

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE N/A	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. 0002		3. EFFECTIVE DATE 10 AUGUST 1999	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)	
6. ISSUED BY LOS ANGELES DISTRICT, COE CESPL-CT-P (L. CARVAJAL) P.O. BOX 532711 LOS ANGELES, CA 90053-2325		CODE	7. ADMINISTERED BY (If other than Item 6)		CODE
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP code)			(X)	9A. AMENDMENT OF SOLICITATION NO. DACW09-99-B-0009	
			X	9B. DATED (SEE ITEM 11) 24 AUG 99 (BID OPENING)	
				10A. MODIFICATION OF CONTRACT/ORDER NO. N/A	
				10B. DATED (SEE ITEM 13) N/A	
CODE		FACILITY CODE		N/A	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
 (a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

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

E. IMPORTANT: Contractor is not, is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
 BLUE DIAMOND DETENTION BASIN, CLARK COUNTY, NEVADA
 *Additions: Section 04200, Table No. 1 and Table No. 2 of Section 01440, and Par. 3.2.1.2.1 of Section 02250.
 *Revisions: Par. 1 and 16 of Section 00800; Par. 2.9.5.4, 3.17b, 3.3, 3.9.7, 3.9.9.1 and 3.9.9.1.1 of Section 01200; Section 01250; Submittal Register of Section 01300; Par. 3.10.5 and 3.10.6 of Section 01440; Par. 2.1.3 of Section 02241; Par. 3.7 of Section 02250; Par. 2.1.4.3.2, 2.1.4.3.3, 2.1.5.1.1, 2.1.5.1.2, 3.2.3, 3.3.1 of Section 02600; Par. 3.1.3 of Section 02710; Par. 3.2 of Section 03101; and Bidding Schedule of Section 00010.

----- CONTINUED ON BACK OF PAGE -----

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

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

**BLUE DIAMOND DETENTION BASIN, CLARK COUNTY, NEVADA.
IFB NO. DACW09-99-B-0009, Standard Form 30 (Continued)**

- Revision: Front and Back of Standard Form 1442.
- Deletions: Section 02510.
- Revised Drawings: Dwg. No. (District File No.):
196/490, 196/491, 196/492, 196/493, 196/494, 196/495, 196/496,
196/497, 196/498, 196/499, 196/500, 196/501, 196/502, 196/503,
196/504, 196/511, 196/512, 196/513, 196/514, 196/515, 196/516,
196/517, 196/519, 196/520, 196/521, 196/522, and 196/524 (all Rev.
`A')
- Added Drawings: Dwg. No. (District File No.):
196/547, 196/548 (all Rev. `A')

Section Descriptions

- § 00010, Solicitation, Offer and Award (SF 1442) and Bidding Schedule
- § 00800, Special Contract Requirements
- § 01200, General Requirements
- § 01250, Measurement and Payment
- § 01300, Submittal Procedures
- § 01440, Contractor Quality Control
- § 02241, Aggregate Base Course
- § 02250, Fills and Subgrade Preparation
- § 02600, Stone Protection
- § 02710, Subdrainage Systems
- § 03101, Formwork For Concrete
- § 04200, Masonry

--- END OF DOCUMENT ---

ENCLOSURE TO AMENDMENT # 2

SOLICITATION, OFFER, AND AWARD (Construction, Alteration, or Repair)	1. SOLICITATION NO. DACW09-99-B-0009	2. TYPE OF SOLICITATION <input checked="" type="checkbox"/> SEALED BID (IFB) <input type="checkbox"/> NEGOTIATED (RFP)	3. DATE ISSUED 07/12/99	PAGE OF PAGES
	IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.			

4. CONTRACT NO.	5. REQUISITION/PURCHASE REQUEST NO. W81EYN-9040-9609	6. PROJECT NO. Blue Diamond
7. ISSUED BY LOS ANGELES DISTRICT, COE CESPL-CT-P (L. CARVAJAL) P. O. BOX 532711 LOS ANGELES CA 90053-2325	CODE SPLCTC02	8. ADDRESS OFFER TO SPLCOAV US ARMY CORPS OF ENGINEERS NELLIS AFB RESIDENT OFFICE 4551 DEVLIN DRIVE BLDG 867 NELLIS AFB NV 89191
9. FOR INFORMATION CALL:	A. NAME LUCY CARVAJAL C02	B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS) (213) 452-3240

SOLICITATION

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

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

BLUE DIAMOND DETENTION BASIN, CLARK COUNTY, NEVADA

The estimated cost of this acquisition is in excess of \$10,000,000.00

Please be advised that this procurement may be delayed, cancelled or revised at any time during the solicitation, evaluation and/or final award process.

11. The Contractor shall begin performance within 10 calendar days and complete it within 390 calendar days after receiving award, notice to proceed. This performance period is mandatory, negotiable. (See * See Section 00800.)

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? (If "YES," indicate within how many calendar days after award in Item 12B.) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	12B. CALENDAR DAYS 010
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13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and 0 copies to perform the work required are due at the place specified in Item 8 by 1:00 PM (hour) local time 08/24/99 (date). If this is a sealed bid solicitation, offers must be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

B. An offer guarantee is, is not required.

C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

D. Offers providing less than 60 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

ENCLOSURE TO AMENDMENT #1

14. NAME AND ADDRESS OF OFFEROR (Include ZIP Code)	15. TELEPHONE NO. (Include area code)
Cage Code: _____ Duns No. _____ CODE FACILITY CODE	16. REMITTANCE ADDRESS (Include only if different than Item 14)

AMOUNTS ▶

Refer to Section 00010, page 00010-3, Price Schedule

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

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

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

AMENDMENT NO.	DATE	20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)	20B. SIGNATURE	20C. OFFER DATE

AWARD (To be completed by Government)

21. ITEMS ACCEPTED:

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

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

SECTION 00010

BIDDING SCHEDULE

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Estimated Amount</u>
1.	DIVERSION AND CONTROL OF WATER	1	Job	L.S.	\$_____
2.	CLEAR SITE & REMOVE OBSTRUCTIONS	1	Job	L.S.	_____
3.	CONSTRUCTION WATER	1	Job	L.S.	_____
4.	EXCAVATION, FOUNDATION	102,000	m ³	_____	_____
5.	EXCAVATION, BASIN	398,000	m ³	_____	_____
6.	EXCAVATION, TOE	14,300	m ³	_____	_____
7.	EXCAVATION, INSPECTION TRENCH	11,500	m ³	_____	_____
*8.	EXCAVATION, SLOPE STABILIZER	13,000	m³	_____	_____
9.	COMPACTED FILL, DAM EMBANKMENT	381,500	m ³	_____	_____
10.	COMPACTED FILL, BASIN	43,000	m ³	_____	_____
11.	BACKFILL, TOE	12,300	m ³	_____	_____
12.	FILTER MATERIAL	10,000	m ³	_____	_____
13.	DRAIN MATERIAL	21,350	m ³	_____	_____
14.	SUBDRAINAGE SYSTEM	1	Job	L.S.	_____
15.	0.460 RIPRAP PROTECTION	21,900	t	_____	_____
16.	0.300 RIPRAP PROTECTION	6,500	t	_____	_____
17.	SPILLWAY TOE STONE	7,100	t	_____	_____
*18.	0.460 TOE STONE, SLOPE STABILIZER	11,400	t	_____	_____
*19.	GROUTED STONE, SLOPE STABILIZER	2,850	m³	_____	_____
20.	ROLLER-COMPACTED CONCRETE (RCC)	58,000	m ³	_____	_____
21.	PORTLAND CEMENT FOR RCC	10,200	t	_____	_____

Enclosure to Amendment No. 0002

*DENOTES CHANGE

22. POZZOLAN FOR RCC	2,560	t	_____	_____
23. CONCRETE, INVERT SLAB	56	m ³	_____	_____
24. CONCRETE, WALLS	94	m ³	_____	_____
25. CONCRETE, TOP SLAB	46	m ³	_____	_____
26. CONCRETE, OGEE WEIR	1,110	m ³	_____	_____
27. REINFORCING STEEL	39	t	_____	_____
28. DAM INTAKE STRUCTURE	1	Job	L.S.	_____
29. DAM OUTLET STRUCTURE	1	Job	L.S.	_____
30. BASIN BYPASS CONDUIT INLET STRUCTURE	1	Job	L.S.	_____
31. BASIN BYPASS CONDUIT OUTLET STRUCTURE	1	Job	L.S.	_____
32. BASIN BYPASS CONDUIT	1	Job	L.S.	_____
33. SPILLWAY ACCESS ROADS	1	Job	L.S.	_____
34. CONCRETE ENCASEMENT, GAS LINE	1	Job	L.S.	_____
35. GROUTED STONE COLLECTOR CHANNEL	1	Job	L.S.	_____
36. AGGREGATE BASE COURSE	2,120	t	_____	_____
37. ACCESS ROADS	1	Job	L.S.	_____
38. ACCESS GATES	2	ea	_____	_____
39. TEMPORARY TORTOISE FENCING	3,700	m	_____	_____
40. CHAIN LINK FENCING	121	m	_____	_____
41. PIPE SAFETY RAILING	160	m	_____	_____
42. GUARD RAIL	12	m	_____	_____
43. DETENTION BASIN HYDROLOGIC INSTRUMENTATION SYSTEM	1	Job	L.S.	_____
44. DETENTION BASIN DEPTH GAGES	1	Job	L.S.	_____

45. SEDIMENT RANGE MONUMENTS AND STAFF GAGES	1	Job	L.S. _____
46. SOIL STABILIZER	20	ha	_____

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 rate 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 the Bidding Schedule, otherwise the bid will be considered nonresponsive and will be rejected.

