Reference: DACW09-83-B-0016

Includes Amendments 1, 2, 3, 4

SPECIFICATIONS

for

NEW RIVER DAM

Phoenix, Arizona

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

Appropriation: 96x3122, Construction General

Corps of Engineers, Civil

Authority: FCA of 1965

P.L. 89-298

US Army Corps of Engineers
Los Angeles District

STANDARD FORM 20
JANUARY 1961 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401

INVITATION FOR BIDS
(CONSTRUCTION CONTRACT)

REFERENCE: DACW09-83-B-0016

DATE: 83 JUN 27

NAME AND LOCATION OF PROJECT: New River Dam, Phoenix, Arizona

DEPARTMENT OR AGENCY: DEPARTMENT OF THE ARMY

BY (Issuing office)

U. S. ARMY ENGINEER DISTRICT, LOS ANGELES

Sealed bids in single copy **for the work described herein will be received until 1 p.m. local time at the place of bid opening,** ~~27 July 1983~~ 2 Aug 83 Am #4

at Room 1030 (south Tower) 2721 North Central Avenue, Phoenix, Arizona 85004

and at that time publicly opened.

Information regarding bidding material, bid guarantee, and bonds

BID BONDS. Each bidder shall submit with his bid a Bid Bond (Standard Form 24) with good and sufficient surety or sureties acceptable to the Government, or other security as provided in paragraph 4 of Instructions to Bidders (Standard Form 22) in the form of 20% of the bid price or $3,000,000, whichever is lesser. The bid bond penalty may be expressed in terms of a percentage of the bid price or may be expressed in dollars and cents.

PERFORMANCE AND PAYMENT BONDS. Within 1 day after the prescribed forms are presented to the bidder to whom award is made for signature, a written contract on the form prescribed by the specifications shall be executed and two bonds, each with good and sufficient surety or sureties acceptable to the Government, furnished; namely a performance bond (Standard Form 25) and a payment bond (Standard Form 25-A). The penal sums of such bonds will be as follows.

(a) Performance Bond. The penal sum of the performance bond shall equal 100% of the contract price.

(b) Payment Bond.

(1) When the contract price is $1,000,000 or less, the penal sum will be 50% of the contract price.

(2) When the contract price is in excess of $1,000,000, but not more than $5,000,000 the penal sum shall be 40% of the contract price.

(3) When the contract price is more than $5,000,000, the penal sum shall be $2,500,000.

Any bonds furnished will be furnished by the Contractor to the Government prior to commencement of contract performance.

NOTE: For bids less than $25,000, bid bonds, performance and payment bonds will not be required.

Description of work

Work consists of construction of dam and dike embankments, spillway, and outlet works; and related construction.

ESTIMATED COST OF CONSTRUCTION IS OVER $10,000,000

☆ U.S. GOVERNMENT PRINTING OFFICE: 1960—O-573738

READ THE FOLLOWING IN CONJUNCTION WITH INSTRUCTIONS TO BIDDERS (U.S. STANDARD FORM 22).

1. PLANT AND EQUIPMENT. Each bidder shall, upon request of the Contracting Officer, furnish a list of the plant available to the bidder and proposed for use on the work. 10/1/65

2. 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 the Invitation for Bids. 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 District Engineer will enable bidders to revise their bids. In such cases, the amendment will include an announcement of the new date for opening bids. 3/22/65

3. BIDDERS are required to acknowledge receipt of all amendments to this Invitation on the Bid Form (Standard Form 21) in the space provided, or by separate letter or telegram prior to opening of Bids. Failure to acknowledge all amendments may cause the rejection of the bid. 1/13/65

4. NOTICE REGARDING BUY AMERICAN ACT (1970 SEP). The Buy American Act (41 U.S.C. 10a-10d) generally requires that only domestic construction material be used in the performance of this contract. Exception from the Buy American Act shall be permitted only in the case of nonavailability of domestic construction materials. A bid or proposal offering nondomestic construction material will not be accepted unless specifically approved by the Government. When a bidder or offeror proposes to furnish nondomestic construction material, his bid or proposal must set forth an itemization of the quantity, unit price, and intended use of each item of such nondomestic construction material. When offering nondomestic construction material pursuant to this paragraph, bids or proposals may also offer, at stated prices, any available comparable domestic construction material, so as to avoid the possibility that failure of a nondomestic construction material to be acceptable under this paragraph will cause rejection of the entire bid. 12/1/70

5. AVAILABILITY OF SPECIFICATIONS, STANDARDS AND DESCRIPTIONS (1977 JUN) Specifications, standards and descriptions cited in this solicitation are available as indicated below:

5.1 Unclassified Federal, Military and Other Specifications and Standards (Excluding Commercial), and Data Item Descriptions. Submit request on DD Form 1425 (Specifications and Standards Requisition) to:

Commanding Officer
U.S. Naval Publications and Forms Center
5801 Tabor Avenue – Philadelphia, Pa. 19120

The Acquisition Management Systems and Data Requirements Control List, DoD Directive 5000.19-L, Volume II, may be ordered on the DD Form 1425. The Department of Defense Index of Specifications and Standards (DODISS) may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C., 20402 When requesting a specification or standard, the request shall indicate the title, number, date and any applicable amendment thereto by number and date. When requesting a data item description, the request shall cite the applicable data item number set forth in the solicitation. When DD Form 1425 is not available, the request may be submitted in letter form, giving the same information as listed above, and the solicitation or contract number involved. Such requests may also be made to the activity by Telex No. 834295, Western Union No. 710-670-1685, or telephone (area code 215-697-3321) in case of urgency. 8/25/77

5.2 Commercial Specifications, Standards and Descriptions. These specifications, standards and descriptions are not available from Government sources. They may be obtained from the publishers.

6. AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS, STANDARDS, DRAWINGS, AND OTHER PERTINENT DOCUMENTS. The specifications, standards, drawings, and other pertinent documents cited in this solicitation may be examined at the following location:

U.S. Army Engineer District, Los Angeles
300 No. Los Angeles Street
Los Angeles, California 90053

7. In addition to the immediate site of construction, the Department of Labor has stated that the Davis-Bacon Act applies to Contractor's operations connected with temporary facilities located off the immediate site of construction such as batch plants, sand pits, rock quarries and similar operations which have been set up exclusively to furnish materials for the contract. Therefore, employees related to these temporary facilities are considered on-site employees, and the Contractor shall maintain complete records as set out in the Labor Standards Provisions of the contract. 4/15/71

8. The Government further reserves the right to make award of any or all schedules of any bid, unless the bidder qualifies such bid by specific limitation; also to make award to the bidder whose aggregate bid on any combination of bid schedules is low. For the purpose of this Invitation for Bids, the word "item" as used in paragraph 10(c) of Standard Form 22, shall be considered to mean "schedule."

Read the following in conjunction with instructions to bidders (U.S. Standard Form 22.)

9. SPECIFICATIONS AND DRAWINGS. Specifications with half-size drawings will be provided upon receipt of payment of $13.00 per set (additional sets of specifications after the first set will cost $1.00). Full-size drawings will be furnished upon receipt of payment of $55.00. If individual plan sheets are requested, they will be furnished at the rate of $0.70 for full size, for each sheet requested, but with a minimum charge of $1.00. The maximum charge shall not exceed the charge for a full set of plans. No refund of the payment for drawings will be made and the drawings will be made. Payments will be made by cash, check or money order and delivered to the U.S. Army Engineer District, Los Angeles, 300 North Los Angeles Street, Los Angeles, California. Checks and money should be made payable to "FAO, U.S. Army, Los Angeles District".

Am 1

10. HAND CARRIED BIDS. Hand carried bids shall be deposited in Room ~~6202, 300 North Los Angeles Street, Los Angeles, California~~ 1030, prior to the time and date set for opening of bids or bids may be delivered to Room 6423 immediately prior to bid opening time.

11. TELEGRAPHIC MODIFICATIONS TO BIDS should be addressed to:

U.S. Army Engineer District, Los Angeles
Phoenix Resident Office
2721 North Central Avenue
Phoenix, Arizona 85004

Am 1

12. NOTE THE AFFIRMATIVE ACTION REQUIREMENT OF THE EQUAL OPPORTUNITY CLAUSE WHICH MAY APPLY TO THE CONTRACT RESULTING FROM THIS SOLICITATION.

13. NOTE THE CERTIFICATION OF NONSEGREGATED FACILITIES IN THIS SOLICITATION. Bidders or offerors and applicants are cautioned to note the "Certification of Non-Segregated Facilities" in the solicitation. Failure of a bidder or offeror to agree to the certification will render his bid or offer nonresponsive to the terms of solicitation involving awards of contracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause. (1975 OCT)

14. ADDITIONAL INFORMATION pertaining to these plans and specifications may be obtained by writing or calling (collect calls not accepted) U.S. Army Engineer District, Los Angeles, Attn: Mr. George E. Davis, P.O. Box 2711, Los Angeles, California 90053. Telephone 213 688-5493.

15. ARITHMETIC DISCREPANCIES.

15.1 For the purpose of initial evaluation of bids, the following will be utilized in resolving arithmetic discrepancies found on the face of the bidding schedule as submitted by bidders:

15.1.1 Obviously misplaced decimal points will be corrected;

15.1.2 In case of discrepancy between unit price and extended price, the unit price will govern;

15.1.3 Apparent errors in extension of unit prices will be corrected; and

15.1.4 Apparent errors in addition of lump-sum and extended prices will be corrected.

15.2 For the purposes of bid evaluation, the Government will proceed on the assumption that the bidder intends his bid to be evaluated on the basis of the unit prices, extensions, and totals arrived at by resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the abstract of bids.

16. SITE INSPECTION. Conducted tours of the site will be made on 13 and 20 July 1983. Those wishing to attend the tour should notify Terry Buckley by telephone at (602) 582-8400 at least two days prior to the dates scheduled.

17. MINIMUM ACCEPTANCE PERIOD (1975 MAR). Bids allowing less than the number of calendar days specified in the "Bid" portion of SF 19 (or on the reverse of SF 21 as applicable) for acceptance by the Government will be rejected as nonresponsive.

18. SMALL DISADVANTAGED BUSINESS CONCERNS SUBCONTRACTING. In order to assist prime contractors in developing a source list of Small Disadvantaged Business Concerns, you are encourage to contact minority Contractor associations, the Office of Minority Business Enterprise, the appropriate Business Development Cente, and the Small Business Administration, addresses of which may be obtained from:

Write: U. S. Army Engineer District, Los Angeles
ATTN: SPLSD
300 North Los Angeles Street, P.O. Box 2711
Los Angeles, CA 90053

Telephone: Jeanine Lattin
Small Business and Economic Utilization Advisor
Area Code (213) 688-5676

19. DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER REPORTING (1980 DEC). In the block with its name and address, the offeror should supply the Data Universal Numbering System (DUNS) Number applicable to that name and address. The Duns Number should be proceeded by "DUNS:". If the offeror does not have a DUNS nUmber, it may obtain one from any Dun and Bradstreet branch office. No offeror should delay the submission of its offer pending receipt of its DUNS Number.

20. NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (1982 FEB)

20.1 The Offeror's or Bidder's attention is called to the "Equal Opportunity" and the "Affirmative Action Compliance Requirements for Construction" clauses set forth herein.

20.2 The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force 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 in each trade
25.0 to 30.0%	6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or Federally assisted) performed in the covered area. If the Contractor performs construction work (whether or not it is Federal or Federally assisted) in a geographical area located outside the covered area, it shall apply the goals established for the geographical area where such work is actually performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs (OFCCP) office. The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity clause, specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction" and its efforts to meet prescribed goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and each trade, and 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, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

20.3 The Contractor shall provide written notification to the Director, OFCCP within 10 working days of 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 name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

20.4 As used in this Notice, and in the contract resulting from this Solicitation, of the "covered area" is: Phoenix, Arizona.

21. EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE. Whenever a contract or modification of contract price is negotiated, the Contractor's cost proposals for equipment ownership and operating expenses shall be determined in accordance with the requirements of paragraph, EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE of the SPECIAL PROVISIONS. A copy of EP 1110-1-8 "Construction Equipment Ownership and Operating Expense Schedule" is available for review at Room 6650, 300 North Los Angeles Street, Los Angeles, California.

* * * * *

22. OPTION TO BID. The TOTAL ESTIMATED AMOUNT to be submitted in the Bidding Schedule should reflect the inclusion of costs for one option only (Item No. 36a.; 36b. and 36c.; or 36d., as shown in the Bidding Schedule). If the TOTAL ESTIMATED AMOUNT includes more than one option, the Government will evaluate the bids using only the lowest estimated amount for the option giving the lowest price. Am #4

INSTRUCTIONS TO BIDDERS

(CONSTRUCTION CONTRACT)

1. Explanations to Bidders.—Any explanation desired by a bidder regarding the meaning or interpretation of the invitation for bids, drawings, specifications, etc., must be requested in writing and with sufficient time allowed for a reply to reach bidders before the submission of their bids. Any interpretation made will be in the form of an amendment of the invitation for bids, drawings, specifications, etc., and will be furnished to all prospective bidders. Its receipt by the bidder must be acknowledged in the space provided on the Bid Form (Standard Form 21) or by letter or telegram received before the time set for opening of bids. Oral explanations or instructions given before the award of the contract will not be binding.

2. Conditions Affecting the Work.—Bidders should visit the site and take such other steps as may be reasonably necessary to ascertain the nature and location of the work, and the general and local conditions which can affect the work or the cost thereof. Failure to do so will not relieve bidders from responsibility for estimating properly the difficulty or cost of successfully performing the work. The Government will assume no responsibility for any understanding or representations concerning conditions made by any of its officers or agents prior to the execution of the contract, unless included in the invitation for bids, the specifications, or related documents.

3. Bidder's Qualifications.—Before a bid is considered for award, the bidder may be requested by the Government to submit a statement regarding his previous experience in performing comparable work, his business and technical organization, financial resources, and plant available to be used in performing the work.

4. Bid Guarantee.—Where a bid guarantee is required by the invitation for bids, failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

A bid guarantee shall be in the form of a firm commitment, such as a bid bond, postal money order, certified check, cashier's check, irrevocable letter of credit or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Bid guarantees, other than bid bonds, will be returned (*a*) to unsuccessful bidders as soon as practicable after the opening of bids, and (*b*) to the successful bidder upon execution of such further contractual documents and bonds (including any necessary coinsurance or reinsurance agreements) as may be required by the bid as accepted.

If the successful bidder, upon acceptance of his bid by the Government within the period specified therein for acceptance (sixty days if no period is specified) fails to execute such further contractual documents, if any, and give such bond(s) (including any necessary coinsurance or reinsurance agreements) as may be required by the terms of the bid as accepted within the time specified (ten days if no period is specified) after receipt of the forms by him, his contract may be terminated for default. In such event he shall be liable for any cost of procuring the work which exceeds the amount of his bid, and the bid guarantee shall be available toward offsetting such difference.

5. Preparation of Bids.—(*a*) Bids shall be submitted on the forms furnished, or copies thereof, and must be manually signed. If erasures or other changes appear on the forms, each erasure or change must be initialed by the person signing the bid. Unless specifically authorized in the invitation for bids, telegraphic bids will not be considered.

(*b*) The bid form may provide for submission of a price or prices for one or more items, which may be lump sum bids, alternate prices, scheduled items resulting in a bid on a unit of construction or a combination thereof, etc. Where the bid form explicitly requires that the bidder bid on all items, failure to do so will disqualify the bid. When submission of a price on all items is not required, bidders should insert the words "no bid" in the space provided for any item on which no price is submitted.

(*c*) Unless called for, alternate bids will not be considered.

(*d*) Modification of bids already submitted will be considered if received at the office designated in the invitation for bids by the time set for opening of bids. Telegraphic modifications will be considered, but should not reveal the amount of the original or revised bid.

6. Submission of Bids.—Bids must be sealed, marked, and addressed as directed in the invitation for bids. Failure to do so may result in a premature opening of, or a failure to open, such bid.

~~**7. Withdrawal of Bids.**—Bids may be withdrawn by written or telegraphic request received from bidders prior to the time set for opening of bids. (See par. 8 regarding late withdrawals.)~~

STANDARD FORM 22 (Rev. 2–78)
Prescribed by GSA, FPR (41 CFR) 1–16.401

8. Late Bids, Modifications of Bids, or Withdrawal of Bids.—(*a*) Any bid received at the office designated in the soliciation after the exact time specified for receipt will not be considered unless it is received before award is made and either

(1) It was sent by registered or certified mail not later than the fifth calendar day prior to the date specified for the receipt of bids (e.g., a bid submitted in response to a solicitation requiring receipt of bids by the 20th of the month must have been mailed by the 15th or earlier); or

(2) It was sent by mail (or telegram if authorized) and it is determined by the Government that the late receipt was due solely to mishandling by the Government after receipt at the Government installation.

(*b*) Any modification or withdrawal of a bid is subject to the same conditions as in (a), above. A bid may also be withdrawn in person by a bidder or his authorized representative, provided his identify is made known and he signs a receipt for the bid, but only if the withdrawal is made prior to the exact time set for receipt of bids.

(*c*) The only acceptable evidence to establish:

(1) The date of mailing of a late bid, modification, or withdrawal sent either by registered or certified mail is the U.S. Postal Service postmark on both the envelope or wrapper and on the original receipt from the U.S. Postal Service. If neither postmark shows a legible date, the bid, modification, or withdrawal shall be deemed to have been mailed late. (The term "postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed on the date of mailing by employees of the U.S. Postal Service. Therefore, offerors should request the postal clerk to place a hand cancellation bull's-eye "postmark" on both the receipt and the envelope or wrapper.)

(2) The time of receipt at the Government installation is the time-date stamp of such installation on the bid wrapper or other documentary evidence of receipt maintained by the installation.

(*d*) Notwithstanding (a) and (b) of this provision, a late modification of an otherwise successful bid which makes its terms more favorable to the Government will be considered at any time it is received and may be accepted.

NOTE: The term "telegram" includes mailgrams.

9. Public Opening of Bids.—Bids will be publicly opened at the time set for opening in the invitation for bids. Their content will be made public for the information of bidders and others interested, who may be present either in person or by representative.

10. Award of Contract.—(*a*) Award of contract will be made to that responsible bidder whose bid, conforming to the invitation for bids is most advantageous to the Government, price and other factors considered.

(*b*) The Government may, when in its interest, reject any or all bids or waive any informality in bids received.

(*c*) The Government may accept any item or combination of items of a bid, unless precluded by the invitation for bids or the bidder includes in his bid a restrictive limitation.

11. Contract and Bonds.—The bidder whose bid is accepted will, within the time established in the bid, enter into a written contract with the Government and, if required, furnish performance and payment bonds on Government standard forms in the amounts indicated in the invitation for bids or the specifications.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978-261-647/3634

Paragraph 12 below replaces paragraphs 7 and 8 of Standard Form 22 which have been deleted.

12. LATE BIDS, MODIFICATIONS OF BIDS OR WITHDRAWAL OF BIDS (1979 MAR)

(a) Any bid received at the office designated in the solicitation after the exact time specified for receipt will not be considered unless it is received before award is made and either:

(i) it was sent by registered or certified mail not later than the fifth calendar day prior to the date specified for the receipt of bids (e.g., a bid submitted in response to a solicitation requiring receipt of bids by the 20th of the month must have been mailed by the 15th or earlier); or,

(ii) it was sent by mail (or telegram if authorized) and it is determined by the Government that the late receipt was due solely to mishandling by the Government after receipt at the Government installation.

(b) Any modification or withdrawal of bid is subject to the same conditions as in (a) above except that withdrawal of bids by telegram is authorized. A bid may also be withdrawn in person by a bidder or his authorized representative, provided his identity is made known and he signs a receipt for the bid, but only if the withdrawal is made prior to the exact time set for receipt of bids.

(c) The only acceptable evidence to establish:

(i) the date of mailing of a late bid, modification or withdrawal sent either by registered or certified mail is the U.S. or Canadian Postal Service postmark on the wrapper or on the original receipt from the U.S. or Canadian Postal Service. If neither postmark shows a legible date, the bid, modification or withdrawal shall be deemed to have been mailed late. (The term "postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed on the date of mailing by employees of the U.S. or Canadian Postal Service. Therefore, offerors should request the postal clerk to place a hand cancellation bull's eye "postmark" on both the receipt and the envelope or wrapper.)

(ii) the time of receipt at the Government installation is the time/date stamp of such installation on the bid wrapper or other documentary evidence of receipt maintained by the installation.

(d) Notwithstanding the above, a late modification of an otherwise successful bid which makes its terms more favorable to the Government will be considered at any time it is received and may be accepted.

NOTE: The term "telegram" includes mailgrams.

(Oct 79)

STANDARD FORM 21
DECEMBER 1965 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401

BID FORM
(CONSTRUCTION CONTRACT)

REFERENCE

DACW09-83-B-0016

Read the Instructions to Bidders (Standard Form 22)
This form to be submitted in single copy

DATE OF INVITATION
83 JUN 27

NAME AND LOCATION OF PROJECT

New River Dam, Phoenix, Arizona

NAME OF BIDDER *(Type or print)*

(Date)

TO: U. S. ARMY ENGINEER DISTRICT, LOS ANGELES
P. O. Box 2711
Los Angeles, California 90053

In compliance with the above-dated invitation for bids, the undersigned hereby proposes to perform all work for dam construction

in strict accordance with the General Provisions, specifications, schedules, drawings, and conditions, for the amount set forth in the attached Bidding Schedule.

21-108

(Continue on other side)

EQUAL EMPLOYMENT COMPLIANCE (1978 SEP) By submission of this offer, the offeror represents that, to the best of his knowledge and belief, except as noted below, up to the date of this offer no written notice such as a show cause letter, a letter indicating probable cause, or any other written notification citing specific deficiencies, has been received by the offeror from any Federal Government agency or representative thereof that the offeror or any of its divisions or affiliates or known first-tier subcontractors is in violation of any of the provisions of Executive Order 11246 of September 24, 1965, as amended, or rules and regulations of the Secretary of Labor (41 CFR, Chapter 60) and specifically as to not having an acceptable affirmative action compliance program or being in noncompliance with any other aspect of the Equal Employment Opportunity Program. It is further agreed that should there be any change (i) in the offeror's status or circumstances between this date and the date of expiration of this offer or any extension thereof, or (ii) during any contract or extension thereof resulting from this solicitation, the Contracting Office will be notified promptly.

The undersigned agrees that, upon written acceptance of this bid, mailed or otherwise furnished within 30 calendar days [redacted] after the date of opening of bids, he will within one calendar day (unless a longer period is allowed) after receipt of the prescribed forms, execute Standard Form 23, Construction Contract, and give performance and payment bonds on Government standard forms with good and sufficient surety. (See paragraph No. 17 of *the Invitation for Bids*).

The undersigned agrees, if awarded the contract, to commence and to complete the work in accordance with the stipulations of Paragraph 1. of the SPECIAL PROVISIONS.

RECEIPT OF AMENDMENTS *The undersigned acknowledges receipt of the following amendments of the invitation for bids, drawings, and/or specifications, etc. (Give number and date of each):*

The representations and certifications on the accompanying STANDARD FORM 19-B are made a part of this bid.

ENCLOSED IS BID GUARANTEE, CONSISTING OF	IN THE AMOUNT OF
NAME OF BIDDER (*Type or print*)	FULL NAME OF ALL PARTNERS (*Type or print*)
BUSINESS ADDRESS (*Type or print*) (*Include "ZIP Code"*) Telephone No.	
BY (*Signature in ink. Type or print name under signature*)	
TITLE (*Type or print*)	

DIRECTIONS FOR SUBMITTING BIDS: *Envelopes containing bids, guarantee, etc., must be sealed, marked, and addressed as follows:*

Envelopes shall be marked in the upper left hand corner
Bid Under Reference No.

DACW09-83-B-0016

Envelopes shall be addressed:
U.S. ARMY ENGINEER DISTRICT
LOS ANGELES (Phoenix Resident Office)
2721 North Central Avenue
Phoenix, Arizona 85004

CAUTION—Bids should not be qualified by exceptions to the bidding conditions.

U.S. GOVERNMENT PRINTING OFFICE 1986 O—205-187—(15-71)

BIDDING SCHEDULE

Item No.	Description	Estimated Quantity	Unit	Unit Price	Estimated Amount
1.	MOBILIZATION AND PREPARATORY WORK	1	Job	L.S.	_____
2.	DIVERSION AND CONTROL OF WATER	1	Job	L.S.	_____
3.	CLEARING AND GRUBBING	1	Job	L.S.	_____
4.	STRIPPING, DIKES 1 & 2	85,000	Cu. yd.	_____	_____
5.	EXCAVATION, DIKE, NO. 1 (EXPLORATION TRENCH)	33,000	Cu. Yd.	_____	_____
6.	SCALING				
	(a) FIRST 1000 Cu. Yd.	1,000	Cu. Yd.	_____	_____
	(b) OVER 1000 Cu. Yd.	500	Cu. Yd.	_____	_____
7.	EXCAVATION.				
	DAM EAST ABUTMENT	11,700	Cu. Yd.	_____	_____
	DAM WEST ABUTMENT	2,000	Cu. Yd.	_____	_____
8.	EXCAVATION, FOUNDATION (DAM)	325,000	Cu. Yd.	_____	_____
9.	EXCAVATION, CORE-TRENCH (DAM)	60,000	Cu. Yd.	_____	_____
10.	FOUNDATION PREPARATION				
	(a) FIRST 1,500 Man Hr.	1,500	Man Hr.	_____	_____
	(b) OVER 1,500 Man Hr.	1,500	Man Hr.	_____	_____
11.	EXCAVATION, OUTLET WORKS	29,000	Cu. Yd.	_____	_____
12.	EXCAVATION, SPILLWAY	96,000	Cu. Yd.	_____	_____
13.	EXCAVATION, ACCESS ROAD	5,500	Cu. Yd.	_____	_____
14.	EXCAVATION, TOE	25,000	Cu. Yd.	_____	_____
15.	FILL, OUTLET WORKS	15,000	Cu. Yd.	_____	_____
16.	FILL, ACCESS ROAD	71,000	Cu. Yd.	_____	_____
17.	FILL, CORE	524,000	Cu. Yd.	_____	_____
18.	FILL, TRANSITION	410,000	Cu. Yd.	_____	_____
19.	FILL, PERVIOUS SHELL	1,640,000	Cu. Yd.	_____	_____

Item No.	Description	Estimated Quantity	Unit	Unit Price	Estimated Amount
20.	FILL, TOE	21,000	Cu. Yd.	_____	_____
21.	FILL, MISCELLANEOUS	245,000	Cu. Yd.	_____	_____
22.	ADDITIONAL ROLLING	500	Hours	_____	_____
23.	GRAVEL DRAIN	9,000	Cu. Yd.	_____	_____
24.	STONE, TYPE I	35,000	Ton	_____	_____
25.	STONE, TYPE II	40,000	Ton	_____	_____
26.	STONE, TYPE III	50,000	Ton	_____	_____
27.	GROUTING, STONEWORK	1,600	Cu. Yd.	_____	_____
28.	CONCRETE, CONDUIT	1,400	Cu. Yd.	_____	_____
29.	CONCRETE, OUTLET CHANNEL SILL	13	Cu. Yd.	_____	_____
30.	CONCRETE, SPILLWAY SILL	36	Cu. Yd.	_____	_____
31.	INTAKE STRUCTURE	1	Job	L.S.	_____
32.	ENERGY DISSIPATOR	1	Job	L.S.	_____
33.	CONCRETE PLUG (LEAN MIX)				
	(a) FIRST 300 Cu. Yd.	300	Cu. Yd.	_____	_____
	(b) OVER 300 Cu. Yd.	100	Cu. Yd.	_____	_____
34.	CONCRETE, DENTAL				
	(a) FIRST 1000 Cu. Yd.	1,000	Cu. Yd.	_____	_____
	(b) OVER 1000 Cu. Yd.	750	Cu. Yd.	_____	_____
35.	GROUT, SLURRY				
	(a) FIRST 500 Cu. Ft.	500	Cu. Ft.	_____	_____
	(b) OVER 500 Cu. Ft.	500	Cu. Ft.	_____	_____
		OPTION NO. 1			
36a.	PORTLAND CEMENT	8,400	Cwt.	_____	_____
		OPTION NO. 2			
36b.	PORTLAND CEMENT	7,100	Cwt.	_____	_____
36c.	POZZOLAN, TYPE N OR F	1,300	Cwt.	_____	_____
		OPTION NO. 3			
36d.	PORTLAND-POZZOLAN CEMENT	8,400	Cwt.	_____	_____

Item No.	Description	Estimated Quantity	Unit	Unit Price	Estimated Amount
37.	STEEL REINFORCEMENT	240	Ton	_____	_____
38.	WATERSTOP	400	Lin. Ft.	_____	_____
39.	FOUNDATION DRILLING AND GROUTING				
	(a) MOBILIZATION AND DEMOBILIZATION	1	Job	L.S.	_____
	(b) DRILLING EXPLORATORY GROUT HOLES	350	Lin. Ft.	_____	_____
	(c) DRILLING GROUT HOLES	9,100	Lin. Ft.	_____	_____
	(d) PIPE FOR GROUT HOLES	500	Lin. Ft.	_____	_____
	(e) DRILL SET-UPS				
	(1) GROUT HOLES	370	Each	_____	_____
	(2) EXPLORATORY GROUT HOLES	4	Each	_____	_____
	(f) PRESSURE TESTING	175	Hour	_____	_____
	(g) GROUT PUMP CONNECTIONS	375	Each	_____	_____
	(h) PLACING GROUT	2,500	Sack	_____	_____
40.	PIPE GATE, OUTLET WORKS	1	Each	_____	_____
41.	DRIVE GATE	1	Each	_____	_____
42.	DOUBLE DRIVE GATE	2	Each	_____	_____
43.	REINFORCED CONCRETE CULVERT, DIKE NO. 1	1	Job	L.S.	_____
44.	CORRUGATED METAL PIPE, 24 INCH	60	LIN. Ft.	_____	_____
45.	CORRUGATED METAL PIPE, 36 INCH	60	Lin. Ft.	_____	_____
46.	CORRUGATED METAL PIPE, 48 INCH	660	Lin. Ft.	_____	_____
47.	METAL END SECTIONS FOR 36" CMP	2	Each	_____	_____
48.	METAL END SECTIONS FOR 24" CMP	2	Each	_____	_____
49.	AGGREGATE BASE, ROAD	2,400	Cu. Yd.	_____	_____
50.	ASPHALT CONCRETE PAVEMENT	2,800	Ton	_____	_____

Item No.	Description	Estimated Quantity	Unit	Unit Price	Estimated Amount
51.	5' CHAIN LINK FENCE	16,000	Lin. Ft.	_____	_____
52.	GUTTER	4,800	Lin. Ft.	_____	_____
53.	GUARDRAIL	450	Lin. Ft.	_____	_____
54.	LOG BARRIER	38	Lin. Ft.	_____	_____
55.	PROJECT SIGN	1	Job	L.S.	_____
56.	HYDROLOGIC FACILITIES	1	Job	L.S.	_____
57.	STAFF GAGES AND MONUMENT	1	Job	L.S.	_____
58.	GAGING STATION BRIDGE	1	Job	L.S.	_____
59.	TOPSOILING	23,000	Cu. Yd.	_____	_____
60.	LANDSCAPE STONE	11,300	Cu. Yd.	_____	_____
61.	DESERT GRAVEL	4,100	Cu. Yd.	_____	_____
62.	DESERT VARNISH FINISH	4,500	Gal.	_____	_____
63.	CONCRETE STAIN	330	Gal.	_____	_____
64.	SEEDING	50	Acre	_____	_____
65.	PLANTING	1	Job	L.S.	_____

TOTAL ESTIMATED AMOUNT $ _____

NOTE: All extensions of the unit prices shown will be subject to verification by the Government. In case of variation between the unit price and the extension, the unit price will be considered to be the bid.

If a bid or modification to a bid based on unit prices is submitted which provides for a lump sum adjustment to the total estimated cost, the application of the lump sum adjustment to each unit price in the bidding schedule must be stated. If it is not stated, the bidder agrees that the lump sum adjustment shall be applied on a pro rata basis to every unit price in the bidding schedule.

Amounts and prices shall be indicated in either figures or words, not both.

Bids shall be submitted on all items of one or more schedules.

REPRESENTATIONS AND CERTIFICATIONS

(Construction and Architect-Engineer Contract)

(For use with Standard Forms 19, 21 and 252)

REFERENCE *(Enter same No.(s) as on SF 19, 21 and 252)*

NAME AND ADDRESS OF BIDDER *(No., Street, City, State, and ZIP Code)*

DATE OF BID

In negotiated procurements, "bid" and "bidder" shall be construed to mean "offer" and "offeror."

The bidder makes the following representations and certifications as a part of the bid identified above. *(Check appropriate boxes.)*

1. SMALL BUSINESS

He ☐ is, ☐ is not, a small business concern. (A small business concern for the purpose of Government procurement is a concern, including its affiliates, which is independently owned and operated, is not dominant in the field of operations in which it is bidding on Government contracts, and can further qualify under the criteria concerning number of employees, average annual receipts, or other criteria as prescribed by the Small Business Administration. For additional information see governing regulations of the Small Business Administration (13 CFR Part 121)).

2. MINORITY BUSINESS ENTERPRISE

He ☐ is, ☐ is not a minority business enterprise. A minority business enterprise is defined as a "business, at least 50 percent of which is owned by minority group members or, in case of publicly owned businesses, at least 51 percent of the stock of which is owned by minority group members." For the purpose of this definition, minority group members are Negroes, Spanish-speaking American persons, American-Orientals, American-Indians, American-Eskimos, and American-Aleuts."

3. CONTINGENT FEE

(a) He ☐ has, ☐ has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the bidder) to solicit or secure this contract, and *(b)* he ☐ has, ☐ has not, paid or agreed to pay any company or person (other than a full-time bona fide employee working solely for the bidder) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract; and agrees to furnish information relating to *(a)* and *(b)* above as requested by the Contracting Officer. *(For interpretation of the representation, including the term "bona fide employee," see Code of Federal Regulations, Title 41, Subpart 1-1.5.)*

4. TYPE OF ORGANIZATION

He operates as an ☐ individual, ☐ partnership, ☐ joint venture, ☐ corporation, incorporated in State of

5. INDEPENDENT PRICE DETERMINATION

(a) By submission of this bid, each bidder certifies, and in the case of a joint bid each party thereto certifies as to his own organization, that in connection with this procurement:

(1) The prices in this bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor,

(2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, in the case of a bid, or prior to award, in the case of a proposal, directly or indirectly to any other bidder or to any competitor; and

(3) No attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition.

(b) Each person signing this bid certifies that:

(1) He is the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein and that he has not participated, and will not participate, in any action contrary to *(a)*(1) through *(a)*(3) above; or

(2) (i) He is not the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein but that he has been authorized in writing to act as agent for the persons responsible for such decision in certifying that such persons have not participated, and will not participate, in any action contrary to *(a)*(1) through *(a)* (3) above, and as their agent does hereby so certify; and (ii) he has not participated, and will not participate, in any action contrary to *(a)*(1) through *(a)*(3) above.

(c) This certification is not applicable to a foreign bidder submitting a bid for a contract which requires performance or delivery outside the United States, its possessions, and Puerto Rico.

(d) A bid will not be considered for award where *(a)*(1), *(a)*(3), or *(b)* above, has been deleted or modified. Where *(a)*(2) above, has been deleted or modified, the bid will not be considered for award unless the bidder furnishes with the bid a signed statement which sets forth in detail the circumstances of the disclosure and the head of the agency, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

NOTE.—Bids must set forth full, accurate, and complete information as required by this invitation for bids (including attachments). The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

STANDARD FORM 19-B, JUNE 1976 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401 AND 1-16.701

THE FOLLOWING NEED BE CHECKED ONLY IF BID EXCEEDS $10,000 IN AMOUNT.

6. EQUAL OPPORTUNITY

He ☐ has, ☐ has not, participated in a previous contract or subcontract subject to the Equal Opportunity Clause herein, the clause originally contained in Section 301 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114; he ☐ has, ☐ has not, filed all required compliance reports; and representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards.

(The above representations need not be submitted in connection with contracts or subcontracts which are exempt from the equal opportunity clause.)

7. PARENT COMPANY AND EMPLOYER IDENTIFICATION NUMBER

Each bidder shall furnish the following information by filling in the appropriate blocks:

(a) Is the bidder owned or controlled by a parent company as described below? ☐ Yes ☐ No. *(For the purpose of this bid, a parent company is defined as one which either owns or controls the activities and basic business policies of the bidder. To own another company means the parent company must own at least a majority (more than 50 percent) of the voting rights in that company. To control another company, such ownership is not required; if another company is able to formulate, determine, or veto basic business policy decisions of the bidder, such other company is considered the parent company of the bidder. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, contractual arrangements, or otherwise.)*

(b) If the answer to *(a)* above is "Yes," bidder shall insert in the space below the name and main office address of the parent company.

NAME OF PARENT COMPANY	MAIN OFFICE ADDRESS *(No., Street, City, State, and ZIP Code)*

(c) Bidder shall insert in the applicable space below, if he has no parent company, his own Employer's Identification Number (E.I. No.) *(Federal Social Security Number used on Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941)*, or, if he has a parent company, the E.I. No. of his parent company.

EMPLOYER IDENTIFICATION NUMBER OF ➤	PARENT COMPANY	BIDDER

8. CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to (1) contracts, (2) subcontracts, and (3) agreements with applicants who are themselves performing federally assisted construction contracts, exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause.)

By the submission of this bid, the bidder, offeror, applicant, or subcontractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certificatons from proposed subcontractors prior to the award of subcontractors exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

9. CLEAN AIR AND WATER

(Applicable if the bid or offer exceeds $100,000, or the contracting officer has determined that orders under an indefinite quantity contract in any year will exceed $100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1857c-8(c)(1)) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or is not otherwise exempt.)

The bidder or offeror certifies as follows:

(a) Any facility to be utilized in the performance of this proposed contract has ☐, has not ☐, been listed on the Environmental Protection Agency List of Violating Facilities.

(b) He will promptly notify the contracting officer, prior to award, of the receipt of any communication from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that any facility which he proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities.

(c) He will include substantially this certification, including this paragraph (c), in every nonexempt subcontract.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1976—O-580-498 #16-1

Alterations to Standard Form 19-B, REPRESENTATIONS AND CERTIFICATIONS

Delete Item No. 2, MINORITY BUSINESS ENTERPRISE and insert the following:

2. SMALL DISADVANTAGED BUSINESS CONCERN (1980 AUG).

(a) The offeror represents that he [ ] is, [ ] is not, a small business concern owned and controlled by socially and economically disadvantaged individuals. The term "small business concern" means a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto. The term "small business concern owned and controlled by socially and economically disadvantaged individuals" means a small business concern-

(1) that is at least 51 per centum owned by one or more socially and economically disadvantaged individuals; or, in the case of any publicly owned business, at least 51 per centum of the stock of which is owned by one or more socially and economically disadvantaged individuals; and

(2) whose management and daily business operations are controlled by one or more such individuals.

(b) The offeror shall presume that socially and economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans (i.e. American Indians, Eskimos, Aleuts, and Native Hawaiians), Asian-Pacific Americans (i.e. U.S. citizens whose origins are from Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, the U.S. Trust Territories of the Pacific, Northern Marianas, Laos, Cambodia, and Taiwan), and other minorities or any other individuals found to be disadvantaged by the Small Business Administration pursuant to Section 8(a) of the Small Business Act.

Delete Item No. 3, CONTINGENT FEE, and insert the following:

3. CONTINGENT FEE (1974 APR).

The Offeror/Quoter represents and certifies as part of his proposal/quotation that: (Check all applicable boxes or blocks).

(a) He [ ] has, [ ] has not, employed or retained any company or person (other than a full time, bona fide employee working solely for the offeror/quoter) to solicit or secure this contract, and (b) he [ ] has, [ ] has not, paid or agreed to pay any company or person (other than a full-time bona fide employee working solely for the offeror/quoter) any fee, commission, percentage, or brokerage fee contingent upon or resulting from the award of this contract; and agrees to furnish information relating to (a) and (b) above, as requested by the Contracting Officer. (For interpretation of the representation, including the term "bona fide employee", see Code of Federal Regulations. Title 41, Subpart 1-1.5.)

If the offeror/quoter, by checking the appropriate box provided therefor, has represented that he has employed or retained a company or person (other than a full-time bona fide employee working solely for the offeror/quoter) to solicit or secure this contract, or that he has paid or agreed to pay any fee, commission, percentage, or brokerage fee to any company or person contingent upon or resulting from the award of this contract, he shall furnish, in duplicate, a complete Standard Form 119, Contractor's Statement of Contingent or Other Fees. If offeror/quoter has previously furnished a completed Standard Form 119 to the office issuing this solicitation, he may accompany his proposal/quotation with a signed statement (a) indicating when such completed form was previously furnished, (b) identifying by number the previous solicitation or contract, if any, in connection with which such form was submitted, and (c) representing that the statement in such form is applicable to this proposal/quotation.

The bidder makes the following representations and certifications as a part of the bid identified hereinbefore. (Check appropriate boxes).

10. WOMEN-OWNED BUSINESS (1981 JUL).

The offeror represents that the firm submitting this offer ☐ is, ☐ is not, a women-owned business. A **women-owned business** is a business that (i) is at least 51 percent owned by a woman or women who are U.S. citizens and who also control and operate the business; and (ii) is a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto. **Control** in this context means exercising the power to make policy decisions. **Operate** in this context means being actively involved in the day-to-day management.

11. PERCENT FOREIGN CONTENT (1978 SEP).

Approximately _____ percent of the proposed contract price represents foreign content or effort.

12. HANDICAPPED ORGANIZATIONS (1981 SEP).

The Offeror certifies that it is ☐ is not ☐ an organization eligible for assistance under section 7(h) of the Small Business Act (15 USC 636). An Offeror certifying in the affirmative is eligible to participate in any resultant contracts hereunder or any part thereof as if he were a small business concern as elsewhere defined in the solicitation. An organization to be eligible under section 7(h) of the Small Business Act must be one (i) organized under the laws of the United States or any state; (ii) operated in the interest of handicapped individuals; (iii) the net income of which does not inure in whole or part to the benefit of any shareholder or other individual; (iv) that complies with any applicable occupational health and safety standard prescribed by the Secretary of Labor; (v) that, during the fiscal year in which it bids upon a set-aside, employs handicapped individuals for not less than 75 per cent of the man-hours required for the production or provision of commodities or services; and (vi) that can qualify under the additional criteria prescribed in Section 118.11, SBA Rules and Regulations, 13 CFR 118.11. For purposes of this clause, the term "handicapped individual" means a person who has a physical, mental, or emotional impairment, defect, ailment, disease, or disability of a permanent nature which in any way limits the selection of any type of employment for which the person would otherwise be qualified or qualifiable.

STANDARD FORM 23
JANUARY 1961 EDITION
GENERAL SERVICES ADMINISTRATION
FED PROC REG (41 CFR) 1-16.401

Rev. LAD Nov. 70

CONSTRUCTION CONTRACT

(See instructions on reverse)

CONTRACT NO

DATE OF CONTRACT

NAME AND ADDRESS OF CONTRACTOR

CHECK APPROPRIATE BOX

- [ ] Individual
- [ ] Partnership
- [ ] Joint Venture
- [ ] Corporation, incorporated in the State of .....

DEPARTMENT OR AGENCY

CONTRACT FOR (*Work to be performed*)

PLACE

CONTRACT PRICE (*Express in words and figures*)

ADMINISTRATIVE DATA (*Optional*)

The United States of America (hereinafter called the Government), represented by the Contracting Officer executing this contract, and the individual, partnership, joint venture, or corporation named above (hereinafter called the Contractor), mutually agree to perform this contract in strict accordance with the General Provisions, and the following designated specifications, schedules, drawings, and conditions:

WORK SHALL BE STARTED	WORK SHALL BE COMPLETED

Alterations. The following alterations were made in this contract before it was signed by the parties hereto:

In witness whereof, the parties hereto have executed this contract as of the date entered on the first page hereof.

THE UNITED STATES OF AMERICA	CONTRACTOR
By _____	_____ (Name of Contractor)
_____ (Official title)	By _____ (Signature)
	_____ (Title)

INSTRUCTIONS

1. The full name and business address of the Contractor must be inserted in the space provided on the face of the form. The Contractor shall sign in the space provided above with his usual signature and typewrite or print his name under the signature.

2. An officer of a corporation, a member of a partnership, or an agent signing for the Contractor shall place his signature and title after the word "By" under the name of the Contractor. A contract executed by an attorney or agent on behalf of the Contractor shall be accompanied by two authenticated copies of his power of attorney or other evidence of his authority to act on behalf of the Contractor.

U.S. GOVERNMENT PRINTING OFFICE 1960 OF—572726—46

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Edition of 29 July 1980

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GENERAL PROVISIONS
(Construction Contract)
(Edition of 29 July 1980)
Issued By: Department of the Army, Corps of Engineers

(General Provisions 1 through 29 and 30 through 38 are those prescribed by the General Services Administration in Standard Form 23-A, April 1975 edition and Standard Form 19-A, January 1979 edition, respectively, as amended pursuant to the latest revisions of the Defense Acquisition Regulation and Engineer Contract Instructions, ER 1180-1-1.)

1.1 DEFINITIONS

(The following clause is applicable if the procurement instrument identification number is prefixed by the letters "DACW")

(a) The term "head of the agency" or "Secretary" as used herein means the Secretary of the Army; and the term "his duly authorized representative" means the Chief of Engineers, Department of the Army, or an individual or board designated by him.

(b) The term "Contracting Officer" as used herein means the person executing this contract on behalf of the Government and includes a duly appointed successor or authorized representative. (DAR 7-602.1 & ECI 7-070)

1.2 DEFINITIONS (1964 JUN)

(The following clause is applicable if the procurement instrument identification number is prefixed by the letters "DACA")

(a) The term "head of the agency" or "Secretary" as used herein means the Secretary, the Under Secretary, any Assistant Secretary, or any other head or assistant head of the executive or military department or other Federal agency; and the term "his duly authorized representative" means any person or persons or board (other than the Contracting Officer) authorized to act for the head of the agency or the Secretary.

(b) The term "Contracting Officer" as used herein means the person executing this contract on behalf of the Government and includes a duly appointed successor or authorized representative. (DAR 7-602.1)

2. SPECIFICATIONS AND DRAWINGS (1964 JUN)

The Contractor shall keep on the work a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy either in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at his own risk and expense. The Contracting Officer shall furnish from time to time such detail drawings and other information as he may consider necessary, unless otherwise provided. (DAR 7-602.2)

3. CHANGES (1968 FEB)

(a) The Contracting Officer may, at any time, without notice to the sureties, by written order designated or indicated to be a change order, make any change in the work within the general scope of the contract, including but not limited to changes:

(i) in the specifications (including drawings and designs);
(ii) in the method or manner of performance of the work;
(iii) in the Government-furnished facilities, equipment, materials, services, or site; or
(iv) directing acceleration in the performance of the work.

(b) Any other written order or an oral order (which terms as used in this paragraph (b) shall include direction, instruction, interpretation or determination) from the Contracting Officer, which causes any such change, shall be treated as a change order under this clause, provided, that the Contractor gives the Contracting Officer written notice stating the date, circumstances, and source of the order and that the Contractor regards the order as a change order.

(c) Except as herein provided, no order, statement, or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment hereunder.

(d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any order, an equitable adjustment shall be made and the contract modified in writing accordingly: Provided however, That except for claims based on defective specifications, no claim for any change under (b) above shall be allowed for any costs incurred more than 20 days before the Contractor gives written notice as therein required: And provided further, That in the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with such defective specifications.

(e) If the Contractor intends to assert a claim for an equitable adjustment under this clause, he must, within 30 days after receipt of a written change order under (a) above or the furnishing of a written notice under (b) above, submit to the Contracting Officer a written statement setting forth the general nature and monetary extent of such claim, unless this period is extended by the Government. The statement of claim hereunder may be included in the notice under (b) above.

(f) No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract. (DAR 7-602.3)

4. DIFFERING SITE CONDITIONS (1968 FEB)

(a) The Contractor shall promptly, and before such conditions are disturbed, notify the Contracting Officer in writing of: (1) subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in this contract. The Contracting Officer shall promptly investigate the conditions, and if he finds that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under this contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the contract modified in writing accordingly.

(b) No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in (a) above; provided, however, the time prescribed therefor may be extended by the Government.

(c) No claim by the Contractor for an equitable adjustment hereunder

shall be allowed if asserted after final payment under this contract. (DAR 7-602.4)

5. TERMINATION FOR DEFAULT - DAMAGES FOR DELAY - TIME EXTENSIONS (1969 AUG)

(a) If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will insure its completion within the time specified in this contract, or any extension thereof, or fails to complete said work within such time, the Government may, by written notice to the Contractor, terminate his right to proceed with the work or such part of the work as to which there has been delay. In such event the Government may take over the work and prosecute the same to completion, by contract or otherwise, and may take possession of and utilize in completing the work such materials, appliances, and plant as may be on the site of the work and necessary therefor. Whether or not the Contractor's right to proceed with the work is terminated, he and his sureties shall be liable for any damage to the Government resulting from his refusal or failure to complete the work within the specified time.

(b) If fixed and agreed liquidated damages are provided in the contract and if the Government so terminates the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Government in completing the work.

(c) If fixed and agreed liquidated damages are provided in the contract and if the Government does not so terminate the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until the work is completed or accepted.

(d) The Contractor's right to proceed shall not be so terminated nor the Contractor charged with resulting damage if:

(1) The delay in the completion of the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, acts of the public enemy, acts of the Government in either its sovereign or contractual capacity, acts of another contractor in the performance of a contract with the Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather, or delays of subcontractors or suppliers arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and such subcontractors or suppliers; and

(2) The Contractor, within 10 days from the beginning of any such delay (unless the Contracting Officer grants a further period of time before the date of final payment under the contract), notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of the delay and extend the time for completing the work when, in his judgment, the findings of fact justify such an extension, and his findings of fact shall be final and conclusive on the parties, subject only to appeal as provided in the "Disputes" clause of this contract.

(e) If, after notice of termination of the Contractor's right to proceed under the provisions of this clause, it is determined for any reason that the Contractor was not in default under the provisions of this clause, or that the delay was excusable under the provisions of this clause, the rights and obligations of the parties shall, if the contract contains a clause providing for termination for convenience of the Government, be the same as if the notice of termination had been issued pursuant to such clause. If, in the foregoing circumstances, this contract does not contain a clause providing for

termination for convenience of the Government, the contract shall be equitably adjusted to compensate for such termination and the contract modified accordingly; failure to agree to any such adjustment shall be a dispute concerning a question of fact within the meaning of the clause of this contract entitled "Disputes."

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

(g) As used in paragraph (d)(1) of this clause, the term "subcontractors or suppliers" means subcontractors or suppliers at any tier. (DAR 7-602.5)

6. DISPUTES (1980 JUN)

(a) This contract is subject to the Contract Disputes Act of 1978 (P.L. 95-563).

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

(c) (i) As used herein, "claim" means a written demand or assertion by one of the parties seeking, as a matter of right, the payment of money, adjustment or interpretation of contract terms, or other relief, arising under or relating to this contract. However, a written demand by the contractor seeking the payment of money in excess of $50,000 is not a claim until certified in accordance with (d) below.

(ii) A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim for the purposes of the Act. However, where such submission is subsequently disputed either as to liability or amount or not acted upon in a reasonable time, it may be converted to a claim pursuant to the Act by complying with the submission and certification requirements of this clause.

(iii) A claim by the contractor shall be made in writing and submitted to the contracting officer for decision. A claim by the Government against the contractor shall be subject to a decision by the Contracting Officer.

(d) For contractor claims of more than $50,000, the contractor shall submit with the claim a certification that the claim is made in good faith; the supporting data are accurate and complete to the best of the contractor's knowledge and belief; and the amount requested accurately reflects the contract adjustment for which the contractor believes the Government is liable. The certification shall be executed by the contractor if an individual. When the contractor is not an individual, the certification shall be executed by a senior company official in charge at the contractor's plant or location involved, or by an officer or general partner of the contractor having over-all responsibility for the conduct of the contractor's affairs.

(e) For contractor claims of $50,000 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 in excess of $50,000 the Contracting Officer must decide the claim within 60 days or notify the contractor of the date when 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) Interest on the amount found due on a contractor claim shall be paid from the date the contracting officer receives the claim, or from the date payment otherwise would be due, if such date is later, until the date of payment.

(h) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal or action arising under the contract, and comply with any decision of the Contracting Officer. (DAR 7-103.12(a))

7. PAYMENTS TO CONTRACTOR (1979 MAR)

(a) The Government will pay the contract price as hereinafter provided.

(b) The Government will make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates approved by the Contracting Officer. If requested by the Contracting Officer, the Contractor shall furnish a breakdown of the total contract price showing the amount included therein for each principal category of the work, in such detail as requested, to provide a basis for determining progress payments. In the preparation of estimates the Contracting Officer, at his discretion, 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 may also be taken into consideration (1) if such consideration is specifically authorized by the contract and (2) if the Contractor furnishes satisfactory evidence that he has acquired title to such material and that it will be utilized on the work covered by this contract.

(c) In making such progress payments, there shall be retained 10 percent of the estimated amount until final completion and acceptance of the contract work. However, if the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, he may authorize such payment to be made in full without retention of a percentage. Also, whenever the work is substantially complete, the Contracting Officer shall retain an amount he considers adequate for the protection of the Government, and, at his discretion, may release to the Contractor all or a portion of any excess amount. Furthermore, on completion and acceptance of each separate building, public work, or other division of the contract, on which the price is stated separately in the contract, payment may be made therefor without retention of a percentage.

(d) All material and work covered by progress payments made shall thereupon become the sole property of the Government, but this provision shall not be construed as 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 as waiving the right of the Government to require the fulfillment of all of the terms of the contract.

(e) The Contractor shall, upon request, be reimbursed for the entire amount of premiums paid for performance and payment bonds (including coinsurance and reinsurance agreements, when applicable) after furnishing evidence of full payment to the surety.

(f) Upon completion and acceptance of all work, the amount due the Contractor under this contract shall be paid upon the presentation of a properly executed voucher and after the Contractor shall have furnished the Government with a release of all claims against the Government arising by virtue of this contract, other than claims in stated amounts as may be specifically excepted by the Contractor from the operation of the release. If the Contractor's claim to amounts payable under the contract has been assigned under the Assignment of Claims Act of 1940, as amended (31 U.S.C. 203, 41 U.S.C. 15), a release may also be required of the assignee. (DAR 7-602.7)

8. ASSIGNMENT OF CLAIMS (1976 OCT)

(a) Pursuant to the provisions of the Assignment of Claims Act of 1940, as amended (31 U.S.C. 203, 41 U.S.C. 15), if this contract provides for

payments aggregating $1,000 or more, claims for moneys due or to become due the Contractor from the Government under this contract may be assigned to a bank, trust company, or other financing institution, including any Federal lending agency, and may thereafter be further assigned and reassigned to any such institution. Any such assignment or reassignment shall cover all amounts payable under this contract and not already paid, and shall not be made to more than one party, except that any such assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in such financing. Unless otherwise provided in this contract, payments to assignee of any moneys due or to become due under this contract shall not, to the extent provided in said Act, as amended, be subject to reduction or setoff. (The preceding sentence applies only if this contract is made in time of war or national emergency as defined in said Act and is with the Department of Defense, the General Services Administration, the Energy Research and Development Administration, the National Aeronautics and Space Administration, the Federal Aviation Administration, or any other department or agency of the United States designated by the President pursuant to Clause 4 of the provision of section 1 of the Assignment of Claims Act of 1940, as amended by the Act of May 15, 1951, 65 Stat. 41.)

(b) In no event shall copies of this contract or of any plans, specifications, or other similar documents relating to work under this contract, if marked "Top Secret," "Secret," or "Confidential," be furnished to any assignee of any claim arising under this contract or to any other person not entitled to receive the same. However, a copy of any part or all of this contract so marked may be furnished, or any information contained therein may be disclosed, to such assignee upon the prior written authorization of the Contracting Officer. (DAR 7-602.8)

9. MATERIAL AND WORKMANSHIP (1964 JUN)

(a) Unless otherwise specifically provided in this contract, all equipment, material, and articles incorporated in the work covered by this contract are to be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in this contract, reference to any equipment, material, article, or patented process, by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition, and the Contractor may, at his option, use any equipment, material, article, or process which, in the judgment of the Contracting Officer, is equal to that named. The Contractor shall furnish to the Contracting Officer for his approval the name of the manufacturer, the model number, and other identifying data and information respecting the performance, capacity, nature, and rating of the machinery and mechanical and other equipment which the Contractor contemplates incorporating in the work. When required by this contract or when called for by the Contracting Officer, the Contractor shall furnish the Contracting Officer for approval full information concerning the material or articles which he contemplates incorporating in the work. When so directed, samples shall be submitted for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material, and articles installed or used without required approval shall be at the risk of subsequent rejection.

(b) All work under this contract shall be performed in a skillful and workmanlike manner. The Contracting Officer may, in writing, require the Contractor to remove from the work any employee the Contracting Officer deems incompetent, careless, or otherwise objectionable. (DAR 7-602.9)

10. INSPECTION AND ACCEPTANCE (1976 OCT)

(a) All work (which term includes but is not restricted to materials, workmanship, and manufacture and fabrication of components) shall be subject to inspection and test by the Government at all reasonable times and at all places prior to acceptance. Any such inspection and test is for the sole benefit of the Government and shall not relieve the Contractor of the responsibility of providing quality control measures to assure that the work strictly complies with the contract requirements. No inspection or test by the Government shall be construed as constituting or implying acceptance. Inspection or test shall not relieve the Contractor of responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of the Government after acceptance of the completed work under the terms of paragraph (f) of this clause, except as hereinabove provided.

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

(c) If the Contractor does not promptly replace rejected material or correct rejected workmanship, the Government (1) may, by contract or otherwise, replace such material or correct such workmanship and charge the cost thereof to the Contractor, or (2) may terminate the Contractor's right to proceed in accordance with the clause of this contract entitled "Termination for Default - Damages for Delay - Time Extensions."

(d) The Contractor shall furnish promptly, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspection and test as may be required by the Contracting Officer. All inspection and test by the Government shall be performed in such manner as not unnecessarily to delay the work. Special, full size, and performance tests shall be performed as described in this contract. The Government reserves the right to charge to the Contractor any additional cost of inspection or test when material or workmanship is not ready at the time specified by the Contractor for inspection or test or when reinspection or retest is necessitated by prior rejection.

(e) Should it be considered necessary or advisable by the Government at any time before acceptance of the entire work to make an examination of work already completed, by removing or tearing out same, the Contractor shall, on request, promptly furnish all necessary facilities, labor and material. If such work is found to be defective or nonconforming in any material respect, due to the fault of the Contractor or his subcontractors, he shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, an equitable adjustment shall be made in the contract price to compensate the Contractor for the additional services involved in such examination and reconstruction and, if completion of the work has been delayed thereby, he shall, in addition, be granted a suitable extension of time.

(f) Unless otherwise provided in this contract, acceptance by the Government shall be made as promptly as practicable after completion and inspection of all work required by this contract, or that portion of the work that the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except as regards latent defects, fraud, or such gross mistakes as may amount to fraud or as regards the Government's rights under any warranty or guarantee. (DAR 7-602.11)

11. SUPERINTENDENCE BY CONTRACTOR (1976 OCT)

The Contractor, at all times during performance and until the work is completed and accepted, shall give his personal superintendence to the work or have on the work a competent superintendent, satisfactory to the Contracting Officer and with authority to act for the Contractor. (DAR 7-602.12)

12. PERMITS AND RESPONSIBILITIES (1964 JUN)

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any applicable Federal, State, and municipal laws, codes, and regulations, in connection with the prosecution of the work. He shall be similarly responsible for all damages to persons or property that occur as a result of his fault or negligence. He shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. He shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire contruction work, except for any completed unit of construction thereof which theretofore may have been accepted. (DAR 7-602.13)

13. CONDITIONS AFFECTING THE WORK (1964 JUN)

The Contractor shall be responsible for having taken steps reasonably necessary to ascertain the nature and location of the work, and the general and local conditions which can affect the work or the cost thereof. Any failure by the Contractor to do so will not relieve him from responsibility for successfully performing the work without additional expense to the Government. The Government assumes no responsibility for any understanding or representations concerning conditions made by any of its officers or agents prior to the execution of this contract, unless such understanding or representations by the Government are expressly stated in the contract. (DAR 7-602.14)

14. OTHER CONTRACTS (1964 JUN)

The Government may undertake or award other contracts for additional work, and the Contractor shall fully cooperate with such other contractors and Government employees and carefully fit his own work to such additional work as may be directed by the Contracting Officer. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor or by Government employees. (DAR 7-602.15)

15. SHOP DRAWINGS (1976 OCT)

(a) The term, "shop drawings", includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data; and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract.

(b) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate his approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate his approval or disapproval of the shop drawings and if not approved as submitted shall indicate his reasons therefor. Any work done prior to such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this

contract, except with respect to variations described and approved in accordance with (c) below.

(c) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Contracting Officer approves any such variation(s), he shall issue an appropriate contract modification, except that, if the variation is minor and does not involve a change in price or in time of performance, a modification need not be issued.

(d) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated herein) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated herein) of all shop drawings will be retained by the Contracting Officer and one set will be returned to the Contractor. (DAR 7-602.54(a))

16. USE AND POSSESSION PRIOR TO COMPLETION (1976 OCT)

The Government shall have the right to take possession of or use any completed or partially completed part of the work. Prior to such possession or use, the Contracting Officer shall furnish the Contractor an itemized list of work remaining to be performed or corrected on such portions of the project as are to be possessed or used by the Government, provided that failure to list any item of work shall not relieve the Contractor of responsibility for compliance with the terms of the contract. Such possession or use shall not be deemed an acceptance of any work under the contract. While the Government has such possession or use, the Contractor, notwithstanding the provisions of the clause of this contract entitled "Permits and Responsibilities," shall be relieved of the responsibility for the loss or damage to the work resulting from the Government's possession or use. If such prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment in the contract price or the time of completion will be made and the contract shall be modified in writing accordingly. (DAR 7-602.39)

17. SUSPENSION OF WORK (1968 FEB)

(a) The Contracting Officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as he may determine to be 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 by an act of the Contracting Officer in the administration of this contract, or by his failure to act within the time specified in this contract (or if no time is specified, within a reasonable time), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by such 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 (1) that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor or (2) for which an equitable adjustment is provided for or excluded under any other provision of this contract.

(c) No claim under this clause shall 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 such suspension, delay, or interruption, but not later than the date of final payment under the contract. (DAR 7-602.46)

18. TERMINATION FOR CONVENIENCE OF THE GOVERNMENT-CONSTRUCTION (1974 APR)

(a) The performance of work under this contract may be terminated by the Government in accordance with this clause in whole, or from time to time in part, whenever the Contracting Officer shall determine that such termination is in the best interest of the Government. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.

(b) After receipt of a Notice of Termination, and except as otherwise directed by the Contracting Officer, the Contractor shall:

(i) stop work under the contract on the date and to the extent specified in the Notice of Termination;

(ii) place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the work under the contract as is not terminated;

(iii) terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the Notice of Termination;

(iv) assign to the Government, in the manner, at the times, and to the extent directed by the Contracting Officer, all of the right, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case the Government shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

(v) settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the Contracting Officer, to the extent he may require, which approval or ratification shall be final for all the purposes of this clause;

(vi) transfer title and deliver to the Government, in the manner, at the times, and to the extent, if any, directed by the Contracting Officer, (A) the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced as a part of, or acquired in connection with the performance of, the work terminated by the Notice of Termination, and (B) the completed or partially completed plans, drawings, information, and other property which, if the contract had been completed, would have been required to be furnished to the Government;

(vii) use his best efforts to sell, in the manner, at the times, to the extent, and at the price or prices directed or authorized by the Contracting Officer, any property of the types referred to in (vi) above; provided however, that the Contractor (A) shall not be required to extend credit to any purchaser, and (B) may acquire any such property under the conditions prescribed by and at a price or prices approved by the Contracting Officer; and provided further, that the proceeds of any such transfer or disposition shall be applied in

reduction of any payments to be made by the Government to the Contractor under this contract or shall otherwise be credited to the price or cost of the work covered by this contract or paid in such other manner as the Contracting Officer may direct;

(viii) complete performance of such part of the work as shall not have been terminated by the Notice of Termination; and

(ix) take such action as may be necessary, or as the Contracting Officer may direct, for the protection and preservation of the property related to this contract which is in the possession of the Contractor and in which the Government has or may acquire an interest.

At any time after expiration of the plant clearance period, as defined in Section VIII, Defense Acquisition Regulation, as it may be amended from time to time, the Contractor may submit to the Contracting Officer a list, certified as to quantity and quality, of any or all items of termination inventory not previously disposed of, exclusive of items the disposition of which has been directed or authorized by the Contracting Officer, and may request the Government to remove such items or enter into a storage agreement covering them. Not later than fifteen (15) days thereafter, the Government will accept title to such items and remove them or enter into a storage agreement covering the same; provided, that the list submitted shall be subject to verification by the Contracting Officer upon removal of the items, or if the items are stored, within forty-five (45) days from the date of submission of the list, and any necessary adjustment to correct the list as submitted shall be made prior to final settlement.

(c) After receipt of a Notice of Termination, the Contractor shall submit to the Contracting Officer his termination claim, in the form and with certification prescribed by the Contracting Officer. Such claim shall be submitted promptly but in no event later than one year from the effective date of termination, unless one or more extensions in writing are granted by the Contracting Officer, upon request of the Contractor made in writing within such one year period or authorized extension thereof. However, if the Contracting Officer determines that the facts justify such action, he may receive and act upon any such termination claim at any time after such one year period or any extension thereof. Upon failure of the Contractor to submit his termination claim within the time allowed, the Contracting Officer may determine, on the basis of information available to him, the amount, if any, due to the Contractor by reason of the termination and shall thereupon pay to the Contractor the amount so determined.

(d) Subject to the provisions of paragraph (c), the Contractor and the Contracting Officer may agree upon the whole or any part of the amount or amounts to be paid to the Contractor by reason of the total or partial termination of work pursuant to this clause, which amount or amounts may include a reasonable allowance for profit on work done; provided, that such agreed amount or amounts, exclusive of settlement costs, shall not exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the contract price of work not terminated. The contract shall be amended accordingly, and the Contractor shall be paid the agreed amount. Nothing in paragraph (e) of this clause, prescribing the amount to be paid to the Contractor in the event of failure of the Contractor and the Contracting Officer to agree upon the whole amount to be paid to the Contractor by reason of the termination of work pursuant to this clause, shall be deemed to limit, restrict, or otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the Contractor pursuant to this paragraph (d).

(e) In the event of the failure of the Contractor and the Contracting Officer to agree, as provided in paragraph (d), upon the whole amount to be paid to the Contractor by reason of the termination of work pursuant to this clause, the Contracting Officer shall pay to the Contractor the amounts determined by the Contracting Officer as follows, but without duplication of any amounts agreed upon in accordance with paragraph (d):

(i) with respect to all contract work performed prior to the effective date of the Notice of Termination, the total (without duplication of any items) of:

(A) the cost of such work;

(B) the cost of settling and paying claims arising out of the termination of work under subcontracts or orders as provided in paragraph (b)(v) above, exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by the subcontractor prior to the effective date of the Notice of Termination of Work under this contract, which amounts shall be included in the cost on account of which payment is made under (A) above; and

(C) a sum, as profit on (A) above, determined by the Contracting Officer pursuant to 8-303 of the Defense Acquisition Regulation, in effect as of the date of execution of this contract, to be fair and reasonable; provided, however, that if it appears that the Contractor would have sustained a loss on the entire contract had it been completed, no profit shall be included or allowed under this subdivision (C) and an appropriate adjustment shall be made reducing the amount of the settlement to reflect the indicated rate of loss; and

(ii) the reasonable cost of the preservation and protection of property incurred pursuant to paragraph (b)(ix); and any other reasonable cost incidental to termination of work under this contract, including expense incidental to the determination of the amount due to the Contractor as the result of the termination of work under this contract. The total sum to be paid to the Contractor under (i) above shall not exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the contract price of work not terminated. Except for normal spoilage, and except to the extent that the Government shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the Contractor under (i) above, the fair value, as determined by the Contracting Officer, of property which is destroyed, lost, stolen, or damaged so as to become undeliverable to the Government, or to a buyer pursuant to paragraph (b)(vii).

(f) Costs claimed, agreed to, or determined pursuant to (c), (d), (e), and (i) hereof shall be in accordance with Section XV of the Defense Acquisition Regulation as in effect on the date of this contract.

(g) The Contractor shall have the right of appeal, under the clause of this contract entitled "Disputes", from any determination made by the Contracting Officer under paragraph (c), (e), or (i) hereof, except that if the Contractor has failed to submit his claim within the time provided in paragraph (c) or (i) hereof, and has failed to request extension of such time,

he shall have no such right of appeal. In any case where the Contracting Officer has made a determination of the amount due under paragraph (c), (e) or (i) hereof, the Government shall pay to the Contractor the following: (i) if there is no right of appeal hereunder or if no timely appeal has been taken, the amount so determined by the Contracting Officer, or (ii) if an appeal has been taken, the amount finally determined on such appeal.

(h) In arriving at the amount due the Contractor under this clause there shall be deducted (i) all unliquidated advance or other payments on account theretofore made to the Contractor, applicable to the terminated portion of this contract, (ii) any claim which the Government may have against the Contractor in connection with this contract, and (iii) the agreed price for, or the proceeds of sale of, any materials, supplies, or other things acquired by the Contractor or sold, pursuant to the provisions of this clause, and not otherwise recovered by or credited to the Government.

(i) If the termination hereunder be partial, the Contractor may file with the Contracting Officer a claim for an equitable adjustment of the price or prices specified in the contract relating to the continued portion of the contract (the portion not terminated by the Notice of Termination), and such equitable adjustment as may be agreed upon shall be made in such price or prices. Any claim by the Contractor for an equitable adjustment under this clause must be asserted within ninety (90) days from the effective date of the termination notice, unless an extension is granted in writing by the Contracting Officer.

(j) The Government may from time to time, under such terms and conditions as it may prescribe, make partial payments and payments on account against costs incurred by the Contractor in connection with the terminated portion of this contract whenever in the opinion of the Contracting Officer the aggregate of such payments shall be within the amount to which the Contractor will be entitled hereunder. If the total of such payments is in excess of the amount finally agreed or determined to be due under this clause, such excess shall be payable by the Contractor to the Government upon demand, together with interest computed at the rate established by the Secretary of the Treasury pursuant to Public Law 92-41, 85 STAT 97 for the Renegotiation Board, for the period from the date such excess payment is received by the Contractor to the date on which such excess is repaid to the Government; provided, however, that no interest shall be charged with respect to any such excess payment attributable to a reduction in the Contractor's claim by reason of retention or other disposition of termination inventory until ten days after the date of such retention or disposition, or such later date as determined by the Contracting Officer by reason of the circumstances.

(k) Unless otherwise provided for in this contract, or by applicable statute, the Contractor shall - from the effective date of termination until the expiration of three years after final settlement under this contract - preserve and make available to the Government at all reasonable times at the office of the Contractor but without direct charge to the Government, all his books, records, documents and other evidence bearing on the costs and expenses of the Contractor under this contract and relating to the work terminated hereunder, or, to the extent approved by the Contracting Officer, photographs, microphotographs, or other authentic reproductions thereof. (DAR 7-602.29(a))

19. PRICING OF ADJUSTMENTS (1970 JUL)

When costs are a factor in any determination of a contract price adjustment pursuant to the "Changes" clause or any other provision of this contract, such costs shall be in accordance with Section XV of the Defense Acquisition Regulation as in effect on the date of this contract. (DAR 7-103.26)

20. PATENT INDEMNITY (1964 JUN)

Except as otherwise provided, the Contractor agrees to indemnify the Government and its officers, agents, and employees against liability, including costs and expenses, for infringement upon any Letters Patent of the United States (except Letters Patent issued upon an application which is now or may hereafter be, for reasons of national security, ordered by the Government to be kept secret or otherwise withheld from issue) arising out of the performance of this contract or out of the use or disposal by or for the account of the Government of supplies furnished or construction work performed hereunder. (DAR 7-602.16(a))

21. ADDITIONAL BOND SECURITY (1976 OCT)

If any surety upon any bond furnished in connection with this contract becomes unacceptable to the Government, or if any such surety fails to furnish reports as to his financial condition from time to time as requested by the Government, or if the contract price is increased to such an extent that the penal sum of any bond becomes inadequate in the opinion of the Contracting Officer, the Contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the Government and of persons supplying labor or materials in the prosecution of the work contemplated by this contract. (DAR 7-602.17)

22. EXAMINATION OF RECORDS BY COMPTROLLER GENERAL (1975 JUN)

(a) This clause is applicable if the amount of this contract exceeds $10,000 and was entered into by means of negotiation, including small business restricted advertising but is not applicable if this contract was entered into by means of formal advertising.

