations.

5.2.2 Other pertinent information of value for future use in construction contract administration, substantiation of design methods, or permanent record shall be included.

5.3 Specifications shall be prepared in accordance with chapter: Specifications of this manual.

5.3.1 Air pollution control.

5.3.1.1 Necessary testing to prove conformance to EPA, state, and local standards and regulations shall be included in the contract specifications. Method of testing required by these regulations shall be specified.

5.3.1.2 Monitoring instrumentation as required by Federal, state, and local regulations and standards, and special instructions, shall be provided (i.e., smoke density recorders when a boiler burns coal or Grade No. 6 fuel-oil).

Chapter 12

ELECTRICAL

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Attachment:
12.1 Electrical Design Analysis Guide

CHAPTER 12

ELECTRICAL

1. GENERAL. This chapter covers instructions for the design of interior and exterior lighting and power systems, fire alarm systems, communications systems, lightning protection systems, energy monitoring and control systems, TV antenna systems, seismic considerations, cathodic protection and energy conservation features. The electrical design should be based on good design practices, ensure a safe system for the user, be economical and maintainable. For guidance on the design analysis and drawings, etc., see respective chapter on same. An ELECTRICAL DESIGN ANALYSIS GUIDE is attached.

1.1 Current Publications. Where reference is made to any publication, standard or code, or paragraph therein, the current issue, including any changes (Paragraph changes or additions) shall apply without further notice. See chapter: General Instructions, paragraph: Design Criteria, Regulations, Manuals and Standards.

1.2 Cross References in Design Documents. Duplication or repeating information or details from the specifications to the drawings or from drawing to drawing generally should be avoided. Where it is essential to call attention to information on another drawing or in the specifications, it is better to reference the drawing or specifications without repeating the information.

1.3 Computations. Computations shall include all formulas, data, assumptions and criteria used. Computations shall be presented in a logical, sequential format for ease of review. Computerized computations shall include a description of method, printout format, abbreviations, symbols, etc., to facilitate checking. Sufficient data must be included to allow calculations or spot checks to be performed by alternate manual or computerized methods. If the computation printout is lengthy, results shall be summarized and submitted with the printouts. See chapter: General Instructions, paragraph: Use of Computer-Aided Analytical Programs, and chapter: Design Analysis, paragraph: Preparation.

1.4 Interface Work. A site visit to verify site conditions and to collect (and corroborate) as-built drawings and data is required. Supplement with field sketches, notes, photos, video tapes where as-builts are incomplete or unavailable. Any work that requires connection to, or modification of, existing equipment or utilities, or interfacing with special systems or equipment shall be clearly identified in contract documents. It is the designer's responsibility to define the work so that it can be bid without a Contractor's site visit and such that it is not subject to interpretation. Capacities of existing equipment to support added burden shall be verified. Locations, quantities, sizes, conditions, types, etc., shall be shown on the plans. (Also see paragraph 8, Rehabilitation.)

1.5 Supplemental Legends. Additional symbols may be developed if the standard electrical legend sheet is not sufficient. If a supplemental legend is used, include cross-references on the standard legend sheet.

1.6 References Used. References are made in this section to other chapters, to guide

specifications or to other publications. Efforts have been made to verify that information is current, however, it is probable that some material will have been revised or reissued by the time design of a given project is underway. Unless directed otherwise, the latest criteria shall be used.

2. REQUIREMENTS FOR PRELIMINARY DESIGN STAGES.

2.1 Project Definition.

2.1.1 Utility Layout Sheet. Electrical work will typically be contained on a common sheet with other utilities. Show transformer location, routing of primary distribution and routing of communications service. Secondary distribution and lighting may be addressed by note in lieu of showing tentative layouts. Tentative transformer size should be identified.

2.1.2 Design Analysis Narrative. Electrical work should be described to the extent necessary to identify scope, proposed configurations, and tentative sizes of major equipment such that funding costs can be verified. The narrative should address exterior power distribution, exterior lighting, exterior communications, interior power, interior lighting, emergency power, communications systems, fire alarm systems, lightning protection systems, energy monitoring and control systems, TV antenna systems, cathodic protection, seismic and energy conservation considerations. General statements of intent are acceptable (Examples: Illumination in parking lots with 0.5 footcandle average from 150 W HPS roadway luminaries. Receptacle configurations will consist of conventional duplex outlets throughout administrative areas, single 20 A floor outlets at 40 foot spacing in corridors.) Designers intentions relative to special requirements or unique design features should be defined more specifically or in greater depth. Such areas might involve 400 Hz power, hazardous environments, security lighting, intrusion detection, UPS equipment, single point grounding, tempest vaults, filtered power lines, EMCS, surge protection, seismic treatment, etc.

2.2 Concept Design.

2.2.1 Interior Drawings. Interior Drawings shall show the following:

2.2.1.1 Typical lighting layout of each different type of illumination. An office, corridor, stairwell, utility room, bedroom and laundry room are examples of different types of illumination. The type of fixture shall be indicated on the drawing. Do not use manufacturer's names with "or approved equal" in schedules or notes. Standard Corps of Engineer fixtures should be used to the extent possible. A description or detail will be necessary for other fixtures.

2.2.1.2 Receptacle layout showing spacing and types of outlets.

2.2.1.3 Power equipment and layout such as switchgear, substations, large motor driven items, shop machinery, kitchen equipment, etc.

2.2.1.4 Power one line diagram shall be shown to indicate arrangement of the system.

2.2.1.5 Communications shall be briefly shown to indicate the designers estimate of requirements.

2.2.1.6 Miscellaneous details of special equipment and systems to indicate understanding of construction.

2.2.2 Exterior Drawings. Exterior drawings shall show the following:

2.2.2.1 Existing powerline(s) applicable to the facility.

2.2.2.2 Route of new line(s).

2.2.2.3 Location of new transformer.

2.2.2.4 Primary voltage of the system.

2.2.2.5 Secondary voltage to facility.

2.2.2.6 Indicate where overhead or underground construction is intended.

2.2.2.7 Show typical layout of lighting system with the pole and fixture type indicated.

2.2.2.8 General description of other appropriate items.

2.2.3 Design Analysis. See chapter: Design Analysis and attached "ELECTRICAL DESIGN ANALYSIS GUIDE."

3. REQUIREMENTS FOR FINAL DESIGN.

3.1 Drawings.

3.1.1 Interior Work. Drawings shall be complete and accurate in every detail and shall include arrangements and types of light fixtures, receptacles, switching, location of special features, necessary details, including legends, fixture schedule, panel schedules, one-line diagrams, layout or functional diagrams for each of the various systems, riser diagrams, connected load and estimated maximum demand for each panel and for the entire building, and any other information needed to develop a set of plans which will be clear, concise and correct. Except for smaller facilities, the power one-line diagram shall be on a dedicated sheet. All rooms must be identified by name and/or number. Full size plans shall be carefully laid out to avoid congested linework and notes that will be difficult or impossible to distinguish at half-size. Floor plans shall be developed on 1/4" scale, unless otherwise approved in writing, by the District. Separate floor plans must be provided for lighting, power, communications, and fire alarm systems. (Exceptions will be permitted for smaller facilities, with floor plans scaled at 3/8" = 1' or greater, larger facilities (such as warehouses) consisting of expansive areas with minimal electrical work, or for preliminary design.) If the design is complex

or involves several systems, consider separate plans for the special systems, and/or blowups of given areas, equipment elevations, installation details, functional layouts, etc.

3.1.2 Exterior Work. Drawings shall be complete and accurate in all details and shall include the alignment of overhead and underground systems, locations of poles, manholes and other important features in conformance with this chapter.

3.2 Design Analysis. See chapter: Design Analysis and attached "ELECTRICAL DESIGN ANALYSIS GUIDE." The design analysis shall contain a description and analysis of the electrical portions of the design. Special features, unusual requirements, etc., shall be noted. Any necessary deviations from criteria shall be explained either in the body or in an appendix. The format of the referenced "ELECTRICAL DESIGN ANALYSIS GUIDE" can be revised and the material consolidated into a narrative format rather than an outline if desired.

3.3 Specifications. See chapter: Specifications. If the referenced guide specifications are not sufficient to adequately define the electrical work, the designer shall prepare supplementary material. If the resultant supplementary provisions are not extensive, they may be inserted at appropriate locations into the standard guides; if not, as many new sections as necessary shall be developed in the format of the standard guides. If the amount of exterior work is minor, the guide specification pertaining to aerial and underground distribution may be combined, at the designer's option, into a single specification on exterior electrical work.

3.4 Presentation of Electrical Data.

3.4.1 General Requirements. When an extensive amount of design data is necessary to define electrical work, it should be organized into a tabular format (schedules, tables, etc.) if possible. The format should be easy to follow and remain legible when reduced to half (or 3/8) size and through several stages of reproduction (especially through several iterations of amendment/modification changes superimposed in succession on the previous revisions). Titles and headings should be informative and readily distinguishable (use larger, bold face type and/or different type styles) from the data itself. For electrical work, the minimum acceptable size for lettering on full size drawings is 5/32-inch with the line weight indicated in the chapter: Presentation of Data. The combined upper/lower case format is the standard format normally required for electrical notes, upper case lettering for titles or headings. However, it will not be mandatory that upper case notes be reworked if they are done at 1/8-inch minimum size, if text is not lengthy, and if notes do not include titles, names, brands, abbreviations, catalog codes or special designations that could be confused (i.e. Emergency Hotline, RAPCON, Sealtite conduit, USE cable, mW, MVA, etc.)

3.4.2 Typewritten Data - Specifications and Design Analysis. If typed data is to be inserted into specifications or design analyses, the original or a first generation copy must be used. Multicycled copies are not normally acceptable. Use of computer printouts, verbatim, should be limited to the appendix/calculations portions of design analyses. Since the hard copy off a typical dot matrix printer uses lightweight print, it is recommended that a darkened-up copy be made and inserted in lieu of the original. Original printouts from laser or bubble-jet printers may normally be

used. Input data and pertinent results contained within a mass of data must be flagged by underlining, boxing in, annotating, keying to numbers, or symbols, etc. (in addition to the requirement for summary sheets in Paragraphs 1.3 and 4.1.1.)

3.4.3 Typewritten Data - Drawings. When typewritten data is used on drawings, it must have a font and point characteristic so as to be easily readable. The determining criterion is that when formats containing typewritten data are used, the lettering quality must not be diminished when appearing in the half-size drawing folios (i.e. the size and line weight must be equal to or better than the typewritten technical provisions of the contract specifications.)

4. INTERIOR WORK. As a minimum, designs shall comply with the National Fire Protection Association (NFPA) Codes. Applicable criteria contained in Technical Manuals, ETL's, AEI, Military Handbook, etc., may exceed the provisions contained in the codes. The most stringent requirements shall be used.

4.1 Lighting Design. Lighting design shall be in accordance with the "Lighting Handbook", published by the Illumination Engineering Society, the "Architectural and Engineering Instructions, Design Criteria" (AEI) for Army Projects or Interim Military Handbook 1190, "Facility Planning and Design Guide" for Air Force projects published by the by HQUSACE, and the following criteria.

4.1.1 General Illumination. It is recommended that computations be based on the lumen method. The lighting system designed must be effective with the least efficient fixture that would comply with plans and specifications. If it is necessary to be restrictive on efficiency (such as requiring the use of a lamp with a "minimum" lumen rating) the plans and specifications shall be carefully prepared to insure that this result will be achieved. Fixtures shall be scheduled in the plans using a schedule similar to the one accompanying Standard Drawing 40-06-04, Appendix A. Computations may be done manually or by computer assisted techniques. Include calculations for each room in the Design Analysis.

4.1.2 Level of Illumination. For applications, use criteria and tables of AEI or Mil Hdbk 1190.

4.1.3 Luminaire Selection. Corps of Engineers standard fixture types as contained in standard drawing series 40-06-04 are to be used whenever possible. Applicable standard drawing sheet numbers are to be inserted in the guide specification. A legible copy of each sheet shall be included in the "proof" copy of specifications used for reproduction. Non-Corps of Engineers light fixture types may be used if a Corps type is not available or is not suitable.

4.1.4 Energy Efficient Lighting.

4.1.4.1 Application Requirements. Refer to the conservation requirements in Chapter 12 of the AEI and to current ETLs. Fluorescent and high pressure sodium vapor lamps should be specified except in cases where color rendition is critical. Avoid the use of incandescent lamps, low efficiency mercury vapor lamps and low efficiency ballasts. Consider the use of low

energy ballasts, and multiple switching of lamps, ballasts, or fixtures. See chapter: Energy Conservation, for coordination of energy conservation requirements. Use
34 watt energy saving fluorescent lamps with matching energy efficient ballasts in lieu of using the conventional 4-foot 40-watt lamp. Energy saving lamps shall not be used for applications involving temperatures below 60°F., strong drafts, low line voltages, emergency lighting systems (inverter supplied), or dimming systems. Energy saving fluorescent lamps must not be retrofitted into fixtures manufactured prior to 1978 since the ballasts will be stressed beyond design limits and will fail at an accelerated rate. If energy efficient lamps are to be used, the existing ballast must be replaced with an energy saving type or a conventional 40-watt ballast that is rated for use with either standard 40-watt lamps or the 32/34-watt energy saving type.

4.1.4.2 Design Calculations. Corps of Engineers Guide Specification 16415 requires rapid start type fluorescent lamps having standard cool white color characteristics. Use lamp lumens in the design calculations corresponding to this type of lamp (for example: 34WT12CW lamps having approximately 2850 initial lumens) unless other criteria requires color characteristics differing from cool white. If it does, indicate what criteria requires it and coordinate the requirement with the specifications. Provide lamp data with the design calculations.

4.1.5 Branch circuit loading supplying light fixtures shall not exceed 80 percent of the circuit capacity.

4.1.6 Emergency and Egress Lighting.

4.1.6.1 General. Emergency lighting systems, egress lighting, and exit signs shall be provided in accordance with the requirements of NFPA 101. Illumination at points of egress must be a minimum of one foot-candle. Use fluorescent fixtures whenever possible. Fixtures containing radioactive materials are not acceptable.

4.1.6.2 Backup Power Provisions. Usually, fixtures with self-contained battery/inverter backup or battery operated emergency light sets will be used. (Coordinate type with user.) Central battery invertor systems (see Paragraph 4.14) may be used in facilities where it is economically justified and it is agreeable with the user. Generator supplied power can be substituted for battery backup when authorized in the project and if the generator would be capable of supporting the load within 10 seconds of a loss of normal power and if terminals or a receptacle were provided to connect a temporary alternate source during a maintenance shutdown.

4.1.7 Self-ballasted mercury vapor lamps shall not be used in new design.

4.2 Power Receptacles.

4.2.1 Single and duplex receptacles for general purpose applications shall be 15 or 20 amp, 125 volt, 2-pole, 3-wire grounding type. In general, a maximum of nine (9) duplex receptacles may be connected to a receptacle circuit, however, 5-8 receptacles is the preferred range for most circuits. Where a circuit is designed for shop type equipment (such as electric drills,

soldering irons, woodworking tools, etc.) maintenance equipment, appliances, test instrumentation, medical apparatus, etc., as few as one or two receptacles might be acceptable. The number of receptacles per circuit shall be the designer's judgment, based on economics and the above generalities. Receptacle circuits shall not supply lighting loads. Receptacles shall be located where required by specific design criteria. In offices, receptacles on walls shall be twelve (12) feet maximum on centers. In other areas, if not specified by the NEC or other criteria, receptacles may be up to twenty (20) feet on centers.

4.2.2 Other receptacles (including special purpose or heavy-duty) of twenty (20) amps or more shall be designed to suit the equipment served. Floor cleaning receptacles (simplex configuration, 20 A, 120 V, 1600 W load) should be furnished in larger facilities (10,000 sq. ft.) and considered for smaller buildings. Place at 40 foot maximum intervals in corridors.

4.3 Miscellaneous Apparatus.

4.3.1 Fixed Equipment. Circuit conductors and over current protection shall conform to applicable NEC requirements.

4.3.2 Heating Appliances. Electric heating will be limited to supplemental uses unless specifically authorized.

4.3.3 Transformers. General purpose dry type transformers should be sized so that the maximum continuous load would not exceed 80 percent nameplate.

4.4 Motors and Related Equipment.

4.4.1 Sizes and capacities shall be based on the most efficient equipment currently available.

4.4.2 Reduced Voltage Controllers. Use shall be based on motor locked rotor current. See CEGS 16415 for criteria to use for determining the need for reduced voltage controllers.

4.4.3 Calculations. For projects that will have a number of motors, a recap sheet should be included.

4.5 Panelboards. Panelboards schedules shall be shown on the drawings.

4.5.1 The following minimum information shall be shown on the schedules: The circuit numbers, size (amperes), number of poles, load (volt-amps), a description of the load, connected load, estimated maximum demand load, panel nomenclature, voltage characteristics, amperes characteristic, main circuit breaker or main lugs only, integrated short circuit rating, enclosure type, ground bus (if required), and any special features such as shunt trips, GFCI, SWD duty, etc.

4.5.2 Sizing Calculations. Size the panel boards based on estimated maximum demand plus spare demand. The demand factors in the NEC may be used as applicable. TM 5-811-2 provides some demand factors that may be used, as applicable. Generally, spare capacity should not

exceed 20% unless otherwise authorized. Panelboard neutrals should be double size when supplying harmonic current loads.

4.5.3 Design of Panelboards shall result in a balanced panel, as near as practicable.

4.5.4 Spare Circuits shall be provided as follows: Schools, Office, Dormitory, Mess Hall, one spare for six (6) active. Shops, manufacturing, hangars, etc., one spare for four (4) active. Flush mounted panels that are inaccessible for future addition of wiring may have empty conduits stubbed above ceilings to allow additional circuits to be installed.

4.6 Feeders and Branch Circuits.

4.6.1 Sizing - General. Sizes shall be based on the load supplied (Panelboard EMD) and voltage drop.

4.6.2 Neutral Sizing. The use of full size neutrals shall be standard practice. Include back-up data in the Design Analysis for all cases where reduced neutrals have been permitted. For all applications involving discharge type lighting (fluorescent, HID) or other harmonics generating equipment (invertor, variable frequency drives, other solid state apparatus), the neutral must be treated as a current carrying conductor (see NEC Table 310-16. In 4 wire 3 phase systems supplying harmonic current loads, the neutral conductor should be sized not less then 173% of the phase current. For single phase to ground loads, a separate neutral conductor should be provided for each phase conductor in its respective branch circuit. Refer to CEGS 16415 and to ETLs for additional harmonic load design information and recommendations.

4.7 Service and Metering Equipment.

4.7.1 The use of a Main Distribution Panel is the recommended design practice in lieu of separate switches interconnected with wireway and/or conduit and wire.

4.7.2 Ground fault protection shall be provided in accordance with NEC 230-95.

4.7.3 Location. Service equipment and disconnecting means shall be readily accessible (NEC 230-70). Equipment shall be located in rooms dedicated exclusively to such equipment (AEI - Chapter 12, Paragraph 2(g)(1)).

4.7.4 Emergency and Security Systems. See appropriate paragraphs concerning "Emergency Power Supply" (4.14) and NEC 700. When a tap is made upstream of the facility main disconnecting means, a disconnect for the emergency system must be located within 10 feet of the tap (or 25 feet maximum if the ampacity of the cable to the switch is at least 33 percent of the service size). Provide current limiting fuses in the disconnects for all taps.

4.7.5 Three phase design shall be provided where the service is large and/or equipment to be served is designed for three-phase power.

4.7.6 Secondary Voltages Over 250 Volts. Where the load exceeds approximately 112-

1/2 KVA, the designer should consider 480Y/277V (or 480V) systems. The 480V and 277V loads must predominate over 120V loads. Dry-type transformers shall be used to supply 120-, 240-, or 208-volt single-phase loads. Ungrounded secondary systems shall not be used unless required by project criteria or approved in writing. Ungrounded secondary systems shall only be used where it is essential that service to critical operations or processes not be interrupted. Provide 'K' rated Delta-wye transformers when the harmonic loads warrant their use. Refer to ETLs for information and recommendations on determining the k-factor rating.

4.7.7 Service Entrance Conductor. Size per Paragraph 4.6.1 above.

4.8 Short Circuit Analysis (Low Voltage). (Coordinate with requirements of paragraph 6.10.)

4.8.1 Basic Requirement. Short circuit computations shall be provided with the Design Analysis.

4.8.2 Calculation Procedures. Computations shall be performed in accordance with standard engineering practices using a method chosen by the designer. Calculations shall show maximum available fault current at the service equipment and downstream to verify interrupting device capacities and equipment bracing requirements. Computations should be based on an infinite bus source unless the source is verified by the local utility company. The source as verified by the local utility company should include forecasted growth of the utility system.

4.8.3 Interrupting Ratings. Equipment ratings shall be determined based on results of the above analysis. Minimum standard interrupting ratings shall be identified on the plans in panel schedules. The designer shall identify variables (such as equipment impedances) which could affect available short circuit current and ascertain that equipment acceptable under contract plans and specifications would not permit fault current levels higher than the specified interrupting ratings. The Contractor could also be given the option to furnish equipment with lower impedances subject to upgrading equipment ratings in accordance with a detailed fault analysis prepared by the Contractor and approved by the District.

4.9 Protective Coordination. The proposed electrical distribution design must be analyzed to determine the most advantageous locations, sizes, settings for overcurrent devices, relays, ground fault equipment, etc. as applicable. The scheme must be compatible with primary system coordination (see paragraph 6.10). Requirements shall be defined by the designer. The Contractor will be assigned responsibility to verify the configuration by performing a short circuit and coordination study based on the specific electrical and mechanical equipment he selects. If connection is made to, or will affect, existing installations, the scope of the evaluation must include the existing system or equipment.

4.10 Voltage Drop.

4.10.1 Primary (over 600 volts) distribution system design shall be based on a maximum of 2% voltage drop.

4.10.2 Secondary (600 volts or less) distribution and branch circuit system design shall be based on a maximum of 5% voltage drop from the transformer to the utilization equipment. This should be split such that there will be 2% or less voltage drop from the transformer (service drop, service entrance, etc.) to the branch circuit panelboard (proportioned most economically between the service and feeder conductors) and 3% voltage drop or more on branch circuits.

4.11 Communications.

4.11.1 Provide complete riser diagram for each system. Identify location of components by room number. Identify equipment, raceways, and conductors types and sizes.

4.11.2 Telephone/Data. The communication system design shall comply with TM 5-811-9, NEC ART 800, Corps of Engineers Specifications, AF ETL 87-9 (Air Force projects), and applicable regulations. The design for Air Force and Army projects shall form a complete communications system, including, but not limited to, wires, terminations, raceway, cabinets, and outlets, as determined by the criteria for each project. The designer shall consult with the Using Agency to verify communication requirements.

4.11.2.1 Outlets, Cabinets, Distribution Frames, or Backboard Protectors, etc. Locations prior to final design shall be provided in accordance with designer's best estimate of the communications requirement. This is necessary for cost estimation. Final locations should be furnished, or agreed to, by the Using Agency prior to final plan submittal.

4.11.2.2 Wiring. All raceways, cabinets, backboards, distribution frames and outlets will be designed with necessary wiring for a complete communication path.

4.11.2.3 Raceway System. The communications systems wiring shall be installed in raceways and cable trays in conformance with criteria.

4.11.3 Public address systems, when required, shall be provided in accordance with Guide Specification 16770.

4.12 Fire Detection and Alarm System shall generally be provided for all facilities in accordance with AEI for Army projects and Mil Hdbk 1190 for Air Force projects. Also see paragraph: Fire Protection of this chapter.

4.12.1 Drawings shall show the disconnect switch, control provisions (FAC), annunciation provisions (FAA), signal transmitting provisions (FST), manual fire alarm stations, signaling devices, and detecting devices. Interconnecting wiring shall normally not be shown on the floor plan. Provide a riser diagram showing interconnection and the location of the above components.

4.12.2 Disconnect Switch. The fused disconnect switch(es) shall be marked, located, and identified in accordance with NFPA 72.

4.12.2.1 If the building service is less than 250 volts, provide a current limiting fused switch connected ahead of (not within) the Service Equipment.

4.12.2.2 If the building service is 480Y/277V, provide a current limiting fused switch connected ahead of (not within) the Service Equipment, supplying a (277 volt to 120 volt) dry type transformer connected to provide 120V single phase to the fire alarm system, via a fused switch or panelboard.

4.13 Low Voltage Power Switchgear and Switchboards. Power distribution equipment shall be provided in accordance with Guide Specification 16415, paragraph entitled "Power-Switchgear Assemblies." For details of design, refer to the NEMA Standards Publications, PB-2 and SG5, current editions, and appropriate manufacturer's catalog and specifications. In general, switchboards should not be used for loads of less than 800 amperes. Drawings showing plan and elevation view and one-line diagrams of all switchgear with dimensions are recommended. The designer should verify equipment dimensions to ensure that required working space and safety clearances can be maintained with any manufacturers equipment. If in doubt, identify dimensional limitations.

4.14 Emergency Power Supply shall be either the instantaneous emergency AC power battery inverter type, or automatic standby AC generator.

4.14.1 Battery Powered Equipment. Individual built-in battery unit type fixtures (Emergency Light Sets) and integral battery/inverter emergency units within lighting fixtures may be used for emergency lighting (see paragraph 4.1.6.2). Battery inverters supplying emergency panels should be sized on the basis of connected load (including spare circuits if any). An overcurrent breaker, fuse, or relay sized to trip on continuous loading exceeding 97 percent of rated inverter output shall be installed at the inverter or panel. If it would be physically possible to insert a higher amperage device, include a label stating the maximum permissible size. The system shall have normal AC power supplied from a fused switch connected ahead of the main service equipment, not within the service disconnecting means (NEC 700-12(e)). Ventilation shall be provided as necessary, to prevent the build up of gases resulting from the charging of batteries.

4.14.2 Standby Generators. Where automatic standby AC generated power is authorized or available, a battery system will not normally be required (see paragraph 4.1.6.2).

4.15 Hazardous Applications. The type (Class, Group, Division, Maximum Temperature) of hazardous environment applicable should be identified on the plans and the boundaries of the area(s) delineated.

4.16 Aluminum Conductor Option. Sizing of wiring, conduit, and related items is to be based on copper conductors; however, project documents should permit substitution of the ampacity equivalent in aluminum sizes for all copper sizes #6 AWG and larger for all projects, except Air Force and hospital projects. For Air Force projects, the aluminum option shall be restricted to the ampacity equivalents of #4 copper and larger. Aluminum conductors shall not be installed in hospitals.

4.17 Raceway. Raceway sizes shall be determined using the tables in Chapter 9 of the NEC. To reduce the possibility of insulation damage, it may be necessary for some long runs or runs with more than two bends, to size the raceways one or two sizes larger than the NEC minimums. Underground conduit shall be sized on the basis of type USE cable.

4.18 Equipment Rooms or Spaces. Equipment shall be located in rooms or space dedicated exclusively to such equipment (NEC 384-4). The dedicated rooms or space shall be coordinated with other disciplines and shall be indicated as such on the drawings. Refer to AEI, chapter 12, paragraph 2.g.1. The electrical designer must verify that adequate ventilation is available particularly when electrical apparatus is added to existing equipment rooms or is to be placed in closets.

4.19 Data Processing Applications. Provide capability of shutting off service to computer equipment by means of a shunt trip main circuit breaker controlled by pushbuttons (or similar arrangement) located at the exits of the computer equipment area (NEC - Article 645). Emergency Power OFF (EPO) pushbuttons shall be of the extended guard style, and shall have a safety cover to prevent accidental disconnection.

5. EXISTING PRIMARY DISTRIBUTION SYSTEM VOLTAGE shall be obtained by contacting the Using Service or the local power company.

6. EXTERIOR SYSTEMS. As a minimum, the designs shall comply with the American National Standard "National Electrical Safety Code," ANSI C2, and the "National Electrical Code," NFPA No. 70. Applicable criteria contained in Technical Manuals, ETL's, AEI, Military Handbook, etc., may exceed the provisions contained in the codes. The most stringent requirements shall be used.

6.1 Secondary Services. Secondary services (less than 600V) shall be designed as directed or as follows:

6.1.1 Underground services should be used in most instances. Conductor size shall be based on the building estimated maximum demand (EMD).

6.1.2 Overhead services (service drop 600 volts or less) should be used in industrial-type areas where appearance is not a significant factor or when underground service is too costly. Conductor size shall be based on the building estimated maximum demand (EMD). Normally aerial secondary conductors will be the neutral supported secondary and service drop type. Refer to CEGS 16370.

6.2 Primary Service. Primary service (over 600 volts) to a building normally will not be used because transformer installations in doors cost more than those installed outdoors; however, secondary feeder lengths may require an interior location or make interior transformer installations economical in some cases. Therefore, unless an economic analysis can support an indoor service transformer location, or it can be justified by an approved engineering analysis, the installation must be located on the exterior of the building.

6.3 Transformer Stations. Transformer stations shall be shown on the drawings. Selection and application shall conform to Chapter 8 of TM 5 811-1, the National Electrical Code (NFPA 70), the National Electrical Safety Code (ANSI C2), MIL-HDBK-1008B, and CEGS 16370 & 16375.

6.4 Overhead Distribution. Design shall be based on the National Electrical Safety Code, Guide Specification 16370, TM 5-811-1 and as follows:

6.4.1 REA standard drawings for line construction may be used, as applicable. Structure details shall be shown on the construction drawings in lieu of referencing the REA details. Do not show manufacturer's names on details or in schedules of materials.

6.4.2 Poles shall be of the wood species shown in Guide Specification 16370. All wood options shall be retained in the specification. All poles shall be numbered for identification. A pole schedule must be shown on plans for projects having five or more poles, indicating pole number, pole length, pole class, and other descriptive details, as applicable. Guy strengths shall be shown on the plans.

6.4.3 Computations for pole length and class, and guy strengths shall be included in the Design Analysis.

6.4.4 Communications Space shall be provided on all poles, except as directed otherwise.

6.4.5 Communication System. The system (cables, structures, etc.,) shall comply with the U.S. Department of Agriculture, Rural Electrification Administration Specifications, where applicable. Communications conductors or cable shall be included in the project unless specifically directed otherwise,

6.4.6 Transmission Line Design (voltages in excess of 15 KV). The design of these lines shall comply with applicable REA Bulletins and Forms.

6.4.7 Overcurrent protection shall be provided at aerial to underground transitions in a distribution system to avoid reclosing on a fault in an underground cable.

6.4.8 REA Publications are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20013.

6.5 Underground Distribution. Design shall be based on the National Electrical Safety Code, TM 5-811-1, Guide Specification 16375 and as follows:

6.5.1 Primary cables shall be installed as specified in Guide Specification 16375.

6.5.1.1 Direct burial installations shall not be specified unless directed in writing.

6.5.1.2 Installations shall be in concrete-encased duct banks or rigid steel (heavy

wall) conduits.

6.5.1.3 Manhole design shall conform to TM 5-811-1 and CEGS 16375. The designer shall provide manholes adequately sized for the intended purpose.

6.5.1.4 Conductor insulation shall be cross-linked polyethylene with option of polyvinyl or polyethylene jacket or jacketed ethylene propylene where electrical characteristics are more significant than physical durability. Insulation level shall be 133%.

6.5.1.5 Conductor size shall be #2 AWG minimum for 15 KV class, #6 AWG minimum for 5 KV class. Design documents shall permit the use of single conductor cable rather than being restricted to the multiconductor construction.

6.5.1.6 Shielded conductors shall be provided in accordance with Guide Specification 16375. Potheads shall not be specified to the exclusion of other type of terminations.

6.5.2 Duct Bank. Conduits shall be specified as shown in Guide Specification 16375. Retain all allowable material options in specification.

6.5.2.1 Configuration shall be shown on the drawings.

6.5.2.2 Reinforced concrete encased duct banks are required under Aircraft Paving and Railroads. Where reinforced concrete is required, it shall be designated on the drawings.

6.5.2.3 Manhole spacing shall be not more than 500 feet. Manholes shall not be installed in aircraft paving.

6.5.2.4 Existing aircraft paving or railroad. When paving or railroads are in place, the options for conduit installation shall be: a carrier pipe drilled or augered under; pushing of pipe or conduit under; or paving cut and replacement where approved.

6.5.3 Secondary Cable. Utilize type USE cable for underground installations whether in conduit or direct buried. For direct burial depth, verify frost depth applicable to the area.

6.6 Exterior Illumination. Design shall be based on Guide Specifications 16528 and the IES Manual.

6.6.1 Luminaire Selection. Light fixtures shall be enclosed in lieu of open type. See Paragraph 4.1.3 "Luminaire Selection" for guidance. Insert applicable sheet number of standard drawing series 40-06-04 in the specifications.

6.6.2 Lamps shall generally be high intensity discharge or fluorescent, in lieu of incandescent.

6.6.3 Circuit Configurations. The supply circuit shall be multiple type for new facilities,

series should be limited to rehabs or expansions of existing.