For the purpose of initial evaluation of bids, the following will be utilized in resolving arithmetic discrepancies found on the Bidding Schedule as submitted by the bidder:

- a. Obviously misplaced decimal points will be corrected;
- b. In case of discrepancy between the unit price and the extended price, the unit price will govern;
- c. Apparent errors in extension of unit prices will be corrected;
- d. Apparent errors in addition of lump sum and extended prices will be corrected.

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

The lump sum "LS" line items in the Bidding Schedule are not "Estimated Quantity" line items and are not subject to the "Variation in Estimated Quantity" contract clause.

The Contract Clause 52.232-7, "Prompt Payment for Construction Contracts" requires that the name and address of the contractor official to whom payment is to be sent, be the same as that in the contract or in a proper Notice of Assignment.

Principal Contracting Officer. The Contracting Officer who signs this contract will be the Principal Contracting Officer for this contract. However, any Contracting Officer assigned to the Los Angeles District, contracting within his/her authority, may take formal action on this contract when the Principal Contracting Officer is unavailable and contract action needs to be taken.

Payment of Electronic Funds Transfer (EFT) is the mandatory method of contract payment. The contractors' attention is directed to Contract Clause No. 52.232-4002 entitled "Mandatory Information for Electronic Funds Transfer Payment" located in Section 00100, and Contract Clause No. 52.232-33 entitled "Payment by Electronic Funds Transfer-Central Contractor Registration" located in Section 00800, for additional information.

Some quantities listed are ESTIMATED, the bidders prices MUST BE FIRM.

Abbreviations:

LS = LUMP SUM

m³ = CUBIC METER

m = METER

t = TONNE (1,000 kg)

ea = EACH

ha = hectare (10,000 m²)

-- End of Section --

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SECTION 00800

SPECIAL CONTRACT REQUIREMENTS

AMD #2 1 52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

The Contractor shall be required to (a) commence work under this contract within 10 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 390 calendar days after the Contractor receives the Notice to Proceed. The time stated for completion shall include final cleanup of the premises.

(End of clause)

2 52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (APR 1984)

(a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, the Contractor shall pay to the Government as liquidated damages, the sum of \$1,350.00 for each day of delay.

(b) If the Government terminates the Contractor's right to proceed, the resulting damage will consist of 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 the Government does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted.

(End of clause)

3 52.211-18 VARIATION IN ESTIMATED QUANTITY (APR 1984)

If the quantity of a unit-priced item in this contract is an estimated quantity and the actual quantity of the unit-priced item varies more than 15 percent above or below the estimated quantity, 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 115 percent or below 85 percent of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contractor may request, in writing, an extension of time, to be received by the Contracting Officer within 10 days from the beginning of the delay, or within such further period as may be granted by the Contracting Officer before the date of final settlement of the contract. Upon the receipt of a written request for an extension, the Contracting Officer shall ascertain the facts and make an adjustment for extending the completion date as, in the judgement of the Contracting Officer, is justified.

(End of clause)

4 52.228-12 PROSPECTIVE SUBCONTRACTOR REQUESTS FOR BONDS (OCT 1995)

In accordance with Section 806(a)(3) of Pub. L. 102-190, as amended by Sections 2091 and 8105 of Pub. L. 103-355, upon the request of a prospective subcontractor or supplier offering to furnish labor or material for the performance of this contract for which a payment bond has been furnished to the Government pursuant to the Miller Act, the Contractor shall promptly provide a copy of such payment bond to the requester.

(End of clause)

5 52.228-14 IRREVOCABLE LETTER OF CREDIT (OCT 1997)

(a) "Irrevocable letter of credit" (ILC), as used in this clause, means a written commitment by a federally insured financial institution to pay all or part of a stated amount of money, until the expiration date of the letter, upon presentation by the Government (the beneficiary) of a written demand therefor. Neither the financial institution nor the offeror/Contractor can revoke or condition the letter of credit.

(b) If the offeror intends to use an ILC in lieu of a bid bond, or to secure other types of bonds such as performance and payment bonds, the letter of credit and letter of confirmation formats in paragraphs (e) and (f) of this clause shall be used.

(c) The letter of credit shall be irrevocable, shall require presentation of no document other than a written demand and the ILC (including confirming letter, if any), shall be issued/confirmed by an acceptable federally insured financial institution as provided in paragraph (d) of this clause, and--

(1) If used as a bid guarantee, the ILC shall expire no earlier than 60 days after the close of the bid acceptance period;

(2) If used as an alternative to corporate or individual sureties as security for a performance or payment bond, the offeror/Contractor may submit an ILC with an initial expiration date estimated to cover the entire period for which financial security is required or may submit an ILC with an initial expiration date that is a minimum period of one year from the date of issuance. The ILC shall provide that, unless the issuer provides the beneficiary written notice of non-renewal at least 60 days in advance of the current expiration date, the ILC is automatically extended without amendment for one year from the expiration date, or any future expiration date, until the period of required coverage is completed and the Contracting Officer provides the financial institution with a written statement waiving the right to payment. The period of required coverage shall be:

(i) For contracts subject to the Miller Act, the later of--

(A) One year following the expected date of final payment;

(B) For performance bonds only, until completion of any warranty period; or

(C) For payment bonds only, until resolution of all claims filed against the payment bond during the one-year period following final payment.

(ii) For contracts not subject to the Miller Act, the later of--

(A) 90 days following final payment; or

(B) For performance bonds only, until completion of any warranty period.

(d) Only federally insured financial institutions rated investment grade or higher shall issue or confirm the ILC. The offeror/Contractor shall provide the Contracting Officer a credit rating that indicates the financial institution has the required rating(s) as of the date of issuance of the ILC. Unless the financial institution issuing the ILC had letter of credit business of at least \$25 million in the past year, ILCs over \$5 million must be confirmed by another acceptable financial institution that had letter of credit business of at least \$25 million in the past year.

(e) The following format shall be used by the issuing financial institution to create an ILC:

(Issuing Financial Institution's Letterhead or Name and Address)
Issue Date _____
Irrevocable Letter of Credit No. _____
Account party's name _____
Account party's address _____
For Solicitation No. _____

(For reference only)

TO: (U.S. Government agency)

(U.S. Government agency's address)

1. We hereby establish this irrevocable and transferable Letter of Credit in your favor for one or more drawings up to United States \$_____. This Letter of Credit is payable at (issuing financial institution's and, if any, confirming financial institution's) office at (issuing financial institution's address and, if any, confirming financial institution's address) and expires with our close of business on _____, or any automatically extended expiration date.

2. We hereby undertake to honor your or the transferee's sight draft(s) drawn on the issuing or, if any, the confirming financial institution,

for all or any part of this credit if presented with this Letter of Credit and confirmation, if any, at the office specified in paragraph 1 of this Letter of Credit on or before the expiration date or any automatically extended expiration date.

3. (This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.) It is a condition of this Letter of Credit that it is deemed to be automatically extended without amendment for one year from the expiration date hereof, or any future expiration date, unless at least 60 days prior to any expiration date, we notify you or the transferee by registered mail, or other receipted means of delivery, that we elect not to consider this Letter of Credit renewed for any such additional period. At the time we notify you, we also agree to notify the account party (and confirming financial institution, if any) by the same means of delivery.

4. This Letter of Credit is transferable. Transfers and assignments of proceeds are to be effected without charge to either the beneficiary or the transferee/assignee of proceeds. Such transfer or assignment shall be only at the written direction of the Government (the beneficiary) in a form satisfactory to the issuing financial institution and the confirming financial institution, if any.

5. This Letter of Credit is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent therewith, to the laws of _____ (state of confirming financial institution, if any, otherwise state of issuing financial institution).