(b) The Contractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of three years after final payment under this contract or such lesser time specified in either Appendix M of the Defense Acquisition Regulation or the Federal Procurement Regulations Part 1-20, as appropriate, have access to and the right to examine any directly pertinent books, documents, papers, and records of the Contractor involving transactions related to this contract.

(c) The Contractor further agrees to include in all his subcontracts hereunder a provision to the effect that the subcontractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of three years after final payment under the subcontract or such lesser time specified in either Appendix M of the Defense Acquisition Regulation or the Federal Procurement Regulations Part 1-20, as appropriate, have access to and the right to examine any directly pertinent books, documents, papers, and records of such subcontractor, involving transactions related to the subcontract. The term "subcontract" as used in this clause excludes (i) purchase orders not exceeding $10,000 and (ii) subcontracts or purchase orders for public utility services at rates established for uniform applicability to the general public.

(d) The periods of access and examination described in (b) and (c) above for records which relate to (i) appeals under the "Disputes" clause of this contract, (ii) litigation or the settlement of claims arising out of the performance of this contract, or (iii) costs and expenses of this contract as to which exception has been taken by the Comptroller General or any of his duly authorized representatives, shall continue until such appeals, litigation, claims or exceptions have been disposed of. (DAR 7-104.15)

23. BUY AMERICAN ACT (1966 OCT)

(a) Agreement. In accordance with the Buy American Act (41 U.S.C. 10a-10d), the Contractor agrees that only domestic construction material will be used (by the Contractor, subcontractors, materialmen, and suppliers) in the performance of this contract, except for nondomestic construction material listed in the "Nondomestic Construction Materials" clause, if any, of this contract.

(b) Domestic construction material. "Construction material" means any article, material, or supply brought to the construction site for incorporation in the building or work. An unmanufactured construction material is a "domestic construction material" if it has been mined or produced in the United States. A manufactured construction material is a "domestic construction material" if it has been manufactured in the United States and if the cost of its components which have been mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. "Component" means any article, material, or supply directly incorporated in a construction material.

(c) Domestic component. A component shall be considered to have been "mined, produced, or manufactured in the United States" (regardless of its source in fact) if the article, material, or supply in which it is incorporated was manufactured in the United States and the component is of a class or kind determined by the Government to be not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality. (DAR 7-602.20)

24. EQUAL OPPORTUNITY (1978 SEP)

(If, during any twelve (12) month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded Federal contracts and/or subcontracts which have an aggregate value in excess of $10,000, the Contractor shall comply with (1) through (7) below. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.)

During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include but not be limited to the following: Employment, upgrading, demotion, or transfer, recruitment or recruitment advertising: layoff or termination, rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this Equal Opportunity clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(3) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding a notice to be provided by the agency Contracting Officer, advising the labor union or workers' representative of the contractor's commitments under this Equal Opportunity clause and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and by the rules, regulations, and orders of the Secretary of Labor or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders.

(6) In the event of the Contractor's noncompliance with the Equal Opportunity clause of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The Contractor will include the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States. (DAR 7-103.18(a))

25. COVENANT AGAINST CONTINGENT FEES (1958 JAN)

The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty the Government shall have the right to annul this contract without liability or in its discretion, to deduct from the contract price or consideration, or otherwise recover, the full amount of such commissions, percentage, brokerage or contingent fee. (DAR 7-103.20)

26. OFFICIALS NOT TO BENEFIT (1949 JUL)

No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit. (DAR 7-103.19)

27. CONVICT LABOR (1975 OCT)

In connection with the performance of work under this contract, the Contractor agrees not to employ any person undergoing sentence of imprisonment

except as provided by Public Law 89-176, September 10, 1965 (18 U.S.C. 4082(c)(2)) and Executive Order 11755, December 29, 1973. (DAR 7-104.17)

28. UTILIZATION OF SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS CONCERNS (1980 AUG)

(a) It is the policy of the United States that small business and small business concerns owned and controlled by socially and economically disadvantaged individuals shall have the maximum practicable opportunity to participate in the performance of contracts let by any Federal agency.

(b) The Contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with the efficient performance of this contract. The term "subcontract" means any agreement (other than one involving an employer-employee relationship) to be entered into by a Federal Government prime contractor or subcontractor calling for supplies or services required for the performance of the original contract or subcontract. The Contractor further agrees to cooperate in any studies or surveys as may be conducted by the United States Small Business Administration or the awarding agency of the United States as may be necessary to determine the extent of the Contractor's compliance with this clause.

(c) As used in this contract, the term "small business concern" shall mean a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto. The term "small business concern owned and controlled by socially and economically disadvantaged individuals," hereafter referred to as disadvantaged business, shall mean a small business concern -

(1) which is at least 51 per centum owned by one or more socially and economically disadvantaged individuals; or, in the case of any publicly owned business, at least 51 per centum of the stock of which is owned by one or more socially and economically disadvantaged individuals; and

(2) whose management and daily business operations are controlled by one or more of such individuals. The Contractor shall presume that socially and economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans (i.e., American Indians, Eskimos, Aleuts and Native Hawaiians), Asian-Pacific Americans (i.e., U.S. citizens whose origins are from Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, the U.S. Trust Territories of the Pacific, Northern Marianas, Laos, Cambodia, and Taiwan, and other minorities, or any individuals found to be disadvantaged by the Administration pursuant to Section 8(a) of the Small Business Act.

(d) Contractors acting in good faith may rely on written representations by their subcontractors regarding their status as either a small business concern or a small business concern owned and controlled by socially and economically disadvantaged individuals. (DAR 7-104.14(a))

29. FEDERAL, STATE, AND LOCAL TAXES (1971 NOV)

(a) Except as may be otherwise provided in this contract, the contract price includes all applicable Federal, State, and local taxes and duties.

(b) Nevertheless, with respect to any Federal excise tax or duty on the transactions or property covered by this contract, if a statute, court decision, written ruling, or regulation takes effect after the contract date, and -

(1) results in the Contractor being required to pay or bear the burden of any such Federal excise tax or duty or increase in the rate thereof which would not otherwise have been payable on such transactions or property, the contract price shall be increased by the amount of such tax or duty or rate increase, provided the Contractor warrants in writing that no amount for

such newly imposed Federal excise tax or duty or rate increase was included in the contract price as a contingency reserve or otherwise; or

(2) results in the Contractor not being required to pay or bear the burden of, or in his obtaining a refund or drawback of, any such Federal excise tax or duty which would otherwise have been payable on such transactions or property or which was the basis of an increase in the contract price, the contract price shall be decreased by the amount of the relief, refund, or drawback, or that amount shall be paid to the Government, as directed by the Contracting Officer. The contract price shall be similarly decreased if the Contractor, through his fault or negligence or his failure to follow instructions of the Contracting Officer, is required to pay or bear the burden of, or does not obtain a refund or drawback of, any such Federal excise tax or duty.

(c) Paragraph (b) above shall not be applicable to social security taxes or to any other employment tax.

(d) No adjustment of less than $100 shall be made in the contract price pursuant to paragraph (b) above.

(e) As used in paragraph (b) above, the term "contract date" means the date set for bid opening, or if this is a negotiated contract, the contract date. As to additional supplies or services procured by modification to this contract, the term "contract date" means the date of such modification.

(f) Unless there does not exist any reasonable basis to sustain an exemption, the Government upon the request of the Contractor shall, without further liability, furnish evidence appropriate to establish exemption from any Federal, State, or local tax; provided that, evidence appropriate to establish exemption from any Federal excise tax or duty which may give rise to either an increase or decrease in the contract price will be furnished only at the discretion of the Government.

(g) The Contractor shall promptly notify the Contracting Officer of matters which will result in either an increase or decrease in the contract price and shall take action with respect thereto as directed by the Contracting Officer. (DAR 7-103.10(a))

30. DAVIS-BACON ACT (40 U.S.C. 276a to a-7) (1977 DEC)

(If this contract is with a State or political subdivision thereof, the Contractor agrees to comply with the requirements of the Contract Work Hours Standards Acts and to insert this clause in all subcontracts hereunder with private persons or firms)

(a) All mechanics and laborers, including apprentices and trainees, employed or working directly upon the site of the work shall be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Copeland Regulations (29 CFR, Part 3)), the full amounts due at time of payment computed at wage rates not less than the aggregate of the basic hourly rates and the rates of payments, contributions, or costs for any fringe benefits contained in the wage determination decision of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor or subcontractor and such laborers and mechanics. A copy of such wage determination decision shall be kept posted by the Contractor at the site of the work in a prominent place where it can be easily seen by the workers. The term mechanics and laborers shall be deemed to include apprentices and trainees not covered by an approved program as provided by the apprentice and trainee clause of the contract.

(b) The Contractor may discharge his obligation under this clause to workers in any classification for which the wage determination decision contains:

(1) Only a basic hourly rate of pay, by making payment at not less than such basic hourly rate, except as otherwise provided in the Copeland Regulations (29 CFR, Part 3); or

(2) Both a basic hourly rate of pay and fringe benefits payments, by making payment in cash, by irrevocably making contributions pursuant to a fund, plan, or program for, and or by assuming an enforceable commitment to bear the cost of, bona fide fringe benefits contemplated by the Davis-Bacon Act, or by any combination thereof. Contributions made, or costs assumed, on other than a weekly basis shall be considered as having been constructively made or assumed during a weekly period to the extent that they apply to such period. Where a fringe benefit is expressed in a wage determination in any manner other than as an hourly rate and the Contractor pays a cash equivalent or provides an alternative fringe benefit, he shall furnish information with his payrolls showing how he determined that the cost incurred to make the cash payment or to provide the alternative fringe benefit is equal to the cost of the wage determination fringe benefit. In any case where the Contractor provides a fringe benefit different from any contained in the wage determination, he shall similarly show how he arrived at the hourly rate shown therefor. In the event of disagreement between or among the interested parties as to an equivalent of any fringe benefit, the Contracting Officer shall submit the question, together with his recommendation, to the Secretary of Labor for final determination.

(c) The assumption of an enforceable commitment to bear the cost of fringe benefits, or the provision of any fringe benefits not expressly listed in section 1(b)(2) of the Davis-Bacon Act or in the wage determination decision forming a part of the contract, may be considered as payment of wages only with the approval of the Secretary of Labor pursuant to a written request by the Contractor. The Secretary of Labor may require the Contractor to set aside assets, in a separate account, to meet his obligations under any unfunded plan or program.

(d) The Contracting Officer shall require that any class of laborers or mechanics, including apprentices and trainees, which is not listed in the wage determination decision and which is to be employed under the contract shall be classified or reclassified conformably to the wage determination decision, and shall report the action taken to the Secretary of Labor. If the interested parties cannot agree on the proper classification or reclassification of a particular class of laborers or mechanics, including apprentices and trainees, to be used, the Contracting Officer shall submit the question, together with his recommendation, to the Secretary of Labor for final determination.

(e) In the event it is found by the Contracting Officer that any laborer or mechanic, including all apprentices and trainees, employed by the Contractor or any subcontractor directly on the site of the work covered by this contract has been or is being paid at a rate of wages less than the rate of wages required by paragraph (a) of this clause, or by the "Apprentices and Trainees" clause of this contract, the Contracting Officer may (i) by written notice to the Government Prime Contractor terminate his right to proceed with the work, or such part of the work as to which there has been a failure to pay said required wages, and (ii) prosecute the work to completion by contract or otherwise, whereupon such Contractor and his sureties shall be liable to the Government for any excess costs occasioned the Government thereby.

(f) Paragraphs (a) through (e) of the clause shall apply to this contract to the extent that it is (i) a prime contract with the Government subject to

the Davis-Bacon Act or (ii) a subcontract also subject to the Davis-Bacon Act under such prime contract. (DAR 7-602.23(a)(i))

31. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT - OVERTIME COMPENSATION (40 U.S.C. 327-333) (1977 DEC)

(If this contract is with a State or political subdivision thereof, the Contractor agrees to comply with the requirements of the Contract Work Hours Standards Act and to insert this clause in all subcontracts hereunder with private persons or firms)

This contract is subject to the Contract Work Hours and Safety Standards Act and to the applicable rules, regulations, and interpretations of the Secretary of Labor.

(a) The Contractor shall not require or permit any laborer or mechanic, including apprentices, trainees, watchmen, and guards in any workweek in which he is employed on any work under this contract to work in excess of eight (8) hours in any calendar day or in excess of forty (40) hours in such workweek on work subject to the provisions of the Contract Work Hours and Safety Standards Act unless such laborer or mechanic, including apprentices, trainees, watchmen, and guards, receives compensation at a rate not less than one and one-half times his basic rate of pay for all such hours worked in excess of eight (8) hours in any calendar day or in excess of forty (40) hours in such workweek, whichever is the greater number of overtime hours. The "basic rate of pay," as used in this clause, shall be the amount paid per hour, exclusive of the Contractor's contribution or cost for fringe benefits and any cash payment made in lieu of providing fringe benefits, or the basic hourly rate contained in the wage determination, whichever is greater.

(b) In the event of any violation of the provisions of paragraph (a), the Contractor shall be liable to any affected employee for any amounts due, and to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including an apprentice, trainee, watchman, or guard, employed in violation of the provisions of paragraph (a) in the sum of $10 for each calendar day on which such employee was required or permitted to be employed on such work in excess of eight (8) hours or in excess of the standard workweek of forty (40) hours without payment of the overtime wages required by paragraph (a). (DAR 7-602.23(a)(ii))

32. APPRENTICES AND TRAINEES (1977 DEC)

(If this contract is with a State or political subdivision thereof, the Contractor agrees to comply with the requirements of the Contract Work Hours Standards Act and to insert this clause in all subcontracts hereunder with private persons or firms)

(a) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a state apprenticeship agency recognized by the Bureau, or if a person is employed in his first ninety (90) days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a state apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen in any craft classification employed on this contract shall not be greater than the ratio permitted to the Contractor as to his entire work force under the register

program. Any employee listed on a payroll at an apprentice wage rate, who is not a trainee as defined in paragraph (b) of this clause or is not registered or otherwise employed as stated above, shall be paid the wage rate determined by the Secretary of Labor for the classification of work he actually performed. The Contractor or subcontractor shall furnish to the Contracting Officer written evidence of the registration of his program and apprentices as well as the appropriate ratios and wage rates (expressed in percentages of the journeyman hourly rates), for the area of construction prior to using apprentices on the contract work. The wage rate paid apprentices shall be not less than the appropriate percentage of the journeyman's rate contained in the applicable wage determination.

(b) Trainees will be permitted to work at less than the predetermined rate for the work performed when they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification, by the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training. The ratio of trainees to journeymen on this contract shall not be greater than permitted under the plan approved by the Bureau of Apprenticeship and Training. Every trainee must be paid at not less than the rate specified in the approved program for his level of progress. Any employee listed on the payroll at a trainee rate who is not registered and not participating in a training plan approved by the Bureau of Apprenticeship and Training shall be paid not less than the wage rate determined by the Secretary of Labor for the classification of work he actually performed. The Contractor or subcontractor shall furnish the Contracting Officer written evidence of the certification of his program, the registration of the trainee, and the ratios and wage rates prescribed in that program. In the event the Bureau of Apprenticeship and Training withdraws the approval of a training program, the Contractor shall no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(c) The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of this contract. (DAR 7-602.23(a)(iii))

33. PAYROLLS AND BASIC RECORDS (1977 DEC)

(If this contract is with a State or political subdivision thereof, the Contractor agrees to comply with the requirements of the Contract Work Hours Standards Act and to insert this clause in all subcontracts hereunder with private persons or firms)

(a) The Contractor shall maintain payrolls and basic records relating thereto during the course of the work and shall preserve them for a period of three (3) years thereafter for all laborers and mechanics, including apprentices, trainees, watchmen, and guards, working at the site of the work. Such records shall contain the name and address of each such employee, his correct classification, rate of pay (including rates of contributions for, or costs assumed to provide, fringe benefits), daily and weekly number of hours worked, deductions made and actual wages paid. (NOTE: Watchmen and guards are reflected on payroll records for Contract Work Hours and Safety Standards Act purposes only.) Whenever the Contractor has obtained approval from the Secretary of Labor as provided in paragraph (c) of the clause entitled "Davis-Bacon Act," he shall maintain records which show the commitment, its approval, written communication of the plan or program to the laborers or mechanics affected, and the costs anticipated or incurred under the plan or program.

(b) The Contractor shall submit weekly a copy of all payrolls to the Contracting Officer. The Government Prime Contractor shall be responsible for the submission of copies of payrolls of all subcontractors. The copy shall be accompanied by a statement signed by the Contractor indicating that the payrolls are correct and complete, that the wage rates contained therein are not less than those determined by the Secretary of Labor, and that the classifications set forth for each laborer or mechanic, including apprentices and trainees, conform with the work he performed. Weekly submission of the "Statement of Compliance" required under this contract and the Copeland Regulations of the Secretary of Labor (29 CFR, Part 3) shall satisfy the requirement for submission of the above statement. The Contractor shall submit also a copy of any approval by the Secretary of Labor with respect to fringe benefits which is required by paragraph (c) of the clause entitled "Davis-Bacon Act."

(c) The Contractor shall make the records required under this clause available for inspection by authorized representatives of the Contracting Officer and the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. (DAR 7-602.23(a)(iv))

34. COMPLIANCE WITH COPELAND REGULATIONS (1964 JUN)

(If this contract is with a State or political subdivision thereof, the Contractor agrees to comply with the requirements of the Contract Work Hours Standards Act and to insert this clause in all subcontracts hereunder with private persons or firms)

The Contractor shall comply with the Copeland Regulations of the Secretary of Labor (29 CFR, Part 3) which are incorporated herein by reference. (DAR 7-602.23(a)(v))

35. WITHHOLDING OF FUNDS (1977 DEC)

(If this contract is with a State or political subdivision thereof, the Contractor agrees to comply with the requirements of the Contract Work Hours Standards Act and to insert this clause in all subcontracts hereunder with private persons or firms)

(a) The Contracting Officer may withhold or cause to be withheld from the Government Prime Contractor so much of the accrued payments or advances as may be considered necessary (i) to pay laborers and mechanics, including apprentices, trainees, watchmen, and guards, employed by the Contractor or any subcontractor on the work the full amount of wages required by the contract, and (ii) to satisfy any liability of the Contractor and any subcontractor for liquidated damages under paragraph (b) of the clause entitled "Contract Work Hours and Safety Standards Act-Overtime Compensation."

(b) If the Contractor or any subcontractor fails to pay any laborer, mechanic, apprentice, trainee, watchman, or guard employed or working on the site of the work, all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Government Prime Contractor, take such action as may be necessary to cause suspension of any further payments or advances until such violations have ceased. (DAR 7-602.23(a)(vi))

36. SUBCONTRACTS (1972 FEB)

(If this contract is with a State or political subdivision thereof, the Contractor agrees to comply with the requirements of the Contract Work Hours Standards Act and to insert this clause in all subcontracts hereunder with private persons or firms)

The Contractor agrees to insert the clauses hereof entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act-Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Regulations," "Withholding of Funds," "Subcontracts," and "Contract Termination-Debarment" in all subcontracts. The term "Contractor" as used in such clauses in any subcontract shall be deemed to refer to the subcontractor except in the phrase "Government Prime Contractor." (DAR 7-602.23(a)(vii))

37. CONTRACT TERMINATION - DEBARMENT (1972 APR)

(If this contract is with a State or political subdivision thereof, the Contractor agrees to comply with the requirements of the Contract Work Hours Standards Act and to insert this clause in all subcontracts hereunder with private persons or firms)

A breach of the clauses hereof entitled "Davis-Bacon Act," Contract Work Hours and Safety Standards Act-Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Regulations," "Withholding of Funds," and "Subcontracts" may be grounds for termination of the contract, and for debarment as provided in 29 CFR 5.6. (DAR 7-602.23(a)(viii))

38. DISPUTES CONCERNING LABOR STANDARDS (1977 DEC)

(If this contract is with a State or political subdivision thereof, the Contractor agrees to comply with the requirements of the Contract Work Hours Standards Act and to insert this clause in all subcontracts hereunder with private persons or firms)

Disputes arising out of the labor standards provisions of this contract shall be subject to the Disputes clause except to the extent such disputes involve the meaning of classifications or wage rates contained in the wage determination decision of the Secretary of Labor or the applicability of the labor provisions of this contract which questions shall be referred to the Secretary of Labor in accordance with the procedures of the Department of Labor. (DAR 7-602.23(a)(ix))

39. CONTRACTOR INSPECTION SYSTEM (1964 NOV)

The Contractor shall (i) maintain an adequate inspection system and perform such inspections as will assure that the work performed under the contract conforms to contract requirements, and (ii) maintain and make available to the Government adequate records of such inspections. (DAR 7-602.10(a))

40. GRATUITIES (1952 MAR)

(a) The Government may, by written notice to the Contractor, terminate the right of the Contractor to proceed under this contract if it is found, after notice and hearing, by the Secretary or his duly authorized representative, that gratuities (in the form of entertainment, gifts, or otherwise) were offered or given by the Contractor, or any agent or representative of the Contractor, to any officer or employee of the Government with a view toward securing a contract or securing favorable treatment with respect to the awarding or amending, or the making of any determinations with respect to the performing of such contract; provided, that the existence of the facts upon which the Secretary or his duly authorized representative makes such findings shall be in issue and may be reviewed in any competent court.

(b) In the event this contract is terminated as provided in paragraph (a) hereof, the Government shall be entitled (i) to pursue the same remedies against the Contractor as it could pursue in the event of a breach of the

contract by the Contractor, and (ii) as a penalty in addition to any other damages to which it may be entitled by law, to exemplary damages in an amount (as determined by the Secretary or his duly authorized representative) which shall be not less than three nor more than ten times the costs incurred by the Contractor in providing any such gratuities to any such officer or employee.

(c) The rights and remedies of the Government provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract. (DAR 7-104.16)

41. SUBCONTRACTING PLAN FOR SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS CONCERNS (FORMALLY ADVERTISED) (1982 JUN)

(The following clause is applicable if this contract (1) offers subcontracting possibilities, (2) is expected to exceed $500,000, or $1,000,000 in the case of construction of any public facility, and (3) is required to include the clause in DAR 7-104.14(a))

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

(b) The apparent low bidder, upon request by the Contracting Officer, shall submit a subcontracting plan which addresses separately subcontracting with small business concerns and small disadvantaged business concerns, and which shall be included in and made a material part of the resultant contract. The subcontracting plan shall be submitted within the time specified by the Contracting Officer. Failure to submit the subcontracting plan shall make the bidder ineligible for award of a contract. As a minimum, the subcontracting plan shall include -

(1) Separate percentage goals (expressed in terms of percentage of total planned subcontracting dollars) for the utilization as subcontractors of small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals. For the purposes of the subcontracting plan, the Contractor shall include all subcontracts to be awarded for the specific purpose of performing this contract and may include a proportionate share of supplies and services whose costs are normally allocated as indirect or overhead costs when reasonably determined to be attributable to this contract.

a. A statement of: (i) total dollars planned to be subcontracted; (ii) total dollars planned to be subcontracted to small business; and (iii) total dollars planned to be subcontracted to small disadvantaged business.

b. A description of the principal supply and service areas to be subcontracted and an identification of those areas where it is planned to use (i) small business subcontractors, and (ii) small disadvantaged business subcontractors.

c. A statement of the method used in developing proposed subcontracting goals for small business and small disadvantaged business concerns.

d. If the offeror includes indirect and overhead costs as an element in establishing the goals in the subcontracting plan, the method used in determining the proportionate share of indirect and overhead costs incurred with (i) small business, and (ii) small disadvantaged business subcontractors shall be explained.

e. A statement of the method used for solicitation purposes (e.g., did the offeror use company source lists, the small business and disadvantaged small business source identification system provided by the Small Business Administration's Procurement Automated Source System, the National Minority Purchasing Council Vendor Information Service, or the services provided by the U.S. Department of Commerce Minority Business

Development Agency's Research and Information Division, and the facilities of small business and disadvantaged business trade associations?).

(2) The name of an individual within the employ of the bidder who will administer the subcontracting plan of the bidder and a description of the duties of such individual;

(3) A description of the efforts the bidder will make to assure that small business and small disadvantaged business concerns will have an equitable opportunity to compete for subcontracts;

(4) Assurances that the bidder will include the clause entitled "Utilization of Small Business and Small Disadvantaged Business Concerns" in all subcontracts which offer further subcontracting possibilities in the United States and that the bidder will require all subcontractors (except small business concerns) who receive subcontracts in excess of $1,000,000 in the case of a contract for the construction of any public facility, or in excess of $500,000 in the case of all other contracts, to adopt a plan in consonance with this clause;

(5) Assurances that the bidder will submit such periodic reports and cooperate in any studies or surveys as may be required by the contracting agency or the Small Business Administration in order to determine the extent of compliance by the bidder with the subcontracting plan; and

(6) A recitation of the types of records the successful bidder will maintain to demonstrate procedures which have been adopted to comply with the requirements and goals set forth in the plan, including the establishment of source lists of small business concerns and small disadvantaged business concerns; and efforts to identify and award subcontracts to such small business concerns. The records shall include at least the following (these records may be maintained on a plant-wide or company-wide basis unless otherwise indicated):

a. Small and small disadvantaged business source lists, guides, and other data identifying small and small disadvantaged business vendors.

b. Organizations contacted for small and small disadvantaged business sources.

c. On a contract-by-contract basis, records on all subcontract solicitations over $100,000, indicating on each solicitation (i) whether small business was solicited and if not, why not; (ii) whether small disadvantaged business was solicited and if not, why not; and (iii) reasons for the failure of responding small businesses or small disadvantaged businesses to receive the subcontract award.

d. Records to support such efforts as:

(i) contacts with disadvantaged and small business trade associations;

(ii) contacts with business development organizations; and

(iii) attendance at small and small disadvantaged business procurement conferences and trade fairs.

e. Records to support internal activities to guide and encourage buyers such as:

(i) workshops, seminars, training programs, etc.; and

(ii) monitoring activities to evaluate compliance.

f. On a contract-by-contract basis, records to support award data submitted to the Government to include name, address, and size status of subcontractor.

(c) In order to effectively implement this plan, the Contractor shall:

(1) Issue and promulgate company-wide policy statements in support of this effort, develop written procedures and work instructions, and assign specific responsibilities regarding the requirements of this clause.

(2) Demonstrate continuing management interest and involvement in support of these programs through such actions as regular reviews of progress and establishment of overall corporate and divisional goals and objectives.

(3) Train and motivate Contractor personnel in support of these programs.

(4) Assist small business and small disadvantaged 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 and small disadvantaged 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.

(5) Provide adequate and timely consideration of the potentialities of small business and small disadvantaged business concerns in all "make-or-buy" decisions.

(6) Counsel and discuss subcontracting opportunities with representatives of small and disadvantaged business firms as are referred by the Small and Disadvantaged Business Utilization Specialist responsible for monitoring performance under this program and representatives of the SBA.

(d) The Contractor shall submit Standard Form 294, Subcontracting Report for Individual Contracts, and Standard Form 295, Summary Subcontract Report, in accordance with instructions provided on the forms.

(e) The bidder understands that:

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

(2) The failure of any Contractor or subcontractor to comply in good faith with (i) the clause entitled "Utilization of Small Business and Small Disadvantaged Business Concerns", or (ii) the terms of any subcontracting plan required by this "Small Business and Small Disadvantaged Business Subcontracting Plan (Advertised)" provision, will be a material breach of the contract or subcontract.

(3) A master subcontracting plan on a plant or division-wide basis which contains all the elements required by (b) above, except goals, may be incorporated by reference as part of the subcontracting plan required of the offeror by this clause, provided: (i) the master plan was approved by the Contractor's cognizant Contract Administration Office prior to bid opening; (ii) the offeror provides copies of the approved master plan and evidence of its approval to the Contracting Officer; and (iii) 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.

(f) In the acquisition of commercial products, the bidder further understands that:

(1) If a commercial product (defined below) is offered, the required subcontracting plan may cover the company's production generally, both for Government contracts and for regular commercial sales, rather than just this acquisition. In such cases, the Contractor may request approval from the Contracting Officer to submit one company-wide, or division-wide, annual plan. If such request is deemed appropriate, the offeror shall submit a proposed company-wide, or division-wide, annual plan for acceptance.

(2) Upon approval by the Contracting Officer, the plan will remain in effect for the company's entire fiscal year. During this period, Government contracts for commercial products of the affected company or division will not be required to contain individual subcontracting plans relating only to the supply or services being acquired, unless the Contracting Officer determines for a particular contract that there are unforeseen possibilities for small business and small disadvantaged business subcontracting.

(3) At least 60 days before the scheduled termination of the company or division-wide plan, the Contractor may submit to the Contracting Officer a proposed company or division-wide subcontracting plan for its commercial products for the succeeding fiscal year. If the plan would

(Continued on next page)

otherwise terminate prior to approval of the succeeding fiscal year's plan, it will remain in effect until the succeeding plan is accepted or rejected, but no longer than 60 days after the end of the company's fiscal year.

(4) For the purpose of this program, the term "commercial product" means a product in regular production sold in substantial quantities to the general public and/or industry at established catalog or market prices. A product which, in the opinion of the Contracting Officer, differs only insignificantly from the Contractor's commercial product may be regarded for the purpose of this clause as a commercial product. (DAR 7-104.14(c))

42. NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (1965 JAN)

(The provisions of this clause shall be applicable only if the amount of this contract exceeds $10,000.)

(a) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the Contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed hereunder, the Contractor shall furnish to the Government, when requested by the Contracting Officer, all evidence and information in possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Contractor has agreed to indemnify the Government.

(c) This clause shall be included in all subcontracts. (DAR 7-103.23)

43. AUTHORIZATION AND CONSENT (1964 MAR)

The Government hereby gives its authorization and consent (without prejudice to any rights of indemnification) for all use and manufacture, in the performance of this contract or any part hereof or any amendment hereto or any subcontract hereunder (including any lower-tier subcontract), of any invention described in and covered by a patent of the United States (i) embodied in the structure or composition of any article the delivery of which is accepted by the Government under this contract, or (ii) utilized in the machinery, tools, or methods the use of which necessarily results from compliance by the Contractor or the using subcontractor with (a) specifications or written provisions now or hereafter forming a part of this contract, or (b) specific written instructions given by the Contracting Officer directing the manner of performance. The entire liability to the Government for infringement of a patent of the United States shall be determined solely be the provisions of the indemnity clauses, if any, included in this contract or any subcontract hereunder (including any lower-tier subcontract), and the Government assumes liability for all other infringement to the extent of the authorization and consent hereinabove granted. (DAR 7-103.22)

44. COMPOSITION OF CONTRACTOR (1965 JAN)

If the Contractor hereunder is comprised of more than one legal entity, each such entity shall be jointly and severally liable hereunder. (DAR 7-602.32)

45. SITE INVESTIGATION (1965 JAN)

The Contractor acknowledges that he has investigated and satisfied himself as to the conditions affecting the work, including but not restricted to those

bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, river stages, tides or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during prosecution of the work. The Contractor further acknowledges that he has satisfied himself 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 information presented by the drawings and specifications made a part of this contract. Any failure by the Contractor to acquaint himself with the available information will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the work. The Government assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis or the information made available by the Government. (DAR 7-602.33)

46. PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS (1965 JAN)

(a) The Contractor will preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the site of work which is not to be removed and which does not unreasonably interfere with the construction work. Care will be taken in removing trees authorized for removal to avoid damage to vegetation to remain in place. Any limbs or branches of trees broken during such operations or by the careless operation of equipment, or by workmen, shall be trimmed with a clean cut and painted with an approved tree pruning compound as directed by the Contracting Officer.

(b) The Contractor will protect from damage all existing improvements or utilities at or near the site of the work, the location of which is made known to him, and will repair or restore any damage to such facilities resulting from failure to comply with the requirements of this contract or the failure to exercise reasonable care in the performance of the work. If the Contractor fails or refuses to repair any such damage promptly, the Contracting Officer may have the necessary work performed and charge the cost thereof to the Contractor. (DAR 7-602.34)

47. OPERATIONS AND STORAGE AREAS (1965 JAN)

(a) All operations of the Contractor (including storage of materials) upon Government premises shall be confined to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by his operations.

(b) Temporary buildings (storage sheds, shops, offices, etc.) may be erected by the Contractor only with the approval of the Contracting Officer, and shall be built with labor and materials furnished by the Contractor without expense to the Government. Such temporary buildings and utilities shall remain the property of the Contractor and shall be removed by him at his expense upon the completion of the work. With the written consent of the Contracting Officer, such buildings and utilities may be abandoned and need not be removed.

(c) The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways or construct and use such temporary roadways as may be authorized by the Contracting Officer. Where materials are transported in the prosecution of the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or

prescribed by any Federal, State or local law or regulation. When it is necessary to cross curbings or sidewalks, protection against damage shall be provided by the Contractor and any damaged roads, curbings, or sidewalks shall be repaired by, or at the expense of the Contractor. (DAR 7-602.35)

48. MODIFICATION PROPOSALS - PRICE BREAKDOWN (1968 APR)

The Contractor, in connection with any proposal he makes for a contract modification, shall furnish a price breakdown, itemized as required by the Contracting Officer. Unless otherwise directed, the breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, subcontract, and overhead costs, as well as profit, and shall cover all work involved in the modification, whether such work was deleted, added or changed. Any amount claimed for subcontracts shall be supported by a similar price breakdown. In addition, if the proposal includes a time extension, a justification therefor shall also be furnished. The proposal, together with the price breakdown and time extension justification, shall be furnished by the date specified by the Contracting Officer. (DAR 7-602.36)

49. SUBCONTRACTORS (1979 MAR)

(In construction contracts to be performed in United States possessions (as defined in DAR 18-703.2) and in Puerto Rico, the second sentence is modified to refer only to the clauses required by DAR 18-703.2)

Within seven days after the award of any subcontract either by himself or a subcontractor, the Contractor shall deliver to the Contracting Officer a completed DD Form 1566. The form shall include the subcontractor's acknowledgement of the inclusion in his subcontract of the clauses of this contract entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act-Overtime Compensation," "Apprentices and Trainees," "Compliance with Copeland Regulations," "Withholding of Funds," "Subcontracts," "Contract Termination-Debarment," and "Payrolls and Basic Records." Nothing contained in this contract shall create any contractual relation between the subcontractor and the Government. (DAR 7-602.37)

50. CLEANING UP (1965 JAN)

The Contractor shall at all times keep the construction area, including storage areas used by him, free from accumulations of waste material or rubbish and prior to completion of the work remove any rubbish from the premises and all tools, scaffolding, equipment, and materials not the property of the Government. Upon completion of the construction the Contractor shall leave the work and premises in a clean, neat and workmanlike condition satisfactory to the Contracting Officer. (DAR 7-602.40)

51. ADDITIONAL DEFINITIONS (1965 JAN)

(a) Wherever in the specifications or upon the drawings the words "directed," "required," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the "direction," "requirement," "ordered," "designation," or "prescription," of the Contracting Officer is intended and similarly the words "approved," "acceptable," "satisfactory" or words of like import shall mean "approved by" or "acceptable to," or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

(b) Where "as shown," "as indicated," "as detailed," or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word

"provided" as used herein shall be understood to mean "provided complete in place," that is "furnished and installed." (DAR 7-602.41)

52. ACCIDENT PREVENTION (1981 AUG)

(a) In order to provide safety controls for protection to the life and health of employees and other persons; for prevention of damage to property, materials, supplies, and equipment; and for avoidance of work interruptions in the performance of this contract, the Contractor shall comply with all pertinent provisions of Corps of Engineers Manual, EM 385-1-1, dated 1 April 1981, entitled "Safety and Health Requirements Manual", and will also take or cause to be taken such additional measures as the Contracting Officer may determine to be reasonably necessary for the purpose.

(b) The Contractor will maintain an accurate record of, and will report to the Contracting Officer in the manner and on the forms prescribed by the Contracting Officer, exposure data and all accidents resulting in death, traumatic injury, occupational disease, and damage to property, materials, supplies and equipment incident to work performed under this contract.

(c) The Contracting Officer will notify the Contractor of any noncompliance with the foregoing provisions and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his representative at the site of the work, shall be deemed sufficient for the purpose. 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 any such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

(d) Compliance with the provisions of this clause by subcontractors will be the responsibility of the Contractor.

(e) Prior to commencement of the work the Contractor will:

(1) submit in writing his proposals for effectuating this provision for accident prevention;

(2) meet in conference with representatives of the Contracting Officer to discuss and develop mutual understandings relative to administration of the over-all safety program. (DAR 7-602.42(a) & (b))

53. GOVERNMENT INSPECTORS (1965 JAN)

The work will be conducted under the general direction of the Contracting Officer and is subject to inspection by his appointed inspectors to insure strict compliance with the terms of the contract. No inspector is authorized to change any provision of the specifications without written authorization of the Contracting Officer, nor shall the presence or absence of an inspector relieve the Contractor from any requirements of the contract. (DAR 7-602.43)

54. RIGHTS IN SHOP DRAWINGS (1966 APR)

(Applicable to all contracts calling for the delivery of shop drawings)

(a) Shop drawings for construction means drawings, submitted to the Government by the Construction Contractor, subcontractor or any lower tier subcontractor pursuant to a construction contract, showing in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit, and attachment details) of materials or equipment. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(b) This clause, including this paragraph (b), shall be included in all subcontracts hereunder at any tier. (DAR 7-602.47)

55. AFFIRMATIVE ACTION FOR DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (1976 JUL)

(This clause is applicable pursuant to 41 C.F.R. 60-250, if this contract is for $10,000 or more.)

(a) The Contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified disabled veterans and veterans of the Vietnam era without discrimination based upon their disability or veterans status in all employment practices such as the following: employment upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

(b) The Contractor agrees that all suitable employment openings of the Contractor which exist at the time of the execution of this contract and those which occur during the performance of this contract, including those not generated by this contract and including those occurring at an establishment of the Contractor other than the one wherein the contract is being performed but excluding those of independently operated corporate affiliates, shall be listed at an appropriate local office of the State employment service system wherein the opening occurs. The Contractor further agrees to provide such reports to such local office regarding employment openings and hires as may be required.

State and local government agencies holding Federal contracts of $10,000 or more shall also list all their suitable openings with the appropriate office of the State employment service, but are not required to provide those reports set forth in paragraphs (d) and (e).

(c) Listing of employment openings with the employment service system pursuant to this clause shall be made at least concurrently with the use of any other recruitment source or effort and shall involve the normal obligations which attach to the placing of a bona fide job order, including the acceptance of referrals of veterans and nonveterans. The listing of employment openings does not require the hiring of any particular job applicant or from any particular group of job applicants, and nothing herein is intended to relieve the Contractor from any requirements in Executive Orders or regulations regarding nondiscrimination in employment.

(d) The reports required by paragraph (b) of this clause shall include, but not be limited to, periodic reports which shall be filed at least quarterly with the appropriate local office or, where the Contractor has more than one hiring location in a State, with the central office of that State employment service. Such reports shall indicate for each hiring location (1) the number of individuals hired during the reporting period, (2) the number of nondisabled veterans of the Vietnam era hired, (3) the number of disabled veterans of the Vietnam era hired, and (4) the total number of disabled veterans hired. The reports should include covered veterans hired for on-the-job training under 38 U.S.C. 1787. The Contractor shall submit a report within 30 days after the end of each reporting period wherein any performance is made on this contract identifying data for each hiring location. The Contractor shall maintain at each hiring location copies of the reports submitted until the expiration of one year after final payment under the contract, during which time these reports and related documentation shall

be made available, upon request, for examination by any authorized representatives of the Contracting Officer or of the Secretary of Labor. Documentation would include personnel records respecting job openings, recruitment and placement.

(e) Whenever the Contractor becomes contractually bound to the listing provisions of this clause, it shall advise the employment service system in each State where it has establishments of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these provisions and has so advised the State system, there is no need to advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this contract clause.

(f) This clause does not apply to the listing of employment openings which occur and are filled outside of the 50 States, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands.

(g) The provisions of paragraphs (b), (c), (d) and (e) of this clause do not apply to openings which the Contractor proposes to fill from within his own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement. This exclusion does not apply to a particular opening once an employer decides to consider applicants outside of his own organization or employer-union arrangement for that opening.

(h) As used in this clause:

(1) "All suitable employment openings" includes, but is not limited to, openings which occur in the following job categories: production and nonproduction; plant and office; laborers and mechanics; supervisory and nonsupervisory; technical; and executive, administrative, and professional openings as are compensated on a salary basis of less than $25,000 per year. This term includes full-time employment, temporary employment of more than three (3) days duration, and part-time employment. It does not include openings which the Contractor proposes to fill from within his own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement nor openings in an educational institution which are restricted to students of that institution. Under the most compelling circumstances an employment opening may not be suitable for listing, including such situations where the needs of the Government cannot reasonably be otherwise supplied, where listing would be contrary to national security, or where the requirement of listing would otherwise not be for the best interest of the Government.

(2) "Appropriate office of the State employment service system" means the local office of the Federal-State national system of public employment offices with assigned responsibility for serving the area where the employment opening is to be filled, including the District of Columbia, Guam, Puerto Rico, and the Virgin Islands.

(3) "Openings which the Contractor proposes to fill from within his own organization" means employment openings for which no consideration will be given to persons outside the Contractor's organization (including any affiliates, subsidiaries, and the parent companies) and includes any openings which the Contractor proposes to fill from regularly established "recall" lists.

(4) "Openings which the Contractor proposes to fill pursuant to a customary and traditional employer-union hiring arrangement" means employment openings which the Contractor proposes to fill from union halls, which is part of the customary and traditional hiring relationship which exists between the Contractor and representatives of his employees.

(i) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Vietnam Era Veterans' Readjustment Assistance Act, hereinafter referred to as the "Act" (38 U.S.C. 2012).

(j) In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(k) The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, Office of Federal Contract Compliance Programs, provided by or through the Contracting Officer. Such notice shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era for employment, and the rights of applicants and employees.

(l) The Contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of the Act, and is committed to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era.

(m) The Contractor will include the provisions of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance. (DAR 7-103.27)

56. VALUE ENGINEERING INCENTIVE--CONSTRUCTION (1980 DEC)

(The following clause is applicable if this contract is in excess of $100,000)

(a) Applicability. This clause applies to any Contractor developed, prepared, and submitted Value Engineering Change Proposal (VECP).

(b) Definitions.

(1) "Contractor's development and implementation costs" means those costs incurred on a VECP before Government acceptance and those costs the Contractor incurs specifically to make the changes required by Government acceptance of a VECP.

(2) "Government costs" means those agency costs that result directly from developing and implementing the VECP and any net increases in the cost of testing, operations, maintenance, and logistic support. They do not include the normal administrative costs of processing the VECP.

(3) "Instant contract savings" means the estimated reduction in Contractor cost of performance resulting from acceptance of the VECP, minus allowable Contractor's development and implementation costs (including subcontractor's development and implementation costs). (See paragraph (g).)

(4) "Value Engineering Change Proposal (VECP)" means a proposal that:

(i) requires a change to this, the instant contract, to implement; and

(ii) results in reducing the contract price or estimated cost without impairing essential functions or characteristics, provided that it does not involve a change in deliverable end-item quantities only.

(c) VECP Preparation. As a minimum, the Contractor shall include the information described in (1) through (6) in each VECP. If the proposed change affects contractually required configuration management procedures, the instructions in the procedures relating to format, identification, and priority assignment shall govern VECP preparation. The VECP shall include the following:

(1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effect of the change on the end item's performance.

(2) A list of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revisions.

(3) A separate, detailed cost estimate for both the affected portions of the existing contract requirement and the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (g). The Contractor shall also include a description and estimate of costs the Government may incur in implementing the VECP, such as test and evaluation and operating and support costs.

(4) A projection of any effects the proposed change would have on collateral costs to the agency.

(5) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.

(6) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved, and previous Government actions, if known.

(d) Submissions.

(1) The Contractor shall submit VECPs to the Resident Engineer at the worksite, with a copy to the Contracting Officer. The Contracting Officer shall notify the Contractor of the status of the VECP within 45 calendar days after the contracting office receives it. If additional time is required because of extenuating circumstances, the Contractor shall be notified within the 45-day period and provided the reason for the delay and the expected date of the Contracting Officer's decision. VECPs shall be processed expeditiously; however, the Government shall not be liable for any delay in acting upon a VECP.

(2) If the VECP is not accepted, the Contracting Officer shall provide the Contractor written notification fully explaining the reasons for rejection. The Contractor may withdraw, in whole or in part, any VECP not accepted by the Government within the period specified in the VECP. The Contracting Officer may require that the Contractor provide written notification before undertaking significant expenditures for VECP effort.

(e) Acceptance. Any VECP may be accepted in whole or in part by the Contracting Officer's award of a modification to this contract citing this clause. The Contracting Officer may accept the VECP, even though an agreement on price reduction has not be reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a contract modification applies a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The Contracting Officer's decision to accept all or part of any VECP shall be final and not subject to the Disputes clause.

(f) Sharing.

(1) Rates. The Contractor's share of savings is determined by subtracting Government costs from instant contract savings and multiplying the result by 55 percent for fixed-price contracts and 25 percent for cost-reimbursement contracts.

(2) Payment. Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a modification to this contract to:

(i) accept the VECP;
(ii) reduce the contract price or estimated cost by the amount of instant contract savings; and
(iii) provide the Contractor's share of savings by adding the amount calculated in (f)(1) to the contract price or fee.

(g) Subcontract. The Contractor shall include appropriate VE clauses in an subcontract of $50,000 or more and may include them in subcontracts of lesser value. To compute any adjustment in the contract price under paragraph (f), the Contractor's VECP development and implementation costs shall include any subcontractor's development and implementation costs that clearly result from the VECP, but shall exclude any VE incentive payments to subcontractors. The Contractor may choose any arrangement for subcontractor VE incentive payments, provided that these payments are not made from the Government's share of the savings resulting from the VECP.

(h) Data. The Contractor may restrict the Government's right to use any part of a VECP or the supporting data by marking the following legend on the affected parts:

> "These data, furnished under the Value Engineering Incentive--Construction clause of Contract _____, shall not be disclosed outside the Government or duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate a VECP submitted under the clause. This restriction does not limit the Government's right to use information contained in these data if it has been obtained or is otherwise available from the Contractor or from another source without limitations."

If a VECP is accepted, the Contractor hereby grants the Government unlimited rights in the VECP and supporting data, except that, with respect to data qualifying and submitted as limited rights technical data, the Government shall have the rights specified in the contract modification implementing the VECP and shall appropriately mark the data. (DAR 7-602.50)

57. AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS (1976 MAY)

(Contracts and subcontracts are exempt from the requirements of the following clause with regard to work performed outside the United States by employees who were not recruited within the United States.)

(a) The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: employment, upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

(b) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(c) In the event of the Contractor's noncompliance with the requirements of this clause, action for noncompliance may be taken in accordance with the rules, regulations and relevant orders of the Secretary of Labor issued pursuant to the Act.

(d) The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, provided by or through the Contracting Officer. Such notices shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped employees and applicants for employment, and the rights of applicants and employees.

(e) The Contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of section 503 of the Rehabilitation Act of 1973, and is committed to take affirmative action to employ and advance in employment physically and mentally handicapped individuals.

(f) The Contractor will include the provisions of this clause in every subcontract or purchase order of $2,500 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance. (DAR 7-103.28)

58. CLEAN AIR AND WATER (1975 OCT)

(Applicable only if the contract exceeds $100,000, or the contracting officer has determined that orders under an indefinite quantity contract in any one year will exceed $100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1857c-8(c)(1) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or the contract is not otherwise exempt.)

(a) The Contractor agrees as follows:

(i) To comply with all the requirements of section 114 of the Clean Air Act, as amended (42 U.S.C. 1857, et seq., as amended by Public Law 91-604) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. 1251, as amended by Public Law 92-500), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and section 308 of the Air Act and the Water Act, respectively, and all regulations and guidelines issued thereunder before the award of this contract;

(ii) That no portion of the work required by this prime contract will be performed in a facility listed on the Environmental Protection Agency List of Violating Facilities on the date this contract was awarded unless and until the EPA eliminates the name of such facility or facilities from such listing;

(iii) To use his best efforts to comply with clean air standards and clean water standards at the facilities in which the contract is being performed; and

(iv) To insert the substance of the provisions of this clause in any nonexempt subcontract, including this paragraph (iv).

(b) The terms used in this cluase have the following meanings.

(i) The term "Air Act" means the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Public Law 91-604).

(ii) The term "Water Act" means Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Public Law 92-500).

(iii) The term "clean air standards" means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in section 110(d) of the Clean Air Act (42 U.S.C. 1857c-5(d), an approved implementation procedure or plan under section 111(c) or section 111(d), respectively, of the Air Act (42 U.S.C. 1857c-6(c) or (d)), or an approved implementation procedure under section 112(d) of the Air Act (42 U.S.C. 1857c-7(d)).

(iv) The term "clean water standards" means any enforceable limitation, control, condition, prohibition, standard or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. 1342), or by a local government to ensure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. 1317)

(v) The term "compliance" means compliance with clean air or water standards. Compliance shall also mean compliance with a schedule or plan ordered or approved by a court of competent jurisdiction, the Environmental Protection Agency or an air or water pollution control agency in accordance with the requirement of the Air Act or Water Act and regulations issued pursuant thereto.

(vi) The term "facility" means any building, plant, installation, structure, mine, vessel or other floating craft, location, or site of operations, owned, leased, or supervised by a contractor, subcontractor, to be utilized in the performance of a contract or subcontract. Where a location or site of operations contains or includes more than one building, plant, installation, or structure, the entire location or site shall be deemed to be a facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are colocated in one geographical area.

(vii) The term "nonexempt contract or subcontract" means a contract or subcontract of more than $100,000 which is not otherwise exempted pursuant to the EPA regulations implementing the Air Act and Water Act (40 CFR 15.5), as further implemented in DAR 1-2302.4 or in FPR 1-1.2302-4 (whichever is applicable) and the procedures of the Department awarding the contract. (DAR 7-103.29)

59. NOTICE TO THE GOVERNMENT OF LABOR DISPUTES (1958 SEP)

(a) Whenever the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor shall immediately give notice thereof, including all relevant information with respect thereto, to the Contracting Officer.

(b) The Contractor agrees to insert the substance of this clause, including this paragraph (b), in any subcontract hereunder as to which a labor dispute may delay the timely performance of this contract; except that each such subcontract shall provide that in the event its timely performance is delayed or threatened by delay by any actual or potential labor dispute, the subcontractor shall immediately notify his next higher tier subcontractor, or the prime contractor, as the case may be, of all relevant information with respect to such dispute. (DAR 7-104.4)

60. CONTRACT PRICES - BIDDING SCHEDULE (1968 APR)

(The following clause is applicable to contracts containing unit prices)

Payment for the various items listed in the Bidding Schedule shall constitute full compensation for furnishing all plant, labor, equipment, appliances, and materials, and for performing all operations required to complete the work in conformity with the drawings and specifications. All costs for work not specifically mentioned in the Bidding Schedule shall be included in the contract prices for the items listed. (DAR 7-603.5)

61. PRIORITIES, ALLOCATIONS, AND ALLOTMENTS (1975 OCT)

(The following clause is applicable to ratable contracts)

The Contractor shall follow the provisions of DMS Reg. 1 or DPS Reg. 1 and all other applicable regulations and orders of the Bureau of Domestic Commerce in obtaining controlled materials and other products and materials needed to fill this order. (DAR 7-104.18)

62. PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA - PRICE ADJUSTMENTS (1970 JAN)

(The following clause is applicable if this contract is in excess of $500,000)

(a) This clause shall become operative only with respect to any modification of this contract which involves aggregate increases and/or decreases in costs plus applicable profits in excess of $500,000 unless the modification is priced on the basis of adequate competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation. The right to price reduction under this clause is limited to defects in data relating to such modification.

(b) If any price, including profit, or fee, negotiated in connection with any price adjustment under this contract was increased by any significant sums because:

(i) the Contractor furnished cost or pricing data which was not complete, accurate and current as certified in the Contractor's Certificate of Current Cost or Pricing Data;

(ii) a subcontractor, pursuant to the clause of this contract entitled "Subcontractor Cost or Pricing Data" or "Subcontractor Cost or Pricing Data - Price Adjustments" or any subcontract clause therein required, furnished cost or pricing data which was not complete, accurate and current as certified in the subcontractor.s Certificate of Current Cost or Pricing Data;

(iii) a subcontractor or prospective subcontractor furnished cost or pricing data which was required to be complete, accurate and current and to be submitted to support a subcontract cost estimate furnished by the Contractor but which was not complete, accurate and current as of the date certified in the Contractor's Certificate of Current Cost or Pricing Data; or

(iv) the Contractor or a subcontractor or prospective subcontractor furnished any data, not within (i), (ii) or (iii) above, which was not accurate, as submitted;

the price shall be reduced accordingly and the contract shall be modified in writing as may be necessary to reflect such reduction. However, any reduction in the contract price due to defective subcontract data of a prospective subcontractor, when the subcontract was not subsequently awarded to such subcontractor, will be limited to the amount (plus applicable overhead and profit markup) by which the actual subcontract, or actual cost to the

Contractor if there was no subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor, provided the actual subcontract price was not affected by defective cost or pricing data.
Note: Since the contract is subject to reduction under this clause by reason of defective cost or pricing data submitted in connection with certain subcontracts, it is expected that the contractor may wish to include a clause in each such subcontract requiring the subcontractor to appropriately indemnify the contractor. However, the inclusion of such a clause and the terms thereof are matters for negotiation and agreement between the contractor and the subcontractor, provided that they are consistent with DAR 23-203 relating to Disputes provisions in subcontracts. It is also expected that any subcontractor subject to such indemnification will generally require substantially similar indemnification for defective cost or pricing data required to be submitted by his lower tier subcontractors. (DAR 7-104.29(b))

63. INTEREST (1972 MAY)

Notwithstanding any other provision of this contract, unless paid within thirty (30) days, all amounts that become payable by the Contractor to the Government under this contract (net of any applicable tax credit under the Internal Revenue Code) shall bear interest from the date due until paid and shall be subject to adjustments as provided by Part 6 of Appendix E of the Defense Acquisition Regulation, as in effect on the date of this contract. The interest rate per annum shall be the interest rate in effect which has been established by the Secretary of the Treasury pursuant to Public Law 92-41; 85 STAT 97 for the Renegotiation Board, as of the date the amount becomes due as herein provided. Amounts shall be due upon the earliest one of (i) the date fixed pursuant to this contract; (ii) the date of the first written demand for payment, consistent with this contract, including demand consequent upon default termination; (iii) the date of transmittal by the Government to the Contractor of a proposed supplemental agreement to confirm completed negotiations fixing the amount; or (iv) if this contract provides for revision of prices, the date of written notice to the Contractor stating the amount of refund payable in connection with a pricing proposal or in connection with a negotiated pricing agreement not confirmed by contract supplement. (DAR 7-104.39)

64. AUDIT BY DEPARTMENT OF DEFENSE (1978 AUG)

(The following clause is applicable unless this contract was entered into by formal advertising and is not in excess of $100,000)

(a) General. The Contracting Officer or his representatives shall have the audit and inspection rights described in the applicable paragraphs (b), (c) and (d) below.

(b) Examination of Costs. If this is a cost reimbursement type, incentive, time and materials, labor hour, or price redeterminable contract, or any combination thereof, the Contractor shall maintain, and the Contracting Officer or his representatives shall have the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to reflect properly all direct and indirect costs of whatever nature claimed to have been incurred and anticipated to be incurred for the performance of this contract. Such right of examination shall include inspection at all reasonable times of the Contractor's plants, or such parts thereof, as may be engaged in the performance of this contract.

(c) Cost or Pricing Data. If the Contractor submitted cost or pricing data in connection with the pricing of this contract or any change or modification thereto, unless such pricing was based on adequate price

competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation, the Contracting Officer or his representatives who are employees of the United States Government shall have the right to examine all books, records, documents and other data of the Contractor related to the negotiation, pricing or performance of such contract, change or modification, for the purpose of evaluating the accuracy, completeness and currency of the cost or pricing data submitted. Additionally, in the case of pricing any change or modification exceeding $100,000 to formally advertised contracts, the Comptroller General of the United States or his representatives who are employees of the United States Government shall have such rights. The right of examination shall extend to all documents necessary to permit adequate evaluation of the cost or pricing data submitted, along with the computations and projections used therein.

(d) Reports. If the Contractor is required to furnish Contractor Cost Data Reports (CCDR), Contract Fund Status Reports (CFSR), or Cost Performance Reports (CPR) the Contracting Officer or his representatives shall have the right to examine books, records, other documents, and supporting materials, for the purpose of evaluating (i) the effectiveness of the Contractor's policies and procedures to produce data compatible with the objectives of these reports, and (ii) the data reported.

(e) Availability. The materials described in (b), (c) and (d) above shall be made available at the office of the Contractor, at all reasonable times, for inspection, audit, or reproduction, until the expiration of three years from the date of final payment under this contract or such lesser time specified in Appendix M of the Defense Acquisition Regulation, and for such longer period, if any, as is required by applicable statute, or by other clauses of this contract, or by (1) and (2) below:

(1) If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for a period of three years from the date of any resulting final settlement.

(2) Records which relate to appeals under the "Disputes" clause of this contract, or litigation or the settlement of claims arising out of the performance of this contract, shall be made available until such appeals, litigation, or claims have been disposed of.

(f) The Contractor shall insert a clause containing all the provisions of this clause, including this paragraph (f), in all subcontracts exceeding $10,000 hereunder, except altered as necessary for proper identification of the contracting parties and the Contracting Officer under the Government prime contract. (DAR 7-104.41(a))

65. SUBCONTRACTOR COST OR PRICING DATA - PRICE ADJUSTMENTS (1970 JAN)

(The following clause is applicable if this contract is in excess of $500,000)

(a) Paragraphs (b) and (c) of this clause shall become operative only with respect to any modification made pursuant to one or more provisions of this contract which involves aggregate increases and/or decreases in costs plus applicable profits expected to exceed $500,000. The requirements of this clause shall be limited to such modifications.

(b) The Contractor shall require subcontractors hereunder to submit cost or pricing data under the following circumstances: (i) prior to the award of any subcontract the amount of which is expected to exceed $500,000 when entered into; (ii) prior to the pricing of any subcontract modification which involves aggregate increases and/or decreases in costs plus applicable profits expected to exceed $500,000; except where the price is based on adequate price

competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation.

(c) The Contractor shall require subcontractors to certify that to the best of their knowledge and belief the cost and pricing data submitted under (b) above is accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract change or modification.

(d) The Contractor shall insert the substance of this clause including this paragraph (d) in each subcontract which exceeds $500,000. (DAR 7-104.42(b))

66.1 GOVERNMENT-FURNISHED PROPERTY (SHORT FORM) (1964 NOV)

(The following clause is applicable when Government Property having an acquisition cost of $50,000 or less is furnished to or acquired by the Contractor)

(a) The Government shall deliver to the Contractor, for use only in connection with this contract, the property described in the schedule or specifications (hereinafter referred to as "Government-furnished property"), at the times and locations stated therein. If the Government-furnished property, suitable for its intended use, is not so delivered to the Contractor, the Contracting Officer shall, upon timely written request made by the Contractor, and if the facts warrant such action, equitably adjust any affected provision of this contract pursuant to the procedures of the "Changes" clause hereof.

(b) Title to Government-furnished property shall remain in the Government. The Contractor shall maintain adequate property control records of Government-furnished property in accordance with sound industrial practice.

(c) Unless otherwise provided in this contract, the Contractor, upon delivery to him of any Government-furnished property, assumes the risk of, and shall be responsible for, any loss thereof or damage thereto except for reasonable wear and tear, and except to the extent that such property is consumed in the performance of this contract.

(d) The Contractor shall, upon completion of this contract, prepare for shipment, deliver f.o.b. origin, or dispose of all Government-furnished property not consumed in the performance of this contract or not theretofore delivered to the Government, as may be directed or authorized by the Contracting Officer. The net proceeds of any such disposal shall be credited to the contract price or paid in such other manner as the Contracting Officer may direct. (DAR 7-104.24(f))

66.2 GOVERNMENT PROPERTY (FIXED PRICE) (1968 SEP)

(The following clause is applicable when Government Property having an acquisition cost in excess of $50,000 is furnished to or acquired by the Contractor)

(a) Government-Furnished Property. The Government shall deliver to the Contractor, for use in connection with and under the terms of this contract, the property described as Government-furnished property in the Schedule or specifications, together with such related data and information as the Contractor may request and as may reasonably be required for the intended use of such property (hereinafter referred to as "Government-furnished property"). The delivery or performance dates for the supplies or services to be furnished by the Contractor under this contract are based upon the expectation that Government-furnished property suitable for use (except for such property furnished "as is") will be delivered to the Contractor at the times stated in the Schedule or, if not so stated, in sufficient time to

enable the Contractor to meet such delivery or performance dates. In the event that Government-furnished property is not delivered to the Contractor by such time or times, the Contracting Officer shall, upon timely written request made by the Contractor, make a determination of the delay, if any, occasioned the Contractor thereby, and shall equitably adjust the delivery or performance dates or the contract price, or both, and any other contractual provision affected by any such delay, in accordance with the procedures provided for in the clause of this contract entitled "Changes." Except for Government-furnished property furnished "as is," in the event the Government-furnished property is received by the Contractor in a condition not suitable for the intended use the Contractor shall, upon receipt thereof, notify the Contracting Officer of such fact and, as directed by the Contracting Officer, either (i) return such property at the Government's expense or otherwise dispose of the property, or (ii) effect repairs or modifications. Upon the completion of (i) or (ii) above, the Contracting Officer upon written request of the Contractor shall equitably adjust the delivery or performance dates or the contract price, or both, and any other contractual provision affected by the rejection or disposition, or the repair or modification, in accordance with the procedures provided for in the clause of this contract entitled "Changes." The foregoing provisions for adjustment are exclusive and the Government shall not be liable to suit for breach of contract by reason of any delay in delivery of Government-furnished property or delivery of such property in a condition not suitable for its intended use.

(b) Changes in Government-furnished Property.

(1) By notice in writing, the Contracting Officer may (i) decrease the property provided or to be provided by the Government under this contract, or (ii) substitute other Government-owned property for property to be provided by the Government, or to be acquired by the Contractor for the Government, under this contract. The Contractor shall promptly take such action as the Contracting Officer may direct with respect to the removal and shipping of property covered by such notice.

(2) In the event of any decrease in or substitution of property pursuant to subparagraph (1) above, or any withdrawal of authority to use property provided under any other contract or lease, which property the Government had agreed in the Schedule to make available for the performance of this contract, the Contracting Officer, upon the written request of the Contractor (or, if the substitution of property causes a decrease in the cost of performance, on his own initiative), shall equitably adjust such contractual provisions as may be affected by the decrease, substitution, or withdrawal, in accordance with the procedures provided for in the "Changes" clause of this contract.

(c) Title. Title to all property furnished by the Government shall remain in the Government. In order to define the obligations of the parties under this clause, title to each item of facilities, special test equipment, and special tooling (other than that subject to a "Special Tooling" clause) acquired by the Contractor for the Government pursuant to this contract shall pass to and vest in the Government when its use in the performance of this contract commences, or upon payment therefor by the Government, whichever is earlier, whether or not title previously vested. All Government-furnished property, together with all property acquired by the Contractor title to which vests in the Government under this paragraph, is subject to the provisions of this clause and is hereinafter collectively referred to as "Government

property." Title to Government property shall not be affected by the incorporation or attachment thereof to any property not owned by the Government, nor shall such Government property, or any part thereof, be or become a fixture or lose its identity as personalty by reason of affixation to any realty.

(d) Property Administration. The Contractor shall comply with the provisions of Appendix B, Defense Acquisition Regulation, as in effect on the date of the contract, which is hereby incorporated by reference and made a part of this contract. Material to be furnished by the Government shall be ordered or returned by the Contractor, when required, in accordance with the "Manual for Military Standard Requisitioning and Issue Procedure (MILSTRIP) for Defense Contractors" (Appendix H, Defense Acquisition Regulation) as in effect on the date of this contract, which Manual is hereby incorporated by reference and made a part of this contract.

(e) Use of Government Property. The Government property shall, unless otherwise provided herein or approved by the Contracting Officer, be used only for the performance of this contract.

(f) Utilization, Maintenance and Repair of Government Property. The Contractor shall maintain and administer, in accordance with sound industrial practice, and in accordance with applicable provisions of Appendix B, a program for the utilization, maintenance, repair, protection, and preservation of Government property until disposed of by the Contractor in accordance with this clause. In the event that any damage occurs to Government property the risk of which has been assumed by the Government under this contract, the Government shall replace such items or the Contractor shall make such repair of the property as the Government directs; provided however, that if the Contractor cannot effect such repair within the time required, the Contractor shall dispose of such property in the manner directed by the Contracting Officer. The contract price includes no compensation to the Contractor for the performance of any repair or replacement for which the Government is responsible, and an equitable adjustment will be made in any contractual provisions affected by such repair or replacement of Government property made at the direction of the Government, in accordance with the procedures provided for in the "Changes" clause of this contract. Any repair or replacement for which the Contractor is responsible under the provisions of this contract shall be accomplished by the Contractor at his own expense.

(g) Risk of Loss. Unless otherwise provided in this contract, the Contractor assumes the risk of, and shall be responsible for, any loss of or damage to Government property provided under this contract upon its delivery to him or upon passage of title thereto to the Government as provided in paragraph (c) hereof, except for reasonable wear and tear and except to the extent that such property is consumed in the performance of this contract.

(h) Access. The Government, and any persons designated by it, shall at all reasonable times have access to the premises wherein any Government property is located, for the purpose of inspecting the Government property.

(i) Final Accounting and Disposition of Government Property. Upon the completion of this contract, or at such earlier dates as may be fixed by the Contracting Officer, the Contractor shall submit, in a form acceptable to the Contracting Officer, inventory schedules covering all items of Government property not consumed in the performance of this contract (including any resulting scrap) or not theretofore delivered to the Government, and shall prepare for shipment, deliver f.o.b. origin, or dispose of the Government property, as may be directed or authorized by the Contracting Officer. The net proceeds of any such disposal shall be credited to the contract price or shall be paid in such other manner as the Contracting Officer may direct.

(j) Restoration of Contractor's Premises and Abandonment. Unless otherwise provided herein, the Government:

(i) may abandon any Government property in place, and thereupon all obligations of the Government regarding such abandoned property shall cease; and

(ii) has no obligation to the Contractor with regard to restoration or rehabilitation of the Contractor's premises, neither in case of abandonment (paragraph (j)(i) above), disposition on completion of need or of the contract (paragraph (i) above), nor otherwise, except for restoration or rehabilitation costs which are properly included in an equitable adjustment under paragraph (b) above.

(k) Communications. All communications issued pursuant to this clause shall be in writing or in accordance with the "Manual for Military Standard Requisitioning and Issue Procedure (MILSTRIP) for Defense Contractors" (Appendix H, Defense Acquisition Regulation). (DAR 7-104.24(a))

67. VARIATIONS IN ESTIMATED QUANTITIES (1968 APR)

(The following clause is not applicable to bid items listed in the "Variations in Estimated Quantities - Subdivided Items" clause, and also is not applicable to contracts for dredging work which contain the "Variations in Estimated Quantities - Dredging" clause.)

Where the quantity of a pay item in this contract is an estimated quantity and where the actual quantity of such pay item varies more than fifteen percent (15%) above or below the estimated quantity stated in this contract, an equitable adjustment in the contract price shall be made upon demand of either party. The equitable adjustment shall be based upon any increase or decrease in costs due solely to the variation above one hundred fifteen percent (115%) or below eighty-five percent (85%) of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contracting Officer shall, upon receipt of a written request for an extension of time within ten (10) days from the beginning of such delay, or within such further period of time which may be granted by the Contracting Officer prior to the date of final settlement of the contract, ascertain the facts and make such adjustment for extending the completion date as in his judgment the findings justify. (DAR 7-603.27)

68. PROGRESS CHARTS AND REQUIREMENTS FOR OVERTIME WORK (1965 JAN)

(a) The Contractor shall within 5 days or within such time as determined by the Contracting Officer, after date of commencement of work, prepare and submit to the Contracting Officer for approval a practicable schedule, showing the order in which the Contractor proposes to carry on the work, the date on which he will start the several salient features (including procurement of materials, plant and equipment) and the contemplated dates for completing the same. The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion at any time. The Contractor shall enter on the chart the actual progress at such intervals as directed by the Contracting Officer, and shall immediately deliver to the Contracting Officer three copies thereof. If the Contractor fails to submit a progress schedule within the time herein prescribed, the Contracting Officer may withhold approval of progress payment estimates until such time as the Contractor submits the required progress schedule.

(b) If, in the opinion of the Contracting Officer, the Contractor falls behind the progress schedule, the Contractor shall take such steps as may be necessary to improve his progress and the Contracting Officer may require him

to increase the number of shifts, or overtime operations, days of work, or the amount of construction plant, or all of them, and to submit for approval such supplementary schedule or schedules in chart form as may be deemed necessary to demonstrate the manner in which the agreed rate of progress will be regained, all without additional cost to the Government.

(c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this provision shall be grounds for determination by the Contracting Officer that the Contractor is not prosecuting the work with such diligence as will insure completion within the time specified. Upon such determination the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part thereof, in accordance with the clause of the contract entitled "Termination for Default - Damages for Delay - Time Extensions." (DAR 7-603.48)

69. CERTIFICATION OF REQUESTS FOR ADJUSTMENT OR RELIEF EXCEEDING $100,000 (1980 FEB)

(The following clause is applicable if this contract is expected to exceed $100,000 and the procurement instrument identification number is prefixed by the letters "DACA")

(a) Any contract claim, request for equitable adjustment to contract terms, request for relief under Public Law 85-804, or other similar request exceeding $100,000 shall bear, at the time of submission, the following certificate given by a senior company official in charge at the plant or location involved:

> 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; and that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable.
>
> _____
> (Official's Name)
>
> _____
> (Title)

(b) The certification in paragraph (a) requires full disclosure of all relevant facts, including cost and pricing data.

(c) The certification requirement in paragraph (a) does not apply to:

(i) requests for routine contract payments--for example, those for payment for accepted supplies and services, routine vouchers under cost reimbursement-type contracts and progress payment invoices;

(ii) final adjustments under incentive provisions of contracts;

(d) In those situations where no claim certification for the purposes of Section 813 has been submitted prior to the inception of a contract dispute, a single certification, using the language prescribed by the Contract Disputes Act but signed by a senior company official in charge at the plant or location involved, will be deemed to comply with both statutes. (DAR 7-104.102)

70. AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION (1982 FEB)

(a) As used in this clause:

(1) "Covered area" means the geographical area described in the solicitation from which this contract resulted;

(2) "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

(3) "Employer identification number" means the Federal social security number used on the employer's quarterly federal tax return, U.S. Treasury Department Form 941.

(4) "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

(b) Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of this clause and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitation from which this contract resulted.

(c) If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan, in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals.

(d) The Contractor shall implement the specific affirmative action standards provided in subparagraphs (g)(1) through (16) of this clause. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. If the Contractor performs construction work (whether or not it is Federal or Federally assisted) in a geographical area located outside of the covered area, it shall apply the goals established for the geographical area where such work is actually performed. The Contractor is expected to make substantially uniform progress toward its goal in each craft.

(e) Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under this clause, Executive Order 11246, or the regulations promulgated pursuant thereto.

(f) In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

(g) The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with this clause shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

(1) Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

(2) Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

(3) Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

(4) Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

(5) Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under (g)(2) above.

(6) Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority

and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

(7) Review, at least annually, the company's EEO policy and affirmative action obligations under this clause with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(8) Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and subcontractors with whom the Contractor does or anticipates doing business.

(9) Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(10) Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.

(11) Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

(12) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

(13) Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under this clause are being carried out.

(14) Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

(15) Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

(16) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

(h) Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations ((g)(1) through (16)). The efforts of a contractor association, joint contractor-union, contractor-community, or other

similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under (g)(1) through (16) of this clause provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractors noncompliance.