6.6.4 Street (Roadway) Lighting. If power lines run parallel to a roadway, it is preferred that luminaries be installed on the distribution poles. Where power poles are not available or use is restricted, separate poles should be provided. See Paragraph 6.6.5.2 below.

6.6.5 Area Lighting.

6.6.5.1 General. Area lighting type luminaries shall be provided in areas where general illumination is desired and walkway, parking lot, and/or street lighting is not considered sufficient. Luminaries mounted on the exterior of a building may be used as part of, or to supplement, area lighting. Illumination level should not exceed an average of 0.5 footcandle without specific direction.

6.6.5.2 Pole Design. It shall be coordinated with each facility to determine the type, material, color, etc. of poles and fixtures that coordinate with their facility comprehensive plan.

6.6.6 Parking Lot Lighting. Illumination shall be provided for all parking areas unless directed otherwise. Target level should be 0.5 footcandles average (horizontal) except at handicapped spaces where 1-2 footcandles is desirable.

6.6.7 Walkway Lighting. Provide if other lighting is not adequate for walks.

6.6.8 Concrete footings for luminaire standards shall be a part of the design and detailed on the drawings.

6.7 Surge Arrestors. Standard practice shall be to require arrestors at all overhead to underground transition poles and at transformers. Arrestor sizes are to be shown on plans. Refer to TM 5-811-1 for sizing arresters.

6.8 Cathodic Protection.

6.8.1 Cathodic protection design shall be prior to advertisement of the project in accordance with ETL 91-6 for Air Force projects and ETL 1110-3-440 for Army projects. Refer to TM 5-811-7 for additional design guidance.

6.8.2 Cathodic protection design shall be accomplished by a NACE certified specialist. The corrosion specialists accreditation must have been obtained in the field of cathodic protection. In lieu of the NACE accreditation the person doing the design must have at least 5 years of experience in the design of cathodic protection systems and be qualified by having a state license or certification to perform such design. The designer's qualifications should be furnished with the design calculations in the design analysis.

6.9 Metering. On Army and Air Force projects, kWh meters with 15-minute demand register

shall be installed on all new buildings with capability of connection to EMCS equipment. On Army projects, kWh meters with 15-minute demand register will be installed at each substation, at each feeder leaving the substation, and at large unique structures such as commissaries, medical facilities, and dining facilities. Coordinate with each facility to determine EMCS requirements for a specific project.

6.10 Short Circuit Analysis and Protective Coordination (Medium Voltage). Short circuit calculations should be performed for the exterior portions of the distribution system as part of or similar to the analysis performed on the interior portions (See paragraph Short Circuit Analysis (Low Voltages)). Sizes, settings, locations of protective devices should be determined based on a coordination study that considers the total system both interior and exterior (see Paragraph Protective Coordination). The sizes and settings selected by the designers will be tentative until the final configuration is determined from a short circuit/coordination study performed by the Contractor after equipment has been selected and approved (see Guide Specifications 16370/16375).

6.11 Grounding of Guy Wires. Guy wires connected to structures supporting conductors with a potential of more than 300 volts shall be effectively grounded as follows:

6.11.1 In soils with resistivity of 30,000 ohm-cm or greater, guy wires may be connected to the system neutral if the system neutral is solidly grounded. Guys may also be grounded through the pole ground wire if the pole ground wire is connected to a grounded neutral (preferred method). In either case, the connection to the guy wire itself should be coated with a silicone grease or other water inhibitor.

6.11.2 In soils with a resistivity of less than 30,000 ohm-cm and where corrosion of underground structures is a problem, galvanized anchors and guys should not be connected to copper grounding systems since severe corrosion may result. Strain insulators should be installed in the guy wire in lieu of grounding. Insulators may be either the cross-connected porcelain type ("Johnny ball") or the fiberglass rod type, however, the flash over rating (wet) must be equal to the phase-to-phase voltage of the electrical circuit.

6.11.3 On systems where a grounded neutral is not present, the above mentioned guy insulators should be installed. If this is not possible, then the guy must be grounded and galvanized ground rods must be used.

6.12 Lightning Protection System.

6.12.1 Ammunition plant design shall comply with AMCR 385-100 Safety Manual as directed by the Using Service.

6.12.2 In general, other facilities will require protection as determined by the criteria in Army TM 5-811-3 or when so directed by the Using Service.

6.12.3 Storage tanks shall be grounded. They will not require air terminals if the cover is more than 3/16-inch thick.

7. MASTER TELEVISION ANTENNA SYSTEMS shall comply with Guide Specification 16781, except as follows:

7.1 Outlet Location shall be shown on the drawings.

7.2 Guide Specifications shall be edited to provide a performance specification.

7.3 Design Details or Computations shall not be provided by the designer.

7.4 Antenna Location shall be determined by the installer in the field for best reception.

7.5 Channel Selection shall be coordinated with the Using Agency and shall include educational stations, provisions for stations under construction, and future additions.

8. REHABILITATION (INTERIOR AND/OR EXTERIOR).

8.1 Field Survey. Design shall be based on a complete field survey.

8.2 Power Study. An electrical power study shall be made to determine the existing system load (Estimated Maximum Demand (EMD)).

8.3 Equipment Removal.

8.3.1 Existing wiring shall be removed and not reinstalled.

8.3.2 Light fixtures removed and reinstalled shall be cleaned and relamped.

8.3.3 Conduit shall not be reused unless verified suitable for use.

8.3.4 Switches and Receptacles (wall and duplex) under 30 amps shall not be reused.

8.4 Government Property. Equipment and material removed and not reinstalled shall be coordinated for proper disposition and the drawings and specification prepared to agree.

8.5 As-Built Plans used for design shall be verified in the field, and where used to show removal or new work, the existing legend symbols, details, etc., shall be revised or added to as directed or required.

9. ENERGY MONITORING AND CONTROL SYSTEM (EMCS). All projects on posts or bases that have an EMCS in operation or a proposed system, shall be designed for inclusion in the EMCS and shall be specified to have the proper connection points, terminals and/or contacts necessary for tie-in to the EMCS. Refer to CEGS 13814 for building preparation for EMCS.

10. FIRE PROTECTION. For fire protection criteria refer to AEI, chapter 9. For fire pump applications, electrical service, sizing of transformers, etc., must conform to NFPA-20.

11. STANDBY GENERATORS. Generators shall be derated for altitude in the same manner specified for motors in CEGS 16415, Electrical Work Interior. Generators shall also be derated, per manufacturer's recommendations for supply harmonic current loads. Diesel-Generator sets, stationary, shall be specified in accordance with Guide Specification CEGS 16263 for 100 to 2500 kw sizes and Guide Specification CE 16264 for 10-99kw sizes.

12. ENERGY CONSERVATION.

12.1 Components, Materials, System Configurations, Etc., Selection. In the selection of components, materials, system configurations, etc., the designer must include energy conservation in addition to first cost reliability, safety, and other factors which influence engineering decisions. The design analysis must address energy conservation as a specific topic and indicate the extent to which the following may have been implemented or considered:

12.1.1 Use of current AEI and Mil Hdbk 1190 illumination levels for basis of design.

12.1.2 Photoelectric devices, occupancy sensors or time switches to control duration of lighting.

12.1.3 Efficient luminaries, ballasts or switching arrangements.

12.1.4 Timers, thermostats, etc. to control cycling of water heaters or other electric appliances, power factor correction, demand monitoring, energy monitoring equipment.

12.2 Energy Conservation Checklist. If an Energy Conservation Checklist is included in the design package and it includes electrical items, reference may be made to the checklist rather than repeating specific items.

13. SEISMIC CONSIDERATIONS. All electrical work must have the capability to support seismic loading. The seismic zone applicable to a given facility should be determined from Table 3-1 of TM 5-809-10, "Seismic Design For Buildings." All facilities must conform to the seismic requirements of the applicable zone as defined in TM 5-809-10 and CEGS 13080 "Seismic Protection for Mechanical, Electrical Equipment."

ELECTRICAL DESIGN ANALYSIS GUIDE

INSTRUCTIONS TO DESIGNER

1. It is intended that this guide be used as a basic editing text for preliminary plans, in progress plans, basis for design, final plans, etc. The format is not mandatory, see Paragraph Design Analysis of Chapter: Electrical.

2. Edit each paragraph (if necessary) by deleting or adding to make paragraph apply. Cross out unwanted options and phrases. Add additional system descriptions as required.

3. On Preliminaries, Basis for Design, or In-Progress documents, include lighting fixture standards or other details as an attachment to Design Analysis.

4. Limited design details shall be included from the appropriate guide specs.

ELECTRICAL DESIGN ANALYSIS

1. General. This design is based on, but not limited to the following publications, codes, specifications, etc.; (List only references not included in General Section of Design Analysis) (Date all references).

1.1 National Electrical Code NFPA No. 70. 19

1.2 Life Safety Code NFPA No. 101. 19

1.3 National Electrical Safety Code (ANSI) C2-19

1.4 Air Force Military Handbook 1190

1.5 HQUSACE Architectural and Engineering Instructions - Design Criteria, latest version.

1.6 Project Development Booklet (PDB)

1.7 Criteria furnished by Using Service.

1.8 Field Survey Report.

1.9 Other appropriate references.

2. Scope. This design will generally consist of the following:

2.1 Interior.

2.1.1 Illumination.

2.1.2 Raceway systems and conductors

2.1.3 Power systems for special equipment and standard receptacles.

2.1.4 Emergency power systems (Battery Operated Invertor AC power system)

2.1.5 Fire Alarm. (Describe zoning concepts and operation of system and interfaces to other systems such as HVAC. Include description of transmission system to the Central Fire Station)

2.1.6 Television System.

2.1.7 Public Address System.

2.1.8 Intercommunication System.

2.1.9 Communication System.

2.1.10 Standby Emergency Generator.

2.1.11 Seismic Requirements.

2.1.12 Lightning Protection.

2.1.13 Energy Monitoring and Control System (EMCS).

2.2 Exterior.

2.2.1 Primary (overhead) (underground) service and distribution.

2.2.2 Secondary (overhead) (underground)

2.2.3 Illumination (Street) (Parking) (Walkway)

2.2.4 Transformer Station.

2.2.5 Substation.

2.2.6 Cathodic Protection of underground ferrous metal pipes and tanks.

3. Interior Work.

3.1 Illumination will be as follows:

Light Fixture Schedule

Rm Name and No.	Description	Lamp type	Design Foot Candles

3.2 Provide description of illumination.

3.2.1 Provide complete computation of intensity for each room or area.

3.2.2 Egress illumination (See NFPA 101) will be provided in corridors, stairwells (list other applicable areas) etc.

3.2.3 Exit sign illumination (See NFPA 101) will be provided over exterior entrance doors, corridor intersections, stairwell entrances, etc. (list other appropriate locations). Describe source of power.

3.3 Raceway System will be as follows:

3.3.1 Intermediate Metal Conduit (IMC)

3.3.2 Electric Metallic Tubing (EMT).

3.3.3 Rigid Metal Conduit (Heavy Wall).

3.3.4 Rigid Nonmetallic Conduit (Plastic).

3.3.5 Surface Raceways (Wiremold).

3.3.6 Underfloor Raceways.

3.3.7 Cellular (Metal)(Concrete) Raceways.

3.3.8 Wireways.

3.3.9 Busways.

3.3.10 Cable Tray.

3.4 Conductors design will be based on copper.

3.4.1 Conductor identification in systems shall be color coded. The color of the insulation of the ungrounded conductors of different voltage systems shall be as follows:

120/208 volt, 3-phase: black, red, and blue; phases A, B, & C, respectively
277/480 volt, 3-phase: brown, orange, and yellow; phases A, B, & C, respectively
120/240 volt, single phase: red and black; phases A and B.

When 120/208 volt and 120/240 volt systems exist in the same project, colors other than red and black for the 120/240 volt single phase system will be used.

3.4.2 Nonmetallic Sheathed Cable will be used in the following areas _____.

3.4.3 Wire size based on 60°C Ampacity Column, for No. 1 AWG and smaller and 75°C Ampacity Column for larger than No. 1 AWG.

3.5 Receptacles will be as follows:

3.5.1 Grounding Type (15) (20) Ampere, 125 volts, three-wire.

3.5.2 Switched receptacles ( ), ( ).

3.5.3 Weatherproof receptacles ( ), ( ).

3.5.4 List other receptacles required through 50 amps.

3.5.5 List Special Purpose or Heavy Duty Receptacles.

3.6 Wall switches will be rated 120 volt (15 or 20 ampere) 277 volt (15 or 20 ampere).

3.7 Service equipment and disconnecting means shall be of the fusible switch or circuit breaker type.

3.8 Panelboards.

3.8.1 Lighting and appliance branch-circuit panelboards will be circuit breaker type.
3.8.2 Distribution, power and feeder panelboards will be fusible switch type.

3.8.3 Load-center Panelboards will not be used, except for residential applications.

3.9 Switchboards (NEMA Standard PB2 Dead Front Distribution Switchboards). Enclosures shall be freestanding ventilated general purpose type. Buses will be optional copper or aluminum. (Provide additional description as may be required).

3.10 (Underground service) (Overhead service drop) to the building will be provided.

3.11 Motors, Motor Control, and Control Center. (Provide brief description.) Reduced voltage controllers. (Reduced voltage controllers will be required when the locked rotor current of motors exceeds the full-load rating of supply transformers or supply conductors.)

3.12 Transformers of the dry type will be used to provide (120/208V)(120/240) volt from a 480 volt source.

3.13 Ground Fault Circuit Interrupters (Personnel Protection See NEC 210-8) will be provided as follows:

3.13.1 Receptacles in toilets (in living quarters as opposed to offices or shops.)

3.13.2 Receptacles in kitchens.

3.13.3 Receptacles exposed to the weather.

3.13.4 Receptacles in wet locations.

3.13.5 Other (describe).

3.14 Ground Fault Protection of Equipment will comply with NEC paragraph 230-95. (Grounded wye systems of more than 150 volts to ground and 1000 amps or more).

3.15 Electric Heat will be of the following type:

3.15.1 Unit Heater

3.15.2 Cabinet Type Unit Heaters

3.15.3 Convector-Type Heaters

3.15.4 Heating Cable

3.16 Standby Emergency Generator will be _____kW. The unit will be provided with (automatic transfer) (Manual transfer) switching (Provide additional electrical description as required.)

3.17 Hazardous areas (See NEC 500, 501, 502, 503) shall be described with justification of classification.

4. Exterior Electrical.

4.1 A new circuit breaker will be installed in the base substation. A new (4160Y/2400V) (12470Y/72 etc., 3-phase line will be installed along _____ road to the _____ area (building, etc.).

The distribution system will consist of a new (single)(three) phase (aerial) (underground) extension from the existing (4160Y/2400) (12470Y/7200) etc., line at the _____ location.

The existing (4160Y/2400) (12470Y/7200)etc., line at the _____ location will be (removed) (abandoned) (recoppered) (underbuilt) etc.

4.2 The Street Lighting System will consist of an extension from the existing system at the _____ location. A new Multiple Street Lighting System will be installed along the new roads; connections to an existing circuit will be made as shown on the drawings.

4.3 The complete exterior system shall include the following material and equipment.

4.3.1 Transformers.

4.3.1.1 (Single phase) (three phase).

4.3.1.2 (Cluster or radial bracket) (Pad mounted compartmentalized) (Integral load-center).

4.3.2 Aerial line conductor.

4.3.2.1 (Primary) (street light).

4.3.2.2 Size.

4.3.2.3 Type (hard drawn copper) (ACSR) (Other, describe).

4.3.3 Underground conductors.

4.3.3.1 (Primary) (street light) (in duct).

4.3.3.2 Size. (AWG)

4.3.3.3 (Ethylene-propylene-rubber with nonmetallic jacket)
(Cross-linked polyethylene with nonmetallic jacket)

(Other, describe).

4.3.4 Secondary conductors.

4.3.4.1 Aerial (neoprene) (polyethylene) (polyvinyl chloride) (messenger supported).

4.3.4.2 Voltage.

4.3.5 Surge arresters.

4.3.6 Down guys and anchors.

4.3.7 Insulators.

4.3.8 Terminations - Molded elastomer, taped, heat shrinkable elastomer, wet-process porcelain, prestretched elastomer.

4.3.9 Duct banks.

4.3.9.1 (Primary) (street lighting) (secondary) (communication) (EMCS).

4.3.9.2 (Fiber) (fire clay cement)

4.3.9.3 (Concrete encased) (without encasement)

4.3.9.4 Reinforced concrete encasement shall be provided under railroads and aircraft paving.

4.3.10 Floodlights-(enclosed) (open) (reflector-lamp)

4.3.11 Street light.

4.3.11.1 Standards-(wooden pole) (aluminum - steel pole) (Concrete pole).

4.3.11.2 Luminaries-(series)(multiple)(enclosed)(open)(filament) (lamp type)

4.3.11.3 Control-(group) (individual) (new) (existing)(manual) (photoelectric).

4.3.11.4 Regulator.

4.3.12 Parking Lot Lighting.

4.3.13 Walkway Lighting.

4.3.14 Exterior Building Lighting.

4.3.15 Manholes (combination) (power) (communications) type.

4.3.16 Primary fuse cutouts.

4.3.17 Pole top switches.

4.3.18 (Add items as needed).

4.4 Provide brief description of other features.

4.5 Cathodic protection (will) (will not) be provided for (gas line) (fuel tank) (steam line). (If not, describe why not.)

4.6 Attach calculations for (pole and guy sizes), (feeders sizes), (short circuit current), (connected load), (demand load or diversity factors), (transformer sizes), (voltage drop), (lighting), and (cathodic protection).

4.7 Communications. (Describe how telephone system hooks up to Base System).

4.8 EMCS. (Describe how data transmission media connects to base system).

4.9 Harmonic Loads. (Describe special features to accommodate harmonic loads).

5. Deviations. Provide brief description of any deviations or alternative types of systems or equipment considered, with explanation (See chapter: Electrical, Paragraph: Standardized Format). Also include a description of any reports or studies required to complete design.

6. Coordination. Coordination with Installation or Outside Agencies.

7. Guide Specifications. List applicable military guide specifications.

CHAPTER 13

FIRE PROTECTION

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CHAPTER 13

FIRE PROTECTION

1. GENERAL. This chapter covers general instructions for the fire protection design for permanent, semipermanent, and temporary constructed facilities. Fire protection design requirements shall be determined by personnel of the A-E firm familiar with and capable of implementing criteria furnished with the scope of work and other instructions stated herein.

1.1 Installed Fire Protection Systems.

1.1.1 CO2 and HALON 1301 fire protection equipment will not be included in the project unless specifically instructed.

1.1.2 Standpipes and hose stations shall be designed in accordance with Military Handbook MIL-HDBK-1008B, and NFPA Standard No. 14.

1.1.3 Sprinkler systems shall be designed in accordance with MIL-HDBK-1008B and NFPA Standard No. 13. Sprinkler system water service shall be provided with a double check back flow preventer.

1.1.3.1 Permanently heated buildings requiring sprinklers shall have wet pipe systems unless required otherwise by the scope of work.

1.1.3.2 Standard 2-1/2-inch fire department hose connections shall be provided for all automatic sprinkler installations.

1.1.3.3 Zoning of fixed fire protection systems shall be coordinated with the base or post fire chief. Each zone shall be separately alarmed for water flow with a signal to the fire alarm panel.

1.1.4 In general, sprinkler system layout will not be shown on the drawings. Show riser size and location, zone boundaries, appropriate valve details, available static pressure and residual pressure and flow rate, location of inspections test, and all other information needed by the Contractor to design and layout the system.

1.1.5 All deluge sprinkler systems shall be hydraulically designed.

1.2 Alarm and Detection Systems. Fire alarm and detection system shall generally be provided for all facilities in accordance with MIL-HDBK-1008B. In addition, the AEI shall be used for Army projects and Military Handbook 1190, "Facility Planning and Design Guide," for Air Force projects.

1.2.1 Drawings shall show the disconnect switch, control panel, annunciator panel, transmitter, manual fire alarm stations, signaling devices, etc., except that the fire detecting equipment and interconnecting wiring shall not be shown. Provide a one-line diagram that includes the location of the above components. In general detectors shall be indicated only as representative of the type with exact location and quantity to be determined by the performance requirements of the specifications. The intent of guide specification 16721 is to identify performance wherever practicable in lieu of specifying extensive physical details. Some projects may require a complete design of the fire detection system, and if so, you will be directed in writing to do so.

1.2.2 Disconnect Switch.

1.2.2.1 If the building service is less than 250 volts, provide a separate one pole, solid neutral current limiting fused switch connected ahead of the Service Equipment.

1.2.2.2 If the building service is 480Y/277V, provide a separate one-pole plus solid neutral current limiting fused switch connected ahead of the Service Equipment, and supplying one single phase (277 volt to 120 volt) dry type transformer connected to provide 120V 2-wire single phase to the fire alarm system.

1.2.3 When a tap is made upstream of the facility main disconnecting means, a disconnect for the fire alarm system must be located within 10 feet of the tap (or 25 feet maximum if the ampacity of the cable to the switch is at least 33 percent of the service size). Provide current limiting fuses in the disconnects for all taps.

1.3 Life Safety. Safety and fire protection shall be an integral part of every building design. Recognized codes and accepted safety standards shall be followed for the design of all facilities. Of the various codes and safety standards, the National Fire Protection Association's "Life Safety Code" (NFPA document 101) shall take precedence. All applicable requirements of the Life Safety Code shall be incorporated into the design. Special attention shall be given to the application of fire codes as they relate to Life Safety. Features of Fire Protection such as area separation walls, smoke stop barriers, automatic operating devices, and exiting must be clearly defined and properly coordinated.

1.3.1 Features of Fire Protection. Features of Fire Protection of appropriate rating, such as partitions or doors, shall be coordinated and provided to protect property and inhabitants from the hazards of fire occurrence. These features shall especially address the isolation of hazardous spaces or materials, the protection of egress components, and the coordination of such features with other (e.g. security) unusual functions connected with them. All such components of the fire protection shall be clearly indicated in the contract and review documents.

1.3.2 Exiting for Inhabitants. Emergency exits, equipped with exit devices, shall be provided for personnel safety in hazardous areas and places of public assembly. Design of these exits must facilitate rapid egress in accordance with the requirements of NFPA 101, Life Safety Code.

1.3.3 Special Coordination. The interrelationship between the requirements for Fire Protection, Life Safety, Tempest Shielding, Sound Control and Physical Security must be carefully studied. For example, individual doors that will satisfy more than a single requirement are generally not available. This can often mean that multiple doors in about the same location are necessary to cover any group of differing requirements, and unless they are correctly placed, can in turn interfere with one another's operation.

1.4 Types of Construction. Types of construction shall conform to the Uniform Building Code (UBC). Fire area limitations and allowable building height shall conform to UBC. Increases to allowable fire areas and building height shall conform to UBC.

1.5 Exterior water sources for building fire protection shall conform to the requirements of chapter: Water and Wastewater Facilities.

1.6 Heating, Ventilating and Air-Conditioning Systems.

1.6.1 All ventilation systems shall be designed to conform to the requirements of NFPA Standards Nos. 90A, 90B, and 91.

1.6.2 Ductwork which pierce 1-, 2-, and 4-hour fire-rated elements of a structure such as walls, partitions, floors and ceilings must be provided with fire-doors or fire-dampers. Fire-dampers are not required for 1-hour rated walls or partitions which have personnel doors with less than 45-minute fire rating. The type and location of these fire protection devices must be shown on the drawings to avoid misinterpretation of NFPA requirements by the Contractor.

2. PROJECT DEFINITION DESIGN (AIR FORCE PROJECTS ONLY).

2.1 Design Analysis shall consist of a narrative of the fire protection features. The narrative shall include a description of occupancy of the facility, type of construction, suppression system(s), and fire alarm and detection system(s).

2.2 All exterior water lines required for fire protection of the facility shall be indicated on a drawing. Drawing shall indicate new, including tie-in points, and existing which are to be removed or abandoned.

3. CONCEPT (ARMY)/PRELIMINARY (AIR FORCE) DESIGN.

3.1 Drawings. Features of Fire Protection, their ratings, and the hazards requiring them, shall be clearly indicated. Sprinkler and fire alarm/detection areas shall also be clearly indicated. 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.

3.2 Design Analysis. The concept Design Analysis shall include a separate fire protection report containing, but not limited to, review statements and/or comments on the following items, where applicable.

3.2.1 Location and rating of fire walls and fire partitions.

3.2.2 Column, floor, and roof protection.

3.2.3 Path of travel for emergency egress and operation of panic exits.

3.2.4 Access to building for fire fighting.

3.2.5 Design and placement of fire and smoke stop doors.

3.2.6 Fire escapes.

3.2.7 Stair towers, protected.

3.2.8 Labeled windows, where required.

3.2.9 Venting of smoke.

3.2.10 Placement of hand fire extinguisher cabinets.

3.2.11 Type and adequacy of sprinkler system.

3.2.12 Building exterior fire protection facilities and building clearances.

3.2.13 Type and adequacy of special fire extinguishing systems.

3.2.14 Ventilation and/or other treatment for areas for storage of flammable liquids or materials.

3.2.15 Type of occupancy.

3.2.16 Zoning of fixed fire protection systems.

3.2.17 Type and adequacy of fire alarm and detection systems.

3.2.18 Zoning of fire alarm and detection systems.

3.2.19 Number of zones of alarm and detection systems that are separately transmitted to the base or installation fire department.

4. FINAL DESIGN (FOR ARMY AND AIR FORCE).

4.1 Drawings. Design will be an extension of the concept submittal, incorporating all comments thereto and any revised criteria, all as specifically directed by the District. All conflicts, lack of specific criteria, and/or direction, inconsistencies, ambiguities, and lack of thorough understanding of the nature and scope of work shall be resolved prior to starting final design work.

4.2 Design Analysis. The final design analysis will be an extension of the concept design analysis and shall be complete for every item covered in the design and will include, but not be limited to, the following:

4.2.1 List of design criteria.

4.2.2 Design conditions.

4.2.3 Design calculations.

4.2.4 Complete description of system alarm zones.

4.2.5 Other pertinent information of value for future use in construction contract administration, substantiation of design methods, or permanent record shall be included.

4.3 Specifications shall be prepared in accordance with chapter: Specifications.

CHAPTER 14

ENERGY CONSERVATION

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CHAPTER 14

ENERGY CONSERVATION

1. GENERAL. This chapter covers general instructions for the consideration of energy conservation. Energy efficient designs shall be used for all facilities which will consume any form of energy in their operation or utilization. Energy conserving innovative designs are encouraged; however, unproven methods or devices shall be avoided.

1.1 Energy Evaluation. A calculation of annual energy consumption (Energy Budget) and evaluation of HVAC alternatives are required as outlined in the scope of work and the AEI.

1.2 Solar Energy. A solar energy feasibility study shall be included in either the concept or early preliminary design phase when stipulated in the scope of work. The analysis shall comply with the requirements of the AEI, chapter: Energy Conservation Criteria.

1.3 Metering. All energy supplied to a facility shall have metering (continuous monitoring of quantities used) provisions as required by the using service.

1.4 Energy Monitoring and Control System. Requirements for a new, an interface to existing, or an interface for future Energy Monitoring and Control System (EMCS) shall be as required in the scope of work.

1.5 Automatic Temperature Set Back. Automatic temperature set back requirements shall be as stated in the AEI, chapter: Air-Conditioning, Dehumidification, Evaporative Cooling, Heating, Mechanical Ventilating, and Refrigeration.

2. CONCEPT DESIGN.

2.1 Drawings. Show facility siting with existing topographic features and any prominent energy conservation features proposed for the facility. This information can be shown on architectural, mechanical, electrical, structural, location, and/or site drawings.

2.2 Design Analysis.

2.2.1 Design statements and calculations shall be given in sufficient detail to enable the reviewer to get a clear picture and understanding of all included work. The Design Analysis shall include and/or discuss any of the following items which apply to the project:

2.2.1.1 Yearly heating and cooling degree days and design temperatures.

2.2.1.2 Unit heat loss and/or gain for ceilings and/or roofs, walls, windows, doors, floors of upper stories or over crawl spaces, if a fifteen (15) degree fahrenheit temperature difference exists, amount of infiltration, amount of ventilation, to include discussion on energy recovery from exhaust systems, foundation (perimeter) or slab on grade insulation and unit heat loss.

2.2.1.3 Fossil fired heating devices, use of waste heat (exhaust, blowdown, etc.) recovery devices, use of intermittent ignition devices, use of temperature setback devices.

2.2.1.4 Net operating efficiencies of mechanical equipment and electrical motors, use of outside air for economy cooling cycles, automatic start-up and shutdown of ventilation and cooling equipment.

2.2.1.5 Energy conservation features which apply to interior and/or exterior lighting.

2.2.1.6 Architectural features (wind screens, awnings or recessed doorways and windows, entry ways, building and roof configuration, etc.) used for energy conservation, including decorating features (shades, curtains, colors, surface textures, etc.) and weather seals and caulking. Discuss types and useful life of weather seals and caulking.

2.2.1.7 Any energy conservation features, not previously noted, which save or conserve a significant amount of energy.

2.2.1.8 Solar energy feasibility study.

2.2.1.9 Energy budget (annual energy in BTU use per square foot of floor space) calculations and summary. See paragraph: "Energy Analysis" hereinafter for additional energy budget criteria.

3. FINAL DESIGN.

3.1 Drawings.

3.1.1 Design shall be an extension of the concept submittal, incorporating all approved comments and any revised criteria, as specifically directed by the District. All conflicts, lack of specific criteria, and/or direction, inconsistencies, ambiguities, and lack of thorough understanding of the nature and scope of work shall be resolved prior to starting final design work.

3.1.2 Energy conservation items shall be detailed on drawings which are related to their appropriate engineering discipline, i.e., architectural energy conservation features on architectural drawings, mechanical energy conservation features on mechanical drawings, etc.

3.1.3 Provide sufficient details to completely describe each energy conservation item.

3.1.4 Coordinate the plans with the specification and design analysis.

3.2 Design Analysis.

3.2.1 The final design analysis shall discuss every energy conservation item included in

the project and cover but not be limited to the following:

3.2.1.1 All energy conservation items noted in the "Concept/Early Preliminary Design" paragraph of this chapter and included in the final design of the project. These energy conservation items shall be completely described and justified.

3.2.1.2 Complete design calculations to determine energy saved by energy conservation items.

3.2.1.3 Revised energy budget to determine all energy consumed by the project as finally designed. Energy budget summary shall be presented in two parts. One part shall include only net (excluding process) building energy consumption (use) limitations. The second part of the energy budget summary shall include both net and process building loads which will predict metered energy consumption to the building.

3.2.2 Other pertinent information of value for future use in construction contract administration, substantiation of design methods, or permanent record shall be included.

3.3 Specifications. Specifications shall be prepared in accordance with chapter: Specifications of this manual.

4. ENERGY ANALYSIS. The energy analysis shall be a separately bound document with a cover sheet similar to that required for the design analysis. The format for the energy analysis shall be as stated below. All energy conserving features of building systems, electrical systems and mechanical systems shall be described in the energy analysis.

4.1 General. State building name and location in this paragraph. Also, indicate the computer program or method used to determine the yearly energy budget.

4.2 Applicable Criteria.

4.3 Energy Budget. State the region the building is in based on heating and cooling degree-days, the "Category Code" of the building, and the allowable energy budget.

4.4 Input Parameters. State the general parameters used in the input such as: Inside design temp-occupied, inside design temp-unoccupied, hours occupied, hours unoccupied, domestic hot water load, area of total building, area and description of each building zone input into the programs to include floor plan with zones identified, description of the HVAC system for each alternative, schedule of equipment operating hours, lighting load and schedule of lighting operation, and any other pertinent input data.

4.5 Energy Analysis Results. State the energy consumption of the building in total Btu's per year and also Btu/sq.ft./year. The percent over or under the allowable energy budget shall be given. In addition, the energy consumed by the following systems shall be listed: lighting energy, fan

energy, cooling energy, heating energy, and domestic hot water heating energy. The energy consumed by these subsystems shall be given in terms of BTUs per each month, BTUs per year, and percent of total. Also list the space heating, cooling, ventilation, lighting, and domestic hot water EBF's plus the process load EBF's and corresponding operating hours per day and days per week. All Computer Printout Data shall be included as an attachment to the narrative portion. Include all input data and supporting hand calculations.

CHAPTER 15

DESIGN ANALYSIS

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15.1 Criteria for Preparation of Concept Submittals (Design Analysis)

CRITERIA FOR PREPARATION OF CONCEPT SUBMITTALS (DESIGN ANALYSIS)

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Attachment D, etc. - List and indicate drawings, sketches, charts, etc.

1. DIRECTIVE AUTHORIZATION. Give job number, directive authorization number and date, item category code number, nomenclature, directive scope, programmed dollars and cost limitation dollars.