6. If this credit expires during an interruption of business of this financial institution as described in Article 17 of the UCP, the financial institution specifically agrees to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

(Issuing financial institution)

(f) The following format shall be used by the financial institution to confirm an ILC:

(Confirming Financial Institution's Letterhead or Name and Address)

Date _____ 19_____

Our Letter of Credit Advice Number _____

Beneficiary: _____

(U.S. Government agency)

Issuing Financial Institution: _____

Issuing Financial Institution's LC No.: _____

Gentlemen:

1. We hereby confirm the above indicated Letter of Credit, the original of which is attached, issued by _____ (name of issuing financial institution) for drawings of up to United States dollars _____/U.S. \$_____ and expiring with our close of business on _____ (the expiration date), or any automatically extended expiration date.

2. Draft(s) drawn under the Letter of Credit and this Confirmation are payable at our office located at _____.

3. We hereby undertake to honor sight draft(s) drawn under and presented with the Letter of Credit and this Confirmation at our offices as specified herein.

4. (This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.) It is a condition of this confirmation that it be deemed automatically extended without amendment for one year from the expiration date hereof, or any automatically extended expiration date, unless:

(a) At least 60 days prior to any such expiration date, we shall notify the Contracting Officer, or the transferee and the issuing financial institution, by registered mail or other receipted means of delivery, that we elect not to consider this confirmation extended for any such additional period; or

(b) The issuing financial institution shall have exercised its right to notify you or the transferee, the account party, and ourselves, of its election not to extend the expiration date of the Letter of Credit.

5. This confirmation is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent

therewith, to the laws of _____ (state of confirming financial institution).

6. If this confirmation expires during an interruption of business of this financial institution as described in Article 17 of the UCP, we specifically agree to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,
(Confirming financial institution)

(g) The following format shall be used by the Contracting Officer for a sight draft to draw on the Letter of Credit:

SIGHT DRAFT

(City, State)

_____, 19____

(Name and address of financial institution)

Pay to the order of _____

(Beneficiary Agency)

the sum of United States \$ _____

This draft is drawn under _____

Irrevocable Letter of Credit No. _____

By: _____

(Beneficiary Agency)

(End of clause)

6 52.228-15 Performance and Payment Bonds--Construction (SEP 1996)

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

Contract price means the award price of the contract or, for requirements contracts, the price payable for the estimated quantity; or for indefinite-delivery type contracts, the price payable for the specified minimum quantity.

(b) Unless the resulting contract price is \$100,000 or less, the successful offeror shall be required to furnish performance and payment bonds to the Contracting Officer as follows:

(1) Performance Bonds (Standard Form 25):

(i) The penal amount of performance bonds shall be 100 percent of the original contract price.

(ii) The Government may require additional performance bond protection when the contract price is increased. The increase in protection shall generally equal 100 percent of the increase in contract price.

(iii) The Government may secure additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(2) Payment Bonds (Standard Form 25-A):

(i) The penal amount of payment bonds shall equal--

(A) 50 percent of the contract price if the contract price is not more than \$1 million;

(B) 40 percent of the contract price if the contract price is more than \$1 million but not more than \$5 million; or

(C) \$2.5 million if the contract price is more than \$5 million.

(ii) If the original contract price is \$5 million or less, the Government may require additional protection if the contract price is increased. The penal amount of the total protection shall meet the requirement of subparagraph (b)(2)(i) of this clause.

(iii) The Government may secure additional protection by directing the Contractor to increase the penal sum of the existing bond or to obtain an additional bond.

(c) The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, within the time period specified in the Bid Guarantee provision of the solicitation, or otherwise specified by the Contracting Officer, but in any event, before starting work.

(d) The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable

security such as 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. Treasury Circular 570 is published in the Federal Register, or may be obtained from the U.S. Department of Treasury, Financial Management Service, Surety Bond Branch, 401 14th Street, NW., 2nd Floor, West Wing, Washington, DC 20227.
(End of clause)

7 52.232-33 PAYMENT BY ELECTRONIC FUNDS TRANSFER--CENTRAL CONTRACTOR REGISTRATION
(MAY 1999)

(a) Method of payment. (1) All payments by the Government under this contract shall be made by electronic funds transfer (EFT), except as provided in paragraph (a)(2) of this clause. As used in this clause, the term "EFT" refers to the funds transfer and may also include the payment information transfer.

(2) In the event the Government is unable to release one or more payments by EFT, the Contractor agrees to either--

(i) Accept payment by check or some other mutually agreeable method of payment; or

(ii) Request the Government to extend the payment due date until such time as the Government can make payment by EFT (but see paragraph (d) of this clause).

(b) Contractor's EFT information. The Government shall make payment to the Contractor using the EFT information contained in the Central Contractor Registration (CCR) database. In the event that the EFT information changes, the Contractor shall be responsible for providing the updated information to the CCR database.

(c) Mechanisms for EFT payment. The Government may make payment by EFT through either the Automated Clearing House (ACH) network, subject to the rules of the National Automated Clearing House Association, or the Fedwire Transfer System. The rules governing Federal payments through the ACH are contained in 31 CFR part 210.

(d) Suspension of payment. If the Contractor's EFT information in the CCR database is incorrect, then the Government need not make payment to the Contractor under this contract until correct EFT information is entered into the CCR database; and any invoice or contract financing request shall be deemed not to be a proper invoice for the purpose of prompt payment under this contract. The prompt payment terms of the contract regarding notice of an improper invoice and delays in accrual of interest penalties apply.

(e) Contractor EFT arrangements. If the Contractor has identified multiple payment receiving points (i.e., more than one remittance address and/or EFT information set) in the CCR database, and the Contractor has not notified the Government of the payment receiving point applicable to this contract, the Government shall make payment to the first payment receiving point (EFT information set or remittance address as applicable) listed in the CCR database.

(f) Liability for uncompleted or erroneous transfers. (1) If an uncompleted or erroneous transfer occurs because the Government used the Contractor's EFT information incorrectly, the Government remains responsible for--

(i) Making a correct payment;

(ii) Paying any prompt payment penalty due; and

(iii) Recovering any erroneously directed funds.

(2) If an uncompleted or erroneous transfer occurs because the Contractor's EFT information was incorrect, or was revised within 30 days of Government release of the EFT payment transaction instruction to the Federal Reserve System, and--

(i) If the funds are no longer under the control of the payment office, the Government is deemed to have made payment and the Contractor is responsible for recovery of any erroneously directed funds; or

(ii) If the funds remain under the control of the payment office, the Government shall not make payment, and the provisions of paragraph (d) of this clause shall apply.

(g) EFT and prompt payment. A payment shall be deemed to have been made in a timely manner in accordance with the prompt payment

terms of this contract if, in the EFT payment transaction instruction released to the Federal Reserve System, the date specified for settlement of the payment is on or before the prompt payment due date, provided the specified payment date is a valid date under the rules of the Federal Reserve System.

(h) EFT and assignment of claims. If the Contractor assigns the proceeds of this contract as provided for in the assignment of claims terms of this contract, the Contractor shall require as a condition of any such assignment, that the assignee shall register in the CCR database and shall be paid by EFT in accordance with the terms of this clause. In all respects, the requirements of this clause shall apply to the assignee as if it were the Contractor. EFT information that shows the ultimate recipient of the transfer to be other than the Contractor, in the absence of a proper assignment of claims acceptable to the Government, is incorrect EFT information within the meaning of paragraph (d) of this clause.

(i) Liability for change of EFT information by financial agent. The Government is not liable for errors resulting from changes to EFT information made by the Contractor's financial agent.

(j) Payment information. The payment or disbursing office shall forward to the Contractor available payment information that is suitable for transmission as of the date of release of the EFT instruction to the Federal Reserve System. The Government may request the Contractor to designate a desired format and method(s) for delivery of payment information from a list of formats and methods the payment office is capable of executing. However, the Government does not guarantee that any particular format or method of delivery is available at any particular payment office and retains the latitude to use the format and delivery method most convenient to the Government. If the Government makes payment by check in accordance with paragraph (a) of this clause, the Government shall mail the payment information to the remittance address contained in the CCR database.

(End of Clause)

8 52.236-1 PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984)

The Contractor shall perform on the site, and with its own organization, work equivalent to at least Thirty-Five (35%) percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

(End of clause)

(R 7-603.15 1965 JAN)

(R 1-18.104)

9 52.236-16 I QUANTITY SURVEYS (APR 1984)--ALTERNATE I (APR 1984)

(a) Quantity surveys shall be conducted, and the data derived from these surveys shall be used in computing the quantities of work performed and the actual construction completed and in place.

(b) The Contractor shall conduct the original and final surveys and surveys for any periods for which progress payments are requested. All these surveys shall be conducted under the direction of a representative of the Contracting Officer, unless the Contracting Officer waives this requirement in a specific instance. The Government shall make such computations as are necessary to determine the quantities of work performed or finally in place. The Contractor shall make the computations based on the surveys for any periods for which progress payments are requested.