(i) A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

(j) The Contractor shall not use the goals or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

(k) The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

(l) The Contractor shall carry out such sanctions and penalties for violation of this clause and of the Equal Opportunity clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of this clause and Executive Order 11246, as amended.

(m) The Contractor, in fulfilling its obligations under this clause shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph (g) of this clause, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or this clause, the Director shall proceed in accordance with 41 CFR 60-4.8.

(n) The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

(o) Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program). (DAR 7-603.60)

71. UTILIZATION OF WOMEN-OWNED BUSINESS CONCERNS (OVER $10,000) (1980 AUG)

(a) It is the policy of the United States Government that women-owned businesses shall have the maximum practicable opportunity to participate in the performance of contracts awarded by any Federal agency.

(b) The Contractor agrees to use its best efforts to carry out this policy in the award of subcontracts to the fullest extent consistent with the efficient performance of this contract. As used in this contract, a "women-owned business" concern means a business that is at least 51 percent owned by a woman or women who are U.S. citizens and who also control and operate the business and that is a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto. "Control" in this context means exercising the power to make policy decisions. "Operate" in this context means being actively involved in the day-to-day management.

(c) Contractors acting in good faith may rely on written representations by their subcontractors regarding their status as women-owned business concerns. (DAR 7-104.52)

72. ENVIRONMENTAL LITIGATION (1974 NOV)(OCE)

(a) If the performance of all or any part of the work is suspended, delayed, or interrupted due to an order of a court of competent jurisdiction as a result of environmental litigation, as defined below, the Contracting Officer, at the request of the Contractor, shall determine whether the order is due in any part to the acts or omissions of the Contractor or a Subcontractor at any tier not required by the terms of this contract. If it is determined that the order is not due in any part to acts or omissions of the Contractor or a Subcontractor at any tier other than as required by the terms of this contract, such suspension, delay, or interruption shall be considered as if ordered by the Contracting Officer in the administration of this contract under the terms of the "Suspension of Work" clause of this contract. The period of such suspension, delay or interruption shall be considered unreasonable, and an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) as provided in that clause, subject to all the provisions thereof.

(b) The term "environmental litigation", as used herein, means a lawsuit alleging that the work will have an adverse effect on the environment or that the Government has not duly considered, either substantively or procedurally, the effect of the work on the environment. (ECI 7-671.10)

SUPERSEDEAS DECISION

STATE: California

COUNTIES: Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura

DECISION NUMBER: CA82-5118

DATE: Date of Publication

Supersedes Decision Nos. CA81-5129 dated July 7, 1981, in 46 FR 34961; and CA81-5154 dated September 25, 1981 in 46 FR 47384

DESCRIPTION OF WORK: Building, Heavy, and Highway Projects; and Residential Projects (excluding Inyo and Mono Counties, California) and Dredging

	Basic Hourly Rates	Fringe Benefits
ASBESTOS WORKERS	$20.25	$2.84
BOILERMAKERS	20.01	3.59
BRICKLAYERS: Stonemasons:		
Area 1	19.09	3.59
Area 2	17.19	3.96
Area 3	18.30	3.22
Area 4	17.65	4.00
Area 5	16.79	4.40
Area 6	16.72	4.06
BRICK TENDERS	13.47	7.28
CARPENTERS:		
Area 1:		
Carpenters	18.29	6.53
Shinglers, Piledrivermen, Bridge or Dock Carpenters	18.42	6.53
Hardwood Floorlayers	18.49	6.53
Millwrights	18.79	6.53
Area 2:		
Carpenters	16.29	6.53
Shinglers; Piledrivermen, Bridge or Dock Carpenters	16.42	6.53
Hardwood Floorlayers	16.49	6.53
Millwrights	16.79	6.53
CEMENT MASONS:		
Area 1:		
Cement Masons	18.56	6.10
Cement Floating and Troweling Machine Operators	18.75	6.10
Area 2:		
Cement Masons	16.56	6.10
Cement Floating and Troweling Machine Operators	16.81	6.10
DRYWALL INSTALLERS:		
Area 1	16.63	5.42
Area 2	14.63	5.42
DIVERS:		
Diver, wet	$37.84	$6.53
Diver, stand-by	18.92	6.53
Diver, tender	17.92	6.53
ELECTRICIANS:		
Area 1:		
Electricians	20.32	4.22
Cable Splicers	20.77	4.23
Area 2:		
Electricians; Technicians	20.65	4.67
Cable Splicers	22.72	4.73
Area 3:		
Electricians; Technicians; Cable Splicers	19.57	4.81
Area 4:		
Electricians	22.12	2.97
Cable Splicers	23.14	3.00
Area 5:		
Electricians	19.79	4.72
Area 6:		
Electricians	18.20	5.25
Cable Splicers	18.70	5.26
Area 7:		
Electricians	20.98	3.99
Cable Splicers	23.08	4.05
Residential Electricians	10.15	3.66
Area 8:		
Electricians	20.55	3.45
Cable Splicers	22.05	3.49
Area 9:		
Electricians	19.11	4.04
Cable Splicers	21.02	4.10
Area 10:		
Electricians	23.55	3.54
Cable Splicers	25.05	3.58
Area 11:		
Electricians	24.40	4.78
Cable Splicers	26.47	4.84

	Basic Hourly Rates	Fringe Benefits
ELEVATOR CONSTRUCTORS:		
Area 1:		
Mechanics	$18.67	$2.465+a
Helpers	13.07	2.645+a
Probationary Helpers	9.34	
Area 2:		
Mechanics	24.22	2.465+a
Helpers	16.95	2.465+a
Probationary Helpers	12.11	
GLAZIERS:		
Area 1	16.12	4.27
Area 2	16.02	2.65
IRONWORKERS:		
Fence Erectors	16.41	7.03
Structural, Ornamental, Reinforcing	17.30	7.03
IRRIGATION and LAWN SPRINKLERS	13.52	5.44
LATHERS:		
Area 1	14.94	3.95
Area 2	15.50	3.88
Area 3	17.78	6.53
Area 4	14.80	4.58
Area 5	15.87	3.35
LINE CONSTRUCTION:		
Area 1:		
Groundman	15.85	3.60
Lineman	20.59	3.74
Cable Splicers	20.89	3.75
Area 2:		
Groundman	15.46	4.51
Lineman	20.65	4.67
Cable Splicers	22.72	4.73
Area 3:		
Groundman	14.73	2.72
Lineman; Equipment Operators	18.09	2.82
Cable Splicers	18.92	2.85
Area 4:		
Lineman	19.32	5.05
Cable Splicers	19.57	4.81
Area 5:		
Lineman	18.22	5.25
Cable Splicers	18.70	5.26
LINE CONSTRUCTION: (Cont'd)		
Area 6:		
Groundman	$13.17	$4.18
Lineman; Equipment Operators	17.56	4.31
Cable Splicers	18.06	4.32
Area 7:		
Groundman	15.07	3.81
Lineman; Equipment Operators	20.23	3.97
Cable Splicers	22.25	4.03
Area 8:		
Groundman	17.69	4.00
Lineman; Equipment Operators	19.11	4.04
Cable Splicers	21.02	4.10
Area 9:		
Groundman	18.36	3.38
Lineman; Equipment Operators	23.55	3.54
Cable Splicers	25.05	3.58
Area 10:		
Groundman	19.24	4.63
Lineman	24.40	4.78
Cable Splicer	26.47	4.84
Area 11:		
Groundman	15.41	3.29
Lineman; Equipment Operators	20.55	3.45
Cable Splicers	22.05	3.49
MARBLE SETTERS:		
Area 1	14.89	5.96
Area 2	17.81	2.95
MARBLE FINISHERS:		
Area 1	13.29	2.30
PAINTERS:		
Area 1:		
Brush; Painter Burners	16.74	3.83
Paperhangers	17.24	3.83
Sandblaster; Iron, steel and Bridge (swing stage)	17.74	3.83
Sheet Rock Tapers	16.05	3.83
Brush (swing stage); Spray	16.99	3.83
Steeplejack	18.39	3.83

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	Basic Hourly Rates	Fringe Benefits
PAINTERS: (Cont'd)		
Area 2:		
Brush	$18.27	$4.10
Brush Painter, structural steel, Paint Burner	18.39	4.10
Swing Stage, under 13 stories; Sandblaster; Pressure Roller Operator; Paperhanger	18.52	4.10
Swing Stage, over 13 stories	18.64	4.10
Paste Machine Operator	18.77	4.10
Spray Painter; Steeplejack	19.52	4.10
Taper	19.31	4.10
Area 3:		
Brush	13.70	3.82
Brush or Roller (swing stage); Paperhangers; Tapers (sheet rock)	14.20	3.82
Spray; Sandblaster	14.70	3.82
Steeplejack	15.70	3.82
Area 4:		
Brush, Pot Tender	17.48	3.61
Paperhangers, Paste Machine Operators; Iron and Steel	17.73	3.61
Spray, Taper; Sandblaster	17.98	3.61
Sign Painter	18.13	3.61
Iron and Steel Spray Painter	18.23	3.61
Steeplejack	18.48	3.61
Drywall Taper and Spray Texture	19.81	3.61
Parking Lot Striping Work and/or Highway Markers:		
Traffic Delineating Device Applicator	13.42	b+1.55
Wheel Stop Installer, Traffic Surface Sandblaster; Striper	11.96	b+1.55
Slurry Seal Operation:		
Mixer Operator	11.96	b+1.55
Squeegee Man, Applicator Operator and Shuttleman	10.60	b+1.55
Top Man	8.91	b+1.55
PLASTERERS:		
Area 1	18.59	4.985
Area 2	23.90	
Area 3	18.28	
Area 4	16.92	3.25
Area 5	18.56	5.02
Area 6	16.955	2.32
Area 7	12.77	3.86

	Basic Hourly Rates	Fringe Benefits
PLASTERERS' TENDERS:		
Area 1	$16.16	$7.36
Area 2	12.75	6.10
Area 3	16.015	7.31
Area 4	14.14	7.16
Area 5	17.59	5.72
Area 6	16.25	6.10
PLUMBERS; Steamfitters:		
Area 1	18.69	7.43
Area 2	17.59	5.21
Area 3	22.59	5.21
Area 4	18.85	6.71
REFRIGERATION and AIR CONDITIONING:		
Area 1	15.30	3.79
Area 2	17.40	6.40
ROOFERS:		
Area 1	14.79	4.80
Area 2	14.30	1.55
Area 3	16.20	4.00
Area 4	16.82	3.385
Area 5	17.055	2.435
Area 6	16.12	2.135
SHEET METAL WORKERS:		
Area 1	20.35	4.16
Area 2	18.80	3.33
Area 3	18.12	4.62
Area 4	14.16	3.87
Area 5	17.11	3.24
Area 6	17.82	3.83
Area 7	23.80	3.33
SOFT FLOOR LAYERS:		
Area 1	15.40	4.79
Area 2	17.67	3.59
Area 3	15.57	3.69
SPRINKLER FITTERS:		
Area 1	21.87	2.43
Area 2	20.42	2.57
TERRAZZO WORKERS:		
Area 1	17.81	2.95
Area 2	16.50	4.30
TILE SETTERS:		
Area 1	17.81	2.95
Area 2	16.43	3.16
Area 3	15.89	3.95
Area 4	16.30	3.25
Area 5	15.95	1.40
TILE FINISHERS:		
Area 1	12.66	3.65
Area 2	12.80	3.30

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	Basic Hourly Rates	Fringe Benefits
LABORERS:		
AREA 1: Remainder of Counties:		
Group 1	$12.82	$7.28
Group 2	12.97	7.28
Group 3	13.17	7.28
Group 4	13.47	7.28
Group 5	13.67	7.28
(GUNNITE):		
Group 1	15.31	7.16
Group 2	14.36	7.16
Group 3	13.10	7.16
(TUNNEL):		
Group 1	14.73	7.16
Group 2	14.85	7.16
Group 3	15.01	7.16
Group 4	15.29	7.16
AREA 2: Point Arguello, Camp Roberts, Edwards Air Force Base, Naval Ordnance Test Center, Vandenberg Air Force Base:		
Group 1	14.82	7.28
Group 2	14.97	7.28
Group 3	15.17	7.28
Group 4	15.47	7.28
Group 5	15.67	7.28
(TUNNEL):		
Group 1	16.73	7.16
Group 2	16.85	7.16
Group 3	17.01	7.16
Group 4	17.29	7.16
POWER EQUIPMENT OPERATORS: DREDGING		
(Hydraulic Suction Dredges):		
Leverman	18.60	5.91
Watch Engineer; Welder; Deckmate	18.02	5.91
Winchman (Stern winch or Dredge)	17.47	5.91
Bargeman; Deckhand; Fireman; Oiler; Leveehand	16.93	5.91
Dozer	18.13	5.91
(Clamshell Dredges)		
Leverman	18.60	5.91
Watch Engineer; Deckmate	18.02	5.91
Barge Mate	17.54	5.91
Bargeman; Deckhand; Fireman; Oiler	16.93	5.91

	Basic Hourly Rates	Fringe Benefits
POWER EQUIPMENT OPERATORS (Cont'd):		
Group 1	$16.75*	$5.81
Group 2	17.03*	5.81
Group 3	17.32*	5.81
Group 4	17.46*	5.81
Group 5	17.68*	5.81
Group 6	17.79*	5.81
Group 7	17.91*	5.81
Group 8	18.08*	5.81
Group 9	18.21*	5.81
*When the home of any employee is over 30 road miles from the center of the job or project on Vandenberg Air Force Base, a rate of $22.00 per scheduled work day shall be added to the base pay.		
TRUCK DRIVERS:		
Group 1	16.48*	4.61
Group 2	16.56*	4.61
Group 3	16.62*	4.61
Group 4	16.71*	4.61
Group 5	16.74*	4.61
Group 6	16.76*	4.61
Group 7	16.80*	4.61
Group 8	16.81*	4.61
Group 9	16.86*	4.61
Group 10	16.89*	4.61
Group 11	16.94*	4.61
Group 12	16.96*	4.61
Group 13	17.01*	4.61
Group 14	17.26*	4.61
Group 15	17.51*	4.61
Group 16	17.61*	4.61
Group 17	17.71*	4.61
Group 18	18.01*	4.61
Group 19	18.51*	4.61
*When the home of an employee is over 30 road miles from the center of the job or project on Vandenberg Air Force Base, a rate of $20.00 per scheduled work day shall be added to the Base Pay.		

FOOTNOTES:

a. Employer contributes 8% of basic hourly rate for over 5 years' service and 6% of basic hourly rate for 6 months to 5 years' service as Vacation Pay Credit. Six Paid Holidays: A through F.

b. Employer contributes $.23 per hour to Holiday Fund plus $.14 per hour to Vacation Fund for the first year of employment, 1 year but less than 5 years $.34 per hour to Vacation Fund, 5 years but less than 10 years $.44 per hour to Vacation Fund, over 10 years $.54 per hour to Vacation Fund.

PAID HOLIDAYS:
A-New Year's Day; B-Memorial Day; C-Independence Day; D-Labor Day; E-Thanksgiving Day; F-Christmas Day

AREA DESCRIPTIONS

BRICKLAYERS; Stonemasons:
Area 1: Imperial County
Area 2: Inyo, Kern, and Mono Counties
Area 3: Los Angeles and Orange Counties
Area 4: Riverside and San Bernardino Counties
Area 5: Santa Barbara and San Luis Obispo Counties
Area 6: Ventura County

CARPENTERS:
Area 1: Camp Roberts, Edwards Air Force Base, Naval Ordnance Test Station, Point Arguello and Vandenberg Air Force Base
Area 2: Remaining Counties

CEMENT MASONS:
Area 1: Camp Roberts, Edwards Air Force Base, Naval Ordnance Test Station, Point Arguello and Vandenberg Air Force Base
Area 2: Remaining counties

DRYWALL INSTALLERS:
Area 1: Camp Roberts, Edwards Air Force Base, Naval Ordnance Test Station, Point Arguello and Vandenberg Air Force Base
Area 2: Remaining Counties

DIVERS:*
Shall receive a minimum of 8 hours pay for any day or part thereof.

ELECTRICIANS:
Area 1: Imperial County
Area 2: Kern County (Remainder of County)
Area 3: Los Angeles County
Area 4: Orange County
Area 5: Riverside County
Area 6: Inyo, Mono, and San Bernardino Counties

AREA DESCRIPTIONS (Cont'd)

ELECTRICIANS: (Cont'd)
Area 7: San Luis Obispo County
Area 8: Santa Barbara (Remainder of County)
Area 9: Ventura County
Area 10: Point Arguello and Vandenberg Air Force Base
Area 11: China Lake Naval Ordnance Test Station and Edwards Air Force Base

ELEVATOR CONSTRUCTORS:
Area 1: Imperial and Inyo Counties; Kern County (south of Tehachapi Range); Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties
Area 2: Kern County (north of Tehachapi Range)

GLAZIERS:
Area 1: Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, San Luis Obispo, and Ventura Counties
Area 2: Imperial County

IRONWORKERS:
Where the project is located 60 miles or more from the City Halls indicated below, the following amount shall be added to the Base Pay:
60 miles to 100 miles - $18.00 per day
100 miles and over - $24.00 per day

City Hall of San Francisco, Oakland, San Jose, Sacramento, Stockton, Fresno, Barkersfield, Eureka, Redding, Napa, Los Angeles, San Diego, San Bernardino, Ventura, and El Centro

LATHERS:
Area 1: Inyo, Kern, and Mono Counties
Area 2: Los Angeles County (except City of Lancaster)
Area 3: Ventura County
Area 4: Orange County
Area 5: Riverside County

LINE CONSTRUCTION:
Area 1: Imperial County
Area 2: Kern County (Rmmainder of County)
Area 3: Orange County
Area 4: Los Angeles County
Area 5: Inyo, Mono, and San Bernardino Counties
Area 6: Riverside County
Area 7: San Luis Obispo County
Area 8: Ventura County
Area 9: Point Arguello and Vandenberg Air Force Base
Area 10: China Lake Naval Ordnance Test Station and Edwards Air Force Base
Area 11: Santa Barbara (Remainder of County)

AREA DESCRIPTIONS (Cont'd)

MARBLE SETTERS:
Area 1: Inyo and Mono Counties
Area 2: Imperial County

MARBLE FINISHERS:
Area 1: Imperial County

PAINTERS:
Area 1: Imperial, Orange, and Riverside Counties; Los Angeles County (Pomona Area); San Bernardino County (excluding western portion)
Area 2: Inyo County; Los Angeles County (except Pomona Area); Mono County; San Bernardino County (west of a line north of Trono including China Lake Area, Johannesburg, Boron, south including the Wrightwood Area); Kern County east of the Los Angeles Aqueduct)
Area 3: Kern County (except the portion lying east of the Los Angeles Aqueduct)
Area 4: San Luis Obispo, Santa Barbara, and Ventura Counties

PLASTERERS:
Area 1: Los Angeles and Orange Counties
Area 2: Imperial, Riverside, and San Bernardino Counties
Area 3: San Luis Obispo County
Area 4: Santa Barbara County
Area 5: Ventura County
Area 6: Point Arguello and Vandenberg Air Force Base
Area 7: Kern, Inyo, and Mono Counties

PLASTERERS' TENDERS:
Area 1: Imperial, Inyo, Mono, Riverside, and San Bernardino Counties
Area 2: Kern County
Area 3: Los Angeles and Orange Counties
Area 4: San Luis Obispo and Santa Barbara Counties
Area 5: Ventura County
Area 6: China Lake Naval Ordnance Test Station and Edwards Air Force Base

PLUMBERS: Steamfitters:
Area 1: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties
Area 2: Inyo, Kern, and Mono Counties
Area 3: Edwards Air Force Base, Naval Weapons-Center and China Lake Naval Ordnance Test Center
Area 4: Point Arguello and Vandenberg Air Force Base

AREA DESCRIPTIONS (Cont'd)

REFRIGERATION and AIR CONDITIONING:
Area 1: Riverside and San Bernardino Counties
Area 2: Los Angeles and Orange Counties

ROOFERS:
Area 1: Imperial County
Area 2: Inyo, Kern, and Mono Counties
Area 3: Riverside and San Bernardino Counties
Area 4: Los Angeles, Orange, and Ventura Counties
Area 5: San Luis Obispo and Santa Barbara Counties
Area 6: Point Arguello and Vandenberg Air Force Base

SHEET METAL WORKERS:
Area 1: Imperial County
Area 2: Kern County and all of Inyo and Mono Counties; Los Angeles County (that portion north of a straight line drawn between Gorman and Big Pines)
Area 3: Los Angeles County (remaining portion)
Area 4: Orange County
Area 5: Riverside and San Bernardino Counties
Area 6: San Luis Obispo, Santa Barbara, and Ventura Counties
Area 7: Edwards Air Force Base and China Lake Naval Weapons Base

SOFT FLOOR LAYERS:
Area 1: Imperial County
Area 2: Los Angeles, Orange, Riverside, Santa Barbara, San Luis Obispo, San Bernardino, and Ventura Counties
Area 3: Kern, Inyo and Mono Counties

SPRINKLER FITTERS:
Area 1: Imperial, Inyo, Kern, and Mono Counties; Orange County (except Santa Ana); Riverside County, San Bernardino County (except Ontario); San Luis Obispo, Santa Barbara and Ventura Counties
Area 2: Los Angeles City and area within 25 miles and Pomona Area; Orange County (Santa Ana); San Bernardino County (Ontario); and Ventura County (Santa Paula, Point Mugu and Port Hueneme)

TERRAZZO WORKERS:
Area 1: Imperial County
Area 2: Remaining Counties

TILE SETTERS:
Area 1: Imperial County
Area 2: Los Angeles, Orange, and Ventura Counties
Area 3: San Luis Obispo and Santa Barbara Counties
Area 4: Riverside and San Bernardino Counties
Area 5: Inyo, Kern, and Mono Counties

TILE FINISHERS:
Area 1: Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties
Area 2: Kern, Inyo and Mono Counties

LABORERS

Group 1: Cleaning and handling of panels forms; Concrete Screeding for rough strike-off; Concrete, water curing; Demolition Laborer, the cleaning of brick and lumber; Dry packing of concrete, plugging, filling or Shee-bolt Holes; Fire Watcher, Limber, Brush Loaders, Pilers and Debris Handlers; Gas, oil and/or water pipeline Laborer; Laborer, general or construction; Laborer, general cleanup; Laborer, landscaping; Laborer, jetting, temporary water and air lines; Material Hoseman (walls, slabs, floors, and decks); Rigging and signaling; Scaler; Slip Form Raisers; Slurry Seal Crews (Mixer Operator, Applicator Operator, Squeegee Man, Shuttle Man, Top Man); Striper, Concrete or other paved surfaces; Tarman and Mortar Man; Tool Crib or Tool House Laborer; Traffic Delineating Device Applicator; Window Cleaner; Wire Mesh, pulling all concrete pouring operations

Group 2: Asphalt Shoveler; Cement Dumper (on 1 yard or larger Mixer and handling bulk cement); Cesspool Digger and Installer, Chucktender; Chute Man, pouring concrete, the handling of the Chute from Ready Mix Trucks, such as walls, slabs, decks, floors, foundations, footings, curb, gutters, and sidewalks; Concrete Curer, Impervious Membrane and Form Oiler; Cutting Torch Operator (demolition); Fine Grader, Highways and street paving, airport, runways, and similar type heavy construction; Gas, oil and/or water Pipeline Wrapper; Pot Tender and Form Man; Guinea Chaser; Headerboard Man, asphalt; Laborer, packing rod steel and pans; Power Broom Sweepers (small); Riprap Stonepaver, placing stone or wet sacked concrete; Roto Scraper and Tiller; Sandblaster (Pot Tender); Septic Tank Digger and Installer (leadman); Tank Scaler and Cleaner; Tree Climber, Faller, Chain Saw Operator, Pittsburgh Chipper and similar type Brush Shredders; Underground Laborer, including Caisson Bellower

Group 3: Asphalt Raker, Lutemen, Ironer and Asphalt Spreader Boxes (all types); Buggymobile Man; Concrete Core Cutter, Grinder or Sander; Concrete Cutting Torch; Concrete Saw Man, cutting, scouring old or new concrete; Driller, Jackhammer, 2½ ft. drill steel or longer; Dri Pak-it Machine; Gas, oil and/or water Pipeline Wrapper, 6" pipe and over, by any method, inside and out; Hydro Seeder and similar type; Impact Wrench Multi-plate; Kettlemen, Potmen and Men applying asphalt, Lay-kold, creosote, lime caustic and similar type materials ("applying" means applying, dipping, brushing or handling of such materials for pipe wrapping and waterproofing); Operators or pneumatic, gas, electric tools; Vibrating Machines, Pavement Breakers, Air Blasting, Come-alongs, and similar mechanical tools not separately classified herein; Pipelayer's Backup Man, coating, grouting, making of joints, sealing, caulking, diapering and including Rubber Gasket Joints, pointing and any and all other services; Rock Slinger; Rotary Scarifier or Multiple Head Concrete Chipping Scarifier; Steel Headerboard Man and Guideline Setter; Tampers; Barko, Wacker, and similar type; Trenching Machine, hand propelled

LABORERS (Cont'd)

Group 4: Cribber, Shorer, Lagging, Sheeting and Trench Bracing; hand-guided Lagging Hammer; Head Rock Slinger; Laser Beam; Oversize Concrete Vibrator Operator, 70 lbs. and over; Pipelayer, including water, sewage, solid, gas or air; Prefabricated Manhole Installer; Sandblaster (Nozzleman), water blasting; Welding in connection with Laborers' work

Group 5: Blaster Powderman, all work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Driller; All power drills, excluding Jackhammer, whether Core, Diamond, Wagon, Track, Multiple Unit, and any and all types of mechanical drills

GUNNITE

Group 1: Nozzlemen and Rodmen

Group 2: Gunmen

Group 3: Reboundmen

TUNNEL

Group 1: Batch Plant Laborers; Bull Gang Mucker, Trackman; Concrete Crew, including Rodders and Spreaders; Changehouseman; Dumpman; Dumpman (outside); Swamper (Brakeman and Switchman on tunnel work); Tunnel materials handling Man; Tool Man

Group 2: Cable Tender; Chuck Tender; Nipper; Steel Form Raiser and Setter's Tender; Vibratorman, Jackhammer, pneumatic tools (except Driller); Loading and unloading Agitator Cars; Pot Tender, using mastic or other materials

Group 3: Blaster, Driller, Powderman; Chemical Grout Jetman; Cherry Pickerman; Grout Gunman; Grout Mixerman; Grout Pumpman; Jackleg Miner; Jumbo Man; Kemper and other pneumatic concrete Placer Operator; Miner, tunnel (hand or machine); Powderman (Primer House); Primer Man; Shotcrete Man; Steel Form Raiser and Setter; Timberman; Retimber (wood or steel); Tunnel Concrete Finisher; Nozzleman; Operating Troweling and/or Grouting Machine; Sandblaster

Group 4: Shaft, Raise Miner; Diamond Driller

POWER EQUIPMENT OPERATORS

Group 1: Brakeman; Compressor (less than 600 C.F.M.); Engineer Oiler; Generator; Heavy Duty repairman; Tender; Pump; Signalman; Switchman

Group 2: Compressor (600 C.P.M. or larger); Concrete Mixer, Skip type, Conveyor; Fireman; Hydrostatic Pump; Oiler Crusher (asphalt or concrete plant); Plant Operator; Generator, Pump or compressor; Rotary Drill Helper (Oilfield); Skiploader, wheel type up to 3/4 yard without attachments; Soils Field Technician; Tar Pot Fireman; Temporary Heating Plant; Trenching Machine Oiler; Truck Crane Oiler

Group 3: A-Frame or Winch Truck; Elevator Operator (inside); Equipment Greaser (rack); Ford Ferguson (with dragtype attachments); Helicopter Radioman (ground); Power Concrete Curing Machine; Power Concrete Saw; Power driven Jumbo Form Setter; Ross Carrier (job site); Stationary Pipe Wrapping and Cleaning Machine

Group 4: Asphalt Plant Fireman; Boring Machine; Boxman or Mixerman (apshalt or concrete); Chip Spreading Machine; Concrete Pump (small portable); Bridge type Unloader and Turntable; Dinkey Locomotive or Motorman (up to and including 10 tons); Equipment Greaser (Greaser Truck); Helicopter Hoist; Highline Cableway Signalman; Hydra-Hammer-Aero Stomper; Power Sweeper; Roller (compacting); Screed (asphalt or concrete); Trenching Machine (up to 6 feet)

Group 5: Asphalt Plant Engineer; Backhoe (up to and including 3/4 yard); Batch Plant; Bit Sharpener; Concrete Joint Machine (canal and similar type); Concrete Planer; Deck Engine; Derrick Man (Oilfield type); Drilling Machine Operator (including water wells); Forklift (under 5 ton capacity); Hydrographic Seeder Machine (straw, pulp or seed); Machine Tool Operator; Maginnis Internal Full Slab Vibrator; Mechanic Berm, Curb or Gutter (asphalt or concrete); Mechanical Finisher (concrete-Clary, Johnson, Bidwell, or similar); Pavement Breaker (truck mounted); Road Oil Mixing Machine; Roller (asphalt or finish); Rubber-tired Earth Moving Equipment (single engine, up to and including 25 yards struck); Self-propelled Tar Pipelining Machine; Slip Form Pump (power driven hydraulic lifting device for concrete forms); Skip-loader (Crawler and wheel type, over 3/4 yard and up to and including 1½ yards); Stinger Crane (Austin-Western or similar type); Tractor, Bulldozer, Tamper Scraper (single engine, up to 100 HP, flywheel and similar types, up to and including D-5 and similar types); Tugger Hoist, 1 drum; Tunnel Locomotive (over 10 tons up to and including 30 tons); Welder-general

POWER EQUIPMENT OPERATORS (Cont'd)

Group 6: Asphalt or Concrete Spreading (tamping or finishing); Asphalt Paving Machine (Barber Greene or similar type); Bridge Crane Operator; Cast-in-place Pipe Laying Machine; Combination Mixer and Compressor (Gunite work); Compactor, self-propelled; Concrete Mixer - paving; Concrete Pump (truck mounted); Crane Operator up to and including 25 ton capacity) (Long-boom pay applicable); Crushing Plant; Drill Doctor; Elevating Grader; Forklift (over 5 tons); Grade Checker; Grade-all; Grouting Machine; Heading Shield; Heavy Duty Repairman; Hoist Operator (Chicago Boom and similar type); Kolman Belt Loader and similar type; LeTourneau Blob Compactor or similar type; Lift Mobile; Lift Slab Machine (Vagtborg and similar types); Loader (Athey, Euclid, Sierra and similar type); Material Hoist, Mucking Machine (1/4 yard rubber tired, rail or track or similar type); Pneumatic Heading Shield (tunnel); Pumpcrete Gun; Rotary Drill (excluding Caisson type); Rubber-tired Earth Moving Equipment (single engine, Caterpillar, Euclid, Athey, Wagon and similar types with any and all attachments, over 25 yards struck); Rubber-tired Scraper (self-loading paddle wheel type, John Deere, 1040 and similar single unit); Skip-loader (Crawler and wheel type, over 1½ yds., up to and including 6½ yds.); Surface Heaters and Planer; Trenching Machine (over 6 ft. depth capacity); Tower Crane; Tractor Compressor Drill Combination; Tractor (any type larger than D-5-100 flywheel HP and over, or similar); Bulldozer, Tamper, Scraper and Push Tractor (single engine); Tractor (boot attachments); Traveling Pipe Wrapping, Cleaning and Bending Machine; Tunnel Locomotive (over 30 tons); Shovel, Backhoe, Dragline, Clamshell (over 3/4 yd. and up to 5 cu. yds. M.R.C.) (Long-boom pay applicable); Self-propelled Curb and Gutter Machine

Group 7: Crane, over 25 ton up to and including 100 tons M.R.C. (Long boom pay applicable); Derrick Barge (Long boom pay applicable); Dual Drum Mixer; Heavy Duty Repairman, Welder combination; Hoist, Stiff-legs, Guy Derrick or similar type, up to and including 100 tons (Long boom pay applicable); Monorail Locomotive (diesel, gas or electric); Motor Patrol-blade Operator (single engine); Multiple Engine Tractor (Euclid and similar type, except Quad 9 Cat); Rubber-tired Earth Moving Equipment (single engine, over 50 yds. struck); Rubber-tired Earth Moving Equipment (multiple engine, Euclid, Caterpillar and similar) (over 25 yards and up to 5 cu. yds. struck); Shovel, Backhoe, Dragline, Clamshell (over 5 cu. yds. M.R.C.) (Long boom pay applicable); Tower Crane Repairman; Tractor Loader (Crawler and wheel type, over 6½ yards); Welder, certified; Woods Mixer and similar Pugmill Equipment

POWER EQUIPMENT OPERATORS (Cont'd)

Group 8: Auto Grader; Automatic Slip Form; Crane-over 100 tons (Long-boom pay applicable); Hoist, Stiff Legs, Guy Derrick or similar types (capable of hoisting 100 tons or more) (Long boom pay applicable); Mass Excavator, less than 750 cu. yds.; Mechanical Finishing Machine; Mobile Form Traveler; Motor Patrol, multi-engine; Pipe Mobile Machine; Rubber-tired Earth Moving Equipment (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck); Rubber-tired Self-loading Scraper (paddle wheel, auger type self-loading, 2 or more units); Rubber-tired Scraper, pushing one another without Push Cat. Push-pull (50¢ per hour additional to base rate); Tandem Equipment (2 units only); Tandem Tractor (Quad 9 or similar type); Tunnel Mole Boring Machine

Group 9: Canal Liner; Canal Trimmer; Helicopter Pilot; High-line Cableway; Remote Controlled Earth Moving Equipment ($1.00 per hour additional to base rate); Wheel Excavator (over 750 cu. yds.)

TRUCK DRIVERS

Group 1: Warehouseman and Teamster

Group 2: Driver of vehicle or combinations of vehicles of 2 axles (including all vehicles less than 6 tons); Traffic Control Pilot Car, excluding moving heavy equipment permit load

Group 3: Truck mounted power Broom

Group 4: Drivers of vehicles or combination of vehicles of 3 axles

Group 5: Bootman; Cement Distributor; Fuel Truck; Road Oil Spreader Truck; Water Truck, 2 axle

Group 6: Dump, or less than 16 yards

Group 7: Transit-mix, under 3 yards; Dumpcrete, less than 6½ yards

Group 8: Truck Repairman Helper

Group 9: Water Truck, 3 or more axles

TRUCK DRIVERS (Cont'd)

Group 10: PB and similar type truck when performing within the Teamsters' jurisdiction; Pipeline and Utility working Truck including Winch, but limited to truck applicable to Pipeline and Utility work, where a composite crew is used; Slurry Driver; Truck Greaser and Tireman (50¢ per hour addition for Tireman)

Group 11: Transit-Mix, 3 yards or more; Dumpcrete, 6½ yards and over

Group 12: Driver or vehicle or combination of vehicles of 4 or more axles

Group 13: Dump, 16 yards but less than 25 yards

Group 14: A-Frame or Swedish Crane, or similar type of equipment Driver; Fork Lift Driver; Rose Carrier, highway

Group 15: All off-highway equipment (off highway combination of vehicles or equipment with multiple power sources, $1.00 per hour additional); Dump, 25 yds. or more; Truck Repairman

Group 16: Truck Repairman Welder

Group 17: Low Bed Driver, 9 axle or over

Group 18: Water Pull, single engine with attachments

Group 19: Water Pull, twin engine with attachments

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)(ii)).

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MODIFICATION PAGE 6

DECISION NO. CA82-5118 - Mod. #1
(47 FR 36513 - August 20, 1982)
Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties, California

	Basic Hourly Rates	Fringe Benefits
Change:		
Bricklayers; Stonemasons:		
Area 4	$17.50	$4.15
Area 5	17.09	4.61
Area 6	17.47	4.06
Drywall Installers	18.06	6.56
Electricians:		
Area 3:		
Electricians	21.52	3%+4.47
Cable Splicers	22.12	3%+4.47
Area 6:		
Electricians	19.00	3%+4.90
Cable Splicers	19.50	3%+4.90
Elevator Constructors:		
Area 1:		
Mechanics	22.24	a+2.69
Helpers	15.57	a+2.69
Probationary Helpers	11.12	
Area 2:		
Mechanics	27.295	a+2.69
Helpers	19.11	a+2.69
Porbationary Helpers	13.65	
Glaziers:		
Area 1	17.62	5.03
Ironworkers:		
Fence Erectors	16.41	8.03
Structural, Ornamental, and Reinforcing	17.30	8.03
Irrigation and Lawn Sprinklers	15.00	39%
Lathers:		
Area 2	18.52	3.63
Area 4	17.70	4.58
Line Construction:		
Area 7:		
Groundman	$15.74	3%+3.36
Lineman; Equipment Operators	20.98	3%+3.36
Cable Splicers	23.08	3%+3.36
Plasterers' Tenders:		
Area 5	17.97	6.52
Roofers:		
Area 2	14.55	1.55
Area 4	18.17	5.485
Sheet Metal Workers:		
Area 6	18.32	10%+4.05
Sprinkler Fitters:		
Area 2	22.39	2.57
Tile Setters:		
Area 2	17.68	3.16
Area 4	16.70	4.20

DECISION NO. CA82-5118 - Mod. #2
(47 FR 36513 - August 20, 1982)
Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties, California

Change:	Basic Hourly Rates	Fringe Benefits
Bricklayers; Stonemasons:		
Area 3	$18.75	$3.52
Area 6	17.97	4.06
Electricians:		
Area 9:		
Electricians	23.11	3%+3.97
Cable Splicers	25.42	3%+3.97
Line Construction:		
Area 8:		
Groundman	17.69	3%+3.97
Lineman; Equipment Operators	23.11	3%+3.97
Cable Splicers	25.42	3%+3.97
Painters:		
Parking Lot Striping Work and/or Highway Markers:		
Traffic Delineating Device Applicator	13.41	b+1.60
Wheel Stop Installer, Traffic Surface Sandblaster; Striper	12.92	b+1.60
Slurry Seal Operation:		
Mixer Operator	12.92	b+1.60
Squeegee Man, Applicator Operator and Shuttleman	11.45	b+1.60
Top Man	9.62	b+1.60
Refrigeration and Air Conditioning:		
Area 2	19.89	7.85
Add:		
Bricklayers; Stonemasons:		
Area 7: Orange County	19.00	2.97

CHANGE:	Basic Hourly Rates	Fringe Benefits
Bricklayers;Stonemasons:		
Area 3: Los Angeles Co.		

DECISION NO. CA82-5118 - Mod. #1
(47 FR 36513 - August 20, 1982)
Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties, California

	Basic Hourly Rates	Fringe Benefits
Change:		
Asbestos Workers	$21.29	$3.83
Electricians:		
Area 1:		
Electricians	21.32	3%+3.61
Cable Splicers	21.77	3%+3.61
Area 4:		
Electricians	23.12	3%+2.31
Area 5:		
Electricians	20.79	3%+4.13
Cable Spicers	21.29	3%+4.13
Area 6:		
Electricians	20.00	3%+4.90
Cable Splicers	20.50	3%+4.90
Soft Floor Layers:		
Area 1	17.80	3.59
Plumbers; Steamfitters:		
Area 2	17.89	5.53
Area 3	22.59	5.53

MODIFICATIONS P. 2

DECISION NO. CA82-5118 - Mod. #4
(47 FR 36513 - August 20, 1982)
Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernatdino, San Luis Obispo, Santa Barbara, and Ventura Counties, California

	Basic Hourly Rates	Fringe Benefits
Change:		
Electricians:		
Area 7:		
Electricians	$22.23	$3.36+ 3%
Cable Splicers	24.45	3.36+ 3%
Residential Electricians	11.40	3.36+ 3%
Area 8:		
Electricians	20.95	3.18+ 3%
Cable Splicers	22.45	3.18+ 3%
Area 9:		
Electricians	20.41	3.67+ 3%
Area 10:		
Electricians	24.20	3.18+ 3%
Cable Splicers	25.70	3.18+ 3%
Line Construction:		
Area 7:		
Groundman	16.67	3.33+ 3%
Lineman; Equipment Operators	22.23	3.33+ 3%
Cable Splicers	24.45	3.33+ 3%
Area 8:		
Lineman; Equipment Operators	20.41	3.67+ 3%
Area 9:		
Groundman	18.96	3.18+ 3%
Lineman; Equipment Operators	24.20	3.18+ 3%
Cable Splicers	25.70	3.18+ 3%

	Basic Hourly Rates	Fringe Benefits
Marble Setters:		
Area 2	$18.50	$2.95
Marble Finishers:		
Area 1	14.14	3.30
Painters:		
Area 4:		
Brush, Pot Tender	18.49	3.61
Paperhangers, Paste Machine Operators; Iron and Steel	18.73	3.61
Spray, Taper; Sandblastor	18.18	3.61
Sign Painter	19.13	3.61
Stoeplejack	19.46	3.61
Drywall Taper and Spray Texture	19.81	3.61
Sheet Metal Workers:		
Area 6	19.17	4.20+ 10%
Terrazzo Workers:		
Area 1	18.50	2.95
Tile Setters:		
Area 1	18.50	2.95
Power Equipment Operators:		
Dredging:		
(Hydraulic Suction Dredges)		
Leverman	18.10	6.41
Watch Engineer; Welder; Deckmate	17.52	6.41
Winchman (stern winch or Dredge)	16.97	6.41
Bargeman; Deckhand; Fireman; Oiler; Leveehand	16.43	6.41
Dozer	17.63	6.41
(Clamshell Dredges):		
Leverman	18.10	6.41
Watch Engineer; Deckmate	17.52	6.41
Barge Mate	17.04	6.41
Bargeman; Deckhand; Fireman; Oiler	16.43	6.41

DECISION NO. CA82-5118 (Cont'd)

	Basic Hourly Rates	Fringe Benefits
Power Equipment Operators:		
Group 1	$16.25	$6.41
Group 2	16.53	6.41
Group 3	16.82	6.41
Group 4	16.96	6.41
Group 5	17.18	6.41
Group 6	17.29	6.41
Group 7	17.41	6.41
Group 8	17.58	6.41
Group 9	17.71	6.41

	Basic Hourly Rates	Fringe Benefits

DECISION NO. CA82-5118 - Mod. #5 (47 FR 36513-August 20, 1982) Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties, California	Basic Hourly Rates	Fringe Benefits
Change:		
Electricians:		
Area 1:		
Electricians	$21.15	$3.78+ 3%
Cable Splicers	21.60	3.78+ 3%
Area 3:		
Electricians	22.97	4.62+ 3%
Cable Splicers	23.57	4.62+ 3%
Area 7:		
Electricians	21.23	3.36+ 3%
Cable Splicers	23.35	3.36+ 3%
Residential Electricians	10.40	3.36+ 3%
Fathers:		
Area 1	15.59	4.30
Area 4	18.06	5.58
Line Construction:		
Area 1:		
Linemen	20.66	3.86+ 3%
Cable Splicers	20.96	3.86+ 3%
Area 7:		
Groundman	15.92	3.33+ 3%
Lineman; Equipment Operators	21.23	3.33+ 3%
Cable Splicers	23.35	3.33+ 3%
Tile Finishers:		
Area 1	13.73	3.71

DECISION NO.CA82-5118 - Mod. 16 (47 FR 36513 - Aug.20,1982 Imperial,Inyo,Kern,Los Angeles, Mono,Orange,Riverside,San Bernardino,San Luis Obispo,Santa Barbara, and Ventura Counties, California	Basic Hourly Rates	Fringe Benefits
Change:		
Electricians:		
Area 9	$23.11	3.97+ 3%

DECISION NO. CA82-5118 - Mod. 87
(47 FR 36513-August 20, 1982)
Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties, California

	Basic Hourly Rates	Fringe Benefits
Change:		
Electricians:		
Area 9	$23.11	$4.47+ 3%
Line Construction:		
Area 1:		
Lineman	21.26	3.65+ 4%
Cable Splicers	21.56	3.65+ 4%
Area 8:		
Groundman	18.38	4.47+ 3%
Lineman; Equipment Operators	23.11	4.47+ 3%
Cable Splicers	26.96	4.47+ 3%
Soft Floor Layers:		
Area 2	18.17	4.05

DECISION NO. CA82-5118 - Mod. 18 (47 FR 36513 - August 20, 1982) Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties, California	Basic Hourly Rates	Fringe Benefits
CHANGE:		
Sheet Metal Workers: Area 5	$20.08	$4.28

DECISION NO. CA82-5118 - Mod. 89
(47 FR 36513 - August 20, 1982)
Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties, California

	Basic Hourly Rates	Fringe Benefits
Change:		
Bricklayers; Stonemasons:		
Area 3	$20.50	$3.32
Area 7	20.75	2.97
Add:		
Add asterisks denoting footnote to Basic Hourly Rate of Power Equipment Operators, Group 1 thru 9 as published in Modification Number 4 on January 3, 1983		

Decision No. CA82-5119 - Mod. #10
(47 FR 36513 - August 20, 1982)
Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties, California

	Basic Hourly Rates	Fringe Benefits
Change:		
Bricklayers; Stonemasons:		
Area 4	$18.00	$4.20
Area 5	17.59	4.60
Electricians:		
Area 1:		
Electricians	22.15	3.78+ 3%
Cable Splicers	22.60	3.75+ 3%
Area 4:		
Electricians	22.88	3.55+ 3%
Cable Splicers	23.93	3.55+ 3%
Area 5:		
Electricians	21.79	4.12+ 3%
Cable Splicers	22.29	4.12+ 3%
Area 6:		
Electricians	21.00	4.90+ 3%
Cable Splicers	21.50	4.90+ 3%
Area 8:		
Electricians	22.20	3.18+ 3%
Cable Splicers	23.70	3.18+ 3%
Area 10:		
Electricians	25.70	3.18+ 3%
Cable Splicers	27.20	3.18+ 3%
Line Construction:		
Area 9:		
Groundmen	20.15	3.18+ 3%
Linemen; Equipment Operators	25.70	3.18+ 3%
Cable Splicers	27.20	3.18+ 3%
Tile Setters:		
Area 4	18.00	4.20

Reference: DACW09-83-B-0016

SPECIFICATIONS

for

NEW RIVER DAM

Phoenix, Arizona

Appropriation: 96x3122, Construction General
Corps of Engineers, Civil

Authority: FCA of 1965
P.L. 89-298

US Army Corps
of Engineers
Los Angeles District

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PART I

SPECIAL PROVISIONS

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1. COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (1965 JAN). The Contractor will be required to commence work under this contract within 5 calendar days after the date of receipt by him of notice to proceed, to prosecute said work diligently, and to complete the entire work ready for use not later than 710 calendar days after the date of receipt of notice to proceed except seeding and planting. Seeding and planting shall be accomplished as soon as practicable and within time limits stated in the Technical Provisions or directed by the Contracting Officer. The time stated for completion shall include final clean-up of the premises.

1.1 Stage III Embankment. Construction of the Stage III embankment indicated on the drawings shall not begin prior to completion of Stage I and Stage II construction. Stage III embankment shall be constructed during the periods of 15 September to 15 November or 1 April to 30 June.

1.2 Spillway, Dikes 1 and 2 shall be completed prior to beginning Stage III embankment construction.

1.3 Outlet Works. Construction of outlet works shall be completed prior to beginning Stage III embankment construction.

2. LIQUIDATED DAMAGES (1965 JAN). In case of failure on the part of the Contractor to complete the work within the time fixed in the contract or any extensions thereof, the Contractor shall pay to the Government as liquidated damages, pursuant to the clause of this contract entitled "Termination for Default-Damages for Delay-Time Extensions," the sum of $500.00 for each day of delay.

3. CONTRACT DRAWINGS, MAPS AND SPECIFICATIONS (1965 JAN).

3.1 Ten sets of large scale contract drawings, maps and specifications will be furnished the Contractor without charge, except applicable publications incorporated into the Technical Provisions by reference. Additional sets will be furnished on request at the cost of reproduction. The work shall conform to the

following contract drawings and maps, all of which form a part of these specifications and are available in the office of the U.S. Army Engineer District, Los Angeles, 300 North Los Angeles Street, Los Angeles, California.

Drawing No. (District File No.)	Title
241/226	Index, Vicinity Map and Project Location Map
241/227	General Plan
241/228	General Site Geology and Diamond Drill Hole Plan of Exploration
241/229	Dam Embankment Foundation Geologic Profile
241/230	Dam Embankment Geologic Logs of Diamond Drill Holes
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241/237	Outlet Works Geologic Logs of Diamond Drill Holes
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241/240	Spillway Plan of Exploration and Logs of Test Trenches
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241/242	Spillway Profile and Sections
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241/245	Refractive Seismic Surveys Plan
241/246	Dam Embankment and Outlet Works Refractive Seismic Surveys Time-Distance Curves and Profiles
241/247	Dike No. 1 Refractive Seismic Surveys Time-Distance Curves and Profile
241/248	Spillway and Dike No. 2 Refractive Sesimic Surveys Time-Distance Curves and Profiles
241/249	Dam Embankment Foundation Soils Exploration Plan
241/250	Borrow Areas Exploration Plan
241/251	Dam Embankment Foundation Soil Logs
241/252	Dam Embankment Foundation Soil Logs
241/253	Dam Embankment Foundation Soil Logs
241/254	Dike No. 1 Foundation Soil Logs
241/255	Borrow Area Nos. 1 and 2 Soil Logs
241/256	Borrow Area No. 3 Soil Logs
241/257	Borrow Area No. 3 Soil Logs
241/258	Borrow Area No. 3 Soil Logs
241/259	Borrow Area No. 3 Soil Logs
241/260	Miscellaneous Exploration (Outside Designated Borrow Areas) Soil Logs

241/261	Dam Embankment Foundation Grouting Profile and Details
241/262	Dam Embankment Plan and Profile
241/263	Dam Embankment Cross Sections
241/264	Dam Embankment Cross Section and Details
241/265	Dam Embankment Cross Section and Detail
241/266	Dam Embankment Cross Sections
241/267	Dam Embankment Typical Sections
241/268	Dam Embankment Turnarounds, Pipe Handrail and Log Barrier Details
241/269	Diversion and Control of Water East and West Diversion Levees Plan, Profiles and Details
241/270	Dike No. 1 Plan and Profile Sta. 84+75± to Sta. 52+00
241/271	Dike No. 1 Plan and Profile Sta. 52+00 to Sta. 22+00
241/272	Dike No. 1 Plan and Profile Sta. 22+00 to Sta. 10+00 and Drainage Details
241/273	Dike No. 1 Cross Sections and Typical Sections
241/274	Dike No. 2 Plan and Profile and Typical Section
241/275	Spillway Plan and Profile
241/276	Spillway Cross Sections, Sill Sections and Details
241/277	Spillway and Dike No. 1 Turnarounds, Guardrail Details and Entrance Gate
241/278	Outlet Works Plan and Profile Sta 24+00± to Sta. 10+50
241/279	Outlet Works Plan and Profile Sta. 10+50 to Sta. 1+73±
241/280	Outlet Works Cross Sections
241/281	Outlet Works Cross Sections and Details-Outlet Channel
241/282	Outlet Works Intake Structure
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~~241/301~~	~~Dike No. 1 Landscape Grading Plan~~
241/302	Dike No. 1 Landscape Plan
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241/304	Dam Embankment and Dike No. 1 Landscape Sections and Schemes
241/305	General Plan Landscape (Miscellaneous)

3.2 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 they shall be performed as if fully and correctly set forth and described in the drawings and specifications.

3.3 The Contractor shall check all drawings furnished him immediately upon their receipt and shall promptly notify the Contracting Officer of any discrepancies. Figures marked on drawings shall in general be followed in preference to scale measurements. Large scale drawings shall in general govern small scale drawings. The Contractor shall compare all drawings and verify the figures before laying out the work and will be responsible for any errors which might have been avoided thereby.

4. CONTRACTOR SUBMITTALS.

4.1 General. Reference is made to the General Provision entitled "Shop Drawings". The Contractor shall submit for approval all shop drawings, certificates of compliance and/or equipment lists called for under the various headings of these specifications. These drawings, certificates and lists shall be complete and detailed. If approved by the Contracting Officer, each copy of the drawings, certificates, or lists will be identified as having received such approval by being so stamped and dated. The Contractor shall make any corrections required by the Contracting Officer. Unless otherwise specified in the Technical Provisions, the number of copies to be submitted shall be as stated herein. The Contractor shall complete ENG Form 4025, "Transmittal of Shop Drawings, Equipment Data, Material Samples, or Manufacturer's Certificates of Compliance for Approval" and forward 6 copies of same with each set of shop drawings, certificates of compliance, or equipment lists submitted. Blank ENG Forms 4025 will be furnished by the Contracting Officer on request. Each shop drawing submitted for approval shall have, in the lower right hand corner just above the title, a white space 3 inches x 4 inches in which the Contracting Officer can indicate the action taken. Shop drawings for submittal shall be either blue line or black line prints on a white background. Blueprints are not acceptable. Each shop drawing, certificate of compliance, and/or equipment list shall be identified with the following information as applicable:

Contract Number
Project Title and Location
Subcontractor's Name
Supplier's Name
Manufacturer's Name
Contract Specification and Paragraph Number
Contract Drawing File Number

4.1.1 Contractor Certification. Each submittal of the shop drawings shall contain the following certification on the face of the ENG Form 4025 accompanying the submittal:

> "I have reviewed the shop drawings in detail and they are correct and in strict conformance with the contract drawings and specifications except as otherwise explicitly stated.
>
> Authorized Prime Contractor Representative"

4.2 Shop Drawings and Materials Submittal Register. Within 15 calendar days after commencement of work under this contract, the Contractor shall submit a preliminary register showing all shop drawings, certificates of compliance, equipment lists, samples, and other data required to be submitted under the various headings of these specifications. The register shall be submitted in duplicate. The preliminary register shall show the submittal identification number, the type of submittal, and the description for all items to be submitted under this contract and, for all items needed prior to submittal of the Project Progress Schedule, the scheduled submittal date, approval need date, and the material/equipment need date shall also be included. The register shall be expanded to include all Contractor scheduled dates and shall be resubmitted within 15 calendar days after submittal of the project progress schedule. After original approval the register shall be updated to indicate actual dates, actions completed, and any additional submittals or resubmittals required, and two copies of all updated sheets shall be submitted on or before the fifteenth of each month. The register shall provide adequate time for review and approval of the submitted material and shall be coordinated with the construction progress schedule to assure that all equipment and materials will be available for incorporation into the work in accordance with approved schedule of construction operations. Payment for materials incorporated into the work will not be allowed until required approvals have been obtained.

4.3 Shop Drawings. The Contractor shall submit to the Contracting Officer for approval 10 copies of all shop drawings as called for under the various headings of these specifications. Nine sets of all shop drawings will be retained by the Contracting Officer and one set will be returned to the Contractor.

4.4 Certificates of Compliance (1969 MAY OCE). Any certificates required for demonstrating proof of compliance of materials with specification requirements shall be executed in 6 copies. 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.

4.5 Resubmittals. If a submittal is returned for correction or is not satisfactory and is disapproved by the Contracting Officer, the Contractor shall resubmit the corrected material in the same quantity, as specified for the original submittal, for approval within 14 calendar days after receipt by him of the disapproved material.

5. PHYSICAL DATA.

5.1 General. Information and data furnished or referred to below are furnished for the Contractor's information. However, it is expressly understood that the Government will not be responsible for any interpretation or conclusion drawn therefrom by the Contractor.

5.2 The physical conditions indicated on the drawings and in the specifications are the result of site investigations by survey, test trenches, borings and seismic surveys.

5.3 Weather Conditions.

5.3.1 Average temperature for period of record from 1951 to 1979 (29 years) inclusive at Phoenix, Arizona

Month	Average Daily Maximum	Average Daily Minimum	Average	Maximum	Minimum
Jan	62.7	39.1	50.9	88	19
Feb	~~68.6~~ 69.6	42.2	55.9	89	26
March	74.6	46.6	60.9	95	25
April	83.1	52.8	67.9	101	37
May	92.5	61.6	77.0	113	40
June	102.2	70.5	86.3	117	51
July	104.9	79.4	92.1	118	57
Aug	102.3	77.2	89.9	114	61
Sep	98.2	70.8	84.5	111	47
Oct	87.6	59.0	73.3	104	34
Nov	71.7	46.3	59.2	93	29
Dec	70.7	45.3	58.3	83	18

5.3.2 Hydrological Data. The following hydrological data were obtained from the U.S. Weather Bureau records for Phoenix, Arizona. The number of rainy days does not include days with only a trace of rainfall recorded.

1951-1979

	Total for Period of Record			Mean for Period of Record
Month	No. Rainy Days	Total Rainfall In Inches	No. of Days	Rainfall (inches)
Jan	114	20.41	4.0	0.70
Feb	105	14.27	3.6	0.49
March	100	23.52	3.4	0.81
April	48	8.57	1.6	0.29
May	25	4.33	0.9	0.10
June	29	3.48	1.0	0.12
July	115	21.55	4.0	0.74
Aug	141	30.60	4.9	1.05
Sept	78	18.93	2.7	0.65
Oct	80	18.89	2.8	0.65
Nov	69	16.09	2.4	0.55
Dec	103	24.81	3.5	0.85
Total	1007	205.51	34.66	7.00

5.4 Transportation Facilities. The Contractor shall make his own investigation of the condition of available public and private roads and railroads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress at the site of work. It shall be the Contractor's responsibility to construct and maintain at his own expense, any haul roads required for construction operations.

5.5 Additional Information, including but not necessarily limited to, results of laboratory tests of material encountered in test holes or other explorations and field logs is available for inspection and study in the Los Angeles of District Office, Geotechnical Branch, Room 6036, 300 North Los Angeles Street, Los Angeles, California.

6. SALVAGE MATERIALS AND EQUIPMENT (1965 JAN). The Contractor shall maintain adequate property control records for all materials or equipment specified to be salvaged. These records may be in accordance with the Contractor's system of property control, if approved by the property administrator. The Contractor shall be responsible for the adequate storage and protection of all salvaged materials and equipment and shall replace, at not cost to the Government, all salvaged materials and equipment which are broken or damaged during salvage operations as the result of his negligence, or while in his care.

7. LAYOUT OF WORK. (1965 APR OCE)

7.1 The Government will establish bench marks at the site of the work.

7.2 From the bench marks established by the Government the Contractor shall complete the layout of the work and shall be responsible for all measurements that may be required for the execution of the work to the location and limit marks prescribed in the specifications or on the contract drawings, subject to such modifications as the Contracting Officer may require to meet changed conditions or as a result of necessary modifications to the contract work.

7.3 The Contractor shall furnish, at his own expense, such stakes, templates, platforms, equipment, tools and material, and all labor as may be required in laying out any part of the work from the bench marks established by the Government. It shall be the responsibility of the Contractor to maintain and preserve all stakes and other marks established by the Contracting Officer until authorized to remove them and if such marks are destroyed, by the Contractor or through his negligence prior to their authorized removal they may be replaced by the Contracting Officer, at his discretion, and the expense of replacement will be deducted from any amounts due or to become due the Contractor. The Contracting Officer may require that work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit checking of the work.

8. QUANTITY SURVEYS (1979 MAR).

8.1 The Government shall make orginal and final surveys and computations to determine the quantities of work performed or finally place.

8.2 The Contractor shall make such surveys and computations as are necessary to determine the quantities of work performed or placed during each period for which a progress payment is to be made. All original field notes, computations and other records for the purpose of layout and progress surveys shall be furnished promptly to the representative of the Contracting Officer at the site of the work and shall be used by the Contracting Officer to the extent necessary in determining the proper amount of progress payments due the Contractor. A copy of the origianl notes, computations and records furnished to the Contracting Officer shall be retained by the Contractor. Unless waived by the Contracting Officer in each specific case, quantity surveys made by the Contractor shall be made under the direction of representative of the Contracting Officer.

9. DAMAGE TO WORK (1966 MAR OCE). The responsibility for damage to any part of the permanent work shall be as set forth in the clause of the contract entitled "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 Clause 3, 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.

10. PERFORMANCE OF WORK BY CONTRACTOR (1965 JAN). The Contractor shall perform on the site, and with his own organization, work equivalent to at least sixty percent (60%) of the total amount of work to be performed under the contract. If, during the progress of the work hereunder the Contractor requests a reduction in such percentage and the Contracting Officer determines that it would be to the Government's advantage, the percentage of the work required to be performed by the Contractor may be reduced, provided written approval of such reduction is obtained by the Contractor from the Contracting Officer.

11. CONTRACTOR QUALITY CONTROL. The Contractor shall provide and maintain an effective quality control program that complies with the clause of the contract entitled "Contractor Inspection System."

11.1 The Contractor shall establish a quality control system to perform suficient inspection and tests of all items of work, including that of his subcontractors, to ensure conformance to applicable specifications and drawings with respect to the materials, workmanship, construction, finish, functional performance, and identification. This control will be established for all construction except where the Technical Provisions of the contract provide for specific Government control by inspections, tests or other means. The Contractor's control system will specifically include the surveillance and tests required in the Technical Provisions of the contract specifications.

11.2 The Contractor's quality control system is the means by which he assures himself that his construction complies with the requirements of the contract plans and specifications. The controls shall be adequate to cover all construction operations and should be keyed to the proposed construction sequence.

11.3 The Contractor's job supervisory staff may be used for quality control, supplemented as necessary by additional personnel for surveillance, special technicians, or testing factilities to provide capability for the controls required by the Technical Provisions of the specifications. Prior approval is required for facilities, equipment, and personnel used by the Contractor in performing the specified tests.

11.4 After the contract is awarded and before cosntruction operations are started, the Contractor shall meet with the Contracting Officer, or his representative, and discuss quality control requirements. The meeting shall develop mutual understanding relative to details of the system, including the forms to be used for recording the quality control operations, inspections, administration of the system, and the interrelationship of Contractor and Government inspection.

11.5 The Contractor shall submit for approval within 10 days after the receipt of the Notice to Proceed a quality control plan which shall include the procedures, instructions, and reports to be used. This document will include as a minimum:

(1) The quality control organization.

(2) Number and qualifications of personnel to be used for this purpose.

(3) Authority and responsibilities of quality control personnel.

(4) Methods of quality control including that for his subcontractor's work.

(5) Test methods including, as specified, name of qualified testing laboratory to be used.

(6) Method of documenting quality control operation, inspection, and testing.

(7) A copy of a letter of direction to the Contractor's representative responsible for the quality control, outlining his duties and responsibilities, and signed by a responsible officer of the firm.

11.6 Unless specifically authorized in writing no construction shall be started until the Contractor's quality control plan is approved.

11.7 All compliance inspection will be recorded on an approved form, including but not limited to the specific items required in the Technical Sections of the Specifications. This form, to include records of corrective action taken, will be furnished to the Government as required by the Contracting Officer.

11.8 If recurring deficiencies in an item or items indicate that the quality control system is not adequate, such corrective actions will be taken as directed by the Contracting Officer.

11.9 In the event the Contractor fails to satisfactorily perform any required inspections and tests; to submit timely, complete, and factual reports and test data; or otherwise comply with the quality control provisions, the Contracting Officer may provide these services from another source and all costs for providing these services will be deducted from payments due the Contractor.

12. VARIATION IN ESTIMATED QUANTITIES-SUBDIVIDED ITEMS (1982 JUN OCE). This clause is applicable only to Items Nos. 6, 10, 33, 34, 35, and 39.

12.1 Variation from the estimated quantity in the actual work performed under any second or subsequent sub-item or elimination of all work under such a second or subsequent sub-item will not be the basis for an adjustment in contract unit price.

12.2 Where the actual quantity of work performed for Items Nos. 6, 10, 33, 34, and 35 is less than 90 percent of the quantity of the first sub-item listed under such item, the Contractor will paid at the contract unit price for that sub-item for the actual quantity of work performed and, in addition, an equitable adjustment in contract price shall be made upon demand of the Contractor. The equitable adjustment in price for the under-run shall be made on the basis that the Contractor has assumed the risk is entitled to no adjustment for the first 10 percent under-run.

12.3 If the quantity of work performed under items Nos. 6, 10, 33, 34, and 35 exceed 105 percent or is less than 96 percent of the total estimated quantity of the sub-items under that item, and/or if the quanitity of work performed under the second sub-item or any subsequent sub-item under Items No. 39 exceed 105 percent or is less than 96 percent of the estimated quantity of any sub-item, and if such variation causes an increase or a decrease in the time required for performance of this contract the contract completion time will be adjusted as follows.

12.3.1 If the quantity variation is such that it will cause an increase in the time necessary for completion, the Contracting Officer shall, upon receipt of a written request for an extension within 10 days from the beginning of such delay or within such further period of time which the Contracting Officer grants prior to the date of final settlement of the contract, ascertain the facts and make such adjustment for extending the completion date is in his judgment the findings justify.

12.3.2 If the quantity variation is such that it will cause a decrease in the time necessary for completion, the Contracting Officer shall ascertain the facts and promptly notify the Contractor in writing of his findings and the extent of adjustment.

12.4 If the parties fail to agree upon the adjustment to be made the dispute shall be determined as provided in Clause 6, "Disputes", of the General Provisions.

13. TIME EXTENSION (1965 JAN). Notwithstanding any other provisions of this contract it is mutually understood that the time extensions for changes in the work depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the contract completion date will be extended only for those specific elements so delayed and that the remaining contract completion dates for all other portions of the work will not be altered and may further provide for an equitable readjustment of liquidated damages pursuant to the new completion schedule.

14. CONTINUING CONTRACTS. (1977 OCT OCE)

14.1 This is a continuing contract, as authorized by Section 10 of the River and Harbor Act of September 22, 1922 (33 U.S. Code 621). The payment of some portion of the contract price is dependent upon reservations of funds from future appropriations. The responsibilities of the Government are limited by this clause notwithstanding any contrary provision of the "Payments to Contractor" clause or any other clause of this contract.

14.2 The sum of $50,000 has been reserved for this contract and is available for payments to the Contractor during the current fiscal year. It is expected that Congress will make appropriations for future fiscal years from which additional funds will be reserved for this contract.

14.2.1 Failure to make payments in excess of the amount currently reserved, or that may be reserved from time to time, shall not entitle the Contractor to a price adjustment under the terms of this contract except as specifically provided in paragraphs 15.6, 15.7, 15.8 and 15.9 below. No such failure shall constitute a breach of this contract, except that this provision shall not bar a breach-of-contract action if an amount finally determined to be due as a termination allowance remains unpaid for one year due solely to a failure to reserve sufficient additional funds therefor.

14.3 The Government may at any time reserve additional funds for payments under the contract if there are funds available for such purpose. The Contracting Officer will promptly notify the Contractor in writing of any additional funds reserved for the contract.

14.3.1 If earnings will be such that funds reserved for the contract will be exhausted before the end of any fiscal year, the Contractor shall give written notice to the Contracting Officer of the estimated date of exhaustion and the amount of additional funds which will be needed to meet payments due or to become due under the contract during that fiscal year. This notice shall be given not less than 45 nor more than 60 days prior to the estimated date of exhaustion.

14.4 No payments will be made after exhaustion of funds except to the extent that additional funds are reserved for the contract. The Contractor shall be entitled to simple interest on any payment that the Contracting Officer determines was actually earned under the terms of the contract and would have been made except for exhaustion of funds. Interest shall be computed from the time such payment would otherwise have been made until actually or constructively made, and shall be at the rate established by the Secretary of the Treasury pursuant to Public Law 92-41, 85 STAT 97, for the Renegotiation Board, as in effect on the first day of the delay in such payment.

14.4.1 Any suspension, delay, or interruption of work arising from exhaustion or anticipated exhaustion of funds shall not constitute a breach of this contract and shall not entitle the Contractor to any price adjustment under the "Suspension of Work" clause or in any other manner under this contract.

14.4.2 An equitable adjustment in performance time shall be made for any increase in the time required for performance of any part of the work arising from exhaustion of funds or the reasonable anticipation of exhaustion of funds.

14.5 If, upon the expiration of sixty (60) days after the beginning of the fiscal year following an exhaustion of funds, the Government has failed to reserve sufficient additional funds to cover payments otherwise due, the Contractor, by written notice delivered to the Contracting Officer at any time before such additional funds are reserved, may elect to treat his right to proceed with the work as having been terminated. Such a termination shall be considered a termination for the convenience of the Government.

14.6 If at any time it becomes apparent that the funds reserved for any fiscal year are in excess of the funds required to meet all payments due or to become due the Contractor because of work performed and to be performed under the contract during the fiscal year, the Government reserves the right, after notice to the Contractor, to reduce said reservation by the amount of such expenses.

15. IDENTIFICATION OF GOVERNMENT FURNISHED PROPERTY (1968 SEP). The Government will furnish to the Contractor the following property to be incorporated or installed in the work or used in its performance. Such property will be furnished, or f.o.b. truck at the project site, and the Contractor will be required to accept delivery when made, paying any demurrage or detention charges incurred, and unloading and transportating the property to the jobsite at his own expense. All such property will be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated herein. The Contractor shall verify the quantity and condition of such Government furnished property when delivered to him, acknowledge receipt thereof in writing to the Contracting Officer.

	Quantity	Items Description
Am 1	~~31~~ 50	Bronze disks for settlement monuments
	12	Bronze Disks for reference monuments
	3	Logos

*The acquisition cost of the Government-furnished items is less than $25,000.000

16. PROPERTY RECORDS (1967 AUG). The Government shall maintain the official contract records in connection with Government property under this contract. The "Government Property" clause is hereby modified by deleting so much thereof as requires that the Contractor maintain such records. (ASPR13-803).

17. APPROVED AGGREGATE SOURCES (1965 APR OCE).

17.1 Concrete Aggregates meeting the requirements of these specifications can be produced from the approved sources listed below.

17.1.1 Commercial sources along the Salt River near Phoenix, Arizona.

17.1.2 Commercial sources along the Agua Fria River near Luke Air Force Base.

17.1.3 Commercial or new sources along Skunk Creek in the vicinity of the project.

17.2 Concrete Aggregate may be furnished from any of the above listed sources or at the option of the Contractor may be furnished from any other source designated by the Contractor and approved by the Contracting Officer, subject to the condition hereinafter stated.

17.3 After the Award of the Contract, the Contractor shall designate in writing only one source or one combination of sources from which he proposes to furnish aggregates. If the Contractor proposes to furnish aggregates from a source or from sources not listed above, he may designate only a single source or single combination of sources for aggregates. Samples for acceptance testing shall be provided as required by section: CONCRETE of the "Technical Provisions". If a source for coarse or fine aggregate so designated by the Contractor is not approved for use by the Contracting Officer, the Contractor may not submit for approval other sources but shall furnish the coarse or fine aggregate, as the case may be, from an approved source listed above at no additional cost to the Government.

17.4 Approval of a source of concrete aggregate is not to be construed as approval of all materials from that source. The right is reserved to reject materials from certain localized areas, zones, strata, or channels, when such materials are unsuitable for concrete aggregate as determined by the Contracting Officer. Materials produced from an approved source shall meet all the requirements of section: CONCRETE of the "Technical Provisions" of these specifications.

18. PAYMENT FOR MOBILIZATION AND PREPARATORY WORK, PAYMENT ITEM NO. 1 (1979 Mar).

18.1 Payments will be made under this contract on the actual expenditures made by the Contractor for mobilization and preparatory work under payment Item No. 1 as follows: The Contractor may submit to the Contracting Officer certified accounts of the actual, payments made by him for construction plant exceeding $10,000 in value per unit, as appraised by the Contracting Officer at the site of the work, acquired for the execution of the work; for the transportation of all plant and equipment to the site; for material purchased for the prosecution of the contract, but not to be incorporated in the work; for construction of camps, access roads or railroads, trailer courts, mess halls, dormitories or living quarters, field headquarters facilities and construction yards, and for personal services and hire of plant on work preparatory to commencing actual work on the construction items for which payment is provided under the terms of the contract. Accounts so submitted must be accompanied by certificate of the Contractor, supported by receipted bills or certified copies of payrolls and freight bills, showing that he has acquired said construction plant and material free from all encumbrances and agreement that it will not be removed from the site and that structures and facilities prepared or erected for the prosecution of the contract work will be maintained and not dismantled prior to the completion and acceptance of the entire work without the written permission of the Contracting Officer. If the Contracting Officer finds said construction plant, material, equipment and the mobilization and preparatory work performed are suitable and necessary to the efficient prosecution of the contract and that the said preparatory work has been done with proper economy and efficiency, payment, less the prescribed retained percentage, will be made therefore to the Contractor. Payment for construction plant, material and structures and facilities prepared or erected for prosecution of the contract work shall not exceed the cost thereof to the Contractor less the estimated value upon the completion of the contract as determined by the Contracting Officer. In no event shall such payment exceed 100 percent of the cost of the Contractor of any such items which have no appreciable salvage value and 75 percent of the cost of the Contractor of such items which have an appreciable salvage value. The findings of the Contracting Officer as to the suitability and value of the construction plant, equipment, materials, structures or facilities shall not be subject to appeal.