2. APPLICABLE CRITERIA. Design is in accordance with the following instructions: (List such as DD Form 1391 date, definitive drawings if applicable, and all other drawings or data furnished for design of project.) State whether new design or site adapted from (location and FY).

3. PURPOSE AND FUNCTION. State project operational function.

4. DESIGN SCOPE. State design scope. Authorized scope will not be exceeded. For all buildings show computations for square footage even though the authorized scope may be "man," "1 Ea." or other units.

5. SITE VISIT NOTES. Visits to the project site must be made by all disciplines involved in the particular project in order to establish criteria for the design. Reports of these visits will be included as enclosures to the report.

6. GOVERNMENT-FURNISHED EQUIPMENT. List any known equipment to be furnished and/or installed by the Using Agency. List any known equipment to be Government furnished/contractor installed.

7. CONSTRUCTION PHASING. Indicate any known or anticipated phasing requirements.

8. WASTE AND BORROW AREAS AND HAUL ROUTES. State whether or not they have been furnished if required.

9. AIR AND WATER POLLUTION CONTROL. State whether or not required, and if so, describe equipment and/or manner of meeting pollution abatement standards. Include brief description of calculations.

10. SPECIFIC DESIGN PROBLEMS. Cite any special problems encountered, with recommended solution.

11. INADEQUATE FUNDS. If it appears that the project cannot be constructed within allowable funds, the A-E shall recommend additive bid items, deletion of certain features of the work, or suggest other means of reducing the cost but still provide a usable facility within acceptable engineering standards.

12. WAIVERS. List any waivers that will be required, such as fire clearance, building spacing, airfield clearances, POL, ammunition/explosive areas, etc.

13. SECURITY PROVISIONS. State any overall security requirements relating to the project. This is in addition to those required in Chapter V, para 6, relating to requirements within or immediately adjacent to a building or structure.

CHAPTER 2 - SITING

1. NARRATIVE DESCRIPTION.

1.1 Existing site conditions.

1.2 Analysis of the most effective use and adaptation of the site for the proposed facility. Briefly explain reason for building orientation, set-back, horizontal and vertical location, driveway and sidewalk location and width, and parking area location and size.

1.3 Briefly explain other siting considerations such as reversal of standard plan, and functional and aesthetic relationship with surroundings.

2. LOCATION MAP. Base Layout.

3. SITE PLAN (structures, paving and drainage) Generally 1" - 30’0" (same scale as Final Site Plan):

3.1 Proposed facility superimposed on existing contours.

3.2 Finish contours where required to determine economical or questionable utilization of the site.

3.3 Show floor elevation and other critical spot elevations.

3.4 Drainage indicated by arrows, and approximate pipe sizes where required. Inlet, manhole, etc., details are not required.

3.5 Sidewalks, roads, loading docks, service and parking areas (number spaces) with ingress and egress.

3.6 Locate and identify existing buildings and facilities surrounding the area, if different than Base Layout.

3.7 Identify by title and building number facilities that are to be removed or relocated.

3.8 N-S orientation, including reference North.

4. SITE PLAN (Utilities).

4.1 Utilities shown on a separate site plan from buildings, grading, paving and drainage at same scale as Site Plan.

4.2 Show size, location and information of existing and proposed utilities properly identified as required by the individual chapters herein.

5. CRITERIA. List criteria needed to complete final data.

CHAPTER 3 - CIVIL

1. ROADS, STREETS, PARKING, HARDSTANDS, WALKS, ETC.

1.1 A statement of general soil condition with a brief outline of soil exploration and testing.

1.2 The type and volume of traffic, and class of roads, Design Index with justification for any deviation from criteria for those classes. Streets classified per TM 5-822-2. (AFM 88-7), Chapter 5).

1.3 The pavement section for vehicular traffic of streets, parking, service, etc., may be based on previous tests, and subject to minor changes after field tests are completed.

2. GRADING AND STORM DRAINAGE.

2.1 Propose types of materials to be specified for culverts and storm drains.

2.2 Proposed rainfall intensity runoff coefficients, ear and live loads to be used for design of culverts and sewers.

2.3 Proposed critical elevations and gradients.

2.4 Special structures: Describe.

2.5 Proposed gutter and parking area grades.

2.6 Proposed grades away from building or up-grade provisions for intercepting storm runoff.

2.7 Proposed longitudinal and transverse slopes on walkways.

3. FENCING. Type, height and justification for use.

4. RAILROADS.

4.1 Statement of type of service for which railroad track will be provided, anticipated volume and type of traffic, and the ruling grade.

4.2 Proposed type, source and thickness of ballast, weight of rail, source, treatment, and dimensions of ties proposed.

5. CRITERIA. List criteria needed to complete final design.

1. WATER SUPPLY. General explanation of the existing service. Where major extensions are required, describe system, indicating type, storage, condition, water pressures, and unsatisfactory elements.

1.1 Provide statement on type of construction, proposed materials, required flows or capacities, including designer's basic estimate of tentative pipe sizes. Where pump stations, storage, or treatment plants are involved, include tentative sizes and basic data (population, fire flows, etc.) which will be used in sizing equipment. Provide a description of the fire protection systems, flow test data, static and residual pressures. Approved computer modeling of the water distribution system may be used in lieu of flow test data.

1.2 List criteria needed to complete final design.

2. SANITARY SEWER SYSTEM.

2.1 Collection.

2.1.1 Explanation of existing system covering particularly the type, capacity, condition, degree of treatment, present flow and unsatisfactory elements of component parts for major extensions.

2.1.2 Describe type of proposed system, tentative sizes and grades, pipe materials, and contributing flows. Where lift stations are required, state type of construction, and tentative pump type and size.

2.2 Treatment Plant.

2.2.1 State type of waste involved, degree of treatment required, type of treatment plant proposed, and anticipated effluent quality. Describe receiving stream and anticipated effect of treatment plant effluent.

2.2.2 Provide a brief description of units involved, including basic data (population, flows, etc.) which will be used in sizing units.

2.2.3 State type of construction and materials which will be used.

2.3 List criteria needed to complete final design.

3. GAS LINES.

3.1 General explanation of the existing system, including gas pressures. Where major extensions are required, describe the unsatisfactory elements.

3.2 Provide statement on type of construction, proposed materials, required flows, pressure drop, and tentative pipe sizes.

3.3 List criteria needed to complete final design.

1. GENERAL DESCRIPTION. Give description as to number of stories, basement, etc., and include as applicable such items as loading docks, covered and/or uncovered porches, entrance ramps, recessed entries, etc.

2. CATEGORY AND TYPE OF CONSTRUCTION. State such as Permanent, Type N, unprotected, non-combustible, etc.

3. SPECIAL FIRE PROTECTION AND EXIT REQUIREMENTS. If not required, so state. The number of exits shall be based on the square foot allowance per person as stipulated in the National Fire Protection Association Pamphlet No. 101, Life Safety Code. The requirements for the various types of occupancy shall be covered, including all basic criteria used in arriving at these requirements. On floor plan required by paragraph 7a, indicate personnel occupancy for each room by symbol, such as: P10 within an ellipse; the figure representing number of people. Identify symbol on plan. Total building occupancy should equal that shown for Heating, Ventilating and Air Conditioning in Chapter 7, Mechanical.

4. ARCHITECTURAL DESIGN SOLUTION. In narrative form, designer should state reasons for basic solution proposed, choice of specific materials, architectural treatment, and brief statement on other solutions considered but rejected, with reasons therefore. Refer to drawings if needed.

4.1 Floor System. (Describe, such as slab on grade, joists, etc.)

4.2 Exterior Design. Describe walls, roofing, windows, doors, miscellaneous (sunshades, porches, entry, dock, canopies and wing walls, special treatment, etc.).

4.3 Interior Design. Describe partitions, doors, equipment.

4.4 Color Schedule. Develop a detail schedule of all colors for all surfaces and finished, i.e., painted surfaces, floor coverings, tile, countertops, etc. The detail schedule shall be based on the basic schedule and shall be incorporated into the contract drawings and specifications.

4.4.1 Miscellaneous or unusual features, such as special hardware, computer floors, sound control, clean-room, elevators, draft curtains, etc.

4.4.2 Provide a tabular Room Finish Schedule. Include floor, base, wainscot, walls, ceiling, and ceiling heights.

5. SECURITY PROVISIONS. Include requirements.

6. DRAWINGS. Show major dimensions for new designs.

6.1 Floor Plans. Single line, showing window and door openings and column locations for all floors including basement, etc., scaled to fit the entire floor plan on one sheet. (1/2" preferred). Show control joint location for masonry walls, partition, and expansion joints, if any.

6.2 Elevations. One eighth inch scale preferred (show control joint locations and expansion joints, if any).

6.3 Cross Section. One eighth inch scale preferred: show floor to ceiling heights.

6.4 Typical Wall Section(s). Three-fourth inch scale preferred.

7. SUGGESTED METHOD OF REDUCING EITHER CONSTRUCTION OR MAINTENANCE COST. List and/or explain. This should not be confused with requirements of Chapter 1, para II, which refers to projects exceeding allowable funds.

8. CRITERIA. List criteria needed to complete final design.

1. STRUCTURAL FRAMING SYSTEM. A general description of the structural framing system for the building including seismic considerations should be given with reasons for selection of the system used and including cost comparison. For example: (1) a system with load bearing walls and interior steel columns supporting steel girders and joists; (2) a steel rigid frame system supporting steel beams and joists; (3) a system with reinforced concrete beams, columns and pan joists.

2. ROOF AND FLOOR SYSTEM. General method of framing and type of deck including options. Cost comparisons shall be furnished to justify system selected.

3. WALLS AND PARTITIONS. Describe composition and general range of thicknesses, seismic design when used, and location of load bearing and shear walls.

4. FOUNDATION SYSTEM. Foundation design data or assumptions and description of type of foundation system to be used.

5. CONTROL JOINTS. Show location for slab on grade floors and for CMU walls.

6. DESIGN LOADS. Roof and floor live loads, wind and seismic lateral loads, and unusual dead loads should be given.

7. UNUSUAL DESIGN FEATURES. Those which might be controversial should be clearly presented in such a manner that definite approval can be given.

8. SITE ADAPTING STANDARD WORKING DRAWINGS. When site adapting standard working drawings or designs used at other locations, the data required herein should be limited to design changes resultig from loading, climatic and soil conditions at the new site and/or updating for conformance to curent criteria.

9. CRITERIA. List criteria needed to complete final design.

1. HEATING, VENTILATING, AND AIR CONDITIONING.

1.1 Basic Analysis.

1.1.1 Basic criteria manuals

1.1.2 Design conditions

1.1.2.1 Inside and outside

1.1.2.2 Personnel load

1.1.2.3 Equipment heat release (if any)

1.1.2.4 Ventilation requirements

1.1.2.5 U Factors

1.1.2.6 Other special conditions, such as alterations and additions.

1.1.3 Type of systems with full description

1.1.3.1 Justification for selection

1.1.3.2 Zoning and control description

1.1.3.3 Description and justification for connection to existing system.

1.1.4 If proposed design capacity exceeds that indicated, explain or justify.

1.2 Calculations.

1.2.1 Summary of heat gain and equipment sizing calculations should be submitted, including the method for handling diversities in the air conditioning load and method of sizing the boilers.

1.2.2 Provide typical air conditioning load calculations, preferably the building peak load. Do not submit detailed calculations until the final submission.

1.3 Equipment.

1.3.1 Brief description of various items of equipment.

1.3.2 Operating temperatures and capacities.

1.4 Piping Systems. Brief description (include type of pipe, whether insulated, concealed or exposed). Calculations or pipe sizes need not be included until the final submission.

1.5 Equipment Installation Layouts (final submission). Contract drawings shall include scale line plans showing the layout and arrangement of all mechanical equipment rooms and spaces in which building service equipment (heating, ventilating, plumbing, electrical, air conditioning, etc.) is to be installed. Plans shall be drawn at scales of 1/4" or 3/8" equals l' (smaller scales will require the approval of the Contracting Officer), and shall show all equipment at true size and location together with all utility lines and connections, and the relationship of such equipment and utility lines and connections with walls, ceilings, floors, doors, and windows. Sections shall also be included as necessary to delineate the equipment arrangement properly and the accessibility thereof for operation and maintenance. Equipment shall be located so that there is proper room for safety and servicing.

1.6 Air Distribution Systems. Brief description of design method used, including maximum velocities and pressure drop per 100 feet in ducts.

1.7 Drawings.

1.7.1 On plan view show equipment layout of following items:

1.7.1.1 Chillers or refrigeration compressors

1.7.1.2 Boilers

1.7.1.3 Pumps

1.7.1.4 Condensers or cooling towers

1.7.1.5 Air handling units

1.7.1.6 Air distribution duct layout - single line

1.7.2 Do not show air quantities, duct sizes, or piping.

1.7.3 Other items of major equipment required for the facility.

1.7.4 Show piping layout in the final submittal.

1.7.5 Show exterior heat distribution on the Utility Plan.

1.8 List criteria needed to complete final design.

2. PLUMBING.

2.1 Basic Analysis.

2.1.1 Basic criteria manuals, codes, etc.

2.1.2 Fixture determination

2.1.2.1 Building population (male and female)

2.1.2.2 Men's toilet (quantity and type of fixture identified by Federal

Specification)

2.1.2.3 Women's toilet (quantity and type of fixture identified by Federal Specification)

2.1.2.4 Other (drinking water fountains, service sinks, etc.) (quantity and type of fixture identified by Federal Specification)

2.2 Hot Water Generator and Storage Tank.

2.2.1 Capacity and type (gas, electric, boiler water)

2.2.2 Insulation

2.3 Piping.

2.3.1 Type and location (concealed or exposed)

2.3.2 Insulation

2.4 Calculations. Only as necessary to determine number of fixtures and cold and hot water capacity requirements.

2.5 Miscellaneous.

2.5.1 Compressed air system -- brief description as to capacity, pressure, piping, location of air outlets, etc.

2.5.2 Roof drainage system -- brief description

2.5.3 Fire protection -- brief description as to type, areas covered, etc.

2.5.4 Gas system -- brief description as to pressure, quantity, and equipment to be served

2.5.5 Other special system -- brief description

2.5.6 List guide specifications to be used

2.6 Drawings.

2.6.1 On plan view show plumbing fixture layout, floor and area drains, equipment layout (hot water generator, storage tank, air compressor, etc.). Show location of gas, vacuum, and other outlets.

2.6.2 Show piping and a piping identification system on the final submittal.

3. SITE ADAPTING. When site adapting standard working drawings or designs used at other locations, the data required herein should be limited to only design changes and/or updating for conformance to current criteria.

4. SPECIAL CONSIDERATIONS.

4.1 Some projects will require supplemental justification or explanatory data. These data will normally be requested by specific instructions for submittal. Typical examples as follows:

4.1.1 Government-furnished equipment

4.1.2 Economic studies

4.1.3 Fuel studies and determination

4.1.4 Equipment testing for rehabilitation

4.1.5 Unusual or unique energy consumption requirements

4.2 Site Adapting Drawings. List only the changes required or conformance to latest criteria.

4.3 List criteria needed to complete final design.

1. INTERIOR ELECTRICAL DISTRIBUTION SYSTEM.

1.1 Indicate electrical characteristics (phase, voltage and number of wires) or circuits.

1.2 Provide a brief description of the lighting system, together with a tabulation showing:

1.2.1 Room name and number.

1.2.2 Lighting intensity for each room (state design basis, such as I.E.S., Definitive Drawings, etc.).

1.2.3 Type of fixture, either by standard drawing number or description.

1.3 Type of wiring system, such as, rigid conduit, electrical metallic tubing, non-metallic sheathed cable, etc., and where proposed to use.

1.4 A paragraph describing proposed additions and alterations or special items of design, such as, specialized equipment, special receptacles, etc.

1.5 Describe any special communication or electronic requirements.

1.6 Type of signal and fire alarm systems.

1.7 Telephone layout will be as provided by Using Service.

1.8 Define any hazardous areas; if none, so state.

1.9 Describe lightning protection system; if none, so state.

1.10 Describe static grounding system to be installed, if required.

1.11 Any questions or problems or deviations concerning criteria should be enumerated.

1.12 Voltage drop for service entrance, panel feeders and branch circuit.

1.13 List guide specifications that will be used.

2. EXTERIOR ELECTRICAL DISTRIBUTION SYSTEM.

2.1 Statement relative to the adequacy of the primary supply at the point of take-off. If primary source is inadequate, state measures proposed to correct the deficiency.

2.2 Electrical characteristics of the primary and secondary service.

2.3 Estimate of total connected load and resulting kilowatt demand load by applying proper demand and diversity factors, if a group of loads is involved.

2.4 Basis for selection of primary and/or secondary distribution voltage.

2.5 Type of conductors, such as, copper or aluminum, and where proposed to use.

2.6 A statement describing pertinent standards of design, such as, voltage drop, physical characteristics of overhead or underground circuits, type of lighting units, lighting intensities, and type of transformers.

2.7 A statement describing street lighting, security lighting, parking lot lighting, or sidewalk lighting requirements.

2.8 List guide specifications that will be used.

2.9 Statement pertaining to installations of cathodic protection system and design values.

2.10 List criteria needed to complete final data.

3. DRAWINGS.

3.1 Exterior Electrical - to be shown on utility site plan.

3.1.1 Existing and new electrical lines both overhead and underground, properly identified.

3.1.2 Show removals and relocations, if any.

3.1.3 Indicate electrical characteristics, voltage, phase, conductor sizes, etc.

3.1.4 Show new construction and location of transformation.

3.1.5 Indicate the service to the facility and whether overhead or underground.

3.2 Interior Electrical.

3.2.1 Show an outline of the building, or a floor plan as required by the architectural.

3.2.2 Indicate the service and main electrical service equipment.

3.2.3 Show the location of all panels (power and communications) and special outlets.

3.2.4 Indicate lighting layout.

3.2.5 Show the proposed power riser diagram. Sizes of all conduits, wires, cables, panels, etc., need not be included.

4. SITE ADAPTION. When site adapting standard working drawings or designs used at other locations, the data required herein should be limited to only design changes and/or updating for conformance to current criteria.

1. EROSION CONTROL. State scope of work (acreage to receive turfing), proposed treatment, such as topsoil, fertilizing, seeding, sodding, watering, etc.

2. LANDSCAPING.

   2.1 State scope of work, such as number and kind of trees and shrubs (not in contract).

   2.2 Show existing trees that are to be protected and saved.

3. GUIDE SPECIFICATIONS. List guide specifications to be used.

4. CRITERIA. List criteria needed to complete final design.

ATTACHMENT A - SPECIFICATIONS

Provide a listing of the technical sections of specifications to be used in final design. Prepare one section of specifications in final format and develop an index for one section in order to evaluate the A-E's method of preparation. Concept drawings shall be coordinated with the outline specifications to indicate clearly the type and sizes of materials, utilities, etc., and specifically to list separately all Contractor-furnished equipment and all Government-furnished equipment to be installed by the Contractor.

CHAPTER 15

DESIGN ANALYSIS

1. GENERAL.

1.1 Requirements. A design analysis is required for all projects in accordance with the scope of work. Any exceptions to design analysis requirements will be covered in the scope of work.

1.2 Definition. A design analysis is a bound assembly, in one or more volumes, of all functional and engineering criteria, design information, and calculations applicable to the project. A design analysis serves for review, approval, user information and record purposes. It is also used in adapting design to other sites and for future reevaluation and modification of existing construction.

2. DESIGN ANALYSIS AT VARIOUS DESIGN STAGES. The design analysis shall be included with the submittal package which consists of drawings, cost estimate and specifications. The specific content of the design analysis for the various engineering/ architectural disciplines is covered in their respective chapters of this manual. All design analyses will be written in the past tense.

2.1 Preconcept and Concept Design Analyses.

2.1.1 General. The design analysis will be a narrative and graphic brochure-type presentation, reflecting a designer's interpretation of criteria furnished for design of a project. Items or details which cannot be adequately described in narrative form shall be graphically shown on sketches, tabulations or photographs bound in the brochure and on drawings appended thereto. An estimate of direct construction cost (code B) for the project shall also be included with the submission. Energy, life-cycle costs, and solar energry will be analyzed as directed. Computerized energy studies will have all input and output data prescribed. Studies will be complete to establish energy budgets and will verify that enough space has been allowed for mechanical and electrical equipment and that this space has been included in the budget data. The format and content required for the concept submission are outlined in attachment 15.1. Use the same chapter number for identification in the design analsis.

2.1.2 Attachments. The design analysis shall cover deviations from furnished criteria and shall discuss, in detail, problem areas and missing criteria that require resolution before design can be completed. Attachments shall include: calculations, conference minutes, outline specifications, pertinent correspondence relative to the design, and the Subsurface Investigation Report prepared by the District. All pages in the attachments shall be presented in clear and legible form. Each attachment shall be provided with a title page and table of contents (index). Pages shall be numbered consecutively for each attachment and identified in the table of contents. Cross-referencing shall be clear. The source of loading conditions, formulas and references shall be identified. Assumptions and conclusions shall be explained.

2.2 Final Design Analysis.

2.2.1 General. The final design analysis shall be a complete document within itself, containing all information pertinent to the design of the project. This document is not only used for review and substantiation of the design, but for record purposes. All applicable data contained in previous design analyses shall be repeated. Reference shall not be made to the previous analyses. The original sheets shall be furnished for the entire final design analysis including the attachments. The A-E shall submit a final design analysis which is 100 percent complete for review. The A-E shall incorporate revisions as a result of final review comments and submit the 100 percent complete final design analysis for record purposes.

2.2.2 Engineering Considerations and Instructions to Field Personnel. The final design analysis shall include a section for the use of the construction agent entitled "Engineering Considerations and Instructions to Field Personnel." This section will be prepared for all construction projects with a current working estimate (CWE) of $1,000,000 or greater; repair, evaluation, maintenance and rehabilitation with CWE of $500,000 or greater; and any lesser CWE where significant design assumptions or aspects are critical to successful project completion. The availability of this section will provide construction field personnel easy access to significant design assumptions or critical phases of the project. This section shall indicate assumed field conditions and all pertinent significant (geotechnical, materials, remediation processes, etc.) aspects of the project that are included as the basis of project design. The section will be modified as required by agreement between the A-E and construction agent.

2.2.2.1 Content of the section will vary according to the nature, complexity and importance of the project. As a minimum, however, the section will contain an explanation of significant design concepts including intent, assumptions and criticalness of the various features. Some of these items are not stated in the construction contract, and field knowledge of basis of design will enhance successful project completion. Field personnel will then be more able to recognize changed site conditions, invalid design assumptions, feasibility of contractor proposed work processes, and criticalness of certain features, allowing resolution of problems or conflicts at the earliest possible time.

2.2.2.2 The section will identify those areas requiring Government quality assurance testing (beyond normal contractor quality control testing), expected ranges for results of these tests, and recommended minimum frequencies of testing. The section will identify areas requiring special attention to contract details and/or inspection. Stages of the project where site visitation by A-E personnel is recommended also will be identified. Known sources of special materials will be indicated if they are not presented in the contract documents.

2.2.2.3 When the section is lengthy or significantly complex, appropriate members of A-E personnel will meet with the construction agent and contractor's field personnel either at the preconstruction conference, partnering session, or later, but prior to starting work, as required in the scope of work.

2.2.3 Attachments. The attachments to the final design analysis shall include all those

used in the previous design analysis, as applicable to the final design. Attachments shall include: complete calculations, minutes of meetings of all review conferences, pertinent correspondence relative to design and the Subsurface Investigation Report prepared by the District. Do not include Outline Specifications in the final design analysis. All pages in the attachments shall be presented in clear and legible form. Each attachment shall be provided with a title page, table of contents (index), and a tabulation showing all design loads and conditions (calculations only). Pages shall be numbered consecutively for each attachment and identified in the table of contents.

2.2.4 Changes. Revisions to the final design documents as a result of final review, amendments during advertising or modification during construction, shall be incorporated into the original final design analysis, as applicable, and submitted with revised plans and specifications.

3. PREPARATION.

3.1 Size and Layout. The narrative portion of the design analysis shall be typewritten. The attachments of the design analysis may be typewritten, handprinted or a combination thereof, as long as it is legible and clearly expressed. All material shall be prepared in relation to an 8-1/2 x 11 inch standard sheet size paper. Larger sheets, folded to the prescribed size may be utilized when reduction is not feasible. Computer printouts shall be trimmed or reduced to the standard sheet size. All side, top, and bottom margins shall be 1-inch minimum to permit side binding and head to head duplication.

3.2 Organization. Generally the design analysis shall be assembled into a single volume with a complete table of contents (insofar as practicable). For projects with more than one major facility, the design analysis may be assembled into separate volumes for each. Each volume shall be numbered sequentially and assembled under a cover sheet indicating the volume number and total number of volumes for the project.

3.3 Classified Material. Every effort shall be made to prepare the design analysis as an unclassified document with the proper references to sources of classified material.

3.4 Design Calculations (Attachments). Calculation sheets shall carry the names or initials of the individual making the calculations and the individual checking them, and the dates of the calculation and the checking. No portion of a design calculation shall be computed and checked by the same individual. Each page of calculations shall have the project title and location indicated. Calculations shall be presented in clear and legible form, incorporating a tabulation showing all design loads and conditions. The source of loading conditions, formulas and references shall be identified. Assumptions and conclusion shall be explained. Cross-referencing shall be clear.

3.5 Automated Data Processing (ADP). When ADP is used, the design analysis shall include description of design methods, including assumptions, theories, and technical formulas employed. This description shall be sufficient to verify the validity of methods, assumptions, theories and formulas, but shall not require source code documentation or otherwise compromise proprietary programs.

3.6 Standard Designs. If a standard design or other design is being site adapted and a design analysis exists, the analysis for the new project shall include appropriate material from the existing analysis modified to incorporate site adaptations and other essential requirements.

4. FORMAT. The format shall be as follows, except where specific title information and format are furnished for special projects as required by the scope of work.

4.1 Cover Sheet. Covers shall be a durable material so that the printed information thereon is not easily effaced. The cover sheet shall contain the following information:

(Final) (Preliminary) (Concept) Design Analysis

(Project Title), (Project No., if applicable)
(Fiscal Year) (Program Funding Identification)

(Name of Installation), (Location)

Prepared By
(Name of Architect-Engineer)
(Location of A-E Office)

For
U.S. Army Engineer District, Kansas City
Kansas City, Missouri
(Month) (Year)

4.2 Table of Contents. The table of contents shall be similar to the table of contents shown in attachment 15.1. Page numbers shall be included for easy reference. The table of contents may be further broken down if the size of the design analysis so warrants.

4.3 Paragraphs. Each chapter shall be broken into paragraphs and paragraphs shall be numbered in sequence. Do not refer to a paragraph as "Not Used", but number as actually used. A decimal numbering system for paragraphs shall be used as illustrated in the numbering of paragraphs in this chapter of the A-E Instruction Manual.

5. REQUIREMENTS FOR OTHER FACILITIES. For projects of the types listed below, the design analysis shall include the information listed in addition to the requirements above.

5.1 Utility Projects. Information to be included in the design analysis for projects involving water-supply sources, treatment plants, storage tanks, reservoirs, pumping stations and distribution systems, gas distribution and storage, sanitary sewers, industrial waste sewers, pumping plants, sewage treatment works, industrial waste treatment plants, incinerators, sanitary landfills and resource recovery systems shall be as required by applicable parts of Technical Manuals in the series

numbered TM 5-800 through 5-899.

5.2 Electrical Distribution Systems. Computations shall be tabulated for determination of conductor, transformer, and switchgear sizes showing all pertinent factors such as mechanical strength, current-carrying capacities, voltage drop, and demand or diversity factors. Short circuit calculations and coordination of protective equipment shall be included in the final design analysis. Interrupting capacity of equipment, fuse/CB size, and relay settings shall be shown on the final drawings.

5.3 Central Boiler and/or Refrigeration Plants. The design analysis shall include:

5.3.1 Statement of basis for selection of type of system, with reference to pertinent criteria and background information.

5.3.2 Individual building loads for presently connected facilities, and facilities to be connected in the future for determining sizes of plant and auxiliary equipment.

5.3.3 Soil and ground-water conditions for underground distribution system, insulation and cathodic protection requirements.

5.3.4 Capacity and size calculations for major items of equipment such as boilers, refrigeration equipment, pumps, expansion tanks, firing devices, air pollution equipment, induced-draft fans, flash arresters, fuel and ash handling equipment, and fuel storage.

5.3.5 Fuel selection analysis.

5.3.6 Calculations for pipe-size and expansion considerations of the distribution system as required.

5.3.7 System analysis of all applicable factors and alternatives with sufficient support data to illustrate options considered, and to justify the design selected.

5.3.8 Evidence of compliance with environmental protection and enhancement regulations. Requirement for and treatment of visual screening shall be indicated.

5.3.9 Operational characteristics related to provisions for the efficient utilization and maintenance of the plant.

5.4 Roads, Streets and Paved Areas. The design analysis shall include the class and type of each road, street, parking and open-storage area, along with the basis for selection of design wheel load, material, and type of construction. Design calculations, as applicable, will be indicated.

5.5 Railroads. The design analysis shall include the basis for design live loads and classification of track, trestle, bridge, main line, yard, etc., as applicable, along with criteria used to

determine weight of rail, size of ties and class of roadbed. Include complete design calculations for trestles, culverts, and bridges. Nomenclature shall conform to TM 5-850-2, Railroad Design and Construction at Army and Air Force Installations.

5.6 Airfield and Heliport Paving. Information to be included in the design analysis shall be as required by applicable parts of TM 5-824-1, General Provisions for Airfield Design, and TM 5-818-1, Procedures for Foundation Design of Buildings and Other Structures (except Hydraulic Structures).

5.7 Special Facilities. Information to be included in design analysis for projects involving missile launch facilities, ammunition maintenance facilities, radiographic facilities, explosives storage facilities, hardened command posts, and facilities for handling nuclear weapons and hazardous substances will be provided by HQUSACE via design directive on a case-by-case basis. These directives will specify any requirements in addition to applicable requirements contained in this regulation, and will include need for criteria sources, references, design calculations and supporting data to justify design.

6. WHITEMAN AIR FORCE BASE DESIGN CHECKLIST. A checklist that has been prepared specifically for Whiteman Air Force Base will be furnished to the designer. The checklist must be completed by the designer and submitted for review with the Design Analysis.

CHAPTER 16

SPECIFICATIONS

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CHAPTER 16

SPECIFICATIONS

1. SCOPE. This section covers instructions for the preparation of bidding documents for fixed-price construction contracts.

2. PURPOSE. Instructions contained herein supplement, explain, and catalog instructions and policies of HQUSACE and are not to be construed as voiding standing instructions of HQUSACE. In the event of conflict between future instructions from HQUSACE and this manual, the instructions from HQUSACE will govern.

3. BIDDING DOCUMENTS. A complete set of bidding documents shall consist of a set of drawings and a bound volume of specifications. A bound specification shall be composed of the following parts in the order listed.

3.1 Front Cover	Prepared by District
3.2 Table of Contents	Prepared by A-E (Division 2 through 16)
3.3 S.F. 1442	Prepared by District with A-E Input Required
3.4 Caution Sheet	Prepared by District
3.5 Instructions to Bidders	Prepared by District
3.6 Representation and Certifications	Prepared by District
3.7 Contract Clauses	Prepared by District
3.8 Special Clauses	Prepared by District with A-E Input Required
3.9 Wage Rates	Furnished by District
3.10 Index Pages at Beginning of Each Division, 2 through 16	Prepared by A-E
3.11 Amendments	Prepared by District with A-E Input Required

4. A-E SUBMITTALS REQUIRED.

4.1 Concept Design Submittal (Army Projects). Submit a listing of the technical sections of the specifications to be used in the final design along with one edited guide specification section typed in final format.

4.2 Preliminary Design AF Projects Submittal. Submit annotated concept review comments, Table of Contents, a legible draft copy of the Technical Specifications consisting of marked-up copies of the printed guide specifications. Those deleted portions of the Guide Specifications shall be left legible so as to determine what has been eliminated; paragraphs shall be renumbered as required by deleted portions. Paragraphs modified to meet site or specific project conditions shall be spelled out and inserted in their proper place.

4.3 Prefinal Design Submittal. Submit the following:

4.3.1 A narrative description of work, suitable for publishing in the Commerce Business Daily.

4.3.2 Bid Schedule.

4.3.3 Table of Contents and Indices for Division 2 through 16.

4.3.4 Construction Schedule and Phasing Requirements.

4.3.5 Sheet number, title, and date for each drawing.

4.3.6 Site or job peculiar items limiting work.

4.3.7 Itemized list of Government furnished-Contractor Installed Equipment.

4.3.8 Itemized list of salvage equipment to be turned over to the Government.

4.3.9 Typed Specifications (Division 2 through 16).

4.4 Final Design Submittal. Submit all items required for the 95% submittal incorporating all review comments.

5. BID ITEMS (BID SCHEDULE).

5.1 General. Standard Form 1442, "Solicitation Offer and Award for Construction, Alteration or Repair," is completed by the District. Projects are usually bid on a lump sum basis (except drilled piers which are bid on a linear foot basis for each diameter). Building construction bid items are normally broken down as follows:

5.1.1 Building Construction. A separate bid item for each building described as follows:

"includes all required work within 5 feet outside the building lines, except drilled piers."