(c) Promptly upon completing a survey, the Contractor shall furnish the originals of all field notes and all other records relating to the survey or to the layout of the work to the Contracting Officer, who shall use them as necessary to determine the amount of progress payments. The Contractor shall retain copies of all such material furnished to the Contracting Officer.

(End of clause)

(R 7-603.50(a) 1979 MAR)
(R 7-603.50(b) 1979 MAR)

10 52.236-4 PHYSICAL DATA (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) The indications of physical conditions on the drawings and in the specifications are the result of site investigations by
Surveys, Auger Borings, Test Borings

(b) Weather conditions - the Contractor shall satisfy himself as to the hazards likely to arise from weather conditions.

(c) Transportation facilities - the Contractor shall make his own investigation of the conditions of existing public and private roads and clearances, restrictions, bridge load limits and other limitations affecting transportation and ingress and egress at the job site. The unavailability of transportation facilities or limitations thereof shall not become a basis for claims against the Government or extensions of time for completion of the work

(d) N/A

(End of clause)
(R 7-603.25 1965 JAN)

11 52.236-21 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FEB 1997)

(a) The Contractor shall keep on the work site 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 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 its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

(b) 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", "order", "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.

(c) 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 "provide complete in place," that is "furnished and installed".

(d) Shop drawings means drawings, submitted to the Government by the Contractor, subcontractor, or any lower tier subcontractor pursuant to a construction contract, showing in detail (1) the proposed fabrication and assembly of structural elements, and (2) the installation (i.e., fit, and attachment details) of materials or equipment. It 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. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(e) 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 its 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 an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the Government's reasons therefor. Any work done before 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 (f) below.

(f) 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, the Contracting Officer shall issue an appropriate contract modification, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

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

(End of clause)

12 52.236-7001 CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS (DEC 1991)

(a) The Government--

(1) Will provide the Contractor, without charge, five (5) electronic file sets of the Plans and Specifications contained on CD-Rom's except publications incorporated into the technical provisions by reference;

(b) The Contractor shall--

(1) Check all drawings furnished immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer of any discrepancies; and

(4) Be responsible for any errors which might have been avoided by complying with this paragraph (b).

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

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

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

Title	File and Drawing No.
LAS VEGAS WASH AND	196/491 Sheet 2
TRIBUTARIES (TROPICANA AND	
FLAMINGO WASHES), NEVADA	
BLUE DIAMOND DETENTION BASIN	

(End of clause)

13 52.247-7023 TRANSPORTATION OF SUPPLIES BY SEA (NOV 1995)

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

(1) "Components" means articles, materials, and supplies incorporated directly into end products at any level of manufacture, fabrication, or assembly by the Contractor or any subcontractor.

(2) "Department of Defense (DoD)" means the Army, Navy, Air Force, Marine Corps, and defense agencies.

(3) "Foreign flag vessel" means any vessel that is not a U.S.-flag vessel.

(4) "Ocean transportation" means any transportation aboard a ship, vessel, boat, barge, or ferry through international waters.

(5) "Subcontractor" means a supplier, materialman, distributor, or vendor at any level below the prime contractor whose contractual obligation to perform results from, or is conditioned upon, award of the prime contract and who is performing any part of the work or other requirement of the prime contract. However, effective May 1, 1996, the term does not include a supplier, materialman, distributor, or vendor of commercial items or commercial components.

(6) "Supplies" means all property, except land and interests in land, that is clearly identifiable for eventual use by or owned by the DoD at the time of transportation by sea.

(i) An item is clearly identifiable for eventual use by the DoD if, for example, the contract documentation contains a reference to a DoD contract number or a military destination.

(ii) Supplies includes (but is not limited to) public works; buildings and facilities; ships; floating equipment and vessels of every character, type, and description, with parts, subassemblies, accessories, and equipment; machine tools; material; equipment; stores of all kinds; end items; construction materials; and components of the foregoing.

(7) "U.S.-flag vessel" means a vessel of the United States or belonging to the United States, including any vessel registered or having national status under the laws of the United States.

(b) The Contractor shall employ U.S.-flag vessels in the transportation by sea of any supplies to be furnished in the performance of this contract. The Contractor and its subcontractors may request that the Contracting Officer authorize shipment in foreign-flag vessels, or designate available U.S.-flag vessels, if the Contractor or a subcontractor believes that--

- (1) U.S.-flag vessels are not available for timely shipment;
- (2) The freight charges are inordinately excessive or unreasonable; or
- (3) Freight charges are higher than charges to private persons for transportation of like goods.

(c) The Contractor must submit any request for use of other than U.S.-flag vessels in writing to the Contracting Officer at least 45 days prior to the sailing date necessary to meet its delivery schedules. The Contracting Officer will process requests submitted after such date(s) as expeditiously as possible, but the Contracting Officer's failure to grant approvals to meet the shipper's sailing date will not of itself constitute a compensable delay under this or any other clause of this contract.

Requests shall contain at a minimum--

- (1) Type, weight, and cube of cargo;
- (2) Required shipping date;
- (3) Special handling and discharge requirements;
- (4) Loading and discharge points;
- (5) Name of shipper and consignee;
- (6) Prime contract number; and
- (7) A documented description of efforts made to secure U.S.-flag vessels, including points of contact (with names and telephone numbers) with at least two U.S.-flag carriers contacted. Copies of telephone notes, telegraphic and facsimile message or letters will be sufficient for this purpose.

(d) The Contractor shall, within 30 days after each shipment covered by this clause, provide the Contracting Officer and the Division of National Cargo, Office of Market Development, Maritime Administration, U.S. Department of Transportation, Washington, DC 20590, one copy of the rated on board vessel operating carrier's ocean bill of lading, which shall contain the following information--

- (1) Prime contract number;
- (2) Name of vessel;
- (3) Vessel flag of registry;
- (4) Date of loading;
- (5) Port of loading;
- (6) Port of final discharge;
- (7) Description of commodity;
- (8) Gross weight in pounds and cubic feet if available;
- (9) Total ocean freight in U.S. dollars; and
- (10) Name of the steamship company.

(e) The Contractor agrees to provide with its final invoice under this contract a representation that to the best of its knowledge and belief--

- (1) No ocean transportation was used in the performance of this

contract;

(2) Ocean transportation was used and only U.S.-flag vessels were used for all ocean shipments under the contract;

(3) Ocean transportation was used, and the Contractor had the written consent of the Contracting Officer for all non-U.S.-flag ocean transportation; or

(4) Ocean transportation was used and some or all of the shipments were made on non-U.S.-flag vessels without the written consent of the Contracting Officer. The Contractor shall describe these shipments in the following format:

	Item Description	Contract Line Items	Quantity
Total.....			

(f) If the final invoice does not include the required representation, the Government will reject and return it to the Contractor as an improper invoice for the purposes of the Prompt Payment clause of this contract. In the event there has been unauthorized use of non-U.S.-flag vessels in the performance of this contract, the Contracting Officer is entitled to equitably adjust the contract, based on the unauthorized use.

(g) The Contractor shall include this clause, including this paragraph (g) in all subcontracts under this contract, which exceed the simplified acquisition threshold in Part 13 of the Federal Acquisition Regulation.
(End of clause)

14 52.1-4001 CONTRACT ADMINISTRATION DATA

The Contract Administration Office for this contract subsequent to award is:

Department of the Army
Los Angeles District, Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053-2325
ATTN: Ms. Tina Davis-Frazier
Telephone No: Area Code (213) 452-3252

Payment will be made by:

USACE Finance Center
ATTN: CEFC-AO-P
5270 Integrity Drive
Millington, TN 38054-5005

Submit Invoices to:

Refer to Standard Form 1442, "Solicitation, Offer and Award" Block No. 26, which will be completed at time of Contract Award

15 52.231-4001 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)
EFARS 52-231-5000

(a) Allowable costs for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP 1110-1-8, "Construction Equipment Ownership and Operating Expense Schedule," Region VII. Working conditions shall be considered to be average for determining equipment rates using the

formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retrospective pricing, the schedule in effect at the time the work was performed shall apply.

(b) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36 substantiated by certified copies of paid invoices. Rates for equipment rented from an organization under common control, lease-purchase or sale-leaseback arrangements will be determined using the schedule except that rental costs leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees are allowable. Costs for major repairs and overhaul are unallowable.

(c) When actual equipment costs are proposed and the total amount of the pricing action is over \$25,000, cost or pricing data shall be submitted on Standard Form 1411, "Contract Pricing Proposal Cover Sheet." By submitting cost or pricing data, the contractor grants to the contracting officer or an authorizing representative the right to examine those books, records, documents and other supporting data that will permit evaluation of the proposed equipment costs. After price agreement the contractor shall certify that the equipment costs of pricing data submitted are accurate, complete and current.