18.2 Payments for mobilization and preparatory work will be made in accordance with paragraph above and such payments will be deducted from the contract price for Item No. 1 "Mobilization and Preparatory Work" until the total amount thus charged to this item reduces this item to zero, after which no further payments will be made under this item. If the total of such payments made does not reduce this item to zero, the balance will be paid to the Contractor in the final payment under the contract. The retained percentage will be paid in accordance with the clause of this contract entitled "Payment to Contractor".

19. PROGRESS PAYMENTS. Progress payments made pursuant to the PAYMENTS TO CONTRACTOR Clause for any item of work in the bid schedule shall be based on the contract unit price or lump sum amount set forth in the bid schedule for that item of work. If the amount of the unit price or lump sum bid for any item of work is in excess of 125 percent of the Government estimate for such item, the Contracting Officer may require the Contractor to produce cost data to justify the price of the bid item. Failure to justify the bid item price to to the satisfaction of Contracting Officer may result in payment of an amount equal to 125 percent of the Government estimate for such bid item upon completion of work on the item and payment of the remainder of the bid item price upon final acceptance of all contract work.

20. EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE. (1982 JUN OCE)

20.1 Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a Contractor for work requiring adjustment in contract price shall be based upon actual costs, provided both ownership and operating costs for each piece of equipment or equipment groups of similar serial and series are proposed by the Contractor or known by the Contracting Officer to be available. When actual equipment costs are proposed, the Contracting Officer may require the Contractor to provide documentation in support of such costs. When actual costs are neither proposed nor known to be available, equipment costs shall be based upon the applicable provisions of the "Construction Equipment Ownership and Operating Expense Schedule," Region VII. For forward pricing, the Schedule in effect at the time of negotiations shall apply. For retrospective pricing, the Schedule in effect as of the time work was performed shall apply. For the purpose of determination of the hourly rates to be applied under this contract, working conditions shall be considered to be average unless otherwise determined by the Contracting Officer. Rats for equipment not in the schedule will be computed by the Government using the formulas in the schedule. Where applicable, rates in the schedule may be used for unlisted equipment of comparable horsepower and auxiliary features.

20.2 Equipment rental costs are allowable, subject to the provisions of DAR 15-205.34 and 15-402.2, substantiated by certified reproduced copies of invoices or bills. Rates for equipment rented from a organization under common control, lease-purchase or sale-leaseback arrangements will be determined in accordance with the schedule. A copy of the schedule will be provided to the successful bidder upon request.

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PART II

TECHNICAL PROVISIONS

SECTION 1A

GENERAL REQUIREMENTS

Index

1. Applicable Publications
2. Project Facilities
3. Construction Signs
4. Project Engineer's Office and Laboratory
5. Bulletin Board
6. Maintenance and Disposal of Project Facilities
7. Scrap Materials
8. Salvage Materials
9. Archaeological Findings During Constructions
10. Public Utilities, Notices, and Restrictions
11. Public Safety
12. Occupational Safety and Health Act (OSHA) Standards
13. Quality Control
14. Dust Control

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.

1.1 Federal Specifications (Fed. Spec.).

FF-B-575C	Bolts, Hexagon and Square
FF-N-105B & Am-3	Nails, Brads, Staples and Spikes: Wire, Cut and Wrought
FF-N-836D & Am-1	Nut: Square, Hexagon, Cap, Slotted, Castle, Knurled, Welding, and Single Ball Seat
MM-L-751H	Lumber; Softwood
TT-E-529C & Am-2	Enamel, Alkyd, Semi-Gloss
TT-P-25E & Am-2	Primer, Paint, Exterior (Undercoat for Wood, Ready-Mixed, White and Tints)

1.2 U.S. Department of Commerce National Bureau of Standards, Product Standard.

PS 1-74	Plywood, Construction and Industrial

2. PROJECT FACILITIES. The Contractor shall construct and/or erect the following project facilities.

2.1 Construction Signs. The signs shall be erected as soon as possible and within 15 days after commencement of work under this contract.

2.1.1 Three Project Signs at locations designated by the Contracting Officer.

2.1.2 Warning Signs facing approaching traffic on all haul roads crossing under overhead power transmission lines.

2.1.3 Six Hard Hat Signs at Locations Directed.

2.2 Project Engineer's Office and Laboratory, including a fenced parking area and a flagpole.

2.3 Bulletin Board at the Contractor's Office.

2.4 Sanitary Facilities.

3. CONSTRUCTION SIGNS.

3.1 Materials.

3.1.1 Lumber shall conform to Fed. Spec. MM-L-751, and shall be seasoned Douglas Fir, S4S, Grade D or better except that posts, braces and spacers shall be construction Grade (WCLB).

3.1.2 Plywood shall conform to Product Standard PS 1, grade A-C, Group 1, exterior type.

3.1.3 Bolts, Nuts and Nails. Bolts shall conform to Fed. Spec. FF-B-575, nuts shall conform to Fed. Spec. FF-N-836, and nails shall conform to Fed. Spec. FF-N-105.

3.1.4 Paints and Oils. Paints shall conform to Fed. Spec. TT-P-25 for primer and TT-E-529 for finish paint and lettering.

3.2 Construction.

3.2.1 Project and Hard Hat Signs shall be constructed as detailed on Figures 1, 2 and 3. Decals and safety signs will be furnished by the Contracting Officer.

3.2.2 Warning Signs shall be constructed of plywood not less than 1/2 inch thick and shall be securely bolted to the supports with the bottom of the sign face 3 feet above the ground. The sign face shall be 2 x 4 feet, all letters shall be 4 inches in height, and the wording shall be: "WARNING: OVERHEAD TRANSMISSION LINES."

3.3 Painting. All exposed surfaces and edges of plywood shall be given one coat of linseed oil and be wiped prior to applying primer. All exposed surfaces of signs and supports shall be given one coat of primer and 2 finish coats of white paint. Except as otherwise indicated, lettering on all signs shall be black and sized as indicated.

4. PROJECT ENGINEER'S OFFICE AND LABORATORY.

4.1 General. The Contractor shall provide two suitable office trailers and a laboratory building for the Project Engineer. The exact site will require the Contracting Officer's approval. Both the trailers and the building shall be adequately heated, well lighted, suitably ventilated, and cooled with exterior mounted, 1,000 cubic feet per minute minimum size, pad-type evaporative coolers,

complete, with all piping and electrical connections. An adequate supply of cooled drinking water shall be furnished and maintained. Open parking space for 6 vehicles and water and sanitary facilities shall be located convenient to the office and laboratory. The combined parking and building area shall be enclosed with a woven wire fence approximately 6 feet high with a 10-foot wide lockable gate accessible from a road or street. The fenced area shall be of sufficient size to permit ease in the parking of vehicles. Materials for the facilities need not be new provided they are adequate for the intended use.

4.2 Each Office Trailer shall be approximately 10 feet wide by 60 feet in length.

4.3 Laboratory Building shall be a weathertight prefabricated metal structure and shall have a 6-inch thick steel troweled concrete slab floor and contain not less than 3,000 square feet of floor area. At least 200 square feet of the building shall have an 18-foot ceiling clearance. The laboratory shall be equipped with water supply, a sink approximately 20 x 35 x 8 inches, and the usual utilities. In addition to the above requirements the Contractor shall provide two 3' x 3' x 3' concrete equipment pads with anchor bolts. Size and location anchor bolts will be provided. The Contractor shall also install approximately 300 lineal feet of shelf-workbench space. The prefabricated metal structure shall be provided with a 8 foot high x 10 foot wide roll-up door in addition to at least 2 standard 3 foot exterior doors.

4.4 Flagpole. The Contractor shall furnish and erect a flagpole at the Project Engineer's Office. The flagpole shall be either wood or sectional steel type, a product of a reputable manufacturer who has been regularly engaged in the manufacture of flagpoles. The flagpole shall be complete with standard fittings and equipment, including pulley, cleats, ground protector, halyards, and snap hooks. The pole shall have 20 feet exposed height and be set in concrete foundation in conformance with the manufacturer's recommendations. Painting of the wooden pole shall conform to the applicable requirements for the project sign. Steel pole shall be galvanized.

5. BULLETIN BOARD. A weatherproof bulletin board, approximately 36 inches wide and 30 inches high, with hinged glass door shall be provided adjacent to or mounted on the Contractor's project office. If adjacent to the office, the bulletin board shall be securely mounted on no less than 2 posts. Bulletin board and posts shall be painted or have other approved factory finish. The bulletin board shall be easily accessible at all times and shall contain wage rates, equal opportunity notice, and such other items required to be posted.

6. MAINTENANCE AND DISPOSAL OF PROJECT FACILITIES. The Contractor shall maintain the project facilities in good condition throughout the life of the project. Upon completion of work under this contract, the facilities covered under this section will remain the property of the Contractor and shall be removed from the site at his expense.

7. SCRAP MATERIAL. Materials indicated to be removed and not indicated to be salvaged, stored or reinstalled are designated as scrap and shall become the property of the Contractor and be removed from the site of the work. The Contractor by signing this contract hereby acknowledges that he made due allowance for value, if any, of such scrap in the contract price.

8. SALVAGE MATERIALS. All materials and/or equipment removed and indicated to be either stored or reinstalled are designated as salvaged materials and/or equipment. Any salvaged materials and equipment which are excess upon completion

of the work and are not indicated to be stored shall become the property of the Contractor.

9. ARCHAEOLOGICAL FINDINGS DURING CONSTRUCTION. The removal of any Indian burial grounds or remains, ceremonial objects, petroglyphs, and archaeological and other artifacts of like nature found within the construction areas will be accomplished by the Government. In the event the Contractor's operations uncover, or his employees find any of the above described objects or materials within the construction areas, it shall be incumbent on the Contractor to notify immediately the Project Engineer or his authorized representative as to what has been found. The Project Engineer, when so notified of such findings, will determine the disposition in accordance with prescribed regulations. Any remains from burials, including Indian ceremonial objects, or other remains of like nature found within the construction area, shall not be destroyed or removed. Should petroglyphs or archaeological material be discovered, the Contractor shall modify his operations so as not to disturb the findings pending receipt of notification from the Project Engineer of his determination of the final disposition of such findings. Any discoveries of an anthropological or archaeological nature within the rights-of-way or upon Government property shall remain the property of the Government and not become the property of the person or persons making the discovery. Should the discovery site require archaeological studies resulting in delays and/or additional work, the Contractor will be compensated by an equitable adjustment under the General Provisions of the contract.

10. PUBLIC UTILITIES, NOTICES, AND RESTRICTIONS.

10.1 Utilities Not Shown. If the Contractor encounters, within the construction limits of the entire project, utilities not shown on the plans and not visible as of the date of this contract and if such utilities will interfere with construction operations, he shall immediately notify the Contracting Officer in writing to enable a determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are left in place, removed or relocated as directed by the Contracting Officer, the Contractor shall be entitled to an equitable adjustment for any additional work or delay.

10.2 Coordination. The Contractor shall consult and cooperate with the owner of utilities that are to be relocated or removed by others to establish a mutual performance schedule and to enable coordination of such work with the construction work. These consultations shall be held as soon as possible after award of the contract or sufficiently in advance of anticipated interference with construction operations to provide required time for the removal or relocation of affected utilities. Memorandums documenting the results of these consultations shall be provided to the Contracting Officer immediately following the meetings:

10.3 Notices.

10.3.1 Traffic Routing. The Contractor shall notify the Contracting Officer 7 days in advance of the time work will be started in areas requiring the rerouting of traffic, and removal of street signs. The foregoing shall apply to progressive modifications of traffic routings within an area in which work is in progress.

10.3.2 Police, Highway Patrol, and Fire Departments shall be notified by the Contractor whenever a street is to be closed to traffic. If the closing is to be of long duration, a single notification to each department on the last working day before closing will be sufficient. A single notification shall then be made at

the time the street is again opened to traffic. If the closing is to be of short duration or if different sections of the street are to be closed at different times, notifications shall be made on a day-to-day basis.

10.3.3 Utilities to be Relocated or Protected. The Contractor shall notify the Contracting Officer, in writing, 14 calendar days prior to starting work on any utility to be relocated or protected. On each relocation, notification shall include dates on which the Contractor plans excavation, by-pass work, removal work and/or installation work, as applicable.

10.3.4 The Contractor shall notify the Contracting Officer, in writing, not less than 14 days in advance of the date on which he will complete trenching, excavation, fill or rough grading, as applicable, at each location where such completed work is required for temporary or permanent relocations by others. The Contractor shall allow a period of 14 calendar days at each relocation, after which time the Contractor may resume his operations.

10.3.5 Existing Bench Marks and R/W Markers. The Contractor shall notify the Contracting Officer, in writing, 7 days in advance of the time he proposes to remove any bench mark or right-of-way marker.

10.3.6 Installation of Permanent Fence. Exact location and alinement for installation of the permanent fence will be staked in the field by by the Contractor 7 calendar days in advance of the scheduled starting of the fence installation. The Contractor shall notify the Contracting Officer when staking completed.

10.4 Restrictions.

10.4.1 Representatives of Other Agencies. Personnel representing owners and agencies may be present for various portions of the work. However, the Contractor will be responsible only to the Contracting Officer.

10.4.2 The Contractor shall not disturb or alter the downstream area of outlet works (outside of the Contractor work limits shown on the contract drawings) until after March 1984 unless approved in writing by the Contracting Officer. Am 1

10.4.3 The Contractor shall not install chain link fencing along Lake Pleasant Road prior to notification by the Contracting Officer.

10.5 Availability of Water. Existing water well data within the immediate project area indicate that the quantity of groundwater presently available would not be sufficient to meet long-term construction requirements. The closest known source of water is a water well owned by the Bureau of Reclamation. This well, approximately 2 miles northwest of the project area, is located near the Agua Fria River just south of the Granite Reef Aqueduct. For information regarding this well, contact Mr. John Rodriguez, Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, Arizona, 85009, Telephone No. (602)262-1501. The nearest commercial sources of water are approximately 4 and 6 miles south of the project area. For information, contact the Sunrise Water Company, 23210 N. 89th Drive, Peoria, Arizona, Telephone No. (602) 972-6133, and the Sun City Water and Sewer Company, 15626 Del Webb Boulevard, Sun City, Arizona, Telephone No. (602) 974-2521. Am 1

11. PUBLIC SAFETY. Attention is invited to the general provision: PERMITS AND RESPONSIBILITIES. The Contractor shall provide temporary fencing, in addition to temporary fencing shown barricades, and/or guards, as required, to provide protection in the interest of public safety. Whenever the Contractor's operations create a condition hazardous to the public, he shall furnish at his own expense and without cost to the Government, such flagmen and guards as are necessary to give adequate warning to the public of any dangerous conditions to be encountered and he shall furnish, erect, or maintain such fences, barricades, lights, signs and other devices as are necessary to prevent accidents and avoid damage or injury

to the public. Flagmen and guards, while on duty and assigned to give warning and safety devices shall conform to applicable city, county, and state requirements. Should the Contractor appear to be neglectful or negligent in furnishing adequate warning and protection measures, the Contracting Officer may direct attention to the existence of a hazard and the necessary warning and protective measures shall be furnished and installed by the Contractor without additional cost to the Government. Should the Contracting Officer point out the inadequacy of warning and protective measures, such action of the Contracting Officer shall not relieve the Contractor from any responsibility for public safety or abrogate his obligation to furnish and pay for those devices. The installation of any general illumination shall not relieve the Contractor of his responsibility for furnishing and maintaining any protective facility.

12. OCCUPATION SAFETY AND HEALTH ACT (OSHA) STANDARDS. The OCCUPATIONAL SAFETY and SAFETY and HEALTH ACT (OSHA) STANDARDS for CONSTRUCTION (Title 29, Code of Federal Regulations Part 1926 as revised from time to time) and the Corps of Engineers General Safety Requirements Manual, EM 385-1-1, are both applicable to this contract. The most stringent requirement of the two standards will be applicable.

13. QUALITY CONTROL. The Contractor shall inspect the work of his own forces and the work of all subcontractors for compliance with the contract requirements and record the results of the inspections. Legible copies of the daily inspection reports shall be maintained by the Contractor at the project site at all times and the original copies of the "Construction Quality Control Report" shall be delivered to the Contracting Officer on the work day following the date of the report.

13.1 Control of on-site construction. The Contractor's control shall include three phases of inspection for all definable features of work, as follows.

13.1.1 Preparatory inspection shall be performed prior to beginning any work on any definable feature of work. It shall include a review of contract requirements; a check to assure that all materials and/or equipment have been tested, submitted, and approved; a check to assure that provisions have been made to provide required control testing; examination of the work area to ascertain that all preliminary work has been completed; and a physical examination of material and equipment to assure that they conform to approved shop drawings or submittal data and that all material and/or equipment are on hand.

13.1.2 Initial inspection shall be performed as soon as work begins on a repesentative portion of the particular feature of work and shall include examination of the quality of workmanship as well as a review of control testing for compliance with contract requirements.

13.1.3 Follow-up inspections shall be performed daily to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work.

13.2 The specified reports must be factual records of the Contractor's daily quality control activities and resulting actions. As such, they shall stress as major components of the report, the following:

(a) Phase(s) of construction underway during the time frame of the report. (i.e. earthwork, concrete work, structural steel erection, etc.)
(b) Phase (preparatory, initial, or follow-up), and locations of

inspections and/or check tests that were made.

(c) Results of inspection, including nature of deficiencies observed and corrective actions taken or to be taken. If no inspections are listed on the report, it must be assumed that no inspections were made and that CQC is not being implemented.

(d) Report of tests performed, including those specified, with the results of the tests, including failures and remedial action to be taken. Test results, including all computations should be attached to the report form. Where test results cannot be completed by the time the report is submitted, a notation should be made that the test was performed and the approximate date test results will be available. Delayed test results should be submitted with the report form on the date received.

(e) Monitoring of materials and equipment upon arrival at the jobsite and prior to incorporation into the work for compliance with submittal approvals, damage and proper storage.

(f) Offsite surveillance activities.

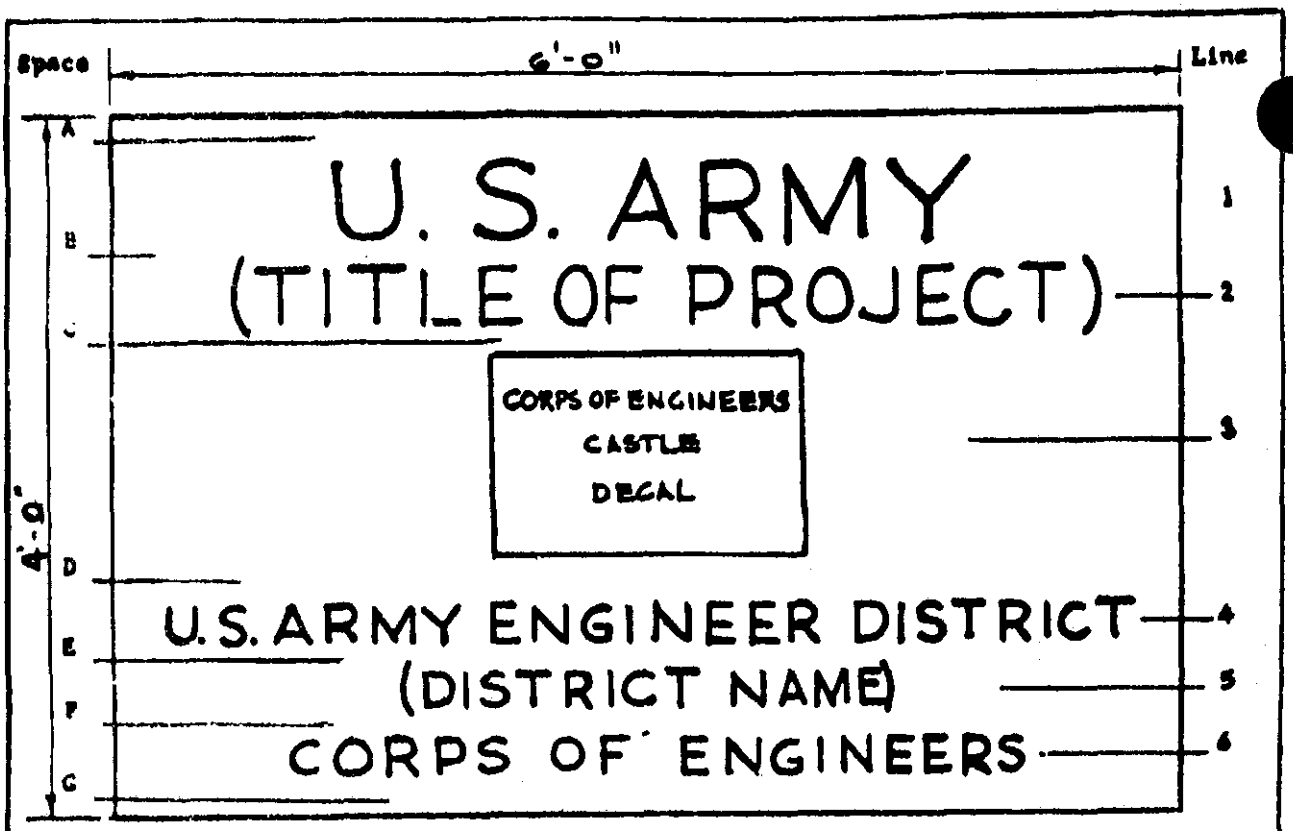
(g) Job Safety.

13.3 The report must contain a record of inspections and tests for all work accomplished subsequent to the previous report. Separate reports in different phases of the work may be submitted by the responsible CQC inspectors or they may be combined into one conslidated report if all CQC activities and results are covered and the responsible CQC inspectors are indentified.

13.4 In all cases, the report or reports must be verified and signed by the one person delegated this responsibility by the Contractor. The verification should contain the statement that all supplies and materials incorporated in the work are in compliance with the terms of the contract except as noted.

14. DUST CONTROL. The Contractor shall provide an acceptable plan for preventing the generation of dust due to his operation in construction zones, along haul routes, in equipment parking areas, and in waste areas located on the Base. This plan may consist of water sprinkling or an equivalent service.

* * * * *



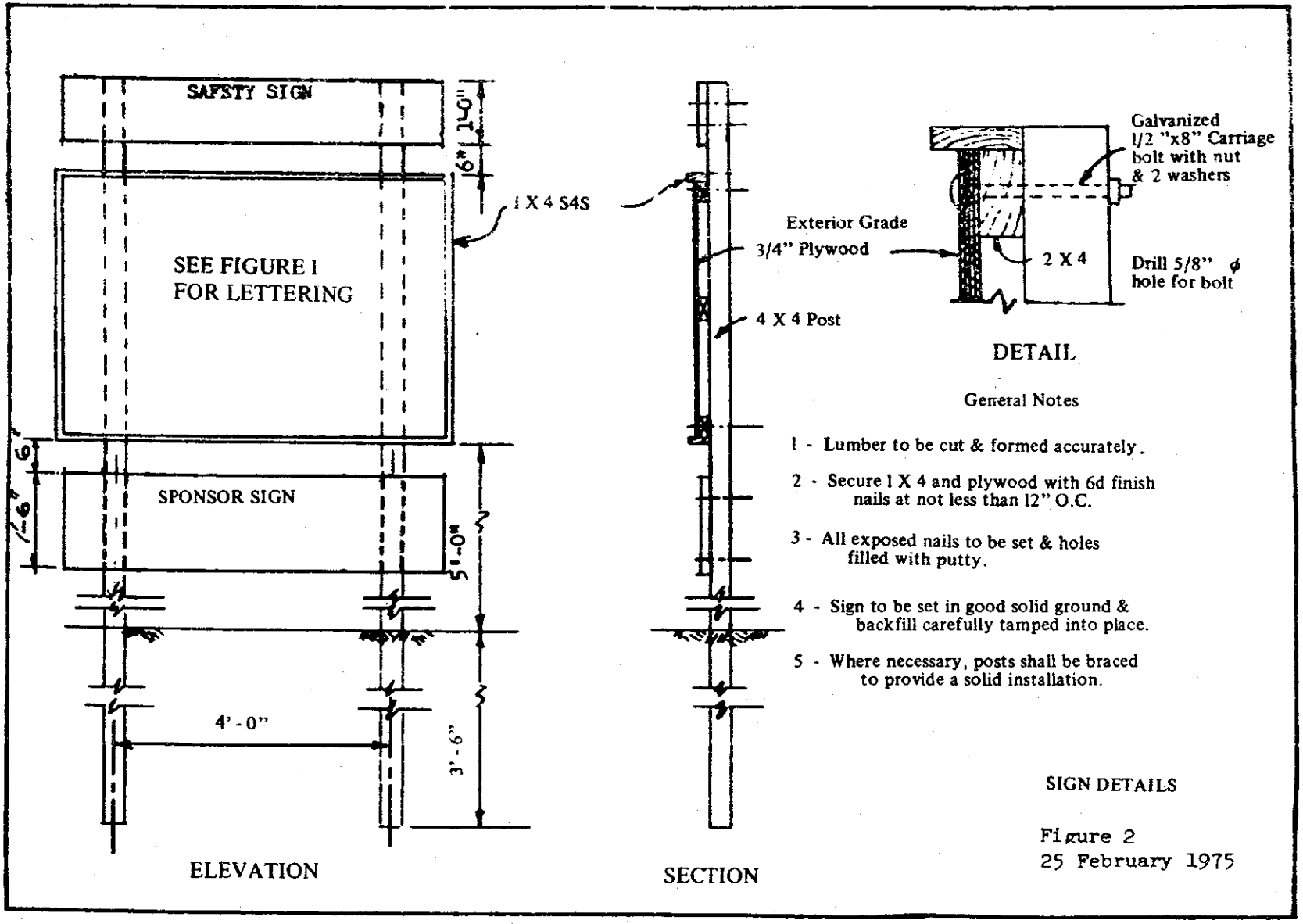
SCHEDULE

Space	Height	Line	Description	Letter Height	Stroke
A	3"				
		1	U. S. ARMY	5 1/2"	7/8"
B	2"				
		2	PROJECT NOMENCLATURE	4"	5/8"
C	2"				
		3	CORPS OF ENGINEERS CASTLE (DECAL)	14"	--
D	3"				
		4	U. S. ARMY ENGINEER DISTRICT	2 3/4"	3/8"
E	2"				
		5	DISTRICT NAME	2 1/4"	1/4"
F	2"				
		6	CORPS OF ENGINEERS	2 1/2"	3/8"
G	3"				

Lettering Color -- Black

PROJECT SIGN
(Army-Civil Works)

Figure 1
14 August 1972



General Notes

1 - Lumber to be cut & formed accurately.

2 - Secure 1 X 4 and plywood with 6d finish nails at not less than 12" O.C.

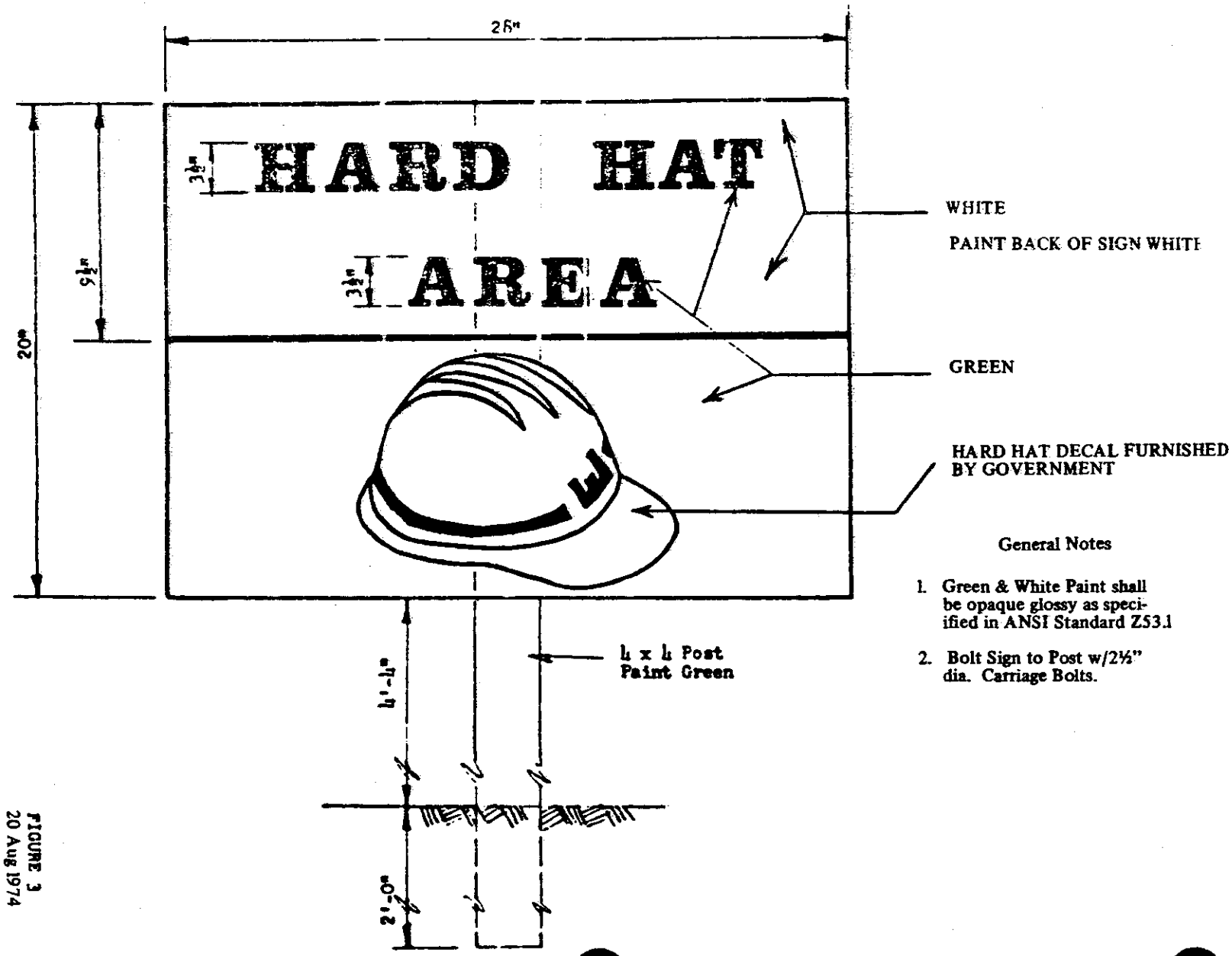
3 - All exposed nails to be set & holes filled with putty.

4 - Sign to be set in good solid ground & backfill carefully tamped into place.

5 - Where necessary, posts shall be braced to provide a solid installation.

SIGN DETAILS

Figure 2
25 February 1975



General Notes

1. Green & White Paint shall be opaque glossy as specified in ANSI Standard Z53.1
2. Bolt Sign to Post w/2½" dia. Carriage Bolts.

FIGURE 3
20 Aug 1974

SECTION 1B

MEASUREMENT AND PAYMENT

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3. Clearing and Grubbing
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5. Foundation Preparation
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8. Concrete
9. Portland Cement and Portland-Pozzolan Cement
10. Pozzolan
11. Additional Rolling
12. Gravel Drain
13. Drive Gates
14. Stone
15. Gutter
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18. Grout, Slurry
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36. Landscape Stone
37. Seeding
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39. Project Signs
40. Desert Varnish Finish
41. Desert Gravel
42. Stripping
43. Concrete Staining

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1. PREPARATORY WORK. *Payment for preparatory work will be made at the applicable* contract price, which payment shall constitute full compensation for the construction of temporary fencing and flagging required for execution of the work, complete. ~~Preparatory l constitute urchase of construction plant, equipment and materials, including temporary fencing, required for the execution of the work, complete.~~

2. DIVERSION AND CONTROL OF WATER. Payment for Diversion and Control of Water will be made at the applicable contract price, which payment shall constitute full compensation for construction and removal of temporary diversion levees and all required stone & slope protection, and maintaining the work areas in a dry condition during construction, complete.

3. CLEARING AND GRUBBING.

3.1 General. Payment shall include all costs for clearing and removal work (except work by others) including all existing obstructions within the embankment and spillway rights-of-way, and fill sites. Except as otherwise specified, payment for clearing and removal work includes applicable earthwork; protection of utilities; and features indicated to remain; and the disposal of all materials.

3.2 Payment for Clearing and Removing Grubbing will be made at the applicable contract price, which payment shall constitute full compensation for clearing, obstruction removal and protection work, complete.

4. EXCAVATION.

4.1 Measurement.

4.1.1 Excavation. A survey of the site shall be made prior to commencement of work, and all measurements will be based on this survey without regard to any changes in the site that may occur during prosecution of the work.

4.1.1.1 Measurement for Scaling, Abutment, Core Trench, Foundation and Exploration Trench excavation will be based on the survey made prior to commencement of the excavation work and surveys taken after the excavation. All excavations outside of excavation lines indicated on the drawings not authorized by the Contracting Officer will be considered as being for the convenience of the Contractor and such excavation will not be measured for payment. The quantity of directed excavation necessary for the removal of unsuitable foundation material, (open work gravel lenses, nested cobbles, and boulders) as specified will be included in the measurement of the excavation where the unsuitable soils, (open work gravel lenses, nested cobbles, and boulders) are encountered. Directed excavation of unsuitable foundation materials from bedrock surfaces using hand methods will not be included under this item, but will be considered as foundation preparation.

Am 1

4.1.1.2 Measurement for Outlet Works, Spillway and Road excavations will be made between the excavation lines and grades, indicated on the drawings and specified, and the ground surfaces as indicated by the survey made prior to commencement of the excavation work. Excavations included in other payment items, such as portions of the core trench and foundation excavations, shall not be included in measurement of excavation for outlet works.

4.1.2 Quantities will be computed in cubic yards by the average end area method and the planimeter will be considered a precise instrument for measuring plotted cross sections.

4.1.3 Trenches. No separate payment will be made for excavation of pipe trenches. All costs in connection therewith shall be included in the contract price for the item to which the work applies.

4.1.4 Excavation for Structures. No separate payment will be made for excavation for structures. All costs therefore shall be included in the applicable contract prices for the item to which the work applies.

4.2 Payment for Excavation of the various types will be made at the applicable contract prices, which payments shall constitute full compensation for excavating, hauling and disposing of the excavated materials. Excavation for Roads shall also include all costs for grading and subgrade preparation.

5. FOUNDATION PREPARATION.

5.1 Measurement of Foundation Preparation will be based on the actual number of man-hours to the nearest 1/4 hour that: (1) bedrock surfaces exposed within the dam embankment core and transition zones and other designated areas are cleaned by air blasting and hand picking of all loose rock fragments, sand, gravel and other objectionable materials, (2) open or filled surface fractures, joints and small pockets occurring within the dam embankment core and transition zones and other

designated areas are cleaned as required, and (3) additional excavation of unsuitable material from bedrock surfaces using hand methods is performed as directed by the Contracting Officer.

5.2 Payment for Foundation Preparation will be made at the applicable contract price, which payment shall constitute full compensation for completing the work under this item. The cost of placing any grout slurry or dental concrete is provided for under payment for grout slurry or dental concrete.

6. FILLS.

6.1 Measurement for payment for fills will be made between the excavation and structure lines and the fill limit lines, or between the ground lines and fill lines, as indicated on the drawings. Quantities will be computed in cubic yards by the average end area method and the planimeter will be considered a precise instrument for measuring plotted cross sections.

6.2 Payment.

6.2.1 Payment for Fills of the various types will be made at the applicable contract price, which payment shall constitute full compensation for obtaining, hauling, stockpiling, spreading, and compacting the fills, including preparation of the subgrades, protection of slopes, and preparation of ground for fills. All costs for preparation of bedrock surfaces as specified in the sections: EMBANKMENTS, DRILLING AND GROUTING, and CONCRETE are provided for under separate payment.

6.2.2 Fill for Structures. No separate payment will be made for fill or backfill about structures. All such costs shall be included in the applicable contract prices for the items to which the work applies.

6.2.3 Trenches. No separate payment will be made for backfilling for utility and pipelines. All costs in connection therewith shall be included in the contract price for the items to which the work applies.

6.2.4 Backfill for directed overcut will be measured and paid for at the applicable contract price for the type of fill placed therein. When there is no applicable contract item, an adjustment in the contract price will be made.

7. EMBANKMENT.

7.1 Measurement. Embankment will be measured between the foundation lines, as determined on the basis of surveys made after abutment, core trench, exploration trench, and foundation excavation and the completion of foundation preparation and the payment, lines grades, and slopes, indicated on the drawings, or otherwise directed by the Contracting Officer. Quantities will be computed in cubic yards by the average end area method and the planimeter will be considered a precise instrument for measuring plotted cross sections.

7.2 Payment for Embankment of the various types will be made at the applicable contract prices which payments shall constitute full compensation for obtaining, placing and compacting the embankments, complete in place. Payment for embankment will include all costs for foundation preparation except costs for preparation of bedrock foundations as specified in sections: EMBANKMENTS, DRILLING AND GROUTING, and CONCRETE for which separate payment is provided.

8. CONCRETE.

8.1 Measurement of Concrete will be made on the basis of the actual volume of concrete within the pay lines of the structures; within the "B" line and the finished concrete surface; within the "B" line, excavation line and the finished concrete surface; and within the excavation line and the finished concrete surface, as applicable and as indicated on the drawings. Concrete placed beyond the "B" line will not be measured for payment. Except as indicated on the drawings, the measurement of concrete placed against the sides of any excavation without the use of intervening forms will be made only within the pay lines of the structure. No deductions will be made for rounded or beveled edges or space occupied by metal work, electrical conduits or timber nor for voids or embedded items which are either less than 5 cubic feet in volume or one square foot in cross section. Concrete wasted or used for the convenience of the Contractor will not be included in the measurement.

8.1.1 Measurement for concrete plug (Lean Mix) and Dental Concrete will be based on the number of cubic yards acceptably placed in the areas indicated or directed. Measurement of concrete will be made to the nearest cubic yard by weighing all ingredients in trial batches of concrete and converting each batch to absolute volume: The volume thus determined and the number of batches of concrete of corresponding proportions acceptably placed in the work (unless specified excepted, wasted, or used for convenience of the Contractor) shall determine the quantity of concrete.

8.2 Payment for Concrete will be made at the applicable contract prices for the various items of the schedule, which payments shall constitute full compensation for labor, materials (except cement and reinforcement for which other payment is provided), and for all equipment and tools required to complete the concrete work. Any excavation by hand methods required for bedrock foundation preparation and cleaning of bedrock surfaces are provided under separate payment. Embedded items shall be included in cost of the concrete except when other payment is specifically provided. No payment will be made for concrete, as such, which is placed in structures for which payment is made on a lump sum basis. Payment items for concrete this contract are as follows.

8.2.1 Payment for Concrete, Conduit will be made at the applicable contract price, which payment shall constitute full compensation for all concrete placed in the conduit.

8.2.2 Payment for Concrete, Spillway Sill and Outlet Channel Sill will be made at the applicable contract price, which payment shall constitute full compensation for all concrete placed in the sills.

8.2.3 Payment for concrete plug (Lean Mix) and Dental Concrete will be made at the applicable contract price, which payment constitutes full compensation for concrete plug (lean mix) and dental concrete, complete in place.

9. PORTLAND CEMENT AND PORTLAND-POZZOLAN CEMENT.

9.1 Measurement. The quantity of Portland cement or Portland-pozzolan cement to be paid for will be the number of hundred-weight (100 pounds) of cement used in concrete paid for on a cubic yard basis except lean mix and dental concrete, and used in the grouting of stonework unless specifically excepted, wasted or used for

the convenience of the Contractor. The quantity to be paid for will be determined by multiplying the approved batch weight of the cement by the number of batches of concrete of the types placed within the pay lines of the structures and dividing by 100.

9.2 Payment for Portland Cement and Portland-Pozzolan Cement will be made at the applicable contract prices, which payments shall constitute full compensation for furnishing the Portland cement or Portland-pozzolan cement complete, ready for use in the work. No payment will be made for Portland cement Portland-pozzolan cement as such, which is used in concrete in structures for which payment is made on a lump sum basis.

9.3 Payment for Portland-pozzolan cement will be made at the applicable contract price, which payment shall constitute full compensation for furnishing the Portland-pozzolan cement, complete, ready for use in the work. No payment will be made for cement as such, which is used in concrete in structures which payment is made on a lump sum basis.

10. POZZOLAN.

10.1 Measurement. The quantity of Pozzolan to be paid for will be the number of hundred-weight (100 pounds) of pozzolan used in the concrete paid for on a cubic yard basis and used in the grouting of stonework unless specifically excepted, wasted or used for the convenience of the Contractor. The quantity to be paid for will be determined by multiplying the approved batch weight of pozzolan in each type of concrete used by the number of batches of concrete of the types placed within the pay lines of the structure and dividing by the product of the average specific gravity of the pozzolan multiplied by 62.4 pounds per cubic foot. The average specific gravity shall be the average of the test results for all material accepted during the period covered by the payment.

10.2 Payment for Pozzolan will be made at the applicable contract price, which payment shall constitute full compensation for furnishing the pozzolan, complete, ready for use in the work. No payment will be made for pozzolan as such, which is used in concrete in structures for which payment is made on a lump sum basis.

11. ADDITIONAL ROLLING.

11.1 Measurement. Embankment compaction required in addition to the number of passes specified will be measured on the basis of the number of hours the rolling equipment approved for the work is operated in making additional required passes. In computing the number of hours worked by the rolling equipment, only the time of actual operation will be included. Time lost by rolling equipment on account of refueling, greasing, oiling, breakdowns or replacement of parts will not be measured.

11.2 Payment for Additional Rolling will be made at the applicable contract price, which payment shall constitute full compensation for work necessary to complete the additional rolling.

12. GRAVEL DRAINS.

12.1 Measurement for Gravel Drain will be the number of cubic yards of gravel drain material acceptably placed in the dam embankment within the lines and grades indicated or directed.

12.2 Payment for gravel drain will be made at the applicable contract price, which payment shall constitute full compensation for the gravel drain in the dam embankment, complete in place.

13. DRIVE GATES. Payment for Drive Gates of each type will be made at the applicable contract prices, which payment shall constitute full compensation for drive gates, complete.

14. STONE

14.1 Measurement. The quantity of stone of the various types to be paid for will be the number of tons, determined by scale weights acceptably placed on the final embankment slopes within the lines and grades indicated on the drawings or directed by the Contracting Officer.

14.2 Payment for the various types of stone will be made at the applicable contract prices, which payments shall constitute full compensation for the stone, complete in place, except grouting of stonework for which separate payment is provided.

15. GUTTER.

15.1 Measurement of gutter will be based on the actual number of linear feet of gutter acceptably placed within the lines and grades indicated on the drawings or as directed by the Contracting Officer. Am 1

15.2 Payment for gutter will be at the applicable contract price, which payment shall constitue full compensation for installation of gutter, complete.

16. GROUTING STONEWORK.

16.1 Measurement. The quantity of grout to be paid for will be measured to the nearest cubic yard by weighing all ingredients in trial batches of grout and converting each batch to absolute volume; the volume thus determined and the number of batches of grout of corresponding proportions acceptably placed in the work shall be used to determine the quantity of grout. Am 1

16.2 Payment for grouting stonework will be made at the applicable contract price, which payment shall constitute full compensation for all costs for grouting stonework (except for Portland Cement), including placing and curing, complete.

17. STEEL REINFORCEMENT.

17.1 Measurement of reinforcement in concrete structures paid on a cubic yard basis will be made of the lengths of bars actually placed in the completed work in accordance with the drawings, approved bar schedules, or as directed. The measured lengths will be converted to weights for the bar numbers listed by the use of the unit weights per linear foot contained in ASTM A 615. Steel in laps indicated on the drawings or required by the Contracting Officer will be measured. No measurement will be made for the additional steel in laps which are authorized for the convenience of the Contractor. No measurement will be made of steel supports and spacers. All costs for furnishing and installing supports and spacers shall be included in the various items with the reinforcement.

17.2 Payment for Steel Reinforcement will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and placing the steel reinforcement, complete.

18. GROUT, SLURRY.

18.1 Measurement of Slurry Grouting will be based on the number of cubic feet acceptably placed in the areas specified by the Contracting Officer.

18.2 Payment for Grout, Slurry will be made at the applicable contract price, which payment shall constitute full compensation for the grout, including cement, complete.

19. INTAKE STRUCTURE. Payment for Intake Structure will be made at the applicable contract price, which payment shall constitute full compensation for the intake structure including trash rack, concrete, cement and reinforcement, and earthwork outside the limits of other required earthwork, complete.

20. ENERGY DISSIPATOR. Payment for Energy Dissipator will be made at the applicable contract price, which payment shall constitute full compensation for the energy dissipator including concrete, cement and reinforcement, fencing, and earthwork outside the limits of other required earthwork, complete.

21. WATERSTOP.

21.1 Measurement of Waterstop will be the actual number of lineal feet including splices of waterstop acceptably installed in the work.

21.2 Payment for Waterstop will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and installing waterstop, complete.

22. FOUNDATION DRILLING AND GROUTING.

22.1 Measurement.

22.1.1 Pipe for Grout Holes will be measured for payment based on the linear feet actually furnished, installed, left in place and in a usable condition as shown on the drawings as directed.

22.1.2 Drill Set-Ups to be paid for will be the actual number of set-ups made for acceptably drilled grout or exploratory grout holes or portions of holes as directed.

22.1.3 Drilling of Grout and Exploratory Grout Holes will be measured for payment on the basis of the linear feet of acceptable holes actually drilled, as shown on the drawings or directed, beginning at the surface of the rock. The linear feet of drilling for each grout or exploratory grout hole will be measured separately.

22.1.4 Pressure Testing. The quantity to be paid for will be the actual number of hours and fractions thereof, measured to the nearest cumulative 1/4-hour for each shift devoted to pressure testing of grout or exploratory grout holes as directed. The beginning of the period for payment shall be the time at which the water hose is connected to the hole for pressure testing, and the end of the period shall be the time at which the water hose is disconnected from the hole, except that excessive time expended in connecting or disconnecting the water hose or in pressure testing because of defective equipment or any other reason not the fault of the Government will not be included in the time approved for payment. All other work in connection with pressure testing shall be considered incidental to and included in the unit price paid therefor.

22.1.5 Group Pump Connections will be measured for payment on the actual number of times the grout pump supply line is acceptably connected to inject grout into a grout hole as directed regardless of the number of times such connections are made for each hole or the amount of grout actually injected.

22.1.6 Placing Grout will be measured for payment on the basis of the number of sacks of materials, exclusive of water and regardless of the proportions of the grout mixes, satisfactorily placed in the dam foundation and surface treatment.

22.2 Payment.

22.2.1 Payment for mobilization and demobilization will be made at the applicable contract price, which payment shall include all costs for the moving of all equipment, materials and personnel necessary for grout and exploratory grout hole drilling and grouting operations to the damsite, the provision of any necessary sanitary facilities and the removal of equipment, unused materials and miscellaneous debris from the site after completion of drilling and grouting work.

22.2.2 Payment for pipe for grout holes will be made at the applicable contract price, which payment shall constitute full compensation for all pipe and fittings for grout holes and installing such pipe, complete except drilling the hole incidental to setting the pipe which shall be paid for separately.

22.2.3 Payment for drill set-ups will be made at the applicable contract price, which payment shall constitute full compensation for moving all equipment necessary for grout or exploratory grout hole drilling operations to the initial drill hole or from a previously drilled hole to the site of the next hole ready for drilling, complete.

22.2.4 Payment for drilling grout or exploratory grout holes will be made at the applicable contract prices, which payment shall constitute full compensation for drilling and washing grout or exploratory grout holes, except all costs incidental to drill set-ups which will be paid for separately. The redrilling of grout, that has been allowed to set in a partially completed hole by direction of the Contracting Officer, will be paid for at the rate of 50 percent of the applicable contract price.

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22.2.5 Payment for pressure testing will be made at the applicable contract price, which payment shall constitute full compensation for completing the work under this item.

22.2.6 Payment for grout pump connections will be made at the applicable contract price, which payment shall constitute full compensation for all labor and incidentals for each connection. Where packer grouting is used, payment for connection will be made for each packer setting in a hole.

22.2.7 Payment for placing grout will be made at the applicable contract price, which payment shall constitute full compensation for furnishing cement, proportioning, mixing and injecting the grout, as specified herein, or as directed, including hand pouring and sealing of surface leaks, and open cracks in the foundation, except for making grout pump connections to grout holes which will be paid for separately. No payment will be made for grout lost due to improper anchorage of grout pipe or connections, for grout lost due to negligence of the Contractor, for grout rejected because of improper mixing.

23. PIPE GATE. Payment for Pipe Gate will be made at the applicable contract price, per each, which payment shall constitute full compensation for the fabrication and installation of the pipe gate including concrete and earthwork.

24. CORRUGATED METAL PIPE.

24.1 Measurement. The quantity of Corrugated Metal Pipe to be paid for will be measured along the centerline of the pipe furnished and installed, measured from end-to-end of the pipe, in place.

24.2 Payment for Corrugated Metal Pipe will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and installing the corrugated metal pipe, in place, including applicable earthwork, stone work, culvert marker, but not including metal end sections, complete.

25. METAL END SECTIONS. Payment for Metal End Sections will be made at the applicable contract price, per each, which payment shall constitute full compensation for the metal end sections, complete in place, including excavation and backfill.

26. DIKE NO. 1; REINFORCED CONCRETE CULVERT.

26.1 Measurement. The quantity of reinforced concrete culvert to be paid for will be measured along the centerline of the pipe furnished and installed, measured from end to end of pipe, in place.

26.2 Payment for the reinforced concrete pipe will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and installing the reinforced concrete pipe in place, including applicable earthwork and grading, inlet and outlet structures standard flapgate, stone work, complete.

27. AGGREGATE BASE.

27.1 Measurement of Aggregate Base at the various areas completed and accepted by the Contracting Officer will be in cubic yards. The volume of aggregate base in place will be determined by the average job thickness obtained in accordance with paragraph: THICKNESS CONTROL of the Section: AGGREGATE BASE and the dimensions indicated.

27.2 Payment for Aggregate Base at the various areas will be made at the applicable contract price, which payment shall constitute full compensation for the construction and completion of the aggregate base, complete.

28. ASPHALT CONCRETE.

28.1 Measurement. The unit of measurement for the asphalt concrete will be the ton (2,000 lbs). The Contractor shall weigh each load on a certified platform scale and shall furnish the Contracting Officer with duplicate Weighmaster's Certificates showing the actual net weights. One ticket shall be furnished to the plant inspector and one ticket to the inspector at the construction site. The bituminous mixture shall be weighed after mixing and no deduction will be made for the weight of bituminous material incorporated therein. Asphalt concrete used for convenience of the Contractor will not be measured for payment.

28.2 Payment for Asphalt Concrete will be made at the applicable contract price, which payment shall constitute full compensation for furnishing, spreading, and compacting the asphalt concrete surfacing complete in place, including weed killer, prime coat, tack coat, and all incidentals.

29. FENCING.

29.1 Measurement of Fencing will be the actual number of linear feet of permanent fences, measured from end to end, acceptably installed in the work.

29.2 Payment for Fencing will be made at the applicable contract price, which payment shall constitute full compensation for the new fence including earthwork complete in place. ~~No separate payment will be made for temporary fencing.~~

Am 1

30. GUARDRAIL.

30.1 Measurement of Guardrail will be the actual number of linear feet of guardrail, measured from end to end, acceptably installed in the work.

30.2 Payment for Guardrail will be made at the applicable contract price, which payment shall constitute full compensation for the guardrail including earthwork, complete in place.

31. LOG BARRIER.

31.1 Measurement of Log Barrier will be the actual number of lineal feet of log barrier, measured from end to end, acceptably installed in the work.

31.2 Payment for Log Barrier will be made at the applicable contract price, which payment shall constitute full compensation for the log barrier including supports, connections, and earthwork, complete in place.

32. HYDROLOGIC FACILITIES. Payment for Hydrologic Facilities will be made at the applicable contract price, which payment shall constitute full compensation for the hydrologic facilities including instrument house, conduits and pull boxes, reservoir gage well, gaging station, concrete, metalwork, carpentry, and earthwork, complete.

33. STAFF GAGES AND MONUMENTS. Payment for Staff Gages and Monuments will be made at the applicable contract price, which payment shall constitute full compensation for fabrication and installation of reservoir staff gages, sediment staff gages, and settlement monuments, sediment range monuments including concrete and earthwork, complete.

34. GAGING STATION BRIDGE. Payment for Gaging Station Bridge will be made at the applicable contract price, which payment shall constitute full compensation for the gaging station bridge including abutments, wing walls, approach slabs, girders, pipe handrail, and earthwork, complete,

35. TOPSOILING. Payment for Topsoiling will be made at the applicable contract price, which payment shall constitute full compensation for obtaining, stockpiling, hauling, and placing topsoil on the embankment, complete.

36. LANDSCAPE STONE. Payment for Landscape Stone will be made at the applicable contract price, which payment shall constitute full compensation for obtaining, selecting (or processing), stockpiling, hauling, and placing the landscaping stones, complete.

37. SEEDING.

37.1 Measurement. The unit of measurement for seeding will be the acre. The quantity of seeding to be paid for will be the acreage actually seeded as specified, computed to the nearest 1/10 of an acre.

37.2 Payment for Seeding will be made at the applicable contract price, which payment shall constitute full compensation for the seeding complete.

38. PLANTING. Payment for Planting will be made at the applicable contract price, which payment shall constitute full compensation for the planting of trees, cacti, and shrubs, complete, including maintenance.

39. PROJECT SIGNS. Payment for Project Signs will be made at the applicable contract price, which payment shall constitute full compensation for fabricating and erecting the project signs including concrete posts, rocks, mound, seeding and earthwork, complete.

40. DESERT VARNISH FINISH.

40.1 Measurement will be based on the actual number of gallons of desert varnish applied to landscape stone and grouted stone as specified.

40.2 Payment for Desert Varnish Finish will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and application of desert varnish, complete.

41. DESERT GRAVEL.

41.1 Measurement of desert gravel will be based on the number of ~~tons~~ cubic yards, ~~determined by scale weights~~, acceptably placed within the lines and grades indicated on the drawings or as directed by the Contracting Officer.

41.2 Payment for desert gravel will be made at the applicable contract price, which payment shall constitute full compensation for obtaining, hauling, stockpiling, and placing the desert gravel, complete.

42. STRIPPING.

42.1 Mesurement for stripping will be based on surveys taken immediately before and after the stripping operations. Quantities will be computed in cubic yards by the average end area method and the planimeter will be considered a precise instrument for measuring plotted cross-sections. Material to be used as topsoil will not be included in measurement for stripping.

42.2 Payment for stripping will be made at the applicable contract price, which payment shall constitue full compensation for stripping for Dikes No. 1 and 2 and disposal of excavated materials, complete.

43. CONCRETE STAINING. Am 1

43.1 Measurement of concrete staining will be made based on the actual number of gallons of concrete staining applied to concrete surfaces as specified.

43.2 Payment for concrete staining will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and application of concrete staining, complete.

SECTION 1C

ENVIRONMENT PROTECTION

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6. Protection of Environmental Resources
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8. Maintenance of Pollution Control Facilities
9. Training of Contractor Personnel In Pollution Control

1. SCOPE. This section covers prevention of environmental pollution and damage as the result of construction operations under this contract and for those measures set forth in other Technical Provisions of these specifications. For the purpose of this specification, environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorable 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.

2. QUALITY CONTROL. The Contractor shall establish and maintain quality control for environmental protection of all items set forth herein. The Contractor shall record on daily reports any problems in complying with laws, regulations and ordinances and corrective action taken.

3. SUBMITTALS. The Contractor shall submit an environmental protection plan in accordance with provisions as herein specified.

3.1 Environmental Protection Plan shall include but not be limited to the following:

(1) 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.

(2) 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, cacti, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, archeological and cultural resources.

(3) 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 pollution of the environment due to accident, natural causes or failure to follow the procedures set out in accordance with the environmental protection plan.

(4) Permit or license and the location of the solid waste disposal area.

(5) 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.

(6) Environmental monitoring plans for the job site, including land, water, air, and noise monitoring.

(7) Traffic control plan.

(8) Methods of protecting surface and ground water during construction activities.

(9) Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas.

3.2 Implementation. After receipt of Notice to proceed, the Contractor shall submit in writing the above Environmental Protection Plan within the time specified under special provisions. Approval 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.

4. SUBCONTRACTORS. Assurance of compliance with this section by subcontractors will be the responsibility of the Contractor.

5. 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 shall be granted or costs or damages allowed to the Contractor for any such suspension.

6. 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.

6.1 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, cacti, 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.

6.1.1 Work Area Limits. Prior to any construction the Contractor shall mark the areas within the construction work limits that are not required to accomplish all work to be performed under this contract. Isolated areas within the general work area which are to be saved and protected shall also be fenced or flagged.

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 marking and/or protection of all necessary objects.

6.1.2 Protection of Landscape. Trees, cacti, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by fencing, flagging, or any other approved techniques.

6.1.3 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. Borrow areas adjacent to the Vegetation Management Zone shall be graded to prevent erosion or undermining of the Vegetation Management Zone. 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.

6.1.4 Temporary Protection of Disturbed Areas. Such methods as necessary shall be utilized to effectively prevent erosion and control sedimentation, including but not limited to the following:

(1) 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.

6.1.5 Erosion and Sedimentation Control Devices. The contractor shall construct or install all temporary and permanent erosion and sedimentation control features as necessary. 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.

6.1.6 Location of Field Offices, Storage and Other Contractor Facilities. The Contractors' field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated by the Contracting Officer. Due to the sensitive nature of riparian habitat in the basin, strict adherence to the designated areas is necessary. Temporary movement or relocation of Contractor facilities shall be made only on approval by the Contracting Officer.

6.1.7 Borrow Areas shall be managed to minimize erosion and to prevent sediment from entering nearby water courses or lakes.

6.1.8 Spoil Areas shall be managed and controlled to limit spoil to areas designated and prevent erosion of soil or sediment from entering nearby water courses or lakes.

6.1.9 Temporary Excavations and Embankments for plant and/or work areas shall be controlled to protect adjacent areas from dispoilment. Excavated areas adjacent to the Vegetation Management Zone shall not have slopes steeper than 1V on 5H.

6.1.10 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.

6.1.10.1 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.

6.1.11 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.

6.1.12 Disposal of Discarded Materials. Discarded material other than those which can be included in the solid waste category will be handled as directed by the Contracting Officer.

6.2 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 so designated on the drawings 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 all work in the immediate area shall be stopped and such observations shall be reported as soon as practicable to the Contracting Officer.

6.3 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.

6.3.1 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.

6.3.2 Cofferdam and Diversion Operations. The contractor shall plan his operation and perform all work necessary to minimize adverse impact or violation of the water quality standard of Federal, state, or local governments. Construction operations for dewatering, removal of cofferdams shall be controlled at all times to limit the impact of water turbidity on the habitat for wildlife and impacts on water quality for downstream use.

6.3.3 Stream Crossings 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.

6.3.4 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.

6.4 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.

6.5 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 the State of Arizona and all Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained for those 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.

6.5.1 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.

6.5.1.1 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 hereinabove 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.

6.5.2 Hydrocarbons and Carbon Monoxide. Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits at all times.

6.5.3 Odors. Odors shall be controlled at all times for all construction activities, processing and preparation of materials.

6.5.4 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.

6.6 Protection of Sound Intrusions. The Contractor shall keep construction activities under surveillance, and control to minimize damage to the environment by noise.

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 approval by the Contracting Officer. This work will be accomplished at the Contractor's expense.

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.

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 familiarization with cultural resource indentification, and installation and care of facilities (vegetative covers, and instruments required for monitoring purposes) to ensure adequate and continuous environmental pollution control.

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SECTION 2A

DIVERSION AND CONTROL OF WATER

1. REQUIREMENT.

1.1 General. All permanent construction and borrow area excavation shall be carried on in areas free from water. The Contractor shall be responsible for providing, maintaining, monitoring, and removing all diversion and water control facilities. Water in varying quantities may be flowing in the streams during the entire period of construction. Runoff from the watersheds is rapid and, during periods of rain, intermittent freshets may be expected. The responsibility of the contractor for protection of work against waterflows is specified in paragraph of the SPECIAL PROVISIONS, entitled DAMAGE TO WORK.

1.2 The schedule for construction operations pertaining to the outlet works, dam embankment and dikes shall be in accordance with the requirements specified in the SPECIAL PROVISIONS.

1.3 A diversion and control of water plans, for the main embankment designed for a 25-year (0.04 probability) flood, shall be constructed as shown on the drawings. The contractor may prepare and submit an alternate plan for diversion and control of water to the Contracting Officer for approval. The plan shall be expanded to include levees to divert and channelize the New River stream and several unnamed washes during the construction period. All diversion and control of water structures shall be removed completely by the Contractor when no longer required.

1.3.1 In addition to the above specified diversion and control of water plan, at all locations where construction work is at a lower elevation than the elevation of the stream or ground water at the time of doing the work, suitable ditches, cofferdams or dikes shall be constructed; the construction area shall be dewatered prior to commencement of the work; and all subgrades, whether for earth fill, filter, material, stone, or concrete, shall be kept drained and free of water throughout the working period.

1.4 Within 10 days after award of the contract, the Contractor shall submit plans showing the methods he proposes to use to dewater each working area and control the water from rain, sheet flow, streamflows, and other surface water. The plans shall show the scheme of operations and a complete layout of drainage pipes, pumps, diversion channels, cofferdams, etc. The Contractor shall assume full responsibility for the adequacy of his dewatering and control methods, and prior knowledge by the Contracting Officer of the Contractors method of dewatering will in no way release the Contractor from the fulfillment of his obligations or place the Government, in any manner, responsible for any losses due to failure or inadequacy of the dewatering and control method used. The plans shall also take into consideration the following specific requirements.

1.4.1 The Contractor shall provide for diversion of streamflows as hereinafter specified. The streamflows will include water originating upstream of the work, water from ~~side drains and~~ channels adjacent to the work site and will be in addition to any and all ground water originating within the work area. Surface flows in excess of the following runoff quantities listed hereinafter will be regarded as floodflows.

1.4.2 Runoff Quantities during period 1 July to 15 September and 15 November to 31 March: a streamflow of 28,000 cfs.

1.4.3 Runoff Quantities during other periods: a streamflow of 500 cfs.

1.5 Drainage Ditches. The location and depth of any drainage ditches shall be subject to approval of the Contracting Officer. Special precautions shall be taken to avoid impairing the permanent subgrade, and any excavation below invert subgrade shall be refilled with compacted fill in accordance with section: FILLS AND SUBGRADE PREPARATION at no additional cost to the Government.

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SECTION 2B

CLEARING AND GRUBBING

Index

1. Applicable Publications
2. Protection
3. Burning
4. Requirements
5. Disposal of Cleared, Grubbed and Removed Material

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.

1.1 U.S. Army, Corps of Engineers Publications.

EM 385-1-1	General Safety Requirements (1 June 1977)

2. PROTECTION.

2.1 Environmental Protection. All work and Contractor operations shall comply with the requirements of section: ENVIRONMENT PROTECTION.

3. BURNING. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

4. REQUIREMENTS.

4.1 General. Except as otherwise specified, and/or indicated, areas to be cleared and grubbed will be limited to actual excavation areas and areas on which fills and/or structures are to be placed. The removal of trees, shrubs, turf, and other vegetation outside of these areas shall be held to a minimum and care shall be exercised not to damage any trees, shrubs, turf, or vegetation which can be left in place.

4.2 Existing Structures and Obstructions. The Contractor shall clear the site, including all fill, borrow, and excavation areas, and remove and dispose of all existing structures and obstructions for project construction, except as otherwise noted on the drawings. Obstructions which are designed or specified to be removed but which are not designated or specified to be removed by others shall be removed by the Contractor. Except as otherwise specified, obstructions designated to be removed by other will be removed in sufficient time to preclude interference with the Contractor's operations. Utility relocations are not considered to be obstructions.

4.3 Clearing. Trees than 1-1/2 inches in diameter and other vegetation, except as specified, shall be cut off 6 inches below the indicated channel subgrade or ground level whichever is lower. Other vegetation shall be cut off flush or slightly below the original ground surface. Clearing operations shall be conducted so as to prevent damage to trees, structures, and installations under construction, or to remain in place, and to provide for the safety of employees and others. All rubbish, waste dumps, and debris areas shall be cleared.

4.4 Grubbing shall consist of removing all trees, stumps, roots, logs, and other objectionable vegetable matter in the required fills, foundation areas, and all excavation areas. In grubbing out stumps and roots, all roots or other timber more than 1-1/2 inches in diameter shall be removed to 3 feet below the depth of the required excavation or existing ground level, whichever is lower. Trees and stumps shall be pulled, not cut off.

4.5 Utilities. Prior to removing an obstruction, all applicable utility relocations shall have been coordinated.

5. DISPOSAL OF CLEARED, GRUBBED, AND REMOVED MATERIAL. All material removed, except material specified and/or indicated to be salvaged, is designated as scrap, shall become the property of the Contractor, and shall be removed from the site. Stone, broken concrete, pavement, and similar materials may be wasted in the miscellaneous fill areas in accordance with the requirements of the section: EXCAVATION. Unsuitable materials from clearing operations may be temporarily used for diversion and control of water. Disposal shall be in accordance with the requirements of section: EXCAVATION.

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SECTION 2C

STRIPPING

1. REQUIREMENTS. Except as otherwise specified and/or indicated, areas to be stripped shall be limited to actual borrow excavation areas and areas on which fills and structures are required to be placed.

1.1 Dam Embankment Foundation and Borrow Areas. Stripping shall consist of excavating the top 8 inches of material.

1.1.1 No separate payment will be made for stripping for foundation excavation or borrow areas, and all costs in connection therewith shall be included in the applicable contract unit prices for "Excavation, Foundation (Dam)", "Fills", or "Embankment".

1.2 Dikes No. 1 and No. 2 Foundation. Stripping shall consist of excavating the materials to the depth indicated on the drawings or as required by the Contracting Officer. Stripping of bedrock encountered at Dike No. 2 shall consist of the removal of all loose rock and other objectionable materials to the depths indicated on the drawings or as approved by the Contracting Officer in the field.

2. DISPOSAL.

2.1 Dam Embankment, Dike No. 1, and Dike No. 2 Foundations, and Borrow Areas. Stripped materials shall be stockpiled for use as topsoil as specified in section: SEEDING. Materials in borrow areas not suitable for embankments and stripped materials not used for topsoil and/or not suitable for topsoil shall be stockpiled adjacent to the borrow area and upon completion of excavation therefrom shall be spread uniformly over the excavated surfaces of the borrow areas as shown on the plans or shall be disposed of in miscellaneous fill area. Compaction will not be required.

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SECTION 2D

EXCAVATION

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1. General
2. Preservation of Property
3. Excavation, Abutment
4. Excavation, Foundation
5. Excavation, Core Trench
6. Excavation, Exploration Trench
7. Excavation, Access Road
8. Excavation, Spillway and Outlet Works
9. Excavation for Structures
10. Excavation, Borrow Areas
11. Scaling
12. Stone Gutter
13. Removal of Unsatisfactory Soils
14. Landscape Stone
15. Blasting

1. GENERAL. Excavation shall consist of the removal and appropriate disposal of every type of material encountered except materials covered by the provisions of the section: CLEARING SITE AND REMOVING OBSTRUCTIONS in the designated areas, or from other areas as directed, to the lines, grades, and elevations indicated. The material to be removed may include but is not limited to earth, hardpan, caliche, silt, clay, sand, gravel, cobbles, boulders, cemented alluvium, rock, slopewash and talus. "Rock" is defined as solid bedrock, decomposed or weathered bedrock and boulders and blocks 1/2 cubic yard or more in volume. All blasting required for excavation shall conform to the requirements specified in the paragraph entitled "Blasting". Slope lines indicated on the drawings for temporary cuts do not necessarily represent the actual slope to which the excavation must be made to safely perform the work. Excavation for permanent cuts shall be made to the slope lines indicated. Excavation shall be performed in a manner which will not impair the subgrade. Except as otherwise directed or specified, the finished surface of subgrade which will form the foundation for concrete structures (except for excavation in rock) shall be not more than 1/2 inch from the indicated grade at any point when tested with a 10-foot straight edge. Any excavation or overcut made outside the payment lines indicated on the drawings or staked in the field shall be refilled with suitable earth or concrete in any approved manner by and at the expense of the Contractor, except where such overcut is directed or specified, in which case payment for such overcut and fill will be made at the applicable contract unit prices for the type of excavation and fill made. On bedrock surfaces underlying the abutment and below the streambed excavation, permanent slopes shall be established so that the average slope is not steeper than the slope of the respective abutment. Methods used to achieve these slopes, whether by benching or other approved means of scaling, shall conform to the requirements specified in paragraphs: BLASTING and SCALING.

1.2 EQUIPMENT. All plant, equipment, tools, and machines used in the performance of the work covered by this section shall be subject to the approval of the Contracting Officer, and shall be maintained in satisfactory working condition at all times. Excavating equipment used in the areas from which fill and borrow materials are obtained shall be capable of excavating to varying depths and of producing the necessary blending required to consistently meet the specified gradation requirements.

1.3 EXCAVATION LIMITS. Limits of excavation for the various structures and parts of the work are as indicated on the drawings but the right is reserved to increase or decrease the depth or areal extent of excavation if, in the opinion of the Contracting Officer, the conditions encountered warrant such modification. Except as otherwise directed, the Contractor shall make all excavations to the profiles and sections shown.

1.4 TOLERANCES FOR ROCK EXCAVATION. Deviations from the lines and grades shown on the drawings or established by the Contracting Officer for excavation in rock shall be within tolerance limits of 9-inches, except for those excavations against which concrete structures are to be constructed. Excavations for concrete structures have certain reference lines designated as "A" line and "B" line. the "A" line is located 9 inches above the "B" line in all inverts and 6 inches inside the"B" line in all walls. The "A" line represents the inner tolerance limit inside which no rock will be permitted to project. Any projections inside of "A" line shall be removed. The "B" line is the line to which measurement for payment of excavation will be made, and is considered to be the final excavation line indicated on the drawings. Measurement for payment will be made to this line regardless of whether the limit of the actual excavation falls inside or outside of it, but sufficient excavation inside of this line shall be performed to provide for the proper installation of steel reinforcement and placement of concrete. Any excavation beyond the "B" line shall be replaced with concrete complying with applicable portions of these specifications without additional cost to the Government.

1.5 Disposal of Excavated Material. Excavated material meeting the requirements of sections: FILLS AND SUBGRADE PREPARATION, EMBANKMENT, or STONE PROTECTION for embankment, fill, or stonework shall be placed in the embankement, fill, and stone protection areas as directed or approved by the Contracting Officer, or shall be temporarily stockpiled for later use, except as otherwise specified hereinafter. Excess excavated materials, unsuitable material from the borrow areas, unsuitable materials from the required excavations and unsatisfactory material shall be disposed of in the miscellaneous fill areas designated on the drawings. Miscellaneous fill areas are required fills and shall be filled in accordance with the requirements of sections: FILLS AND SUBGRADE PREPARATION and EMBANKMENTS.

2. PRESERVATION OR PROPERTY. All excavation operations shall be conducted in such a manner that improvements which are to remain in place permanently will not be damaged or subjected to settlement or horizontal movement.

3. EXCAVATION, ABUTMENT. Abutment excavation within the core and transition zones consists of the removal and disposal of all materials between the existing ground surface and the top of sound bedrock, as indicated on the drawings or as approved by the Contracting Officer in the field. All objectionable materials, including overburden, weathered and intensely fractured rock, and detached blocks and slabs, shall be removed to a suitable foundation rock. Additional excavation by hand methods as directed by the Contracting Officer shall be in accordance with paragraph 5.2.1 of the section: EMBANKMENTS. Abutment excavation outside the core and transition zones consist of the removal and disposal of all loose overburden and rock, vegetation and other objectionable materials to the depths indicated on the drawings or as required by the Contracting Officer. The abutment excavation has been subdivided into west abutment excavation and east abutment excavation due to the greater degree of difficulty anticipated on the west side, where the slope is much steeper and different excavation methods may be needed.