5.1.2 Drilled Piers. A separate bid item for each diameter described as follows: "includes all work required to provide piers per lineal footage established by the top and bottom elevations indicated and all work incidental thereto."

5.1.3 Site Improvements. Are described as "includes all required work beyond 5 feet outside of the building lines."

5.1.4 Projects Other than Building Construction. Bid items should be coordinated with the District. Bid Quantities are usually lump sum.

SAMPLE:

Project: Tactical Equipment Shop, Fort Riley, Kansas.

BIDDING SCHEDULE

BASE SCHEDULE

0001	Tactical Equipment Shop	Lump Sum	$_____
0002	Site Work	Lump Sum	$_____
		TOTAL (Base Schedule)	$_____

OPTIONS
(In order of priority)

0003	Exterior Drainage	Lump Sum	$_____
0004	Oak Trees	Lump Sum	$_____
		TOTAL (Base & Options)	$_____

5.2 Additive Bid Items (when funds are limited). Where additive items are required by any subsequent instructions, they shall be numbered consecutively (as per established priority) on the bid form and designated on the drawings using only the name (i.e., "Parking Lot - Additive"). Drawings shall clearly indicate condition with and without the additive work. The additives shall not be numbered on the drawings.

5.3 Option Bid Items. Items in the schedule may be identified as options. Such options need the approval of the Contracting Officer and shall be indicated on the drawings if required to make the option work clearer. The options may or may not be exercised. Drawings shall clearly indicate condition with and without the optional work. The options shall not be numbered on the drawings.

5.4 A-E Submittals Required. The A-E shall submit a narrative description for each bid item, and each additive or option bid item. Submittal is required with the Prefinal and Final Design Submittals.

5.5 Common Errors.

5.5.1 Labeling "Additives" as "Alternates" on the drawings.

5.5.2 Not deleting Measurement and Payment paragraphs from the Guide Specifications. (NOTE: Leave in requirement for Waybills).

5.5.3 Not including proposed bid schedule with the Prefinal Design Submittals.

6. TABLE OF CONTENTS AND INDEXES. See Attachments A, B and C. They give the form that shall be followed by A-Es in the preparation of the Table of Contents and Index pages. All Divisions and Sections within each Division shall be listed in the Table of Contents, and a detailed index shall be used at the front of each Division for the Sections in that Division.

6.1 Table of Contents. A-E submittal shall start with Division 2. See Attachment A.

6.2 Index Pages. The A-E submittal shall start with Division 2. All index pages start with the letter "D" followed by the Division Number, a dash and the page number (see Attachment B). Provide Index pages for Divisions not used (see Attachment C). Insert Index pages in the front of each Division.

6.3 Common Errors.

6.3.1 Not receiving the Table of Contents or Index Pages with the Specification submittal.

6.3.2 Submitting Index Pages that indicated "part numbers" rather than paragraph numbers.

7. SPECIAL CLAUSES (SECTION 00800).

7.1 Drawings. Typed listing of Sheet Numbers, drawing titles, and date of each drawing.

7.2 Salvage Equipment. Itemized List, including Quantity and Description, of salvage equipment to be delivered to the Government, and their delivery destination.

7.3 Construction Sequencing - Completion Time - Concurrent Construction. The A-E shall coordinate the recommended construction period with the Using Service and include any special interface or concurrent construction phasing that may be required in the SPECIAL CLAUSES section of the specifications. If the Using Service's completion requirements or concurrent construction needs affect the total project cost they should be advised of the extra cost involved and

the reasons therefor.

7.4 Government-Furnished Property. Itemized List including Quantity and Description of Government-furnished property, its location and method of furnishing.

7.5 Special Requirements i.e. protection of existing work, maintenance, asbestos removal and any other requirements unique to this specific job.

7.6 Shop Drawing Submittals. Reference SECTION 00800: Special Clause paragraph entitled SUBMITTALS.

7.7 Common Errors. A-E submission not received until after prefinal review.

8. TECHNICAL PROVISIONS.

8.1 A-E Submittals Required. See paragraph: A-E Submittals Required.

8.2 Special Instructions. Technical Provisions shall be prepared in accordance with the requirements of this section and paragraph: Typing. In applying the instructions, the overall objective is a professional-looking and professional-quality specifications.

8.3 References. HQUSACE Guide Specifications

HQUSACE Standard Specifications
ER 1110-345-1001
ER 1110-2-1200
ER 1110-345-720
Applicable Technical Manuals
Applicable Regulations

8.4 Division 1 - General Requirements. Division 1, General Requirements, will be prepared by the District for all projects.

9. GUIDE SPECIFICATIONS. Guide Specifications are issued by HQUSACE (Divisions 2 through 16) to promote uniformity of construction throughout the Corps, to provide requirements which coordinate with industry, and to serve as convenient worksheets for the preparation of contract specifications. HQUSACE guide specifications and abridged guide specifications are available from the District for small projects only. The files are available in a text or ASCII format and may be used in any word processing system. For larger projects with a substantial number of specification sections, a subscription service shall be used by the A-E to provide current HQUSACE guide specifications. Specification sections relative to earthwork and pavements will be provided by the District in accordance with the scope of work.

9.1 Use of Guide Specifications.

9.1.1 Notes to Designer. Notes on use of the guide specifications which occur at the end of all HQUSACE Guide Specifications shall be studied closely before starting on the section to be written. These instructions cover special considerations and directions to be followed in the use of the particular Guide Specification.

9.1.2 Military Projects. HQUSACE Guide Specifications marked "FOR MILITARY CONSTRUCTION" shall be used except for Paving, which shall be furnished by the District as indicated in the scope of work.

9.2 Editing the Guide Specifications. Prior to the guide specifications editing for the project, the A-E shall carefully read the instructions given in each guide specification. All work by the Contractor must be precisely delineated in the contract documents (specifications or drawings). The guide specifications are prepared for adaptation to major projects of varying types and at different locations in the continental United States. Guide specifications issued establish the form to be used and, as far as practicable, the specific requirements to be included. The guide specifications are intended to promote uniformity of construction throughout the Corps, provide requirements that have been coordinated with industry, and serve as convenient work sheets to be marked by the A-E preparing project specifications. Certain of the requirements in the guide specifications have general applicability to all projects, while other requirements that must vary from project to project have blanks to be filled in; alternative words, phrases, or paragraphs to be chosen; or special paragraphs to be added. Where parentheses or brackets are used to indicate alternative requirements, the parentheses or brackets shall be removed from the expression chosen to be a part of the contract specifications. When editing is complete and checked, the paragraphs and subparagraphs within each technical section of the specification shall be numbered in sequence. Do not use "Not Used" for a paragraph that has been deleted.

9.2.1 Deviations. The guide specifications will need to be tailored to fit the specific project under design. Tailoring a guide specification either by a deletion or by an addition is considered to be a deviation. The following deviations are authorized without further approval:

9.2.1.1 Changes required or permitted in the INSTRUCTIONS TO THE DESIGNER.

9.2.1.2 Deletion of inapplicable text material, as necessary to tailor the specifications to fit a specific project. After the specifications writer has deleted all inapplicable paragraphs, subparagraphs, and schedules from the body of the guide specification (including but not limited to the correction of lists in "Submittals," "Tests," and "Installation" paragraphs), he shall then delete all nonapplicable references listed in the preceding "Applicable Publications" and "Materials" paragraphs.

9.2.1.3 Additions. If the guide does not cover a feature that is in the project, new sentences and/or paragraphs shall be inserted in proper locations to adequately cover that feature of the work. If a new material is added, it shall be properly referenced in "Applicable Publications, "Materials," "Submittal," "Tests," and "Installation" paragraphs, as applicable.

9.2.1.4 For Air Force projects only, tailoring to comply with the requirements of Military Handbook 1190, "Facility Planning and Design Guide."

9.2.1.5 Changes to reduce requirements for submittals of technical data and samples, in accordance with the following: Submittals of shop drawings, test reports, certificates, and samples will not be required for noncritical items of relatively low value as compared to the cost of making the submittal; that is, a submittal will not be required when the cost will exceed the benefit to the job. Avoidance of such submittal requirements is particularly encouraged for small projects. However, under no circumstances should the cost of a test or the cost of the item being tested be considered as the sole criterion for determining the value of a test. Occasionally, the success or failure of a major portion of a project may be critically influenced by some small item; therefore, the overall benefit to the job should be used as the basis for determining the value of the test.

9.2.1.6 Changes to make testing the Contractor's responsibility, in accordance with the following: Except where applicable guide specifications explicitly state that testing will be the responsibility of the Government, all testing will be made the responsibility of the Contractor. However, in preparing detailed specifications making testing the Contractor's responsibility, the contract requirements shall be written in such way that the Contracting Officer may perform testing when deemed necessary.

9.2.2 Trade Names and Proprietary Items. As a general policy, the use of trade names, proprietary items, and the drafting of a specification by adopting a manufacturer's description of a particular commercial article shall be avoided. When it is necessary to specify materials or equipment other than by reference to a document generally known to and used by the industry, minimum requirements may be stated in one of the following ways: (1) in terms of physical characteristics, chemical composition, laboratory test results, performance in actual use, or any combination of these as applicable, in such manner as to insure full and free competition; or (2) by use of manufacturer's cut, catalog number or trade name, qualified with the words "or equal." However, experience indicates that a "brand name or equal" description is appropriate only in rare instances; therefore, before this method is used, guidance should be obtained by letter or phone from the District. Where it is necessary to specify or to employ a proprietary material, system, or process exclusively, the District should be consulted.

9.2.3 Labels. Hazardous items are required to bear the label of Underwriters' Laboratories, Inc., or similar organizations. Accordingly, the following wording shall be used in specifications where such labels are required. "The Contractor shall submit proof that the (state item) which he proposes to furnish under this specification conforms to the standards of the (list appropriate testing organization(s)). The label of (listed testing organization(s)) shall be accepted as conforming to this requirement. In lieu of the label, the Contractor may submit a written certification from any nationally recognized testing agency, adequately equipped and competent to perform such services, that the (state item) has been tested and conforms to the standards, including methods of test, of the (listed testing organization(s))."

9.2.4 Selecting Type, Grade and Class. Material, equipment and/or other items based on Mil. or Fed. Spec., Industrial specifications (ASTM, ANSI, etc.), or standards of other agencies shall

be identified by type, grade, class, etc., as applicable. A general reference to a particular publication is usually insufficient.

9.2.5 Cross Reference to other paragraphs, pages or sections of the specification by number designation is improper. Reference shall be made to paragraphs or sections by title in lieu of their respective numbers in order to prevent erroneous cross references due to renumbering.

9.2.6 References to Drawings. Information noted "as shown on the drawings" must be correlated with the drawing to assure such information is actually shown on the drawings. Phrases "or as shown on the drawing," "unless otherwise detailed," etc., shall be deleted unless the feature is actually shown or otherwise detailed.

9.3 Conflicts. Notes and details on the drawings that conflict with the specifications shall be corrected or deleted. Sizes, thicknesses, spacings, etc., must agree with the specifications. The guide specification will reflect the most current detail criteria except on items for which specific engineering instructions are furnished, in which case, the latter will prevail and the guide shall be altered accordingly.

9.4 Terminology used on drawings shall match that of the guide specifications. The specification requirements may not be binding if terminology used on the drawings and in the specifications is not consistent.

9.5 Standard Drawings (page size details attached to the guides) required for the project shall be listed in the Attachments under the Index of the specification section. Standard Drawings not applicable to the job shall be deleted from the list. For electrical work most of the standard details are furnished with the engineering instructions in lieu of being attached to the various electrical guides. All standard detail drawings listed in the "Attachments" shall be inserted at the end of the respective section by the A-E when the specification is assembled. All pages shall be numbered, and these details shall not be duplicated on the full size drawings. Schedules and tables at the end of the section, with pages numbered, are not to be listed as attachments and shall be edited and typed along with regular specification pages.

9.6 Third Party. References to a third party shall be avoided. Only the "Contractor" and the Contracting Officer" are involved. The terms "Other," "Owner," "Engineer," etc., and references solely to the subcontractor or any other third party shall not be used when stating any contract requirements.

9.7 Materials and Components. Technical Provisions shall specify materials by reference to Federal and Military Specifications and Standards, in that order, whenever these publications cover the desired materials. Interim Federal Specifications shall not be referenced in place of approved Federal Specifications, unless issued by an Army service or authorized by HQUSACE. Where Federal and Military Specifications and Standards are not applicable, suitable publications of individual Government departments may be used. Where none of these are applicable, widely used specifications of trade and professional organizations may be used. Where none of these are applicable the minimum requirements will be stated in terms of physical characteristics, chemical

composition laboratory test results, performance in actual use, or otherwise in such a manner as to assure full and free competition.

9.8 Bridges and Railroads. Technical Provisions for highway bridges shall conform to the standard specifications of the American Association of State Highway Officials or to those of the State Highway Department concerned. Technical Provisions for railroads and railroad bridges should conform to the general specifications of the American Railway Engineering Association or to the applicable specifications and standards of the railroad system involved.

9.9 Format.

9.9.1 Arrangement of Paragraphs within a Section. The Technical Provisions consist of one or more sections describing materials, methods of construction and quality of workmanship required for the job. Although no change is required in guide specification arrangement, each section usually consists of the following paragraph or groupings: applicable publications list, general requirements, materials, installation.

9.9.1.1 Applicable Publications. The publications list shall include only the publications referred to in the subsequent parts of the specifications. The publications listed shall be checked against the latest index or HQUSACE Notices to insure that only the current publications are being used.

9.9.1.2 General requirements are used in a section to state requirements that apply to all work in the section, and in military jobs this paragraph would include any information that would otherwise be included in a scope paragraph.

9.9.1.3 Materials shall list the standards for material referred to in subsequent parts of the section by the name of the material only.

9.9.1.4 Installation shall define the methods of construction and the quality of workmanship required. Sufficient detail should be given.

9.9.1.5 Payment shall define the payment items that are to reflect the cost of performing the work covered by the section. This part shall be omitted in cases where all costs in connection with the item are to be included in one lump sum Bid item. Payment (except drilled piers) is usually omitted from Military Projects.

9.9.2 Arrangement of Sections Within the Specifications. The Construction Specifications Institute (CSI) Format for Construction Specifications shall be used for the Technical Provisions. The contractual-legal provisions of CSI shall not be used. The CSI Format consist of a system of sixteen divisions and an established pattern of sections which, when they are used, would always appear in the same division. Arrangement within a division is flexible to permit typing before the sequence of all sections has been determined and to permit the inclusion of additional sections as the need arises.

9.9.3 Numbering.

9.9.3.1 Parts. Part I shall include the Special Clauses (prepared by the District with A-E input) and Part II shall include the Technical Provisions.

9.9.3.2 Divisions used in the CSI Format for the Technical Provisions are numbered and titled as follows:

Division 1 - General Requirements
Division 2 - Site Work
Division 3 - Concrete
Division 4 - Masonry
Division 5 - Metals: Structural and Miscellaneous
Division 6 - Carpentry
Division 7 - Moisture Protection
Division 8 - Doors, Windows, and Glass
Division 9 - Finishes
Division 10 - Specialties
Division 11 - Equipment
Division 12 - Furnishings
Division 13 - Special Construction
Division 14 - Conveying Systems
Division 15 - Mechanical
Division 16 - Electrical

For jobs with work in 8 or more divisions, all 16 divisions are to be included in each specification; and where no work is included in a division, the words "NOT USED" are to be typed in the middle of the page. (See Attachment C) For jobs with work in less than 8 divisions, only the divisions used are to be included in the specifications, and the statement "(ALL WORK INCLUDED IN DIVISIONS , , , , , and)" is to be included in the Table of Contents.

9.9.3.3 Sections shall be designated as shown in Attachments A and B.

9.9.3.4 Paragraphs. The number-period system shall be used. Paragraphs are numbered in sequence (1., 2., 3., etc.). Subparagraphs shall be designated as follows: first tier - 1.1, 1.2, 1.3, etc.; second tier - 1.1.1, 1.1.2, 1.1.3, etc.; third tier - 1.1.1.1, 1.1.1.2, 1.1.1.3, etc. Lists or enumerations of items or descriptions in sequence shall be identified by lower case letters, and if unavoidable by letters in parenthesis below that. Paragraphing below the third tier should be avoided whenever possible. The numbered period system is used in this chapter.

9.9.3.5 Pages should be numbered with the section number followed by a dash and the sequence number. (02050-1, 02050-2, etc)

9.9.4 Titles and Underlining. Titles shall be used for each part, section, paragraph, and to the maximum extent practicable for each subparagraph. Main paragraph titles shall be in capital

letters. First tier subparagraph titles shall be caps and lower case without underline. Where the first word or words of the paragraph or subparagraph are the title, never use a separate title then start the paragraph with the title words. Be sure the titled used accurately describes the contents of the paragraph or subparagraph. Example follows:

1. ALL CAPITAL LETTERS.

1.1 Caps and lower case without underline.

1.1.1 Caps and lower case without underline.

9.9.5 Paragraphing. When subparagraphs are used, care shall be taken to include at least two subparagraphs within each tier used. When it is impossible to have at least two subparagraphs within a particular tier, the provisions of the single subparagraph shall be included in another part of the basic paragraph.

9.9.6 Word forms.

9.9.6.1 The words "Contractor," "Contracting Officer," "Federal," and "Government" are always capitalized.

9.9.6.2 Reference to conditions stated in Part I shall be made as the "SPECIAL CLAUSES", Section 00800. Reference to clauses of the Contract Clauses shall be made as "CONTRACT CLAUSES," Section 00700.

9.9.6.3 Reference to another section shall be made as "SECTION: CONCRETE."

9.9.6.4 Reference to a paragraph in the same section shall be made as "paragraph: FINISHING." Reference to a subparagraph in the same section shall be made as "subparagraph: Broom finish." Do not make reference to paragraphs in other sections; make reference to the section in which the paragraph occurs.

9.9.6.5 Except where used in tables, the words "inches" and "feet" shall be used instead of their abbreviations.

9.9.6.6 When referring to publications, the words "Federal Specifications" shall be spelled out and the words "ASTM Standard" or "ASTM Specification" shall be used instead of "ASTM Designation."

9.9.6.7 Use the word "shall" when the Contractor is to perform.

9.9.6.8 Use the word "will" when the Government has the option to perform.

9.9.7 Use of numbers. Whole numbers less than 10 shall be spelled out and all other

numbers shall be expressed as figures.

9.10 Common Errors.

9.10.1 Not reading instructions given in guide specifications prior to editing.

9.10.2 Using out-of-date-guide specifications.

9.10.3 Using brand names when specifying materials.

9.10.4 Not editing out all inapplicable portions of guide specifications, i.e., paragraph measurement, pavement, and bracket phrases, etc.

9.10.5 Using similar job specification as a guide specification (always start from updated guides if available).

9.10.6 Not giving typist the instructions contained in the typing section.

9.10.7 Using subparagraphs in index instead of just main paragraphs (paragraphs will be listed in the index pages).

9.10.8 Using Guide Specification for minor item of work (i.e., 30 pages of concrete specifications for 10 cubic yards of concrete).

9.10.9 Submitting final specifications without IFB number (see paragraph: TYPING).

10. TYPING. The paper used by the Government measures 8-1/2 by 11 inches as used commercially. A sample of Print Quality should be submitted at 35 percent Review. Single Pass Dot Matrix is unacceptable. The use of unassigned sections, "NOT USED" paragraphs, "A" pages (except amendments), and blanked out paragraphs is not permitted. The hard copy of the final design review specifications shall be printed in near letter quality, 12 pitch (elite) type. In order for all District guide specifications to be consistent, a predetermined set of standard formats have been established. Page and paragraph numbering, line spacing, capitalizing, bolding, margin widths, format, etc., are part of the preset format. It is required that the A-E keep the preestablished format. Typed specifications which do not conform to this format will be returned for retyping. Cutting and splicing of the "original" copy of specifications is not allowed for making corrections. Standard drawings listed as attachments shall be included at the end of the respective sections as required. The specifications shall be proofread prior to submittal. No pen and ink changes are allowed on the specifications. Do not add any additional headers or footers to the specifications.

10.1 Spacing shall be as follows:

10.1.1 Top line with "Invitation for Bid" number is started on line 4.

10.1.2 Bottom line of text is ended on line 55, except a maximum of three lines lower is

permitted when additional lines are used to complete a paragraph.

10.1.3 Page number is centered on line 58, except a maximum of three lines lower is permitted when additional lines are used to complete a paragraph.

10.1.4 Text is always single spaced.

10.1.5 Paragraph numbers are always indented two spaces. Two spaces occur between paragraph numbers and paragraph titles.

10.2 Paragraph Titles shall be all caps. Subparagraph titles shall be upper and lower case.

10.3 Margins shall be as follows:

10.3.1 Odd-numbered pages shall have a left margin of 1-1/4 inches and a right margin of 3/4 inch.

10.3.2 Even-numbered pages shall have a left margin of 3/4 inch and a right margin of 1-1/4 inches.

10.3.3 Second and subsequent lines of paragraphs and subparagraphs are always returned to the left margin.

10.4 Hyphenation. Words are hyphenated according to syllables; however, no division is made when there are less than three characters on either side of hyphen. Words should not be hyphenated between pages.

10.5 IFB/RFP Number. Each page shall carry the "Invitation for Bid" or "Request for Proposal" number, not A-E Contract number. The invitation or request number shall be located on line 4 in the following manner: on even-numbered pages the left outer corner at margin, and on odd-numbered pages the right outer corner ending at 3/4-inch margins. The number will not be established until just prior to final typing and should be requested at that time from the project manager. In the event the number has not been established prior to final typing, the number will be added by the District at the time of advertising.

10.6 End of Section shall be designated by six asterisks placed in a row two lines below the last line of the last paragraph and with a single space between each asterisk.

10.7 Submittal Register. As a part of the specifications, the A-E shall complete the "Submittal Register" at Design Complete. The Submittal Register will become a part of the specifications, SECTION: 01305. The system whereby the Contractor can maintain effective scheduling, control, and processing of submittals required by the contract in order to regulate the timely flow of materials to be incorporated into the construction is addressed in
ER 415-1-10, dated 30 June 1991.

10.8 Common Errors.

10.8.1 Not giving these instructions to typist.

10.8.2 Not giving these instructions to A-E subcontractors.

10.8.3 Not switching margins for odd- and even-numbered pages.

10.8.4 Not denoting end of section.

10.8.5 Not completing index pages and Table of Contents.

10.8.6 Using A-E contract number rather than "Solicitation" number.

10.8.7 Submitting Final Specifications without (IFB) number.

11. AMENDMENTS TO PROJECT. Amendments will be issued by the District. After a project is advertised for bids, revisions or corrections to specifications and drawings may be necessary. The A-E is required to prepare amendment type revisions to complete and correct the advertised documents.

11.1 Scheduling. The amendment revisions shall be prepared and submitted under a strict time schedule as directed in order that the revisions can be issued to bidders at approximately the midpoint in the advertising period.

11.2 Transmitting. Regular U.S. Mail shall not be used to transmit amendment revisions to this office. The District shall be consulted to determine what urgent delivery system will be acceptable.

11.3 Specification Revisions shall be marked on loose pages taken from an unbound set of the advertised specifications to show exact corrections and the pages so marked shall be submitted. New sections and pages of specifications to be added by amendment shall be furnished in hard copy. This office will prepare the specifications portion of the amendment in its final format. Do not renumber pages, paragraphs, or subparagraphs when making additions or deletions by amendment.

11.3.1 New Pages. If changes on any given page are so extensive that it becomes necessary to insert more than one page, the additional pages shall be numbered as "a" or "b" pages. The numbers of the existing page and the following unrevised pages shall remain the same. New pages of specifications to be added by amendment shall be furnished in hard copy.

11.3.2 New Paragraphs or subparagraphs should always be inserted at the most logical chronological place between existing paragraphs or subparagraphs. For example, after Paragraph 3, the inserted paragraph shall be numbered 3A.

11.3.3 New Section. If an entire new section of specifications is to be inserted, it shall be typed on bond paper. New sections of specifications to be added by amendment shall be

furnished in hard copy.

11.3.4 General Changes. Revised specification pages in typed form will be submitted by the A-E in all cases. Double asterisks are to be placed in the margins before and after lines or paragraphs changed from the previous issue in order that the changes can be easily identified.

11.4 Drawing Changes. Design changes, dimensional changes, etc. to drawings shall only be made by issuing a revised drawing or insert 8-1/2 by 11 inch drawing. Notes for clarification purposes may be added to the drawings by narrative description. The required narrative changes shall be furnished to the District by the A-E in typed form for inclusion in the amendment.

11.5 Common Errors.

11.5.1 Narrative changes to Specifications rather than revising the affected specification page.

11.5.2 Not providing double asterisks in the margins to denote the changes from the previous issue of the specification page.

11.5.3 Narrative changes to drawing that should be made by revising the drawings (i.e. design changes, dimensions, etc.).

11.5.4 Receipt of Amendment information in the District later than 5 days prior to issue date.

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CHAPTER 17

CHECKING GOVERNMENT APPROVED SUBMITTALS (SHOP DRAWINGS)

1. GENERAL. The A-E should be familiar with the current Section 01305, Submittal Procedures, of the contract specifications. The Resident Engineer is responsible for the prosecution of the construction contract so official approval action on submittals will be taken only by the Resident Engineer. The A-E's approval of a submittal will be the basis for official approval by the Resident Engineer.

1.1 Definition. The term "submittals" as used herein shall mean all items identified on the submittal register and in the contract specifications as GOVERNMENT APPROVED SUBMITTALS. Should there be any inconsistencies in the contract specifications in regard to the submittals as defined, or if the approved action is not identified, contact the District immediately. These items include drawings by the Contractor of structural steel, reinforcing steel, mechanical or electrical systems, sprinkler irrigation systems, and other items requiring special drawings. Also included are equipment lists of hardware, plumbing, heating, air conditioning and electrical items, sewage and water treatment equipment. Submittals may include actual samples when so required by the specifications to be submitted for approval. Submittals of some equipment may be catalog cuts and descriptive data as required by the specifications.

1.2 Purpose. Submittals provide the means for defining in detail the manner in which materials, equipment, and workmanship are proposed to be furnished by the Contractor to meet the requirements of the plans and specifications. These requirements cannot be changed by approval of submittals. "Approval" of submittals means approval of details, methods, and procedures within the contract requirements. The approval of inadequate or incorrect submittals may give rise to claims and appeals; therefore, care and good judgment must be exercised in processing these items to insure that the action taken is complete, correct, and that it will not impede, in any way, the progress of the project.

1.3 For Information Only Submittals which are inadvertently sent to the A-E shall be forwarded to the Resident Engineer involved with no approval action taken.

1.4 Parts List and operating and maintenance manuals for equipment items are not to be reviewed for approval, as such, unless they are an integral part of the descriptive data for the item concerned. Where such lists and manuals are separate from other descriptive data, they shall be considered For Information Only items.

1.5 Material. Equipment and test certifications are not to be considered submittals or treated as such, except as follows:

1.5.1 When specifications specifically state that certifications are to be submitted for "approval."

1.5.2 When certifications contain descriptive information or data not otherwise presented, and which is considered essential in determining compliance with the specifications.

1.6 Certifications of a general nature that do not come under the preceding classifications shall be forwarded to the Resident Engineer involved with no approval action taken. Samples included with submittals shall be forwarded to the Resident Engineer involved.

2. PROCESSING PROCEDURE. The A-E may receive all submittals directly from the Construction Contractor and will return submittals to the Resident Engineer or contractor as directed. The A-E may affix a stamp of his choice on all copies of the Transmittal Form indicating the firm's name and date of receipt.

2.1 Time Frame. All submittals are to be processed through the A-E's office within ten (10) working days after receipt. The Resident Engineer shall be promptly notified in each case where this time is expected to be exceeded. Because of extremely large submittals, complicated design, or other valid reasons, additional time may be allowed to permit complete and adequate review. In all cases, time required for review shall be held to an absolute minimum. A delayed, incomplete, or otherwise deficient submittal from the Contractor which might adversely affect the timely prosecution of the construction contract shall immediately be brought to the attention of the Resident Engineer. Submittals pertinent to early stages of construction, especially structural steel and reinforcing steel, and other items requiring fabrication should be approved, approved with minor corrections, or disapproved and returned as promptly as possible so that fabrication of those items may proceed.

2.2 Transmittal and Disposition. All specifications issued by this office require the Construction Contractor to use a standard Submittal Form, Engineering Form 4025, in transmitting its submittals for approval. The A-E will receive several sets of all drawings, catalog data, descriptive literature, specifications, etc. All but one of the annotated copies of shop drawings, catalog data, descriptive literature, specifications, etc., shall be forwarded to the Resident Engineer. All actions taken shall be noted in the "FOR CE USE CODE" column of the Submittal Form, which shall be forwarded to the Resident Engineer along with any additional information or statements by the Contractor in support of his selection of equipment. All submittals and correspondence shall be transmitted by the most expeditious means. One (1) copy of all submitted drawings and data shall be retained in the A-E's files.

3. CHECKING THE SUBMITTAL. The A-E will check the submittal to verify that the item meets all the requirements of the contract plans and specifications with all amendments and modifications currently posted. The submittal form will show the section and paragraph that require the submittal. If this information is not shown or is incorrectly shown, it shall be added or corrected. The total count of materials and accuracy to assure field fit is not the A-E's responsibility, although reasonable attention should be given to this aspect.

3.1 Cross-Checking. All submittals for individual pieces of equipment weighing 200 lbs, or more and groups of equipment with a total weight of more than 200 lbs. shall also be furnished to

the A-E for the purpose of cross-checking applicable structural designs of the buildings. Where equipment has any type of electrical supply, control, contact, or connection, it must also be cross-checked for compliance with the electrical drawings and specifications.

3.2 Checklist shall include the following:

3.2.1 Structural steel drawings should be checked for the size and weight of each different member and the design of structural connections must be verified.

3.2.2 Reinforcing steel must be checked for the size and spacing of bars, proper lap and positioning of steel.

3.2.3 Material stress grade for items to be furnished, coats of shop paint, shop finish on laminated wood beams, and similar items shall be verified and checked against requirements in the plans and specifications.

3.2.4 Fire Protection drawings shall be checked for compliance with NFPA Standards and no deviations are to be approved, except to conform to the local authority's interpretation of these standards, or the deviations set forth on the plans and specifications.

4. ACTION AND COMMENTS ON SUBMITTALS. When specifications require submittals on control systems, wiring diagram, piping layouts, or other items of this nature, approval shall not be given to component parts of the system until the required drawings and data in complete detail are submitted. If the A-E discovers that submittals have been inadvertently approved that do not comply with the plans and specifications, the A-E will take immediate action to notify the Resident Engineer.

4.1 Types of Action. The "FOR CE USE CODE" column of the Submittal Form shall be filled out per letter codes listed on the back of the Form. No actions are to be made or stamped on any of the drawings or catalog data. The following seven (7) action codes are applicable, and no other variations shall be used:

4.1.1 "A" - Straight Approval Only. Items meeting all requirements of the plans and specifications.

4.1.2 "B" - Approved, subject to corrections noted on submitted data and/or Comments on an attached sheet. Corrections shall be made on all copies of drawings and data submitted for approval. This action should be taken only when it is possible for the supplier to accomplish the correction without major revision to the submitted item.

4.1.3 "C" - Approved, subject to corrections noted on submitted data and/or comments on attached sheet. Resubmission required. Corrections shall be made on all copies of drawings and all data submitted for approval. This action should be taken when there is a major revision to the submitted item, but because of a short construction schedule, long lead time, or the need for fabrication, it is felt that the submittal should be approved.

4.1.4 "D" - Will be returned by separate correspondence. This action should be taken when the submittal is large enough that it will take several days to mark up and process the submittal and the contractor needs to know approval actions for fabrication purposes.

4.1.5 "E" - Disapproved, with corrections noted on the drawings and/or catalog data or reasons on an attached sheet. Reasons for Action "E" may be as follows:

4.1.5.1 Data submitted from more than one manufacturer for a single item shall be returned "Disapproved" through the Resident Engineer with the request that the Contractor resubmit one make, since approval can be given to only one. Substitutions submitted at a later date shall not be approved unless the Contractor gives a valid reason, such as delayed delivery, discontinuance of manufacture, etc., which has been verified by the Resident Engineer.