(End of clause)

AMD #2 16 52.232-4001 CONTINUING CONTRACTS (ALTERNATE) (MAR 1995) EFARS 52-232-5002

(a) Funds are not available at the inception of this contract to cover the entire contract price. The sum of **\$100,000.00** has been reserved for this contract and is available for payment to the contractor during the current fiscal year. It is expected that Congress will make appropriations for future fiscal years from which additional funds, together with funds provided by one or more non-federal project sponsors will be reserved for this contract. The liability of the United States for payment beyond the funds reserved for this contract is contingent on the reservation of additional funds.

(b) Failure to make payment in excess of the amount currently reserved, or that may be reserved from time to time, shall not be considered a breach of this contract, and shall not entitle the contractor to a price adjustment under the terms of this contract except as specifically provided in paragraphs (e) and (h) below.

(c) 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 of any additional funds reserved for the contract by issuing and administrative modification to the contract.

(d) 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 of additional funds which will be needed to meet payments due or to become due under this 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.

(e) No payments will be made after exhaustion of funds except to the extent that additional funds are reserved for the contract. If and when sufficient additional funds are reserved, the contractor shall be entitled to simple interest on any payment that the contracting officer determines was actually earned under the terms of this 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, as in effect on the first day of the delay in such payment.

(f) 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 a "Suspension of Work" or similar clause or in any other manner under this contract.

(g) 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.

(h) 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 at no cost to the Government, except that, to the extent that additional funds to make payment therefore are allocated to this contract, it may be treated as a termination for the convenience of the Government.

(i) 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 this contract during the fiscal year, the Government reserves the right, after notice to the contractor, to reduce said reservation by the amount of such excess.

(j) The term "Reservation" means monies that have been set aside and made available for payments under this contract.

(End of clause)

17 52.236-4001 PLANT AND MATERIAL REMOVAL AFTER CONTRACT TERMINATION (MAR 1996)
EFARS 52.236-5000

Should this contract be terminated as provided in clause 52.232-5001 because of the failure of Congress to provide additional funds for its completion, the contractor may be permitted to remove plant and material on which payments for preparatory work have been made, subject to an equitable deduction from the amounts due the contractor to reimburse the United States for the unabsorbed value of such plant and material.

(End of clause)

18 52.239-4001 YEAR 2000 COMPLIANCE FOR CONSTRUCTION CONTRACTS

a. In accordance with FAR 39.106, the contractor shall ensure that with respect to any design, construction, goods, or services under this contract as well as any subsequent task/delivery orders issued under this contract (if applicable) all information technology contained therein shall be Year 2000 compliant. Specifically:

b. The contractor shall:

(1) Perform, maintain, and provide an inventory of all major components to include structures, equipment, items, parts, and furnishings under this contract and each task/delivery order which may be affected by the Y2K compliance requirement.

(2) Indicate whether each component is currently Year 2000 compliant or requires an upgrade for compliance prior to Government acceptance.

19 52.249-4001 BASIS FOR SETTLEMENT OF PROPOSALS EFARS 52.249-5000

Actual costs will be used to determine equipment costs for a settlement proposal submitted on the total cost basis under FAR 49.206-2(b). In evaluating a terminations settlement proposal using the total costs basis, the following principals will be applied to determine allowable equipment costs:

(1) Actual costs for each piece of equipment, or groups of similar serial or series equipment, need not be available in the contractor's accounting records to determine total actual equipment costs.

(2) If equipment costs have been allocated to a contract using predetermined rates, those charges will be adjusted to actual costs.

(3) Recorded job costs adjusted for unallowable and unallowable expenses will be used to determine equipment operating expenses.

(4) Ownership costs (depreciation) will be determined using the contractor's depreciation schedule (subject to the provisions of FAR 31.205-11).

(5) License, taxes, storage and insurance costs are normally recovered as an indirect expense and unless the contractor charges these costs directly to contracts, they will be recovered through the indirect expense rate.

(End of Statement)

END OF SECTION 00800

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SECTION 01200

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

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

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1 (1983) Construction and Industrial Plywood

FEDERAL SPECIFICATIONS (FS)

FS FF-B-575 (Rev C) Bolts, Hexagon and Square

FS FF-N-105 (Rev B; Am 3, Int Am 4; Notice 1) Nails, Brads, Staples and Spikes: Wire, Cut and Wrought

FS FF-N-836 (Rev D; Am 3) Nut: Square, Hexagon, Cap, Slotted, Castle, Knurled, Welding and Single Ball Seat

FS MM-L-751 (Rev H) Lumber; Softwood

FS TT-P-1510 (Rev A, Am 1) Paint, Latex, Exterior for Wood Surfaces, White and Tints

FS TT-P-001984 (Basic) Primer Coating, Latex Base, Exterior (Undercoat for Wood), White and Tints

ENGINEERING MANUALS (EM)

EM 385-1-1 (1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.2 SUBMITTALS

Government approval is required for all submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

SD-01 Data

Access and Haul Roads; GA.

The Contractor shall submit his access and haul road plan to the Contracting Officer in conformance with paragraph ACCESS AND HAUL ROADS.

Heavy Equipment; GA.

The Contractor shall submit the method of transporting heavy equipment in conformance with paragraph CONTRACTOR'S EQUIPMENT.

Storm Water Pollution Prevention Plan; FIO.

The Contractor shall submit copies of the Storm Water Pollution Plan to the Contracting Officer.

Notice of Intent; FIO.

The Contractor shall submit copies of the Notice of Intent to the Contracting Officer.

SD-04 Drawings

As-built Drawings; GA.

The Contractor shall submit for approval as-built drawings of the project as installed and completed by the Contractor in conformance with paragraph AS-BUILT DRAWINGS.

1.3 PROJECT FACILITIES

The Contractor shall construct and/or erect the following project facilities as soon as possible and not less than 15 calendar days after notice to proceed.

1.3.1 Construction Signs

The signs shall include the following:

- a. Project Signs: One Project Sign at location designated by the Contracting Officer.
- b. Warning Signs: Facing approaching traffic on all haul roads crossing under overhead power transmission lines.
- c. Hard Hat Signs: Ten hard hat signs at locations directed.

1.3.2 Project Engineer's Office

Project Engineer's office shall include a fenced parking area.

1.3.3 Bulletin Board

Bulletin board shall be erected at the Contractor's office.

1.3.4 Sanitary Facilities

Suitable sanitary facilities shall be provided and maintained by the Contractor.

PART 2 PRODUCTS

2.1 CONSTRUCTION SIGNS

2.1.1 Materials

2.1.1.1 Lumber

FS 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).

2.1.1.2 Plywood

DOC PS 1, grade A-C, Group 1, exterior type.

2.1.1.3 Bolts, Nuts and Nails

Bolts shall conform to FS FF-B-575, nuts shall conform to FS FF-N-836, and nails shall conform to FS FF-N-105.

2.1.1.4 Paints and Oils

Paints shall conform to FS TT-P-001984 for primer and FS TT-P-1510 for finish paint and lettering.

PART 3 EXECUTION

3.1 CONSTRUCTION OF SIGNS

3.1.1 Project and Hard Hat Signs

Constructed as detailed in Figures 1, 2, and 3. Decals and safety signs will be furnished by the Contracting Officer.

3.1.2 Warning Signs

Constructed of plywood not less than 2 inch thick and shall be securely bolted to the supports with the bottom of the sign face 1 m above the ground. The sign face shall be 0.60 m x 1.20 m, all letters shall be 100 mm in height, and the wording shall be: "WARNING: OVERHEAD TRANSMISSION LINES."

3.2 PAINTING SIGNS

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.

3.3 PROJECT ENGINEER'S OFFICE

The Contractor shall provide an office within an on site trailer for the Governments use. The office shall be approximately 10' x 10' and may be co-located within a Contractors trailer on site. The Government office space shall have its own private and lockable entrance. Furnishings shall include a desk and three chairs, file cabinet and book shelf. HVAC system shall be capable of maintaining a year round temperature of 75 degrees Fahrenheit. Adequate lighting at the desk shall be provided. Windows shall include shading to block out sunlight. Chilled drinking water shall be provided and maintained. The office space shall be maintained in good condition and shall remain on site beginning from day 14 of the contract through the final inspection.

3.3.1 PROJECT ENGINEER'S OFFICE EQUIPMENT

Contractor shall provide computer software (3.5" floppy disc size) to the Contracting Officer for the type of scheduling system to be used and quantity/fill programs for tracking or estimating bid quantities during construction. Scheduling software must be capable of downloading completely to the COE Standard Data Exchange Format. The Contractor shall utilize a hand held radio system for communication between the Contractor's quality control representative and the Government's quality assurance representative. Radio equipment to be supplied for the Government's use shall include a hand held radio, two batteries and one charger. The Contractor shall provide Government personnel with the following equipment for the duration of the contract: 1 Cellular telephone with voice mail, 2 nickel cadmium batteries, 1 desk top charger, 1 travel charger, and 400 minutes of air time per month or portion thereof.