4. EXCAVATION, FOUNDATION. Foundation excavation consists of the removal and disposal of all materials between the existing ground surface and the top of bedrock or as indicated on the drawings. Additional excavation by hand methods as directed by the Contracting Officer shall be in accordance with paragraph 5.2.1 of the section: EMBANKMENTS.

5. EXCAVATION, CORE TRENCH. Core trench excavation consists of the removal and disposal of all material between the lines and grades indicated on the drawing or as directed by the Contracting Officer in the field. Open-work gravel lenses, nested cobbles and boulders, and debris shall be removed from the sides and bottom of the trench. Where bedrock has been exposed in the core trench, all weathered and intensely fractured rock, and detached blocks and slabs shall be removed to a suitable foundation rock. Unsuitable materials occurring in pot holes, scour channels, or other small depressions shall also be excavated and disposed of. Additional excavation by hand methods shall be in accordance with paragraph 5.2.1 of the section: EMBANKMENTS.

6. EXCAVATION, EXPLORATION TRENCH. Exploration trench excavation for Dike No. 1 consists of the removal and disposal of all material between the lines and grades indicated on the drawings or as directed by the Contracting Officer in the field. Open-work gravel lenses, nested cobbles and boulders and debris shall be removed from the sides and bottom of the trench.

7. EXCAVATION, ACCESS ROAD. The excavation for the access roads shall consist of the removal and disposal of all materials to the lines, grades, and elevations indicated on the drawings. Suitable material excavated for the access road may be used for access road fill.

8. EXCAVATION, SPILLWAY AND OUTLET WORKS. Excavation consists of the removal and disposal of all materials, from the spillway, outlet works, and related structures to the lines and grades indicated on the drawings. Excavation methods (whether by ripping or blasting) shall be controlled to prevent damage to rock outside the limits of excavation. If damage occurs due to excavation methods utilized, the Contractor shall discontinue his operation and complete excavation work using controlled blasting techniques, as specified in the paragraph: BLASTING. Approach and outlet channel excavation consists of the removal and disposal of all materials within the lines and grades shown on the drawings.

9. EXCAVATION FOR STRUCTURES. Excavation for all structures shall be made accurately to the lines, grade, and elevations shown. Trenches and foundation pits 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. Rock or other hard foundation material shall be cleaned of loose debris and cut to a firm surface, either level, stepped, or serrated. Loose disintegrated rock and thin strata shall be removed. When concrete 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 is placed.

10. EXCAVATION, BORROW AREAS. Borrow shall be taken from the borrow areas indicated. An excavation plan, methods, and equipment to be used in excavating borrow areas shall be submitted to the Contracting Officer for approval prior to excavating in borrow areas. No borrow excavation of Pervious Shell Materials

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shall be permitted within 200 feet of the upstream toe of the embankment. The depth of cut in all borrow areas will vary and shall at all times be controlled to produce the specified gradations. Material shall be excavated with an inclined or vertical cut face for the full depth. Excavation shall be performed in a manner which will produce maximum blending of materials from top to bottom of the excavation. The excavation shall be conducted in such a manner that the borrow area will not pond water. Moisture shall be added before the excavation of the core borrow material and during the blending if mixing plants are used. All borrow material shall be blended for the full depth of the excavation prior to placing the materials on the embankment to meet the requirements specified in section: EMBANKMENT. The core borrow material shall be moistened for the full depth of excavation prior to placing the materials on the embankement to meet the requirements specified in section: EMBANKMENT. Unsuitable materials shall be wasted within the miscellaneous fill areas. Areas of highly cemented materials which are unsuitable will be encountered beneath the uncemented materials and at the edges of the borrow areas adjacent to the hills. The methods proposed for transporting material from the borrow area to the embankment shall be submitted for approval prior to use. If haul roads are required, the Contractor shall construct and maintain such roads. Upon completion of excavation in the borrow area, all slopes shall be not steeper than 1V: 5H and the areas shall be left in a neat condition, graded to drain and in accordance with the requirements specified in section: ENVIRONMENT PROTECTION.

10.1 Whenever, in the opinion of the Contracting Officer, it is necessary to change the location of the excavating equipment working in the borrow areas in order to obtain specified material, or to avoid areas of highly cemented materials, the Contractor shall move his equipment to a new location at no additional cost to the Government. The Contractor shall provide sufficient personnel in the borrow areas to monitor the excavation and direct the disposition of the excavated materials.

11. SCALING consists of the removal and disposal of bedrock material from vertical and over-hanging rock ledges on the abutments ~~and~~, within the core trench below streambed and elsewhere, as directed. Large rock overhangs and protrusions shall be removed to a relatively uniform slope by means of line drilling and blasting. Any excavation using benches required to achieve permanent slopes as specified in paragraph: GENERAL shall have vertical surfaces not more than three feet in height and horizontal surfaces of sufficient width. The required scaling will be indicated on the ground surface with stakes, paint, or like means by the Contracting Officer. Material excavated from the areas scaled shall be disposed of in the designated ~~waste~~ miscellaneous fill areas. Scaling within 100 feet of areas to be grouted shall be completed prior to commencement of grouting operations. Each abutment shall be scaled before any work is commenced in the streambed near the abutment toe.

12. STONE GUTTER. Excavation of stone gutters shall be accomplished by cutting accurately to the cross sections, grades, and elevations shown. Care shall be taken not to excavate gutters below grades shown. Excessive open gutter excavation shall be backfilled with satisfactory, thoroughly, compacted material or with suitable stone or cobble to grades shown on the drawings at no cost to the government. Materials excavated shall be disposed of in the designated miscellaneous fill area. The Contractor shall maintain all excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

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13. REMOVAL OF UNSATISFACTORY SOILS. The removal of soils which are unsatisfactory for foundations of the embankment, structures, roads, and drains, may be required in certain areas. The Contractor will be required to excavate any such areas to the depth directed and backfill the areas with compacted fill conforming to the requirements of the sections: FILLS AND SUBGRADE PREPARATION and EMBANKMENTS.

14. LANDSCAPE STONE.

14.1 General. Landscape stone is defined as volcanic Andesite and is obtained and stockpiled as a result of project excavation. Minimum size of all stone shall be 4 inch diameter and maximum size shall not exceed 18 inch diameter. Not more than 50% or less than 30% shall be larger than 8-inch diameter.

14.2 Source. All landscape stone required for landscaping shall be obtained from the spillway excavation.

14.3 Handling and Storage. After project excavation, rocks shall be stored at a safe location, away from heavy haul roads and other areas of heavy construction activity, as approved by the Contracting Officer. Upon completion of work, any excess rock shall be disposed of as directed by the Contracting Officer.

14.4 Placement. Landscape stone shall be transported from the stockpile and installed in a manner that will avoid further chipping, cracking, and breaking of the rock, unless necessary to maintain required size gradations. Rock shall be placed so that the rock is stable and that heavy construction equipment working nearby would not cause movement of the rock. The rock shall be located as shown on the contract drawings. The Contractor shall notify the Contracting Officer at least 72 hours prior to placement.

15. BLASTING.

15.1 Safety Requirements. For these requirements reference is made to the paragraph: ACCIDENT PREVENTION in the GENERAL PROVISIONS. Blasting will be permitted only when precautions are taken for the protection of persons, the work, and property. Any damage to the work or property shall be repaired by the Contractor at no cost to the Government.

15.2 General.

15.2.1 The Contractor shall submit 3 copies of drawings of proposed blasting techniques and blasting schedules to the Contracting Officer for approval before starting any blasting in any area, showing the position and spacing of drill holes, types of explosives proposed for use, position and size of each charge, and the timing schedule for detonating the charges. Use of non-electric blasting caps is prohibited.

15.2.2 Demonstration of ~~Capability~~ Capability. The capability of the Contractor to perform any blasting technique shall be demonstrated at a point no closer than 10 feet from a final excavation line. If demonstration does not produce results satisfactory to the Contracting Officer, the Contractor shall modify his technique and perform such demonstrations as are necessary to produce the desired results.

15.2.3 The Contractor shall control the blasting procedures so as not to overshoot and will be required to remove, at his own expense, any material outside the authorized lines and grades indicated on the drawings which may be shattered or loosened by such blasting.

15.2.4 During blasting operations the Contractor shall have on the site, and in immediate charge of the blasting and rock excavation, a blasting expert acceptable to the Contracting Officer who has had no less than 3 years of continuous experience in controlled blasting and rock excavation operations. Powder handlers shall have had no less than one year of continuous experience in preparation and loading of powder charges.

15.3 Controlled Blasting.

15.3.1 Controlled blasting techniques (i.e., presplitting, line drilling, or smooth blasting) shall be required for blasting within the spillway and outlet works excavation and such other areas designated by the Contracting Officer. The explosives shall be of such strength and quantity and shall be used in such a manner as will neither open seams nor otherwise damage the rock outside of prescribed limits of excavation. In the outlet works and spillway areas where blasting is performed for excavation, buffer zones are to be provided as indicated on the drawings. The controlled blasting in these areas shall be performed in a manner which will produce relatively smooth and sound rock faces at the final excavation lines. As the excavation approaches the buffer zones and the final excavation lines the depth and spacing of blast holes and the amount of explosives shall be varied with the field conditions to prevent damage to the rock faces. Whenever, in the opinion of the Contracting Officer, blasting may injure the cut slopes or rock upon which or against which concrete is to be placed, the use of explosives shall be discontinued and the excavation shall be completed by wedging, barring, channeling and broaching, or other suitable methods. Any damage to, or displacement of, supports and any damage to any part of the work caused by blasting shall be repaired by and at the expense of the Contractor and in a manner satisfactory to the Contracting Officer. No blasting will be permitted within 100 feet of concrete which has been in place less than 7 days, nor within 100 feet of a grouted area. Am 1

15.3.2 Blasting of the horizontal buffer zone above the spillway and outlet works invert shall be done by use of successive rows of blast holes drilled perpendicular to the invert. The spacing of the vertical rows of blast holes shall not exceed 36 inches and the spacing between holes in a row shall not exceed 30 inches or as directed. Alternative spacings and blasting techniques must be demonstrated to produce suitable results in an area outside (above) the horizontal buffer.

15.3.3 Ammonium nitrate type explosives shall not be used along any final excavation lines or within 10 feet of any buffer zone where controlled blasting techniques are employed.

15.4 Records. The Contractor shall keep and furnish to the Contracting Officer accurate logs and records of all operations pertaining to the preparation, drilling, blasting and excavation procedures. The records shall be submitted daily with the Quality Control Report and shall include the following.

15.4.1 The number, size, type, and make of all equipment used in the excavation process.

15.4.2 The number, size, depth, direction, and spacing of drill holes utilized for each round of blasting, to include a plan sketch drawing.

15.4.3 The quantity, type, strength, and stemming of explosives used in blasting each drill hole.

15.4.4 The type, make, and system of detonation used for each round of blasting.

15.4.5 The volume of rock excavated from each round of blasting.

15.4.6 Any unusual drilling or blasting occurrences.

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SECTION 2E

FILLS AND SUBGRADE PREPARATION

Index

1. Applicable Publications
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3. General Requirements for Compacted Fills and Compacted Backfills
4. Compacted Fill, Outlet Works and Diversion Levees
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7. Subgrade Preparation
8. Stockpiled Topsoil and Mound Fill.
9. Desert Gravel
10. Borrow Area Landscape Treatment
11. Site Restoration

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.

1.1 American Society for Testing and Materials (ASTM) Publications.

D 698-78	Moisture-Density Relations of Soils and Soil Aggregate Mixtures, Using a 5.5-Lb. Rammer and a 12-In. Drop
D 1557-78	Moisture-Density Relations of Soils and Soil Aggregates Mixtures Using 10-Lb. Rammer and 18-In. Drop
D 1556-64 (1974)	Density of Soil In-Place by the Sand-Cone Method
D 2049-69	Relative Density of Cohesionless Soils

1.2 American Association of State Highway and Transportation Officials (AASHTO) Standards.

T 99-74	Moisture-Density Relations of Soils Using a 5.5-Lb. Rammer and a 12-In. Drop
T 180-74	Moisture-Density Relations of Soils Using a 10-Lb. Rammer and an 18-In. Drop
T 191-61 (1974)	Density of Soil In-Place by the Sand-Cone Method

1.3 General Services Administration, Federal Standard No. 59A, "Federal Standard Colors" dated 2 January 1968.

2. EQUIPMENT. All equipment, tools, and machines shall be maintained in satisfactory working condition at all times. Compaction equipment shall be suitable for consistently producing uniform soil densities.

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3. GENERAL REQUIREMENTS FOR COMPACTED FILLS AND COMPACTED BACKFILLS.

3.1 Control. Fills and backfills shall be regularly and continuously inspected and tested by the Contractor. The Contractor shall vary his operations to secure the results specified herein. Moisture-density relations shall be established by the Contractor. Field density tests shall be performed by the Contractor in sufficient number and in such locations to insure that the specified density is being obtained. Moisture-density relations and field densities shall be reported on approved forms. One copy of density data, less dry weight determination, shall be provided on the day each test is taken. The completed test reports shall be provided with the Contractor Quality Control Report on the work day following the test.

3.1.1 Laboratory Control. One moisture-density relation shall be made for each classification, blend or change in classification of soil materials encountered. Approval of moisture-density relations shall be obtained prior to the compaction of any material in the work. The moisture-density relations shall be determined in a laboratory in accordance with the following requirements.

3.1.1.1 Outside of road rights-of-way, the requirements shall be in accordance with ~~Roads Rights-of-Way~~. AASHTO Standard T 99, or ASTM Specification D 698, modified as specified hereinafter. Within road rights-of-way ~~For compacted fill roads~~, the requirements shall be in accordance with AASHTO T-180 or ASTM D 1557, modified, as specified hereinafter.

3.1.1.1.1 A separate batch of materials will be used for each compaction test specimen. No materials will be re-used.

3.1.1.1.2 The desired amount of mixing water will be added for each compaction test specimen, mixed well, and the mixture will be placed in a container with an airtight cover and allowed to cure for 24 hours. A shorter curing time may be allowed where tests show that shortening the curing time will not affect the results.

3.1.2 Field Control. Field in-place density shall be determined in accordance with AASHTO Standard T 191 or ASTM Specifications D 1556, except that in each test, the weight of the disturbed sample representing the full depth of layer shall be not less than 10 pounds for fine grain material and 12 pounds for coarse grain material using a scale for weighing of sufficient capacity and sensitive to .01 pounds. The density tests shall be well distributed and shall average not less than one test for each 2000 cubic yards of material. At least one test shall be made in each 2 feet of compacted material processed as a unit and at least one test shall be made in each area.

3.1.3 Moisture-Density Curves for Cohesionless and Cohesive Materials. 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.

3.2 Settling of Fills or Backfills With Water will not be permitted.

3.3 Material shall be obtained from the required excavation and/or borrow areas, shall be free from sod, roots, brush, debris, trash or other objectionable material, and shall contain no stone whose greatest dimension is more than 3/4 of the layer thickness.

3.4 Placement. Fill material shall not be placed against concrete which has not been in place at least 14 days or until the concrete has attained a strength of 2,500 p.s.i. when tested in accordance with the section: CONCRETE CONSTRUCTION. Heavy equipment shall not be operated over pipes and buried structures until at least 2 feet of fill material has been placed and compacted over them in conformance with the requirements of the paragraph: BACKFILL AND FILL ABOUT STRUCTURES. Compacted fill and backfill shall be placed with suitable equipment in horizontal layers which, after compaction, shall not exceed 12 inches in depth for rubber-tired or vibratory rollers and front-end loaders, 6 inches in depth for tamping rollers, and 4 inches in depth when mechanical tampers are used. The Contractor may vary the layer thickness within these limits for most efficient operations. Material containing stones shall be placed in a manner to prevent the stones from striking the concrete structures and to prevent the formation of voids.

3.5 Moisture Content. Material shall have a uniform moisture content while being placed and compacted. Water shall be added at the source, if required, or by sprinkling each layer of material during placement. Uniform distribution of moisture shall be obtained by disking, harrowing, or otherwise manipulating the soil during and after the time water is added. Material containing an excess of moisture shall be manipulated with suitable implements to facilitate maximum aeration and shall be permitted to dry to the proper consistency before being compacted. Fill shall have a maximum moisture content of not more than 2 percent above optimum and a minimum moisture content of not less than 3 percent below optimum.

3.6 Compaction. No layer of fill shall be compacted before the practicable uniform moisture content has been obtained. Scarified areas shall be compacted as specified for the fill placed thereon. Rollers will not be permitted to operate within one foot of channel or structure walls or over buried structures until the compacted fill over the top of the structures has reached a depth of 2 feet. Compaction equipment shall be so operated that structures are not damaged nor overstressed during compaction operations. Mechanical tampers shall be used for compaction of fill material adjacent to structures where rolling equipment is impracticable for use in compaction.

4. COMPACTED FILL, OUTLET WORKS AND DIVERSION LEVEES.

4.1 Behind Energy Dissipator Walls.

4.1.1 Limitations on Equipment. The gross weight of any piece of equipment, or the combined weight of any combinations of equipment coupled together, used to place, moisten and/or compact fill behind walls shall not exceed 35,000 pounds, including dynamic forces produced by vibratory equipment. Equipment used to compact the fill behind the walls shall be of such size as to be capable of operating in the area between the cut slope and the wall. Compaction equipment will not be required to operate at elevations lower than 2 feet above the top of wall footings. This equipment shall be of such size as to be capable of operating in the area between the cut slope and wall at any point 2 feet above the top of the heel of wall footings.

4.1.2 Construction Balance. Fills behind walls on one side of the energy dissipator shall not exceed by more than 3 feet the height of the fill behind the opposite wall at any time during construction.

4.1.3. Compaction. Each layer of fill behind walls shall be compacted to not less than 90 percent of maximum density.

4.1.4 Trimming. The top of fill adjacent to walls shall be trimmed to the lines indicated on the drawings with a tolerance of plus or minus one inch. Any material loosened by trimming shall be recompacted and the berm area moistened and compacted with one pass of a smooth-wheeled roller. Tolerances shall apply after rolling. The fill slopes shall be trimmed to a uniform alinement at top of berm and to a reasonably uniform slope at or outside the lines shown on the drawings.

4.2 Levees Along the Outlet Channel Downstream of the Energy Dissipator.

4.2.1 Preparation for Placing. Before placing material for compacted fill, the foundation surface shall be cleared of all existing obstructions, vegetation, and debris. Unsuitable material not meeting the requirements for fill material shall be removed where directed, and the existing surface scarified to a depth of 6 inches before placing the fill. Sloped ground surfaces steeper than one vertical to 4 horizontal on which fill or compacted backfill is to be placed shall be steeped in such a manner that the compaction equipment will bear on the full depth of the fill layer.

4.2.2 Compaction. Each layer of fill for outlet channel construction shall be compacted to not less than 90 percent of maximum density.

4.2.3 Trimming. The channel side and top of compacted fill shall be trimmed to the lines indicated on the drawings with a tolerance of plus or minus one inch, as measured perpendicular to the slope. Any material loosened by trimming shall be recompacted. The land side of compacted fill shall be trimmed to a uniform alinement at top and to a reasonably uniform slope at or outside the lines shown on the drawings.

4.3 Diversion Levees.

4.3.1 Preparation For Placing. Before placing material for compacted fill, the foundation surface shall be cleared of all existing obstructions, vegetation, and debris. Sloped ground surfaces steeper than one vertical to four horizontal on which fill or compacted backfill is to be placed shall be stepped in such a manner that the compaction equipment will bear on the full depth of the fill layer.

4.3.2 Compaction. Each layer of the fill for diversion levee construction shall be compacted to not less than 90 percent of maximum density.

5. COMPACTED FILL, ROAD.

5.1 Location. Compacted road fill shall consist of fill placed for road and parking area construction, and all other fill and backfill within the access road right-of-way.

5.2 Compaction. Each layer of road and parking area shall be compacted to not less than 90 percent of maximum density, except the upper 6 inches of fill shall be compacted to not less than 95 percent of maximum density.

5.3 Trimming. All shoulders and side slopes shall be neatly and accurately trimmed to the cross sections indicated.

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6. BACKFILLS.

6.1 Backfill and Fill About Structures.

6.1.1 Location. Backfill and fill shall consist of all fill against and/or around structures, except backfill for culverts and the backfill within the embankment.

6.1.2 Material. Backfill and fill material shall be obtained from the required excavation as approved by the Contracting Officer. In general, the best material available will be designated as backfill and fill about structures. Backfill may consist of sand, gravelly sand, silty sands, sandy silts, clayey sands, and sandy clays. Organic material, silt, clay, broken concrete or pavement, boulders and other objectionable material shall not be used.

6.1.3 Placing. Fill material shall not be placed against concrete which has not been in place at least 14 days or until the concrete has attained a strength of 2,500 p.s.i. when tested in accordance with section: CONCRETE CONSTRUCTION. Fill shall be placed in 4-inch layers.

6.1.4 Compaction shall be not less than 95 percent of maximum density.

7. SUBGRADE PREPARATION.

7.1 Subgrade for Levee Slope Pavement. Fills and excavation for levee slopes shall be trimmed to the lines and grades indicated on the drawings. The finished surface of subgrade shall be smooth and shall not vary more than 1/2 inch from the indicated grade at any point when tested with a 10-foot straightedge.

7.2 Subgrade Preparation for Roads and Parking Area. The subgrade shall be alternately watered and scarified until the material is uniformly moistened throughout for a depth of not less than 6 inches. All stones larger than 4 inches in diameter, and hard ribs of earth shall be removed. The amount of water to be applied shall be that which is required to provide optimum results in compaction under rolling. Following the above operations, the roadbed shall be shaped to a true cross section sufficiently higher than the specified grade to allow for subsequent compaction and then be thoroughly compacted to not less than 95 percent of maximum density. After the subgrade has been prepared and completed, the surface shall be firm, hard, and unyielding, with a true, even, and uniform surface conforming to the grade and cross section indicated on the drawings. All points of the finished subgrade shall be not more than 1/4 inch below or above true subgrade.

8. STOCKPILED TOPSOIL AND MOUND FILL.

8.1 Materials. Stockpiled topsoil and project sign mound fill shall be the top 8 inches of cleared surface soil conforming to section: CLEARING AND GRUBBING and shall be taken from dike No. 1 construction area. Material shall be free of all foreign material, and all organic material and stones larger than 3 inch diameter.

8.2 Placement.

8.2.1 Stockpiled topsoil shall be spread over Dike No. 1 as shown on the contract drawings in a manner which will leave the finished surface smooth and uncompacted so that minimum preparation will be required for seeding.

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8.2.2 Project sign mound fill shall conform to the placement requirements of landscape fill material with the surface 6 inches finished rough and left uncompacted so that minimum preparation will be required for seeding.

9. DESERT GRAVEL.

9.1 Desert Gravel shall be granite with size gradation of between 1/2 inch to one inch size with coloration conforming to Fed. Std. No. 595a, Shade No. 20400.

9.2 Material shall be spread oven stone slope protection on the dam embankment, as shown on the contract drawings, to a ~~minimum~~ thickness of 8 inches, to fill all voids in the stone protection and leave the finished surface smooth.

9.3 Desert gravel shall be obtained from commercial sources and not from the required excavations.

10. BORROW AREA LANDSCAPE TREATMENT.

10.1 Borrow Areas No's. 2 and 3.

10.1.1 Grading. After excavation of fill material each excavated area shall be graded to maintain natural appearing variable percentage slopes not exceeding 20 percent. The finished surface of these borrow areas shall be graded smooth and compacted to a minimum of 90 percent. As much natural occurring rock as possible shall be left exposed on all finished surface.

10.1.2 Ponding. After excavation of fill material all excavated areas shall be allowed to pond water to a depth between 40 to 50 percent of total depth of excavation. This operation may be coordinated with erosion and sedimentation control measures under section: ENVIRONMENTAL PROTECTION" and with section: DIVERSION and CONTROL of WATER. Major streams occurring over the borrow areas exceeding 3 feet in depth shall be diverted away from the ponded area. ~~or avoided~~.

10.2 Borrow Area No. 1.

10.2.1 Grading. After excavation of borrow material this area shall be graded to maintain natural appearing variable percentage slopes not exceeding 25 percent. This area shall be graded to drain into the main streambed of New River except that ponding of water to a depth of 8 to 14 inches shall be required.

10.2.2 Seeding. Borrow areas No. 1 shall be the only borrow area receiving seeding. The finshed surface of this borrow area shall be graded rough and uncompacted so that minimum preparation will be required for seeding. Seeding shall conform to section: SEEDING.

10.2.3 No separate payment will be made for borrow area landscape treatment, and all costs in connection therewith shall be included in the applicable contract unit prices for "Fill" or Embankment".

11. SITE RESTORATION.

11.1 Haul Roads. All haul roads shall be scarified and resolved prior to completion of construction. Seeding shall conform to section: SEEDING.

11.2 Areas Disturbed by ~~Contruction~~ Construction. All areas disturbed by construction shall be scarified, re-seeded, and otherwise brought back to its natural appearance, except as specified elsewhere. Seeding shall conform to section: SEEDING.

11.3 No separate payment will be made for site restoration, and all costs in connection therewith shall be included in the applicable contract unit price for the work causing site restoration to be required.

SECTION 2F

EMBANKMENTS

Index

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8. Compaction
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12. Slides
13. Embankment Demonstration Fill

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.

1.1 American Society for Testing and Materials (ASTM) Publications.

C 131-76	Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
C 136-76	Sieve or Screen Analysis of Fine and Coarse Aggregates
D 698-78	Moisture-Unit Weight Relations of Soils and Soil Aggregate
D 2049-69	Relative Density of Cohesionless Soils

2. DEFINITIONS. The term "embankment" as used in these specifications is defined as the earth fill portions of the dam and dike structures and includes all types of fill and drain materials for the dam, dikes, exploration trench, core trench, and all other specified or directed earth fills, excepting those stone materials used for slope protection, which are described in section: STONE PROTECTION, within the limits of the dam. "Compacted fill" includes all fill, except backfill, deposited in layers and compacted by rolling or tamping. The types of compacted earth fill are (1) "core material" for the core and exploration trenches, and core section of the embankment; (2) transition fill adjacent to the core and pervious shell; (3) "pervious shell fill" forming the upstream and downstream sections of the embankment; (4) gravel drain forming the horizontal pervious drainage blanket. "Miscellaneous fill" includes all fill, deposited in layers but not compacted except by the controlled movement of hauling and spreading equipment. "Backfill," as used in these specifications, is defined as that excavation refill which cannot be placed around or adjacent to a structure until the structure is completed or until a specified time interval has elapsed after completion.

3. GENERAL.

3.1 Grade Control. The embankment shall be constructed to the lines, grades and cross sections indicated on the drawings. The Government reserves the right to increase or decrease the foundation widths, to modify the embankment slopes, or to make such other changes in the embankment sections as necessary to meet field

conditions and produce a safe structure. The end slopes and side slopes of partial fill sections shall not be steeper than the slopes indicated.

3.2 Conduct of The Work. The Contractor shall maintain and protect the embankment in a satisfactory condition at all times until final completion and acceptance of all work under the contract. If, in the opinion of the Contracting Officer, the hauling equipment causes horizontal shears, slicken-sides, rutting, quaking, heaving, cracking or excessive deformation of the embankment, the Contractor shall limit the type, load or travel speed of the hauling equipment on the embankment. Any approved embankment material which is lost in transit or rendered unsuitable after being placed in the embankment and before final acceptance of the work, shall be replaced by the Contractor in a satisfactory manner and no additional payment will be made therefor. The Contractor shall excavate and remove from the embankment any material which the Contracting Officer considers objectionable and shall also dispose of such material and refill the excavated area at no cost to the Government. The Contractor may be required to remove, at his own expense, any embankment material placed outside of prescribed slope lines. The Contractor shall vary his operations where directed to allow the Contracting Officer to conduct in-place density tests on compacted embankment fill. The embankment construction operations shall be conducted in a direction parallel to the embankment axis or as approved by the Contracting Officer.

3.3 Haul Roads. Haul roads shall be located and constructed as approved by the Contracting Officer. They shall be designed to maintain the intended traffic, to be free draining and shall be maintained in good condition throughout the contract period. Haul roads within the area of contact between the embankment and its foundation and abutment shall be removed and the area shall be treated as specified in paragraph: PREPARATION OF FOUNDATION, PARTIAL FILL SURFACES AND ABUTMENTS.

3.4 Stockpiling from Approved Borrow Sources. When the excavation from approved borrow sources progresses at a faster rate than placement in the fill is being accomplished such excavated material shall be stockpiled at approved locations adjacent to the work until its use is authorized. No payment will be made for such stockpiling nor for the reloading and hauling of this material to its final position in the embankment.

4. MATERIALS.

4.1 General. The origin of any fill material in no way determines where it may be used in the embankment. Materials for embankment fills shall be secured from required excavations and from the borrow areas indicated. The intention is to use the most suitable materials obtainable from these sources. Material to be wasted will be identified by the Contractor at the time the material is excavated. Materials containing caliche cemented material, brush, roots, sod or other perishable materials will not be considered suitable. Rock from the required excavations will not be considered suitable. However, andesite rock from the spillway excavation is suitable for use in the downstream pervious shell fill. The suitability of the materials shall be subject to the approval of the Contracting Officer and their disposition in the embankment shall be as approved by the Contracting Officer. The Contractor shall excavate in the borrow areas in the location determined by the Contracting Officer, whenever such control is necessary to obtain the type of material required for the embankment. Blending of materials during the excavating process at the borrow area shall be required. Fill materials shall meet the required gradations specified hereinafter. Total gradations shall be determined on materials in accordance with ASTM C 136.

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4.2 Core Fill. Material for compacted core fill shall consist of sandy clays, clayey sands, sandy silts, or silty sands obtained from the designated borrow areas or required excavation. Materials shall have not less than 20 percent, by weight, passing the U.S. Standard No. 200 sieve and shall contain no stone whose greatest dimension is more than 3/4 the maximum lift thickness.

4.3 Pervious Shell Fill. Material for compacted pervious shall fill shall be clean, free draining gravelly sand and sandy gravel obtained from natural deposits within borrow area No. 3 and from designated excavations. The material shall contain no stone larger than 18 inches. Particles of material shall be free from any objectionable coating and not more than 10 percent of the material, by weight, shall pass a No. 200 sieve.

4.4 Transition Fill. Material for compacted transition fill shall be obtained by removing the material greater than 4 inches in size from the pervious shell material.

4.5 Miscellaneous Fill. Except as otherwise indicated on the drawings or required by the Contracting Officer, material for miscellaneous fill may consist of any or all types of material available from required excavations and designated borrow areas.

4.6 Backfill. Backfill shall consist of material of a type and quality conforming to that specified for the contiguous embankment fill material.

4.7 Gravel Drain. Materials shall be composed of tough, durable particles; shall be reasonably free from thin, flat and elongated pieces; and shall contain no organic matter nor soft, friable particles in quantities considered objectionable by the Contracting Officer. Gravel drain material shall have a percentage of wear not to exceed 50 as determined by ASTM C 131. Gravel Drain materials shall consist of sand, gravel, or crushed stone, well graded between the limits specified below:

Gravel Drain Material Sieve Size	Percent by Weight Passing
2-inch	100
1-1/2-inch	95-100
3/4 ~~1~~-inch	35-70
3/8-inch	10-30
No. 4	0-5

All points on individual grading curves obtained from representative samples of drain materials shall lie between the boundary limits as defined by smooth curves drawn through the tabulated grading limits plotted on a mechanical analysis diagram. The individual grading curves within these limits shall not exhibit abrupt changes in slope denoting skip grading, scalping of certain sizes or other irregularities which would be detrimental to the proper functioning of the gravel drain.

5. PREPARATION OF FOUNDATION, PARTIAL FILL SURFACES AND ABUTMENTS.

5.1 Earth. After excavation of the embankment foundation and excavation of the core and exploration trenches to the extent indicated on the drawings or otherwise required and after inspection and approval by the Contracting Officer, the sides of stump holes, test pits, and other similar cavities or depressions shall be broken down, so as to flatten out the slopes, and the sides of the cut or hole shall be scarified to provide bond between the foundation material and the fill.

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The slopes and bottom of the core and exploration trenches shall be scarified. Unless otherwise directed, each depression shall be filled with either transition, pervious shell, or core material dependent upon the type of materials which is to be placed immediately above the foundation. The fill shall be placed in layers, moistened, and compacted in accordance with the applicable requirements specified hereinafter. Materials which cannot be compacted by roller equipment because of inadequate clearances shall be spread in 4-inch layers and compacted with power tampers to an extent equal to that of the contiguous embankment fill material. After filling of depressions and immediately prior to placement of compacted fill in any section of the embankment, the foundation of such section shall be loosened thoroughly by scarifying, plowing, discing or harrowing to a minimum depth of 12 inches, and the moisture content shall be adjusted to the amount specified for the appropriate type of material. After removal of roots, stones larger than 9 inches, or other debris turned up in the process of loosening, the entire surface of the embankment foundation area shall be smoothed so that no stone or boulder protrudes above the surface more than 6 inches, and shall be compacted by, 8 complete passes of the rubber-tired roller as hereinafter specified. Prior to placement of compacted fill on or against the surfaces of any partial fill section, all soft or loose material, all material containing cracks or gullies, and all material that does not conform with the specified zoning of the embankment shall be removed except as otherwise indicated. The remaining surface of the partial fill shall be loosened by scarifying, plowing, discing or harrowing to a minimum depth of 6 inches, and the moisture content shall be adjusted for the appropriate type of material. The surface of the partial fill section upon which fill is to be placed shall then be compacted as hereinafter specified for the appropriate type of fill material. No separate payment will be made for loosening and rolling the foundation area, the abutment area, or the surfaces of partial fill sections, but the entire cost thereof shall be included in the applicable contract price for fill.

5.2 Bedrock. Prior to foundation drilling and grouting operations, or placement of core and transition materials upon or against rock surfaces, the rock surfaces shall be prepared and treated as specified herein below. Preparation shall be coordinated with requirements for area preparation specified in section: DRILLING AND GROUTING.

5.2.1 Preparation. Bedrock surfaces underlying the core and transition material shall be cleaned by air blasting and hand picking of all loose rock fragments, sand, gravel and other objectionable materials as directed. The use of water jets will not be permitted. The depth required for cleaning open or filled joints and fractures shall be not less than three times the width of the joint or fracture. Excavation of unsuitable materials from bedrock surfaces using hand methods shall be performed as directed by the Contracting Officer. Air cleanings shall be required prior to foundation drilling and grouting operations to allow geologic mapping of the dam embankment core and transition zones, and immediately prior to surface treatment for material placement. Additional air cleanings may be required due to changes in field conditions or work schedules.

5.2.2 Surface Treatment. Following foundation drilling and grouting operations and prior to placement of embankment materials, all areas of bedrock surfaces underlying the core and transition material shall be treated with grout slurry or dental concrete as directed by the Contracting Officer. No grout slurry or dental concrete shall be placed until the foundation cleanup is approved by the Contracting Officer.

5.2.2.1 Grout slurry shall be used to fill all open joints, fractures and small pockets to the depths cleaned. Grout slurry shall conform to the applicable requirements of section: CONCRETE.

5.2.2.2 Dental concrete shall be used to fill pot holes, scour channels or other depressions not accessible to compaction equipment. Large rock overhangs and protrusions shall be removed by scaling techniques as specified in section: EXCAVATION. Areas of bedrock surfaces where embankment materials cannot be acceptably placed shall be filled with tamped concrete. Concrete including forming shall conform to the applicable requirements of section: CONCRETE.

5.2.3 Final Clean Up. Immediately prior to placement of embankment materials, the bedrock surfaces underlying the core and transition material shall be given a final clean-up as specified in paragraph 5.2.1 to remove any unsuitable materials. All standing water shall also be removed. No thin coats of mortar shall be left on smooth, intact rock surfaces. Areas approved for material placement which have been exposed for more than 5 days may require re-cleaning at no additional expense to the Government.

6. PLACEMENT.

6.1 General. No fill shall be placed on any part of the embankment foundation until the foundation treatment has been completed and such areas have been inspected and approved. In the areas where the foundation treatment includes grout, grout slurry, and dental concrete, no fill shall be placed, until all grout, grout slurry, and dental concrete in that area has set and the surface inspected and approved by the Contracting Officer. The gradation and distribution of materials throughout the compacted fill section of the embankment shall be such that the embankment will be free from lenses, pockets, streaks, and layers of material differing substantially in texture or gradation from surrounding material of the same class.

6.2 Rate of Placement. The embankment shall be maintained at approximately the same level regardless of the number of types of materials being placed except for stone.

6.3 Core Material Fill. In general, the more impervious materials shall be placed towards the center of the impervious section and the less impervious materials toward the transition sections so that a transition in permeability is effected from the core to the transition zone.

6.4 Transition Fill. Transition fill shall be placed in the transition zones of the embankments. In general, the more impervious transition material within the embankment shall be placed toward the core section and the more pervious transition material shall be placed toward the inner edge of the pervious shell section so that a transition in permeability is effected from the core section to the pervious shell.

6.5 Pervious Shell Fill. Pervious shell fill shall be placed in the pervious shell zones of the embankment. In general, the pervious sections of embankment shall be placed with the less pervious material near the transition zones of the embankment and the more pervious materials near the outer slopes of the embankment. The oversized material removed from the pervious shell fill shall be placed on the upstream slope.

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6.6 Gravel Drain. The gravel drain shall be placed in the embankment in the manner herein described and to the lines and grades indicated on the plans. Deviations of minus 2 inches shall not be continuous over an area greater than 200 square feet.

6.7 Spreading. After dumping, the materials shall be spread by motor graders or other approved means in approximately horizontal layers over the entire fill areas. Unless otherwise directed, the thickness of these layers before compaction with tamping type rollers shall not be more than 8 inches for core materials, except backfill, which shall be spread in accordance with requirements in paragraph: BACKFILL. Unless otherwise directed, the thickness of layers before compaction with rubber-tired rollers shall not be more than 12 inches for core transition material before compaction. Pervious shell, including spalls, shall be spread in layers not more than 24 inches in thickness before compaction. Gravel drain material shall be spread in layers not more than 12 inches thick. As soon as practicable after commencement of construction of any section of the embankment, the central portion thereof shall be raised or crowned with grades not to exceed 4 percent so that the surface of the fill will drain freely and shall be so maintained throughout construction. If the compacted surface of any layer of material, exclusive of gravel drain is determined to be too smooth to bond properly with the succeeding layers, it shall be loosened by harrowing, or by any other approved method, before the succeeding layer placed thereon. During the dumping and spreading processes, the Contractor shall maintain at all times a force of men adequate to remove all roots and debris from all embankment materials and all stones of greater than 9 inches in maximum dimension from core material and greater than 18 inches in maximum dimension from pervious shell materials. Stone so removed shall be placed in the outer slopes of the embankment and the roots and debris shall be removed from the embankment and disposed of in an approved manner. The entire surface of any section of the embankment under construction shall be maintained in such condition that construction equipment can travel on any part of any one section. Ruts in the surface of any layer shall be filled satisfactorily before compaction. Should tamping rollers be used on the core matrials, the maximum stone dimension shall not exceed 3 inches.

7. MOISTURE CONTROL.

7.1 General. The materials in each layer of the fill shall contain the amount of moisture, within the limits specified below. Water shall be uniformly applied to the material on grade by power spray or other approved equipment to preclude moisture loss, facilitate compaction, and improve trafficability. Material that is not within the specified limits after compaction shall be reworked, regardless of density.

7.2 Core MATERIAL ~~and Landscape Fills~~. The moisture content after compaction shall be as uniform as practicable throughout any one layer of core ~~or landscape fill~~ materials. Pre-wetting in the core borrow will be required. The moisture content after compaction shall be within the limits of 3 percentage points above optimum and 3 percentage points below optimum. Material that is too wet shall be spread on the embankment and permitted to dry, assisted by discing and/or harrowing, if necessary, until the moisture content is reduced to an amount within the specified limits. When the material is too dry, the Contractor shall be required to sprinkle each layer on the fill. Discing, harrowing, or other approved methods will be required to work the moisture into the material until a uniform distribution of moisture is obtained. Water applied on a layer of fill shall be accurately controlled in amount so that free water will not appear on the surface during or subsequent to rolling. Should too much water be added to any part of the

embankment, so that the material is too wet to obtain the desired compaction, the rolling on that section of the embankment shall be delayed until the moisture content of the material is reduced to an amount within the specified limits. Should test results indicate uniform distribution of moisture is not being achieved, lift thicknesses and the number of passes will be reduced proportionately. If it is impracticable to obtain the specified moisture content by drying the material on the fill, the Contractor may be required to prewet or dry back the material at the source of excavation. If, in the opinion of the Contracting Officer, the top or contact surfaces of the partial fill section become too dry to permit suitable bond between these surfaces and the additional fill to be placed thereon, the Contractor shall loosen the dried materials by scarifying or discing to such depths as required, shall dampen the loosened material to an acceptable moisture content, and shall compact this layer in accordance with the applicable requirements specified hereinafter. If the top or contact surfaces of a partial fill section become too wet to permit suitable bond between these surfaces and the additional fill to be placed there on, the wet material shall be scarified and permitted to dry, assisted by discing or harrowing, if necessary, to such depths as required. The material shall be dried to an acceptable moisture content and recompacted in accordance with the applicable requirements specified hereinafter.

7.3 Gravel Drain. Moisture control of gravel drain will not be required and sluicing will not be permitted.

7.4 Pervious Shell and Transition Sections. Moisture control of the pervious shell and transition material will not be required and sluicing will not be permitted. Although moisture control is not required for compaction of pervious shell and transition materials, water will be required in compliance with section: ENVIRONMENTAL PROTECTION.

8. COMPACTION.

8.1 Equipment. Compaction equipment shall conform to the following requirements and shall be used as prescribed in subsequent paragraphs.

8.1.1 Tamping Rollers.

8.1.1.1 Towed. Tamping Rollers shall consist of two or more non-vibratory roller drums mounted side-by-side in a suitable frame and towed by either a crawler-type or rubber tired tractor having sufficient power to pull the roller satisfactorily when the drums are fully ballasted. Each drum shall be free to pivot about an axis parallel to the direction of travel. Rollers operated in tandem sets shall be controlled in a manner such that the prints produced by the tamping feet of the tandem units are staggered. Each drum of a roller shall have an outside diameter of not less than 5 feet and shall be not less than 5 feet in length. The space between two adjacent drums, when on a level surface, shall not be less than 12 inches nor more than 15 inches. (Each drum ballasted with fluid shall be equipped with at least one pressure-relief value and with at least one safety head. The safety head shall be equal to union-type safety heads equipped with rupture discs suitable for rupturing pressures between 50 and 75 psi as manufactured by Fike Metal Products Corporation, Blue Spring, Missouri. The pressure-relief value is a manually operated valve and shall be opened periodically. Personnel responsible for opening pressure-relief valves shall be periodically instructed to ascertain that valve openings are free from plugging to assure that any pressure developed in roller drums is released at each inspection.) At least one tamping foot shall be provided for each 100 square inches of drum surface. The length of each

tamping foot from the outside surface of the drum shall be not more than 10 inches and shall be maintained at not less than 7 inches. The bearing surface of each tamping foot shall be flat with a surface area not less than 5 square inches nor more than 10 square inches. During the operation of rolling, the spaces between the tamping feet shall be maintained clear of materials which would impair the effectiveness of the tamping rollers. The weight of a roller when fully loaded shall be not less than 4,000 pounds per foot of length of drum. The weight of a roller when empty shall be not more than 2,500 pounds per foot of drum length. The bearing surface, tamping foot size, the drum loading, and operation of the rollers shall be as required to obtain the desired compaction. If more than one roller is used on any one layer of fill, all rollers so used shall be of the same type and essentially of the same dimensions. Rollers shall be drawn by crawler-type or rubber-tired tractors at a speed not to exceed 5.0 miles per hour. The use of rubber-tired towing equipment shall be discontinued if the tires leave ruts that prevent uniform compaction by the tamping roller, and the substitution of crawler-type towing equipment may be directed by the Contracting Officer.

8.1.1.2 Self-propelled. The use of self-propelled non-vibratory tamping rollers conforming with the following specification will be permitted, and their design and operation shall be subject to the approval of the Contracting Officer who shall have the right at any time during the prosecution of the work, to direct such modifications to the tamping feet or variations in roller drum weight where applicable, as may be found necessary to secure optimum compaction of the earthfill materials. If use of self-propelled tamping rollers causes shearing of the fill, laminations in the fill, or results in inadequate compaction, the Contracting Officer may direct that such rollers be removed from the fill and that appropriate towed tamping rollers be used. Two- or three-drum side-by-side units that are either in drive position or drawn by separate power equipment shall have a clearance between adjacent drums not less than 12 inches nor more than [illegible] inches. Two-drum or four-drum equipment separated by cab and differential and arranged in tandem must have its static weight equally distributed to all compaction drums and must have the tandem drums positioned such that the prints of the tamping feet produced by the tandem drums are staggered. The surface on which the tamping feet are mounted shall have a minimum outside diameter of 4 feet and at least one tamping foot for each 100 square inches of drum surface. The distance between the centers of any two adjacent tamping feet shall be not less than 9 inches. The length of each tamping foot from the outside mounting surface of the drum shall be not more than 11 inches and shall be maintained at not less than 9 inches. The bearing surface of each tamping foot shall be flat and have a surface area not less than 7 square inches nor more than 14 square inches. Cupped recesses within the bearing surface of each tamping foot will be permitted but shall not exceed 0.5 inches in depth. During rolling operations, the spaces between the tamping feet shall be maintained clear of materials which would impair the effectiveness of the tamping roller. The weight of all roller drums during compaction of fill materials shall be maintained uniform and with the weight per foot of drum length not less than 4,300 pounds. For self-propelled rollers with drums capable of being ballasted with fluid, each drum shall be equipped with at least one pressure-relief valve and with at least one safety head. The safety head shall be equal to union type safety heads equipped with rupture discs suitable for rupturing pressures between 50 and 75 psi as manufactured by the Fike Metal Products Corporation, Blue Springs, Missouri. The pressure relief valve is a manually operated valve and shall be opened periodically. Personnel responsible for opening pressure-relief valves shall be periodically instructed to ascertain that valve openings are free from plugging to assure that any pressure developed in roller drums is released at each inspection. For self-propelled rollers in which steering is accomplished through the use of rubber-tired wheels, the tir

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pressure shall not exceed 40 psi. The use of the compactor shall be discontinued if the tires leave ruts that prevent uniform compaction by the tamping roller and the substitution of appropriate towed tamping rollers may be directed by the Contracting Officer. When a self-propelled roller is provided with a dozer blade, coverages made with the blade in operation shall not be counted as compaction coverages. Self-propelled rollers shall be operated at a speed not to exceed 5.0 mph.

8.1.2 Vibratory Rollers. Vibratory rollers for compacting pervious shell and transition material shall be equipped with a smooth steel compaction drum and shall be operated at a frequency of vibration during compaction operations between 1100 and 1500 vpm. Vibratory rollers may be either rowed or self-propelled and shall have an unsprung drum weight that is a minimum of 60 percent of the rollers' static weight. Towed rollers shall have at least 90 percent of their weight transmitted to the ground through the compaction drum when the roller is standing in a level position hitched to the towing vehicle. Rollers for compacting pervious shell and transition material shall have a minimum static weight of 20,000 pounds, a minimum dynamic force of 40,000 pounds when operating at 1400 vpm, and an applied force not less than 9,000 pounds per foot of compaction drum length. The level of amplitude and vibration frequency during compaction will be maintained uniform throughout the embankment zone within which it is operating. Rollers shall be operated at speeds not to exceed 1.5 miles per hour. The equipment manufacturer shall furnish sufficient data, drawings, and computation for verification of the above specifications, and the character and efficiency of this equipment shall be subject to the approval of the Contracting Officer.

8.1.3 Rubber-Tired Rollers. Rubber-tired rollers shall have a minimum of four wheels equipped with pneumatic tires. The tires shall be of such size and ply as can be maintained at tire pressures between 80 and 100 pounds per square inch for a 25,000 pound wheel load during rolling operations. The roller wheels shall be located abreast and be so designed that each wheel will carry approximately equal load in traversing uneven ground. The spacing of the wheels shall be such that the distance between the nearest edges of adjacent tires will not be greater than 50 percent of the tire width of a single tire at the operating pressure for a 25,000 pound wheel load. The roller shall be provided with a body suitable for ballast loading such that the load per wheel may be varied, as directed by the Contracting Officer, from 18,000 to 25,000 pounds. The roller shall be towed by a crawler-type tractor at speeds not to exceed 5 miles per hour. The character and efficency of this equipment shall be subject to the approval of the Contracting Officer.

8.1.4 Power Tampers and Other Equipment. Compaction of material, in areas where it is impracticable to use a roller shall be performed by the use of approved power tampers or rubber-tired front-end loaders.

8.2 Core Material ~~and Landscape Fill~~. After a layer of core material and ~~landscape fill~~ has been dumped and spread, it shall be harrowed to break up and blend the fill materials, and to obtain uniform moisture distribution. Harrowing shall be performed with a heavy disc plow, or other approved harrow, to the full depth of the layer. If two passes of the harrow does not accomplish the breaking up and blending of the materials, additional passes of the harrow may be required, but in no case will more than three passes of the harrow on any one layer be required for this purpose. Discs that have been worn by more than 10 percent of the disc diameter shall be replaced. When the moisture content and the condition of the layer is satisfactory, the lift shall be compacted by not less than 8 complete passes of the tamping roller or 8 complete passes of the rubber-tired

roller. The use of towed tandem roller drums that are in true alinement shall not be permitted. A pass shall consist of one movement of the roller over the area to be compacted. Portions of the fill which are not accessible to the roller shall be placed in 4-inch layers loose measurement and compacted with power tampers to a degree equal to that obtained on the other portions of the compacted fill by rolling as specified. Dumping, spreading, sprinkling, and compacting may be performed at the same time at different points along a section when there is sufficient area to permit these operations to proceed simultaneously. When, in the prosecution of the work, excavation precedes fill to such an extent that the materials excavated cannot be placed directly in the embankmemt, such materials shall be stockpiled at approved locations adjacent to the work until their use is authorized. No additional payment will be made for such stockpiling nor for the reloading and hauling of this material to its final position.

8.3 Pervious Shell and Transition Fill. After each layer of pervious shell and transition material has been dumped and spread, the entire surface of the layer shall be compacted by not less than 8 complete passes of the vibratory roller.

8.4 Additional Rolling for Compaction. If, in the opinion of the Contracting Officer, the desired compaction of any portion of the embankment is not secured by the minimum number of passes specified, additional complete passes shall be made over the surface area of such designated portion until the desired compaction has been obtained.

8.5 Gravel Drain. After each layer of gravel drain material has been dumped and spread the entire layer shall be compacted to not less than 85 percent relative density in accordance with ASTM D 2049.

8.6 Abutment-Embankment Contact. Core materials to a distance of at least 10 feet horizontally from the abutment-embankment contact shall be compacted with a front-end loader, power tampers or other approved equipment to a minimum density of 95 percent of maximum density as determined by ASTM D 698.

9. MISCELLANEOUS FILL. Material shall be placed in the areas indicated on the drawings or otherwise directed. The fill shall be dumped and spread in horizontal layers not to exceed 24 inches in thickness. Compaction other than that obtained by the controlled movement of the hauling and spreading equipment over the area will not be required.

10. BACKFILL.

10.1 General. No backfill or other load shall be placed on or against concrete surfaces before expiration of the minimum period after placing the concrete as indicated below:

Walls and vertical faces	14 days
Conduit	14 days or until the concrete has attained a strength of 3,000 psi in accordance with section: CONCRETE

Subsequent to 14 days after placing concrete in the conduit or other buried structures, backfill operations may be initiated but no rolling or hauling equipment will be permitted to pass over the conduit or buried structure, or within 2 feet of any part thereof. During this period, backfill may be placed against the sides of the conduit and conduit collars and to a thickness of not

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more than 2 feet over the top of the conduit or structure. Before passage of hauling and rolling equipment over the top of the conduit or other structure will be permitted, the depth of fill over the concrete shall be sufficient to permit such passage without inducing harmful stresses or vibrations in the structure. The gross weight of any piece of equipment or the combined weight of any combinations of equipment coupled together, used to place, moisten and/or compact fill behind walls and over the conduit shall not exceed 35,000 pounds including dynamic forces produced by vibrating equipment.

10.2 Placement. Backfill shall be placed in 4-inch layers and thoroughly compacted. Unless otherwise directed, the placing and compacting of all backfill material and the control of its moisture content shall conform to the applicable provisions specified hereinbefore. Rollers will not be permitted to operate within 2 feet of structure walls, conduit sides, or conduit top. Within this restricted area, and other areas where rollers cannot be used, the material shall be compacted by means of power tampers. Fill in back of wing walls shall be kept at approximately the same elevations as that of the backfill, gravel blankets, riprap, or derrick stone on the opposite side of the wall until placement has reached the maximum elevation of the materials to be placed on the toe of the wall. Drainage openings through walls shall be kept open at all times.

11. COMPACTION. Backfill material shall be compacted to not less than 80 percent of relative density as determined by ASTM D ~~698~~. 2049

12. SLIDES. In the event of slides in any part of the embankment prior to final acceptance of the work the Contractor shall remove material from the slide area, as directed, and shall rebuild such portion of the embankment. In case it is determined that the slide was caused through fault or negligence of the Contractor the removal and disposal of material and the rebuilding of the embankment shall be performed without cost to the Government; otherwise, this work will be paid for at the applicable contract unit prices for borrow excavation and compacted fill or backfill.

13. EMBANKMENT DEMONSTRATION FILL. Prior to embankment construction, the Contractor shall construct a test fill to demonstrate his fill processing operations. The test fill shall demonstrate his capability of spreading, discing, moisture conditioning and rolling of representative samples of suitable embankment materials. The purpose of the demonstration test fill is to provide quality control and quality assurance provisions. The location of the embankment demonstration fill will be within the Stage I fill area. No separate payment will be made for the embankment demonstration fill. Payment will be made under the various items of embankment fills.

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SECTION 2G

STONE PROTECTION

Index

1. Applicable Publications
2. Materials
3. Foundation Preparation
4. Placement
5. Scales
6. Waybills and Delivery Tickets

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.

C 88-73	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C 127-73	Specific Gravity and Absorption of Coarse Aggregate
C 136-71	Sieve or Screen Analysis of Fine and Coarse Aggregates
C 131-69	Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
C 535-69 (R 1975)	Resistance to Abrasion of Large Size Coarse Aggregate by Use of the Los Angeles Machine

2. MATERIALS.

2.1 Source and Material Approval. The Contractor shall make all arrangements, pay all royalties, and secure all permits for the procurement, furnishing and transporting of materials. The sources from which the Contractor proposes to obtain the material shall be selected and a sample submitted a minimum of 45 days in advance of the time when the material will be required in the work. Stone from a proposed source where exploratory investigations and compliance test reports or satisfactory service records are not available will be tested by the Government for quality compliance. The Government will test one sample of each material type at its expense. If the material fails the tests or if the Contractor desires to utilize more than one source, additional testing will be accomplished by the Government for the sum of $1600.00 for each sample tested. The costs of such tests will be deducted from payment due the Contractor. All test samples (500 pounds minimum) shall be representative of the stone source and shall be obtained by the Contractor under the supervision of the Contracting Officer and delivered at the Contractor's expense to the South Pacific Division Laboratory, U.S. Army Engineer Division, South Pacific, Sausalito, California. If the stone is obtained from more than one source, the stone, after placement, shall be uniform in appearance. The Contractor shall vary the quarrying, processing, loading and placing operations to secure the type and quality of stone protection specified. If the stone being furnished by the Contractor does not fully meet all the requirements of these specifications, the Contractor shall furnish at no additional cost to the Government, other stone meeting the requirements of these specifications. Approval of stone from a source shall not be construed as a waiver of the right of the

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Government to require the Contractor to furnish stone which complies with these specifications. Materials produced from localized areas, zones or strata will be rejected when such materials do not comply with the specifications. Stone of a suitable quality for stone protection may be obtained from the oversize material resulting from processing the pervious shell material from the borrow area to produce transition material. Processing of the pervious shell material will be required to produce stone protection meeting the requirements of this specification.

2.1.1 Rock from any required excavation will not be suitable for use as stone protection.

2.2 Quality Compliance. Test results and/or service records may be used to determine the acceptability of the stone protection materials. In the event compliance test reports and/or service records are not available, the material shall be subjected to the tests outlined in these specifications to determine its acceptability for use in the work. In the event stone from a quarry is accepted based on service records, samples of the actual stone used to determine the record shall be taken and shall be subjected to the tests outlined in these specifications. The test results will form the requirements for stone used in this project. Before a source of stone will be considered for sampling and testing, one of the following criteria must be met:

a. A sufficiently developed quarry operation to demonstrate that an adequate quantity of stone is available to fulfill the contract requirements; or,

b. An exposed face plus sufficient explorations (results of which are made available to the Government) to demonstrate that an adequate quantity of stone is available to fulfill the contract requirements.

2.3 Quality Compliance Tests for Stone Protection. Stone shall meet the following test requirements.

Test	Test Method	Requirement
Specific Gravity (Bulk SSD)	ASTM C 127	2.50 minimum (5)
Absorption	ASTM C 127	2.0% maximum (5)
Wetting & Drying	SPD Test Procedure(1)	No fracturing(3)
Sodium Sulfate	ASTM C 88(2)	10% max. loss(4)
Abrasion Loss	ASTM C 535	50% max. loss

In addition to the above tests, the stone shall be subjected to a petrographic and X-ray diffraction analysis. The stone must not contain any swelling type clay (illite or montmorillonite).

NOTE: (1): Test procedure wetting-and-drying tests. The initial step of the test is the careful examination of the entire sample and the selection of representative test specimens. The piece should be large enough to produce two cut slabs, 1 inch thick (± 1/4 inch) with a minimum surface area of 30 square inches on one side. Two chunks approximately three by four inches are also chosen. The slabs and chunks are carefully examined under a low-power microscope and all visible surface features are noted and recorded. The specimens are then oven dried at 140 degrees F., for eight hours, cooled and weighed to the nearest tenth of a gram. The test specimens are photographed to show all surface features before the test. The chunks and slabs are then subjected to fifteen cycles of wetting and drying. One slab and one chunk are soaked in fresh tap water, the other slab and

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chunk are soaked in salt water prepared in accordance with ASTM D 1141. Each cycle consists of soaking for sixteen hours at room temperature and then drying in an oven for eight hours at 140 degrees F. After each cycle the specimens are examined with the low-power microscope to check for opening or movement of fracturs, flaking along edges, swelling of clays, softening or rock surface, heaving of micaceous minerals, breakdown of matrix material and any other evidence of weakness developing in the rock. The cycle in which any of these action occurs is recorded. After fifteen cycles, the slabs and chunks are again carefully examined and all changes in the rocks are noted and recorded. The test specimens together with all flakes or particles which come off during the test are oven dried, weighed and photographed.

NOTE: (2): The test shall be made on 50 particles each weighing 1000 grams, +20 grams, in lieu of the gradation given in C 88.

NOTE: (3): Weakening and loss of individual surface particles is permissible unless bond of the surface grains softens and causes general disintegration of the surface material.

NOTE: (4): Sandstones which have a loss greater than the specified limit will be accepted if the Contractor demonstrates that the rock has a satisfactory service record.

NOTE: (5) Vesicular stone with specific gravities (Bulk SSD) between 2.20 and 2.50 and absorption values between 2.0 and 4.0 percent will satisfy these testing requirements. No more than 15 percent of this stone shall be placed on the grade or in localized areas on the grade.

2.4 Gradation Sampling and Testing for Stone Protection shall be performed by an approved testing laboratory on samples selected by the Contracting Officer. The Government reserves the right to perform check tests and to use the Contractor's sampling and testing facilities to make the tests. Each sample shall consist of not less than five tons of materials and shall be selected at random from stone that has been placed on the embankment. One gradation test is required at the beginning of production prior to delivery of stone to the project and a minimum of one additional test for each 10,000 tons of material placed. All sampling and gradation tests performed by the Contractor shall be under the supervision of the Contracting Officer.

2.5 Gradation.

2.5.1 General. All points on individual grading curves shall be between the boundary limits as defined by smooth curves drawn through specified grading limits plotted on a mechanical analysis diagram. The individual grading curves shall not exhibit abrupt changes in slope denoting skip grading or scalping of certain sizes. Specified grading of all material shall be met both at the source and as delivered to the project. In addition, material not meeting the required grading due to segregation or degradation during placement shall be rejected. If test results show that stone does not meet the required grading, the hauling operation will be stopped immediately and will not resume until processing procedures are adjusted and a gradation test is completed showing gradation requirements are met. All gradation tests shall be at the expense of the Contractor.

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2.5.2 Type III stone shall be well graded between the limits specified below when tested in accordance with ASTM C 136.

Sieve Size	Percent Finer (by Weight)
6 inch	100
4 inch	60-100
1 1/2 inch	30-60
3/4 inch	15-40
3/8 inch	5-20
No. 4	0-10

Rip Rap

2.5.3 Type I stone shall be reasonably well graded within the limits specified below:

Weight of Individual Pieces (pounds)	Percent Smaller (By Weight)
~~640~~ 160	100
~~450~~ 120	70-100
~~160~~ 40	30-50
~~40~~ 10	0-15
~~20~~ 5	0

2.5.4 Type II Stone shall be reasonably well-graded within the limits specified below:

Weight of Individual Pieces (pounds)	Percent Smaller (By Weight)
120	100
90	80-100
30	25-50
9	0-15
4	0

3. FOUNDATION PREPARATION. Areas on which stone is to be placed shall be trimmed and dressed to conform to cross sections indicated or directed, within an allowable tolerance of plus or minus one inch from the theoretical slope lines and grades. Where such areas are below the allowable minus tolerance limit they shall be brought to grade by filling with material similar to the adjacent material and well compacted, or by filling with approved material, and no additional payment will be made for any material thus required. Immediately prior to placing the stone, the prepared base shall be inspected by the Contracting Officer and no material shall be placed thereon until that area has been approved.

4. PLACEMENT.

4.1 Stone shall be spread uniformly on the prepared base, in a manner to produce a reasonably well-graded mass with the minimum practicable percentage of voids, and shall be constructed to the lines and grades indicated or directed.

4.2 Stone shall be placed to its full course thickness in one operation and in a manner to avoid displacing the underlying material. Method of placement shall be submitted to Contracting Officer for approval prior to commencement of placement operations. The Contractor shall maintain the stone protection until accepted and

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any material displaced by any cause shall be replaced at his expense to the lines and grades shown on the drawings. Self propelled equipment shall not be used on the embankment slopes and/or toe slopes. Hand placing, barring, or placing by crane will be required only to the extent necessary to secure the results specified. Placing stone by dumping into chutes or by similar methods likely to cause segregation will not permitted. A tolerance of plus or minus 2 inches from the indicated slope lines and grades will be allowed in the finished surface, for Type I stone and a tolerance of plus 3 inches to minus 0 inches for Type II stone, except that either extreme of such tolerance shall not be continuous over an area greater than 200 square feet.

5. SCALES shall be standard truck scales of the beam type. The scales shall be of sufficient size and capacity to accommodate all trucks used in hauling the material. Scales shall be tested, approved, and sealed by an inspector of the State Inspection Bureau charged with scales inspection within the state in which the project is located. Scales shall be calibrated and resealed as often as necessary to insure continuous accuracy. The necessary number of standard weights for testing the scales shall be on hand at all times and, if an official inspection bureau of the state is not available, the scales will be tested by the Contracting Officer.

6. WAYBILLS AND DELIVERY TICKETS. Copies of waybills or delivery tickets shall be submitted to the Contracting Officer during the progress of the work. Before the final statement is allowed, the Contractor shall file with the Contracting Officer certified waybills and/or certified delivery tickets for all stone actually used in the construction covered by the contract.

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SECTION 2H

AGGREGATE BASE

Index

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15. Maintenance
16. Waybills and Delivery Tickets

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.

1.1 American Society for Testing and Materials (ASTM) Publications.

C 117-69	Materials Finer than No. 200 (75-M) Sieve in Mineral Aggregates by Washing
C 127-73	Specific Gravity and Absorption of Coarse Aggregate
C 128-73	Specific Gravity and Absorption of Fine Aggregate
C 131-76	Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
C 136-76	Sieve or Screen Analysis of Fine and Coarse Aggregates
D 75-71	Sampling Aggregates
D 422-63	Particle-Size Analysis of Soils
D 423-66 (R 1972)	Liquid Limit of Soils
D 424-59 (R 1971)	Plastic Limit and Plasticity Index of Soils
D 1556-64 (1974)	Density of Soil In Place by the Sand-Cone Method
D 1557-70	Moisture-Density Relations of Soils, Using 10-lb. (4.5-kg) Rammer and 18-in. (457-mm) Drop
E 11-61	Sieves for Testing Purposes

2. MATERIALS. Aggregates shall consist of crushed stone or slag, crushed gravel, angular sand, soil, or other sound, durable, approved materials processed and blended or naturally combined. Aggregates shall be durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. It shall be the responsibility of the Contractor to obtain materials that will meet the requirements specified herein and that can be constructed to meet the grade and smoothness requirements specified herein after all compaction requirements have been completed. The material retained on a No. 4 sieve shall be known as coarse aggregate, and the material passing the No. 4 sieve shall be known as binder material.

2.1 Coarse Aggregate conforming to the requirements specified above shall have a percentage of wear not to exceed 50 percent after 500 revolutions. Slag shall be an air-cooled blast-furnace product having a dry weight of not less than 65 pounds per cubic foot. Coarse aggregate shall consist of angular fragments reasonably uniform in density and quality. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one having a ratio of width to thickness greater than 3, and an elongated particle is one having a ratio of length to width greater than 3.

2.1.1 Coarse aggregate retained on each sieve specified shall contain at least 50 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 piece. When two fractures are adjacent, the angle between the planes of the fractures must be at least 30 degrees to count as two fractured faces.

2.2 Binder Material shall consist of screenings, angular sand, soil, or other finely divided mineral matter processed or naturally combined with the coarse aggregate. Liquid-limit and plasticity-index requirements stated herein shall apply to any component that is blended to meet the required gradation and shall also apply to the completed course. The portion of any component or of the completed course passing the No. 40 sieve shall be either nonplastic or shall have a liquid limit not greater than 25 and a plasticity index not greater than 5.

2.3 Gradation requirements specified herein shall apply to the completed base course, and it shall be the responsibility of the Contractor to obtain materials that will meet the gradation requirements after mixing, placing, compacting, and other operations. The aggregates shall be continuously graded within the limits specified below:

Sieve Size	Percentage by Weight Passing Square-Mesh Sieve
1-1/8	100
No. 4	38-65
No. 8	25-60
No. 30	10-40
No. 200	3-12

The values are based on aggregates of uniform specific gravity, and the percentages passing the various sieves are subject to appropriate correction by the Contracting Officer when aggregates of varying specific gravities are used.

3. SAMPLING AND TESTING shall be by and at the expense of the Contractor.

3.1 Samples shall be the size required and shall be taken by the Contractor. Copies of test results shall be submitted for approval 14 days prior to starting the work, and thereafter at regular intervals during production as specified hereinafter. These samples shall be obtained at the source, from test pits, borings, trucks, stockpiles, or from other designated locations. Samples for material gradation, liquid-limit determination, and plasticity-index tests shall be taken in conformance with ASTM D 75. After the material has been placed and compacted, samples for density tests shall be taken as specified in ASTM D 1556, and additional samples for gradation, liquid-limit, and plasticity-index tests shall be taken by an appropriate method. Where deemed necessary, the sampling will be supervised by the Contracting Officer. The Contractor shall arrange his work so that sampling and testing may be performed without interruption.

3.2 Tests.

3.2.1 Aggregate Gradation. Aggregate gradation shall be determined in accordance with ASTM C 117, C 127, C 128, C 136, and D 422. Sieves shall conform to ASTM E 11.

3.2.2 Liquid Limit shall be determined in accordance with ASTM D 423.

3.2.3 Plasticity Index shall be determined in accordance with ASTM D 424.

3.2.4 Wear Test shall be made in conformance with ASTM C 131.

3.2.5 Field-In Place Density shall be determined in accordance with ASTM D 1556. Moisture-density relations shall be established in the laboratory in accordance with ASTM D 1557, method D.

3.3 Testing Frequency. Results of tests to determine particle shape, presence of objectionable coatings and foreign matter, percentage of wear, fracture count, gradation, liquid-limit, plasticity-index, specific gravity, and other specification requirements for determination of the acceptability of the source shall be submitted for approval at least 7 days prior to starting of manufacture of the base course material. Production testing for material gradation, liquid limit, and plasticity index shall be performed at regular intervals with at least one test being made for each 500 cubic yards or fraction thereof, of material produced and results shall be submitted on a daily basis. Deviations from specification requirements shall be corrected immediately upon discovery. After the material has been placed and compacted, one field density test for each 1,000 square yards or fraction thereof of finished base course and one additional gradation, liquid-limit, and plasticity index test for each 3,000 square yards of base course or fraction thereof shall be performed. Maximum-density moisture relations shall be established for each 1,000 cubic yards of base course material. The location of the after-placement tests shall be as directed. One copy of density data less dry weight determinations shall be provided on the day each test is taken. The completed test report shall be provided with the Contractor Quality Control Report on the following work day. Results of all tests made shall be submitted for approval on a daily basis and subsequent paving operations shall not commence until final approval has been obtained. Failure of any test shall be reported verbally, by the most expeditious means and followed promptly by written report. Contractor field operations shall immediately reflect corrective measures. For every failing test, retesting after completion of corrective measures have been taken will be required.

3.4 Approval of Materials. The source of the material shall be selected 14 days in advance of the time materials will be required in the work. Tentative approval of the preliminary reports submitted by the Contractor and the source will be based on an inspection by the Contracting Officer. Tentative approval of the materials will be based on test samples as specified herein. Final approval of both the source and the materials will be based on specified tests performed on samples taken from the completed and compacted base course.

4. EQUIPMENT. All plant, equipment, and tools used in the performance of the work covered by this section will be subject to approval by the Contracting Officer before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and have the capability of producing the required compaction, meeting grade controls, thickness controls, and smoothness requirements as set forth herein and within the specified time limits.

5. OPERATION OF PITS OR QUARRIES. All work involved in clearing, stripping, and excavating in opening or operation of pits or quarries shall be performed by the Contractor. Pits or quarries shall be opened to expose vertical faces of deposit to depths suitable for working. Materials excavated from pits shall be obtained in successive vertical cuts extending through all exposed strata. All pockets or strata of unsuitable materials overlying or occurring within the deposit shall be wasted as directed. The methods of operating pits or quarries and the processing and blending of the material may be changed or modified by the Contracting Office when necessary to obtain material conforming to the specified requirements. Quarries shall be conditioned in agreement with the local laws or authorities.

6. WEATHER LIMITATIONS. Aggregate base courses shall be constructed when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F., the contractor shall protect all areas of the completed aggregate base course, by approved methods, against any detrimental effects of freezing. Areas of completed aggregate base course damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

7. PREPARATION OF UNDERLYING SURFACE. Prior to constructing the aggregate base course, the previously constructed subgrade shall be cleaned of all foreign substances. The surface of the subgrade shall be inspected by the Contractor for adequate compaction and surface tolerances. The subgrade shall conform to section: FILLS AND SUBGRADE PREPARATION. Ruts or soft, yielding spots that may appear in the subgrade, areas having inadequate compaction, and deviations of the surface from the requirements set forth therein, shall be corrected to line and grade and to all specification requirements. The finished subgrade shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the base course is placed.

8. GRADE CONTROL. During construction the lines and grades including crown and cross slope indicated for the aggregate base course shall be maintained by means of line and grade stakes placed by the Contractor at the worksite in accordance with SPECIAL PROVISIONS of these specifications.

9. MIXING AND PLACING MATERIALS. The materials shall be mixed by the stationary-plant, traveling-plant or road-mix method and placed in such a manner as to obtain uniformity of the aggregate base course material and at a uniform optimum moisture content for compaction. The Contractor shall make such adjustments in mixing or placing procedures or in equipment as may be directed to obtain the true grades,

to minimize segregation and degradation, to reduce to accelerate loss or increase of water, and to insure a satisfactory aggregate base course meeting all the requirements of this specification.

10. LAYER THICKNESS. The compacted thickness of the aggregate base course shall be as indicated. When a compacted layer of 6 inches is indicated, the material may be placed in a single layer. When a compacted layer thickness of more than 6 inches is indicated, the material shall be placed in two layers of approximately equal thickness.