4.1.5.2 Equipment or materials which do not meet all requirements of the plans and specifications will not be approved. Substitute equipment and materials submitted by the Contractor will be given no consideration and will be returned "Disapproved" through the Resident Engineer unless accompanied by a full explanation by the Contractor, describing all points in which it differs from the requirements of the specifications, how its substitution will affect other items, and the reasons for submittal. If material is submitted in this manner by the Contractor, and if in the opinion of the A-E the substitute has merit and should be considered, the entire submittal together with comments and recommendations will be forwarded to the Resident Engineer for action and distribution.

4.1.5.3 The Contractor is responsible for field fit and dimensions; therefore, when drawings are received asking for verification of dimensions, they should be returned to the Contractor through the Resident Engineer as "Disapproved" and noted "Contractor shall verify field fit and dimensions."

4.1.6 "F" - Receipt acknowledged. This action should be used when receiving a submittal that requires no action. A submittal "For Information Only" is a typical example.

4.1.7 "G" - Other (Specify). This action should be taken when used in conjunction with other actions. A written statement specifying what the action code means shall be included in the space provided for "Remarks".

4.2 Changes to the Construction Contract Affecting Submittals.

4.2.1 Submittals affected by changes to the Construction Contract made by modification will be checked and approved on the basis of the current status of the plans and specifications. Submittals will not be categorically disapproved based on a pending modification, except on specific instructions from the District. In rare instances when it appears there would be a major savings in overall costs and when the full scope of the modification is known and the date of issue is firm and very near, the A-E may be instructed to note affected items for resubmittal "in accordance with

forthcoming Modification No. ____." If in doubt, consult the Resident Engineer.

4.2.2 When the Contractor's submittal proposes a change, this information (all marked-up copies of the submitted data, including a narrative description of the change), together with comments, recommendations, and an estimate will be transmitted immediately to the Resident Engineer for necessary action.

4.2.3 When it has been determined by the A-E as a result of the review of submittals (submitted in accordance with contract specifications), that a change to the contract is necessary, the submittals together with the A-E's recommended changes, comments, and an estimate of cost should be forwarded immediately to the Resident Engineer for necessary action.

4.3 Comments on Submittal Material.

4.3.1 All corrections and all comments possible should be placed on the drawings or other submitted data. All corrections made to the reproducible drawings shall be encircled with a cloud symbol so the Contractor can easily identify the changes made. Corrections made on all other submitted data shall be made in "red". No markings indicating Action are to be made on any of the drawings or other submitted data. Other comments should be placed on a sheet of paper attached to the submittal form. Comments made on an attached sheet or by letter should be cross-referenced on the submitted data showing where made, e.g., "See comments on attached sheet," or "… in attached letter."

4.3.2 Comments on partially approved submittals shall be clear in regard to items not approved and shall give proper instruction for resubmittal.

5. CONTACT WITH THE CONTRACTOR. The A-E is not authorized to make direct contact with the Construction Contractor. All contacts will be made through the Resident Engineer.

6. APPLICABLE REFERENCED PUBLICATIONS. Checking of submittals requires that A-E's performing this service procure copies of or have access to specifications, standards, and pamphlets referenced in the project specifications. Specifications and standards cited in the Project Specifications are available as indicated below:

6.1 Unclassified Federal, Military, and Other Departmental Specifications and Standards (excluding the Corps of Engineers Handbook for Concrete and Cement (CRD-C Series) and Commercial). Submit request on DD Form 1425, Specifications and Standards Requisitions, or in letter form to:

Standardization Document
Order Desk, Building 4, Section D
700 Robbins Avenue
Philadelphia, PA 19111-5094
Telephone (215) 697-3321

Requests may be submitted in letter form indicating the specification title, number, and date, and any applicable amendment thereto by number and date.

6.2 Corps of Engineers Specifications of the CRD-C series may be obtained from: U.S. Army Engineer Waterways Experiment Station, ATTN: Publications Distribution Information Services Branch, P.O. Box 631, Vicksburg, MS 39180, and are also on file and available for review in this office.

6.3 Commercial Specifications and Standards are not available from District sources. They may be obtained from the publishers.

6.4 Codes and Publications from Other Sources which are referenced by the items and the publications must be made available to personnel actually checking the submittals.

CHAPTER 18

ESTIMATING GUIDE

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CHAPTER 18

ESTIMATING GUIDE

1. GENERAL. The purpose of this guide is to outline the requirements for preparing estimates for military projects. All MILCON-funded projects will utilize the Corps' Micro based Computer Aided Cost Estimating System (MCACES-Gold) for estimate preparation. Any deviations from this requirement will be specifically granted by the District and included in the scope of work.

2. REFERENCES.

2.1 General. The A-E shall prepare a cost estimate for the project at the various stages of design, as specified in the scope of work. Estimates shall be prepared in conformance with the following manuals:

2.1.1 TM 5-800-2, Cost Estimates, Military Construction, June 1985, published by Headquarters, Department of the Army.

2.1.2 EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, published by HQUSACE.

2.1.3 AR 415-17, Construction Cost Estimating for Military Programming.

2.2 Contradictions. WHERE CONTRADICTIONS EXIST BETWEEN THIS MANUAL AND THE TM 5-800-2, THIS MANUAL SHALL GOVERN. Questions concerning the interpretations of these requirements shall be directed to the District.

3. TYPES OF ESTIMATES: Current Working Estimates (CWE) are designated as either Code A, Code B or Code C. These estimates are used not only as a basis for Congress to appropriate funds, but once funds are appropriated, to maintain cost control during the design process, and to assure that the cost stays within the funds available.

4. CODE B ESTIMATES:

4.1 General. Code B estimates are submitted with their respective design documents when design is from 25 percent to 65 percent complete. To the extent possible, the procedures for Code C estimates shall be used. If the design is unrefined at the time of submittal, more general methods may be used, e.g., use of system approach, unit prices which include labor plus materials, not itemizing indirect costs, etc.

4.2 Degree of Detail. The degree of detail to be provided is directly related to the amount of design completed when the estimate is prepared. The more refined the design, the more detailed the estimate should be. At the 65 percent Code B stage, the estimate should more closely resemble a Code C estimate.

4.3 Example Code B Estimate. Use the Example Code B estimate, Appendix C, TM 5-800-2 (June 1985) as a guide. The prices and percentages shown are for illustration only. The estimator shall determine the proper prices and percentages for a specific project.

4.4 Format.

4.4.1 Costs shall be divided into the following major categories: Each new building to 5 feet beyond exterior building surface; each building addition to the 5-foot line; alterations to each existing building; and exterior work. The major categories shall be further subdivided in accordance with the Work Breakdown Structure (WBS).

4.4.2 Unusual foundation cost (such as drilled piers, the removal of unsatisfactory material and replacement with suitable material, rock excavation, or high water table); separately funded items identified in the scope of work (such as O&M or multi-agency funded work); and optional, alternative or additive designs shall be kept separate.

4.4.3 Asbestos removal costs shall be kept separate.

4.4.4 Exterior work shall be divided into electric service; water, sewer, and gas; steam and/or chilled water distribution; paving, walks, curbs and gutters; storm drainage; site improvements/demolition; communications; and other work.

4.5 Unit Costs.

4.5.1 Indicate source(s) of unit costs.

4.5.2 Line items shall be described sufficiently to clearly identify them, including such information as size, thickness, gauge, rating, etc. Explanatory notes shall be incorporated into the estimate to clarify all aspects and assumptions.

4.6 Subcontractor Overhead. Preferably as a separate line item. Mark all line items with overhead included in unit cost and indicate the percentage included.

4.7 Subcontractor Profit. Preferably as a separate line item. Mark all line items with overhead included in unit cost and indicate the percentage included.

4.8 Prime Contractor Indirect Cost (Overhead). Add as a separate line item.

4.9 Prime Contractor Profit. Add as a percentage by separate line item.

4.10 Design Contingency. This is an amount which may be added by separate line item to the estimate to allow for missing items and missing costs due to the immature state of the project design. The amount of design contingency , usually expressed as a percentage, should decrease along with the progressive refinement of the design. The estimator should make the decision as to whether a contingency should be added and how much it should be. Because some portions of the design may need a design contingency while others may not, it is best to apply the percentage at an intermediate summary sheet rather than only once at the project summary sheet.

4.11 Cost Level Date. The "cost level date" is the effective date of the prices used in the estimate, i.e., the average date for which the prices are valid. The cost level date may be different than the date of estimate submission.

4.12 Cost Growth (Escalation). An allowance for anticipated labor, equipment and material price increases from the cost level date to the midpoint of the project construction period shall be included in the estimate. The allowance shall be added as a single line item on the "Estimate Detail Summary Sheet" as a percentage. Show the method of arriving at the percentage increase.

4.13 Reserve for Contingencies. This is an amount of money set aside for change orders and contract modifications after award of the contract. It is normally 5 percent of the contract cost for new construction and 10 percent for alterations to existing construction. The preponderance of the work determines which figure is used. A weighted average is not used.

4.14 Supervision and Administration (S&A or SIOH). This is an amount of money set aside for Government supervision and administration of the contract. It is normally 6.0 percent (7.5 percent on Operation & Maintenance-funded work) of the total of the contract cost plus the contingency reserve.

4.15 Current Working Estimate (CWE). This is the grand total of all elements discussed above.

5. PREPARATION OF CODE C ESTIMATES.

5.1 General. Code C estimates are based on final drawings and specifications of a design more than 65 percent complete. Code C estimates shall conform not only to all requirements for Code B estimates but also to the additional requirements described in this section. These estimates shall be prepared on the basis that the District is bidding in competition with private contractors. All reasonable, anticipated expenses that would be incurred by the contractor shall be included in the estimate.

5.2 Method of Preparation. Code C estimates shall be prepared using MCACES-Gold, unless specific written permission is received from the Cost Engineering Branch authorizing a waiver. Refer to CACES current version Users Manual and additional instructions and information supplied by the District.

5.3 Format. In addition to the requirements for Code B estimates, Code C estimates shall have each line item of work divided into separate unit costs for labor, equipment, and material. Refer to TM 5-800-2.

5.3.1 When asbestos removal is required, the selected method of removal shall be fully explained. Specific contract specifications requirements for asbestos removal shall be itemized and priced in detail.

5.3.2 For hazardous, toxic and radioactive waste (HTRW) remediation projects, fully explain the method of cleanup, assumptions, qualifying or limiting factors involved, crew composition and crew productivity. Specifically address 'level of protection' required and the resultant crew (labor and equipment) inefficiencies.

5.4 Labor Unit Cost. The labor unit cost shall be based on local wage rates, but not less than the Davis-Bacon rate determination for the area. The estimate shall contain a listing of the wage rates utilized. DA Form 5420-R with applicable entries, shall be used for this purpose, for non-MCACES estimates. The labor unit cost shall be based on the "burdened" labor rate, i.e., the "Total Hourly Cost" as calculated in column k of DA Form 5420-R. The rate shall include the basic hourly wage plus normal fringe benefits (pension, health and welfare, vacation, apprentice training, etc.), insurance and tax on labor (workmen's compensation and employer's liability, social security and Federal and State unemployment tax) and, where applicable, overtime and travel or subsistence.

5.5 Equipment Unit Cost. Each line item of work, when applicable, shall contain a unit cost and extended cost for the contractor's construction equipment.

5.6 Material Unit Cost. The estimate shall contain a detailed material breakdown. The

material cost for each line item shall show the unit cost and the extended cost. The material unit cost shall be the current local cost and include transportation delivered to the job site. Sales tax and material taxes, as applicable, shall be applied to the summation of material by discipline or other estimate heading.

5.7 Unit Cost Support.

5.7.1 All sources, such as quotations, estimating manuals, and catalogues from which labor unit costs, equipment unit costs, and material unit costs are taken or derived shall be identified. With respect to labor unit costs and equipment unit costs, specifically identify work crews used, equipment used, labor rates equipment rental rates, and work crew productivity.

5.7.2 For crew composition and crew productivity, use DA Forms 5419-R and 5421-R (refer to TM 5-800-2) for non-MCACES estimates.

5.7.3 For heavy and highway construction, refer to Attachment 2, Code C estimate, of this chapter.

5.7.4 When a unit cost is taken from an identified source but has been adjusted, the reason for the adjustment and the adjustment factor shall be given. The "cost level date" (the date for which the unit costs are valid) for each data source shall be given.

5.8 Subcontractor Work. Subcontractor work shall be itemized and summarized separate from prime contractor work with overhead and profit added by separate line items. Indicate those line items for which subcontract quotations are received. Quotation sources should be identified.

5.9 Prime Contractor Work. Prime contractor work shall be itemized and summarized separately. The policy of the District is that no less than 20% of the actual work shall be performed by the prime contractor's own forces.

5.10 Insurance and Tax on Labor (Workman's Compensation and Employer's Liability, Federal and State Unemployment Tax, and Social Security). Refer to paragraph: Labor Unit Cost.

5.11 Overtime, Travel Cost, Subsistence Cost. Refer to the discussion in paragraph: Labor Unit Cost.

5.12 Sales Tax and Other Material Taxes. These taxes may be added by separate line item. However, if they are included in material prices a statement to that affect shall be given in the estimate.

5.13 Quotations. When quotes for special materials or construction are used in the estimate they shall be flagged and their sources identified by indicating company name and address as well as point-of-contact by name and telephone number.

5.14 Subcontractor Indirect Cost. A subcontractor's indirect cost (overhead) is usually limited to the costs pertaining to one phase of the work. Since such overhead bears a fairly stable relationship to that phase of the work, it may be estimated on a percentage basis. However, if desired, the subcontractor indirect cost may be developed in the same manner as the prime contractor indirect cost. For a reasonable percentage the estimator should rely on his own experience or historical data records, or refer to cost estimating publications.

5.15 Subcontractor Profit. Subcontractor profit may be estimated as a percentage of subcontractor costs. For a reasonable percentage, the estimator should rely on his own experience or historical data records, or refer to cost estimating publications.

5.16 Prime Contractor Indirect Cost.

5.16.1 This cost is also called prime contractor overhead cost. The prime contractor's indirect cost is not a fixed percentage of the prime contractor's work, or of an entire job, but depends upon the amount of job supervision required, the nature of the temporary facilities, and the amount of work that is subcontracted. Therefore, attempts to assess such costs as a percentage of the total cost of a project may lead to errors. The estimator shall itemize the prime contractor indirect costs.

5.16.2 For a detailed indirect cost checklist refer to TM 5-800-2, Appendix E.

5.16.3 Prime contractor indirect costs (Overhead) shall be transformed into a percentage and distributed over the cost of all basic bid items. For additive bid items apply the following prime contractor indirect costs: (1) a percentage for home office overhead, (2) the cost for additional mobilization and demobilization specifically attributable to the additive work, and (3) additional job overhead expenses.

5.17 Prime Contractor Profit (Weighted Guideline Method).

5.17.1 Cost estimates shall contain a reasonable percentage for prime contractor profit. A percentage for profit shall be separately estimated using the following table. Refer to TM 5-800-2, Chapter 12, for additional details on selection of Weight. Also refer to Appendix of this guide.

Factor	Rate	X	Weight	=	Value
Degree of Risk	20				
Relative Difficulty of Work	15				
Size of Job	15				
Period of Performance	15				
Contractor's Investment	5				
Assistance by Government	5				

Degree of Risk	20
Relative Difficulty of Work	15
Subcontracting	25
	100%

5.18 The prime contractor's performance and payment bond shall be added by separate line item. Refer to Attachment 1 for bond rate tables.

5.19 Cost Level Date. See paragraph: Code B Estimates.

5.20 Cost Growth (Escalation). See paragraph: Code B Estimates.

5.21 Reserve for Contingency. See paragraph: Code B Estimates.

5.22 Supervision and Administration. See paragraph: Code B Estimates.

5.23 Bid Items. When the Bid Schedule for a project will be composed of more than one Bid Item, the estimate shall be summarized to produce an estimated construction cost for each Bid Item.

6. SECURITY OF THE CODE C ESTIMATE.

6.1 Access to the estimate and its contents shall be limited to personnel whose duties require that they have knowledge of the subject. The 100 percent Final Design Estimate shall be furnished separately in a double-sealed envelope with the outer envelope marked:

"FINAL COST ESTIMATE
FOR OFFICIAL USE ONLY"

6.2 Signature Sheet. All individuals who have had access to the total amount of the Code C estimate shall sign this sheet. Refer to TM 5-800-2 (June 1985), par. 2-5b, page 2-2.

7. HEAVY AND HIGHWAY CONSTRUCTION.

7.1 General. Where all or most of the project is heavy or highway construction, a different estimate format for direct costs shall be used, which better relates to this type of construction. The unit costs for this type of work are usually unique for each project. For example, for earthwork projects costs will vary depending on haul distances, terrain, haul equipment, excavation equipment, type of materials, weather conditions, moisture conditions, placement and compaction requirements, the construction period, congestion of the worksite, labor rates, etc. Therefore, costs for this type of work must be supported with an estimate for equipment, labor, and material showing in detail the work crew composition, equipment used, technique used, production rates, equipment rental or

ownership costs, equipment payloads, material shrinkage factors, etc. The estimate should be logically presented with each phase fully described including the items and distribution sheet.

7.2 Site Improvements. When the site improvements associated with a building construction project are a relatively minor part of the total project cost, as they usually are, they may be priced using the same unit cost format as for the building construction part of the project.

7.3 Example Estimates. Attachment 2 illustrates documentation of crew composition and productivity for an earthwork operation. See TM 5-800-2 for other examples.

8. CONTRACT MODIFICATION ESTIMATES: Modification estimates will be prepared in the detail required for Code C estimates. Additional costs for removals, restocking, or other lost effort shall be identified separately. Impact costs will be determined by the District.

9. CHECKLIST FOR REVIEW OF DETAILS AND FORMAT PRIOR TO FINALIZING THE ESTIMATE:

The estimator is encouraged to use this checklist in the final review of his estimate as an aid in identifying potential errors.

9.1 Legibility and Trackability. Is the estimate trackable? Does it progress logically and clearly from a listing of quantities with unit prices through summary sheets and application of overhead, profit, and other markups to the final bid price? Can the reviewer follow all steps mathematically?

9.1.1 Are the pages of estimate numbered serially?

9.1.2 Are sheet numbers from which amounts are brought forward indicated on summary sheets?

9.2 Descriptions and Supporting Details:

9.2.1 Are line items described in enough detail, such as size, thickness, gauge, material, type, rating, etc., to adequately identify them so that the reviewer can evaluate them? Examples of some line item descriptions are as follows:

Unacceptable	Acceptable
4" pipe	4" type K copper pipe
vinyl asbestos tile	vinyl asbestos tile, 1/16"
unit heater	unit heater, gas-fired, 100 MBH
sheet piling	sheet piling, 38 psf
fence	chain link fence, 9 ga., 6 ft.
painting	paint CMU, 2 coats, latex
insulation	batt insulation, fiberglass, R11
5" steel pipe	5" pipe, blk steel sch. 40, threaded

9.2.2 Are the sizes and types of construction equipment indicated? Has equipment been designated as company owned or rented? Is the length of the rental period given?

9.2.3 Are large lump sum costs supported in detail?

9.2.4 Are direct cost contingencies incorrectly included in a Code C estimate?

9.2.5 Are undefined terms such as "markup," "labor burden," "bare cost," and "supervision," used? All such terms should be defined.

9.3 Labor.

9.3.1 When man-hours are used for labor, has an allowance for supervision been included?

9.3.2 Should the estimate include overtime and if so have overtime costs been properly identified?

9.3.3 Does hot or cold weather impact on labor efficiency and on the time required to complete the work?

9.3.4 Is asbestos removal required? Are such costs listed separately? Has the cost impact of asbestos removal on other work in progress on the same project been clearly explained and included?

9.3.5 Does the estimate identify by separate line items labor inefficiencies and additional costs due to hazardous or toxic waste removal and disposal requirements?

9.4 Wage Rates.

9.4.1 Have the proper wage rates been used? Building Construction rates; Heavy and Highway Construction rates; Family Housing Construction rates; Service Contract rates?

9.4.2 Has a tabulation of the wage rates used in the estimate been included (DA Form 5420-R)?

9.5 Insurance and Tax on Labor.

9.5.1 If Insurance and Tax on Labor has not been included in the man-hour rates, has it been included by separate line item?

9.5.2 If the Insurance and Tax on Labor is greater than 20 percent, is it itemized in detail?

9.5.3 Has Insurance and Tax on Labor been correctly applied only to the cost of labor?

9.6 Subcontractor Work.

9.6.1 Has subcontractor work been identified?

9.6.2 Have subcontractors' overheads been added as separate line items?

9.7 Prime Contractor Work.

9.7.1 Has prime contractor work been identified?

9.7.2 Is prime contractor work at least 20% of the project?

9.7.3 Have prime contractor indirect cost been itemized in detail?

9.7.4 Has the prime contractor's home office overhead been included?

9.7.5 Has the prime contractor's overhead incorrectly been added as a percentage though it was already included in the form of an itemized breakdown (a double entry)?

9.8 Profit.

9.8.1 Have Subcontractors' Profits and Prime Contractor's Profit been added by separate line items?

9.8.2 Has the Prime Contractor Profit for Code C estimates been computed by using the "O.C.E. Weighted Guidelines Formula?"

9.9 Cost Growth.

9.9.1 Has cost growth inadvertently been added twice? Was it allowed for in unit costs and a second time by separate line item on the summary sheet?

9.9.2 Has cost growth been added as a separate line item?

9.9.3 Has the cost growth index used for the cost growth computation been identified?

9.10 Other.

9.10.1 Has the math been checked?

9.10.2 Has a percentage for bond been added?

9.10.3 Has a "PROJECT SUMMARY (DD FORM 1391 FORMAT)" been included?

9.10.4 Has a "reserve for contingency" percentage been added to the finalized construction cost estimate (5 percent for new work, 10 percent for remodeling work)?

9.10.5 Has a percentage been added to the construction cost estimate for District supervision and administration of the contract? Use 6.0 percent for Military Construction Army and Army Family Housing work and 7.5 percent for operations and maintenance work.

27 July 1989

PERFORMANCE AND PERFORMANCE PAYMENT BOND RATES
LUMP SUM AND UNIT FIXED PRICE CONTRACTS

1. The rate per $1,000 of contract price using Surety Association of America standard advisory rate (non-deviating) is as follows:

Amount of Contract Price	Class B:	Class A:	Class A1:
First $ 100,000	$ 25.00/M	$ 15.00/M	$ 9.40/M
Next 400,000	15.00	10.00	7.20
Next 2,000,000	10.00	7.00	6.00
Next 2,500,000	7.50	5.50	5.00
Next 2,500,000	7.00	5.00	4.50
Over 7,500,000	6.50	4.50	4.00

2. The rate per $1,000 of contract price may deviate with eachcompany depending on competition, contractor's time in profitable business, and net worth. The following rates are typical of large contractors having a "preferred" rate structure:

Amount of Contract Price	Class B:	Class A:	Class A1:
First $ 100,000	$ 9.00/M	$ 7.00/M	$ 4.70/M
Next 400,000	7.00	5.25	4.20
Next 2,000,000	6.25	4.75	3.90
Next 2,500,000	5.25	4.20	3.65
Next 2,500,000	4.75	3.65	3.35
Over 7,500,000	4.20	3.10	2.85

3. Rules governing the application of the above rates:

a. If the contract is susceptible to two classifications which take different rates, apply the higher rate.

b. Separate contracts take the same classification as a general contract. Neither the classification nor the rate is changed by subdividing the work or by the Government's providing certain materials.

c. Subcontracts take the same classifications and rate as general contracts.

d. When using the standard advisory rates, if the stipulated

time for completion is over 12 months or 365 calendar days, add 1 percent of the basic premium for each month in excess of 12 months. When using the preferred rates, if the stipulated time for completion is over 24 months or 731 calendar days, add 1 percent of the basic premium for each month in excess of 24 months.

3. Extras

a. If the consent of the surety is not required and given for changes or extras, first and renewal premiums for the additional cost thus caused are computed at manual rates from the date of the bond.

b. If the consent of the surety is required and given for changes or extras, premium for the additional cost thus caused is computed at manual rates from the date of such surety's consent.

4. Minimum premium charge is $ 25.00.

5. Some contractors may use rates between the standard(non-deviating) and "preferred" rates, sometimes referred to as"merit" rates.

Amount of Contract Price	Class B:	Class A:	Class A1:
First $ 100,000	$ 10.00/M	$ U/M	$ U/M
Next 400,000	8.00	N	N
Next 2,000,000	7.00	K	K
Next 2,500,000	6.00	N	N
Next 2,500,000	5.00	O	O
Over 7,500,000	4.00	W	W
		N	N

a. When using the "merit" rates, if the stipulated time for completion is over 12 months or 365 calendar days, add 1/2 percent of the basic premium for each month in excess of 12 months, up to and including 24 months. If the stipulated time for completion is over 24 months or 731 calendar days, add 1/2 percent of the basic premium for each month in excess of 12 months, plus add 1 percent of the basic premium for each month in excess of 24 months.

Site Improvements	QUANTY	UOM	MANHRS	LABOR	EQUIPMNT	MATERIAL	TOTAL COST	UNIT COST

Excavate, Haul, Place for Ramp

Assume topsoil will be hauled 3 miles. Assume truck can make 3 trips per hour. Therefore crew productivity is 6 x 3 x 12 = 216 CY/hr. This would be loose soil. To convert to placed volume 216/1.47= 147 CY/hr
Time required = 115,000 CY / 147 CY/hr = 782.31 hours.

Outside Equip. Op. (Foreman)			0.00	10.09	0.00	0.00	10.09	
	782.31	HR	0	7,895	0	0	7,895	10.09
Laborer (2)			0.00	9.79	0.00	0.00	9.79	
	1564.63	HR	0	15,320	0	0	15,320	9.79
Eq Oper, Medium (4)			0.00	9.30	0.00	0.00	9.30	
	3129.25	HR	0	29,088	0	0	29,088	9.30
Truck Drivers, Heavy, 6 Ea.			0.00	10.70	0.00	0.00	10.70	
	4693.88	HR	0	50,237	0	0	50,237	10.70
LDR,FE,CRWLR, 2.5 CY, 963			0.00	0.00	46.16	0.00	46.16	
	782.31	HR	0	0	36,110	0	36,110	46.16
Small Tools			0.00	0.00	1.42	0.00	1.42	
	782.31	HR	0	0	1,109	0	1,109	1.42
TRUCK OPT,REAR DUMP BODY, 12 CY			0.00	0.00	2.47	0.00	2.47	
6 Each	4693.88	HR	0	0	11,613	0	11,613	2.47
TRK, HWY, 3 AXLE, 41000 GVW, 6X4			0.00	0.00	19.65	0.00	19.65	
	4693.88	HR	0	0	92,246	0	92,246	19.65
DOZER,CWLR,D-7H,PS,(ADD BLADE)			0.00	0.00	54.19	0.00	54.19	

782.31 HR 0 0 42,395 0 42,395 54.19

BLADE, UNIVERSAL,HYDR,FOR D7 0.00 0.00 5.28 0.00 5.28
782.31 HR 0 0 4,132 0 4,132 5.28

LNDFL COMPACTOR,TF 0.00 0.00 65.06 0.00 65.06
51"Dia. X 44"L, W/BLD 782.31 HR 0 0 50,894 0 50,894 65.06

TRK,HWY,4X4,F250,3/4T,8800 GVW 0.00 0.00 7.10 0.00 7.10
(Pickup for Foreman) 782.31 HR 0 0 5,551 0 5,551 7.10

Site Improvements	QUANTY	UOM	MANHRS	LABOR	EQUIPMNT	MATERIAL	TOTAL COST	UNIT COST
Disc	0.00		0.00	7.73	0.00	7.73		
	782.31	HR	0	0	6,047	0	6,047	7.73
GRADER,MOTOR,CAT12-G, ARTIC	0.00		0.00	26.46	0.00	26.46		
ARTICULATED FRAME, POWERSHIFT	782.31	HR	0	0	20,697	0	20,697	26.46
Excavate, Haul, Place for Ramp	115000	CY	0	102,540	270,793	0	373,334	3.25
Heavy Construction	1.00	EA	8,079	265,955	301,704	338,882	906,541	906541.03

CHAPTER 19

CONTRACT PAYMENT PROCEDURES

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CHAPTER 19

CONTRACT PAYMENT PROCEDURES

1. GENERAL. Contract payment provisions are discussed in the Contract Clauses under clause: "Method of Payment" and "Payment" for A-E and Indefinite Delivery Type (IDT) A-E contract services, respectively. Billings shall be submitted on Payment Estimate - Contract Performance Form ENG 93, dated 1 March 1978. Several copies of ENG 93 and ENG 93a, are provided to the A-E at the time of contract award. This chapter discusses the general procedures to follow in preparing these forms. The discussion is limited to A-E contracts and A-E Indefinite Delivery-Type contract payments.

2. ADDRESS FOR SUBMITTING PAY ESTIMATES (ENG 93). All military design payment estimate submittals (ENG 93) shall be mailed to the following address:

U.S. Army Engineer District, Kansas City
601 E. 12th Street, 757 Federal Building
Kansas City, MO 64106
ATTN: CEMRK-CT-M

3. PAY ESTIMATE COPIES REQUIRED. Pay estimates shall be attached to a forwarding letter of transmittal and submitted in duplicate, with original signatures on both copies.

4. ISSUANCE OF PAYMENT. Payments are made on a continual basis, Monday through Thursday, of each week. No checks will be issued the last three working days of the month. Normally, thirty days are required to complete all processing after receipt of ENG 93. Pursuant to the Prompt Pay Act, 30 days will be taken regardless of the time required to process the estimate.

5. REFERENCED PAYMENT DOCUMENTS.

5.1 Payment Estimate - Contract Performance, ENG 93. Form on which all pay estimates shall be submitted and approved for payment.

5.2 Payment Estimate - Contract Performance (Continuation), ENG 93a. Continuation sheet to ENG 93 for listing additional contract performance work items.

6. INSTRUCTIONS FOR PREPARING ENG FORM 93 ("C" Contracts). The important elements of this form which should be filled in completely are:

6.1 Block 1, Date: Date when form is prepared. Must be the current date and it should match the date in Block 12.

6.2 Block 2, Contractor and Address: Complete firm name and address as shown on

original contract or as changed by modification.

6.3 Block 3, Contract Number: The DACA41 or DACW41 number as shown on the original contract.

6.4 Block 4, District: The District from which the contract is administered (usually Kansas City).

6.5 Block 5, Description of Work: Brief description of the work taken from the original contract document, e.g., 'Design of EMCS, Fort Riley, KS.'

6.6 Blocks 6, 7 and 10: Leave blank.

6.7 Block 8, Location: The Location of the project, such as Fort Riley or Kansas City District.

6.8 Block 9, Period Covered by This Estimate: Period of time estimate is covering (through date must not be later then the date shown in Block 1).

6.9 Block 11, Estimate Number: Starting with number 1, number each estimate sequentially. All phases of work, completed as well as work in progress, are to appear on every estimate as contract is based on running totals.

6.10 Block 11a, Item Number: Each phase of work should be requested under a separate item number. A separate line item is required for each modification. Also, Shop Drawing Review and Engineering and Design During Construction shall be listed as separate line items and billed separately even if awarded as one contract modification.

6.11 Block 11b, Description: A brief description of the work as outlined in the modification, i.e., P00001, Additional Site Work, Fort Leavenworth. Description must include the modification number and the project manager's name.

6.12 Block 11c and 11d: Leave blank.

6.13 Block 11e, Amount: This is the total amount negotiated for each phase of work as outlined in the Payment section of each modification.

6.14 Block 11f, Quantity and Unit: This is the percentage of work completed to date.

6.15 Block 11g:

6.15.1 Amount: This is the extension of 11e multiplied by 11f. Be sure to round to the nearest whole dollar amount, i.e., $55.50 = $56.00, $34.27 = $34.00.

6.15.2 Includes Modification Thru: Leave blank; this information is included in the description block (11b).

6.15.3 Total Contract: This is the total contract amount awarded to date. This must show the total of all modifications included on the ENG 93.

6.15.4 Total Earnings to Date: This is the total of column 11g.

6.16 Block 12: The contractor's name shall appear in the box marked 'Payee' and an original signature of an authorized individual shall appear in the box marked 'Per.' The date signed is to appear in the 'Date' block and the title of the signer shall be shown in the block marked 'Title.'

6.17 Block 13: The name of the District's project manager is to be typed in the block marked 'signature' and the title 'project manager' should be in the next block. Do not enter a date as the project manager will add the date the day the estimate is signed. The 'Contracting Officer Approval' section should be left blank and will be filled in at the processing office.

6.18 Block 14a, Previous Deductions other than Retained Percentage: Usually blank.

6.19 Block 14b, Previous Retained Percentage: Leave blank on first pay estimate. For estimate 2 and any estimates thereafter, the amount shall be the cumulative total of 14f (found in block 15 of the previous pay estimate).