3.4 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.

3.5 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.

3.6 SCRAP MATERIAL

Materials indicated to be removed and not indicated to be salvaged, stored or reinstalled are designated as scrap and shall be disposed of at the disposal site shown on the plan.

3.7 ARCHAEOLOGICAL FINDINGS DURING CONSTRUCTION

Should the Contractor or any of his employees in the performance of this contract find or uncover any archaeological remains, he shall notify the Project Engineer immediately. Such notifications will be a brief statement in writing giving the location and nature of the findings. 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 CONTRACT CLAUSES of the contract.

3.8 PROTECTION OF EXISTING WORK

Before beginning any cutting or removal work, the Contractor shall carefully survey the existing work and examine the drawings and specifications to determine the extent of the work. The Contractor shall take all necessary precautions to insure against damage to such work to remain in place, to be reused, or to remain the property of the Government, and any damage to such work shall be repaired or replaced as approved by the Contracting Officer at no additional cost to the Government. The Contractor shall carefully coordinate the work of this section with all

other work and construct and maintain shoring, bracing and supports, as required. The Contractor shall insure that structural elements are not overloaded and be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under any part of this contract.

3.9 PUBLIC UTILITIES, NOTICES, AND RESTRICTIONS

3.9.1 General

The approximate location of all railroads, pipe lines, power and communication lines, and other utilities known to exist within the limits of the work are indicated on the drawings. The sizes, locations, and names of owners of such utilities are given from available information, but their accuracy is not guaranteed. Except as otherwise indicated on the drawings, all existing utilities will be left in place and the Contractor shall conduct his operations in such a manner that the utilities will be protected from damage at all times, or arrangements shall be made by the Contractor for their relocation at the Contractor's own expense. The Contractor shall be responsible for any damage to utilities known to exist and shall reimburse the owners for such damage caused by his operations.

3.9.2 Relocation or Removal

Utilities to be relocated or removed not as part of this contract are designated "To be Relocated by Others" or "To be Removed by Others", respectively. Utilities shown on the plans and not so designated will be left in place and be subject to the provisions of the CONTRACT CLAUSE: PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS.

The Contractor may make arrangements with the owner for the temporary relocation and restoration of utilities not designated to be relocated, or for additional work in excess of the work needed to relocate utilities designated for relocation at no additional cost to the Government.

3.9.3 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.

3.9.4 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.

3.9.5 Notices

3.9.5.1 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.

3.9.5.2 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.

3.9.5.3 Spill Reporting

The Contractor shall notify the Contracting Officer immediately after any spill, regardless of quantity, including all personnel exposures. The Contractor shall submit a written notification not later than 7 calendar days after the initial notification. The written notification shall include the following:

- a. Item spilled, leaked or releases in an unauthorized manner (Identification, Quantity and Manifest Numbers).
- b. Whether the amount spilled, leaked or released in an unauthorized manner is EPA reportable and, if reported, a copy of the report.
- c. Exact location of the spill, leak or unauthorized release.
- d. Nature of exposure to personnel.
- e. Containment procedures initiated.
- f. Anticipated cleanup and disposal procedure.
- g. Disposal location of spill, leak or unauthorized release residue.

3.9.5.4 Environmental Assessment Requirements

In order to satisfy the Environmental assessment for this project, the Contracting Officer is required to have a qualified biologist on the site at all times while clearing and grubbing operations are in progress. The Contractor shall notify the Contracting Officer 14 calendar days prior to the start of clearing and grubbing activities so that a biological monitor can be made available to walk immediately in front of the Contractor's clearing and grubbing equipment to survey for threatened desert tortoise. **For scheduling purposes, the contractor shall coordinate and complete all clearing and grubbing activities within one-eleven workday period.**

3.9.6 Restrictions

3.9.6.1 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.

3.9.6.2 Traffic Control Plan

The Contractor shall develop a Traffic Control Plan and obtain an approval

from the Clark County Department of Public Works prior to construction. The plan shall include vehicular detour plans, details of truck haul routes, details of roadway restriping and signage for vehicular circulation, and parking details.

3.9.6.3 Existing Roads

The work shall be planned in such a manner that traffic on the existing roads outside actual construction areas shall be maintained at all times. The work area shall be examined carefully relative to the order and scope of work to be performed, with respect to the limiting provisions of the plans and specifications. The construction schedule shall be prepared giving full consideration to not impacting and maintaining traffic on existing roads outside the construction area. Additional work on the existing roads may be done by others during the life of this contract.

3.9.6.4 Access and Haul Roads

Plans shall be submitted for approval for all proposed access and haul roads, whether within or outside the limits of the construction area, at least 15 calendar days prior to construction of such roads. The plans shall indicate width of road, direction of traffic, road markings, type of guardrail, curves, grades, runouts, and other information in sufficient detail for studying safety of the proposed roads. Haul roads shall be proposed so that use of existing residential streets and roads are minimized.

3.9.6.5 Public and Private Access Roads

When it is necessary for heavy equipment to operate on or to cross project roads or arterial roads, flaggers, signs, lights and/or other necessary safeguards shall be furnished to safely control and direct the flow of traffic. When it is necessary to operate on existing roads outside the construction area, all necessary permits shall be obtained from the appropriate private or public authority. Work shall be conducted in such manner so as to obstruct and inconvenience traffic on existing roads outside the construction limits as little as possible. Spillage of earth, dusty materials, boulders, and mud on project roads or other road will not be permitted. If spillage cannot be prevented, the spillage shall be immediately removed and such areas shall be kept clear throughout the workday. At the conclusion of each workday, such traveled areas shall be cleared of spillage, boulders, and mud.

3.9.6.6 Maintenance of Roads

All haul and access roads, within the construction area, including the borrow areas, shall be maintained to provide vehicular access for the Government's vehicles and the Contractor's vehicles and equipment. Road maintenance shall include rock/mud slides, washouts, and any incident which would restrict vehicular/equipment access. Prior to any alterations of any road alignment, the Contractor shall receive an approval from the Contracting Officer. Road maintenance and alterations shall be performed by the Contractor at no additional cost to the Government.

3.9.6.7 Traffic Safety

In accordance with CONTRACT CLAUSE: ACCIDENT PREVENTION, signs, barricades, and warning devices shall be provided, installed, and maintained as are required for protection of vehicular traffic at any location where

operations interfere with public roads. Signs, barricades, lights, and signals, shall be in conformance with Part VI of the U.S. Department of Transportation Manual on Uniform Traffic Control Devices for Streets and Highways.

3.9.6.8 Rock and Gravel

Rock and gravel for use on haul roads and other facilities may be obtained from any source with the excavation limits or stockpiles source shall be subject to approval by the Contracting Officer.

3.9.6.9 Cooperation with Others

In addition to CONTRACT CLAUSE: OTHER CONTRACTS, agreements shall be made for cooperative use and maintenance of project road directly between the Contractors concerned and shall be subject to approval by the Contracting Officer. No maintenance shall be charged for its use of the roads.

3.9.6.10 Temporary Culverts

Temporary culverts shall be provided as required for road drainage. Temporary culverts shall be corrugated metal pipe of adequate diameter. Exact locations of the temporary culverts shall be subject to approval by the Contracting Officer.

- a. All culverts within the construction area, including the borrow areas, shall be maintained to provide unrestricted flow through the culverts. Culvert maintenance shall include debris cleaning, repair of failures, and extension of culverts due to road alterations. Culvert maintenance shall be performed by the Contractor at no additional cost to the Government.

3.9.7 Construction Schedule

The contractor shall complete construction of the roller compacted concrete (RCC) spillway, stilling basin and spillway walls by 1 June 2000. All items required to be constructed prior to RCC placement between dam Sta.2+00± an Sta.7+80± shall be in place so RCC placement can be accomplished. These items shall include but not be limited to the outlet works conduit and outlet works conduit outlet structure; basin bypass conduit within the footprint of the dam embankment and the basin bypass conduit outlet structure, the drain material, filter material and subdrainage system and the required compacted dam embankment.

3.9.8 Working Hours

The Contractor shall restrict all construction activities to the following schedule:

- a. No restriction shall apply to the hours of work.
- b. No work will be permitted on Sundays or Federal Holidays without the prior written approval from the Contracting Officer.
- c. Disposal area and haul route(s) may require restricted hauling hours. The Contractor is notified that hauling or disposal activities may be restricted to normal business hours (7 a.m. to 4 p.m.) in the event that such operations are considered to be disruptive to existing neighborhood safety and noise conditions. In the event that such a

situation develops, the Contracting Officer shall notify the Contractor of restrictive hauling and/or disposal times. The Contractor shall develop their schedule for construction so that restrictive hauling times can be absorbed without extending the overall contract completion period.