11. COMPACTION. Each layer of the aggregate base course (including shoulders) shall be compacted with approved compaction equipment. Water content shall be maintained at optimum or at the percentage specified during compaction. In places not accessible to the rollers, the mixture shall be compacted with mechanical tampers. Compaction shall continue until each layer through the full depth is compacted to at least 100 percent of maximum density. The Contractor shall make such adjustments in rolling or finishing procedures as may be required to obtain true grades, to minimize segregation and degradation, to reduce or accelerate loss or gain of water, and to insure a satisfactory aggregate base course. Unsatisfactory materials shall be reworked to produce a satisfactory material.

12. EDGES OF BASE COURSE. Where the course is not placed between curbs or similar construction, approved material shall be placed along the edges of the aggregate base course in such quantities as will compact to the thickness of the course being considered, or when the course is being constructed in two layers, to the thickness of each layer of the course. Allow in each operation at least a 1-foot width of the shoulder to be rolled and compacted simultaneously with the rolling and compacting of each layer of the base course, as directed.

13. SMOOTHNESS TEST. The surface of each layer shall not show any deviations in excess of 3/8 inch when tested with either a 10- or 12-foot straightedge applied both parallel with and at right angles to the centerline of the paved area. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting, as directed.

14. THICKNESS CONTROL. The completed thickness of the base course shall be within 1/2 inch, plus or minus, of the thickness indicated. Thickness test shall be made and recorded by the Contractor. The thickness of the base course shall be measured at intervals in such manner that there will be a thickness measurement for at least each 500 square yards of base course. The thickness measurement shall be made by test holes at least 3 inches in diameter through the base course. Where the measured thickness of the base course is more than 1/2, inch deficient in thickness, the Contractor, at no additional expense to the Government, shall correct such areas by scarifying, adding mixture of proper gradation, reblading, and recompacting, as directed, Where the measured thickness of the base course is more than 1/2 inch thicker than that indicated, it shall be considered as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the job measurements determined as specified above, but shall be within 1/4 inch of the thickness indicated.

15. MAINTENANCE. The Contractor shall maintain the aggregate base course in a satisfactory condition until the completed work is accepted.

16. WAYBILLS AND DELIVERY TICKETS. Copies of waybills or delivery tickets shall be attached to the Daily Contractor Quality Control Report for the day of delivery. Before the final statement is allowed, the Contractor shall file with the Contracting Officer waybills and/or certified delivery tickets for all aggregates actually used in the construction covered by the contract.

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SECTION 2I

PRIME COAT AND WEED KILLER

Index

1. Applicable Publications
2. Bituminous Materials
3. Sampling and Testing
4. Quantity to be Applied
5. Weather Limitations
6. Equipment
7. Preparation of Surface
8. Weed Killer
9. Application of Bituminous Material
10. Waybills and Delivery Tickets

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.

1.1 American Society for Testing and Materials (ASTM) Publications.

D 140-70 (R 1976)	Sampling Bituminous Materials
D 1250-56 (R 1977)	Petroleum Measurement Tables
D 2027-76	Liquid Asphalt (Medium-Curing Type)

2. BITUMINOUS MATERIAL. The bituminous material for the prime coat shall be liquid asphalt, conforming to ASTM D 2027, designation MC-70.

3. SAMPLING AND TESTING.

3.1 Sampling. Samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140.

3.2 Testing shall be the responsibility of the Contractor. Testing shall be performed by an acceptable commercial testing laboratory or by the Contractor on approval of the Contracting Officer. Materials shall be tested to establish compliance with the specified requirements.

3.3 Certified Laboratory Test Reports. Before delivery of bituminous materials, certified copies, in triplicate, of the tests specified herein and in referenced publications shall be submitted to and approved by the Contracting Officer. The testing shall have been performed by an independent laboratory approved by the Contracting Officer.

4. QUANTITY TO BE APPLIED. Bituminous material for the prime coat shall be applied in quantities of not less than 0.15 gallon nore more than 0.4 gallon per square yard of the surface to be primed. Application of prime coat shall be divided, if necessary, into 2 applications to avoid flowing off the surface. The exact quantities which may be varied to meet field conditions shall be determined by the Contractor and approved by the Contracting officer.

5. WEATHER LIMITATIONS. The prime coat shall be applied only when the prepared surface is dry or contains moisture not exceeding quantity to permit uniform distribution and desired penetrations. Prime coat shall be applied only when the ambient temperature is 50 degrees F. or above and the temperature has not been below 35 degrees F. for 12 hours immediately prior to application.

6. EQUIPMENT.

6.1 General. All equipment, tools, and machines, used in the performance of the work required by this section shall be subject to the approval of the Contracting Officer and shall be maintained in satisfactory working condition.

6.2 Bituminous Distributor shall have pneumatic tires of such width and number that the load produced on the base surface shall not exceed 650 pounds per inch of tire width. The distributor shall be designed and equipped to distribute the bituminous material uniformly at even heat on variable widths of surface at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard with a pressure range of 25 to 75 pounds per square inch and with an allowable variation not to exceed 5 percent from any specified rate. Distributor equipment shall include a separate power unit for the bitumen pump, full circulation spray bars, tachometer, pressure gage, volume measuring devices, adequate heaters for heating the materials to the proper application temperature, a thermometer to show the temperature of the tank contents, and a hose attachment suitable for applying bituminous material to spots unavoidably missed by the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

6.3 Heating Equipment for Storage Tanks. Equipment for heating bituminous material shall consist of steam coils and equipment for producing steam, so designed that steam cannot get into the material. An armored thermometer with a range from 40 to 200 degress F. shall be fixed to the tank so that the temperature of the bituminous material may be read at all times.

6.4 Brooms and Blowers shall be of the power type and shall be suitable for cleaning prepared surfaces.

7. PREPARATION OF SURFACE. Immediately before applying the weed killer and prime coat, all loose material, dirt, clay or other objectionable substance shall be removed from the surface by means of a power broom or blower supplemented with hand brooms. After the cleaning operation and prior to the application of the material, an inspection of the area to be treated shall be made by the Contractor to detemine its fitness to receive the material. The Contracting Officer shall be notified 24 hours in advance of application of the material. To assure a uniform spread of the material, the areas prepared for treatment, if excessively dry, shall be lightly sprinkled with water immediately before the application as directed.

8. WEED KILLER. A chemical weed killer shall be applied to subgrade surfaces of areas to be paved prior to application of the prime coat. The weed killer may be either a fire retardant non-corrosive, water soluble mixture of sodium chlorates and sodium borates, or dry, free flowing borax. The sodium chlorate-sodium borate mixture shall be applied in a water solution at a rate that will yield a minimum

of one pound of sodium chlorate per 100 square feet of treated surface. The equipment used for application of the solution shall mechanically agitate and circulate the solution at all times application is in process. Borax shall be applied dry on a previously dampened subgrade at a rate to yield the equivalent of 3 pounds of boron trioxide (B_2O_3) per 100 square feet of treated surface. After application of the borax, the area shall be uniformly sprinkled with water. The quantity of water applied in the solutions or after application of dry borax shall be at least 4 gallons per 100 square feet of treated surface.

9. APPLICATION OF BITUMINOUS MATERIAL. Immediately following the preparation of the surface, the bituminous material shall be applied by means of a bituminous distributor. The bituminous material shall be applied at a pressure within the range of 25 to 75 pounds per square inch and in the amounts as directed. The bituminous material shall be so applied that uniform distribution is obtained at all points of the surface to be treated. Unless the distributor is equipped to obtain satisfactory results at the junction of the previous and subsequent applications, building paper shall be spread on the surface of applied material for a sufficient distance back from the ends of each applciation so that flow from the spray may be started and stopped on the paper, and all sprayers operate at full force on the surface to be treated. Immediately after the application, building paper shall be removed and destroyed. Spots unavoidably missed by the distributor shall be properly treated with bituminous material. Following the application of bituminous material, the surface shall be allowed to dry without being disturbed for a period of not less than 48 hours, or longer as necessary to attain penetration into the foundation course and evaporation of the volatiles from prime material. The Contractor shall furnish and spread enough approved sand to blot up effectively and cure any excess bituminous material. The Contractor shall maintain the primed surface until the succeeding layer of pavement is placed by protecting the surface against damage and by repairing and repriming deficient areas at no additional cost to the Government. No smoking, fires, or flames other than heaters that are a part of the equipment shall be permitted without heating, distributing, or transferring operations of bituminous material.

9.1 Application Temperature shall be as directed and shall provide an application viscosity between 40 and 120 centistrokes, kinematic, or 20 and 60 seconds, Saybolt-Furol. Application temperatures shall be within the following ranges, except that appropriate changes should be made when the range of viscosity is raised or lowered.

MC-70	120-190 degrees F.

The temperature-viscosity relationship shall be furnished to the Contracting Officer.

10. WAYBILLS AND DELIVERY TICKETS. Copies of waybills or delivery tickets shall be submitted during the progress of the work. Before the final statement is allowed, the Contractor shall file with the Contracting Officer certified waybills and/or certified delivery tickets for all bituminous material actually used in the construction of pavement covered by this section of the specification. The Contractor shall not removed bituminous material from the tank car of storage tank until the initial outage and temperature measurements have been taken by the Contracting Officer; nor shall the Contractor release the car or storage tank until the final outage has been taken by the Contracting Officer.

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SECTION 2J

ASPHALT CONCRETE

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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.

1.1 American Association of State Highway Transportation Officials (AASHTO) Standard.

M 226-73I	Viscosity Graded Asphalt Cement

1.2 American Society for Testing and Materials (ASTM) Publications.

C 117-69	Materials Finer Than No. 200 (75 um) Sieve in Mineral Aggregates by Washing
C 127-73	Specific Gravity and Absorption of Coarse Aggregate
C 128-68	Specific Gravity and Absorption of Fine Aggregate
C 136-71	Sieve or Screen Analaysis of Fine and Coarse Aggregates
D 242-70	Mineral Filler for Bituminous Paving Mixtures
D 1559-72	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus

1.3 Military Standard (Mil. Std.).

MIL-STD-620A & Notice 1	Test Methods for Bituminous Paving Materials

2. DESCRIPTION. Asphalt concrete indicated as "A.C." or "P.M.S." shall consist of fine and coarse aggregates and mineral filler, if required, uniformly mixed with hot bituminous material, and placed and compacted on a prepared base course subgrade.

3. AGGREGATES shall consist of crushed stone, crushed slag, crushed or uncrushed gravel, screenings, sand, and mineral filler. Aggregates shall have a satisfactory service record in bituminous pavement construction. The source selected shall be approved by the Contracting Officer. Material passing the No. 200 sieve shall be known as mineral filler. Mineral filler shall conform to ASTM D 242. The combined aggregates and mineral filler shall meet the requirements of subsequent paragraphs entitled AGGREGATE GRADATION and COMPOSITION OF MIXTURE.

4. BITUMINOUS MATERIAL to be mixed with the mineral aggregates shall be asphalt cement conforming to AASHTO M226, viscosity grade AR-80 Table 3.

5. AGGREGATE GRADATION. The aggregate gradation as determined by ASTM C 117 and C 136 and as selected by the Contracting Officer shall conform to one of the following:

Sieve Openings	Percentage by Weight, Passing	
	a	b
1 inch	100	100
3/4 inch	97-100	80-100
1/2 inch	95-100	65-85
3/8 inch	70-90	55-75
No. 4	50-75	40-60
No. 8	35-65	25-45
No. 50	20-40	10-30
No. 200	2-8	2-8

6. COMPOSITION OF MIXTURE.

6.1 Job-Mix Formula shall be submitted by the Contractor, and no bituminous mixture shall be manufactured until it has been approved. The formula will indicate the percentage of each sieve fraction of aggregate, percentage of asphalt, and temperature of the mixture as discharged from the mixer. The percentage of asphalt in the job-mix formula will be between 5.5 percent and 6.5 percent for mix a, 4.0 percent and 5.5 percent for mix b. Samples of the aggregates and asphalt shall be submitted for approval with the job-mix formula.

6.2 Test Properties of Bituminous Mixtures. The apparent specific gravity, as determined by ASTM C 127 and C 128, shall be used in computing the voids total mix and voids filled with bitumen, and the mixture shall meet the following requirements as determined by ASTM D 1559.

Test Property	50-Blow Compaction
Stability, minimum, pounds	500
Flow, maximum, 1/100-inch	20
Voids total mix, percent	3-5
Voids filled with bitumen, percent	75-85

6. Stripping of Aggregates. If the index of retained stability of the job-mix formula is less than 75 tested in accordance with Method 104 of MIL-STD-620, the aggregates shall be rejected or treated by one of the following procedures:

(1) Addition of heat-stable additives to bitumen.

(2) Addition of hydrated lime, or other cementitious material containing free lime, as a portion of the mineral filler.

7. MIXING PLANT shall be a weigh-batch or continous-mixing type approved by the Contracting Officer and operated so as to produce a mixture within the job-mix formula.

8. OTHER EQUIPMENT.

8.1 Bituminous-Material Spreaders shall be self-propelled, capable of producing a finished surface conforming to the smoothness requirements specified hereinafter. The use of a spreader that leaves indentations or other objectionable irregularities in the freshly-laid mix will not be permitted.

8.2 Blowers and Brooms shall be of the power type suitable for cleaning the surface to be paved.

8.3 Saw shall be of the power type, capable of rapidly cutting pavement and trimming joints and edges of pavement.

8.4 Small Tools available on the work shall consist of the following: rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heater for heating small tools, wood sandals and stilt sandals of standard type, and other small tools as may be required.

8.5 Steel-Wheel Rollers shall be self-propelled, 3-wheel (tricycle) and/or tandem type, weighing not less than 20,000 pounds each. The rollers shall have adjustable wheel scrapers, water tanks, and sprinkling apparatus to keep the wheels sufficiently wet to prevent the bituminous mixture from sticking to the wheels. Rollers shall be capable of reversing without backlash and shall be free from worn parts. Roller wheels shall not have flat or pitted areas or projections that will leave marks in the pavement.

8.6 Pneumatic-Tired Rollers shall be self-propelled and shall consist of two axles on which are mounted multiple pneumatic-tired 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 90 psi. Construction of roller shall be such that each wheel can be loaded to a minimum of 4,500 pounds.

9. TREATMENT OF UNDERLYING SURFACE. Prior to laying a bituminous course, the underlying surface shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, and hand brooms, as directed. The surface to be paved shall receive a prime coat conforming to the requirements of the section: PRIME COAT AND WEED KILLER.

10. TRANSPORTATION OF BITUMINOUS MIXTURE. The bituminous mixture shall be transported from the mixing plant to the site in trucks having tight, clean, smooth bodies with a minimum coating of concentrated solution of hydrated lime and water to prevent adhesion of the mixture. Each load of mixture shall be covered with canvas or other suitable material to protect the mixture from the weather and to prevent loss of heat. Mixtures having temperatures greater than 350 degrees, mixtures having temperatures less than 235 degrees, or mixtures which form or show indications of moisture will be rejected. Hauling over freshly laid material will not be permitted.

Am 1

11. PLACING. Contact surfaces of previously constructed pavement, curbs, manholes, and other structures shall be sprayed with a thin coat of asphalt. The mechanical spreader shall be adjusted and its speed regulated so that the surface of the course being placed will be smooth and continuous without tears and pulling. The course will be of such depth that after compaction, the cross section, grade, and contour will be as indicated. In areas where the use of machine spreading is impractical, the mixture shall be spread by hand. Unless otherwise directed, placing shall begin on the high side of areas with a one-way slope or along the centerline of areas with a crowned section and shall be in the direction of the main traffic flow. Placing of the mixture shall be as continuous as possible, and the speed of placing shall be adjusted, as directed, to permit proper rolling.

12. COMPACTION OF MIXTURE shall be accomplished by steel-wheel or pneumatic tired rollers. Rolling shall begin as soon after placing as the mixture will support the roller without undue displacement. Rolling of the course shall be continued until all roller marks are eliminated and at least 95 percent of the density of a laboratory specimen of the same mixture has been obtained. The speed of the rollers at all times shall be slow enough to avoid displacement of the hot mixture. The wheels of the roller shall be moistened to prevent adhesion of the mixture. In areas not accessible to the roller, the mixture shall be compacted with hot hand tampers.

13. JOINTS. The joints between old and new pavements or between lanes of new work shall be constructed so as to insure uniform bond, texture, density, and smoothness as in other sections of the course. Edges of existing pavement shall be cut to straight, vertical surfaces. All contact surfaces of existing pavement shall be painted with a thin, uniform coat of asphalt.

14. PROTECTION OF PAVEMENT. After final rolling, no vehicular traffic shall be permitted on the pavement for at least 6 hours after rolling.

15. SURFACE REQUIREMENTS. The finished surface shall not vary more than 1/4 inch from a 10-foot straightedge. The straightedge shall be furnished by the Contractor. Defective areas shall be corrected by the Contractor at no additional cost to the Government.

16. SAMPLING. Sampling for the determination of thickness and density of the completed pavements will be performed by the Contracting Officer. All tests necessary to determine conformance with the specified requirements will be performed by the Contracting Officer without cost to the Contractor. The Contractor shall replace the pavement where samples are removed at his expense. No payment will be made for areas of pavement deficient in composition, density, or thickness until they are removed and replaced by the Contractor as directed by the Contracting Officer.

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SECTION 2K Am 1

CULVERTS

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5. Pipe for Culverts
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10. Backfilling

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.

1.1 Federal Specifications (Fed. Spec.)
WW-P-405B Pipe, Corrugated (Iron or Steel, Zinc Coated)

2. DELIVERY, STORAGE, AND HANDLING OF MATERIALS.

2.1 Delivery and Storage. Materials delivered to site shall be inspected for damage, unloaded, and stored with the minimum of handling. Do not store materials directly on the ground. Inside of pipes and fittings shall be kept free of dirt and debris.

2.2 Handling. Materials shall be handled in such a manner as to insure delivery to the trench in sound undamaged condition. Pipe shall be carried to the trench not dragged.

3. MANUFACTURER'S RECOMMENDATIONS. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Contracting Officer prior to installation. Installation of the item will not be allowed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

4. TESTS FOR PIPE. Certified copies of test reports demonstrating conformance to applicable pipe specifications shall be delivered to the Contracting Officer before pipe is installed.

5. PIPE FOR CULVERTS shall be as indicated and shall conform to requirements for the following pertinent types.

5.1 Corrugated Steel Pipe and Arch. Fed. Spec. WW-P-405B, Class I or II, Shape I and 3, respectively. Sheet thickness shall be 0.052-inches for corrugated steel pipe and 0.168 inches for pipe arch.

5.2 Flared End Sections. Sections shall be of a standard design with pipe manufacturer and manufactured of the same material as specified for the pipe.

6. CORRUGATED METAL PIPE JOINTS. Space between pipe and connecting bands shall be kept free from dirt and grit so that corrugations fit snugly. The connecting band, while being tightened, shall be tapped with a soft-head mallet of wood, rubber or plastic to take up slack and insure a tight joint.

6.1 Standard Field Joints. Unless otherwise specified, field joints shall be made with outside bands, each band consisting of one or two pieces. The type, size, and gage of band and the size of angles and bolts shall be as specified in the applicable standards or specifications for the pipe.

7. EXCAVATION AND TRENCHING FOR PIPE CULVERTS. Excavation of trenches and backfilling for culverts shall be in accordance with the applicable portions of sections: EXCAVATION and FILLS AND SUBGRADE PREPARATION and the following requirements.

7.1 Trenching. Width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 24 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around pipe. Sheeting and bracing where required shall be placed within the trench width as specified. Care shall be taken not to overexcavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures shall 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.

7.2 Removal of Rock. Rock in either ledge or boulder formation shall be replaced with selected materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least eight inches or one-half inch for each foot 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.

7.3 Removal of Unstable Material. Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is encountered in bottom of trench, such material shall be removed to depth required and replaced to the proper grade with selected 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, resulting material shall be excavated and replaced, by the Contractor without additional expense to the Government.

8. BEDDING. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. The pipe shall be bedded carefully 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 pipe or arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be only of such length, depth, and width as required for properly making the particular type joint.

9. PLACING PIPE. Each pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alinement 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. Under no circumstances shall pipe be laid in water, and no pipe shall 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. All pipe in place shall be inspected before backfilling, and those damaged during placement shall be removed and replaced at no additional cost to the Government.

9.1 Corrugated Metal Pipe and Pipe Arch. Laying shall be with the separate sections joined firmly together, with the outside laps of circumferential joints pointing upstream and with longitudinal laps on the sides. Any unprotected metal in the joints shall be coated with bituminous material specified in Fed. Spec. WW-P-405. Interior coating shall be protected against damage from insertion or removal of struts or tie wires. Lifting lugs, when used, shall be placed to facilitate moving pipe without damage to exterior or interior coatings. Prior to placing backfill, damaged areas of coupling bands and pipe shall be given a coating of bituminous material specified in Fed. Spec. WW-P-405.

10. BACKFILLING.

10.1 Backfilling Pipe in Trenches. After the bedding has been prepared and the pipe installed, 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 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. Care shall be taken to insure thorough compaction of the fill 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 12 inches 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 8 inches. Tests for density shall be made as necessary to insure conformance to the compaction requirements specified in "Compaction" below. Where it is necessary in the opinion of the Contracting Officer, any sheeting and/or portions of bracing used shall be left in place, and the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

10.2 Backfilling Pipe in Fill Sections. For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified above and in "Compaction" below. The fill material shall be uniformly spread in layers longitudinally on both sides of pipe, not exceeding six inches 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 12 inches 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 12 feet, whichever is less. After the backfil has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and throughly compacted in layers not exceeding 8 inches.

10.3 Movement of Construction Machinery. In 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 at any stage of the construction shall be at the Contractor's risk. Any pipe damaged thereby shall be repaired or replaced at the expense of the Contractor.

10.3 Compaction. Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Chohesive 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.

10.4.1 Minimum Density. Backfill over and around pipe, and backfill around and adjacent to all other drainage structures shall be compacted at the approved moisture content to the following applicable minimum densities which will be determined as specified in section: FILLS AND SUBGRADE PREPARATION.

~~10.4.1.1 Under paved roads, parking areas, and similar-use pavements including adjacent shoulder~~ areas, 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~~.

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SECTION 2L

REINFORCED CONCRETE PIPE CONDUIT

Index

1. Applicable Publications
2. General Requirements
3. Concrete Pipe

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.

1.1 American Society for Testing and Materials (ASTM) Publication.

C 76-80	Reinforced Concrete Culvert, Storm Drain and Sewer Pipe

2. GENERAL REQUIREMENTS.

2.1 General. The reinforced concrete pipe conduit shall be constructed as shown and as specified. Concrete shall conform to the applicable requirements of the section: CONCRETE CONSTRUCTION. Where pipe is embedded in concrete, the pipe shall be supported in such a manner to hold it rigidly in position while concrete is placed. Earthwork about the conduit shall conform to the applicable requirements of the sections: EXCAVATION, STRIPPING, and FILLS AND SUBGRADE PREPARATION. Specified and/or indicated D-loading is the minimum acceptable, and heavier pipe may be furnished at the option of the Contractor.

2.2 Tests for Pipe. Certified copies of test reports, demonstrating conformance to the applicable pipe specifications, shall be furnished the Contracting Officer before installation of the pipe. Strength tests for concrete pipe, as required in the applicable specifications, shall be the three-edge bearing tests.

3. CONCRETE PIPE.

3.1 Materials

3.1.1 Reinforced Concrete Pipe shall conform to the requirements of ASTM Specification C 76, strenth as indicated. The following additional markings shall be clearly stenciled on the pipe:

Permissible D-load to produce a 0.01-inch crack
Internal diameter in inches.

3.1.2 Mortar.

3.1.2.1 Composition. Mortar for joints shall be composed of cement, sand, and water proportioned at the approximate ratio of one part cement to not more than two parts sand. The materials shall conform to the applicable requirements of the section: CONCRETE CONSTRUCTION.

3.1.2.2 Mixing. The mortar shall be mixed in a concrete mixer in the manner specified for concrete, or in a watertight mixing box. If mixed in a box, the box shall first be filled with the required amount of sand, the volume of which shall be determined with a one-cubic-foot measuring box. The requisite amount of cement

shall then be added and the material dry mixed by turning at least three times with a mortar hoe. Sufficient water shall then be added and the mixing continued until the batch is uniform in color and consistency. Mortar shall show no visible signs of setting and shall be used within a period of 30 minutes after mixing with water. No retempering will be permitted.

3.2 Installation.

3.2.1 Placing. Each pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alinement indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe be laid in water, and no pipe shall 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. All pipe in place shall have been inspected before encasing in concrete. Laying shall proceed upgrade with the tongue ends of tongue-and-groove pipe pointing in the direction of the flow. Circular concrete pipe with ellliptical reinforcing shall be so placed that the reference lines designating the top of the pipes will be not more than 5 degrees from the vertical plane through the longitudinal axis of the pipe. In encasing the pipe in concrete, care shall be taken to prevent damage to or misalinement of the pipe.

3.2.2 Mortar Joints. All joint areas shall be cleaned and moistened with a wet brush immediately before calking. The interior surface of the lower portion of the groove of the tongue-and groove pipe shall have a layer of soft mortar applied. The tongue end of the second section, while in a horizontal position, shall have a layer of soft mortar applied to the upper half of the tongue. The tongue shall then be inserted in the groove. The joint shall then be calked with mortar, completely filling the annular space between the pipe sections. The inside of the joint shall then be wiped and finished smooth. The outside of the joint shall be immediately protected from the air and sun with continously moist burlap or earth until the mortar is cured.

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SECTION 2M

GUARDRAIL AND LOG BARRIER

Index

1. Applicable Publications
2. Materials
3. Preservative Treatment
4. Metal Guardrail
5. Log Barrier

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.

1.1 Federal Specifications (Fed. Spec.).

TT-P-102D & Am-1	Paint, Oil Alkyd (Modified), Exterior, Fume Resistant Ready-Mixed, White and Tints
TT-P-641G & Am-1	Primer Coating; Zinc Dust-Zinc Oxide (for Galvanized Surfaces)

1.2 Military Specifications (Mil. Spec).

DOD-C-15328D	Primer (Wash), Pretreatment (Formula No. 117 for Metals) (Metric)
MIL-P-28582 (YD)	Primer Coating, Exterior, Lead Pigment-Free (Undercoat for Wood, Ready-Mixed, White and Tints)

1.3 American Society for Testing and Materials. (ASTM) publications.

A 123-78	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
A 307-78	Carbon Steel Externally Threaded Standard Fasteners
C 94-78a	Ready-Mixed Concrete
D 25-73	Round Timber Piles

1.4 West Coast Lumber Inspection Bureau (WCLB) publication.

No. 16	Standard Grading and Dressing Rules for Douglas Fir, Western Hemlock, Western Red Cedar, White Fir, Sitka Spruce Lumber (Sep 1, 1970; Rev. Jan 1, 1979)

1.5 American Association of the State Highway and Transportation Officials (AASHTO) Standard.

M 180-78	Corrugated Sheet Steel Beams for Highway Guardrail

1.6 American Wood Preservers' Association (AWPA) Standard.

C 14-79	Wood for Highway Construction Preservative Treatment by Pressure Processes

1.7 American Wood Preservers Bureau (AWPB) Standard.

LP 3-78	Standard for Softwood Lumber, Timber and Plywood Pressure treated with light Hydrocarbon Solvent-Penta Solution for above Ground Use
LP 33-78	Standard for Softwood Lumber, Timber and Plywood Pressure treated with light Hydrocarbon Solvent-Penta Solution for Ground Contact Use

2. MATERIALS.

2.1 Concrete and Reinforcement shall conform to the requirements of section: CAST-IN-PLACE STRUCTURAL CONCRETE.

2.2 Anchor Bolts shall conform to ASTM A 397.

2.3 Lumber.

2.3.1 Posts and Blocking. Douglas Fir, shall be No. 1 grade, graded in accordance with the standard grading and dressing rules of WCLB No. 16.

2.3.2 Logs. Pressure Treated Douglas Fur clean-peeled, conforming to ASTM D 25.

2.4 Metal Beam Guard Railing. Except as otherwise specified rail elements, terminal sections, bolts, nuts, and other fittings shall conform to AASHTO M 180. The rail metal shall be open hearth, oxygen furnace, or electric furnace steel and, in addition to conforming to the requirements of AASHTO M 180, shall withstand a cold bend, without cracking, of 180 degrees around a mandrel of a diameter equal to 2-1/2 times the thickness of the plate. The rail elements may be hot-dip galvanized before fabrication, in which case the provisions in Section 3 of ASTM A 123 shall not apply. The weight of zinc coating, on rail elements, per square foot of actual surface shall average not less than 2.0 ounces and no individual specimen shall show less than 1.8 ounces. Workmanship shall be equivalent to good commercial practice and all edges, bolt holes and surfaces shall be free of torn metal, burrs, sharp edges and protrusions. Bolts shall have shoulders of such shape that will prevent the bolts from turning. Holes in rail elements shall be of similar shape as the bolt shoulder. Rail elements shall be spliced at intervals not to exceed 12 feet 6 inches and such splices shall be made at posts, unless otherwise shown.

2.5 Paint.

2.5.1 Exterior Finish Paint for wood and metal shall conform to Fed. Spec. TT-P-102.

2.5.2 Metal Primer Paint shall conform to Fed. Spec. TT-P-641.

2.5.3 Vinyl-Type Wash Coat shall conform to Mil. Spec. MIl-C-15328.

2.5.4 Wood Primer Paint shall conform to Mil. Spec. MIL-P-28582.

2.6 Galvanizing shall conform to ASTM A 123.

3. PRESERVATIVE TREATMENT. Lumber shall be preservative-treated after fabrication. Treatment shall be in accordance with AWPA C 14. Surfaces to be painted shall be treated with water-borne preservatives or pentachlorophenol in suitable solvents. After using a salt treatment, the moisture content of the lumber shall be reduced to not over 19 percent.

4. METAL GUARDRAIL.

4.1 Posts shall be treated Douglas fir, size as indicated, and shall be rough or S4S. Only one type of post shall be used for any one continuous length of guardrail. Post shall be embedded as indicated, in the ground and set in such position that the top of the guardrail shall be 1 inch below the top of the post. The space around the post shall be backfilled with approved earth material and shall be thoroughly tamped. The surface of the backfill shall be crowned. Spacing of posts shall be at equal intervals in accordance with the manufacturers standards.

4.2 Blocks for metal beam guard railing shall be treated Douglas fir, size as indicated, rough or S4S. The size tolerance of rough sawn blocks in the direction of the bolt holes shall be not more than plus or minus 1/4 inches. Only one type of block shall be used for any one continuous length of guard railing. Blocks shall be toenailed to posts with one 16 penny galvanized nail on each side of the block.

4.3 Rail shall be installed so that the top of the rail shall be one inch below the top of the post. Ends of all rails shall be turned away from the roadway and shall be fitted with manufacturer's standard terminal sections. Joint design shall be in accordance with the manufacturer's standards. The rail at joints shall have full bearing. Rail element joints shall be lapped not less than 12-1/2 inches in the direction of traffic and bolted. The bolted connection of the rail element to the post shall withstand a 5,000-pound pull at right angles to the line of the railing.

4.4 Painting. Exposed portions of posts shall be painted with one prime coat and 2 finish coats of brown paint. Guardrail shall be cleaned of all grease and other foreign material and shall be solvent cleaned and treated with vinyl-type wash coat. Vinyl-type wash coat shall be mixed by adding one volume of acid component to 4 volumes of resin component. The acid component shall be added slowly with constant stirring to the resin component. After mixing, the wash coat shall be used within 8 hours. If additional thinning is required to maintain a wet spray, reduction shall be made with normal butyl alcohol or 99 percent isopropyl alcohol. After the vinyl-type wash coat treatment the guardrail shall receive 2 prime coats and one finish coat of brown paint.

5. LOG BARRIER.

5.1 Log barriers shall be closely fitted, accurately set to the indicated lines and grades, cut to the indicated shape, bored, countersunk and rigidly secured in place with anchor bolts as indicated.

5.2 Preservative Treatment. Vertical members in contact with the ground shall be pressure-treated in accordance with AWPB LP 33. Horizontal log members shall be pressure-treated in accordance with AWPG LP 3.

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SECTION 2N

FENCES AND BARRICADES

Index

1. Applicable Publications
2. Materials
3. Installation of Fence
4. Temporary Fence

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.

1.1 Federal Specifications. (Fed. Spec.).

FF-T-276b	Thimbles, Rope
RR-C-271B	Chains and Attachments, Welded and Weldless
RR-F-191G/GEN.	Fencing, Wire and Post, Metal (and Gates, Chain-Link Fabric, and Accessories)
RR-W-410C	Wire Rope and Strand

1.2 American Society for Testing and Materials (ASTM) Standards.

A 58-81	High-Strength, Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. Thick
B-32-76	Solder Metal
C94-78a	Ready-Mixed Concrete

1.3 General Services Administration, Federal Standard No. 595 A, "Federal Standard Colors", dated 2 January 1968.

2. MATERIALS shall conform to Fed. Spec. RR-F-191G/GEN and other requirements specified below.

2.1 Chain-Link Fabric. Chain link fabric shall be galvanized and have a continuously bonded vinyl coating applied under pressure to 5000 p.s.i. The wire shall be vinyl clad before weaving and shall be free and flexible at all joints. The vinyle thickness shall be a minimum of 0.020 inches and shall be black in color.

2.2 Concrete. ASTM C 94, using 3/4-inch maximum size aggregate, and having minimum compressive strength of 3,000 psi at 28 days. Grout shall consist of one part Portland cement to 3 parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

2.3 Post, Rails and Accessories for Chain-Link Fences. Fed. Spec. RR-F-191, zinc-coated, except as modified herein. Posts shall be weathered steel pipe conforming to ASTM A 588.

Am 1

2.3.1 Gates. Gate leaves more than 8 feet wide shall have either intermediate members and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist. Gates less than 8 feet wide shall have truss rods or intermediate braces. Gate fabric shall be attached to the gate frame by method standard with the manufacturer except that welding will not be permitted. Latches shall be arranged for padlocking so that padlock will be accessible from both sides of the gate regardless of the latching arrangement. All gate hinges shall be the non-removable bolt-pin type.

2.3.2 Reinforcing Wire. Minimum tensile strength of 80,000 pounds per square inch, vinyl-coated for use with vinyl-coated fabric.

2.3.3 Tie Wire. Aluminum alloy of 0.144-inch diameter for attaching fabric to top rail and to intermediate posts. Preformed clips of 6-gage vinyl-coated steel wire may be used for attaching fabric to intermediate posts.

2.3.4 Hog Rings. Aluminum wire of 0.110-inch diameter for attaching fabric to top and bottom reinforcing wires.

2.3.5 Post Braces and Truss Rods. For each gate, corner, pull, or end post. Truss rods shall be provided with turnbuckles or other equivalent provisions for adjustment.

2.3.6 Post, Rails, and Braces. The posts, rails, and braces, except for bridge fence, shall be either round or H-Section; however, the same type shall be used throughout the project. For bridge fence, round members only shall be used.

2.3.7 Fittings shall have two coats of red-lead primer and one coat of lusterless enamel ~~conforming to Fed. Std. Color No. 595a (rust brown).~~ Color No. 30109 as listed in Fed. Std. No. 595a (rust brown).

2.5 Temporary Fence. The fabric may be new or used chain-link fencing, or poultry netting, 20 gage wire, one-inch hexagon mesh. The fabric shall have a width of not less than 48 inches.

3. INSTALLATION OF FENCE.

3.1 General. The fence shall be installed to the alinement indicated. Fence installation shall be in accordance with the fence manufacturer's written installation instructions except as modified herein. Details shall be as indicated on the drawings.

3.2 Excavation for concrete-embedded items shall be of the dimensions indicated except in bedrock. If bedrock is encountered before reaching the required depth, the excavation shall be continued to the depth indicated or 18 inches into the bedrock, whichever is less, and shall be a minimum of 2 inches larger than the outside diameter of the post. Post hole shall be cleared of loose material. Waste material shall be spread where directed.

3.3 Post Setting. Posts shall be set plumb and in alinement. Posts shall be set in concrete bases of dimensions indicated except where posts are set in preformed holes or in holes excavated in bedrock. Concrete shall be thoroughly compacted so as to be free of voids and finished in a dome. Braced pull posts shall be installed at fence ends, intersections, each change in direction of 10 degrees or more horizontally, and at each grade change of 5 percent or more. In addition, straight runs between braced pull posts shall be installed at least every 1000 feet. In bedrock and in preformed holes, posts shall be set with a minimum of one

inch of grout around each post. Grout shall be thoroughly worked into the hole so as to be free of voids and finished in a dome. Concrete and grout shall be cured a minimum of 72 hours before any further work is done on the posts.

3.4 Post Caps and Supporting Arms shall be installed as recommended by the manufacturer. Post caps shall be of the design as required to accommodate the top rail. In addition to manufacturer's standard connections, supporting arms shall be securely anchored to posts in such manner that will prevent easy removal with hand tools. Studs driven by low-velocity explosive-actuated tool may be used with steel, wrought iron, ductile iron, or malleable iron. Studs driven by any explosive-actuated tool will not be used with gray iron or other material that will be fractured.

3.5 Top Rails. Top rail shall be installed before installing chain-link fabric and shall pass through intermediate post caps. The top rail shall have expansion couplings spaced as indicated. Top rail shall be installed at bridge approaches and where the slope of the wall is greater than 2:1.

3.6 Top and Bottom Reinforcing Wires shall be installed before installing chain-link fabric and shall be pulled taut.

3.7 Fabric shall be pulled taut and secured to the top wire and bottom wire close to both sides of each post and at intervals of not more than 24 inches on centers. Fabric shall be attached to the sides of the post away from the channel or enclosed opening. Fabric shall be secured to braced pull posts using stretcher bars and ties or clips or by integrally weaving to integral fastening loops of ends, corner, pull, and gate posts for the full length of each post. Fabric shall be attached to line posts at not greater than 15 inches on center using ties or clips. Splices in fabric shall be made with suitable splicing wire. Edges of fabric made by field tests shall be knuckled or barbed as applicable.

3.8 Gates shall be installed as indicated. Hinge brackets shall be installed in drilled holes in the gate and gate posts or shall be tack welded to gate and gate posts.

3.9 Repair. In the event that any portion of galvanized items is abraded or otherwise damaged to the extent that the base metal is exposed, such damaged or abraded portions shall be neatly covered with Grade 50B solder conforming to the requirements of ASTM B 32.

4. TEMPORARY FENCE shall be installed in locations indicated on the drawings. The fence shall be in place before channel excavation is started and remain in place until backfill is completed. Pedestrian crossings over the channel excavation shall have the fence along both rails. Upon completion of the work, the fence materials shall become the property of the Contractor and shall be removed from the site. The temporary fence shall be maintained by the Contractor in good repair throughout its use.

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SECTION 3A

FORMWORK FOR CONCRETE

Index

1. Applicable Publications
2. Submittals
3. Design
4. Materials
5. Installation
6. Chamfering
7. Coating
8. Removal
9. Field Quality Control
10. Box Conduit Reshoring

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.

1.1 American Concrete Instutute (ACI) Standards.

ACI 347-68	Recommended Practice for Concrete Formwork

1.2 American Soceity for Testing Materials (ASTM).

C 31-69 (R 1975)	Making and Curing Concrete Test Specimens in the Field
C 39-72	Compressive Strength of Cylindrical Concrete Specimens

1.3 U.S. Department of Commerce, National Bureau of Standards (NBS) Product Standard.

PS 1-74	For Construction and Industrial Plywood

2. SUBMITTALS.

2.1 Shop Drawings. Drawings for all formwork required shall be submitted at least 14 days before either fabrication on site or before delivery of prefabricated forms. The drawing and data submitted shall include the type, size, quantity and strength of all materials of which the forms are made, the plan for jointing of facing panels, details affecting the appearance, and the assumed design values and loading conditions.

2.2 Manufacturer's literature shall be submitted for plywood, concrete form hard board, form accessories, prefabricated forms, form coating, and form lining materials.

3. DESIGN. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the Contractor. The formwork shall be designed for loads, lateral pressure and allowable stresses in accordance with Chapter 1 of ACI Standard 347. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall have sufficient rigidity to maintain specified tolerances.

4. MATERIALS.

4.1 Forms shall be fabricated with facing materials that produce the specified construction tolerance and surface requirements of section: CONCRETE.

4.1.2 Class "B" Finish. This class of finish shall apply to all formed surfaces except those specified to receive Class C or Class D. The sheathing shall be composed of tongue-and-groove or shiplap lumber, plywood conforming to NBS Product Standard PS-1 exterior type, grade B-B plyform, tempered concrete form hardboard, or steel. Steel lining on wood sheathing will not be permitted.

4.1.3 Class "C" Finish. This class of finish shall apply to outlet conduit and channel walls. The sheathing may be of either tongue-and-groove lumber, plywood, concrete form hardboard, or steel. Wood sheathing for curved or warped surfaces shall be composed of splines of lumber which can be bent to the required shape without splitting or cracking to form a smooth tight form.

4.1.4 Class "D" Finish. This class of finish shall apply to surfaces receiving backfill or unexposed surfaces. The sheathing may be of wood or steel.

4.2 Form Accessories. Ties and other similar form accessories to be partially or wholly embedded in the concrete shall be of a commercially manufacturered type. After the ends or end fasteners have been removed, the embedded portion of metal ties shall terminate not less than 2-inches from any concrete surface either exposed to view or exposed to water. Plastic snap ties may be used in locations where the surface will not be exposed to view. Form ties shall be constructed so that the ends or end fasteners can be removed without spalling the concrete.

4.3 Form Coating shall be a commercial formulation of satisfactory and proven performance that will not bond with, stain or adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.

5. INSTALLATION. Forms shall be mortar tight, properly alined and adequately supported to produce concrete surfaces meeting the surface requirements and construction requirements of section: CONCRETE. Where concrete surfaces are to be permanently exposed to view, joints in form panels shall be arranged to provide a pleasing appearance. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface so as to obtain accurate alinement of the surface and to prevent leakage of mortar. Forms shall not be re-used if there is any evidence of surface wear and tear or defects which would impair the quality of the surface. All surfaces of forms and embedded materials shall be cleaned of any mortar from previous concreting and of all other foreign material before concrete is placed in them.

6. CHAMFERING. All exposed joints, edges, and external corners shall be chamfered by molding placed in the forms unless the drawings specifically state that chamfering is to be omitted or as otherwise specified. Chamfered joints shall not be permitted where earth or rockfill is placed in contact with concrete surfaces. Chamfered joints shall be terminated a sufficient distance outside the limit of the earth or rockfill so that the end of the joints will be clearly visible.

7. COATING. Forms for exposed or painted surfaces shall be coated with form oil or a form-release agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for unexposed surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

8. REMOVAL. Forms shall not be removed without approval and all removal shall be accomplished in a manner which will prevent injury to the concrete. Forms shall not be removed before the expiration of the minimum time indicated below, except as otherwise directed or specifically authorized. When conditions of the work are such as to justify the requirement, forms will be required to remain in place for a longer period.

8.1 Unsupported Concrete. Formwork for walls, columns, sides of beams, gravity structures and other vertical type forms not supporting the weight of concrete shall not be removed in less than 24 hours. The time depends on temperature, lift heights and type and amount of cementitious material in the concrete. Where forms for columns, walls and sides of beams also support formwork for slabs or beam soffits, the removal time of the latter shall govern.

8.2 Supported Concrete. Pan joist forms of the type which can be removed without disturbing shoring shall not be removed in less than 3 days. Supporting forms and shoring shall not be removed until structural members have acquired sufficient strength to support safely their own weight and any construction load to which concrete may be subjected. In no case shall forms and shoring be removed until both minimum time and sufficient strength have been attained.

	Concrete with Type II Portland Cement, or Portland Pozzolan Cement	Concrete with Blends of Portland Cement with Other Cementitious Material
Archs, including gallery and conduit roofs	7 days	10 days
Joist, beams or girder soffits where clear structural span between support is		
under 10	4	6
feet 10 to 20 feet	7	10
over 20 feet	14	21
Floor slab where clear structural span between supports is		
under 10 feet	3	5
10 to 20 feet	4	6
Over 20 feet	7	10

In addition to minimum times above, results of control tests conducted in accordance with ASTM C-31 and C-39 will be used as evidence that concrete has attained sufficient strength to permit removal of forms. Concrete cylinders shall

be stored in the structure or as near the structure as possible, shall receive insofar as possible the same curing and protection as given those portions of the structure they represent, and shall be tested with 24 hours after removal from the structure. Cylinders will be tested by and at the expense of the Government. Supporting forms shall not be removed until after minimum time and control test specimens have attained at least 80 percent of strength required for the structure in accordance with quality and location requirements of section: CONCRETE.

9. FIELD QUALITY CONTROL. Forms and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

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SECTION 3B

CONCRETE

Index

1. Related Work Specified Elsewhere
2. Applicable Publication
3. Quality Assurance
4. Evaluation and Acceptance
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1. RELATED WORK SPECIFIED ELSEWHERE.

1.1 Expansion, Contraction and Construction Joints in Concrete Section 3D.

1.2 Concrete Reinforcement - Section 6A.

1.4 Formwork for Concrete - Section 3A.

2. 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.

2.1 American Concrete Institute (ACI) Standards.

ACI 211.1-77 (CRD-C99)	Recommended Practice for Selecting Proportions for Normal Weight and Heavyweight Concrete
ACI 214-77	Recommended Practice for Evaluation of Compression Test Results of Field Concrete
ACI 305R-77	Hot Weather Concreting - Committee Report, 1977 - Title No. 74-33
ACI 309-72 (R 1978)	Recommended Practice for Consolidation of Concrete

2.2 American Society for Testing and Materials (ASTM) with Corresponding CRD Standard Indicated Where Available.

C 31-69 (CRD-C 11) (R1980)	Making and Curing Concrete Test Specimens in the Field
C 33-81 (CRD-C 133)	Concrete Aggregates
C 39-80 (CRD-C 14)	Compressive Strength of Cylindrical Concrete Specimens
C 70-79 (CRD-C 111)	Surface Moisture of Fine Aggregate

C 94-81 (CRD-C 31)	Ready-Mixed Concrete
C 125-81 (CRD-C 43)	Te ms Relating to Concrete and Concrete Aggregates
C 136-81 (CRD-C 103)	Sieve or Screen Analysis of Fine and Coarse Aggregates
C 143-78 (CRD-C 5)	Slump of Portland Cement Concrete
C 171-69 (CRD-C 310) (R 1980)	Sheet Materials for Curing Concrete
C 172-71 (CRD-C 4) (R 1977)	Sampling Fresh Concrete
C 192-81 (CRD-C 10)	Making and Curing Concrete Test Specimens in the Laboratory
C 231-81 (CRD-C 41)	Air Content of Freshly Mixed Concrete by the Pressure Method
C 494-77A (CRD-C 87)	Chemical Admixtures for Concrete
C 566-78 (CRD-C 113)	Total Moisture Content of Aggregate by Drying
D 75-71 (CRD-C 155) (R 1978)	Sampling Aggregates
E 329-77 (CRD-C 500)	Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction

2.3 Concrete Plant Manufacturer's Bureau (CPMB).

6th Revision (CRD-C 95)	Concrete Plant Standards

2.4 Federal Specifications (Fed. Specs.) with Corresponding CRD Standards.

SS-C-1960/3 (CRD-C 200)	Cement, Portland
SS-C-1960/4 (CRD-C 200)	Cement, Hydraulic, Blended
SS-C-1960/5 (CRD-C 200)	Pozzolan, for Use in Portland Cement Concrete

2.5 National Bureau of Standards (NBS) Handbook.

44 Specifications, Tolerance and Other Technical Requirements for Commercial weighing and Measuring Devices (4th Edition 1971 with Replacement Sheets).

2.6 U.S. Army Corps of Engineers Handbook for Cement and Concrete (CRD).

CRD-C 13-79	Air Entraining Admixture for Concrete

CRD-C 55-78	Concrete Mixer Performance
CRD-C 100-75	Concrete Aggregate and Aggregate Sources and Selection of Material for Testing
CRD-C 112-69	Surface Moisture in Aggregate by Water Displacement
CRD-C 300-77	Membrane-Forming Compounds for Curing Concrete
CRD-C 400-63	Water for Use in Mixing or Curing Concrete
CRD-C 588-79	Non-Shrink Grout

2.7 General Services Administration, Federal Standard No. 595A, "Federal Standard Colors" dated 2 January 1968.

3. QUALITY ASSURANCE.

3.1 Preconstruction Testing.

3.1.1 Air-Entraining Admixture. Which has been in storage at the project site for longer than 6 months or which has been subjected to freezing will be retested at the expense of the Contractor when directed by the Contracting Officer and shall be rejected if test results are not satisfactory.

3.1.2 Water~~ing~~ Reducing, Admixtures. Will be accepted based on compliance with applicable specification, except that 6-month and 1-year compressive strength requirements are waived.

3.1.3 Cement. If cement is to be obtained from more than one source, the initial notification shall state the estimated amount to be obtained from each source and the proposed schedule of shipments. Cement will be sampled at the mill or shipping point and/or at the site of the work. If tests prove that a cement which has been delivered is unsatisfactory, it shall be promptly removed from the site of the work. Cement which has not been used within six months after test will be retested at the expense of the Contractor when directed by the Contracting Officer and shall be rejected if test results are not satisfactory. The cost of testing cement excess to the project requirements will also be at the expnese of the Contractor. The charges for testing cement at the expense of the Contractor will be deducted from the payments due the Contractor at a rate of 4 cents per hundred weight of cement represented by the tests.

3.1.3.1 Prequalified Cement Sources. Cement shall be delivered and used directly from a mill of a producer designated as a qualified source. Samples of cement for check testing will be taken at the project site or concrete producing plant by a representative of the Contracting Officer for testing at the expense of the Government. A list of prrequalified cement sources is available from Commander and Director, U.S. Army Engineer Waterways Experiment Station. P.O. Box 631, Vicksburg, Mississippi 39180.

3.1.3.2 Other Cement Sources. Sampling, testing and the shipping inspection from the point of sampling, when the point is other than at the site of the work, will

be made by, or under the supervision of the Government and at its expense. No cement shall be used until notice has been given by the Contracting Officer that test results are satisfactory. In the event of failure, the cement may be resampled and tested at the request of the Contractor,and at the Contractor's expense. When the point of sampling is other than at the site of the work, the fill gate or gates of the sampled bin will be sealed and kept sealed until shipment from the bin has been completed. Sealing of the fill gate or gates and of conveyances used in shipment will be done by or under the supervision of the Government. Conveyances will not be accepted at the site of the work unless recived with all seals intact. If tested cement is rehandled at transfer points, the extra cost of inspection will be at the Contractor's expense.

3.1.4 Pozzolan will be sampled at the source and stored in sealed bins pending completion of certain tests. Pozzolan will also be sampled at the site when determined necessary. All sampling and testing will be by and at the expense of the Government. Release for shipment and approval for use will be based on compliance with 7-day lime-pozzolan strength requirements and other physical and chemcial and uniformity requirements for which tests can be completed by the time the 7-day lime-pozzolan strength test is completed. Release for shipment and approval for use on the above basis will be contingent on continuing compliance with the other requirements of the specifications. If a bin fails, the contents may be resampled and tested at the Contractor's expense. In this event the pozzolan may be sampled as it is loaded into cars, trucks or barges provided they are kept at the source until released for shipment. Unsealing and resealing of bins and sealing of shipping conveyances will be done by or under the supervision of the Government. Shipping conveyances will not be accepted at the site of the work unless received with all seals intact. If pozzolan is damaged in shipment, handling, or storage, it shall be promptly removed from the site of the work. Pozzolan which has not been used within six months after test will be retested at the expense of the Contractor when directed by the Contracting Officer and shall be rejected if the test results are not satisfactory. If tested pozzolan is rehandled at transfer points, the extra cost of inspection will be at the Contractor's expense. The cost of testing excess pozzolan will be at the Contractor's expense at a rate of 85 cents per ton. The amount will be deducted from payment to the Contractor.

3.1.5 Aggregates. Aggregates for use in concrete construction may be obtained from any commercial source in the Phoenix area. The Contractor shall notify the Contracting Officer at least 60 days in advance of the source of aggregates for use in concrete.

3.2 Construction Testing By Government. The Government will sample and test aggregates and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. When the Contractor proposes to reduce concrete mixing time, uniformity tests at reduced mixing time will be made by the Government at the Contractor's expense. Samples of aggregates will be obtained at the point of batching. Concrete will be sampled in accordance with ASTM C 172. Slump and air content will be determined in accordance with ASTM C 143 and ASTM C 231, respectively. Compression test specimens will be made and cured in accordance with ASTM C 31 and compression test specimens tested in accordance with ASTM C 39. Samples for strength tests of each class of concrete placed each day will be taken not less than once each day, nor less than once for each 150 cu. yd, of concrete, nor less than once for each 5,000 sq. ft. of surface area of one side of slabs or walls. Three specimens will be made from each sample, two will be tested at 28 days for acceptance and one will be tested at 7 days for

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information. The acceptance test results will be the average of the strengths of the two specimens tested at 28 days.

4. EVALUATION AND ACCEPTANCE.

4.1 Concrete. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equal or exceed the required specified strenth f'_c and no individual test result falls below the specified strengh f'_c by more than 500 pounds per square inch. Structural analysis or additional testing may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient. Concrete work judged inadequate by structural analysis or by results of tests shall be reinforced with additional construction as directed by the Contracting Officer or shall be replaced at the Contractor's expense.

4.2 Construction Tolerances. Variation in alinement, grade and dimensions of the structures from the established alinement, grade and dimensions shown on the drawings shall be within the tolerance specified in the following tables:

TABLE I

CONSTRUCTION TOLERANCES FOR CONDUITS

(1)	Departure from established alinement or from established grade	Free-flow conduits.....1-inch High-velocity conduits.....1/2-inch ~~Railroad tunnels...1-inch~~
(2)	Variation in thickness, at any point	Conduits.....minus 2-1/2 percent or 1/4-inch, whichever is greater Conduits.....plus 5 percent or 1/2-inch, whichever is greater
(3)	Variation from inside dimensions	.....1/2 of 1 percent

TABLE II

TOLERANCES FOR CONCRETE CANAL LINING

(1)	Departure from established alinement	.....2-inches on tangents .....4-inch on curves
(2)	Departure from established profile grade	.....1-inch

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(3)	Reduction in thickness in lining	.....10 percent of specified thickness: provided, that average thickness is maintained as determined by daily batch volumes
(4)	Variation from specified width of section at any height	.....1/4 of 1 percent plus 1 inch
(5)	Variation from establish height of lining	.....1/2 of 1 percent plus 1-inch
(6)	Variations in surfaces	.....Invert 1/4-inch in 10 feet .....Side slopes 1/2-inch in 10 feet

TABLE III

TOLERANCES FOR ALL OTHER CONCRETE

(1)	Departure from established alignment	.....1-inch
(2)	Departure from establihsed grades	.....1-inch
(3)	Variation from the plumb or the specified batter in the lines and surfaces of columns, piers, walls, and in arrises	Exposed, in 10 feet.....1/2-inch Backfilled, in 10 feet.. 1-inch
(4)	Variation from the level or from the grades indicated on the drawings in slabs, beams horizontal grooves, and railing offsets	Exposed, in 10 feet.....1/2-inch Backfilled, in 10 feet.. 1-inch
(5)	Variation in cross-sectional dimensions of columns, piers slabs, walls, beams, and similar parts	Minus.....1/4-inch Plus.....1/2-inch
(6)	Variation in thickness of bridge slabs	Minus.....1/8-inch Plus.....1/4-inch
(7)	Footings:	Same as footings for buildings
(8)	Variation in the sizes and locations of slabs and wall openings	.....1/2-inch

(9)	Sills and sidewalls for radial gates and similar watertight Structures	Variation from the plumb or level .....Not greater than 1/8 in. in 10 ft.

4.3 Surface Requirements. The surface requirements for the classes of finish required by Section: FORMWORK FOR CONCRETE shall be as hereinafter specified. Allowable irregularities are designated "abrupt" or "gradual" for purposes of providing for surface varitions. Offsets resulting from displaced, misplaced or mismatched forms, or sheathing, or by loose knots in sheathing, or other similar form defects, shall be considered "abrupt" irregularities. Irregularities resulting from warping, unplaneness or similar uniform variations from planeness, or true curvature, shall be considered "gradual" irregularities. "Gradual" irregularities will be checked for compliance with the prescribed limits with a 5-foot template, consisting of a straightedge for plane surfaces and a shaped template for curved or warped surfaces. In measuring irregularities, the straigthedge or template may be placed anywhere on the surface in any direction, with the testing edge held parallel to the intended surface.

Class of Finish	Irregularities	
	Abrupt, inches	Gradual, inches
B	1/4	1/2
C	+	1/4
D	1	1

+ Variation for class C finish shall not exceed zero positive and 1/8-inch negative in the direction of flow of the water.

5. SUBMITTALS.

5.1 Test Reports.

5.1.1 Concrete Mixture Proportions shall be submitted for approval. The proportions of all ingredients and nominal maximum coarse aggregate size that will be used in the manufacture of each quality of concrete shall be stated. Proportions shall indicate weight of cement and water and weights of aggregates in a saturated surface-dry condition. The submission shall be accompanied by test reports from a laboratory complying with ASTM E 329 attesting that proportions thus selected will produce concrete of the qualities indicated. No substitution shall be made in the source or type of materials used in the work without additional tests to show that the new materials and quality of concrete are satisfactory.

5.1.2 Cement and Pozzolan will be accepted on the basis of manufacturer's certification of compliance, accompanied by mill test reports that materials meet the requirements of the specification under which it is furnished. Certification and mill test reports shall identify the particular lot furnished. No cement or pozzolan shall be used until notice of acceptance has been given by the Contracting Officer. Cement and pozzolan will be subject to check testing from samples obtained at the mill, at transfer points or at the project site, as scheduled by the Contracting Officer, and such sampling will be by or under the supervision of the Government at its own expense. Material not meeting specifications shall be promptly removed from the site of work.

5.2 Manufactuers' Certificate.

5.2.1 Accelerating Admixture shall be certified for compliance with all specification requirements.

5.2.2 Impervious Sheet Curing Materials shall be certified for compliance with all specification requirements.

5.2.3 Air-Entraining Admixture shall be certified for compliance with all specification requirements.

5.2.4 Water-Reducing Admixture shall be certified for compliance with all specification requirements.

5.2.5 Curing Compound shall be certified for compliance with all specification requirements.

5.3 Review of Plant, Equipment and Methods.

5.3.1 Batch Plant. Details of the data on concrete plant shall be submitted for review by the Contracting Officer for conformance with paragraph: PRODUCTION OF CONCRETE.

5.3.2 Mixers. The make, type and capacity of concrete mixers proposed for mixing concrete shall be submitted for review by the Contracting Officer for conformance with paragraph: PRODUCTION OF CONCRETE.

5.3.3 Conveying Equipment. The methods and equipment for transporting, handling, and depositing the concrete shall be submitted for review by the Contracting Officer for conformance with paragraph: CONVEYING.

5.3.4 Placing. All placing equipment and methods shall be submitted for review by the Contracting Officer for conformance with paragraph: PLACING.

5.3.5 Joint Clean-Up. The method and equipment proposed for joint clean-up shall be submitted for review by the Contracting Officer for conformance with paragraph: PREPARATION FOR PLACING. Method of waste disposal for any method proposed for joint clean-up shall be approved by the Contracting Officer.

5.3.6 Curing. The curing medium and methods to be used shall be submitted for review by the Contracting Officer for conformance with paragraph: CURING AND PROTECTION.

5.3.7 Cold-Weather Requirements. If concrete is proposed to be placed under cold weather conditions the materials, methods and protection proposed to accomplish it in accordance with the requirements of paragraph: PLACING and CURING AND PROTECTION shall be approved by the Contracting Officer.

5.3.8 Hot-weather Requirements. If concrete is proposed to be placed under hot weather conditions the materials and methods proposed to accomplish it in accordance with the requirements of paragraphs: PLACING AND CURING AND PROTECTION shall be approved by the Contracting Officer.

6. MATERIALS.

6.1 Cement and Pozzolan shall be Portland cement or Portland-pozzolan cement or Portland cement in combination with pozzolan and shall conform to appropriate specifications listed below.

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6.1.1 Portland Cement. Fed. Spec. SS-C1960/3, Type II low alkali.

6.1.2 High-Early-Strength Portland Cement. Fed. Spec. SS-C-1960/3, Type III with tricaloium aluminate limited to 5 percent, used only when specifically approved in writing.

6.1.4 Portland-Pozzolan Cement. Fed. Spec. SS-C-1960/4, Type IP (MS).

6.1.5 Pozzolan. Fed. Spec. SS-C-1960/5, Class F or N.

6.2 Aggregates. Fine and coarse aggregate will conform to the grading requirements of ASTM C-33. The nominal maximum size shall be as listed in paragraph: PROPORTIONING. The proposed aggregate gradations to be used shall be submitted to the Contracting Officer for approval.

6.3 Admixtures to be used, when required or permitted shall conform to the appropriate specification listed below.

6.3.1 Air-Entraining Admixture. CRD-C 13.

6.3.2 Accelerating Admixture. Calcium chloride conforming to ASTM D 98.

6.3.3 Water-Reducing ~~or Retarding~~ Admixtures ASTM C 494, Type A.

6.4 Curing Materials.

6.4.1 Impervious Sheet Materials ASTM C 171, type optional except polyethylene film, if used, shall be white opaque.

6.4.2 Membrane-Forming Curing Compound. CRD-C 300, pigmented, nonpigmented, chlorinated rubber base, resin-base dissipating type as required in paragraph: CURING AND PROTECTION. Non-pigmented, compound shall contain a fugitive dye.

6.5 Water for mixing shall be fresh, clean and drinkable, except that undrinkable water may be used if it meets the requirements of CRD-C 400. Water for curing shall not contain any substance that is injurious to the concrete.

7. PROPORTIONING.

7.1 Quality and Location. Concrete of various qualities indicated and as required under other sections shall be proportioned for use in various structures or portions of structures as follows.

7.1.1 Strength. Specified compressive strength f'c shall be as follows:

Compressive Strength @ 28 days, psi	Structure or Portion of Structure
4000	Outlet conduit
3000	All other structures

7.1.2 Maximum Water - Cement Ratio. Maximum water cement ratio shall be as follows:

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Maximum Water-Cement Ratio, by wt	Structure or Portion of Structure
0.45	Outlet conduit, channel invert and ~~dentals~~ dentates.
0.50	Outlet channel walls
0.55	All other structures

7.2 Nominal Maximum Size Coarse Aggregate shall be 1-1/2 inches except 3/4-inch nominal maximum size coarse aggregate shall be used when any of the following conditions exist: the narrowest dimension between sides of forms is less than 7-1/2 inches, the depth of the slab is less than 4-1/2 inches or when the minimum clear spacing between reinforcing is less than 2 inches.

7.3 Air Content as determined by ASTM C 231 shall be 5.0 ± 1.5 percent except that when the nominal maximum size coarse aggregate is 3/4-inch it shall be 6.0 ± 1.5 percent.

7.4 Slump. The slump shall be determined in accordance with ASTM C-143 and shall not depart more than 1-1/2-inches from that stipulated below:

Structure Element	Slump; inches
Massive or lightly reinforced sections, ~~tunnel inverts~~, bridge decks, concrete plug, and all slabs	1-1/2
~~Tunnel side walls~~	~~3-1/2~~
Other construction	2-1/2

7.5 Concrete Proportioning. Trial design batches and testing requirements for various qualities of concrete specified shall be the responsibility of the Contractor. Samples of approved aggregates shall be obtained in accordance with the requirements of ASTM D 75. Samples of materials other than aggregate shall be representative of those proposed for the project and shall be accompanied by manufacturer's test reports indicating compliance with applicable specified requirements. Trial mixtures having proportions, consistencies and air content suitable for the work shall be made based on ACI Standard 211.1, using at least three different water-cement ratio which will produce a range of strength encompassing those required for the work. Trial mixtures shall be designed for maximum permitted slump and air content. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192. They shall be tested at 7 and 28 days in accordance with ASTM C 39. From these test results a curve shall be plotted showing the relationship between water-cement ratio and strength.

7.6 Average Strength. For each portion of the structure, proportions shall be selected so that the maximum permitted water-cement ratio is not exceeded and so as to produce an average strength f_{cr} exceeding the specfied strength f_c by the amount indicated below. Where the production facility has a standard deviation record determined in accordance with ACI 214, based on 30 consecutive strength tests of similar mixture proportions as proposed, obtained within one year of the time when concrete placing is expected, it shall be used in selecting average

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strength. The average strength used as the basis for selecting proportions shall exceed the specified strength f'_c by at least

350 psi if standard deviation is less than 300 psi

550 psi if standard deviation is 300 to 450 psi

750 psi if standard deviation is 450 to 600 psi

900 psi if standard deviation is 600 to 750 psi

If the standard deviation exceeds 750 psi or if a standard deviation record is not avaialbe, proportions shall be selected to produce an average strength at least 1,000 psi greater than the specified strength.

8. PRODUCTION OF CONCRETE.

8.1 Capacity. The batching and mixing equipment shall have a capacity of at least 100 cubic yards per hour.

8.2 Batching Plant shall conform to the requirements of the Concrete Plant Standards of CPMB and as specified; however, rating plates attached to batch plant equipment are not required.

8.2.1 Equipment. The batching controls shall be semi-automatic or automatic. The semi-automatic batching system shall be provided with interlocks such that the discharge device cannot be actuated until the indicated material is within the applicable tolerances. The semi-automatic or automatic batching system shall be equipped with an accurate recorder or recorders which meet the requirement of the Concrete Plant Standards of CPMB. Separate bins or compartments shall be provided for each size group of aggregate and cement and pozzolan. Aggregate shall not be weighed in the same batcher with cement pozzolan. If both cement and pozzolan are used they may be batched cumulatively provided Portland cement is batched first. If measured by weight, water shall not be weighed cumulatively with another ingredient. Water batcher filling and discharging valves shall be so interlocked that the discharged valve cannot be opened before the filling valve is fully closed. An accurate mechanical device for measuring and dispensing each admixture shall be provided. Each dispenser shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and discharge automatically in a manner to obtain uniform distribution throughout the batch in the specified mixing period. Where use of truck mixers make this requirement impracticable, the admixture dispensers shall be interlocked with the sand batcher. Admixtures will not be combined prior to introduction in water or sand. The plant shall be arranged so as to facilitate the inspection of all operations at all times. Suitable facilites shall be provided for obtaining representative samples or aggregates from each bin or compartment.

8.2.2 Scales. The weighing equipment shall conform to the applicable requirements of NBS Handbook 44, except that the accuracy shall be plus or minus 0.2 percent of scalle capacity. The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring devices. The tests shall be made at the frequency required in paragraph: CONTRACTOR QUALITY CONTROL and in the presence of a Government inspector.

8.2.3 Batching Tolerances.

8.2.3.1 Weighing Tolerances. Whichever of the following tolerances is greater shall apply, based on required scale reading.

Material	Percent of Required Weight	Percent of Scale Capacity
Cement and Pozzolan	±1	±0.3
Aggregate	±2	±0.3
Water	±1	±0.3
Admixture	±3	±0.3

8.2.3.2 Volumetric Tolerances. For volumetric batching equipment the following tolerances shall apply to the required volume of material being batched:

Water: Plus or minus 1 percent.

Admixtures: Plus or minus 3 percent.

8.2.4 Moisture Control. The plant shall be capable or ready adjustment to compensate for the varying mositure contents of the aggregates, and to change the weights of the materials being batched.

8.3 Mixers.

8.3.1 General. The mixers shall not be charged in excess of the capacity recommended by the manufacturer. The mixers shall be operated at the drum or mixing blade speed designated on the manufacturer's data plate. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repared.

8.3.2 Concrete Plant Mixers shall be tilting, non-tilting, horizontal shaft or vertical-shaft type and shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elasped.

8.3.2.1 Mixing Time and Uniformity. In the absence of uniformity data for concrete mixers, the mixing time for each batch after all solid materials are in the mixer shall be one minute for mixers having a capacity of one cubic yard, provided that all of the mixing water is introduced before one-fourth of the mixing time has elapsed. For mixers of greater capacity, this minimum time shall be increased 15 seconds for each additional cubic yard or fraction therof. These mixing times are predicated on operation at designated speed and proper introduction of materials into the mixer. The mixing time will be increased to secure the requred uniformity when the average variability index for the tests performed in accordance with paragraph: CONTRACTOR QUALITY CONTROL is less than any of the following uniformity requirements:

Tests	Average Variability Index
Water content, % by wt.	91.5
Coarse aggregate content, % by wt.	90.5
Unit-weight of air-free mortar, % by wt.	98.5
Cement content of dried mortar, % by wt.	82.5

The mixing time may be reduced, when requested by the Contractor, to the minimum time required to meet all the uniformity requirements. Mixer performance tests in accordance with CRD-C 55 at reduced mixing times will be performed by the Government at the Contractor's expense.

8.3.3 Truck Mixers. Truck mixers, the mixing of concrete therein, and concrete uniformity, shall conform to the requirements of ASTM C-94. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it will be possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. Truck mixers shall not be used to mix or to agitate concrete with greater than 1-1/2-inch nominal maximum size aggregate.

9. PREPARATION FOR PLACING.

9.1 Construction Joints. Concrete surfaces to which other concrete is to be bonded shall be prepared for receiving the next lift or adjacent concrete by cleaning with either wet sandblasting, high pressure water jet, or other approved method; however, approved wet sandblasting equipment shall be provided.

9.1.1 High-Pressure Water Jet. A stream of water under a pressure of not less than 3000 psi may be used for cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse aggregate particles. Where the cleaning occurs more than two days prior to placing the next lift or where the work in the area subsequent to the cleaning causes dirt or debris to be deposited on the surface, the surface shall be cleaned again as the last operation prior to placing the next lift. If the water jet is incapable of a satisfactory cleaning, the surface shall be cleaned by wet sandblasting.

9.1.2 Wet Sandblasting. When employed in the preparation of construction joints, wet sandblasting shall be performed as the final operation completed before placing the following lift. The operation shall be continued until all accumulated laitance, coatings, stains, debris, and other foreign materials are removed. The surface of the concrete shall then be washed thoroughly to remove all loose material. The surface shall again be washed just prior to placing the succeeding lift.

9.1.3 Waste Disposal. The method used in disposing of waste water employed in cutting, washing and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the envirnoment of the project area. Method of disposal shall be subject to approval.

9.2 Embedded Items. Before placing concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on

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the drawings, or required. Embedded items shall be free of oil and other foreign matter such as loose coatings or rust, paint and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into the voids.

10. CONVEYING.

10.1 General. Concrete shall be conveyed from mixer to forms as rapidly as practicable and within the time interval in paragraph: PLACING by methods which will prevent segregation or loss of ingredients. Any concrete transferred from one conveying device to another shall be passed through a hopper which is conical in shape and shall not be dropped vertically more than 5 feet, except where suitable equipment is provided to prevent segregation and where specfically authorized. Telephonic or other satisfactory means of rapid communication between the mixing plant and the forms in which concrete is being placing shall be provided and available for use by Government inspectors.

10.2 Buckets. The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum size aggregate and the area of the gate opening shall be not less than two-square feet. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed any may be manually, pneumatically or hydraulically operated except for buckets larger than 2 cubic yards shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

10.3 Trucks. Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C -94. Non-agitating equipment may be used for transporting plant mixed concrete over a smooth road when hauling time is less than 15 minutes. Bodies of non-agitating equipment shall be smooth, watertight, metal containers equipped with gates that will permit the discharge of the concrete. Covers shall be provdied for protection against the weather.

10.4 Chutes. When concrete can be placed directly from a truck mixer, agitator or non-agitating equipment, the chutes attached to this equipment may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete except when specifically approved.

10.5 Belt Conveyors. Belt conveyors may be used when approved. Such conveyors shall be designed and operated to assure to uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing.

10.6 Pump Placement. Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type. The pipeline shall be rigid steel pipe or heavy duty flexible hose. The inside diameter of the pipe shall be at least three times the nominal maximum size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. The maximum size coarse aggregate will not be reduced to accommodate the pumps. The distance to be pumped shall not exceed limits recommended by the pump manufacturer. The concrete shall be supplied to the concrete pump continously.

When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place. after each operation, eqiuipment shall be throughly cleaned, and flushing water shall be wated outside of the forms.