6.20 Block 14c, Previous Payments: Leave blank on first pay estimate. For estimate 2 and any estimates thereafter, the amount shall be the total dollar amount of all checks issued to the contractor. This amount must equal the 'Total Paid' amount in block 15 of the previous pay estimate.

6.21 Block 14d, Previous Earnings: The total of blocks 14a, b and c.

6.22 Block 14e, Earnings This Period: The total earnings to date minus 14d.

6.23 Block 14f, Less Retained Percentage: The total dollar amount of retained percentage to be withheld from this estimate. Retained percentage is calculated at 10% of the amount earned this period (14e). For all pay estimates, the retained percentage is ascertained by multiplying the earnings this period (14e) by 10% and rounding that figure to the nearest whole dollar. This amount is placed in block F and subsequently in block H. (For further information on retention, see Payment Clause of the Contract Clauses. The 10% figure may be reduced at the option of the Contracting Officer if the work is progressing as scheduled or ahead of schedule. The 10% figure may also be increased at the option of the Contracting Officer if work is not progressing as scheduled.)

6.24 Block 14g, Less Deduction Other Then Retained Percentage For: Usually blank.

6.25 Block 14h, Total Deductions This Period: The total of 14f and 14g.

6.26 Block 14i, Retainage Refunded: A refund may be requested as each phase of work is 100% complete. This amount will be the total amount of retained percentage withheld for that particular phase.

6.27 Block 14j, Other Refunds: Usually blank.

6.28 Block 14k, Total Refunds This Period: The total of 14i and 14j.

6.29 Block 14l, Amount Due Contractor: The total dollar amount the check will be written for. This is calculated by subtracting 14h from 14e and adding 14k.

6.30 Block 15, Recapitulation: Total retained percentage is calculated by adding 14b and 14f, then subtracting 14i. Total Paid is found by adding 14c and 14l. The total of these two amounts MUST add up to the Total Earnings to Date.

7. INSTRUCTIONS FOR PREPARING ENG FORM 93 (Indefinite Delivery Type Contracts, (IDT)), "D" Contracts. The important elements of this form which should be filled in completely are:

7.1 Block 1, Date: Date when form is prepared.

7.2 Block 2, Contractor and Address: Complete firm name and address as shown on original contract or as changed by modification.

7.3 Block 3, Contract Number: The DACA41 or DACW41 number as shown on the original contract.

7.4 Block 4, District: The District from which the contract was administered (usually Kansas City).

7.5 Block 5, Description of Work: Brief description of the work taken from the original contract document, e.g., 'Indefinite Delivery Type Contract for Drafting Services.'

7.6 Blocks 6 and 7: Leave blank.

7.7 Block 8, Location: The location of the project, such as Fort Riley or Kansas City District.

7.8 Block 9, Period Covered by This Estimate: Period of time this estimate is covering (through date must not be later then the date shown in Block 1).

7.9 Block 10, Job Order Number: The delivery order number(s) for work you wish to be paid.

7.10 Block 11, Estimate Number: Starting with number 1, number each estimate sequentially for the entire contract, not for each delivery order. Do not submit separate estimates for individual delivery orders, except as directed for splitting military and civil funded delivery orders. All phases of work, completed as well as work in progress, are to appear on every estimate as contract is based on running totals.

7.11 Block 11a, Item Number: Each phase of work should be requested under a separate item number. A separate line item is required for each delivery order/modification. Also, Shop Drawing Review and Engineering and Design During Construction shall be listed as separate line items and billed separately even if awarded as one contract modification.

7.12 Block 11b, Description: A brief description of the work as outlined in the delivery order/modification, i.e., DO 1, Concept Design, Renovate Building 223, Fort Leavenworth; P00001, Additional Site Work, Renovate Building 223, Fort Leavenworth. Description must include the modification and/or delivery order number.

7.13 Block 11c and 11d: Leave blank.

7.14 Block 11e, Amount: This is the total amount negotiated for each phase of work as outlined in the Payment section of each delivery order or modification.

7.15 Block 11f, Quantity and Unit: This is the percentage of work completed to date.

7.16 Block 11g:

7.16.1 Amount: This is the extension of 11e multiplied by 11f. Be sure to round to the nearest whole dollar amount, i.e., $55.50 = $56.00, $34.27 = $34.00.

7.16.2 Includes Modification Thru: Leave blank; this information is included in the description block (11b).

7.16.3 Total Contract: This is the total contract amount awarded to dated. This must show the total of all delivery orders and modification included on the ENG 93.

7.16.4 Total Earnings to Date: This is the total of column 11g.

7.17 Block 12: The contractor's name shall appear in the box marked 'Payee' and an original signature of an authorized individual shall appear in the box marked 'Per.' The date signed is to appear in the 'Date' block and the title of the signer shall be shown in the block marked 'Title.'

7.18 Block 13: The name of the District's project manager is to be typed in the block marked 'signature' and the title 'project manager' should be in the next block. If more than one project manager is involved, leave this block blank. Do not enter a date as the project manager will insert the date the day the estimate is signed. The 'Contracting Officer Approval' section should be left blank and will be filled in at the processing office.

7.19 Block 14a, Previous Deductions other than Retained Percentage: Usually blank.

7.20 Block 14b, Previous Retained Percentage: Leave blank on first pay estimate. For estimate 2 and any estimates thereafter the amount shall be cumulative of 14f (found in block 15 of the previous pay estimate).

7.21 Block 14c, Previous Payments: Leave blank on first pay estimate. For estimate 2 and any estimates thereafter the amount shall be the total dollar amount of all checks issued to the contractor. This amount must equal the 'Total Paid' amount in block 15 of the previous pay estimate.

7.22 Block 14d, Previous Earnings: The total of blocks 14a, b and c.

7.23 Block 14e, Earnings This Period: The total earnings to date minus 14d.

7.24 Block 14f, Less Retained Percentage: The total dollar amount of the retained percentage to be withheld from this estimate. Retained percentage is calculated at 10% of the amount earned this period (14e). For all pay estimates, the retained percentage is ascertained by multiplying the earnings this period (14e) by 10% and rounding that figure to the nearest whole dollar. This amount is placed in block F and subsequently in block H. (For further information on retention, see Payment Clause of the Contract Clauses. The 10% figure may be reduced at the option of the Contracting Officer if the work is progressing as scheduled or ahead of schedule. The 10% figure may also be increased at the option of the Contracting Officer if work is not progressing as scheduled.)

7.25 Block 14g, Less Deduction Other Then Retained Percentage For: Usually blank.

7.26 Block 14h, Total Deductions This Period: The total of 14f and 14g.

7.27 Block 14i, Retainage Refunded: A refund may be requested as each phase of work is 100% complete. This amount will be the total amount of retained percentage withheld for that particular phase.

7.28 Block 14j, Other Refunds: Usually blank.

7.29 Block 14k, Total Refund This Period: The total of 14i and 14j.

7.30 Block 14l, Amount Due Contractor: The total dollar amount the check will be

written for. This is calculated by subtracting 14h from 14e and adding 14k.

7.31 Block 15, Recapitulation: Total retained percentage is calculated by adding 14b and 14f, then subtracting 14i. Total Paid is found by adding 14c and 14l. The total of these two amounts MUST add up to the Total Earnings to Date.

8. FINAL PAYMENT ESTIMATE AND CONTRACT CLOSE-OUT. Upon completion of the contract requirements, the final payment estimate shall include the word "Final" after the number in Item 11 of ENG 93. A Release of Claims must accompany or precede the final ENG 93 in order for payment to be made.

9. COMMON PAYMENT ESTIMATE ERRORS. Most frequent errors are:

9.1 Mathematical errors.

9.2 Including contract modifications not signed by Contracting Officer.

9.3 Signature in the wrong block or unsigned.

9.4 Payment estimate signed by an unauthorized person.

9.5 Item 14H and/or Item 14K left blank.

ATTACHMENT 2

PRELIMINARY GEOTECHNICAL REPORTS, SITES 1A, 1B, 1D

PRELIMINARY GEOTECHNICAL REPORT

FORT LEAVENWORTH HOUSING

PHASE 1A

LEAVENWORTH, KANSAS

PREPARED FOR

GOSSEN LIVINGSTON ASSOCIATES

JANUARY 2002

PROJECT NO: 74-00555-3B-147

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INTRODUCTION

This report presents the results of a preliminary Geotechnical Study for the proposed Phase 1A housing project at Fort Leavenworth, Kansas. The study was conducted to develop preliminary geotechnical recommendations for a design/build package and is not intended as final design criteria. Additional borings and subsurface soils information may be necessary prior to final design of this project. The Geotechnical Report was conducted in general accordance with our proposal to Gossen Livingston Associates.

A field exploration program was conducted to obtain information on the subsurface conditions. Samples obtained during the field investigation were tested to determine physical and engineering characteristics of the in-situ soils. Field exploration and laboratory test results were analyzed to develop geotechnical recommendations. Results of the field exploration, laboratory testing, and our conclusions and recommendations are presented herein.

PROPOSED CONSTRUCTION

The proposed construction was not final at the time of this report. The proposed construction may consist of 1 or 2 story housing units and may be slab on grade or may have basements. Column loads are anticipated to be approximately 25 metric tons or less and wall loads are anticipated to be on the order of 1 to 1.5 metric tons per 0.5 meter. Finished floor elevations were not available at the time of this report and therefore cut and fill depths are not known. However, since the project site is in a low lying area considerable fill may be required to achieve design grades.

EXISTING SITE CONDITIONS & GEOLOGY

The project site is located at Fort Leavenworth in the northeast portion of Kansas. During the field exploration, the project site consisted primarily of grassed areas. A soccer field was located near the northwest portion of the site and a pond was present near the southeast portion of the site. A drainage channel crosses the site with several smaller intersecting channels. Visual observations indicate several springs may be present at the site. Portions of the site may have been used for borrow for other projects. The existing ground surface has slight to moderate slopes. Ground surface elevations between the borings varied approximately 8 meters.

The geologic formation in the area of the project site appears to be the Douglas Group from the Virgilian Series of the Pennsylvanian System. Subsurface soils encountered in the borings consisted primarily of clays overlying clay shale and limestone bedrock. Existing fill was encountered in some of the borings. Shallow groundwater was present in the borings during drilling.

FIELD EXPLORATION

The field exploration conducted on December 18 and 19, 2001 consisted of 10 exploratory borings. The borings were drilled to depths ranging from 3 to 6 meters at various locations across the project site to explore subsurface conditions and obtain samples for laboratory testing. All field and laboratory testing was performed under the direction of a Professional Engineer.

Exploratory borings were advanced through the soils with a Mobile Drill B-31 drill rig using 15 centimeter continuous flight auger and a rock bit. The borings were logged in the field by a representative of Allied Laboratories based on visual procedures. Measurements of the water levels were attempted in the borings shortly after completion of drilling.

Exploratory boring locations were determined by Allied Laboratories Survey Division. Approximate boring locations are shown on the Boring Location Sketch, Figure A-2. Ground surface elevations at the boring locations were determined by Allied Laboratories Survey Division.

Samples of the subsurface materials were taken with a 5 centimeter O.D. splitspoon sampler at various depth intervals. The sampler was driven into the various strata using a 63.5 kilogram hammer falling 76 centimeters. The number of blows required to advance the sampler three successive 15 centimeter increments is recorded. The total number of blows required to advance the sampler the second and third 15 centimeter increments is the penetration resistance value (N). Penetration resistance values indicate the relative density of cohesionless soils and consistency of cohesive soils. Standard Penetration tests were performed in accordance with ASTM D-1586.

Undisturbed samples were obtained by hydraulically pushing 7.6 centimeter diameter Shelby Tubes into the soil according to ASTM D-1587.

LABORATORY TESTING

Soil samples obtained during the field exploration were observed and visually classified according to ASTM D-2488 "Soil Classification for Engineering Purposes" which is based on the Unified Soil Classification System. Selected samples were tested to determine engineering and physical properties according to ASTM D-2487. Index and engineering tests performed included moisture content analysis, dry unit weight, and Atterberg Limits. All laboratory tests were performed according to ASTM standards unless indicated otherwise on the report forms. Laboratory test results are summarized on the attached figures and boring logs.

SUBSURFACE CONDITIONS

The subsurface profile encountered in the borings consisted primarily of clay soils. Bedrock was encountered in the lower portions of some of the borings. Existing fill was also encountered in some of the borings.

Brief descriptions of the soils and groundwater conditions encountered follow. The attached Boring Logs should be reviewed for subsurface conditions at each boring location. Sharp transitions between various soils types are presented on the boring logs. However, soil transitions may occur gradually and depths to the transitions are approximate. Laboratory test results of selected samples are discussed below and presented on the attached figures.

EXISTING FILL

Existing fill was encountered in borings B-2 and B-3. The existing fill consisted primarily of clay soils with intermixed gravels. Fill depths ranged from approximately 1.6 to 2.4 meters. The existing fill varied from lightly moist to moist with a firm to stiff consistency. Standard penetration values in the fill ranged from 12 to 14 blows for 30 centimeters of penetration and an unconfined compressive strength of 136.4 kPa was obtained on the one sample tested. Moisture contents ranged from approximately 22.5 to 25.4 percent. The fill did not appear to contain appreciable debris or deleterious materials. However, scattered gravel was observed in the fill.

NATURAL SOILS

The natural soils encountered in the borings consisted primarily of lean to fat clay with scattered limestone fragments and shale partings. These soils were generally characterized as moist to very moist although wet to saturated zones were present. Moisture contents for the samples tested ranged from approximately 19 to 34 percent.

Consistency of the clay soils varied considerably between the borings and with depth. The consistency ranged from soft to very stiff based on visual observations, standard penetration testing and unconfined compressive strengths. Standard penetration values ranged from 4 to 16 blows per 30 centimeters of penetration. Unconfined compressive strengths varied from 38.8 to 132.1 kilopascals and dry unit weights ranged from 1354 to 1670 kilograms per cubic meter.

Atterberg limits testing indicated these soils ranged from lean to fat clay. Liquid limits ranging from 44 to 53 and plasticity indices from 23 to 33 percent were obtained on the samples tested.

BEDROCK

Bedrock was encountered in borings B-1, B-5, B-6, B-7, B-8 and B-10 at depths ranging from approximately 3.1 to 5.3 meters below the existing ground surface. The bedrock ranged from clay shale to limestone. The bedrock was weathered in the upper portion grading to medium hard and hard with minimal penetration. Standard penetration values ranged from 28 blows for 30 centimeters of penetration to over 50 blows for 2 centimeters of penetration. Practical drilling refusal occurred after minimal penetration into limestone in several of the borings.

GROUNDWATER

Groundwater measurements were obtained immediately after drilling and approximately 24 hours after drilling. The groundwater level in the borings varied significantly. The 24 hour measurements ranged from approximately 0.5 to 3.2 meters below the ground surface. However, additional water could accumulate in borings or excavations left open for a longer period since the majority of the soils at this site will exhibit low permeability rates.

The groundwater in the borings appears to be present in seepage zones in the clay soils and bedrock. It may not constitute a true groundwater table although significant quantities of groundwater are present in the soils. It appears that these seepage zones surface at several locations on the site creating springs where water flows to the surface.

The water level presented on the boring logs and discussed in this report does not necessarily indicate where free water will be encountered during construction. Groundwater levels can vary depending on the climatic conditions, time of year, surface runoff and other factors beyond the scope of this report.

CONCLUSIONS AND RECOMMENDATIONS

Field exploration results indicate subsurface soil and groundwater conditions will vary considerably at this site. Final project design information regarding grading and structures was not available for this report. Considering our field exploration results, laboratory tests and proposed construction, the following general conclusions and recommendations are presented.

GENERAL COMMENTS

Due to the variable subsurface soil and groundwater conditions, an extensive subsurface exploration program may be necessary before construction. The subsurface exploration requirements will need to be determined based on final design and site grading plans. Also, construction at this site may be difficult due to the soft conditions, shallow groundwater and surface seepage zones.

SUBGRADE PREPARATION

All existing soft fill, soft soils, and the organic portion of the topsoil should be removed prior to placing new engineered fill. A stripping depth of 15 to 20 centimeters is anticipated for this site. However, groundwater seepage zones are present at the site which may require additional over-excavation. After stripping and removal of these materials, the exposed subgrade should be observed by a Geotechnical Engineer to assure all soft soils and deleterious materials have been removed. The exposed subgrade should then be scarified, moisture conditioned and re-compacted to the requirements outlined in this report.

The subgrade soils encountered in the upper portion of the soil profile at this site may become soft when wetted. These conditions can cause difficulties for construction during wet periods. Low ground pressure equipment may be necessary depending on excavation depths and subsurface conditions encountered. If excessive movement of the subgrade soils occurs, over-excavation and replacement of the soft or loose soils may be necessary.

ENGINEERED FILL

All new engineered fill should be placed under controlled conditions with observation by a licensed Professional Engineer or his designated representative. We suggest this observation work be provided by separate agreement between the Observer and the Owner. Considering the proposed construction and intended use of this project, the following recommendations are presented for fill materials and compaction of engineered fill.

FILL MATERIALS

All new fill should consist of clean soils free of debris and deleterious materials. Our recommendations for various fill materials follow.

- General fill for site grading (outside of building areas) should consist of on-site soils or imported fill with a maximum plasticity index of 25. All imported fill for building and pavement areas should consist of select fill or non-expansive soils. Expansive soils should not be used within building and pavement areas.
- Select fill for stabilized zones should consist of imported Low Volume Change soil (LVC). Natural LVC materials consist of lean clay, sandy clay, clayey sand or similar soils with a maximum liquid limit of 40 and a plasticity index between 5 and 15. Limestone screenings and limestone gravel are acceptable select fill materials. Other materials may be used for select fill as approved by a Geotechnical Engineer.
- Manufactured select fill consisting of mixing two or more materials (i.e. clay and sand) may only be used if the materials are mixed thoroughly by discing or other methods to assure a homogeneous fill material meeting the requirements for select fill. Manufactured select fill may require considerable mixing and moisture conditioning.
- Clean sand may only be used for fill material for the building pad, pavements and site grading when approved by a Geotechnical Engineer. Clean sand outside of confined conditions (i.e. inside stem walls) will tend to displace under construction traffic even when well compacted since these materials are cohesionless. Clean sand may also

provide difficulties for construction and may require low pressure ground equipment, stabilization of the upper working surface and re-compaction throughout construction.

COMPACTION

Compaction should be controlled based on the **MODIFIED PROCTOR ASTM D-1557**. For this project the following minimum compaction specifications are recommended.

- Footings — 90 % of Maximum Dry Density
- Pavement (stabilized subgrade) — 90 % of Maximum Dry Density
- Floor Slabs — 88 % of Maximum Dry Density
- General Structural Fill/Backfill — 88 % of Maximum Dry Density

MOISTURE CONTROL

Moisture content of the fill material should be controlled during construction based on an acceptable range of moisture content. The following moisture ranges are recommended for various soil types:

- Fat Clay (CH) — 4% above Optimum Moisture Content or greater
- Lean Clay (CL) — 2% above Optimum Moisture Content or greater
- Silts, Clayey Sand, LVC (GM, GC, SM, SC) — ± 3 % Optimum Moisture Content
- Sands, Gravel (GW, GP, SW, SP) — Workable Moisture Content

PLACEMENT

- All fill material should be placed in horizontal lifts.
- Engineered fill should extend a minimum of 1.5 meters outside of building pad and 0.5 meters outside of pavements and sidewalks.
- Maximum loose lift thickness should not exceed 22 centimeters. Smaller lift thickness may aid in compaction and should be used for energy sensitive soils or if light compaction equipment is used.
- Moisture sensitive soils such as silt materials may require stricter moisture control to achieve the required compaction.
- Potentially expansive clay soils should not be compacted more than 3 percent above the recommended minimum compaction specification.

EXCAVATION

The subsurface soils encountered in the upper portion of the exploratory borings consisted primarily of clay. These materials should be excavatable with heavy construction equipment. Bedrock consisting of medium hard to hard clay shale and limestone was observed in the lower portions of several borings. These materials were hard and may be difficult to excavate.

The upper clay materials appear to range from Type A to Type B soil according to OSHA guidelines. The maximum OSHA recommended slope for Type A soil is 3/4 horizontal to 1 vertical and Type B is 1 horizontal to 1 vertical. However, wet zones were observed at various depths in some of the borings indicating additional sloping will be necessary. All excavations should be constructed and shored according to OSHA, state and local requirements. Each excavation must be evaluated individually during construction to determine the appropriate sloping or shoring technique.

SURFACE DRAINAGE

Ponded water can cause problems during and after construction. Site grading and backfill should be sloped to provide positive drainage away from structure foundations, slab-on-grade and pavements. A minimum grade of 5 percent for the first 3 meters and 2 percent thereafter is suggested. Downspouts should be designed to discharge well away from the building foundations.

FOUNDATIONS

Considering the subsurface conditions and proposed construction, the following general conclusions and recommendations are presented for foundation design.

- Spread and mat foundations may be feasible at this site depending on structure locations and elevations. Field exploration results indicate net allowable soil bearing capacities of the in-situ soils range from approximately 50 to 120 kilopascals. Allowable soil bearing capacities are based on a theoretical factor of safety against shear failure on the order of 3.
- Estimated average settlement of footings placed on the in-situ soils ranges from approximately 2.5 to 6 centimeters. Differential settlements may range from ½ to ¾ of the total settlement. These estimated settlements are based on assumed footing details and depths and should be considered as approximate. Additional settlement analysis will be warranted depending on footing sizes and depths.
- All exterior footings and interior footings under unheated areas should be founded a minimum of 100 centimeters below finished grade for frost protection and to protect against moisture variations of the near surface soils.
- Due to the variable soil conditions at the site, some structures may need to be placed on new engineered fill. Spread or mat foundations placed on new engineered fill should be designed for a maximum allowable net soil bearing capacity of 120 kilopascals.
- Continuous spread footings should have a minimum width of 40 centimeters and isolated column footings should have a minimum width of 80 centimeters.
- Avoid disturbing the in-situ soils below the bearing elevation during excavation. Use hand excavation to remove slough, if necessary.
- Place concrete in footings as soon as practicable after excavation to avoid drying or wetting of the exposed soils. If the bearing soils are disturbed, allowed to dry, or are wetted by rain or seepage water, remove the affected soil and extend the footings.
- All footing excavations should be observed by a qualified Geotechnical Engineer to ensure adequate bearing soils are present.

FLOOR SLABS

The subsurface soils consist primarily of medium to high plasticity clays with plasticity indices ranging from 23 to 33 percent. Considering these conditions, a minimum of 45 centimeters of select fill (exclusive of any sand leveling course or moisture vapor barrier) should be placed below all floor slabs. Prior to placing the select fill, the exposed subgrade should be scarified, moisture conditioned and recompacted to the requirements outlined in this report.

LATERAL EARTH PRESSURE

Below grade and retaining walls will be subject to lateral earth pressures. The magnitude of the lateral earth pressure is related to the in-situ soils and backfill adjacent to the walls. For the in-situ clay soils, the following pressure coefficients may be used for design of below grade walls.

- Coefficient of Active Pressure 0.5
- Coefficient of At-rest Pressure 0.8
- Coefficient of Passive Pressure 2.0

The active case may be used if walls are allowed to rotate sufficiently to fully mobilize active pressure. The at-rest case should be used for rigid walls where little or no rotation is anticipated. The equivalent fluid unit weights presented do not account for hydrostatic pressures. If backfill adjacent to the below grade or retaining walls becomes saturated, significantly larger pressures may develop. Below grade walls should be designed for saturated conditions, or a perimeter drain system consisting of drain tile and clean granular backfill should be used. Lateral loads may be resisted by passive earth pressure and a coefficient friction of 0.3 between concrete and moist clays.

PAVEMENT

Samples of near surface subgrade soils obtained from the exploratory borings indicate the subgrade soils in the pavement areas will consist primarily of lean to fat clay soils with medium to high plasticity indices. Typically, California Bearing Ratio values of remolded, soaked samples of these types of materials range from approximately 2 to 4 which is considered a poor subgrade for pavements. Due to poor subgrade and potential for subgrade movement, a minimum of 20 centimeters of stabilized subgrade should be placed below the pavement section. The stabilized subgrade may consist of imported select fill, limestone gravel or approved equivalent.

Rigid pavement should be considered for areas where heavy vehicles will be driving and stopping. These areas include truck routes, loading and unloading zones and trash receptacle areas. Rigid pavements tend to perform better in these areas. Asphaltic concrete pavement should consist of a plant mixture composed of aggregate and bituminous material which meets the requirements established by a qualified engineer. All concrete should be based on a mix design established by a qualified engineer.

SOIL CORROSIVITY

The potential corrosive environment for materials placed on or beneath the ground surface was evaluated by laboratory testing. The laboratory data collected includes; pH, sulfates, chlorides, laboratory resistivity and soil classification. A qualified Corrosion Engineer should review the information presented to design the appropriate corrosion protection. Additional information should be obtained if necessary. A summary of our laboratory corrosivity test results for the project follows.

Sample Location	**Sample Depth**	**Soil Type**	**pH** std.	**Resistivity** Ohm cm	**Chlorides** mg/kg	**Sulfates** mg/kg
B-1	0.5 to 1 meters	Lean to Fat Clay	7.74	1604	30	50
B-6	2.5 to 3 meters	Lean to Fat Clay	7.57	1349	10	ND

ND = Not Detected, Detection limits for: Sulfates = 10 mg/kg, Chlorides = 10 mg/kg

GENERAL NOTES AND LIMITATIONS

Moderate to high volume change soils occur on this site. These soils are generally stable at a constant natural moisture content, but can expand or consolidate with moisture variations. The volume change potential of soils can change erratically both in vertical and lateral extent. Moisture changes also occur erratically, resulting in conditions that cannot always be predicted.

The recommendations presented are based on experience with similar soils. The builder and owner should be aware that there is a risk in construction on these types of soils. Performance of the building will depend on following the design and construction recommendations and proper maintenance after construction is complete. Since water is the main cause of volume change of these soils, it is necessary that changes in moisture content be kept to a minimum. This may require restricted watering of lawns and positive surface and subsurface drainage away from the building foundation, pavements and floor slabs.

Geotechnical recommendations are usually based on periodic sampling in widely spaced, small diameter borings. Actual subsurface conditions may vary from those encountered in the borings. Due to this variability, engineering judgment and adjustments to the geotechnical recommendations may be necessary during construction. A Geotechnical Engineer should be retained for observation and testing during construction to ensure recommendations are met or adjusted as necessary.

This report has been prepared according to generally accepted soil and foundation engineering practices. It is intended to be a preliminary report for information only and is based on limited design information. Additional investigation may be necessary for final design. The recommendations are intended for the exclusive use of the client for preliminary project design. Individual portions of this report should not be taken out of context and used on this or other projects.

The conclusions and recommendations presented are based on the data obtained from the borings at the locations indicated. The nature and extent of subsurface variations across the site may not become evident until construction. If subsurface conditions are encountered other than described in this report, the recommendations in this report may need to be re-evaluated and adjusted.

Prepared by,

ALLIED LABORATORIES

_____

Steven M. Herman, P.E.
Geotechnical Division Manager

attachments

PRELIMINARY GEOTECHNICAL REPORT

FORT LEAVENWORTH HOUSING

PHASE 1B

LEAVENWORTH, KANSAS

PREPARED FOR

GOSSEN LIVINGSTON ASSOCIATES

APRIL/MAY 2002

PROJECT NO: 74-00555-3B-147

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APPENDIX A – ***FIELD EXPLORATION RESULTS***

APPENDIX B – ***LABORATORY TEST RESULTS***

INTRODUCTION

This report presents the results of a preliminary Geotechnical Study for the proposed Phase 1B housing project at Fort Leavenworth, Kansas. The study was conducted to develop preliminary geotechnical recommendations for a design/build package and is not intended as final design criteria. Additional borings and subsurface soils information may be necessary prior to final design of this project. The Geotechnical Report was conducted in general accordance with our proposal to Gossen Livingston Associates.

A field exploration program was conducted to obtain information on the subsurface conditions. Samples obtained during the field investigation were tested to determine physical and engineering characteristics of the in-situ soils. Field exploration and laboratory test results were analyzed to develop geotechnical recommendations. Results of the field exploration, laboratory testing, and our conclusions and recommendations are presented herein.

PROPOSED CONSTRUCTION

The proposed construction was not final at the time of this report. The proposed construction may consist of 1 or 2 story housing units and may be slab on grade or may have basements. Column loads are anticipated to be approximately 25 metric tons or less and wall loads are anticipated to be on the order of 1 to 1.5 metric tons per 0.5 meter. Finished floor elevations were not available at the time of this report and therefore cut and fill depths are not known. However, since the project site has sloping contours, considerable cut and fill may be required to achieve design grades.

EXISTING SITE CONDITIONS & GEOLOGY

The project site is located at Fort Leavenworth in the northeast portion of Kansas. During the field exploration, the project site consisted primarily of grassed areas, asphalt and gravel drives and concrete pads. The site had been developed with several utilities crossing the site. The site was terraced and the existing ground surface has slight to moderate slopes. Ground surface elevations between the borings varied approximately 12 meters.

The geologic formation in the area of the project site appears to be the Douglas Group from the Virgilian Series of the Pennsylvanian System. Subsurface soils encountered in the borings consisted primarily of clay soils. Existing fill was not encountered in the borings, however the site is developed and existing fill will be present at the site. Groundwater was not present in the borings during drilling, however wet zones were present in the clay soils.

FIELD EXPLORATION

The field exploration conducted on April 12, 2002 consisted of 12 exploratory borings. The borings were drilled to depths ranging from 3 to 6 meters at various locations across the project site to explore subsurface conditions and obtain samples for laboratory testing. All field and laboratory testing was performed under the direction of a Professional Engineer.

Exploratory borings were advanced through the soils with a Mobile Drill B-31 drill rig using 15 centimeter continuous flight auger and a rock bit. The borings were logged in the field by a representative of Allied Laboratories based on visual procedures. Measurements of the water levels were attempted in the borings shortly after completion of drilling.

Exploratory boring locations were determined by Allied Laboratories Survey Division. Approximate boring locations are shown on the Boring Location Sketch, Figure A-2. Ground surface elevations at the boring locations were determined by Allied Laboratories Survey Division.

Samples of the subsurface materials were taken with a 5 centimeter O.D. splitspoon sampler at various depth intervals. The sampler was driven into the various strata using a 63.5 kilogram hammer falling 76 centimeters. The number of blows required to advance the sampler three successive 15 centimeter increments is recorded. The total number of blows required to advance the sampler the second and third 15 centimeter increments is the penetration resistance value (N). Penetration resistance values indicate the relative density of cohesionless soils and consistency of cohesive soils. Standard Penetration tests were performed in accordance with ASTM D-1586.

Undisturbed samples were obtained by hydraulically pushing 7.6 centimeter diameter Shelby Tubes into the soil according to ASTM D-1587.

LABORATORY TESTING

Soil samples obtained during the field exploration were observed and visually classified according to ASTM D-2488 "Soil Classification for Engineering Purposes" which is based on the Unified Soil Classification System. Selected samples were tested to determine engineering and physical properties according to ASTM D-2487. Index and engineering tests performed included moisture content analysis, dry unit weight, unconfined compression, pocket penetrometer and Atterberg Limits. All laboratory tests were performed according to ASTM standards unless indicated otherwise on the report forms. Laboratory test results are summarized on the attached figures and boring logs.

SUBSURFACE CONDITIONS

The subsurface profile encountered in the borings consisted primarily of clay soils. Bedrock was not encountered in the borings, and existing fill was also not encountered in the borings.

Brief descriptions of the soils and groundwater conditions encountered follow. The attached Boring Logs should be reviewed for subsurface conditions at each boring location. Sharp transitions between various soils types are presented on the boring logs. However, soil transitions may occur gradually and depths to the transitions are approximate. Laboratory test results of selected samples are discussed below and presented on the attached figures.

EXISTING FILL

Existing fill was not encountered in borings except for surface gravel. However, the site has been terraced and developed with utilities. Therefore, existing fill may be present at this site and should be anticipated.

NATURAL SOILS

The natural soils encountered in the borings consisted primarily of lean to fat clay. These soils were generally characterized as moist to very moist although wet to saturated zones were present at various depths. Moisture contents for the samples tested ranged from approximately 15 to 35 percent.

NATURAL SOILS (CONT.)

Consistency of the clay soils varied considerably between the borings and with depth. The consistency ranged from soft to stiff based on visual observations, standard penetration testing and unconfined compressive strengths. Standard penetration values ranged from 2 to 13 blows per 30 centimeters of penetration. Unconfined compressive strengths varied from 149 to 340 kilopascals and dry unit weights ranged from 1520 to 1592 kilograms per cubic meter. Pocket penetrometer values ranged from 47.8 to 239 kilopascals.

Atterberg limits testing indicated these soils were borderline lean to fat clay. Liquid limits ranging from 37 to 49 and plasticity indices from 18 to 26 percent were obtained on the samples tested.