3.9.9 Construction Water

The Contractor shall be responsible for obtaining water for construction purposes.

3.9.9.1 Optional Water Source

The Las Vegas Valley Water District (LVVWD) currently has a 42-inch water line with stub-outs that terminates near the intersection of Fort Apache Road and Warm Springs Road northeast of the project site. The Contractor, at his option may connect to a water line stub-out in the area, as directed by LVVWD, for a source of construction water. The Contractor shall be responsible for preparing and submitting all applications, connection designs and required drawings for LVVWD approvals and for paying all application fees and costs. For information on LVVWD requirements, the Contractor may contact Karen Jensen of LVVWD at telephone No. (702) 258-3166.

3.9.9.1.1 Temporary Water Line Route

The Government has established a route from the above LVVWD water source to the project site. If the Contractor chooses to use the LVVWD water source, the temporary water lines constructed shall be required to follow this route. The route is along existing unimproved roads and is shown on the drawings. **The Route is approximately 4.12 kilometers long.** The Contractor shall be responsible for maintaining the temporary water lines and immediately repairing any developed leaks. The construction of water lines will require protection for the Desert Tortoise as specified in Section 01130 ENVIRONMENTAL PROTECTION.

3.10 Lighting

The Contractor shall provide a minimum of 5 foot-candle lighting intensity for all construction areas during the contract performance period.

3.11 Identification of Vehicles

All the Contractor's vehicles shall display suitable permanent identification.

3.12 Construction Method Observation

Any construction method, plant, or piece of equipment used on this contract shall not be considered proprietary, and can be inspected or photographed at any time by the Government, regulatory agencies, or any group approved by the Government.

3.13 Contractor's Equipment

The planned method of transportation and operation of cranes and other heavy equipment to be used in the performance of this contract shall be submitted for approval by the Contracting Officer. The plan shall include the type, size, loadings of equipment, the proposed transportation routes,

and work areas to be used on the project.

3.14 PUBLIC SAFETY

Attention is directed to the CONTRACT CLAUSE: PERMITS AND RESPONSIBILITIES.

The Contractor shall provide temporary fencing, 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.

3.15 OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) STANDARDS

The OCCUPATIONAL 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 and Health Requirements Manual, EM 385-1-1, are both applicable to this contract. The most stringent requirement of the two standards will be applicable.

3.15.1 Accident Reporting

In accordance with EM 385-1-1, the Contractor shall submit a written summary of worker's compensation claims which have been filled by worker's in connection with work on the project. The summary shall be submitted at the time when the work is approximately 50 percent complete and at project completion. The summary shall include all subcontractors. The Contractor's and subcontractor's compensation insurance carrier shall certify that the summaries are "correct and true".

3.16 PERMITS

3.16.1 General

Reference is made to the article of the contract entitled "Permits and Responsibilities", which obligates the Contractor to obtain all required licenses and permits.

3.16.2 Air Pollution Permit (APP)

The Contractor shall obtain an APP from the Clark County Health Department. For further information, contact Ms. Cynthia Mikes at telephone number (702) 383-1276.

3.16.3 National Pollutant Discharge Elimination System (NPDES) Permit

The Contractor shall obtain a NPDES permit from the United States Environmental Protection Agency (USEPA) under the Nation Wide Permit (NWP) program, which requires that a Storm Water Pollution Prevention Plan (SWPPP) shall be prepared and maintained on-site throughout the construction period. A copy of the plan will be submitted to the Contracting Officer. In accordance with the NWP, a minimum of two (2) days prior to the start of construction activities, the Contractor shall submit a Notice of Intent (NOI) with fees to the Nevada Division of USEPA. The NOI shall be submitted on the standard EPA Form 3510-6 (8-92), and copies shall be provided to the Contracting Officer. For further information, contact Mr. Robb Saunders at telephone number (702) 687-467.

CONTRACTOR
SAFETY PERSONNEL REQUIREMENT

3.17 GENERAL

Full-time, on-site, safety coverage by Contractors shall be required at all times during this contract. The Contractor shall employ at the project site to cover all hours of work at least one Safety and Occupational Health Technician per shift, to manage the Contractor's accident prevention program. In addition, the Contractor shall have one Safety and Occupational Health Professional to manage the overall Safety program. The principal safety person (the Safety Professional) shall report to and work directly for the Contractors on-site top manager, higher level official, or corporate safety office. The Safety and Health staff shall have the authority to take immediate steps to correct unsafe or unhealthful conditions. The presence of a Safety and Health person will not abrogate safety responsibilities of other personnel.

3.17.1 Qualifications for Safety and Health Professional(s)

- a. Shall have a degree in engineering or safety in at least a four year program from an accredited school and in addition, shall have been engaged in safety and occupational health for at least two (2) years, no time being credited to these two (2) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health; or
- b. Shall have legal registration as a Professional Engineer, Certified Safety Professional, or a Certified Safety Manager, and, in addition, shall have been engaged in safety and occupational health for at least one (1) year, no time being credited to this one (1) year experience unless at least fifty (50) percent of the time was devoted to safety and occupational health; or
- c. Shall have degree other than that specified in (a) above and, in addition, shall have been engaged in safety and occupational health for at least three (3) years, no time being credited to these three (3) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health; or
- d. In lieu of a degree, shall have been engaged in safety and occupational health for at least five (5) years, no time being credited to these five (5) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health.
- e. First aid work is not creditable experience.

3.17.2 Qualification for Safety and Health Technicians

- a. A bachelors degree in safety or an associated discipline and currently employed in a safety position; or
- b. An associate degree in Safety or an associated discipline and currently experience in Safety, and currently employed in a safety position; or
- c. Five years field experience in safety or an associated discipline and currently employed in a safety position.
- d. First Aid work is not creditable experience.

3.17.3 Names and Duties

The name and qualifications of nominated safety persons shall be furnished to the Contracting Officer (in resume format) for acceptability. A functional description of duties shall be provided prior to the pre-work conference. In addition, a copy of a letter from an authorized official of the Contractor which describes the duties and authority of the safety professional, including delegating sufficient authority to stop work to immediately correct the unsafe or unhealthful conditions.

3.18 NOTICE OF PARTNERSHIP

The Government intends to encourage the foundation of a cohesive partnership with the Contractor and its subcontractors. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance and intended to achieve completion within budget, on schedule, and in accordance with plans and specifications. This partnership would be bilateral in makeup, and participation will be totally voluntary. Any cost associated with effectuating this partnership will be agreed to by both parties and will be shared equally with no change in contract price. To implement this partnership initiative it is anticipated that within 60 days of Notice to Proceed the Contractor's on-site project manager and the Government's Resident Engineer would attend a two day partnership development seminar/team building workshop together with the Contractor's key on-site staff and key Government personnel. Follow-up workshop of 1 to 2 days duration would be held periodically throughout the duration of the contract as agreed to by the Contractor and Government.

3.19 AS-BUILT DRAWINGS

3.19.1 General

The Contractor shall prepare as-built drawings for the Government. The as-built drawings shall be a record of the construction as installed and completed by the Contractor. They shall include all the information shown on the contract set of drawings and a record of all deviations, modifications, or changes from those drawings, however minor, which were incorporated in the work, all additional work not appearing on the contract drawings, and all changes which are made after final inspection of the contract work. In the event that the Contractor accomplishes additional work, which changes the as-built conditions of the facility after submission of the as-built drawings, the Contractor shall furnish revised and/or additional drawings as required to depict as-built conditions. The

requirements for these additional drawings will be the same as for the as-built drawings included in the original submission. The drawings shall show the following information, but not be limited thereto:

- a. The location and description of any utility lines or other installations of any kind or description known to exist within the construction area. The location includes dimensions to permanent features.
- b. The location and dimensions of any changes within the building or structure.
- c. Correct grade or alignment of roads, structures, or utilities if any changes were made from contract plans.
- d. Correct elevations if changes were made in site grading.
- e. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.
- f. The topography and grades of all drainage installed or affected as a part of the project construction.
- g. All changes or modifications which results from the final inspection.

3.19.2 Options

Where contract drawings or specifications allow options, only the option selected for construction shall be shown on the as-built drawings.

3.19.3 Preliminary As-Built Drawings

The contractor shall maintain one (1) set of full size, blue-line prints marked up in red to show the as-built conditions. This set of as-built prints shall be kept current and available at the job site at all times. Information to be included on these preliminary drawings shall conform to the requirements as stated above. The Contracting Officer and the Contractor prior to submission of each monthly pay estimate will jointly inspect the marked up as-built prints. Failure to keep the as-built field data current shall be sufficient justification to withhold a retained percentage from the monthly pay estimate.