11. PLACING.

11.1 General. Concrete placement will not be permitted when, in the opinion of the Contracting Officer, weather conditions prevent proper placement and consolidation. Concrete shall be deposited as close as possible to its final position in the forms, and in so depositing there shall be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so reulated that it may be effectively cnsolidated in horizontal layers 1-1/2 feet or less in thickness with a minimum of lateral movement. The amount deposited in each location shall be that which can be readily and thoroughly consolidated. The surfaces of construction joints shall be kept continously wet for the first twelve hours during the twenty-four hourperiod prior to placing concrete. Free water shall be removed prior to placement of concrete. Sufficient placing capacity shall be provided so that concrete placement can be kept plastic and free of cold joints while concrete is being placed.

11.2 Time Interval Between Mixing and Placing. Concrete shall be placed within thirty minutes after it has been mixed except when conveyed by agitating equipment. When concrete is truck mixed or when a truck mixer or agitator is used for transportating concrete mixed by a concrete plant mixer, the concrete shall be delivered to the site of the work and discharge shall be completed within 1-1/2 hours after introduction of the cement to the aggregates except when the concrete temperature exceeds 80°F. the discharge shall be completed within 45 minutes. When the length of haul makes it impossible to deliver truck mixed concrete within these time limits, batching of cement and a portion of the mixing water shall be delayed until the truck mixer is at or near the contruction site. Not more than 80 percent of the water and all other materials except cement shall be batched at the distant batch plant and tranpsorted to the cement batcher without mixing. Concrete shall be placed within 15 minutes after it has been discharged.

11.4 Hot-Weather Placing. Concrete shall be properly placed and finished with approved procedures in accordance with paragraph: SUBMITTALS. The concrete placing temperature shall not exceed 85°F. Cooling of the mixing water and/or aggregates will be required to obtain an adequate placing temperature. Steel forms and reinforcement shall be cooled prior to concrete placement when steel temperatures are greater than 120°F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete placing temperature.

11.5 Concrete on Earth Foundations. Earth surfaces upon which concrete is to be placed shall be clean, damp, and free from standing or running water. Prior to placing concrete the earth foundation shall have been satisfactorily compacted in accordance with the provisions of section: FILLS AND SUBGRADE PREPARATION.

11.6 Concrete on Rock Foundations. Rock surfaces upon which concrete is to be placed shall be clean, free from oil, standing or running water, ice, mud, drummy rock, coatings, debris and loose, semi-detached or unsound fragments. Open or filled surface fractures and joints will be cleaned to a miminum depth of three times their width and to firm rock on the sides. All fractures and joints will then be filled with a grout slurry conforming to the paragraph: Grout Slurry Mix. Immediately before concrete is placed, all rock surfaces shall be cleaned

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thoroughly by high velocity air jets. All rock surfaces shall be kept continously wet for at least 24 hours immediately prior to placing concrete thereon.

11.6.1 Grout Slurry Mix. Grout slurry shall be composed of cement, sand and water mixed in the proportions as directed. The estimated proportions may vary between one part of cement by volume to a minimum of 3 parts sand by volume to a maximum of 6 parts sand by volume and water to produce a satisfactory mixture consistent with placing requirements for foundation surface treatment as determined by the Contracting Officer.

11.7 Consolidation. Immediately after placing, each layer of concrete shall be consolidated by internal vibrating equipment. Vibrators will not be used to tranpsort concrete within the forms. Hand spading may be required if necessary with internal vibration along formed surfaces permanently exposed to view. The vibrating equipment shall at all times be adequate in number of units and power of each unit to properly consolidate the concrete. A spare vibrator shall be kept on the job site during all concrete placing operations. Form or surface vibrators shall not be used unless specifically approved. Vibrators of the proper size, frequency and amplitude shall be used for the type of work being performed in conformance with the following requirements:

Application	Head Diameter (inches)	Frequency VPM	Amplitude (in.)
Thin walls, beams, etc.	1-1/4 - 2-1/2	9000 - 13500	0.02 - 0.04
General construction	2 - 3-1/2	8000 - 12000	0.025 - 0.05

The frequency and amplitude shall be within the range indicated in the table above when determined in accordance with paragraph: VIBRATORS. The vibrator shall be inserted vertically at uniform spacing over the entire area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if such exists. It shall be held stationary until the concrete is consolidated and then withdrawn slowly.

11.8 Placing Concrete in Spillway Sill. The unformed portion of the spillway sill shall be finished by placing concrete slightly above grade and striking off to grade by accurate screeding. Screeding may be accomplished by semimechanical devices or by a mechanical screed which consolidates and screeds the surface in one operation. Ribs embedded in the fresh concrete as guides for screeds will not be permitted.

12. REPAIR OF SURFACE DEFECTS. Within 4 hours after form removal, all fins, and loose materials shall be removed and surface defects including tie holes shall be remedied. All honeycombed and other defective concrete shall be repaired. All unsound concrete shall be removed from defective areas. Defective areas larger than 36 square inches and deeper than steel or 4 inches shall be delineated in a rectangular shape by a saw cut a minimum depth of one-inch and repaired with concrete replacement. Minor honeycomb and holes left by the removal of tie rods in all surfaces not to receive additional concrete shall be reamed or chipped and filled with dry pack mortar. If chipping is necessary the edges shall be perpendicular to the surface or slightly undercut. As determined by trial mixtures, the cement used in the mortar or concrete for all surfaces permanently exposed to view shall be a blend of Portland cement and white cement properly

proportioned so that the final color when cured will be the same as adjacent concrete. Temperature of the concrete, ambient air, replacement concrete or mortar during remedial work including curing shall be above 50°F. The prepared area shall be dampened, brush-coated with a neat cement grout or with an approved epoxy resin, and filled with mortar or concrete. The mortar shall consist of one part cement to 2-1/2 parts fine aggregate. The quantity of mixing water shall be the minimum necessary to obtain a uniform mixture. The mortar shall be remixed without addition of water until it obtains the stiffest consistency that will permit placing. Mortar shall be thoroughly compacted in place and struck off to adjacent concrete. Replacement concrete shall be drier than the usual mixture and thoroughly tamped into place and finished. Forms shall be used if required. Metal tools shall not be used to finish permanently exposed surfaces. The patched areas shall be cured for seven days.

13. FINISHING UNFORMED SURFACES.

13.1 General. The ambient temperature of spaces adjacent to surfaces being finished shall be not less than 50°F. All unformed surfaces that are not to be covered by additional concrete or backfill shall be finished to the elevation shown on the drawings. Surfaces to receive additional concrete or backfill shall be brought to elevation shown on the drawings and left true and regular. Exterior surfaces shall be sloped for drainage unless otherwise shown on the drawing or as directed. Joints shall be carefully made with a jointing tool. The finished surfaces shall be protected from stains or abrasions. Surfaces or edges likely to be injured during the construction period shall be protected from damage. Tolerance for a screeded finish shall be true planes within 3/8-inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction. Tolerance for a floated finish shall be true planes within 1/4-inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction. Tolerance for a troweled finish shall be true planes within 1/8-inch in 10-foot as determined by a 10-foot straightedge placed anywhere on the slab in any direction.

13.2 Float Finish. All unformed surfaces of concrete that are not to be covered by additional concrete or backfill, shall have a float finish unless a steel trowel finish is specified. Surfaces shall be screeded and darbied or bullfloated to bring the surface to the required finish level with no coarse aggregate visible. No cement or mortar shall be added to the surface during the finishing operation. The concrete, while still green but sufficiently hardened to bear a man's weight without deep imprint, shall be floated to a true and even plane. Floating may be performed by use of hand or power driven equipment. Hand floats shall be made of magnesium or aluminum.

13.3 Trowel Finish. A steel trowel finish shall be applied to the invert of the outlet works conduit. Concrete surfaces shall be finished with a float finish and after surface moisture has disappeared, the surface shall be steel-troweled to a smooth, even, dense finish free from blemishes including trowel marks.

14. CURING AND PROTECTION.

14.1 General. All concrete shall be cured by an approved method for the period of time given below:

Type III Portland cement	3 days
Type II Portland cement or	14 days

Type IP (MS) portland pozzolan cement	
Type II Portland cement blended with pozzolan	21 days

Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and injury from rain and flowing water. All materials and equipment needed for adequate curing and protection shall be available and at the placement site prior to start of concrete placement. Concrete shall be protected from the damaging effects of rain for 12 hours, flowing water for 14 days, and direct rays of the sun for 3 days. All concrete shall be adequately protected from damage. No fire or excessive heat shall be permitted near or in direct contact with concrete at any time.

14.2 Moist Curing. Concrete moist-cured shall be maintained continously (not periodically) wet for the entire curing period. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, they shall be cleaned as required in paragraph: EVALUATION AND ACCEPTANCE. When wooden form sheathing is left in place during curing, the sheathing shall be kept wet at all times. Horizontal surfaces shall be cured by ponding, by covering with a minimum uniform thickness of 2 inches continously saturated sand, or by covering with satruated non-staining burlap or cotton mats or sealed impervious sheet materials. The following exceptions are permitted:

(1) Horizontal construction joints may be allowed to dry for twelve hours immediately prior to placing of the following lift.

(2) Where insulation is approved for cold weather protection, all joints in the insulation shall be sealed to prevent moisture loss and maintained sealed throughout curing period.

14.3 Membrane Curing. Concrete may be cured with an approved curing compound in lieu of moist curing except that membrane curing will not be permitted on any surface to which sack rubbed finish is to be applied, on any surface containing protruding steel reinforcement. It may be used on surfaces to which concrete or any other material is to be bonded only under the conditions given in this paragraph.

14.3.1 A Pigmented Type Curing Compound conforming to CRD-C 300 may be used on surfaces which will not be exposed to view when the project is completed, on surfaces where the appearance of the compound as determined by the Contracting Officer is not objectionable, or on surfaces that are to be painted. It may also be used on surfaces against which concrete is to be bonded, except those to which sack rubbed finish is to be applied or those containing protruding steel reinforcement, provided that it is completely removed by high-pressure water jet or by wet sandblasting described in paragraph: PREPARATION FOR PLACING prior to placing the new concrete. Only a chlorinated rubber base curing compund conforming to CRD-C 300 may be used on surfaces that are to be painted. Only a resin-base dissipating membrane-type curing compound conforming to CRD-C 300 may be used on surfaces that are to be stained or desert varnished. A non-pigmented type curing compound, containing a fugitive dye, conforming to CRD-C 300 with the reflective requirements waived may be used on surfaces which will be exposed to view when the project is completed. In hot weather, concrete cured with the non-

pigmented type shall be shaded from the direct rays of the sun for the first 3 days of the curing period.

14.3.2 The curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. The surfaces shall be thoroughly moistened with water and the curing compound applied as soon as free water disappears. The curing compound shall be applied to unformed surfaces as soon as free water has disappeared. The curing compound shall be applied in a 2-coat continuous operation by approved motorized powerspraying equipment and at a uniform coverage of not more than 400 sq. ft. per gallon for each coat. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage herein specified. All concrete surfaces on which the curing compound has been applied shall be adequately protected for the duration of the entire curing period from pedestrian and vehicular traffic and from any other cause which will disrupt the continuity of the curing membrane.

14.4 Impervious-Sheet Curing. All horizontal concrete slab surfaces may be cured using impervious sheets. All surfaces shall be thoroughly wetted and be completely covered with waterproof paper, polyethylene film or with polythylene-coated burlap having the burlap thoroughly water-saturated before placing. Covering shall be laid with light colored side up. Covering shall be lapped not less than 12 inches and securely weighted down or shall be lapped not less than 12 inches and securely weighted down or shall be lapped not less than 4 inches and taped to form a continuous cover with completely closed joints. The sheet shall be wighted to prevent displacement so that it remains in contact with the concrete during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears or holes appears during the curing period.

14.5 Hot Weather. When the rate of evaporation of surface moisture, as determined by use of Fig. 2.1.5 of ACI 305, may reasonably be expected to exceed 0.2 lb per square foot per hour, provision for windbreaks, shading, fog spraying, or wet covering with a light colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as finishing operations will allow.

15. FINISHING FORMED SURFACES. Surfaces shall be left with the texture imparted by the forms except defective surfaces shall be repaired in accordance with paragraph: REPAIR OF SURFACE DEFECTS.

16 CONTRACTOR QUALITY CONTROL.

16.1 General. The Contractor shall perform the inspection and tests described in the following paragraphs and based upon the results of these inspections and tests he shall take the appropriate action required. Reports shall be submitted as required in the following paragraphs. The laboratory performing the tests shall conform to ASTM E 329.

16.2 Inspection Details and Frequency of Testing.

16.2.1 Fine Aggregate.

16.2.1.1 Grading. At least once during each shift in which concrete is being delivered, there shall be one sieve analysis and fineness modulus determination in

accordance with ASTM C 136 and C 125, respectively, for the fine aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits.

16.2.1.2 Moisture Content. There shall be when in the opinion of the Contracting Officer the electric moisture meter is not operating satisfactorily at least four tests for moisture content in accordance with either ASTM C 70, C 566, or CRD-C 112 during each 8-hour period of mixing plant operation. The times for the tests shall be selected randomly within the 8-hour period. An additional test shall be made whenever the slump is shown to be out of control or excessive variation in workability is reported by the placing foreman.

16.2.2 Coarse Aggregate.

16.2.2.1 Grading. At least once during each shift concrete is being delivered, there shall be a sieve analysis in accordance with ASTM C 136 for each size group of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor is responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken shall show the results of the 5 most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than at the batch plant bins to allow for degradation during handling.

16.2.2.2 Moisture Content. A test for moisture content of each size of coarse aggregate shall be made at least once a shift. When two consecutive readings for smallest size coarse aggregate differ by more than 1.0 percent, frequency of testing shall be increased to that specified for fine aggregate in this section.

16.2.3 Deleterious Substances. When in the opinion of the Contracting Officer, a problem exists in connection with deleterious substances in fine or coarse aggregates, tests shall be made in accordance with ASTM C 33. Testing frequency shall be not less than one per week.

16.2.4 Scales.

16.2.4.1 Weighing Accuracy. The accuracy of the scales shall be checked by test weights at least once a month for conformance with the applicable requirements of paragraph: PRODUCTION OF CONCRETE. Such tests shall also be made whenever there are variations in properties of the fresh concrete which could result from batching errors.

16.2.4.2 Batching and Recording Accuracy. Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight and the actual weight batched.

16.2.5 Batch-Plant Control. When the concrete plant is operating the measurement of all constituent materials including cement, pozzolan, each size of aggregate, water and admixtures shall be continously controlled. The aggregate weights and amount of added water to compensate for free moisture in the aggregates shall be continously control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in

each size of aggregate, and the batched aggregate and water weights per cubic yard for each class of concrete batched during plant operation.

16.2.6 Concrete.

16.2.6.1 Air Content. At least two tests for air content shall be made on randomly selected batches of each class of concrete during each 8-hour period of concrete production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Tests shall be made in accordance with ASTM C 231. The average of each set of two tests shall be plotted on a control chart on which the average is set at 5.0 percent and the upper and lower control limits at 6.0 and 4.0 percent respectively. The range shall be plotted on a control chart on which the upper control limit is 2.0 percent. For concrete having a nominal maximum aggregate size of 3/4-inch, the average shall be set at 6.0 percent and the lower and upper control limits at 5.0 and 7.0 percent respectively.

16.2.6.2 Slump. At least two slump tests shall be made on randomly selected batches of each mixture of concrete during each day's concrete production in accordance with ASTM C 143. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. The average of each set of two tests shall be plotted on a control chart on which the average is that stipulated in paragraph: PROPORTIONING and the upper and lower limits are set 1.0 inch above and below the average. The range shall be plotted on a control chart on which the upper control limit is 2.0 inches.

16.2.7 Preparation for Placing. Foundation or construction joints, forms and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Contracting Officer it is ready to receive concrete. The results of each inspection shall be reported in writing.

16.2.8 Placing. The placing foreman shall supervise all placing operations, shall determine that the correct quality of concrete or grout is placed in each location as directed by the Contracting Officer and shall be responsible for measuring and recording concrete temperatures, ambient temperature, weather conditions, time of placement, yardage placed, and method of placement.

16.2.9 Vibrators. The frequency and amplitude of each vibrator shall be determined prior to initial use and at least once a month when convrete is being placed. Additional tests shall be made when a vibrator does not appear to be adequately consolidating the concrete. A vibrating reed tachometer or resonant reed tachometer shall be used for checking frequency. The frequency shall be determined while the vibrator is operating in concrete holding the tachometer against the upper end of the vibrator while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. for flexible shaft electric and air vibrators, two measurements shall be taken, one near the tip and another near the upper end of the vibrator head, and these result averaged. For other types of internal vibrators, measurements shall be taken in accordance with ACI 309. A visual effect scales (optical wedge), as shown in ACI 309 or obtained from the vibrator manufacturer, shall be attached to the vibrator where required with the "V" parallel to the axis of the vibrator. The make, model, type and size of the vibrator and frequency and amplitude result shall be reported in writing.

16.2.10 Curing.

16.2.10.1 Moist Curing. At least once each shift an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

16.2.10.2 Curing Compound. No curing compound shall be applied until it has been verified that the compound is properly mixed and ready for spraying. At the end of each operation the quantity of compound used and the area of concrete surface covered shall be reported and the rate of coverage in square feet per gallon shall be computed. The report shall state whether coverage is uniform.

16.2.10.3 Impervious Sheet Curing. At least once each shift an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.

16.2.11 Protection. At least once each shift an inspection shall be made of all areas subject to cold weather protection. Deficiencies shall be noted. During removal of protection, measurement of concrete and ambient temperature shall be made at least hourly.

16.2.12 Mixer Uniformity.

16.2.12.1 Concrete Plant Mixer. At the start of concrete placing, and at least once every three months when concrete is being placed, uniformity of concrete shall be detemined. The initial and every fourth test shall be performed in accordance with regular test of CRD-C 55. Other tests shall be performed in accordance with abbreviated tests of CRD-C 55. Whenever adjustments in mixer or increase mixing times are necessary because of failure of any mixer to comply, the mixer shall be retested after adjustment. For complete testing three different batches of concrete shall be tested. For abbreviated tests one batch shall be tested. Results of tests shall be reported in writing.

16.2.12.2 Truck Mixers. At the start of concrete placing and at least once every three months when concrete is being placed, uniformity of concrete shall be determined in accordance with ASTM C 94. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of blades may be regarded as satisfactory. Results of tests shall be reported in writing.

16.3 Action Required.

16.3.1 Fine Aggregate.

16.3.1.1 Grading. When the amount passing any sieve is outside the specification limits, the fine aggregate shall immediately be resampled and retested. If there is another failure on any sieve, the fact shall immediately be reported to the Contracting Officer, and inmediate steps shall be taken to rectify the situation.

16.3.1.2 Moisture Content. Whenever the moisture content of the fine aggregate changes by 0.5 percent or more, the scale settings for the fine aggregate batcher and water batcher shall be adjusted directly or by means of a moisture compensation device.

16.3.2 Coarse Aggregate.

16.3.2.1 Grading. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall immediately be resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. When two consecutive averages of 5 tests are outside of specification limits, that fact shall be reported to the Contracting Officer and immediate steps shall be taken to correct the grading.

16.3.2.2 Moisture Content. Whenever the moisture content of the smallest size of coarse aggregate changes by 0.5 percent or more, the scale settings for the aggregate batcher and water batcher shall be adjusted (directly or by means of a moisture compensation device).

16.3.3 Deleterious Substances. When the results for a deleterious substance is outside the specfication limit, the aggregate shall be resampled and retested for the deleterious substance that failed. If the second sample fails, that fact shall be reported to the Contracting Officer. When material finer than No. 200 sieve for coarse aggregate exceeds specfication limit, immediate steps, such as washing or other corrective actions, shall be initiated.

16.3.4 Scales. Whenever either the weighing accuracy or batching accuracy is found not to comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

16.3.5 Concrete.

16.3.5.1 Air Content. Whenever points on the control chart approach the upper or lower control limits an adjustment should be made in the amount of air-entraining admixture batched. If a single test result is outside the specification limit such adjustment is mandatory. As soon as practical after each adjustment another test shall be made to verify the correctness of the adjustment. Whenever a point falls above the upper control limit for range, the dispenser shall be calibrated to insure that it is operating correctly and with good reproducibility. Whenever two consecutive points either for average or range are outside the control limits, the Contracting Officer shall be notified. Whenever the air content departs from the specified range, the concrete shall not be delivered to the forms.

16.3.5.2 Slump. Whenever points on the control chart approach the upper or lower control limits an adjustment should be made in the batch weights of water and fine aggregate. When a single slump is outside the control limits such adjustment is mandatory. As soon as practical after each adjustment another test shall be made to verify the correctness of the adjustment. Whenever the slump departs from that stipulated in paragraph: PROPORTIONING more than 1-1/2 inches the concrete shall not be delivered to the forms. Whenever two consecutive slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range above the upper control limit, the slump shall be considered to be out of control and the additional testing for aggregate moisture content required in this section shall be undertaken.

16.3.6 Placing. The placing foreman shall not permit placing to begin until he has verified that an adequate number of acceptable vibrators in working order and with competent operators are available. Placing shall not be continued if any pile is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

16.3.7 Curing.

16.3.7.1 Moist Curing. When a daily inspection report lists an area of inadequate curing, the required curing period for that area shall be extended by one day.

16.3.7.2 Curing Compound. When the coverage rate of curing compound is less than that specifed or when the coverage is not uniform, the entire surface shall be sprayed again.

16.3.7.3 Impervious Sheet Curing. When a daily inspection report lists any tears, holes or laps of joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by one day.

16.3.8 Protection. Whenever any concrete temperature during the period of protection or protection removal fails to comply with the specifications, that fact shall be reported to the Contracting Officer and immediate steps should be taken to correct the situation.

16.3.9 Mixer Uniformity. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased or adjustments shall be made to the mixer until compliance is achieved.

16.4 Reports. All results of tests conducted at the project site shall be reported weekly and shall be delivered to a designated representative of the Contracting Officer within 3 days after the end of each weekly reporting period. Each weekly report shall include the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all Contractor quality control records.

17. CONCRETE STAINING.

17.1 General. All exposed concrete surfaces of the outlet structure to the dam embankment shall receive a chemical stain surface treatment.

17.2 Material. The chemical stain shall be an acid based water soluable penetrating solution capable of reacting with cured concrete to produce insoluable abrasion-resistant color deposits in the concrete surface ports. It shall be the product of a manufacturer regularly engaged in the production of concrete coloring products. The final surface coloration shall conform to Federal Standards No. 595a, and be similar to Shade No. 20400 of that standard.

17.3 Concrete Preparation. Prior to the staining operation, the concrete surface shall be covered at least 30 days, dry, and free of all foreign matter which would prevent necessary penetration and subsequent reaction of the stain solution with the concrete surface to be colored.

17.4 Application shall conform to the recommendations of the manufacturer.

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SECTION 3C

PRECAST-PRESTRESSED CONCRETE GIRDERS

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

1.1 American Society for Testing and Materials (ASTM) Publications.

A 416-74	Uncoated Seven-Wire Stress Relieved Strand for Prestressed Concrete
C 231-78	Air Content of Freshly Mixed Concrete by the Pressure Method

1.2 American Concrete Institute (ACI) Publication.

318-77	Building Code Requirements for Reinforced Concrete, With Commentary

2. SHOP DRAWINGS. Complete shop drawings for all prestressed concrete work shall be submitted to the Contracting Officer for approval in accordance with this paragraph, other paragraphs of the TECHNICAL PROVISIONS and the SPECIAL PROVISIONS. The shop drawings shall show complete details including formwork, inserts, reinforcing steel, size and type of tensioning elements and anchorages, sequence of stressing, method of curing, quality of concrete, erection details and methods, and complete stressing calculations. Prestressing shall be performed by the pretensioning method only.

3. MATERIALS. Concrete composition shall conform to the applicable requirements of section: CONCRETE, and as specified herein.

3.1 Coarse Aggregate. Coarse aggregate shall conform to the requirements for No. 4 to 3/4 inch aggregate.

3.2 Cement shall be Portland cement, Type II.

3.3 Admixtures. In no event shall calcium chloride or materials that will release nitrates in solution be used. The amount of chemicals added to the mix by the mixing water, aggregate, cementitious materials and admixtures shall not exceed the following: chlorides (as calcium chloride) - 125 grams per cubic yard; nitrates (as ammonium nitrate) - 10 grams per cubic yard.

3.3.1 Air-entraining Admixture. Air-entrained concrete shall have an air content of not more than 4 percent of the volume of the concrete as determined by ASTM C 231.

3.3.2 Other Admixtures. Admixtures, other than air-entraining agents, shall be used only on written approval.

3.4 Prestressing Steels. Prestressing steel shall be clean and free of loose rust, scale and pitting. A light oxide is permissible. Unbonded steel shall be permanently protected from corrosion. Steel shall be protected against abrasion during shipment and handling.

3.4.1 Seven-Wire Strand and Strand Assemblies. Seven-wire high tensile stress-relieved strand shall conform to ASTM A 416, Grade 270. Strand assemblies shall be shop assembled. The anchor sleeves shall be of an alloy steel positively attached to the strand or strands, and the strand or strands shall be anchored to a cast-in-place bearing assembly with a threaded anchor, wedge, or cone of metal of proven corrosion compatibility as recommended by the material supplier.

3.5 Tendon Anchorage Assemblies. Anchorage assemblies must be set in a plane normal to the axis of the tendons such that uniform bearing on the concrete is assured. Friction or wedge type anchors shall not be used in inaccessible locations. Anchorage assemblies and connections shall be subject to the approval of the Contracting Officer and shall be capable of fully developing the minimum guaranteed ultimate strength of the tendon without excessive slip. Anchorage and end fittings shall be permanently protected against corrosion.

3.6 Tendon Splices. Wires of parallel-wire assemblies shall not be spliced. No more than one strand shall be spliced in any one member where single strand tensioning is employed. Strand splices shall be capable of developing the full ultimate strength of the strand. Slippage of the splice shall be checked and correction made for differential slippage. Where multiple strand tensioning is used, not more than 10 percent of the strands in any member shall be spliced. Strands to be spliced shall have the same lay or direction of twist and the ends shall be cut by shears or abrasive grinders.

3.7 Steel Reinforcement shall be Grade 60 conforming to the applicable requirements of the section: CONCRETE REINFORCEMENT.

3.8 Elastomeric Bearing Pads shall conform to the applicable reuqirements of the section: MISCELLANEOUS METAL WORK AND MATERIALS.

3.9 Test Reports. Certified test reports showing the results of manufacturers' mill or plant tests performed by an independent laboratory shall be submitted to the Contracting Officer in advance of any prestressing operation. They shall show that the materials comply with the applicable specifications and shall include but not be limited to the following items: strand, reinforcing steels, and admixtures. Reports shall be furnished for each shipment and shall be identified with reels, heats, or other specific lots. A system of identification shall be established showing disposition of tested materials and correlated with specific beds and members. These records shall be furnished the Contracting Officer before completion of the contract.

4. FORMWORK. Forms and formed surfaces shall conform to the applicable portions of the section: FORMWORK FOR CONCRETE of these specifications as well as to the following. Forms for pretensioned members shall be constructed to permit movement of the member without damage during release of the pretensioning force. Deflection of members due to the prestressing force and deformation of falsework shall be considered in the design. Forms shall be made and maintained true to the grade, alinement and dimensions shown on the drawings. Form joints shall be smooth and tight. Beds and forms shall be thoroughly cleaned before use.

5. TENSIONING OF TENDONS.

5.1 General. The stress induced in the tendons by any method of tensioning shall be determined independently by both (1) measurement of strand elongation and (2) direct measurement of force using a pressure gage and/or load cell. The results of these two measurements shall check each other and the theoretical values within 5 percent. If they do not, the operation shall be carefully checked and the source of error determined and corrected before proceeding further.

NOTE: DETERMINATION OF THE INITIAL PRESTRESS FORCE MUST CONSIDER PRESTRESS LOSSES IN ACCORDANCE WITH ACI BUILDING CODE ACI 318, SECTION 18.6

The concrete strength at transfer of stress shall be adequate for the requirements of the anchorages or for transfer through bond as well as meet camber or delflection requirements. In any case, concrete cylinder tests shall indicate a breaking strength of at least 4,500 pounds per square inch before transfer unless otherwise indicated on the drawings. The final prestress load in each unit after seating shall be as shown on the drawings. The prestressing steel shall not be placed until such time as all welding has been completed on any portion of the supports, or any part which might be in contact with the prestressing steel. The Contractor shall certify to the Contracting Officer that a technician skilled in the use of the prestressing system to be used will be available to give as much instruction in the operation as may be necessary to obtain satisfactory results. Safety measures shall be taken by the Contractor to prevent accidents caused by failure of a prestressing wire, tendon, or component.

5.2 Pretensioning. Tendons may be tensioned by jacking of groups or may be tensioned individually by means of a single-strand jack. Before final tensioning of tendons, all tendons shall be brought to a uniform initial tension of approximately 1,000 pounds per strand per 200 feet of bed, with a minimum of 1,000 pounds and a maximum of 3,000 pounds per strand. The force corresponding to the initial tension shall be measured by a dynamometer or other approved method to aid in determining the final elongation. After this initial tensioning, the tendons shall be stressed to the total tension required by the plans using hydraulic or mechanical equipment with gages or dynamometers graduated and calibrated to accurately determine the load applied. Cable stress shall be maintained between anchorages until the concrete has reached a compressive strength as indicated in the above paragraph.

5.3 Detensioning.

5.3.1 General. Forces from pretensioned strands shall be transferred to the concrete by either the mulitple-strand release or the single-strand release method. The stress transfer shall not be performed until concrete strength, as

indicated by test cylinders, has reached the transfer strength required in this section of the specifications. If concrete has been heat-cured, the detensioning shall be done immediately following the curing period while the concrete is still warm and moist. During detensioning, the prestressing forces shall be kept nearly symmetrical about the vertical axis of the member and shall be applied in a manner that will minimize sudden loading. Maximum eccentricity about the vertical axis shall be limited to one strand.

5.3.2 Multiple-strand release. In this method, all strands shall be detensioned simultaneously and the load transferred gradually to the concrete by hydraulic jacking.

6. PRECAST-PRESTRESSED CONCRETE CONSTRUCTION.

6.1 Fabrication. Fabrication of precast-prestressed members shall follow the applicable provisions of the PCIMNL-117 except as specified herein. Shop drawings must be approved by the Contracting Officer before any fabrication is begun. Unless otherwise shown on the contract drawings, the following dimensional tolerances of members will govern:

6.1.1 Cross Section Dimensions. Dimensions less than 6", plus or minus 1/8"; 6" to 18", plus or minus 3/16"; 18" to 36", plus or minus 1/4"; over 36", plus or minus 3/8".

6.1.2 Overall Length. Plus or minus 1/8" per 10', max. plus or minus 3/4".

6.1.3 Deviations from a Straight Line. 1/8" per 10', max. plus or minus 3/4".

6.1.4 Deviation from Specified Design Camber after Installation. plus or minus 1/8" per 10' of span length.

6.1.5 Differential Camber Between Adjacent Units after Installation. plus or minus 1/16" per 10' of span length.

6.2 Marketing. All precast units shall be plainly marked and identified for ready correlation with corresponding test specimens. Pickup points shall be plainly marked on all units. Units shall be marked to show the number, size and location of reinforcement bars and to identify the top face and the position on the placement drawings. Units designed specifically to be erected adjacent to other units with which they are to function, shall be adequately match-marked before removal from the casting bed.

6.3 Erection. Points of support used in handling, transportation, storage and erection of members shall be as close as practical to the final points of bearing. All erection details including shoring and bracing shall be clearly shown on the shop drawings. Extreme care shall be taken during storage, hoisting and handling to prevent cracking and damage. Members damaged during handling, storage and erection shall be replaced by the Contractor at his expense.

7. ACCURACY OF STRESS AND ELONGATION MEASUREMENT.

7.1 Stress Measurement. Hydraulic gages, dynamometers, load cells or other devices for measuring stressing load shall have an accuracy of reading within two percent. Gages shall be calibrated for the jacks for which they are used by

approved testing laboratory and a certified testing curve shall accompany each gage. Recalibration shall be performed at any time that a gaging system shows indication of eratic results in the opinion of the Contracting Officer and, in any case, at intervals not greater than 12 months. Gages shall indicate loads directly in pounds or be accompanied by a chart which converts dial readings into pounds.

7.2 Elongation Measurement. After the initial force has been applied to a tendon, reference points for measuring elongation due to additional tensioning forces shall be established. They shall be located according to the method of tensioning and type of equipment. The system used shall be capable of measuring the true elongation plus or minus 1/16 inch.

8. INSPECTION. The Contractor's facilities shall be open for inspection by the Contracting Officer at any time. The Contractor shall maintain full and accurate records of all materials incorporated into prestressed concrete. Manufacturer's test reports shall be submitted on all tendon steels and anchor assemblies, reinforcing steels, cement, admixtures, and curing materials. All concrete and cement testing shall be as provided in the section: CONCRETE CONSTRUCTION. Complete tensioning records shall be maintained by the Contractor showing the date of tensioning, description, location and identification of the tendon members, manufacturer and size of tendon, identification of jacking equipment, final and initial design load for each tendon, theoretical elongation per tendon, actual tensioning load per tendon, and actual elongation per tendon. Certified calibration records for each set of jacking equipment shall be submitted to the Contracting Officer prior to the start of tensioning.

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SECTION 3D

EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS IN CONCRETE

Index

1. Applicable Publications
2. Quality Assurance
3. Submittals
4. Materials
5. Installation

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.

1.1 American Society for Testing and Materials (ASTM) Standards. (With corresponding U.S. Army Corps of Engineers Handbook for Concrete and Cement (CRD) Specifications where indicated.)

D 1751-73 (CRD-C 508)	Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
D 1752-67 (R 1978) (CRD-C 509)	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
D 2628-69 (R 1976) (CRD-C 531)	Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

1.2 U.S. Corps of Engineers Handbook for Concrete and Cement (CRD) Specifications.

CRD-C 513-74	Rubber Waterstops
CRD-C 572-74	Polyvinylchloride Waterstops

2. QUALITY ASSURANCE.

2.1 Materials Tests.

2.1.1 Non-Metallic Waterstops. Samples of materials and splices as required in 4.2.2 below shall be visually inspected and tested by and at the expense of the Government for compliance with CRD-C 513 or CRD-C 572, as applicable. If a sample fails to meet the specification requirements, new samples shall be provided and the cost of retesting will be deducted from payments due the Contractor at the rate of $500.00 per material sample retested and $200.00 per splice sample retested.

2.2 Procedure and Performance Qualifications for Splicing Waterstops shall be demonstrated in the presence of the Contracting Officer.

2.2.1 Non-Metallic Waterstops. Procedure and performance qualifications for splicing non-metallic waterstops shall be demonstrated by the manufacture at the

factory and the Contractor at the jobsite by each making three splice samples of each size and type of finished waterstop.

3. SUBMITTALS.

3.1 Test Repots. Certified manufacturer's test reports shall be provided for premolded expansion-joint filler strips, to verify compliance with the applicable specification.

3.2 Samples.

3.2.1 Waterstops. Waterstop materials and splice samples shall be submitted for inspection and testing and shall be identified to indicate manufacturer, type of material, size and quantity of material and shipment represented. Each materials sample shall be a piece not less than 12 inches long cut from each 200 feet of finished waterstop furnished, but not less than a total of 4 linear feet of each type and size furnished. For spliced segments of waterstops to be installed in the work, one splice sample of each size and type for every 50 splices made in the factory and every 10 splices made at the jobsite shall be furnished for inspection and testing. The splice samples shall be made using straight run pieces with the splice located at the mid-length of the sample and finished as required for the installed waterstop. The total length of each splice sample shall be not less than 12 inches long.

4. MATERIALS.

4.1 Expansion Joint Filler Strips, Premolded shall conform ASTM D 1751 or ASTM D 1752, Type I or resin impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

4.2 Waterstops.

4.2.1 Non-Metallic. Rubber waterstops shall conform to CRD-C 513. Polyvinylchloride waterstops shall conform to CRD-C 572.

5. INSTALLATION. Joint locations and details, including materials and methods of installation of joint fillers and waterstops, shall be as specified, shown on the drawings and as directed.

5.1 Expansion Joints. Premolded expansion-joint filler strips shall have oiled wood strips secured to the top thereof and shall be accurately positioned and secured against displacement to clean, smooth concrete surfaces. The wood strips shall be slightly tapered, dressed and of the size required to install filler strips at the desired level below the finished concrete surface and to form the groove for the joint sealant or seals not less than one inch deep. Material used to secure premolded fillers and wood strips to concrete shall not harm the concrete and shall be compatible with the joint sealant or seals. The wood strips shall not be removed until after the concrete curing period. The groove shall be thoroughly cleaned of all laitance, curing compound, foreign materials, protrusions of hardened concrete and any dust which shall be blown out of the groove with oil-free compressed air.

5.2 Waterstops shall be carefully and correctly positioned during installation to eliminate faulty installation that may result in joint leakage. The bottom of each waterstop shall be embedded a minimum of 6 inches in firm rock or sealed to other cut-off systems. All waterstops shall be installed so as to form a

continuous watertight diaphragm in each joint. Adequate provision shall be made to support and protect the waterstops during the progress of the work. Any waterstop punctured or damaged shall be replaced or repaired at the Contractor's expense. The concrete shall be thoroughly consolidated in the vicinity of the waterstop. Suitable guards shall be provided to protect exposed projecting edges and ends of partially embedded waterstops from damage when concrete placement has been discontinued.

5.2.1 Splices. Joints in waterstops shall be spliced together by qualified splicers using the approved splicing procedures to form a continuous watertight diaphragm.

5.2.1.1 Non-Metallic Waterstops. All splices shall be made on a bench in a temporary shop provided at the site of the installation or at the manufacturer's plant. A miter guide and portable powersaw shall be used to cut the ends to be joined to insure good alinement and contact between joined surfaces. The continuity of the characteristic features of the cross section of the waterstop shall be maintained across the splice.

5.2.1.1.1 Rubber Waterstops. Splices shall be vulcanized in accordance with the approve procedure.

5.2.1.1.2 Polyvinylchloride Waterstops. Splices shall be made by heat sealing the adjacent surfaces in accordance with the approved procedure. A thermostatically controlled electric source of heat shall be used to make all splices. The correct temperature at which splices should be made will differ with the material concerned but the applied heat should be sufficient to melt but not char the plastic. Waterstops shall be reformed at splices with a remolding iron with ribs or corrugations to match the pattern of the waterstop. The spliced area, when cooled and bent by hand in as sharp an angle as possible, shall show no sign of separation.

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SECTION 3E

GROUTING STONE PROTECTION

Index

1. Applicable Publications
2. Materials
3. Mixing
4. Placing

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.

1.1 Federal Specifications (Fed. Spec.).

SS-C1960/GEN	Cement and Pozzolan, General Requirements
SS-C-1960/3	Cement, Portland

1.2 American Society for Testing and Materials (ASTM), Publications.

C33-74a	Concrete Aggregates

1.3 U.S. Department of the Army, Corps of Engineers, Handbook for Concrete and Cement.

CRD-C 300-72	Membrane-Forming Compounds for Curing Concrete

2. MATERIALS.

2.1 Aggregate shall conform to the requirements specified for fine aggregate of the section: CONCRETE.

2.1 Aggregate.

2.1.1 General. Aggregate as delivered to the mixers, shall consist of clean, hard, uncoated particles, and shall conform to ASTM, C, 33. The Contractor shall designate in writing within 15 days after date of notice to proceed the source or sources from which he proposed to furnish the aggregate and submit certification from an approved testing laboratory that aggregates to be furnished meet the requirements of these specifications.

2.1.2 Gradation. The aggregate shall conform to the following specific requirements.

Sieve Designation, U.S. Standard Square Mesh	Percentage by Weight Passing
3/8 in.	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

In addition to the grading limits shown above, the aggregate, as delivered to the mixer, shall have a fineness modulus of not less than 2.40 or more than 3.10. The grading of the aggregate shall also be controlled so that the fineness moduli of at least 9 to 10 test samples of the aggregate as delivered to the mixer shall not vary more than 0.15 from the average fineness modulus of all samples previously taken. The fineness modulus shall be determined by dividing by 100, the sum of the cumulative percentages retained on U.S., Standard Sieves Nos., 4, 8, 16, 30, 50, and 100. At the option of the Contractor, aggregate may be separated into 2 or more sizes or classifications, but the resulting combined sand shall be of uniform grading within the limits specified above.

2.2 Portland Cement shall conform to the requirements of Fed. Spec. SS-C-1960.3, Type II. The alkali content of the cement shall not exceed 0.6 percent.

2.3 Water shall be fresh, clean, and potable.

3. MIXING. Grout shall be composed of cement, sand, and water mixed in the proportions as directed. The estimated cement content requirement per cubic yard of grout is 7-1/2 sacks. The water content of the mix shall not exceed 8-1/2 gallons per sack of cement. In calculating total water content of the mix, the amount of moisture carried on the surfaces of aggregate particles shall be included. Slump of grout mix shall be between 9 and 10 inches for the first course and between 7 and 8 inches for the second course or where one course is placed. The grout shall be mixed in a concrete mixer in the manner specified for concrete, except that time of mixing shall be as long as is required to produce a satisfactory mixture, and the grout shall be used in the work within a period of 30 minutes after mixing. Retempering of grout will not be permitted. The consistency of the grout shall be such as to permit gravity flow into the interstices of the stones with the help of spading, rodding, and brooming. Grout batches in the same course shall be uniform in mix, size, and consistency.

4. PLACING. Prior to grouting, the stone shall be flushed with water to wash down the fines and to prevent absorption of water from grout. The stone shall be kept wet just ahead of the actural placing of grout. The grout shall be placed in one course in invert and in 2 courses in side slopes. Each course shall be placed full width or in successive lateral strips approximately 10 feet in width, as applicable, extending from toe of slope to top on side slopes. The grout shall be brought to the place of final deposit by approved means and discharged directly on the stones using a splash plate of metal or wood to prevent displacement of stone directly under the discharge. The flow of grout shall be directed with brooms or other approved baffles to cover the entire area and to assure that all crevices are filled. Sufficient barring shall be done to loosen tight pockets of stone and otherwise aid the penetration of grout. The first course shall fully penetrate the stone blanket. The second course shall be placed as soon as the first course has sufficiently stiffened so that it will not flow when additional grout is added. On side slopes, all brooming shall be uphill, and after the second course has stiffened the entire surface shall be rebroomed to eliminate runs in the top course and to fill voids caused by sloughing of the layers of grout. The grouted surface shall then be allowed to set for not less than one hour, after which air-water cleaning shall be performed. Air pressure at the nozzle shall not be less than a constant 100 psi. The nozzle shall be held as nearly perpendicular as possible to the surface of the stone at such distance and narrow range as to clean the exposed stone without damaging the surrounding grout surface. After completion of any strip or panel, no workmen or other load shall be permitted on the grouted surface for a period of 24 hours. The grouted surface shall be protected from injurious action of the sun; shall be protected from rain, flowing

water, and mechanical injury; and shall be moist cured or membrane cured at the Contractor's option. Moist curing shall consist of covering the grout with a uniform thickness of 2 inches of sand which shall be kept continuously saturated for a period of 14 days. Membrane curing compound shall be a pigmented curing compound, conforming to Corps of Engineers Serial No. CRD-C 300. The curing compound shall be applied as soon as the free water disappears and shall be applied in a 2-coat continuous operation by approved power-spraying equipment at a rate of not to exceed 200 square feet per gallon for the combined coats. The second coat shall be applied to overlap the first coat in a direction approximately at right angles to the direction of the first application.

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SECTION 3F

DRILLING AND GROUTING Am 1

Index

1. Applicable Publications
2. General
3. Equipment
4. Grouting Materials
5. Drilling and Grouting
6. Contact Grouting
7. Quality Control

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

1.1 U.S. Army Corps of Engineers, Handbook for Concrete and Cement.

CRD-C 103-60	Sieve Analysis of Fine and Coarse Aggregate for Use in Portland Cement Concrete
CRD-C 113-68	Moisture Content of Aggregate by Loss in Weight by Drying

1.2 American Society for Testing and Materials (ASTM) Standard.

A 120-73	Black and Hot Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Use

1.3 American National Standards Institute (ANSI) Standard.

B 163-1971	Malleable Iron Threaded Fittings, 150 and 300 lb.

2. GENERAL.

2.1 Program. The work contemplated consists of foundation exploratory drilling and grouting the bedrock beneath the core zone of the dam embankment and the outlet works. The approximate locations, limits, and details are indicated on the drawings. The program shown on the drawings and described herein is tentative and is presented for the purpose of canvassing bids. The amount of drilling and grouting which actually will be required is unknown, and will be governed by conditions encountered as the work progresses. The Government reserves the right to increase or to eliminate any part of the drilling and grouting program should conditions indicate this as being desirable. Survey controls will be established, prior to drilling for grout holes, to provide reference points to determine the location and elevation of grout holes and to provide control for geologic mapping of the bedrock exposed in the core and transition zones. The controls shall be established along the centerline of the embankment, from station 10+00 to station 33+50 on 25-foot centers with elevations at each station. Survey controls will not be required in areas where bedrock is not exposed in the core zone.

2.1.1 Area Preparation Prior to Grouting. Prior to grouting operations in the dam embankment core ~~and transition~~ zones, including setting grout pipe, all faults and seams within the core transition zone which might interfere with the grouting shall be cleaned as directed, free from oil, standing or running water, mud, drummy rock, coatings, debris and loose or unsound rock fragments. All bedrock surfaces shall

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be cleaned thoroughly by air blasting or by other approved methods. Water shall not be used in the cleaning. This area preparation does not relieve the Contractor from the responsibility of additional cleaning of the area prior to surface treatment for material placement.

2.2 Procedures. The sequence in which the holes are drilled and grouted will be determined in the field and shall be as directed. All grouting mixes, pressures, pumping rates and other specific grouting operations shall be controlled by and in the presence of the Contracting Officer. Survey controls will be necessary in the field for alinement and elevations of grout pipes.

3. EQUIPMENT.

3.1 General. All drilling and grouting equipment used shall be of a type, capacity, and mechanical condition suitable for doing the work as determined by the Contracting Officer. The power, equipment and layout thereof shall meet all applicable requirements of local, state, and Federal regulations and codes, both safety and otherwise, and the applicable requirements of the SPECIAL PROVISIONS. Sufficient lighting facilities shall be provided and maintained so that all drilling and grouting operations, including calking of grout leaks, can be satisfactorily performed.

3.2 Drilling Equipment. Standard rotary or percussion drilling equipment using water or an air-water mixture as a circulating medium shall be used for grout hole drilling. The equipment shall be capable of drilling holes with a minimum diameter of 1-1/2 inches to the depths indicated or as directed and at an inclination not to exceed 45 degrees measured from the vertical, with a maximum tolerance of 3 degrees for both angle and bearing. Drilling machines used for exploratory grout hole drilling shall be of the rotary type with hydraulic feed, which can swivel so that holes can be drilled at angles up to 45 degrees measured from the vertical. They shall be capable of operating core barrels which will produce 2.06 inches cores. Water shall be used as a circulating medium. Water shall be furnished in sufficient quantity to insure drilling operations will not be delayed by shortages.

3.2.1 It is anticipated that drilling operations on the west abutment will be more difficult than in other areas so that different drilling equipment and set-up procedures may be required.

3.3 Grouting Equipment. Grout plants shall be capable of supplying, mixing, stirring and pumping grout to the satisfaction of the Contracting Officer. Each plant shall have a minimum capacity of 30 g.p.m. of grout injected at a pressure not greater than 100 psi. Plants shall be maintained in first-class operating condition at all times and any grout hole that is lost or damaged due to mechanical failure of equipment or inadequacy of grout supply shall be replaced by another hole, drilled by the Contractor at his expense. Each grout plant shall include the following minimum equipment.

3.3.1 An air- or fuel-driven progressing cavity-type pump capable of delivering grout slurries at minimum capacity of 30 gpm at gage pressures up to 100 psi.

3.3.2 A mechanically driven high speed grout mixer capable of effectively mixing and stirring grout having water-cement ratios ranging from 0.6 to 6.0 measured by volume and which can be emptied into a sump without interrupting grout pump operations. The mixer shall be capable of operating at 1500 revolutions per minute or greater and shall have an impeller used in conjunction with a vortex

separator. It shall have a capacity of not less than 3/4 the capacity of the sump. The mixer shall be equipped with a suitable disc-type water measuring device calibrated to read in cubic feet and tenths, so designed that after each delivery the hands can be conveniently set back to zero and shall have a minimum 6-inch diameter vertical-set dial.

3.3.3 A mechanically agitated sump, so designed as to be capable of effectively stirring and holding in suspension all solid matter contained in the grout. It shall have a minimum capacity of 16 cubic feet and a means of measuring the quantity contained to 0.1 cubic feet.

3.3.4 A tank for auxiliary water supply to be used in pressure testing, flushing, and pressure washing operations.

3.3.5 Such valves, pressure hose, small tools, and accessories as may be necessary to provide a continuous supply of grout and accurate pressure control. The inside diameter of the delivery line shall be not less than 1-1/2 inches and have a length not more than 200 feet from the sump to the header and be connected and operated such that objectionable blocking of the line will not take place when pumping at the minimum discharge capacity of the pump.

3.3.6 A 100-mesh vibrating screen with a minimum of 576 square inches of screening area for screening grout from the grout hole return line to the sump or other acceptable means to insure that lumps are screened from the grout supply.

3.3.7 Ground plugs and packers and attachment devices of an approved type for pressure testing and grouting of grout and exploratory holes.

3.3.8 A water meter graduated in gallons per minute for use in pressure testing operations.

3.3.9 Pressure gages graduated to read 0 to 100 psi for use in pressure testing and grouting operations. An accurately calibrated, high precision pressure gage shall be furnished for periodically checking the accuracy of all gages.

3.3.10 A pressure gage graduated to read 0 to 50 psi with no greater than 2 psi divisions on the dial for use in grouting operation at shallow depths.

3.3.11 Sufficient stop cocks and screw caps for capping holes within 50 feet of grouting operations.

3.3.12 A variety of caulking tools with a supply of quick setting mortar, sacked sand, oakum, lead wool, and such other materials that would be useful in sealing grout leaks through open fractures and joints.

3.4 The arrangement of the grouting equipment shall be such as to provide a continuous circulation of grout throughout the system and to permit accurate pressure control by operation of a valve on the grout return line, regardless of how small the grout take may be. Any hole being grouted shall be no farther than 200 feet from the grout pump. The equipment and lines shall be prevented from becoming fouled by the constant circulation of grout and by the periodic flushing out of the system with water. Flushing shall be done with the grout intake valve closed, the water supply valve open, and the pump running at full speed. Either of the following three distinct arrangements of connecting and operating grout equipment may be required.

3.4.1 Direct Grouting shall be done by connecting the grout supply hose to the grout pipe with a "direct grouting header" as shown on the drawings. This method shall be used on clean holes and will generally be the most-used method of grouting.

3.4.2 Packer Grouting shall be done by setting a packer in the hole at the depth directed and using a direct grouting header. Several packer settings may be used during one grouting operation.

3.4.3 Circuit grouting shall be done by lowering a 1/2-inch pipe to the bottom of the grout hole and washing, if necessary to get through cavings. At the Contractor's option, "E" drill rod may be substituted for 1/2-inch pipe. The "circut grouting header" as shown on the drawings shall then be connected so that grout is forced down the 1/2-inch pipe, returning up the hole outside the pipe and back to the sump. The return grout shall be discharged on the 100-mesh vibrating screen to remove rock fragments and lumps. This method may be used in caving holes to insure that the hole is grouted all the way to the bottom.

3.5 Records. The Contracting Officer will keep records of all drilling and grouting operations, such as a log of the exploratory and grout holes, results of washing and pressure testing operations, time of each change of grouting operation, pressure, rate of pumping, amount of cement for each change in water-cement ratio, and other data as deemed by him to be necessary. The Contractor shall furnish all necessary assistance and cooperation to this end.

3.6 Communications. When, for his own convenience, the Contractor has the individual elements of his plant so located that communication by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as a telephone or other suitable device.

3.7 Lighting. The Contractor shall furnish weatherproof, minimum 300 watts each, light clusters on portable stands, in such quantity and with cables, bulbs, etc., as to provide adequate lighting for all elements of grout operations in the event grouting must be extended into hours of darkness. A power source, furnished by the Contractor, shall be available at all grout operation locations.

3.8 Protection to Work and Cleanup. Prior to drilling and grouting operations, the Contractor shall be required to prepare a plan to collect and divert the drill wash water. During grouting operations the Contractor shall take such precautions as may be necessary to prevent drill cuttings, equipment exhaust oil, wash water, and grout, from defacing or damaging any part of the permanent structure. The Contractor will be required to furnish such pumps as may be necessary to care for waste water and grout from his operation. The Contractor shall upon completion of his operations remove all grout pipe above the foundation surface, clean up all waste resulting from his operations that is unsightly or would interfere with the efficient operation of the project as anticipated by the original design. All holes or depressions thus formed shall be patched with a grout slurry mix conforming to the applicable requirements of section: CONCRETE.

4. GROUTING MATERIALS.

4.1 Water. Water to be used for drilling, washing, pressure testing and grouting operations shall be fresh, clean, and free from any sediment. Water shall be furnished by the Contractor and shall be supplied in quantities to prevent interruption of any of these operations.

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4.2 Cement. Cement used in grout shall by Type II and shall conform to the requirements of section: CONCRETE. Only cement furnished in cloth or paper bags will be accepted for use in the work. A bag (sack) shall contain 94 pounds net. A sufficient quantity of cement shall be stored at or near the site of the work to insure that grouting operations will not be delayed by shortage of cement. In the event the cement is found to contain lumps or foreign matters of a nature and in amounts which, in the opinion of the Contracting Officer, may be deleterious to the grouting operations, such cement shall be removed from the site at no cost to the Government.

4.3 Pipe. All metal pipe and fittings required for constructing grout and exploratory holes, grout hole connections and air vents shall conform to ASTM A 120, standard weight, galvanized. All fittings shall conform to ANSI B 16.3, 150 lb. class.

5. DRILLING AND GROUTING.

5.1 General. All exploratory grout and grout holes shall be drilled at the locations, in the direction and to the depths shown on the drawings or as directed. In general, grouting will be started at the lower elevation of a section being grouted. Exploratory grout and grout holes may be drilled to depths ranging from 25 to 75 feet or as directed. All exploratory grout or grout holes shall be washed, pressure tested and grouted. The location of the first series of holes (primary) shall be determined by conditions in the field. The location of intermediate holes (secondary series) shall be determined by the split-spacing method. The number of grout holes may be increased, progressively, by the split-spacing method, as desired.

5.2 Installing Pipe for Grouting. The Contractor shall be required to furnish and install pipe for drilling and grouting as directed. The grout pipes shall be securely anchored no deeper than 1.5 feet into the firm bedrock. The pipes are to be inserted by flaring the bottom of the pipe, or other approved methods, then grouting or caulking it in place with some suitable material to preserve alinement, to prevent entry of foreign materials into the hole, and to prevent leakage. The pipe and fittings shall be cleaned thoroughly of all dirt, grease, oil, grout and mortar immediately before installing. All joints shall be made up snug and the assembly held securely in position and protected from damage or displacement. The Contractor shall take all necessary precautions to prevent any pipe from becoming clogged or obstructed from any cause and any pipe which becomes clogged shall be cleaned out in a manner satisfactory to the Contracting Officer at the Contractor's expense. The presence of tramp metal such as nails, wire, bolts, nuts, and other foreign material in the pipes through which grout holes are to be drilled shall be considered as obstructions.

5.3 Grout Hole Drilling. Grout holes shall be drilled into firm bedrock through pipes embedded in the bedrock. Grout holes shall be drilled with standard rotary or percussion drilling equipment as hereinbefore designated. No core recovery will be required and the type of bit used shall be optional with the Contractor. The minimum diameter of hole shall be 1-1/2 inches at the point of maximum penetration. No grout hole will be drilled at an angle greater than 45 degrees measured from the vertical. The angle and bearing of the hole shall be measured by a Brunton compass or similar device with a maximum tolerance of 3 degrees. Drilling shall be done in accordance with the procedures hereinafter described. The use of grease, "rod dope" or other lubricant on rotary drill rods will not be permitted except that an approved neutral liquid soap may be added to the drill water. Each hole shall be protected from becoming clogged or obstructed by means

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of a cap or other suitable device on the collar and any hole that becomes clogged or obstructed before completion of operations shall be cleaned out in a manner satisfactory to the Contracting Officer or another hole provided by and at the expense of the Contractor. Whenever the drill water is lost, or artesian flow is encountered, the drilling operations shall be stopped and the hole grouted before drilling operations are resumed in such hole. The grout within a partially completed hole shall be removed therefrom by washing or other methods before it has set sufficiently to require redrilling. Redrilling required because of the Contractor's failure to clean out a hole before the grout has set shall be performed at the Contractor's expense.

5.4 Definition and Procedure for Drilling and Grouting. Drilling and the grouting shall be done in sections using the split spacing, stage grouting method as described herein.

5.4.1 Zone. A zone is a predetermined partial depth of grouting. The first zone extends 25 feet downward from the ground surface. The second zone extends 25 feet downward from the bottom of the first zone. The third zone extends 25 feet downward from the bottom of the second zone. In general, all grouting in a given zone and section will be finished before work is started in the next underlying zone. Also, grouting of the second zone in any one section shall not begin until the first zone of the adjoining section is completed. Grouting of the third zone in any one section shall not begin until the second zone of the adjoining section is completed.

5.4.2 Section. A section is a reach in the grout area, not less than 50 feet in length in which grouting operations will not be permitted at the same time that drilling is in progress. In so far as practicable, the grout area will be subdivided into sections in manner which will facilitate the Contractor's operations. Hole spacing for any one arrangement of holes will be varied in accordance with conditions encountered and as directed.

5.4.3 Stage. A stage is a partial or complete depth of hole within any given zone. The actual depth of a stage depends upon geologic conditions encountered in drilling. It may vary from a fraction to the full depth of the zone, and is marked by the loss or gain of drill water in appreciable amounts or by some other conditions which prevent the hole from being drilled to the full depth of a particular zone.

5.4.4 Split Spacing. Split spacing is the procedure of locating an additional grout hole between two previously drilled and grouted holes.

5.5 Stage Grouting. Stage grouting is a complete cycle of drilling and grouting of any portion of a hole or all of the hole within a given zone. It involves the placement of a grout curtain by drilling and grouting in successive operations in accordance with the following general procedures.

5.5.1 Primary holes for grouting shall be drilled within the first zone. The depths will be governed by the foundation conditions. Normal spacing of primary holes is 10 feet.

5.5.2 After the grouting of any hole, the grout within the hole shall be removed by washing or by other methods before it has set sufficiently to require redrilling.

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5.5.3 After the interval of time as specified in paragraph: STAGE GROUTING PROCEDURES, has elapsed the primary holes not already drilled to the limit of the first zone shall be drilled as directed by the Contracting Officer to additional depths not exceeding the zone limit.

5.5.4 The primary holes thus deepened shall again be washed and pressure tested and then grouted at higher pressures as directed by the Contracting Officer. Grout shall be removed as prescribed in paragraph 5.5.2.

5.5.5 The process of successively drilling primary holes to additional depths and grouting at higher and higher pressures in stages, as directed, shall be repeated until all of the first set of holes have been completely drilled and grouted to the depth of the first zone over such section of the grout curtain as directed by the Contracting Officer.

5.5.6 After the primary holes in the first zone ~~has~~ have been completed in any section specified above, the second and succeeding series of holes, as determined by the "split spacing method," shall be drilled and grouted to the depth of the first zone in like manner until the first zone of that section is completely grouted as directed.

5.5.7 The process of successively drilling to specified depths and grouting at higher pressures in stages for the first series of holes and then for succeeding series of holes shall be repeated for the second and third zones of that section. Other sections along the grout curtain shall be grouted in like manner until grouting is completed, to the satisfaction of the Contracting Officer. As the drilling and grouting work progresses, it may develop that conditions are such that all or parts of the foundation already grouted require additional grouting. In such event, the equipment shall be returned and additional holes for grouting shall be drilled and grouted as directed by the Contracting Officer and no additional allowance above the contract prices will be made for drilling and grouting such holes or for the expense of any movement of equipment to the performance of such work.

5.5.8 Washing. Upon completion of drilling each grout hole the hole shall be thoroughly washed with clean water. All drill cuttings, intersecting rock seams and crevices containing clay or other washable materials shall be washed by circulating water from the bottom of the hole to the top with the maximum pump capacity. The circulation shall continue until the water is clear or for a maximum of 10 minutes. No separate payment will be made for washing.

5.6 Pressure Testing. Immediately before pressure grouting of any hole, the hole shall be pressure tested starting with low pressures and increasing the pressure to successively higher rates until the maximum pressure, for the increment being tested, has been reached. Maximum pressure for testing shall be the same as the maximum grouting pressure indicated in para 5.8.2. Where no pressure can be built up, the zone shall be tested at the maximum pumping capacity for 5 minutes. The pump to be used for pressure testing shall be a progressing-cavity-type capable of delivering a steady, uninterrupted waterflow at the collar of the hole of up to 35 gallons per minute at any pressure between 0 and 100 pounds per square inch.

5.7. Stage Grouting Procedures.

5.7.1. First Stage. The Contractor shall perform the first stage or low-pressure grouting, by drilling, washing and grouting holes at locations indicated on the drawings or as directed. Before grouting is begun in any hole of a given series

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in any section, at least the two adjacent holes in advance of each such hole shall be completely drilled for the same stage and the adjacent hole completely washed and pressure tested to facilitate washing and flushing out of any intervening clay-filled seams, fractures, or solution openings.

5.7.2. Second Stage. After all first stage grouting in any section has been completed, as specified above, the Contractor shall proceed, when so directed, with second stage drilling and grouting in accordance with the procedure outlined herein but in no case shall the deepening of any hole preparatory to grouting be commenced before a minimum period of 16 hours has elapsed since completion of the previous stage-grouting at the hole, nor shall second stage grouting be conducted within a distance of approximately 50 feet of any hole in which a previous stage of grouting has been completed until the grout in such previous stage holes has set for a period of 16 hours. Grouting at subsequent stages shall conform to the same requirements as to minimum time and distance.

5.8. Grouting. All pressure grouting operations shall be performed in the presence of the Contracting Officer, and shall be in accordance with the following general procedures.

5.8.1. Grout Mixes. Mixes shall be in the proportion directed by the Contracting Officer who will, from time to time, direct changes to suit the conditions in the particular grout hole as revealed by the drilling and grouting operations. The water cement ratio by volume will be varied to meet the characteristics of each hole and will range between 0.6 and 6.0. The grout shall be neat cement consisting of cement and water.

5.8.2. Grouting Pressures. Grouting pressures to be used in the work will vary with conditions encountered in the respective holes and the pressures used shall be as directed by the Contracting Officer. It is anticipated that pressures will range from 0 to 50 psi at the collar of the hole but in no event will pressure in excess of 100 psi be required.

5.8.3. Grout Injection. If the permeability calculated from pressure test data for a given stage is less than 0.1 feet per day, grouting of that portion of the hole shall be deferred. If pressure test data indicate a tight hole with a calculated permeability of 0.1 feet per day or greater, grouting shall be started with a thin mix of approximately 6:1. If an open hole condition exists, as determined by loss of drill water or inability to build up pressure during pressure testing operations, then grouting may be started with a thicker mix and with the grout pump operating as nearly as practicable at constant speed at all times; the ratio will be decreased, if necessary, until the required pressure has been reached. When the pressure tends to rise too high, the water-cement ratio shall be increased as may be required to produce the desired results. If necessary to relieve premature stoppage, periodic applications of water under pressure shall be made. Under no conditions shall the pressure or rate of pumping be increased suddenly, as either may produce a water-hammer effect which may promote stoppage. The grouting of any hole shall not be considered completed until that hole refuses to take any grout whatsoever at 3/4 the maximum pressure required for the stage or when that hole takes 0.1 cubic feet of grout or less in not less than a 10-minute period at the maximum pressure required for the stage. Should grout leaks develop and grout escape through open fractures or grout pipes, plugging, caulking, or capping will be required as directed. In general, surface grout leaks through open fractures shall be sealed with a thick mortar containing a quick setting agent. At times, however, oakum, lead wool or other such materials may be used. If grout escapes through adjacent grout holes, those holes shall be

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capped and before the grout has set, the grout pump shall be connected to each of these holes and the grouting completed at the pressures specified as directed. Once grouting has been started it shall be continued to completion without any interruption whatsoever except where there is no return to the agitator. In this case, at the direction of the Contracting Officer, the grout may be periodically circulated for periods not to exceed one minute to preclude grout setting up in the lines. If, due to size and continuity of fracture, it is found impossible to reach the required pressure after pumping a reasonable volume of grout at the minimum workable water-cement ratio, the speed of the pumping shall be reduced. Following such reduction in pumping speed, if the desired result is not obtained, grouting in the hole shall be discontinued when directed by the Contracting Officer. In such event, the hole shall be cleaned, the grout allowed to set, and additional drilling and grouting shall then be done in this hole or in the adjacent area as directed, until the desired resistance is built up. Bleeding from the grout hole through a diaphragm bleeder valve mounted on the grout header shall be required at regular intervals during grouting operations to insure that each stage is satisfactorily grouted. After grouting of any hole, the pressure shall be maintained by means of a stopcock or other suitable device until the grout has set to the extent that it will be retained in the hole. Grout that cannot be placed, for any reason within 2 hours after mixing shall be wasted. If such grout is mixed at the direction of the Contracting Officer or with his knowledge or consent, such wasted grout (except grout or the material constituents thereof, wasted due to the improper anchorage of the grout pipe or connections, negligence on the part of the Contractor, or improper mixing) will be paid for at 50 percent of the contract price for the grout placed. After grout has set in completed holes, the hole shall be kept filled with grout to ground surface by hand pouring. Any holes in which the grouting is omitted shall be filled with grout to ground surface by hand pouring. Any grout holes lost due to insufficient cement or other materials shall be replaced by the Contractor at no additional cost to the Government.

5.9. Exploratory Grout Hole Drilling.

5.9.1. General. Explorary holes shall be drilled in order to explore the foundation material and to check the penetration of the grout. Exploratory holes shall be located by the Contracting Officer. The core holes shall be drilled to the depths and angles directed and the core diameter shall be 2.06-inch (NW) size. The drilling shall be done in a workmanlike manner and all necessary precautions shall be taken to secure the best possible cores. Core barrels shall be standard ball-bearing double tube, swivel-type NW-design with a core capacity of 5 feet. They shall be equipped with diamond-set bottom-discharge bits and standard core-lifters. The inner tube shall be split lengthwise such that after each run, the tube can be removed from the outer barrel, opened and the core inspected and removed intact. Casing shall be of a diameter to take the size core barrel to be employed. Additional equipment shall include drill rods, packers, and such other tools and supplies required to satisfactorily perform the work. Exploratory holes shall be washed to their full depth, pressure tested, and pressure grouted as specified herein. In most cases the holes will be grouted to their full depth in one operation at which time the Contractor will not be required to remove the grout from any part of the hole. A few holes may require grouting in stages due to drill water losses, ravelling or some other irregularity in order for the drilling to be completed to the required depths.

5.9.2. Core Boxes shall be well constructed of new, seasoned fir and plywood and shall be of such length, width, and height that four 4-foot cores may be placed in each box, separated by firmly fastened wooden partitions and furnished with

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plywood covers hinged on the inside by a minimum of 3 hinges equipped with at least 6 screws each. Each cover shall contain 4 countersunk screw holes, 2-inch front and one on each side, so that 1.5-inch diameter flathead screws can be used to firmly fasten the cover to the box. Each box shall contain sufficient loose wooden blocks, 2-1/8 x 2-1/8 x 5/8 inches, to be used as markers for the bottom end of each core run and any core losses. Details of core boxes to be used in the work shall be submitted for approval prior to their construction. Core boxes shall be ready for use well in advance of their actual need so that at no time will it be considered necessary to employ makeshift methods in storing the core samples. The Contractor shall furnish sufficient core boxes to accommodate all cores recovered. A separate core box or group of boxes shall be provided for each core hole drilled. All core boxes shall be constructed for NW size cores.

5.9.3. Procedure. The drilling shall be done in a workmanlike manner and all necessary precautions shall be taken to secure the best possible cores. The core barrel shall be pulled after each 5-foot advance in depth or at lesser advances to prevent injury or undue loss of the core. As soon as any core block occurs, the core barrel shall be pulled. The core shall then be removed, placed in a wooden V-trough, washed and placed in proper sequence in the core boxes. The depth of each core run shall be suitably and legibly marked on the wooden blocks used for separating the core runs. As each box is filled with the core samples, it shall be suitably and legibly marked with project name, hole number, depth, and other pertinent information as directed. No box shall contain cores from more than one hole. The boxes shall be delivered in the vicinity of the work, as directed. Exploratory holes may be grouted under pressure, if conditions so indicate, but in all cases the holes will be grouted to full depth.

6. CONTACT GROUTING. Contract grouting shall be required along the outlet works conduit between the concrete plug and rock foundation and shall be done in such a manner as to insure that all voids between the concrete and the rock face will be filled with grout.

7. QUALITY CONTROL. In addition to records kept by the Contracting Officer the Contractor shall establish and maintain quality control for all drilling and grouting to assure compliance with contract requirements and maintain records of his quality control for all operations including but not limited to the following:

(a) Drilling of exploratory grout and grout holes. Records of drilling should provide plan showing location of all holes and information on type of drilling equipment used, depths of drilling, drilling rates, washing and pressure testing and depths of water loss.

(b) Grouting. Records should be kept of type of grouting plant used, including all grouting equipment, grouting depths, grouting mixes, and amount of cement for each change in water cement ratio, pressures and pumping rates, ambient temperature, and grout takes and wastage, and time of each change of grouting operation.

7.1 Records and Tests. A copy of these records and tests as well as the records of corrective action taken, will be furnished the Government as required in paragraph: CONTRACTOR QUALITY CONTROL of section: GENERAL REQUIREMENTS.

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SECTION 3G

GROUTED RIVER RUN STONE

1. MATERIALS.

1.1.1 Stone shall be sound and durable and be obtained within the limits of the designated borrow areas as approved by the Contracting Officer.

1.1.2 Stone shall be consistently rounded river washed (run), smooth, and shall not be split or broken.

1.1.3 Stone shall range in size from 6 inches, minimum dimension, to 10 inches, maximum dimension. Not less than 50 percent nor more than 75 percent shall be smaller thana 8 inches, minimum dimension.

1.2 Grout shall conform to Section 3E (Grouting Stone Protection).

2. Foundation preparation shall conform to paragraph 13 of Section 2D.

3. Placement.

3.1 Stone shall be manually placed after laying of grouted gutter foundation as shown on contract drawings.

3.2 Stone shall be placed in grout so that an even and continuous surface texture is obtained with a 1/2 inch relief on stone surface.

3.3 After placement, exposed stone surfaces shall be thoroughly cleaned of all excess grout.

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SECTION 3H

PNEUMATICALLY PLACED CONCRETE

Index

1. Applicable Publications
2. Usage
3. Description
4. Materials
5. Proportioning and Mixing
6. Preparation of Surfaces
7. Placing
8. Finishing
9. Curing and Protection
10. Contractor Quality Control

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.

1.1 American Society for Testing and Materials (ASTM) Publications.

C 33-78 Concrete Aggregates

1.2 American Concrete Institute (ACI) Standard

ACI 304-73 (R 1978) Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete

2. USAGE. Pneumatically placed concrete shall be placed where indicated. At the option of the Contractor pneumatically placed concrete may be used in lieu of poured-in-place concrete for the spillway sideslopes and sloped concrete slab around gage well.

3. DESCRIPTION. Pnuematically placed concrete shall be produced by either the dry mixed process in which most of the mixing water is added to the dry materials immediately prior to its explusion from the nozzle, or the wet mix process in which all of the materials (including water) are premixed before entering the delivery hose.

4. MATERIALS.

4.1 Portland Cement shall conform to the requirements of section: CONCRETE.

4.2 Fine Aggregate shall conform to the requirements of ASTM C 33. Fine aggregate shall contain not less than 3 percent nor more than 6 percent moisture by weight, and shall conform to the following:

Sieve Opening	Percent by Weight, Passing
3/8 inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	5-30
No. 100	0-10

4.3 Water for mixing and curing shall be clean, fresh and free from injurious amounts of mineral and organic substances.

4.4 Reinforcement. Reinforcement shall conform to the section: STEEL BARS, WELDED WIRE FABRIC AND ACCESSORIES FOR CONCRETE REINFORCEMENT.