BEDROCK

Bedrock was not encountered in exploratory borings to the depth investigated. Bedrock in this area, when encountered, typically consists of clay shale and/or limestone.

GROUNDWATER

Groundwater measurements were attempted immediately after drilling and approximately 24 hours after drilling. Groundwater was not observed in the borings immediately after drilling nor approximately 24 hours after drilling. However, water could accumulate in borings or excavations left open for a longer period since the majority of the soils at this site will exhibit low permeability rates.

Wet, soft zones were observed in the borings, and the borings were drilled after an extended dry period. We anticipate seepage water will be present during wet periods and at various times of the year. The groundwater may not constitute a true groundwater table although significant quantities of groundwater can be present in these soils.

The water level presented on the boring logs and discussed in this report does not necessarily indicate where free water will be encountered during construction. Groundwater levels can vary depending on the climatic conditions, time of year, surface runoff and other factors beyond the scope of this report.

CONCLUSIONS AND RECOMMENDATIONS

Field exploration results indicate subsurface soil and groundwater conditions will vary considerably at this site. Final project design information regarding grading and structures was not available for this report. Considering our field exploration results, laboratory tests and proposed construction, the following general conclusions and recommendations are presented.

GENERAL COMMENTS

Due to the variable subsurface soil and potential groundwater conditions, a more extensive subsurface exploration program may be necessary before construction. The subsurface exploration requirements will need to be determined based on final design and site grading plans. Also, groundwater was not encountered in our exploratory borings although wet zones were present. We anticipate groundwater will be encountered in this formation at various times of the year.

SUBGRADE PREPARATION

All structures, existing fill, soft soils, and the organic portion of the topsoil should be removed prior to placing new engineered fill. A stripping depth of 15 to 20 centimeters is anticipated for this site. However, existing fill and soft zones may be present at the site which may require additional over-excavation. After stripping and removal of these materials, the exposed subgrade should be observed by a Geotechnical Engineer to assure all soft soils and deleterious materials have been removed. The exposed subgrade should then be scarified, moisture conditioned and re-compacted to the requirements outlined in this report.

The subgrade soils encountered in the upper portion of the soil profile at this site may become soft when wetted. These conditions can cause difficulties for construction during wet periods. Low ground pressure equipment may be necessary depending on excavation depths and subsurface conditions encountered. If excessive movement of the subgrade soils occurs, over-excavation and replacement of the soft or loose soils may be necessary.

ENGINEERED FILL

All new engineered fill should be placed under controlled conditions with observation by a licensed Professional Engineer or his designated representative. We suggest this observation work be provided by separate agreement between the Observer and the Owner. Considering the proposed construction and intended use of this project, the following recommendations are presented for fill materials and compaction of engineered fill.

FILL MATERIALS

All new fill should consist of clean soils free of debris and deleterious materials. Our recommendations for various fill materials follow.

- General fill for site grading (outside of building areas) should consist of on-site soils or imported fill with a maximum plasticity index of 25. All imported fill for building and pavement areas should consist of select fill or non-expansive soils. Expansive soils should not be used within building and pavement areas.
- Select fill for stabilized zones should consist of imported Low Volume Change soil (LVC). Natural LVC materials consist of lean clay, sandy clay, clayey sand or similar soils with a maximum liquid limit of 40 and a plasticity index between 5 and 15. Limestone screenings and limestone gravel are acceptable select fill materials. Other materials may be used for select fill as approved by a Geotechnical Engineer.
- Manufactured select fill consisting of mixing two or more materials (i.e. clay and sand) may only be used if the materials are mixed thoroughly by discing or other methods to assure a homogeneous fill material meeting the requirements for select fill. Manufactured select fill may require considerable mixing and moisture conditioning.
- Clean sand may only be used for fill material for the building pad, pavements and site grading when approved by a Geotechnical Engineer. Clean sand outside of confined conditions (i.e. inside stem walls) will tend to displace under construction traffic even when well compacted since these materials are cohesionless. Clean sand may also provide difficulties for construction and may require low pressure ground equipment, stabilization of the upper working surface and re-compaction throughout construction.

COMPACTION

Compaction should be controlled based on the **STANDARD PROCTOR ASTM D-698**. For this project, the following minimum compaction specifications are recommended.

• Footings	98 % of Maximum Dry Density
• Pavement (stabilized subgrade)	98 % of Maximum Dry Density
• Floor Slabs	95 % of Maximum Dry Density
• General Structural Fill/Backfill	95 % of Maximum Dry Density
• Non-Structural Fill/Backfill	90 % of Maximum Dry Density

MOISTURE CONTROL

Moisture content of the fill material should be controlled during construction based on an acceptable range of moisture content. The following moisture ranges are recommended for various soil types:

• Fat Clay (CH)	2% above Optimum Moisture Content or greater
• Lean Clay (CL)	Optimum Moisture Content or greater
• Silts, Clayey Sand, LVC (GM, GC, SM, SC)	± 3 % Optimum Moisture Content
• Sands, Gravel (GW, GP, SW, SP)	Workable Moisture Content

PLACEMENT

- All fill material should be placed in horizontal lifts.
- Engineered fill should extend a minimum of 1.5 meters outside of building pad and 0.5 meters outside of pavements and sidewalks.
- Maximum loose lift thickness should not exceed 22 centimeters. Smaller lift thickness may aid in compaction and should be used for energy sensitive soils or if light compaction equipment is used.
- Moisture sensitive soils such as silt materials may require stricter moisture control to achieve the required compaction.
- Potentially expansive clay soils should not be compacted more than 3 percent above the recommended minimum compaction specification.

EXCAVATION

The subsurface soils encountered in the upper portion of the exploratory borings consisted primarily of clay. These materials should be excavatable with heavy construction equipment. Bedrock consisting of medium hard to hard clay shale and limestone was observed in the lower portions of several borings. These materials were hard and may be difficult to excavate.

The upper clay materials appear to range from Type A to Type B soil according to OSHA guidelines. The maximum OSHA recommended slope for Type A soil is 3/4 horizontal to 1 vertical and Type B is 1 horizontal to 1 vertical. However, wet zones were observed at various depths in some of the borings indicating additional sloping will be necessary. All excavations should be constructed and shored according to OSHA, state and local requirements. Each excavation must be evaluated individually during construction to determine the appropriate sloping or shoring technique.

SURFACE DRAINAGE

Ponded water can cause problems during and after construction. Site grading and backfill should be sloped to provide positive drainage away from structure foundations, slab-on-grade and pavements. A minimum grade of 5 percent for the first 3 meters and 2 percent thereafter is suggested. Downspouts should be designed to discharge well away from the building foundations.

FOUNDATIONS

Considering the subsurface conditions and proposed construction, the following general conclusions and recommendations are presented for foundation design.

- Spread and mat foundations may be feasible at this site depending on structure locations and elevations. Field exploration results indicate net allowable soil bearing capacities of the in-situ clay soils range from approximately 50 to 120 kilopascals. Allowable soil bearing capacities are based on a theoretical factor of safety against shear failure on the order of 3.
- Estimated average settlement of footings placed on the in-situ soils ranges from approximately 2.5 to 6 centimeters. Differential settlements may range from ½ to ¾ of the total settlement. These estimated settlements are based on assumed footing details and depths and should be considered as approximate. Additional settlement analysis will be warranted depending on footing sizes and depths.
- All exterior footings and interior footings under unheated areas should be founded a minimum of 100 centimeters below finished grade for frost protection and to protect against moisture variations of the near surface soils.
- Due to the variable soil conditions at the site, some structures may need to be placed on new engineered fill. Spread or mat foundations placed on new engineered fill should be designed for a maximum allowable net soil bearing capacity of 120 kilopascals.
- Continuous spread footings should have a minimum width of 40 centimeters and isolated column footings should have a minimum width of 80 centimeters.
- Avoid disturbing the in-situ soils below the bearing elevation during excavation. Use hand excavation to remove slough, if necessary.
- Place concrete in footings as soon as practicable after excavation to avoid drying or wetting of the exposed soils. If the bearing soils are disturbed, allowed to dry, or are wetted by rain or seepage water, remove the affected soil and extend the footings.
- All footing excavations should be observed by a qualified Geotechnical Engineer to ensure adequate bearing soils are present.

FLOOR SLABS

The subsurface soils consist primarily of medium to high plasticity clays with plasticity indices ranging from 18 to 26 percent. Considering these conditions, a minimum of 45 centimeters of select fill (exclusive of any sand leveling course or moisture vapor barrier) should be placed below all floor slabs at grade. Prior to placing the select fill, the exposed subgrade should be scarified, moisture conditioned and recompacted to the requirements outlined in this report. Due to the potential for groundwater at this site, a layer of clean, coarse graded sand graded to drain to a sump is anticipated for basement floors.

LATERAL EARTH PRESSURE

Below grade and retaining walls will be subject to lateral earth pressures. The magnitude of the lateral earth pressure is related to the in-situ soils and backfill adjacent to the walls. For the in-situ clay soils, the following pressure coefficients may be used for design of below grade walls.

- Coefficient of Active Pressure 0.5
- Coefficient of At-rest Pressure 0.8
- Coefficient of Passive Pressure 2.0

The active case may be used if walls are allowed to rotate sufficiently to fully mobilize active pressure. The at-rest case should be used for rigid walls where little or no rotation is anticipated. The equivalent fluid unit weights presented do not account for hydrostatic pressures. If backfill adjacent to the below grade or retaining walls becomes saturated, significantly larger pressures may develop. Below grade walls should be designed for saturated conditions, or a perimeter drain system consisting of drain tile and clean granular backfill should be used. Lateral loads may be resisted by passive earth pressure and a coefficient friction of 0.3 between concrete and moist clays.

PAVEMENT

Samples of near surface subgrade soils obtained from the exploratory borings indicate the subgrade soils in the pavement areas will consist primarily of lean to fat clay soils with medium to high plasticity indices. Typically, California Bearing Ratio values of remolded, soaked samples of these types of materials range from approximately 2 to 3 which is considered a poor subgrade for pavements. Due to poor subgrade and potential for subgrade movement, a minimum of 20 centimeters of stabilized subgrade should be placed below the pavement section. The stabilized subgrade may consist of imported select fill, limestone gravel or approved equivalent.

Rigid pavement should be considered for areas where heavy vehicles will be driving and stopping. These areas include truck routes, loading and unloading zones and trash receptacle areas. Rigid pavements tend to perform better in these areas. Asphaltic concrete pavement should consist of a plant mixture composed of aggregate and bituminous material which meets the requirements established by a qualified engineer. All concrete should be based on a mix design established by a qualified engineer.

SOIL CORROSIVITY

The potential corrosive environment for materials placed on or beneath the ground surface was evaluated by laboratory testing. The laboratory data collected includes; pH, sulfates, chlorides, laboratory resistivity and soil classification. A qualified Corrosion Engineer should review the information presented to design the appropriate corrosion protection. Additional information should be obtained if necessary. A summary of our laboratory corrosivity test results for the project follows.

Sample Location	**Sample Depth**	**Soil Type**	**pH** std.	**Resistivity** Ohm cm	**Chlorides** mg/kg	**Sulfates** mg/kg
B-3	0.5 to 1 meters	Lean to Fat Clay	7.55	1888	ND	10
B-5	0.5 to 1 meters	Lean to Fat Clay	6.57	2078	ND	50

ND = Not Detected, Detection limits for: Sulfates = 10 mg/kg, Chlorides = 10 mg/kg

GENERAL NOTES AND LIMITATIONS

Moderate to high volume change soils occur on this site. These soils are generally stable at a constant natural moisture content, but can expand or consolidate with moisture variations. The volume change potential of soils can change erratically both in vertical and lateral extent. Moisture changes also occur erratically, resulting in conditions that cannot always be predicted.

The recommendations presented are based on experience with similar soils. The builder and owner should be aware that there is a risk in construction on these types of soils. Performance of the building will depend on following the design and construction recommendations and proper maintenance after construction is complete. Since water is the main cause of volume change of these soils, it is necessary that changes in moisture content be kept to a minimum. This may require restricted watering of lawns and positive surface and subsurface drainage away from the building foundation, pavements and floor slabs.

Geotechnical recommendations are usually based on periodic sampling in widely spaced, small diameter borings. Actual subsurface conditions may vary from those encountered in the borings. Due to this variability, engineering judgment and adjustments to the geotechnical recommendations may be necessary during construction. A Geotechnical Engineer should be retained for observation and testing during construction to ensure recommendations are met or adjusted as necessary.

This report has been prepared according to generally accepted soil and foundation engineering practices. It is intended to be a preliminary report for information only and is based on limited design information. Additional investigation may be necessary for final design. The recommendations are intended for the exclusive use of the client for preliminary project design. Individual portions of this report should not be taken out of context and used on this or other projects.

The conclusions and recommendations presented are based on the data obtained from the borings at the locations indicated. The nature and extent of subsurface variations across the site may not become evident until construction. If subsurface conditions are encountered other than described in this report, the recommendations in this report may need to be re-evaluated and adjusted.

Prepared by,

ALLIED LABORATORIES

_____

Steven M. Herman, P.E.
Geotechnical Division Manager

attachments

PRELIMINARY GEOTECHNICAL REPORT

FORT LEAVENWORTH HOUSING

PHASE 1D

LEAVENWORTH, KANSAS

PREPARED FOR

GOSSEN LIVINGSTON ASSOCIATES

APRIL/MAY 2002

PROJECT NO: 74-00555-3B-147

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APPENDIX A – ***FIELD EXPLORATION RESULTS***

APPENDIX B – ***LABORATORY TEST RESULTS***

INTRODUCTION

This report presents the results of a preliminary Geotechnical Study for the proposed Phase 1D housing project at Fort Leavenworth, Kansas. The study was conducted to develop preliminary geotechnical recommendations for a design/build package and is not intended as final design criteria. Additional borings and subsurface soils information may be necessary prior to final design of this project. The Geotechnical Report was conducted in general accordance with our proposal to Gossen Livingston Associates.

A field exploration program was conducted to obtain information on the subsurface conditions. Samples obtained during the field investigation were tested to determine physical and engineering characteristics of the in-situ soils. Field exploration and laboratory test results were analyzed to develop geotechnical recommendations. Results of the field exploration, laboratory testing, and our conclusions and recommendations are presented herein.

PROPOSED CONSTRUCTION

The proposed construction was not final at the time of this report. The proposed construction may consist of 1 or 2 story housing units and may be slab on grade or may have basements. Column loads are anticipated to be approximately 25 metric tons or less and wall loads are anticipated to be on the order of 1 to 1.5 metric tons per 0.5 meter. Finished floor elevations were not available at the time of this report and therefore cut and fill depths are not known. However, since the project site has sloping contours, considerable cut and fill may be required to achieve design grades.

EXISTING SITE CONDITIONS & GEOLOGY

The project site is located at Fort Leavenworth in the northeast portion of Kansas. During the field exploration, the project site consisted primarily of grassed areas, asphalt and gravel drives and a concrete pad. The site had been developed with utilities crossing the site. An overhead powerline crosses a portion of the site and a substation is located adjacent to the site. The site surface has moderate to steep slopes. Ground surface elevations between the borings varied approximately 7 meters.

The geologic formation in the area of the project site appears to be the Douglas Group from the Virgilian Series of the Pennsylvanian System. Subsurface soils encountered in the borings consisted primarily of clay soils. Existing fill was not encountered in the borings, however the site is developed and existing fill will be present at the site. Groundwater was not present in the borings during drilling, however wet zones were present in the clay soils.

FIELD EXPLORATION

The field exploration conducted on April 12 and 13, 2002 consisted of 8 exploratory borings. The borings were drilled to depths of 6 meters at various locations across the project site to explore subsurface conditions and obtain samples for laboratory testing. All field and laboratory testing was performed under the direction of a Professional Engineer.

Exploratory borings were advanced through the soils with a Mobile Drill B-31 drill rig using 15 centimeter continuous flight auger and a rock bit. The borings were logged in the field by a representative of Allied Laboratories based on visual procedures. Measurements of the water levels were attempted in the borings shortly after completion of drilling.

Exploratory boring locations were determined by Allied Laboratories Survey Division. Approximate boring locations are shown on the Boring Location Sketch, Figure A-2. Ground surface elevations at the boring locations were determined by Allied Laboratories Survey Division.

Samples of the subsurface materials were taken with a 5 centimeter O.D. splitspoon sampler at various depth intervals. The sampler was driven into the various strata using a 63.5 kilogram hammer falling 76 centimeters. The number of blows required to advance the sampler three successive 15 centimeter increments is recorded. The total number of blows required to advance the sampler the second and third 15 centimeter increments is the penetration resistance value (N). Penetration resistance values indicate the relative density of cohesionless soils and consistency of cohesive soils. Standard Penetration tests were performed in accordance with ASTM D-1586.

Undisturbed samples were obtained by hydraulically pushing 7.6 centimeter diameter Shelby Tubes into the soil according to ASTM D-1587.

LABORATORY TESTING

Soil samples obtained during the field exploration were observed and visually classified according to ASTM D-2488 "Soil Classification for Engineering Purposes" which is based on the Unified Soil Classification System. Selected samples were tested to determine engineering and physical properties according to ASTM D-2487. Index and engineering tests performed included moisture content analysis, dry unit weight, unconfined compression, pocket penetrometer and Atterberg Limits. All laboratory tests were performed according to ASTM standards unless indicated otherwise on the report forms. Laboratory test results are summarized on the attached figures and boring logs.

SUBSURFACE CONDITIONS

The subsurface profile encountered in the borings consisted primarily of clay soils. Bedrock was not encountered in the borings, and existing fill was also not encountered in the borings.

Brief descriptions of the soils and groundwater conditions encountered follow. The attached Boring Logs should be reviewed for subsurface conditions at each boring location. Sharp transitions between various soils types are presented on the boring logs. However, soil transitions may occur gradually and depths to the transitions are approximate. Laboratory test results of selected samples are discussed below and presented on the attached figures.

EXISTING FILL

Existing fill was not encountered in borings except for surface gravel. However, the site has been terraced and developed with utilities. Therefore, existing fill may be present at this site and should be anticipated.

NATURAL SOILS

The natural soils encountered in the borings consisted primarily of lean to fat clay. These soils were generally characterized as moist to very moist although wet zones were present at various depths. Moisture contents for the samples tested ranged from approximately 15 to 37 percent.

NATURAL SOILS (CONT.)

Consistency of the clay soils varied considerably between the borings and with depth. The consistency ranged from soft to stiff based on visual observations, standard penetration testing and unconfined compressive strengths. Standard penetration values ranged from 4 to 15 blows per 30 centimeters of penetration. Unconfined compressive strengths varied from 148 to 208 kilopascals and dry unit weights ranged from 1595 to 1635 kilograms per cubic meter. Pocket penetrometer values ranged from 23.9 to 191 kilopascals.

Atterberg limits testing indicated these soils were borderline lean to fat clay. Liquid limits ranging from 31 to 45 and plasticity indices from 13 to 25 percent were obtained on the samples tested.

BEDROCK

Bedrock was not encountered in exploratory borings to the depth investigated. Bedrock in this area, when encountered, typically consists of clay shale and/or limestone.

GROUNDWATER

Groundwater measurements were attempted immediately after drilling and approximately 24 hours after drilling. Groundwater was not observed in the borings immediately after drilling nor approximately 24 hours after drilling. However, water could accumulate in borings or excavations left open for a longer period since the majority of the soils at this site will exhibit low permeability rates.

Wet, soft zones were observed in the borings, and the borings were drilled after an extended dry period. We anticipate seepage water will be present during wet periods and at various times of the year. The groundwater may not constitute a true groundwater table although significant quantities of groundwater can be present in these soils.

The water level presented on the boring logs and discussed in this report does not necessarily indicate where free water will be encountered during construction. Groundwater levels can vary depending on the climatic conditions, time of year, surface runoff and other factors beyond the scope of this report.

CONCLUSIONS AND RECOMMENDATIONS

Field exploration results indicate subsurface soil and groundwater conditions will vary considerably at this site. Final project design information regarding grading and structures was not available for this report. Considering our field exploration results, laboratory tests and proposed construction, the following general conclusions and recommendations are presented.

GENERAL COMMENTS

Due to the variable subsurface soil and potential groundwater conditions, a more extensive subsurface exploration program may be necessary before construction. The subsurface exploration requirements will need to be determined based on final design and site grading plans. Also, groundwater was not encountered in our exploratory borings although wet zones were present. We anticipate groundwater will be encountered in this formation at various times of the year.

SUBGRADE PREPARATION

All structures, existing fill, soft soils, and the organic portion of the topsoil should be removed prior to placing new engineered fill. A stripping depth of 15 to 20 centimeters is anticipated for this site. However, existing fill and soft zones may be present at the site which may require additional over-excavation. After stripping and removal of these materials, the exposed subgrade should be observed by a Geotechnical Engineer to assure all soft soils and deleterious materials have been removed. The exposed subgrade should then be scarified, moisture conditioned and re-compacted to the requirements outlined in this report.

The subgrade soils encountered in the upper portion of the soil profile at this site may become soft when wetted. These conditions can cause difficulties for construction during wet periods. Low ground pressure equipment may be necessary depending on excavation depths and subsurface conditions encountered. If excessive movement of the subgrade soils occurs, over-excavation and replacement of the soft or loose soils may be necessary.

ENGINEERED FILL

All new engineered fill should be placed under controlled conditions with observation by a licensed Professional Engineer or his designated representative. We suggest this observation work be provided by separate agreement between the Observer and the Owner. Considering the proposed construction and intended use of this project, the following recommendations are presented for fill materials and compaction of engineered fill.

FILL MATERIALS

All new fill should consist of clean soils free of debris and deleterious materials. Our recommendations for various fill materials follow.

- General fill for site grading (outside of building areas) should consist of on-site soils or imported fill with a maximum plasticity index of 25. All imported fill for building and pavement areas should consist of select fill or non-expansive soils. Expansive soils should not be used within building and pavement areas.
- Select fill for stabilized zones should consist of imported Low Volume Change soil (LVC). Natural LVC materials consist of lean clay, sandy clay, clayey sand or similar soils with a maximum liquid limit of 40 and a plasticity index between 5 and 15. Limestone screenings and limestone gravel are acceptable select fill materials. Other materials may be used for select fill as approved by a Geotechnical Engineer.
- Manufactured select fill consisting of mixing two or more materials (i.e. clay and sand) may only be used if the materials are mixed thoroughly by discing or other methods to assure a homogeneous fill material meeting the requirements for select fill. Manufactured select fill may require considerable mixing and moisture conditioning.
- Clean sand may only be used for fill material for the building pad, pavements and site grading when approved by a Geotechnical Engineer. Clean sand outside of confined conditions (i.e. inside stem walls) will tend to displace under construction traffic even when well compacted since these materials are cohesionless. Clean sand may also

provide difficulties for construction and may require low pressure ground equipment, stabilization of the upper working surface and re-compaction throughout construction.

COMPACTION

Compaction should be controlled based on the **STANDARD PROCTOR ASTM D-698**. For this project, the following minimum compaction specifications are recommended.

• Footings	98 % of Maximum Dry Density
• Pavement (stabilized subgrade)	98 % of Maximum Dry Density
• Floor Slabs	95 % of Maximum Dry Density
• General Structural Fill/Backfill	95 % of Maximum Dry Density
• Non-Structural Fill/Backfill	90 % of Maximum Dry Density

MOISTURE CONTROL

Moisture content of the fill material should be controlled during construction based on an acceptable range of moisture content. The following moisture ranges are recommended for various soil types:

• Fat Clay (CH)	2% above Optimum Moisture Content or greater
• Lean Clay (CL)	Optimum Moisture Content or greater
• Silts, Clayey Sand, LVC (GM, GC, SM, SC)	± 3 % Optimum Moisture Content
• Sands, Gravel (GW, GP, SW, SP)	Workable Moisture Content

PLACEMENT

- All fill material should be placed in horizontal lifts.
- Engineered fill should extend a minimum of 1.5 meters outside of building pad and 0.5 meters outside of pavements and sidewalks.
- Maximum loose lift thickness should not exceed 22 centimeters. Smaller lift thickness may aid in compaction and should be used for energy sensitive soils or if light compaction equipment is used.
- Moisture sensitive soils such as silt materials may require stricter moisture control to achieve the required compaction.
- Potentially expansive clay soils should not be compacted more than 3 percent above the recommended minimum compaction specification.

EXCAVATION

The subsurface soils encountered in the upper portion of the exploratory borings consisted primarily of clay. These materials should be excavatable with heavy construction equipment. Bedrock consisting of medium hard to hard clay shale and limestone was observed in the lower portions of several borings. These materials were hard and may be difficult to excavate.

The upper clay materials appear to range from Type A to Type B soil according to OSHA guidelines. The maximum OSHA recommended slope for Type A soil is 3/4 horizontal to 1 vertical and Type B is 1 horizontal to 1 vertical. However, wet zones were observed at various depths in some of the borings indicating additional sloping will be necessary. All excavations should be constructed and shored according to OSHA, state and local requirements. Each excavation must be evaluated individually during construction to determine the appropriate sloping or shoring technique.

SURFACE DRAINAGE

Ponded water can cause problems during and after construction. Site grading and backfill should be sloped to provide positive drainage away from structure foundations, slab-on-grade and pavements. A minimum grade of 5 percent for the first 3 meters and 2 percent thereafter is suggested. Downspouts should be designed to discharge well away from the building foundations.

FOUNDATIONS

Considering the subsurface conditions and proposed construction, the following general conclusions and recommendations are presented for foundation design.

- Spread and mat foundations may be feasible at this site depending on structure locations and elevations. Field exploration results indicate net allowable soil bearing capacities of the in-situ clay soils range from approximately 50 to 120 kilopascals. Allowable soil bearing capacities are based on a theoretical factor of safety against shear failure on the order of 3.
- Estimated average settlement of footings placed on the in-situ soils ranges from approximately 2.5 to 6 centimeters. Differential settlements may range from ½ to ¾ of the total settlement. These estimated settlements are based on assumed footing details and depths and should be considered as approximate. Additional settlement analysis will be warranted depending on footing sizes and depths.
- All exterior footings and interior footings under unheated areas should be founded a minimum of 100 centimeters below finished grade for frost protection and to protect against moisture variations of the near surface soils.
- Due to the variable soil conditions at the site, some structures may need to be placed on new engineered fill. Spread or mat foundations placed on new engineered fill should be designed for a maximum allowable net soil bearing capacity of 120 kilopascals.
- Continuous spread footings should have a minimum width of 40 centimeters and isolated column footings should have a minimum width of 80 centimeters.
- Avoid disturbing the in-situ soils below the bearing elevation during excavation. Use hand excavation to remove slough, if necessary.
- Place concrete in footings as soon as practicable after excavation to avoid drying or wetting of the exposed soils. If the bearing soils are disturbed, allowed to dry, or are wetted by rain or seepage water, remove the affected soil and extend the footings.
- All footing excavations should be observed by a qualified Geotechnical Engineer to ensure adequate bearing soils are present.

FLOOR SLABS

The subsurface soils consist primarily of medium to high plasticity clays with plasticity indices ranging from 13 to 25 percent. Considering these conditions, a minimum of 45 centimeters of select fill (exclusive of any sand leveling course or moisture vapor barrier) should be placed below all floor slabs at grade. Prior to placing the select fill, the exposed subgrade should be scarified, moisture conditioned and recompacted to the requirements outlined in this report. Due to the potential for groundwater at this site, a layer of clean, coarse graded sand graded to drain to a sump is anticipated for basement floors.

LATERAL EARTH PRESSURE

Below grade and retaining walls will be subject to lateral earth pressures. The magnitude of the lateral earth pressure is related to the in-situ soils and backfill adjacent to the walls. For the in-situ clay soils, the following pressure coefficients may be used for design of below grade walls.

- Coefficient of Active Pressure 0.5
- Coefficient of At-rest Pressure 0.8
- Coefficient of Passive Pressure 2.0

The active case may be used if walls are allowed to rotate sufficiently to fully mobilize active pressure. The at-rest case should be used for rigid walls where little or no rotation is anticipated. The equivalent fluid unit weights presented do not account for hydrostatic pressures. If backfill adjacent to the below grade or retaining walls becomes saturated, significantly larger pressures may develop. Below grade walls should be designed for saturated conditions, or a perimeter drain system consisting of drain tile and clean granular backfill should be used. Lateral loads may be resisted by passive earth pressure and a coefficient friction of 0.3 between concrete and moist clays.

PAVEMENT

Samples of near surface subgrade soils obtained from the exploratory borings indicate the subgrade soils in the pavement areas will consist primarily of lean to fat clay soils with medium to high plasticity indices. Typically, California Bearing Ratio values of remolded, soaked samples of these types of materials range from approximately 2 to 3 which is considered a poor subgrade for pavements. Due to poor subgrade and potential for subgrade movement, a minimum of 20 centimeters of stabilized subgrade should be placed below the pavement section. The stabilized subgrade may consist of imported select fill, limestone gravel or approved equivalent.

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SOIL CORROSIVITY

The potential corrosive environment for materials placed on or beneath the ground surface was evaluated by laboratory testing. The laboratory data collected includes; pH, sulfates, chlorides, laboratory resistivity and soil classification. A qualified Corrosion Engineer should review the information presented to design the appropriate corrosion protection. Additional information should be obtained if necessary. A summary of our laboratory corrosivity test results for the project follows.

Sample Location	**Sample Depth**	**Soil Type**	**pH** std.	**Resistivity** Ohm cm	**Chlorides** mg/kg	**Sulfates** mg/kg
B-5	0.5 to 1 meters	Lean to Fat Clay	7.55	1942	ND	10

ND = Not Detected, Detection limits for: Sulfates = 10 mg/kg, Chlorides = 10 mg/kg

GENERAL NOTES AND LIMITATIONS

Moderate to high volume change soils occur on this site. These soils are generally stable at a constant natural moisture content, but can expand or consolidate with moisture variations. The volume change potential of soils can change erratically both in vertical and lateral extent. Moisture changes also occur erratically, resulting in conditions that cannot always be predicted.

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The conclusions and recommendations presented are based on the data obtained from the borings at the locations indicated. The nature and extent of subsurface variations across the site may not become evident until construction. If subsurface conditions are encountered other than described in this report, the recommendations in this report may need to be re-evaluated and adjusted.

Prepared by,

ALLIED LABORATORIES

_____

Steven M. Herman, P.E.
Geotechnical Division Manager

attachments

ATTACHMENT 3

DRAWING FORMAT
(TRI-SERVICE STANDARDS)

Provided in a separate file.
Click on the button bar
for Volume 1
or for Volume 2

ATTACHMENT 4

SAFETY AND HEALTH REQUIREMENTS MANUAL

Provided in a separate file.
Click on the title on the button bar.