5. PROPORTIONING AND MIXING.

5.1 Dry Mix Process. The dry mixture shall consist of one part Portland cement to not more than 4-1/2 parts of fine aggregate. Measurement may be either by volume or weight. The material shall be mixed dry in an approved power batch mixer equipped with accurate measuring and timing devices and capable of thoroughly mixing the fine aggregate and sand in sufficient quantity to maintain placing continuity. The mixing time shall be as recommended by the manufacturer of the mixer except that the mixing time shall be not less than one minute in drum-type mixers. Mixers shall be capable of discharging all mixed material without any carryover between batches. Materials that have been mixed for more than 45 minutes have not been incorporated into the work shall not be used.

5.2 Wet Mix Process. The premixed concrete shall contain not less than 6-1/2 sacks of Portland cement per cubic yard of fine aggregate and water. A maximum of 30 percent pea gravel may be substituted for an equal amount of fine aggregate. The maximum size of pea gravel shall be such that 100 percent passes the 1/2 inch screen and at least 90 percent passes the 3/8 inch screen. Measurement may be either by volume or weight. The mixing equipment shall be capable of thoroughly mixing the materials in sufficient quantity to maintain continuous placing. The required mixing time shall depend on the mix being used and the efficiency of the mixer. Mixing shall conform to ACI 304. Non-agitating hauling equipment may be used subject to the approval of the Contracting Officer.

5.3 Strength. Pneumatically placed concrete shall have a minimum compressive strength of not less than 3,000 pounds per square inch at 28 days.

6. PREPARATION OF SURFACES.

6.1 Preparation of Foundation. Areas to receive pneumatically placed concrete shll be thoroughly compacted and trimmed to line and grade with sufficient moisture to provide a firm foundation and prevent absorption of water from the concrete. No free water shall be present on the surface. Ground or gaging wires shall be used where necessary to establish thicknesses, surface planes and finish lines.

7. PLACING.

7.1 Workmen. Only experienced foremen, gunmen, nozzlemen, and rodmen shall be employed and satisfactory written evidence of such experience shall be furnished the Contracting Officer or his representative upon demand.

7.2 Equipment. The Contractor shall provide delivery equipment of approved design which will apply the material by means of pneumatic pressure. Air shall be supplied in sufficient volume and under such pressure as may be necessary for the best operating conditions. Air pressure at the nozzle shall be steady and without pulsation. A constant pressure of not less than 45 pounds per square inch shall be maintained in the placing machine where the hose length is 100 feet or less and

the pressure shall be increased at least 5 pounds for each additional 50 feet of hose or fraction therof. Water used for hydration at the nozzle shall be maintained at a uniform pressure not less than 15 pounds per square inch greater than the air pressure at the machine.

7.3 Applying. The nozzle shall be held as nearly perpendicular as possible to the surface to which the mortar is applied, at such distance and narrow range of movement as will produce a spreading effect over a small area. The velocity of discharge from the nozzle, the distance of the nozzle from the face, and the amount of water used shall be regulated by the nozzlemen in such a way as will produce a dense coating resulting in a minimum rebound of materials and no sloughing. Rebound material shall not be used again but shall be removed from the work. The maximum thickness of each layer will be limited to the thickness which can be placed without the material sagging. Time between application of layers shall be only sufficient to insure against sloughing. In case a portion of the previous layer has set to such hardness or has become coated in a manner preventing adequate bonding, the surface of that layer shall be cleaned by air and water jets before starting the next layer. Construction joints shall be avoided. Where necessary, at the end of the day's work or similar stopping periods, the concrete shall be tapered to a thin edge. Before applying the adjacent section, this tapered portion shall be thoroughly cleaned and wetted.

7.4 Clean-up. At the completion of each day's work, or as otherwise directed. All accumulations of pneumatically placed concrete on adjacent surfaces shall be removed.

8. FINISHING. After the concrete has been placed to the required thickness the surface shall be checked with a straightedge and any low spots or depressions shall be filled.

8.1 Wood Float Finish. All surfaces shall receive a wood float finish. After the concrete has taken an initial set (crumbling slightly when cut) the surfaces shall be screeded with straightedges and when surface moisture disappears, the surfaces finished to an even granular textured surface with a wood float.

9. CURING AND PROTECTION. Curing and protection shall conform to the requirements of section: CONCRETE.

10. CONTRACTOR QUALITY CONTROL.

10.1 General. The Contractor shall perform the following inspections and tests, and based upon the results of these inspections and tests, he shall take such action and submit reports as hereinafter specified.

10.2 Inspection Details and Frequency of Testing.

10.2.1 Preparation of Placing. Foundation, forms and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Contracting Officer it is ready to receive concrete. The results of each inspection shall be reported in writing.

10.2.2 Placing. The placing foreman shall supervise all placing operations and shall be responsible for measuring and recording ambient temperature, weather conditions, time or placement, yardage placed, and method of placement.

10.2.3 Compressive Strength. The Contractor shall provide for test purposes 2 test panels from each-8-hour shift. Each panel shall be not less than 12 inches square and 3 inches in thickness. Cubes, 3 x 3 x 3 inches in size shall be sawed from the panels for testing. One half of the cubes shall be tested at 7 days and one half at 28 days. Panels shall be cured, stored and tested by and at the expense of the Contractor. Cube strengths may be reported as determined or converted to cylinder strengths by multiplying by the factor 0.85. Test results shall be reported in writing.

10.2.4 Curing.

10.2.4.1 Curing Compound. No curing compound shall be applied until the Contractor's authorized representative has verified that the compound is properly mixed and ready for spraying. At the end of each operation he shall estimate the quality of compound used and the area of concrete surface covered and compute the rate of coverage in square feet per gallon. He shall note whether coverage is uniform.

10.3 Action Required.

10.3.1 The placing foreman shall not permit placing to continue when material is not uniform at the nozzle or the material is not being applied at proper velocity for good compaction. Immediate steps shall be taken to correct these conditions.

10.3.2 Curing.

10.3.2.1 Curing Compound. When the coverage rate of curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

10.3.3 Compressive Strength. When laboratory-cured specimens fail to conform to the requirements for strength, the Contractor shall change the proportions or the water contents, or both, for the remaining portions of the work.

10.4 Reports. All results of tests conducted at the project site shall be reported weekly and shall be delivered to a designated representative of the Contracting Officer within 3 days after the end of each weekly report period. Each weekly report shall include the updating of control charts covering the entire period from the start of the construction season through the current week. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all Contractor quality control records.

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SECTION 3I

CONCRETE REINFORCEMENT

Index

1. Applicable Publications
2. Quality Assurance
3. Submittals
4. Materials
5. Installation

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.

1.1 American Concrete Institute (ACI) Standards.

ACI 315-74	Manual of Standard Practice for Detailing Reinforced Concrete Structures
ACI 318-77	Building Code Requirements for Reinforced Concrete

1.2 American Society for Testing and Materials (ASTM) Standards.

A 185-73	Welded Steel Wire Fabric for Concrete Reinforcement
A 497-72	Welded Deformed Steel Wire Fabric for Concrete Reinforcement
A 615-78	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A 706-76	Low-Alloy Steel Deformed Bars for Concrete Reinforcement
E 8-78	Tension Testing of Metallic Materials

1.3 American Welding Society (AWS) Code.

D 12.1-75	Reinforcing Steel Welding Code

2. QUALITY ASSURANCE.

2.1 Materials Tests. The Contractor shall have required material tests performed by an approved laboratory to demonstrate that the materials are in conformance with the specifications. Tension tests shall be performed on full cross section specimens in accordance with ASTM E 8, using a gage length that spans the extremities of specimens with welds or sleeves included. Tests shall be at the Contractor's expense.

3. SUBMITTALS.

3.1 Shop Drawings. The Contractor shall prepare and submit complete shop drawings to the Contracting Officer for approval in accordance with specified

requirements. Shop drawings shall include the following:

(1) Reinforcement steel schedules complete with the quantity, shape and size, dimensions, weight per foot and total weights, and bending details.

(2) Details of bar supports including types, sizes, spacing and sequence.

3.2 Test Reports. Certified tests reports of reinforcement steel showing that the steel will comply with the applicable specifications shall be submitted to the Contracting Officer by the Contractor. Reports shall be furnished for each steel shipment and shall be identified with specific lots prior to use of the steel in the work.

4. MATERIALS.

4.1 Steel Reinforcement shall conform to ASTM A 615, Grade 40, with the following exceptions:

(1) Tension test specimens shall be bars of full cross section as rolled for all sizes.

(2) The bend test requirements shall be based upon 180 degree bends of full size bars for all grades of steel. The bend diameters for bend test shall be as indicated in the following table and shall be measured on the inside of bars:

Bar Size	Maximum Diameter
No. 3, 4, and 5	3-1/2 bar diameters
No. 6, 7, and 8	5 bar diameters
No. 9, 10, and 11 (Grade 40)	5 bar diameters

The Contractor shall furnish results of all tension and bend tests performed.

4.2 Welded Wire Fabric shall conform to ASTM A 185, gages, spacing and arrangement of wires as indicated on the drawings or ASTM A 497, sizes, spacing, deformations, and dimensions as indicated on the drawings.

4.3 Accessories.

4.3.1 Bar Supports shall conform to ACI 315. Bar supports for formed surfaces exposed to view or to be painted shall be plastic protected wire, stainless steel or precast concrete supports. Precast concrete bar supports shall be wedge-shaped, not larger than 3-1/2 x 3-1/2 inches, of thickness equal to that indicated for concrete cover and shall have an embedded hooked tie wire for anchorage. If formed surface is exposed to view, the precast concrete bar support shall be the same quality, texture, and color as the finish surface.

4.3.2 Wire Ties shall be 16-gage or heavier black annealed wire and shall have ends pointing away from the form.

5. INSTALLATION. Reinforcement steel and accessories shall be installed or placed as specified and as shown on contract and approved shop drawings. Placement details of reinforcement and accessories not specified or shown on the drawings shall be in accordance with ACI 315 or ACI 318. Reinforcement shall be fabricated to shapes and dimensions shown, placed where indicated within specified tolerances and adequately supported during concrete placement. At the time of concrete placement all reinforcement shall be free from loose, flaky rust, scale

(except tight mill scale), mud, oil, grease or any other coating that might reduce the bond with the concrete. Unless specifically indicated on the drawings, arc-welding of crossing bars, ties, stirups, spirals or any other reinforcement will not be permitted.

5.1 Hooks and Bends. Reinforcement bars may be mill or field bent. All bars shall be bent cold unless otherwise authorized. No bars partially embedded in concrete shall be field bent unless indicated on the drawings or otherwise authorized. All hooks or bends shall be in accordance with ACI 318.

5.2 Welding of reinforcement bars will be permitted only where indicated on the drawings or as otherwise directed by the Contracting Officer. Welding shall be performed in accordance with AWS D 12.1.

5.3 Placing Tolerances.

5.3.1 Spacing of Bars. Bars shall be spaced as indicated on the drawings or as otherwise directed. The spacing between adjacent bars and the distance between layers may not vary from the indicated position by more than one bar diameter nor more than one inch.

5.3.2 Concrete Cover. The minimum concrete cover of main reinforcement steel shall be as indicated on the drawings. The tolerances shall be as follows:

MINIMUM COVER	VARIATION
6"	+ 1/2"
4"	+ 3/8"
3"	+ 3/8"
2"	+ 1/4"
1-1/2"	+ 1/4"
1"	+ 1/8"
3/4"	+ 1/8"

5.4 Splicing. Splices in reinforcement steel shall be as specified, shown on the drawings or as directed by the Contracting Officer. Bars may be spliced at alternate or additional locations at no additional cost to the Government, subject to the approval of the Contracting Officer. Except as provided herein, all splicing shall be in accordance with approved splicing procedures and the requirements of ACI 318.

5.4.1 Lapped Splices shall be used only for bars smaller than size no. 14. Bar paps may be placed in contact and securely tied or may be spaced transversely apart to permit the embedment of the entire surface of each bar in concrete, but shall not be spaced farther apart than one-fifth the required length of lap nor 6-inches. Lengths of laps for bars or welded wire fabric shall conform to the requirements of ACI 318, except when otherwise shown on the drawings.

* * * * *

SECTION 4A

STEEL DOORS AND FRAMES

Index

1. Applicable Publications
2. Shop Drawings
3. General Requirements
4. Construction of Frames
5. Construction of Doors
6. Delivery and Storage
7. Installation

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.

1.1 American National Standards Institute, Inc. (ANSI) Standard.

A115.2-1971	Bored or Cylindrical Locks for 1-3/4" Doors
A123.1-1974	Nomenclature for Steel Doors and Steel Door Frames

1.2 American Society for Testing and Materials (ASTM) Publications.

A 366-72 (R 1979)	Steel, Carbon, Cold-Rolled Sheet, Commercial Quality
A 569-72 (R 1979)	Steel, Carbon (0.15 Maximum, Percent Hot-Rolled Sheet and Strip, Commercial Quality
D 1692-76	Rate of Burining and/or Extent and Time of Burning of Cellular Plastics Using a Specimen Supported by a Horizontal Screen

2. SHOP DRAWINGS shall be submitted for approval in accordance with the SPECIAL PROVISIONS. Shop drawings shall indicate the location of the door and frame, elevation of the door and frame, details of construction, method of assembling sections, location and extent of hardware reinforcement, hardware locations, type and location of struts and anchors for frames, and thicknesses of metal. Shop drawings shall include specifications for shop painting including pretreating and painting materials and processes, and catalog cuts or descriptive data for the weather stripping and threshold.

3. GENERAL REQUIREMENTS.

3.1 Steel. Door and frame shall be factory fabricated from steel conforming to ASTM A 366 or A 569, stretcher level degree of flatness, pickled and oiled if hot rolled material, and Manufacturer's Standard Gages specified hereinafter for the various uses.

3.2 Shop Painting. After fabrication, door and frame shall be thoroughly cleaned, pretreated to provide a strong bond between metal and paint, and shop painted with a rust inhibiting primer paint.

3.3 Workmanship. The finished items shall be rigid, neat in appearance, and free from defects, warp, or buckle. Molded members shall be sharp in detail, straight, and true. Corner joints shall be coped or mitered, well-formed, and in true alinement. Exposed welded joints shall be dressed smooth.

3.4 Preparation For Hardware. Door and frame shall be prepared for hardware in conformance with the templates provided under section: HARDWARE; BUILDERS'; the requirements of ANSI A115.2 and A123.1; and the application locations specified in section: HARDWARE; BUILDERS'. Cutting, reinforcing, drilling, and tapping of door and frame shall be done at the factory, except drilling and tapping for surface applied hardware will be done in the field when the hardware is applied. Door frames shall be prepared for silencers, and rubber silencers shall be provided with the frames. Reinforcement of door and frame for hardware shall be as specified in Table I at the end of this section.

3.5 Weatherstripping for head and jamb protection shall be spring-tension type or integral elastomeric type. Spring-tension type weatherstripping shall have hemmed edges and shall be of bronze, aluminum, or corrosion-resisting steel. Spring bronze or spring aluminum shall be not less than 0.008 inch thick; and corrosion-resisting steel shall be not less than 0.005 inch thick. Integral elastomeric type weatherstrip shall be of synthetic rubber, vinyl or neoprene standard with the manufacturer of the door frame. The integral elastomeric type weatherstripping shall be installed at the factory or on the jobsite in accordance with the door frame manufacturer's recommendations. Weatherstripping for bottom of doors shall be of the mounted sweep type consisting of 1/8-inch thick neoprene in an extruded aluminum or bronze housing not less than 0.070 inch thick.

3.6 Thresholds shall be extruded aluminum or bronze, flat type with a fluted top, and shall provide the proper clearance and an effective seal with the specified weatherstripping.

4. CONSTRUCTION OF FRAMES. Pressed steel frames for door shall be of the combination buck, frame, and trim type of the sizes and details shown. Gages of metal shall be not lighter than 16-gage. Frames shall be knockdown type or welded unit type.

4.1 Welded Unit Type Frames shall have headers and jambs secured at the corners either by internal welding of faces or by welded splice plates and shall be further secured at the rabbet either by welding or mechanical interlock. As an alternate, the headers and jambs shall be secured at the corners by external welding of faces and grinding smooth. Faces of frames at junction of head and jamb shall present neat line joints. Transom bars shall member with jambs, and shall be butt welded thereto.

4.2 Knockdown Type Frames shall have joints that interlock rigidly so as to maintain alinement of parts and provide functionally satisfactory performance of completed frames when field assembled. Faces of frames at junction of head and jambs shall present neat line joints.

4.3 Anchors. Frames shall be provided with a minimum of three wall anchors per jamb as required for the adjoining wall construction, ceiling strut anchors as required by the drawings, and anchors for attachment of frame to the floor. Anchors shall be of not less than 18 gage steel.

5. CONSTRUCTION OF DOORS. Doors shall be of the type, size, and design shown. Door clearances shall not exceed the following: 1/8 inch at jambs and head; and

3/4 inch at bottom measured from finished floorline. Doors shall have top edges closed flush and sealed against water penetration.

5.1 Flush Doors shall be of full flush construction. Doors shall be internally reinforced to resist impact and to insure flatness of finished surfaces by steel members welded in place, water-resistant honeycomb core glued in place, or rigid insulation core glued or foamed in place. Doors with metal reinforcing shall have sound deadening material applied to the interior of the door to eliminate metallic sound incident to normal door operation. Honeycomb core material shall have a crushing strength of not less than 4,000 p.s.f., and the lamination shall withstand not less than 1,500 p.s.f. surface shear. Foam insulation core material shall have a compressive strength of not less than 1,500 p.s.f. and a shear strength of not less than 18 p.s.i., shall have an insulation-to-steel strength at lest equal to the strength of the insulation, shall be dimensionally stable within plus or minus 5 percent of volume after 24-hour exposure to temperatures ranging from minus 15 degrees F. to 165 degrees F., shall have no voids extending 1/2 inch in any direction, and shall have a density of not less than 1.0 pound per cubic foot. Foam insulation shall be rated as self-extinguishing when tested in accordance with ASTM Test Method D 1692. Solid mineral insulation core material shall have a density of not less than 20 pounds per cubic foot.

5.1.1 Full Flush Construction shall have face sheet of not less than 18-gage-steel, shall have no seams or joints on door faces, and shall have top and bottom closed with a recessed channel or a flush and end closure treatment.

6. DELIVERY AND STORAGE. To provide protection during shipment, welded unit type frames shall be strapped together in pairs with heads at opposite ends or provided with temporary steel spreaders at the bottom of each frame; and knockdown type frames shall be securely strapped in bundles. Materials shall be delivered to the site in undamaged condition, stored out of contact with the ground and under a weatertight covering, permitting good air circulation. Whenever they become evident, abraded, scarred or rusty areas shall be cleaned and touched up with the paint used for the shop painting.

7. INSTALLATION. Frames shall be plumbed, leveled, and rigidly secured in place. Temporary spreaders shall be installed until the wall at the frame is completed and the frame is securely anchored in its final position. Wall anchors on doorframes shall be installed approximately at the hinge and strike levels. Doors shall be installed in conjunction with the application of hardware weatherstripping and thresholds shall be installed to provide weathertight installation.

TABLE I. REINFORCEMENT

Hardware Item	Minimum Gage	Minimum Size, Inches
Hinges	Door 10	8 x 1-1/4
	Frame 10	8 x 1-1/4
Mortise Locksets and Deadlocks	Door 14	10 x 3-3/4
	Frame 14	6-1/2 x 1-1/2

Lighter gages may be used if formed to a channel-shape or a U-shape that provides rigidly equivalent to that of flat reinforcements of specified gage. Gage and size of reinforcement for hardware items not listed above shall be as required by the templates for those items.

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SECTION 4B

HARDWARE; BUILDERS'

Index

1. Applicable Publications
2. General
3. Templates
4. Submittals
5. Packaging, Marking, and Labeling
6. Finishes
7. Fastenings
8. Keying
9. Locks and Latches
10. Butts and Hinges
11. Miscellaneous
12. Application
13. Hardware Sets

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.

1.1 American National Standards Institute (ANSI) Standards.

A156.1-1981	Butts and Hinges
A156.2-1976	Locks and Lock Trim
A156.7-1972	Template Hinge Dimensions

1.2 American Society of Architectural Hardware Consultants (ASAHC) Publication.

Keying-Procedures, Systems and Nomenclature. (Jan 1978).

1.3 Builders Hardware Manufacturers Association (BHMA) Standards.

1301-1980	Materials and Finishes

1.4 Door and Hardware Institute (DHI) Publication.

Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames (1975).

2. GENERAL. Hardware shall conform to the applicable requirements of the standards listed herein, unless otherwise specified. Reinforcement for hardware in metal frames shall be as specified in section: STEEL DOORS AND FRAMES.

3. TEMPLATES. The Contractor shall furnish templates or information otherwise necessary to enable the door and frame manufacturer to make proper provision in his work to receive the specified hardware. Where two or more articles of hardware are to be mounted on the same door, the Contractor shall effect proper coordination between the manufacturers of the different articles. Templates of hinges shall conform to ANSI A156.7

4. SUBMITTALS.

4.1 Certificates of Compliance. Certificates of compliance attesting that hardware items conform to the ANSI or BHMA standards under which the items are specified shall be submitted in accordance with the SPECIAL PROVISIONS. A

statement that the proposed hardware items appear in the current applicable BHMA Certified Products Directory may be submitted in lieu of certificates.

4.2 Hardware Schedule. Hardware schedule shall list all of the materials to be furnished and shall be submitted to the Contracting Officer for approval. The schedule shall include for each item; the quantities, manufacturer's catalog numbers, hinge sizes, detail information and location and hardware set identification, corresponding ANSI or BHMA standard type or function number to manufacturer's catalog number, complete keying schedule, and list of abbreviation and template numbers. The keying schedule shall be developed in accordance with ASAHC publication "Keying-Procedures, Systems and Nomenclature."

5. PACKING, MARKING, AND LABELING. Hardware shall be delivered to the project site in the manufacturer's original packages. Each article of hardware shall be individually packaged in the manufacturer's standard commercial carton or container, properly marked or labeled so as to be readily identifiable with the approved hardware schedule. Each change-key shall be tagged or otherwise identified with the door for which its cylinder is intended. Where double cyclinder functions are used where it is not obvious which is the key side of the door, appropriate instructions shall be included with the lock and on the hardware schedule.

6. FINISHES of the following types shall conform to the finishes identified under BHMA 1301, and shall conform to the requirements of the standard under which the item is specified. Base materials shall be of the material identified by the finish number.

6.1 Hinges. Hinge finish shall be 612.

6.2 Lock and Door Trim Finishes. Lock and door trim finishes shall be 625.

7. FASTENINGS of proper type, size, quantity, and finish shall be supplied with each article of hardware. Machine screws and expansion shields shall be used for attaching hardware to concrete. Fastenings exposed to the weather in the finished work shall be of brass, bronze, or stainless steel, as applicable.

8. KEYING. Cylinder locks shall be keyed in sets as scheduled. Keys for cylinder locks shall be stamped with change number and the inscription "Do Not Duplicate".

Cylinder locks	2 change keys each lock.

The keys shall be turned over to the Contracting Officer properly tagged and designated as to location.

9. LOCKS AND LATCHES. Manufacturers' standard plain design shall be used.

9.1 Cylinder Locks. Cylinders shall have five pins with paracentric keyway. Cylinders for cylinder locks, and the cylinder locks, shall be the product of the same manufacturer.

9.2 Locksets and Latchsets. Locksets and latchsets shall conform to ANSI A156.2, conforming to series 4,000, Grade 1.

10. BUTTS AND HINGES. Hinges shall conform to ANSI A156.1 and A 156.7, type A 8111, NRP.

10.1 Hinges for Reverse Bevel Doors with Locks. Hinges for reverse bevel doors with locks shall have pins that are made nonremovable by means such as a set screw in the barrel, or safety stud, when the door is in the closed position.

10.2 Contractor's Option. Hinges with anti-friction bearings may be furnished in lieu of ball bearing hinges.

11. MISCELLANEOUS.

11.1 Metal Treshold. Threshold shall be as specified in section: STEEL DOORS AND FRAMES.

12. APPLICATION. Hardware shall be located on doors in accordance with DHI "Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames." When approved, slight variations in locations or dimensions will be permitted.

13. HARDWARE SET shall be as follows:

HW-1	1-1/2 pr.	4" x 4" Butts
	1 ea.	Lockset, F86
	1 ea.	Threshold

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SECTION 4C

MISCELLANEOUS METAL WORK AND MATERIALS

Index

1. Applicable Publications
2. Materials
3. Workmanship
4. Finishing
5. Zinc Coating (Galvanizing)
6. Castings
7. Elastomeric Bearing Pads
8. Welding
9. Bolted Connections
10. Railing, Gaging Station Bridge

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

1.1 Federal Specifications (Fed. Specs.).

FF-B-575C	Bolts, Hexagon and Square
FF-N-836D & Am-1	Nut, Square, Hexagon, Cap, Slotted Castle, Knurled, Welding and Single Ball Seat
FF-S-325 Int. Am-3 (GSA-FSS)	Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)
QQ-B-750 & Am-2	Bronze, Phosphor; Bar, Plate, Rod, Sheet, Strip, Flat Wire, and Structural and Special Shaped Sections
QQ-S-763D Notice 1 & Int. Am-1	Steel Bars, Wires Shapes, and Forgings, Corrosion-Resisting
RR-W-365 & Am-1	Wire Fabric (Insect Screening)
WW-P-401E	Pipe and Pipe Fittings, Cast-Iron, Soil
L-S-125B	Screening, Insect, Non-metallic

1.2 American Society for Testing and Materials (ASTM) Standards.

A 36-77a	Structural Steel
A 108-73	Steel Bars, Carbon, Cold Finished Standard Quality
A 320-78	Alloy-Steel Bolting Materials for Low-Temperature Service
A 325-78a	High Strength Bolts for Structural Steel Joints

A 449-78a	Quenched and Tempered Steel Bolts and Studs
A 500-78	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
A 501-76	Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

1.3 American Welding Society (AWS) Standard.

B3.0-77	Welding Procedure and Performance Qualification
D1.1-75	Structural Welding Code

1.4 American National Standards Institute, Inc. (ANSI) Standards.

A 14.3-1974	Safety Requirements for Fixed Ladders

1.5 American Association of State Highway and Transportation Officials (AASHTO) Specifications.

M 251-74	Laminated Elastomeric Bridge Bearings

2. MATERIALS.

2.1 General. Materials indicated on the drawings or required in the work and not covered elsewhere by detailed requirements shall conform to the requirements of this section. In all cases not specifically covered in these specifications, the Contractor shall furnish approved highest grade commercial materials or products.

2.2 Structural Steel shall conform to ASTM A 36.

2.3 Corrosion-Resisting Steel Bolts and Anchor Bolts shall conform to Fed. Spec. QQ-S-763, Class 304, Condition A, or the applicable requirements of ASTM A 320, Grade B8.

2.4 Bronze shall conform to Fed. Spec. QQ-B-750, hard temper of either composition.

2.5 Bolts shall conform to Fed. Spec. FF-B-575.

2.6 Nuts shall conform to Fed. Spec. FF-N-836.

2.7 Cast Iron Pipe and Fittings shall conform to the applicable requirements of Fed. Spec. WW-P-401.

2.8 Expansion Anchors shall conform to the applicable requirements of Fed. Spec. FF-S-325. Anchors shall be multiple unit with inside thread.

2.9 Structural Tubing shall conform to the applicable requirements of ASTM A 500 or A 501. Tubing shall be hot-dip galvanized after fabrication.

3. WORKMANSHIP. Steel with welds will not be accepted, except where welding is definitely specified or called for on the drawings. All bolts, nuts, and screws shall be tight. All exposed ferrous metalwork (except cast-iron and corrosion-resistant steel and items to be completely embedded in concrete) shall be galvanized unless other protective coatings are specified. Metalwork shall be galvanized after fabrication. Complete shop drawings for fabrication of all miscellaneous metalwork shall be submitted for approval, in accordance with the requirements for shop drawings of SPECIAL PROVISIONS.

4. FINISHING. In general, tolerances for machine-finished surfaces designated by nondecimal dimensions shall be within 1/64 inch. Sufficient machining stock shall be allowed on placing pads to insure true surfaces of solid material. Finished contact or bearing surfaces shall be true and exact to secure full contact. All drilled holes for bolts shall be accurately located and drilled from templates.

6. ZINC COATING (GALVANIZING). Zinc coatings shall be applied in a manner and of a thickness and quality conforming to ASTM A 123. In the event that any portion of galvanized metalwork is abraded or otherwise damaged to the extent that the base metal is exposed, such damaged or abraded portions shall be neatly covered with Grade 50B solder conforming to the requirements of ASTM B 32.

6. CASTINGS. Each casting shall have the mark number and heat number cast or stamped upon it. Dimensions of castings shown on the approved shop drawings will be the finish dimensions. Before leaving the foundry, all castings shall be thoroughly cleaned and subjected to hammer inspection after which they shall be treated.

7. ELASTOMERIC BEARING PADS shall conform to requirements of AASHTO M 251. The Contractor shall furnish to the Contracting Officer a certification by the manufacturer that the elastomer, and fabric (if used), in the elastomeric bearing pads to be furnished conforms to the specification requirements.

8. WELDING shall conform to the provisions of AWS D1.1. Welders who have not been certified within 2 years of the date of commencement of work under this contract shall be required to pass successfully the qualification test as prescribed by AWS B3.0.

9. BOLTED CONNECTIONS. Bolts holes shall be reamed normal to the number and shall be truly cylindrical throughout. Unless otherwise specified, holes for bolts shall not be more than .02 inch larger than the diameter of the bolt.

10. RAILING, GAGING STATION BRIDGE.

10.1 General. Metal railing (tubular) shall be of the type shown and shall be constructed and installed as indicated on the drawings. Prior to starting any construction work on a railing, detailed shop drawings showing the complete railing shall be submitted and final approval obtained. Railing and all parts and fittings shall be galvanized after fabrication.

10.2 Materials.

10.2.1 Tubular rails, posts, rods, bolts, and nuts shall conform to the following requirements:

Material	ASTM Designation
Tubular steel rails	A 500 or A 501
Steel posts	A 36
Steel sleeves for tubular rails	A 36
High strength bolts	A 325 or A 449
High strength threaded rods	A 449
Stud bolts	A 108, Grades 1015 to 1020
Nuts and washers	A 325
High strength bolts or threaded rods furnished in accordance with ASTM A 449 shall comply with mechanical requirements of ASTM A 449 after galvanizing	

10.3 Fabrication and Erection. Metal railing shall conform closely to the horizontal and vertical lines shown on the plans or directed. The railing shall present a smooth, uniform appearance in its final position. The difference between out-to-out rail sleeve dimensions and the clear inside dimensions of the tubular steel rails shall not exceed 3/16 inch after galvanizing. Materials shall be carefully handled so that no parts will be bent, broken, abraded or otherwise damaged. Fabrication, handling, or installation methods which will injure or distort the members or damage the galvanizing shall not be used. Bearing surfaces and surfaces to be in permanent contact shall be cleared before the railing parts are assembled. When directed, the vertical position of the metal railing shall be adjusted to compensate for camber and dead load deflection of the superstructure. The amount of adjustment will be determined by the Contracting Officer before the metal railing is installed. Metal railing shall not be installed on a bridge span until falsework supporting that span has been released, unless otherwise directed.

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SECTION 5A

GAGES AND MONUMENTS

Index

1. Applicable Publications
2. General
3. Materials
4. Installation

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.

1.1 American Society for Testing and Materials (ASTM) Standards.

A 36-77a	Structural Steel
A 53-78	Pipe, Steel, Black and Hot-Dipped Zinc Coated Welded and Seamless
A 120-78	Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Use

1.2 The American Association of State Highway and Transportation Officials (AASHTO) Standards.

M 36-78	Zinc Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains

1.3 American National Standards Institute (ANSI) Standards.

B 16.3-1977 Malleable-Iron Threaded Fittings, Class 150 and 300

1.4 Porcelain Enamel Institute (PEI) Inc.

PEI:100(65)	Specification for Architectural Porcelain Enamel on Steel for Exterior Use

2. GENERAL

2.1 Submittals. The Contractor shall submit shop drawings for the staff gages and sediment monuments in accordance with the SPECIAL PROVISIONS. Shop drawings shall include complete material description, fabrication and installation details.

2.2 Unless otherwise specified herein, workmanship, galvanizing, welding and materials shall conform to the applicable requirements of the section: MISCELLANEOUS METALS AND MATERIALS.

2.3 Concrete shall conform to the applicable requirements of the section: CONCRETE.

3. MATERIALS.

3.1 Tamper Proof Machine Screws and Wood Screws shall be round head, corrosion resistant, steel size as indicated.

3.2 Settlement Monuments Plates shall be Government-furnished bronze disks. The Contractor shall stamp the monument number on the disks prior to installation.

3.3 Staff Gage and Number Plates shall be fabricated with low carbon steel or iron. Gage face of graduated section and numeral plates shall be finished with porcelain enamel conforming to PEI:S-100. Noncorrosive soft metal eyelets shall be installed permanently in each screw hole.

3.4 Steel Plates and Shapes shall be structural steel conforming to ASTM A 36, galvanized.

3.5 Conduit Between Gage Well, Instrument House and Pull Boxes shall be steel pipe conforming to ASTM A 120, standard weight, galvanized. Steel Pipe Fittings shall be malleable iron, threaded, 150 lb. class, conforming to ANSI B 16.3.

3.6 Corrugated Metal Pipe for Gage Well shall conform to AASHTO M 36.

3.7 Rockfill for Gage Well shall be crushed stone or gravel, or natural gravel. Fill material shall be clean, sound, durable and free of clay lumps or friable particles. Material shall be uniformly graded between 3/8 inch and 1-1/2 inches.

3.8 Cast Iron Pull Boxes shall be waterproof with bolt down cover and gasket, weight 35 lbs. minimum, inside dimensions as indicated. Outlets shall be drilled and tapped to accommodate the conduit. Pull boxes shall be galvanized inside and outside. Bolts for cover shall be stainless steel. Gaskets shall be the box manufacturers standard.

3.9 Pipe for sediment monument shall conform to ASTM A 53. Concrete for pipe footing and fill shall conform to section : CONCRETE. Concrete shall be thoroughly consolidated and finished in a dome at the top of the pipe

4 INSTALLATION.

4.1 General. Gages and monuments shall be installed at the locations indicated. Exact locations of monuments will be determined by the Contracting Officer. Gages and monuments shall not be installed until all pavement, slope protection and related work has been completed. Surveys to determine elevations for settlement monuments will be accomplished by the Government.

4.2 Excavation for concrete footings shall be of the dimensions indicated. If bedrock is encountered before reaching the required depth, the excavation shall be continued to the depth indicated or 18 inches into the bedrock, whichever is less. Prior to placing concrete, the excavation shall be cleared of loose material. Waste material shall be disposed of as directed.

4.3 Staff Gage.

4.3.1 Post Setting. Posts shall be set plumb in concrete bases of dimensions indicated. Concrete shall be thoroughly compacted so as to be free of voids and finished in a dome.

4.3.2 Staff Gage Face Section and Numerals shall be accurately mounted to the exact elevation corresponding to the numeral and the gradations. Screws shall be tightened without damage or cracking of the porcelain enamel finish.

4.4 Monument Disks shall be set in concrete bases as indicated. Concrete shall be thoroughly compacted so as to be free of voids and top surface finished level. Disks shall be installed in the fresh concrete so that the bottom of the disk is flush with the top surface of the concrete footing. After the concrete has set, all laitance or other adhering material shall be removed from the disk.

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SECTION 5B

PROJECT SIGN

Am 1

1. SUBMITTALS. The following samples shall be sumitted to the Contracting Officer 10 days prior to construction of the project sign:

1.1 Shop Drawings. Shop drawings shall be submitted in accordance with SPECIAL PROVISIONS. Drawings shall include all erection details.

1.2 Concrete. Sample panels shall be 12 inches by 12 inches. One sample each shall be submitted for the sign surface and the sign base. Samples shall demonstrate texture of finish and color of concrete to be used in sign construction.

1.3 Lettering. One sample each of capital and lower case lettering shall be submitted at full-size. Manufacturer's literature indicating method of mounting shall be submitted.

2. MATERIALS.

2.1 Concrete. Concrete shall be as specified under section: CONCRETE.

2.2 Sign Letters. Sign letters shall be of cast bronze, satin finish, and 1 1/2 inches thick. Letter style shall be "Helvetica Bold" with sizes as shown on the drawings.

2.3 Quick-setting cement shall conform to U.S. Army Corps of Engineers Handbook for Cement and Concrete, publication no. CRD-C 590-74, "Grout, Adhesive, Epoxy Resin, Flexible, Filled".

3. INSTALLATION.

3.1 Formwork. Formwork shall be consistent with the requirements of section: FORMWORK FOR CONCRETE, except as follows.

3.1.1 Variation in cross-sectional dimensions shall not be greater than 1/4 inch.

3.1.2 Variation from plumb and level shall not be greater than 1/8 inch as measured with a 10-foot straightedge.

3.2 Finishes.

3.2.1 General. Immediately after removal of formwork, all ridges shall be removed.

3.2.2 Sign Surface. All voids on the exposed face of the sign (including voids created in removing form supports) shall be filled with mortar with the same color as the concrete surface. The sign surface shall be sanded to form a smooth and even finish.

3.2.3. Sign Base. All voids in the concrete shall be filled as required for sign surface. The concrete base shall be sandblasted to expose the aggregate. Care shall be taken not to damage the sign surface in sandblasting of the base.

3.3 Lettering. Lettering shall be installed as shown on the contract drawings. Variation from a straight line level shall not be greater than 1/32-inch in a foot or 1/8-inch over 8 feet.

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SECTION 6A

CONCRETE REINFORCEMENT

Index

1. Applicable Publications
2. Quality Assurance
3. Submittals
4. Materials
5. Installation

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.

1.1 American Concrete Institute (ACI) Standards.

ACI 315-74	Manual of Standard Practice for Detailing Reinforced Concrete Structures
ACI 318-77	Building Code Requirements for Reinforced Concrete

1.2 American Society for Testing and Materials (ASTM) Standards.

A 185-73	Welded Steel Wire Fabric for Concrete Reinforcement
A 497-72	Welded Deformed Steel Wire Fabric for Concrete Reinforcement
A 615-78	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A 706-76	Low-Alloy Steel Deformed Bars for Concrete Reinforcement
E 8-78	Tension Testing of Metallic Materials

1.3 American Welding Society (AWS) Code.

D 12.1-75	Reinforcing Steel Welding Code

2. QUALITY ASSURANCE.

2.1 Materials Tests. The Contractor shall have required material tests performed by an approved laboratory to demonstrate that the materials are in conformance with the specifications. Tension tests shall be performed on full cross section specimens in accordance with ASTM E 8, using a gage length that spans the extremities of specimens with welds or sleeves included. Tests shall be at the Contractor's expense.

3. SUBMITTALS.

3.1 Shop Drawings. The Contractor shall prepare and submit complete shop drawings to the Contracting Officer for approval in accordance with specified requirements. Shop drawings shall include the following:

(1) Reinforcement steel schedules complete with the quantity, shape and size, dimensions, weight per foot and total weights, and bending details.

(2) Details of bar supports including types, sizes, spacing and sequence.

3.2 Test Reports. Certified tests reports of reinforcement steel showing that the steel will comply with the applicable specifications shall be submitted to the Contracting Officer by the Contractor. Reports shall be furnished for each steel shipment and shall be identified with specific lots prior to use of the steel in the work.

4. MATERIALS.

4.1 Steel Reinforcement shall conform to ASTM A 615, Grade 40, with the following exceptions:

(1) Tension test specimens shall be bars of full cross section as rolled for all sizes.

(2) The bend test requirements shall be based upon 180 degree bends of full size bars for all grades of steel. The bend diameters for bend test shall be as indicated in the following table and shall be measured on the inside of bars:

Bar Size	Maximum Diameter
No. 3, 4, and 5	3-1/2 bar diameters
No. 6, 7, and 8	5 bar diameters
No. 9, 10, and 11 (Grade 40)	5 bar diameters

The Contractor shall furnish results of all tension and bend tests performed.

4.2 Welded Wire Fabric shall conform to ASTM A 185, gages, spacing and arrangement of wires as indicated on the drawings or ASTM A 497, sizes, spacing, deformations, and dimensions as indicated on the drawings.

4.3 Accessories.

4.3.1 Bar Supports shall conform to ACI 315. Bar supports for formed surfaces exposed to view or to be painted shall be plastic protected wire, stainless steel or precast concrete supports. Precast concrete bar supports shall be wedge-shaped, not larger than 3-1/2 x 3-1/2 inches, of thickness equal to that indicated for concrete cover and shall have an embedded hooked tie wire for anchorage. If formed surface is exposed to view, the precast concrete bar support shall be the same quality, texture, and color as the finish surface.

4.3.2 Wire Ties shall be 16-gage or heavier black annealed wire and shall have ends pointing away from the form.

5. INSTALLATION. Reinforcement steel and accessories shall be installed or placed as specified and as shown on contract and approved shop drawings. Placement details of reinforcement and accessories not specified or shown on the

drawings shall be in accordance with ACI 315 or ACI 318. Reinforcement shall be fabricated to shapes and dimensions shown, placed where indicated within specified tolerances and adequately supported during concrete placement. At the time of concrete placement all reinforcement shall be free from loose, flaky rust, scale (except tight mill scale), mud, oil, grease or any other coating that might reduce the bond with the concrete. Unless specifically indicated on the drawings, arc-welding of crossing bars, ties, stirups, spirals or any other reinforcement will not be permitted.

5.1 Hooks and Bends. Reinforcement bars may be mill or field bent. All bars shall be bent cold unless otherwise authorized. No bars partially embedded in concrete shall be field bent unless indicated on the drawings or otherwise authorized. All hooks or bends shall be in accordance with ACI 318.

5.2 Welding of reinforcement bars will be permitted only where indicated on the drawings or as otherwise directed by the Contracting Officer. Welding shall be performed in accordance with AWS D 12.1.

5.3 Placing Tolerances.

5.3.1 Spacing of Bars. Bars shall be spaced as indicated on the drawings or as otherwise directed. The spacing between adjacent bars and the distance between layers may not vary from the indicated position by more than one bar diameter nor more than one inch.

5.3.2 Concrete Cover. The minimum concrete cover of main reinforcement steel shall be as indicated on the drawings. The tolerances shall be as follows:

MINIMUM COVER	VARIATION
6"	+ 1/2"
4"	+ 3/8"
3"	+ 3/8"
2"	+ 1/4"
1-1/2"	+ 1/4"
1"	+ 1/8"
3/4"	+ 1/8"

5.4 Splicing. Splices in reinforcement steel shall be as specified, shown on the drawings or as directed by the Contracting Officer. Bars may be spliced at alternate or additional locations at no additional cost to the Government, subject to the approval of the Contracting Officer. Except as provided herein, all splicing shall be in accordance with approved splicing procedures and the requirements of ACI 318.

5.4.1 Lapped Splices shall be used only for bars smaller than size no. 14. Bar laps may be placed in contact and securely tied or may be spaced transversely apart to permit the embedment of the entire surface of each bar in concrete, but shall not be spaced farther apart than one-fifth the required length of lap nor 6-inches. Lengths of laps for bars or welded wire fabric shall conform to the requirements of ACI 318, except when otherwise shown on the drawings.

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SECTION 7A

SEEDING

Index

1. Applicable Publications
2. Source Inspections
3. Submittals
4. Delivery, Storage, and Handling
5. Materials
6. Site Preparation
7. Application
8. Protection of Seeded Areas
9. Establishment Period for Seeded Area
10. Maintenance During the Establishment Period
10. Final Acceptance

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

1.1 Federal Specification (Fed. Spec.).

O-F-241D	Fertilizers, Mixed, Commercial

1.2 U.S. Department of Agriculture Federal Seed Act of August 9, 1939.

53 Stat. 1275 (AMD 1976, 1977)	Rules and Regulations

2. SOURCE INSPECTIONS.

2.1 Topsoil. The stockpiled topsoil will be inspected by the Contracting Officer to determine the acceptability of the topsoil, including the maximum depth to which it is to be shipped.

3. SUBMITTALS

3.1 Samples. Ten pounds of each type of soil amendments to be used shall be submitted.

3.2 Certificate of Compliance and Certified Laboratory Test Reports. Before delivery, certificates of compliance shall be submitted certifying that materials meet the requirements specified. Where such certification requires a laboratory test, the test shall be certified and reported as part of the certificate of compliance. Testing shall be performed by an approved, independent laboratory within 10 days of submittal of reports. Test report of a previously tested material shall be accompanied by certificates from the manufacturer certifying that the previously tested material is identical in all respects to that proposed for this project. Certified copies of the reports for the following materials shall be submitted.

a. Seed. For purity.

b. Organic Amendments. For classification of total nitrogen, moisture ash and organic matter, and ph.

3.3 Maintenance Instructions. Written instructions for year-round maintenance and care of seeded areas shall be furnished to the Contracting Officer.

4. DELIVERY, STORAGE, AND HANDLING.

4.1 Delivery.

4.1.1 Plant material shall be inspected upon arrival at the jobsite, and unacceptable material shall be removed from the jobsite.

4.1.2 During delivery, seed shall be protected from any drying or contamination by detrimental material.

4.1.3 Soil conditioners and amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's guaranteed chemical analysis, and name. In lieu of containers, soil conditioners, and amendments may be furnished in bulk, and a certificate from the manufacturer indicating the above information shall accompany each delivery.

4.1.4 All pesticide material, including soil fumigants, shall be delivered to the site in the original unopened containers. Containers that do not have a legible label that identifies the Environmental Protection Agency registration number and the manufacturer's registered uses will be rejected.

4.2 Storage. Seed and soil conditioners amendments shall be kept in dry storage away from contaminants, insects and rodents. Soil sterilant shall be isolated from any other landscape materials. Pesticide material shall be kept in dry storage and shall not contaminate adjacent material and shall be handled and stored following manufacturer's directions.

5. MATERIALS.

5.1 Seed. Seed shall be certified seed to be the latest season's crop and shall be delivered in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures and pure live seed. Seed shall be labeled in conformance with U.S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable State seed laws. Seed that has become wet, moldly, or otherwise damaged will not be acceptable. On-site seed mixing will not be allowed unless approved. Weed seed shall not exceed 1 percent by weight of total mixture. Seed mixtures shall be proportioned by weight as follows:

Name of Seed (Botanical & Common)	Live Seed per pound	SEED WEIGHT (LBS) per acre
Ambrosia dumosa Burr - Sage	28,000	6
Atriplex glauca Saltbush	18,000	12
Baccharis sarathroides Desert Broom	174,000	1.5

Name of Seed (Botanical & Common)	Live Seed per pound	SEED WEIGHT (LBS) per acre
Cercidium floriddum (Scarified) Blue Palo Verde	4,800	5
Encelia farinosa Brittle Bush	195,000	7
Eschscholzia californica Calif. poppy	200,000	2.5
Larrea divaricata Creosote	30,000	9
Schismus barbatus N.C.N.	300,000±	14

5. Soil Conditioners and Amendments.

5.2 Topsoil. Stockpiled topsoil shall be the top 8 inches of stripping for Dike No. 1 after clearing and shall conform to requirements of section: FILLS AND SUBGRADE PREPARATION.

5.3 Fertilizer. Fertilizer shall be commercial grade, free flowing, uniform in compositon and shall conform to applicable State and Federal regulations. Granular fertilizer shall conform to Fed. Spec. O-F-241, Type I, Level B, and shall bear the manufacturer's guaranteed statement of analysis. Granular fertilizer shall contain a minimum percentage by weight of 16 nitrogen of which 50 percent shall be organic, 7 available phosphoric acid, and 12 potash.

5.4 Soil Conditioner. Soil Conditioner shall be humectant (moisture absorbent starch).

5.5 Mulch. Wood cellulose fiber for use with hydraulic application of grass seed and fertilizer shall consist of specially prepared wood cellulose fiber or a combination of wood cellulose and recycled newsprint fibers, processed to contain no growth or germination-inhibiting factors and dyed an appropriate color to facilitate visual metering of the application of materials. On an air-dry weight basis, the wood cellulose fiber shall contain a maximum of 12 percent moisture, plus or minus 3 percent at the time of manufacture. The combination of wood cellulose and recycled newsprint fibers shall contain a maximum of 12 percent moisture plus or minus 3 percent at the time of manufacture. The pH range for either mix shall be between 3.5 and 5.0. The wood cellulose fiber shall be manufactured so that:

a. After addition and agitation in slurry tanks with fertilizers, grass seeds, water, and other approved additives, the fibers in the material will become uniformly suspended to form a homogeneous slurry.

b. When hydraulically sprayed on the ground, the material will form a blotterlike cover impregnated uniformly with grass seed.

c. The cover will allow the absorption of moisture and allow rainfall or applied water to percolate to the underlying soil. Shrinkage after wetting shall not exceed 20 percent of the surface area.

5.6 Water. Water shall not contain elements toxic to plant life. Water necessary for the maintenance of hydroseeded area shall be obtained by the Contractor.

5.7 Herbicides and Pesticides. Herbicides and pesticides use must comply with all applicable State and Federal laws. Pesticides must be registered with the U.S. Environmental Protection Agency.

6. SITE PREPARATION.

6.1 Preparation of Seed Beds.

6.1.1 Placing Topsoil. Topsoil shall be distributed uniformly and spread evenly to a minimum thickness of 8 inches where indicated on the drawings. Topsoil shall be spread so that planting can proceed with no additional soil preparation or additional tillage. Surface irregularities resulting from topsoiling or other operations shall be leveled to prevent depressions. Topsoil shall not be placed when the subgrade is frozen, excessively wet, extremely dry, excessively compacted, or in a condition detrimental to the proposed planting or grading, and shall be in conformance with section: FILLS AND SUBGRADE PREPARATION.

6.2 Soil Treatment.

6.2.2 Herbicide and Pesticide Application. Herbicides and pesticides shall be applied in accordance with the manufacturer's written instructions.

7. APPLICATION.

7.1 Planting Seasons and Conditions. Planting shall be done within the following dates.

Seed sown from 15 February to 1 April for spring planting and from 1 October to 15 November for fall planting.

7.2 Seeding.

6.2.1 The seed, mulch, soil conditioner, and fertilizer shall be mixed in the required amount of water to produce a homogeneous slurry and then uniformly applied under pressure at the following rate (dry weight) per acre:

2000 lbs. wood cellulose fiber mulch
300 lbs. 16-7-12 commercial fertilizer
57 lbs. of seed mix
Soils Conditioner per manufacturers recommendation

8. PROTECTION OF SEEDED AREAS. Immediately after seeding, the area shall be protected against traffic or other use by erecting barricades, as required, and approved signs shall be placed at appropriate intervals until final acceptance.

8.1 Restoration and Clean-Up. Excess and waste material shall be removed daily. When hydroseeding in an area has been complete, the area shall be cleaned of all debris and excess material. Paving shall be cleaned when work in adjacent areas is completed.

9. ESTABLISHMENT PERIOD FOR SEEDED AREA.

9.1 General

9.1.1 The establishment period for the seeded areas will be 120 days in duration.

9.1.2 An acceptably seeded area is defined as having no areas greater than 6 inches square containing no plants of the specified seed mix.

9.1.3 The Contractor shall be responsible for the establishment and proper care of the entire seeded area.

10. MAINTENANCE DURING THE ESTABLISHMENT PERIOD.

10.1 The Contractor shall provide the following maintenance: watering, fertilizing, overseeding and any other operation necessary to promote the growth of plants.

10.2 During the plant establishment period, the Contractor shall water the entire seeded area as necessary to maintain an adequate supply of moisture within the root zone. An adequate supply of water is estimated to be the equivalent of one inch of absorbed water per month that is delivered at monthly intervals in the form of natural rain or is augmented as required by periodic waterings. Water shall not be applied with a force sufficient to displace mulch and shall not be applied so quickly that it cannot be absorbed by the mulch and plants.

11. FINAL ACCEPTANCE

11.1 General. Final Inspection and acceptance will be at the end of the establishment period of seeded area. Acceptance will be based upon satisfactory stand of seed material as defined in paragraph: ESTABLISHMENT PERIOD FOR SEEDED AREA.

11.2 Replacement. Areas larger than 6 square inches (except exposed surface rocks) that do not have a stand of plants must be re-seeded. Rejected areas shal be re-seeded witin acceptable planting dates as approved by the Contracting Officer.

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SECTION 7B

TREES, SHRUBS, AND CACTI

1. Applicable Publications
2. Source Inspections
3. Submittals
4. Delivery, Storage and Handling
5. Materials
6. Site Preparation
7. Installation
8. Plant Establishment
9. Final Acceptance

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.

1.1 Federal Specification (Fed. Spec.).

O-F-241d	Fertilizers, Mixed, Commercial.

1.2 American National Standards Institute (ANSI) Publication.

Z60.1-1980	American Standard for Nursery Stock

1.3 American Joint Committee on Horticultural Nomenclature Publication.

Second Edition-1942	Standardized Plant Names

1.4 American Society for Testing and Materials (ASTM) Publication.

C2-80	Lumber, Timber, Bridge Ties and Mine Tiers - Preservative Treatment by Pressure Processes

2. SOURCE INSPECTIONS.

2.1 Plant Materials. Plant materials shall be inspected at the growing site and tagged or otherwise approved for delivery.

2.2 Stockpiled Topsoil. Stockpiled topsoil shall be as specified in section seeding.

3. SUBMITTALS.

3.1 Samples. The following samples shall be submitted for approval before work is started.

a. Organic Mulch - Ten pounds of each type to be used in the project.

b. Soil Amendments - Ten pounds of each type to be used in the project.

3.2 Certified Laboratory Test Reports. Testing shall be performed by an approvved independent laboratory within 10 days of submittal of reports. Test reports on a previously tested material shall be accompanied by certificates from the manufacturer certifying that the material is equal in all respects to that proposed for this project. Certified copies of the reports of tests listed below shall be submitted.

Organic Amendments for classification of total nitrogen, moisture ask and organic matter and PH.

3.3 Maintenance Instruction. Written instructions for year-round care of installed plants shall be furnished.

3.3 Identification. All plants shall be identified with durable waterproof labels and weather-resistant ink. Labels shall be securely attached to plants, bundles, or containers of plants and shall state the correct plant name and size.

4. DELIVERY, STORAGE, AND HANDLING.

4.1 Delivery.

4.1.1 Plant material shall be inspected upon arrival at the job site and unacceptable plant material shall be removed from the job site.

4.1.2 Plants shall be protected during delivery to prevent damage to the root balls or desiccation of leaves. Trees shall be protected during transportation by tying in the branches and covering all exposed branches.

4.1.3 The use of equipment such as "tree spades" shall be permitted provided that the plant balls are sized in accordance with ANSI Z60.1 and tops are protected from damage.

4.1.4 Soil conditioners and amendments shall be delivered to the site in the original, unopen containers bearing the manufacturer's guaranteed chemical analysis and name. In lieu of containers, soil conditioners and amendments may be furnished in bulk and a certificate from the manufacturer indicating the above information shall accompany each delivery.

4.1.5 All pesticide material, including soil fumigants, shall be delivered to the site in the original unopened containers. Containers that do not have a legible label that identifies the Environmental Protection Agency registration number and the manufacturer's registered uses will be rejected.

4.2 Storage.

4.2.1 Plant Storage. Plants not installed on the day of arrival at the site shall be stored and protected. Outside storage locations shall be continually shaded and protected from the wind. Bare root plants shall be heeled-in. Plants stored on the project shall be protected from any drying at all times by covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss, or other similar mulching material. Plants, including those in containers, shall be kept in a moist condition until planted by watering with a fine mist spray.

4.2.2 Storage of Other Materials. Soil conditions and amendments shall be kept in dry storage away from contaminants. Soil sterilant shall be isolated from any other landscape materials. Pesticide material shall be kept in dry storage and shall not contaminate adjacent material, and shall be handled and stored following manufacturer's directions. Storage of materials shall be in areas designated or as approved by the Contracting Officer.

4.3 Handling. Care shall be taken to avoid drying or damaging plants being moved from the nursery or storage area to the planting site. Balled and burlapped plants shall be handled carefully to avoid cracking or breaking the earth ball.

Am 1

Plants shall not be handled by the truck or stems. Bareroot plants shall be "puddled" when removed from the heeling-in bed to protect the roots from drying out. Plants shall be protected from freezing or drying by a covering of burlap, tarpaulin, or mulching material during transportation from the heeling-in bed to the planting site. Damaged plants will be rejected and shall be removed from the site.

5. MATERIALS.

5.1 Plants.

5.1.1 Plants shall be nursery grown or field collected stock conforming to ANSI Z60.1 and shall be of the varieties specified in the plant list bearing botanical names listed in the publication for Standardized Plant Names.

5.1.2 Planting stock shall be well-branched and well-formed, sound, vigorous, healthy, and free from disease, sun-scald, windburn, abrasion, and harmful insected or insect eggs and shall have healthy, normal, and unbroken root sytems. Evergreen trees and shrubs shall have well-developed symmetrical tops with typical spread of branches for each particular species or variety. Plants shall have been grown under climatic conditions similar to those in the locality of the project. Plants budding into leaf or having soft growth shall be sprayed wtih an antidesiccant at the nursery and collected field before digging.

5.1.3 The minimum acceptable sizes of all plants, measured before pruning and with branches in normal position, shall conform to the measurements indicated. Plants larger in size than specified may be used as approved. If larger plants are used, the ball of earth or spread of roots shall be increased in accordance with ANSI Z60.1.

5.1.4 Plants shall be dug and prepared for shipment in a manner that will not cause damage to branches, shape, and future development after planting.

5.1.5 Balled and burlapped and balled and potted plants shall have ball sizes and ratios conforming to ANSI Z60.1. Plants shall be balled with firm, natural balls of soil. B & B plants shall be wrapped firmly with burlap, strong cloth, or plastic and tied.

5.1.6 Balled and platformed plants shall be balled and wrapped in the same manner as balled and burlapped plants and bound securely to strong platforms.

5.1.7 Container grown plants shall have sufficient root growth to hold the earth intact when removed from containers but shall not be root bound.

5.1.8 Field collected plants (other than saguaro cacti) designated "collected" shall be obtained from native stands or established plantings as approved by the Contracting Officer. To be acceptable, collected plants shall have been growing in favorable locations in a subgrade that ensures good fibrous root development and a vigorous growing condition. Minimum root spread for collected plant materials obtained bare-root shall be one-third greater than minimum root spread of bare-root nursery-grown stock; minimum ball sizes for collected plant materials obtained balled and burlapped shall be the next larger ball size than for nursery-grown stock in accordance with ANSI Z60.1. See paragraph. DESCRIPTIVE TEXT OF FIELD COLLECTED AND TAGGED SAGUARD CACTI FOR TRANSPLANTING in this section.

Am 1

5.2 Soil Amendment. Shredded bark shall be composited wood fiber material containing not less than one percent by weight nitrogen, composed of 100 percent wood shavings from 1/4" to 3/4" in size.

5.3 Planting Soil Mixtures.

5.3.1 Cacti (including Ocotillo). The planting soil mixture shall be composed of 2 parts site topsoil, 1 part gravel and 1 part nitrolized shredded bark.

~~5.3.2 Cacti (including Ocotillo). The planting soil mixture shall be composed of 3 parts site topsoil, 1 part nitrolized shredded bark.~~

5.3.2 Trees and Shrubs. The planting soil mixture shall be composed of 3 parts site topsoil, 2 parts gravel, 1 part nitrolized shredded bark, and 3 pounds per cubic yard of 16-7-12 slow-release fertilizer.

5.4 Mulch. Mulch shall be free from deleterious material and shall be stored so as to prevent inclusion of foreign materials.

5.4.1 Organic mulch materials shall be ground or shredded bark ranging in size from 1/4" to 3/4".

5.5 Plant Guard Material.

5.5.1 Posts for netting support shall be rough sawn wood, free from knots, rot, cross grain, or other defects that would impair the strength. Size shall be a minimum of 1" x 2" and 3 feet long and pointed at one end.

5.5.2 Netting shall be one-inch hardware cloth, wire size 0.062, 36" wide, and conform to ASTM A 740.

5.6 Water. Water shall not contain elements toxic to plant life.

5.7 Herbicides and Pesticides. Herbicides and pesticides use must comply with all applicable state and federal laws and be registered with the U.S. Environmental Protection Agency.

5.8 <u>Descriptive Text of Field Collected Taggus Saguaro Cactus for Transplanting</u>.

#1 - Approx. 10' Tall - Single Trunk
#2 - Approx. 14' Tall - Single Trunk
#3 - Approx. 7' Tall - Single Trunk
#4 - Approx. 6' Tall - Single Trunk
#5 - Approx. 10' Tall - Single Trunk
#6 - Approx. 14' Tall - Multiple Buds.
#7 - Approx. 4' Tall - Single Trunk
#8 - Approx. 13' Tall - Single Trunk
#9 - Approx. 12' Tall - Single Trunk
#10 - Approx. 13' Tall - Single Trunk
#11 - Approx. 9' Tall - Single Trunk
#12 - Approx. 10' Tall - Single Trunk
#13 - Approx. 18' Tall - Multiple Buds
#14 - Approx. 10' Tall - Single Trunk
#15 - Approx. 9' Tall - Single Trunk, Close to #14 location, Tagged Adjacent Tree.

#16 - Approx. 15' Tall - Single Trunk
#17 - Approx. 7' Tall - Single Trunk,
Tagged Root At Base
#18 - Approx. 10' Tall - Single Trunk
#19 - Approx. 11' Tall - Single Trunk
#20 - Approx. 15' Tall - Single Trunk,
Close to #19 Location Has A Poor Base
#21 - Approx. 16' Tall - Multiple Buds,
Located Near Dirt Road
#22 - Approx. 10' Tall - Single Trunk
#23 - Approx. 9' Tall - Single Trunk
#24 - Approx. 16' Tall - Multiple Buds
Just Starting
#25 - Approx. 16' Tall - Single Trunk
Tagged Adjacent Base
#26 - Approx. 13' Tall - Single Trunk,
Tagged Adjacent Shrubs
#27 - Approx. 16' Tall - Single Trunk
with Bud Forming
#28 - Approx. 17' Tall - Single Trunk
#29 - Approx. 11' Tall - Single Trunk
#30 - Approx. 9' Tall - Single Trunk,
Tagged Adjacent Shrub
#31 - Approx. 16' Tall - Single Trunk
W/Buds Forming, Tagged
#32 - Approx. 15' Tall - Single Trunk
W/Buds Forming, Tagged
Root Stock
#33 - Approx. 14' Tall - Single Trunk
#34 - Approx. 20' Tall - Single Trunk
W/Multiple Buds Forming
#35 - Approx. 19' Tall - Multiple
Large Arms Tagged Adjacent Shrub
#36 - Approx. 20' Tall - Multiple Arms
Tagged Adjacent Shrubs
#37 - Approx. 16' Tall - Multiple Arms,
Located Near Dirt Road
#38 - Approx. 14' Tall - Single Trunk
#39 - Approx. 13' Tall - Single Trunk
W/One Large Arm, Located
Next to #38, Tagged Adjacent Shrub
#40 - Approx. 12' Tall - Single Trunk
Tagged Adjacent Shrub
#41 - Approx. 12' Tall - Single Trunk,
Tagged Adjacent Shrub
#42 - Double Trunk Approx. 8' & 13' -
Tagged Adjacent Shrub
#43 - Approx. 12' Tall - Single Trunk,
Tagged Adjacent Shrub
#44 - Approx. 3' Tall - Single Trunk
#45 - Approx. 15' Tall - Single Trunk
#46 - Approx. 10' Tall - Single Trunk
#47 - Approx. 13' Tall - Single Trunk,
Tagged Adjacent Shrub
#48 - Approx. 12' Tall - Single Trunk
#49 - Approx. 15' Tall - Single Trunk

#50 - Approx. 11' Tall - Single Trunk,
#51 - Double Trunk Approx. 3' & 8'-
Next to Barrel Cactus, Tagged
Adjacent Shrub
#52 - Approx. 4' Tall - Single Trunk,
Located Near #51
#53 - Approx. 12' Tall - Single Trunk
Tagged Adjacent Shrub
#54 - Approx. 13' Tall - Single Trunk
#55 - Approx. 13' Tall - Single Trunk
#56 - Approx. 11' Tall - Single Trunk
#57 - Approx. 15' Tall - Single Trunk
#58 - Approx. 4' Tall - Single Trunk
#59 - Approx. 13' Tall - Single Trunk
#60 - Approx. 16' Tall - Single Trunk,
W/Arms & Buds, Tagged
at Base on Root
#61 - Approx. 15' Tall - Single Trunk

See Contract Drawing Sheet No. 80 For Locations of Numbered Cacti.

Five Additional saguaro cacti (6' min. height) shall be field collected from Dike No. 1 construction area and transplanted around the project sign. See contract drawing sheet No. 75.

6. SITE PREPARATION.

6.1 Layout. Plant material locations and bed outlines shall be staked on the project site before any plant pits or beds are dug. Plant material locations may be adjusted by the Contracting Officer to meet field conditions.

6.2 *Protection of Existing Vegetation.* If hydroseeding has been established prior to planting operations, the surrounding hydrosseding areas shall be covered before work is begun, in a manner that will protect hydroseeded areas. Existing trees and shrubbery that are to be preserved shall be barricaded in a manner that will effectively protect them during planting operations.

6.3 Underground Obstructions to Planting. If underground utilities, construction, or solid rock ledges are encountered, other locations for planting may be selected by the Contracting Officer.

6.4 Plant Pits. Plant pits shall be dug to produce vertical sides and flat, uncompacted bottoms. When pits are dug with an auger and the sides of the pits become glazed, the glazed surface shall be scarified. The size of plant pits shall be as shown on the drawings.

6.5 Herbicide and Pesticide Application. Herbicides, insecticides and fugicides shall be applied as needed and in accordance with the manufacturer's recommendations.

7. INSTALLATION.

7.1 Planting Seasons and Conditions. Planting shall be done from 15 September to 15 March. Planting shall be done with the approval of the Contracting Officer only when the ground is in a suitable condition for planting. If special conditions exist that may warrant a variance in the conditions, a written request

shall be submitted to the Contracting Officer stating the special conditions and proposed schedule.

7.2 Setting Plants.

7.2.1 Balled and burlapped stock shall be backfilled with planting soil mixture to approximately half the depth of the ball and then tampered and watered. Burlap and typing materials shall be carefully removed or opened and folded back. Plastic wrap shall be completely removed before the placement of backfill. The remainder of backfill of planting soil mixture shall be tamped and watered. Earth saucers or water basins shall then be formed around isolated plants. Water holding basins shall be ample enough in size and height to hold at least 2-1/2 gallons for shrubs or 5 gallons for trees.

7.2.2 Existing stock which is moved by means of a mechanical transplanter shall be removed from the ground with a ball attached which meets the requirements of paragraph MATERIALS. The ball shall be wrapped with proper material and kept moist if it is not replanted within one hour. The plant's stem or trunk shall be centered in the ball, and all roots at the ball's surface shall be cut cleanly. No roots shall be pulled from the ground.

7.2.3 Container-grown stock shall be removed from containers without damaging plant or root system. Planting shall be completed as specified for balled and burlapped plants.

7.3 Watering. All watering shall be done in a manner which will provide uniform coverage but which will not cause erosion or damage to the finished surface.

7.4 Mulching.

7.4.1 Mulching shall take place within 24 hours after planting.

7.4.2 Organic mulch shall be spread to uniform thickness as shown on the drawings.

7.4.3 Mulch shall be kept out of the crowns of shrubs.

7.5 Plant Guards. Plants shall be guarded as indicated on the drawings.

7.6 Pruning.

7.6.1 New plant material shall be pruned in the following manner. Dead and broken branch shall be removed. Deciduous trees and shrubs shall be pruned to reduce total amount of anticipated foilage by one-fourth to one-third. Typical growth habit of individual plants shall be retained with as much height and spread as is practicable. Cuts shall be made with sharp instruments, and shall be flush with trunk or adjacent branch to ensure elimination of stubs. "Headback" cuts at right angles to line of growth shall not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off". Trimmings shall be removed from the site.

7.7 Waste Removal. Excess and waste material shall be disposed of as indicated. Existing native areas that have been damaged or scarred during planting operations shall be restored to their original condition.

7.8 Maintenance During Installation. Mainteance operations shall begin immediately after each plant is planted and shall be continued as required until final acceptance. Plants shall be kept in a healthy, growing condition by watering, pruning, spraying, weeding, and any other necessary operations of maintenance. Plant saucers and beds shall be kept free of weeds, grass, and other undesired vegetation. Plants shall be inspected at least once per week during the installation period and needed maintenance performed. All weeds growing in Native Hillside, rock, and desert gravel areas shall be removed.

7.9 Special Saguaro Field Collecting and Transplanting Requirements.

7.9.1 Collecting.

7.9.1.1 As much root structure as possible shall be left undamaged and attached to cacti.

7.9.1.2 Cacti shall be placed in padded crates for moving.

7.9.2 Transplanting.

7.9.2.1 Cacti shall remain out of the ground for one week prior to transplanting.

7.9.2.2 Sun orientation of cacti after transplanting shall remain the same as before collecting.

7.9.2.3 Bury base of cacti at a minimum depth to adequately support the plant.

7.9.2.4 Deep water once a month during establishment.

8. FINAL ACCEPTANCE.

8.1 Preliminary Inspection. A preliminary inspection will be held 180 days from the date of the beginning of the plant establishment period to determine plant acceptability and the number of replacements. Plants not in healthy growing conditons will be noted and as soon as seasonal conditions permit shall be removed from the site and replaced with plants of the same species and sizes as originally specified. Alternate or substituted varieties of plants shall be used only if approved. Replacement planting dates shall conform to planting dates in paragraph: INSTALLATION.

8.2 Final Inspection. A final inspection of all plants will be held after the replacement planting has been completed. No additional plant establishment period will be required for replacement plants.

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SECTION 9A

DESERT VARNISH FINISH

Index

1. Scope
2. Samples and Descriptive Data
3. Materials
4. Application
5. Cleanup

1. SCOPE. This section covers the furnishing and application of a varnish type finish for use on cut rock areas, relocated rock, and on grouted stone as shown on the contract drawings.

2. SAMPLES AND DESCRIPTIVE DATA.

2.1 Manufacturer catalog or descriptive data describing the materials and method of application of the desert varnish treatment to be used, shall be submitted to the Contracting Officer, for approval.

2.2 One sample of each cut rock area and of each rock and stone type shall be treated with the proposed desert varnish required under this section. The resulting color, tone, and intensity of the samples, when approved by the Contracting Officer, shall become the standard for comparison for all coloring applied to the designated surfaces. Subsequent samples may be required by the Contracting Officer if the submitted panels are not approved.

2.3 Application of the desert varnish to the spillway sideslopes is subject to approval by the Contracting Officer to ensure that all of the spillway excavation and the required geologic mapping and photography has been completed prior to application.

3. MATERIALS. Desert varnish finish shall be a stable, acid base, artificially accelerated oxidation process, having a projected life of at least 50 years. The materials and formulations shall be suitable for use on landscape stone and rock. The precise chemical mixtures shall result in a stain of color, tone and intensity similar to that of the dark colored volcanic rocks found on the adjacent hillsides.

3.1 Preconditioner for surface preparation and curing agent breakdown shall be a clear liquid, non-staining, and contain not less than 5 percent by weight sodium hydroxide and sodium chloride.

3.2 Liquid brown colored conditioner shall contain not less than 8 percent by weight ferrous sulfate. Colors shall be such that alteration of the color and further color development after application can be accomplished. The preconditioner and colored conditioner shall penetrate the rock surface and have at least 75 percent permanency over 1,000 wet-dry cycles. Tests shall be conducted on treated samples of rock and stone prior to acceptance of the desert varnish finish for use in the work to determine the permanence of the applied finish. Am #1

4. APPLICATION.

4.1 The application of the acid base coloring process shall be by a qualified and experienced applicator with appropriate training in the use of the coloring process herein specified.

4.2 Surface Preparation. Preparation of the surfaces to receive the coloration shall be as recommended by the manufacturer of the acid base coloring process to be used in the work.

4.3 Curing Compounds. Curing compounds or other materials applied to the concrete shall conform to requirements of section: CONCRETE.

4.4 Appearance. All rock surfaces that are visually exposed after placement of the rock shall be treated to obtain a relatively homogeneous color. All colored surfaces shall be clean, neat and blend in with the adjacent natural hill slopes when viewed from the bases of the embankments on either side of the dam.

5. CLEANUP. The Contractor shall remove from adjacent surfaces any materials or stains, including excessive color residue on the concrete or landscape stone considered undesirable by the Contracting Officer. The Contractor shall be responsible for all damages or defacement to the adjacent structures and natural areas.

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