ATTACHMENT 5

ASBESTOS SURVEY RESULTS

SAMPLE MATERIAL TYPES

04/11/2002

Code	Description	Location	#	ACM
FT 1	9 x 9 tan/white/gray mottled ACM 8%	83,85,87, 98, 119, 139	3	yes
FT 2	9 x 9 gray w/gray/white--patches	85, 139	3	No
FT 3	9 x 9 gray/tan/white mottles--patches	121	3	No
FT 4	12 x 12 white with brown stripes	83,85,87,119	3	No
FT 5	12 x 12 white with brown and gray splotches	85	1	No
FT 6	12 x 12 white with lighter stripes	85	2	No
FT 7	12 x 12 tan with gray and brown specks	83	2	No
FT 8	12 x 12 white w/gray/brown specks--patches	83		
FT 9	12 x 12 white with blue/gray specks	98,139	2	No
FT 10	12 x 12 gray w/brown and white streaks	98, 139	2	No
FT 11	12 x 12 light gray mottled	87	1	No
FT 12	12 x 12 white with tan and brown specks	139	1	No
FT 13	12 x 12 light brown w/brown & white stripes--patches	139	1	No
FT 14	12 x 12 tan with brown and white streaks--patches	139	1	yes
SV 1	large tan squares	87,119	3	No
SV 2	gray/white/tan mosaic, smooth	83	3	No
SV 3	darker gray/tan mosaic, squares	85	3	?
SV 4	tan mosaic, small squres, sparkly	87	2	Yes
SV 5	beige/tan small irregular mosaic	119, 121	2	Yes
SV 6	tan/gray, large irregular mosaic	121	2	?
CB 1	Black cove base	83,85,87	3	No
CB 2	Dark brown cove base	83,85,87,119	3	No
CB 3	Beige cove base	139	2	No
CB 4	Dark gray cove base	119	1	No
CB 5	Light gray cove base	83, 98	3	No
RS 1	Roofing shingle and tar paper	83,87,119	3	No
DW 1	Dry wall and mud	98	3	No
TW1	Tar wrap	98	1	No

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101549-0

Client Name: Ft. Leavenworth- Environmental Office
Address: 820 McClellan
Ft. Leavneworth, KS 66027

REPORT NO.: B-33009
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
Collected by: P. Gearld/ J. Wimberg
Submitted by: Judy Wimberg
Date sample submitted: 2/4/2002

Project No.:
Analyst: Tami Van
Analysis Date: 2/7/2002

Sample No.: 1A
Layer No.: 1
Location of Material: 87, 5th artillery: 12x12 white w/brown stripe floor tile
Description of Material: White/brown cementitious (FT4)

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 1A
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 1B
Layer No.: 1
Location of Material: 85, 5th artillery: 12x12 white w/brown stripe floor tile
Description of Material: White/brown cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 1B
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 1C
Layer No.: 1
Location of Material: 119, 5th artillery: 12x12 white w/brown stripe floor tile
Description of Material: White/brown cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Ft. Leavenworth- Environmental Office
Address: 820 McClellan
Ft. Leavneworth, KS 66027

REPORT NO.: B-33009
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
Collected by: P. Gearld/ J. Wimberg
Submitted by: Judy Wimberg
Date sample submitted: 2/4/2002

Project No.:
Analyst: Tami Van
Analysis Date: 2/7/2002

Sample No.: 1C
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 2A
Layer No.:
Location of Material: 87, 5th artillery: Roofing shingle
Description of Material: Black viscous fibrous w/ gray & tan granular (RS1)

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		Cellulose	45	Bulk	55

Sample No.: 2B
Layer No.:
Location of Material: 83, 5th artillery: Roofing shingle
Description of Material: Black viscous fibrous w/ gray & tan granular

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		Cellulose	45	Bulk	55

Sample No.: 2C
Layer No.:
Location of Material: 119, 5th artillery: Roofing shingle
Description of Material: Black viscous fibrous w/ gray & tan granular

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		Cellulose	45	Bulk	55

Sample No.: 3A
Layer No.: 1
Location of Material: 119, 5th artillery: 9x9 gray/white/tan floor tile
Description of Material: Gray/white/tan cementitious (FT1)

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	**8**			Bulk	92

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Ft. Leavenworth- Environmental Office
Address: 820 McClellan
Ft. Leavneworth, KS 66027

REPORT NO.: B-33009
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
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Submitted by: Judy Wimberg
Date sample submitted: 2/4/2002

Project No.:
Analyst: Tami Van
Analysis Date: 2/7/2002

Sample No.: 3A
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	10	Cellulose	2	Bulk	88

**Samples 3B & 3C were not tested.

Sample No.: 4A
Layer No.: 1
Location of Material: 85, 5th artillery: Dk. Brown covebase
Description of Material: Dk. Brown flexible

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 4A
Layer No.: 2
Location of Material: Covebase adhesive
Description of Material: Brown brittle putty-like (CB2)

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 4B
Layer No.:
Location of Material: 87, 5th artillery: Dk. Brown covebase
Description of Material: Dk. Brown flexible

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 4C
Layer No.: 1
Location of Material: 119, 5th artillery: Dk. Brown covebase
Description of Material: Dk. Brown flexible

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Ft. Leavenworth- Environmental Office
Address: 820 McClellan
Ft. Leavneworth, KS 66027

REPORT NO.: B-33009
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
Collected by: P. Gearld/ J. Wimberg
Submitted by: Judy Wimberg
Date sample submitted: 2/4/2002

Project No.:
Analyst: Tami Van
Analysis Date: 2/7/2002

Sample No.: 4C
Layer No.: 2
Location of Material: Covebase adhesive
Description of Material: Brown putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
				Bulk	

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
				Bulk	

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
				Bulk	

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
				Bulk	

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code. 101649-0

Client Name: Ft. Leavenworth- Environmental office
Address: 820 McClellan
Ft. Leavenworth, KS 66027

REPORT NO.: B-33071
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
Collected by: Phil Gearld
Submitted by: Judy Wimberg
Date sample submitted: 2/8/2002

Project No.:
Analyst: Tami Van
Analysis Date: 2/12/2002

Sample No.: 5A
Layer No.: 1
Location of Material: 98, 5th artillery, 2nd fl. Bath: 12x12 floor tile
Description of Material: White/gray cementitious (FT9)

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Sample No.: 5A
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Tan clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Sample No.: 5B
Layer No.: 1
Location of Material: 98, 5th artillery, 2nd fl. Bath: 12x12 floor tile
Description of Material: White/gray cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Sample No.: 5B
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Tan clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Sample No.: 5C
Layer No.: 1
Location of Material: 139, 5th artillery, 2nd fl. Bath: 12x12 floor tile
Description of Material: White/gray cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Ft. Leavenworth- Environmental office
Address: 820 McClellan
Ft. Leavenworth, KS 66027

REPORT NO.: B-33071
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
Collected by: Phil Gearld
Submitted by: Judy Wimberg
Date sample submitted: 2/8/2002

Project No.:
Analyst: Tami Van
Analysis Date: 2/12/2002

Sample No.: 5C
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Tan clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Sample No.: 6A
Layer No.: 1
Location of Material: 83, 5th artillery, kitchen: Lt. Gray covebase
Description of Material: Lt. Gray flexible (CB4)

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Sample No.: 6A
Layer No.: 2
Location of Material: Covebase adhesive
Description of Material: Lt. Tan putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Sample No.: 6B
Layer No.: 1
Location of Material: 83, 5th artillery, 1st floor: Lt. Gray covebase
Description of Material: Lt. Gray flexible

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Sample No.: 6B
Layer No.: 2
Location of Material: Covebase adhesive
Description of Material: Lt. Tan putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
NONE DETECTED			Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Ft. Leavenworth- Environmental office
Address: 820 McClellan
Ft. Leavenworth, KS 66027

REPORT NO.: B-33071
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
Collected by: Phil Gearld
Submitted by: Judy Wimberg
Date sample submitted: 2/8/2002

Project No.:
Analyst: Tami Van
Analysis Date: 2/12/2002

Sample No.: 6C
Layer No.: 1
Location of Material: 98, 5th artillery: Lt. Gray covebase
Description of Material: Lt. Gray flexible

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 6C
Layer No.: 2
Location of Material: Covebase adhesive
Description of Material: Tan putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 7A
Layer No.: 1
Location of Material: 139, 5th artillery: 12x12 gray w/brown & white floor til
Description of Material: Gray w/brown & white cementitious (FT / C)

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 7A
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
CHRYSOTILE	**2**			Bulk	98

Sample No.: 7B
Layer No.: 1
Location of Material: 98, 5th artillery: 12x12 gray w/brown & white floor tile
Description of Material: Gray w/brown & white cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Analyst: TV

Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Ft. Leavenworth- Environmental office
Address: 820 McClellan
Ft. Leavenworth, KS 66027

REPORT NO.: B-33071
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
Collected by: Phil Gearld
Submitted by: Judy Wimberg
Date sample submitted: 2/8/2002

Project No.:
Analyst: Tami Van
Analysis Date: 2/12/2002

Sample No.: 7B
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear yellow viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 7C
Layer No.: 1
Location of Material: 98, 5th artillery: 12x12 gray w/brown & white floor tile
Description of Material: Gray w/brown & white cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 7C
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear yellow viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 8A
Layer No.: 1
Location of Material: 87, 5th artillery: Black covebase
Description of Material: Black flexible (CB1)

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 8A
Layer No.: 2
Location of Material: Covebase adhesive
Description of Material: Yellow putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101849-0

Client Name: Ft. Leavenworth- Environmental office
Address: 820 McClellan
Ft. Leavenworth, KS 66027

REPORT NO.: B-33071
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
Collected by: Phil Gearld
Submitted by: Judy Wimberg
Date sample submitted: 2/8/2002

Project No.:
Analyst: Tami Van
85 **Analysis Date:** 2/12/2002

Sample No.: 8B
Layer No.: 1
Location of Material: 87, 5th artillery: Black covebase
Description of Material: Black flexible

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 8B
Layer No.: 2
Location of Material: Covebase adhesive
Description of Material: Off-white putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 8C
Layer No.: 1
Location of Material: 83, 5th artillery: Black covebase
Description of Material: Black flexible

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 8C
Layer No.: 2
Location of Material: Covebase adhesive
Description of Material: Brown brittle

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 9A
Layer No.: 1
Location of Material: 87, 5th artillery: Drywall
Description of Material: Lt. Brown fibrous chalky (DW 1)

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		Cellulose	5	Bulk	95

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Ft. Leavenworth- Environmental office
Address: 820 McClellan
Ft. Leavenworth, KS 66027

REPORT NO.: B-33071
RUSH TAT
Project Name: HA 17
Address:

Date sample collected:
Collected by: Phil Gearld
Submitted by: Judy Wimberg
Date sample submitted: 2/8/2002

Project No.:
Analyst: Tami Van
Analysis Date: 2/12/2002

Sample No.: 9A
Layer No.: 2
Location of Material: 87, 5th artillery: Drywall
Description of Material: Brown compact fibrous/ paint

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		Cellulose	80	Bulk	20

Sample No.: 9B
Layer No.: 1
Location of Material: 139, 5th artillery: Drywall
Description of Material: White fibrous chalky

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		Cellulose	5	Bulk	95

Sample No.: 9B
Layer No.: 2
Location of Material: 139, 5th artillery: Drywall
Description of Material: Brown compact fibrous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		Cellulose	100	Bulk	*

Sample No.: 9C
Layer No.: 1
Location of Material: 98, 5th artillery: Drywall
Description of Material: White fibrous chalky

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		Cellulose	5	Bulk	95

Sample No.: 9C
Layer No.: 2
Location of Material: 98, 5th artillery: Drywall
Description of Material: Brown compact fibrous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		Cellulose	100	Bulk	*

Analyst: TV Laboratory Director: Tami Van

ATTACHMENT 6

DRAWINGS PROVIDED WITH RFP

ATTACHMENT 7

HOUSING QUALITY VERIFICATION CHECKLIST

HOUSING QUALITY VERIFICATION CHECKLIST
(Example of Definable Feature of Work)

Building Layout
(Examples of Quality Control Checks)

- Check building setback requirements.
- Verify Building elevations.
- Verify benchmark.

Strip Site

- Check for protection of existing utilities, vegetation, and structures before operations begin.
- Check segregation of topsoil from backfill.
- Check requirements for erosion control.

Foundation Excavation

- Check for contractor's location, identification and necessary protection of existing site utilities, vegetation, and existing structures before operations begin.
- Digging permits.
- Building setback.
- Removal of unsatisfactory materials.
- Check excavation, dewatering.
- Erosion control
- Use of satisfactory materials for backfill.
- Compliance with compaction requirements.
- Required testing of backfill.
- Condition of subgrade (compaction, moisture, finish).

Underslab Plumbing

Water Supply and Distribution

- Check that piping materials comply with requirement for under slab location.
- Check that there are no pipe joints below building slab.
- Check size and depth of water line service.
- Check sleeve requirements.
- Check separation requirements of sewer and water line.
- Test piping prior to follow-on work.

Sanitary Drainage

- Check that piping materials comply with requirement for under-slab location.
- Check size of waste line.
- Check slope.
- Check separation requirements of sewer and water line.
- Check for drainage pattern type fittings.
- Check requirements for building sewer clean-out.
- Test piping prior to follow-on work.

Radon Piping

- Check for approved materials.
- Check layout.
- Check penetrations thru foundation.

Soil Treatment

- Pesticide labels to bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).
- Check handling, mixing, application requirements of pesticide.
- Check disposal requirements of containers and residual pesticide.
- Check the requirement for soil poisoning under and around building structures.
- Check for approval of material to be used and watch specifically for required concentration.
- Check application for coverage and quantity of material used.
- Check EPA requirements.
- Check MSDA sheets.

Slab-on-grade

- Check capillary water barrier, gradation, depth, consolidation.
- Is vapor barrier membrane of specified thickness?
- Check vapor barrier edges for specified lap
- Check requirement for sealing the edges.
- Check that vapor barrier joints and penetrations are sealed with tape.
- Check reinforcing steel required by plans and/or shop drawings.
- Check reinforcing supports.
- Check forms.
- Check footing depth and width.
- Clearance of steel from forms and subgrade, and support material.
- Location and construction of contraction and expansion joints.

- Concrete tests-slump, entrained air content, temperature, strength.
- Concrete placement-vibration/consolidation.
- Concrete finish.
- Check form removal. Check patching.
- Check protection and curing of concrete.
- Check materials, dimensions, and installation of perimeter insulation.

Wall Framing & Ext. Sheathing

Lumber Grading

- Species and grade for particular use comply with the specifications.
- Check for grade stamp.
- Defects in material do not exceed grading rules.

Lumber Seasoning and Storage

- Check moisture content of wood.
- Check for proper storage of materials.

Fasteners

- Nailing complies with the AFPA Manual for Wood Frame Construction.

Protection Against Termites and Decay

- Check for pressure preservative treated wood where wood is resting on concrete which is in contact with the ground.
- Wood supports and nailers which support permanent structures and which are embedded in concrete in direct contact with earth or exposed to the weather, should be pressure preservative treated.
- Check that treated lumber in contact with concrete that contacts the ground is treated to a retention level of 0.40pcf. Check grade stamp.

Anchorage of Sills and Plates to Foundation

- Foundation plates or sills shall be bolted to the foundation or foundation wall with not less than 1/2-inch nominal diameter steel bolts embedded at least 7 inches into concrete and spaced not more than 6 feet apart. Check plans and specifications for other requirements.
- Check that there are a minimum of two bolts per piece with one bolt located within 12 inches of each end of each piece.
- Check for a properly sized nut and washer tightened on each bolt to the plate.
- Check special requirements for shear walls.
- Check hold down anchors.

Wall and Partition Framing

- Check stud spacing.
- Double top plates for bearing walls and bearing partitions.
- Horizontal blocking.
- All openings are framed.
- Solid blocking provided for hanging of fixtures, handrails, cabinets, baseboards, and similar items.
- Headers are sized properly.
- Top plate corners overlap.
- Top plate end joints offset as specified (or 48 inches by UBC).
- Check for defects in studs beyond allowable.
- Notches in exterior wall studs or bearing partition do not exceed 25 percent of its width.
- Notches in nonbearing partition do not exceed 40 percent of its width.
- Borings in any stud do not exceed 40 percent of its width.
- Borings are not greater than 60 percent of the width of the stud in nonbearing partitions or in any wall where each bored stud is doubled, and no more than two such successive doubled studs are so bored.
- The edges of bored holes are no closer than 5/8 inch to the edge of the stud and the hole is not located in the same section of stud as a cut or notch.
- Check special requirements for shear walls.
- Check hold down anchors.

Above grade Wood Framed Floor

- Notches or holes in joists are not cut in the middle one-third of the joist span.
- Notches in the outer sections of the span are no greater than one-sixth the joist depth.
- Notches at joist end for ledger support are no greater than one-fourth the joist depth.

- Holes in the outer joist sections are limited in diameter to one-third the joist depth and are cut with the edge of the hole no closer than 2 inches to the top or bottom edges.
- Where bearing partitions are parallel to floor joists, double joist should be directly under the partition.
- Where walls containing plumbing are parallel to floor joists, the joists underneath are doubled, spaced and blocked to permit the passage of pipes.
- Joist hangers and nails are the correct size for supported member.
- Joists on wood plates bear a minimum of 1-1/2 inches.
- Joists on concrete bear a minimum of 3 inches.
- Floor systems having joists framing from opposite sides over a bearing support are tied together by lapping a minimum of 3 inches.
- Ends of floor joists are blocked full depth.

Exterior Wall Sheathing

- Check for required diagonal bracing. Check sheathing against specification requirements for type material, thickness, width, and length.
- Nails and spacing as specified?
- Proper orientation of sheathing.
- End joints over framing members.
- Check requirements for air infiltration barrier.

Roof Trusses & Sheathing

Roof Trusses

- Check Requirements for storage, handling, and installation in accordance with TPI HIB-91.
- Check moisture content of wood.
- Ensure trusses are not field altered.
- Check shop drawings for bearing points of trusses. Trusses should not be nailed to interior partitions at non-load bearing locations.
- Are provisions to allow the bottom chord to float at interior walls required?. Check for truss clips.
- Check shop drawings for tie straps and hangers.
- Check shop drawings for bracing of top and bottom chords. Check bracing of web members.

Roof Sheathing

- Check sheathing for type, grade, and thickness required.
- Check for required space at plywood joints.
- Check sizes, lengths, and spacing of fasteners.
- Check that long dimension of structural panels is perpendicular to rafters with panel continuous over two or more spans.
- Check that joints are staggered.
- Check requirement for panel clips.

Roof Shingles

- Check for approved materials.
- Shingles are labeled as UL approved.
- Sheathing is smooth, firm, dry, and free from loose boards.
- Pipe and other roof penetrations are properly flashed.
- Flashing is installed or on hand to be installed concurrently with roofing.
- Ensure compliance with roofing manufacturer's instructions regarding: underlayment, fasteners (type and location), drip edge, starter course, successive courses, hip and ridge shingles, flashing, valley construction.
- Underlayment on top of metal drip edge at eaves.
- Metal drip edge on top of underlayment at rake.

Install HVAC Ducts

Fabrication and Erection

- Check that ductwork delivered to the site conforms with approved shop drawings
- Check sheet metal material type, thickness and shape
- Check flexible duct type and size..
- Check workmanship of lock seams of sheet metal ducts.
- Check gauge of dampers and splitters.
- Check for framed openings or duct sleeves in wall penetrations where required.

- Examine duct hangers for specified material, thickness, and spacing.
- Check flexible connections where required.
- Test ducts for air tight ness prior to follow-on work as required.

Insulation

- Check the type and thickness of insulation and requirements for vapor barrier.
- Check the method of fastening insulation to exterior or interior of duct. Check fasteners or adhesives.
- Check sealing requirements of insulation vapor retarder.
- Check for continuity of insulation through walls and floor, if required.
- Check materials for fire-retardant requirements.

Electrical and Communication Rough-In

General Requirements

- Notches in exterior wall studs or bearing partition do not exceed 25 percent of its width.
- Notches in nonbearing partition do exceed 40 percent of its width.
- Borings in any stud do not exceed 40 percent of the stud width.
- Borings are not greater than 60 percent of the width of the stud in nonbearing partitions or in any wall where each bored stud is doubled, and no more than two such successive doubled studs are so bored.
- The edges of bored holes are no closer than 5/8 inch to the edge of the stud and the hole is not located in the same section of stud as a cut or notch.
- Notches or holes in joists are not cut in the middle one-third of the joist span.
- Notches in the outer sections of the span are no greater than one-sixth the joist depth.
- Holes in the outer joist sections are limited in diameter to one-third the joist depth and are cut with the edge of the hole no closer than 2 inches to the top or bottom edges.
- Bored holes in wood wall framing: Check requirements for minimum distance of wire to edge of wood member (equal to or greater than 1-1/4 inches). Check requirements if minimum distance cannot be maintained.
- Notches in wood wall framing: Check requirements for protection of wires thru notches in wood members.
- Where a service raceway enters from an underground distribution system, check that it is sealed. (NEC 230-8)

General Purpose Circuits

- Check that outlet boxes comply with specifications for material.
- Check duplex receptacles for location and spacing.
- Check that hallways equal or greater than 10 feet have a receptacle.
- Check offset requirements of boxes on opposite sides of fire rated partitions and walls. Check fire sealing requirements on fire rated partitions and walls.
- Check requirements for clearance on non-insulated cover recessed light fixtures (3 inches from insulation, 1/2 inch to combustibles).
- Check support requirements for ceiling boxes for mounting lighting fixtures.
- Check mounting requirements of boxes in relation to finished surface of wall/ceiling.
- Check height of receptacles, switches, and HVAC controls. Check special height requirements for accessibility in accordance with the Uniform Federal Accessibility Standards.
- Check boxes are not overcrowded with conductors.

Utility

- Check requirements for hot water heater, heat pump, washer and dryer. Check conductors and circuits.
- Check that at least one 20-amp branch circuit is provided to the laundry (NEC 220-4c and 210-52f).

Kitchen Circuits

- Check spacing of outlets.
- Check requirements for 20-amp small appliance circuits.

Appliances

- Check electric range conductor.
- Check garbage disposal and dishwasher wiring.
- Outlet location for garbage disposal shall permit disposal cord to be less than 36 inches (minimum length of cord is 18 inches).
- Outlet location for dishwasher shall permit dishwasher cord to be less than 4 feet (minimum length of cord is 3 feet).
- Check that outlet locations for appliances are accessible

Wiring

- Check type of insulation and jacket, conductor material, conductor size and stranding in each circuit.
- Sheathing to extend no less than ? inch into box.
- Check that wire is clamped to box if required.
- Protective cable plates required where wires are within 1-1/4 inch of edge of stud.
- Check that wire is stapled within 12 inches of cabinets, boxes, and fittings and secured at intervals not to exceed 4'-6".
- Check that wire installed in attics is protected within 6 feet of the attic entrance.

Grounding Electrode System

- Check requirements for size and type of grounding electrode conductor.
- Check for approved clamp to water service.
- Check for approved rod connection for contact with soil.
- Check size, length, and material of ground rods or electrodes against contract drawings and specifications.
- Check special requirements for grounding of equipment.
- Check grounding resistance.

Meter Main

- Check for approved materials.
- Check meter height.

Panelboard

- Check that circuits are labeled.
- Check that breakers are make and model per panel labeling.
- Check that unused openings are properly closed.
- Check for required clearances in front of panel.
- Check that maximum breaker height does not exceed 6 feet 6 inches.

Windows/Exterior Doors

- Check for approved products.
- Check that door hardware complies with specifications.
- Verify manufacturer's installation requirements. Fasteners, sealant, and shims as required.
- Check that exterior door jambs are rabbeted from a solid board to provide an integral stop.
- Check door clearance, top, sides, and bottom.
- Check operation of doors and windows.
- Check for approved garage door and hardware. Check operation of garage door and hardware.
- Check for accessible doors where required. Doors to comply with the Uniform Federal Accessibility Standards.
- Check fire-rating requirement of door from garage to unit.

Plumbing Rough-in

General Requirements

- Notches in exterior wall studs or bearing partition do not exceed 25 percent of its width.
- Notches in nonbearing partitions do not exceed 40 percent of its width.
- Borings are not greater than 60 percent of the width of the stud in nonbearing partitions or in any wall where each bored stud is doubled, and no more than two such successive doubled studs are so bored.
- The edge of bored holes is no closer than 5/8 inch to the edge of the stud and the hole is not located in the same section of stud as a cut or notch.
- Notches or holes in joists are not cut in the middle one-third of the joist span.
- Notches in the outer sections of the span are no greater than one-sixth the joist depth.

- Holes in the outer joist sections are limited in diameter to one-third the joist depth and are cut with the edge of the hole no closer than 2 inches to the top or bottom edges.
- Where plumbing, heating or other pipes are placed in or partly in a partition, necessitating the cutting of the soles or plates, a metal tie not less than 0.058 inches (16 galvanized gauge) and 1-1/2 Inches wide shall be fastened to each plate across and to each side of the opening with not less than six 16d nails.
- Check for fire sealing thru fire rated walls and partitions.
- Check supports for tub enclosure.
- Check piping and fixture supports.
- Test piping prior to follow-on work.

Water Supply and Distribution

- Check that piping materials comply with requirements.
- In multi-unit buildings, check that separate water shut off is provided for each unit. These valves shall be accessible in the unit that they control.
- Check that valves are oriented with stems in horizontal position or above. Check flow orientation of globe valves.
- Check for drain fitting at service entrance if required.
- Check required locations for water hammer arrestors and air chambers. Check for access to water hammer arrestors.
- Check for required air gaps and vacuum breakers.
- Check pipe joints.
- Check pipe sizes.

Sanitary Drainage

- Check that piping materials comply with requirements.
- Check for required cleanouts and traps.
- Check pipe joints.
- Check pipe and trap sizes.
- Check slopes.

Vents

- Check that piping materials comply with requirements.
- Check pipe sizes, joints, and slope.
- Check that vents rise vertically to a point not less than six (6) inches above the flood level rim of the fixture served before offsetting horizontally.
- Check that the plumbing fixture's maximum trap arm length will not be exceeded.
- Check minimum size of vent thru roof.
- Check height of vent above roof.
- Check location of vent thru roof in relation to windows and vertical surfaces.

Traps and Trap Arms

- Check pipe size, joints, slope, and trap size.
- Ensure that the vent opening is at or above the level of the weir of the trap it serves.
- Check that the plumbing fixture's maximum trap arm length will not be exceeded.

Ceiling and Wall Insulation

- Check that material has been submitted and approved.
- Check that other trades that might damage the insulation or vapor retarder are finished prior to installation of the insulation materials.
- Check for proper placement of vapor retarder. Lap and seal edges and ends of vapor retarder.
- Check loose fill insulation for required thickness.
- Where interior partitions abut exterior walls, check that insulation and vapor retarder is provided at intersection.

Hang Drywall on Wood Framing

Delivery and Storage

- Check that materials meet the specification and are in good condition.
- Gypsum wallboard should be stored flat, off the floor and supported to prevent sagging. Protect from moisture and damage.
- Framing members and wall assembly are to be protected from moisture.
- Check environmental pre-conditioning and installation requirements.

Ceiling Framing

- Check alignment of members.

- Check for required backing. All edges of gypsum wallboard are to be supported.
- Where truss uplift is a concern, check for backing/fasteners for floating corners at non-bearing interior walls and ceiling. Provide truss clips on bottom chord of truss where required to allow for movement.
- At ceiling joists where wiring passes through borings in wood members less than 1-1/4 Inches from the edge of the member, it shall be protected by a steel plate at least 1/16 inch thick. Holes are not allowed through truss members.

Wall Framing

- Where plumbing, heating or other pipes are placed in or partly in a partition, necessitating the cutting of the soles or plates, a metal tie not less than 0.058 inches (16 galvanized gauge) and 1-1/2 Inches wide shall be fastened to each plate across and to each side of the opening with not less than six 16d nails.
- Where wiring passes through borings in wood members less than 1-1/4 Inches from the edge of the member, it shall be protected by a steel plate at least 1/16 inch thick.
- Check alignment of framing. Check that walls are straight and true.
- Check stud spacing and required blocking.
- Check for twisted studs, protruding blocking, soil pipes, and other items that would create an uneven surface.
- Check that moisture content of wood members does not exceed 15% at time of gypsum wallboard application.
- Check for drywall stops or corner blocking for fastening at interior corners.

Ceiling Installation

- Check for vapor barrier if required.
- Where moisture resistant gypsum wallboard is required, omit vapor barrier.
- Verify that material being used complies with specifications and requirements of fire or sound rating.
- Check for high strength gypsum wallboard if required.
- Make sure proper perpendicular or parallel application of board is used, and the end joints are staggered.
- Check fasteners and spacing. Check adhesive if required.
- Check for proper application of floating interior corners.
- Where truss uplift is a concern, check for proper attachment of gypsum wallboard to bottom chord of truss. Allow for floating interior corners.

Wall Installation

- Check for vapor barrier if required.
- Where moisture resistant gypsum wallboard is required, omit vapor barrier.
- Apply approved mastic to all cut or exposed panel edges at utility holes, joints, and intersections of moisture resistant gypsum wallboard.
- Verify that material being used complies with specifications and requirements of fire or sound rating.
- Make sure proper perpendicular or parallel application of board is used, and the end joints are staggered.
- Check fasteners and spacing. Check adhesive if required.
- Check that fasteners are at least 3/8 inch from edges and ends.
- Ensure that fasteners are applied starting from the center of board and working to ends and edges.
- Check for proper application of floating interior corners.

Finish Drywall

- Check that materials meet the specification (taping and embedding compound, joint tape, finishing compound, drywall corner bead, control joints).
- Check that corner beads are one piece.
- Check that surfaces to receive joint compound are free of dirt, oil and other materials that would effect bond.
- Check that joint tape is placed over sufficient joint compound to ensure bond.
- Check that at least two coats of finishing compound are applied after tapping and embedding compound.

Install Heat Pump and HW Heater

- Check for approved equipment
- Check BTU ratings, capacity, recovery, etc.
- Check for required locations of dielectric connections.
- Check for condensate requirements for size, trap, and air gap.
- Check for required disconnect switch.

Paint Interior Walls

- Test reports of submitted paints comply with specifications.
- Check requirements for storage of paint.
- Check for protection of unpainted adjacent surfaces.
- Worker protection controls are in place.
- Check surfaces prior to painting. Need to be clean and free of foreign matter.
- Exposed ferrous metals are spot primed
- Check that new gypsum wallboard is primed.
- Ensure gypsum wallboard compound has cured as required.
- Check ambient temperature
- Check preparation of previously painted surface.
- Check that required number of coats and thickness is obtained.
- Ensure uniform coverage.

Install and Paint Interior Doors and Trim

- Check for approved products.
- Check storage of products. Protect from extremes of temperature and humidity.
- Wood door edges to be sealed prior to shipment.
- Check that exterior door jambs are rabbeted free from a solid board to provide an integral stop.
- Check for required wedge blocking between frame and rough opening. Installation to comply with manufacturer's instructions and specifications.
- Check door clearance, top, sides, and bottom.
- Check finishes are applied in accordance with the specifications.
- Check that internal parts of electrical equipment are free from paint, plaster, or other materials. (NEC 110-12c)

Cabinets and Trim

- Check storage of cabinets.
- If required, check for KCMA Certification Seal.
- Check construction details of cabinets.
- Check finish of cabinets.
- Check alignment for level and plumb installation.
- Anchors and fasteners installed at required intervals and locations.
- Check counter laminate thickness.
- Check counter substrate thickness and material.
- Countertops attached at required locations

Install Plumbing Fixtures, HVAC Devices, Electrical Fixtures and Devices

Plumbing Fixtures

- Check for approved fixtures.
- Check condition of fixtures.
- Installation in accordance with specifications and installation instructions.

Traps and Trap Arms

- Check pipe size, joints, slope, and trap size.

Electrical Devices and Fixtures

- Check receptacles for compliance with the specifications.
- Check alignment of receptacles.
- Check for GFCI where required.
- Check for approved fixtures.
- Test fixtures.

Diffusers, Registers, and Grills

- Check for approved materials.
- Check for proper operation of registers and diffusers.

HVAC Balancing and Testing

- Perform air balancing and sound tests of HVAC system.
- Perform test of heat pump system.

Smoke Detectors

- Check for approved devices.
- Test operation of devices.

Resilient Floor and Carpet

Concrete Floor

- Check that concrete is smooth and level.
- Check that defects are repaired.
- Check for leveling compound where needed.
- Perform dryness test if required.

Framed floor

- Check for approved underlayment.
- Check material, grade, and thickness.
- Check for approved fasteners and spacing.
- Check that underlayment joints are offset from parallel subflooring joints.
- Check surfaces, including joints and fastener locations, are smooth for finish flooring.

Resilient Flooring and Base

- Check storage area for required temperature and low humidity.
- Check that resilient flooring, edge strips, and adhesive is approved.
- Check thickness and width of flooring material.
- Ensure required temperature is maintained prior to and after installation of flooring materials.
- Ensure that newly installed flooring is cleaned in accordance with the specifications.
- Provide protection of flooring from damage.

Carpet and Base

- Check for approved materials.
- Ensure required temperature is maintained prior to and after installation of flooring materials.
- Check thickness of carpet and carpet cushion.
- Check installation in accordance with manufacturer's instructions and CRI 104.
- Check orientation of seams.
- Ensure that newly installed carpet is cleaned in accordance with the specifications.
- Provide protection of carpet from damage.

Siding and Soffit

- Check for approved siding and accessories.
- Check storage of siding.
- Installation of accessories, starter strip, corners, trim.
- Check siding thickness.
- Verify flashing.
- Approved fasteners.
- Check for approved sealant.
- Siding installed in accordance with approved erection instructions and drawings.

Gutters and Downspouts

- Check materials against specification requirements for type of material, thickness, finish, size.
- Check slope of gutters to provide drainage to outlets.
- Check brackets and spacers for size, type, location, and spacing.

Paving and Sidewalks

- Removal of unsatisfactory materials.
- Check excavation, dewatering.
- Erosion control.
- Use of satisfactory materials for backfill.
- Compliance with compaction requirements.
- Required testing of backfill.
- Condition of subgrade (compaction, moisture, finish).
- Compaction of Aggregate Base
  Forms.
- Check reinforcing steel required by plans and/or shop drawings.
- Check footing thickness and width.
- Check thickness of sidewalks, porches and patios.
- Concrete mix – strength.
- Clearance of steel from forms and subgrade, and support material.
- Location and construction of contraction and expansion joints.
- Concrete Placement – slump, vibration, and finish.
- Concrete finish.
- Concrete curing.
- Location and care of imbedded items.

Exterior Paint

- Test reports of submitted paints comply with specifications.
- Check requirements for storage of paint.

- Check surfaces prior to painting. Need to be clean and free of foreign matter.
- Exposed ferrous metals are spot primed.
- Check that required number of coats and thickness is obtained.
- Ensure uniform coverage.
- Wood surfaces are prepared and finished in accordance with the specifications.