3.19.4 Submittal to Contracting Officer for review and approval

The Government shall furnish the Contractor with compact disk(s) (CD-ROM) containing electronic copies of the contract construction drawing files. The electronic files will be in Microstation format (Microstation Computer-Aided Design and Drafting Program, Microstation SE). The Contractor shall give the Government two weeks notice prior to his need for the electronic drawing files. The Contractor shall use the electronic files to generate as-built drawing for the project. Not later than two weeks after acceptance of the project by the Government, the Contractor shall deliver to the Contracting Officer one (1) set of marked up preliminary as-built drawings, two (2) full size sets of blue-line prints

and one (1) set of full size paper or mylar reproducible prints of the as-built drawings. The Contractor shall also submit compact disk(s) containing electronic copies of the as-built drawing files in the same Microstation format as the files furnished. If upon review, the drawings are found to contain errors and/or omissions, the Contractor shall be notified and the electronic as-built drawing files returned to the Contractor for corrections. Within ten (10) calendar days, the Contractor shall complete the corrections and return to the Contracting Officer two (2) sets of corrected as-built electronic drawing files on compact disks and one (1) set of full size blue-line prints generated from the corrected electronic files.

3.19.4.1 General Requirements

The as-built drawings shall be done in a quality equal to that of the original contract drawings. Line work, line weight, lettering and symbols shall be the same as that used on the originals. When final revisions have been completed, each drawing will be identified with the words "AS-BUILTS" in block letters 10 millimeters high placed above or below the title block in the lower right portion of the drawing. The drawing revision blocks shall be noted with the date of completion and the words "REVISED AS BUILTS". Compact disks submitted shall be clearly marked with typed disk labels containing the following information: Contractor's firm name, project name, project location, date, and the submittal type (AS-BUILT); if there is more than one disk to a set the disk number and sequence shall also be on the label.

3.20 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (ER 415-1-15, 31 OCT 89)

a. This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE: DEFAULT (FIXED PRICE CONSTRUCTION). In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

- (1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.
- (2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

b. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DAYS
Work Days Based on five (5) Day Work Week

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
6	2	2	1	1	0	2	2	1	1	1	3

c. Upon acknowledgment of the Notice to Proceed (NTP) and continuing

throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. The number of actual adverse weather days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in subparagraph b, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the CONTRACT CLAUSE: DEFAULT (FIXED PRICE CONSTRUCTION).

3.21 REQUIRED INSURANCE

The Contractor shall procure and obtain during the entire period of his performance under this contract the following minimum insurance:

- a. General Public Liability insurance for bodily injury and property damage with minimum limits of \$1,000,000 combined single limit per occurrence and \$1,000,000 annual aggregate for bodily injury to or death, personal injury and property damage.
- b. Automobile Liability insurance for bodily injury and property damage with minimum limits of \$1,000,000 combined single limit for each occurrence and \$1,000,000 annual aggregate.
- c. Either Workman's Compensation or Employer's Liability insurance with a minimum limit of \$1,000,000.

In every case the insurance coverage shall amount to at least the limits stated above. However, where the Financial Responsibility Compulsory Insurance Law of the State in which the installation is located requires higher limits, the Automobile Liability Insurance Policy should provide coverage of at least those limits. County of Clark, a political subdivision of the state of Nevada, and Clark County Regional Flood Control District shall be named as additional insured parties and all policies issued in performance of work under this contract. The Contractor does hereby agree to indemnify, defend, and save harmless Clark County and Regional Flood Control District from loss, damage, liability, costs, or expense to the proportionate extent caused by the Contractor, his employees, agents, or consultants and/or consultants arising out of its performance of this contract, including, but not limited to the negligent acts, errors, omissions, or intentional misconduct of the Contractor, its employees, agents or consultants and/or subconsultants in connection with this contract. Contractor further does hereby agree, as a precaution to the performance of any work under this contract and as a precaution to any obligation of the Clark County to make any payment under this contract, to provide Clark County with a certificate and/or a certificate issued by the State Industrial Insurance System (SIIS) in accordance with Nevada Revised Statute 616.280. Contractor agrees to maintain required workers compensation throughout the entire term of the contract. If Contractor does not maintain coverage throughout the entire term of the contract, Contractor agrees that Owner may, at any time the coverage is not maintained by Contractor, order the Contractor to stop work, assess liquidated damages as defined herein, suspend the contract, or terminate the contract. For each six month period this contract is in effect, Contractor agrees, prior to the expiration of the six month period, make

another written request to SIIS for the provisions of a certificate and notice of lapse in or nonpayment of coverage. If Contractor does not make the request or does not provide the certificate before the expiration of the six month period, Contractor agrees that owner may order the Contractor to stop work, suspend the contract or terminate the contract.

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SECTION 01250

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 GENERAL

The contract price and payment shall constitute full compensation as stated in the Contract Clause, CONTRACT PRICES - BIDDING SCHEDULES, for completion of the work. No separate payment will be made for any material or work covered in this specification, but not specifically mentioned as part of a bid items, and all costs into which the work pertains or considered incidental to all bid items. As stated in Contract Clause, SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, the word "provided" shall be understood to mean "furnished and installed" when used in this section or elsewhere in the technical sections.

1.2 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 maintaining the work area in a dry condition.

1.3 CLEAR SITE AND REMOVE OBSTRUCTIONS

Payment shall include all costs for clearing, removal, replacement, and restoration work (except work by others) including all existing obstructions within the construction work area. Except as otherwise specified, payment for clearing and removal work includes applicable earthwork; grubbing; filling holes; removal of materials for salvage; removal of existing surface trash and debris and removal of trees and vegetation from within areas to be excavated and areas to receive fills, structures and stockpiles; protection, replacement or restoration of existing structures and features indicated and disposal of all materials. Payment for Clear Site and Remove Obstructions will be made at the applicable contract price, which payment shall constitute full compensation for clearing, obstruction removal, and protection work, complete.

1.4 CONSTRUCTION WATER

Payment for Construction Water will be made at the applicable contract price, which payment shall constitute full compensation for furnishing construction water for the work including cost of permits, cost of water taps or hydrants, applicable earthwork, design and installation of temporary water pipeline and storage tanks, maintaining and repairing the water supply system and all incidentals, complete.

1.5 EXCAVATION

1.5.1 Measurement

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 be made between the excavation lines and grades indicated on the drawings or staked in the field and the ground surfaces as indicated by the above mentioned survey. The actual slopes as excavated may be greater or less than those indicated or staked, depending on the materials excavated and methods used in performing the work, but such alterations

shall not change the measurement for payment from the original lines as specified herein. The quantity of directed excavation necessary for the removal of unsuitable foundation material as specified shall be included in the measurement of the excavation where the unsuitable soils are encountered. Quantities will be computed in cubic meters by the average end area method and the planimeter will be considered a precise instrument for measurement of plotted cross sections. The Contractor has the option of using computer methods for quantity estimations, but all computer methods of quantity estimations shall be approved by the Contracting Officer. All excavation outside of excavation lines shown on the drawings will be considered as being for convenience of the Contractor.

1.5.2 Payment

Payment for Excavation will be made at the applicable contract price, which payment shall constitute full compensation for excavation for the dam and **spillway foundation, inspection trench, basin, slope stabilizer, toes, and other areas as indicated on the drawings including** shoring, blasting, rock excavation, and cemented alluvium excavation; shaping and trimming of areas to receive riprap, concrete and roller compacted concrete; loading, stockpiling, crushing, processing, hauling, and dumping suitable materials for fills for the dam embankment, basin, toes and backfill for structures and pipes; loading, stockpiling, hauling, placing and grading excess satisfactory excavated materials in the graded basin area as shown on the drawings or as directed; and any costs associated with offsite disposal of unsatisfactory excavated materials, complete. Payment will not be included for excavation (including shoring) outside the excavation limits indicated on the drawings or staked in the field, and other earthwork requirements for which separate payments are provided.

1.5.2.1 Subgrade Preparation

No separate payment will be made for subgrade preparation and all costs in connection therewith shall be included in the contract prices for the items to which the work applies.

1.5.2.2 Unsatisfactory Soils

No separate payment will be made for the excavation, hauling, and disposal of unsatisfactory soils. When such excavation is directed, payment therefore will be included in the applicable contract price for the items of work under which the unsuitable soils are encountered. When there is no applicable contract item an adjustment will be made.

1.5.2.3 Excavation for Structures

No separate payment will be made for excavation for structures. All costs therefore shall be included in the applicable contract item to which the work applies.

1.5.2.4 Trenches

No separate payment will be made for excavation of utility and pipe trenches. All costs therefore shall be included in the applicable contract prices for the items to which the work applies.

1.5.2.5 Shoring

When shoring is indicated or directed for items for which separate payment

is made, payment will be included in the applicable contract price for the items of work under which the shoring is placed.

1.6 FILLS

1.6.1 Measurement

Measurement 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 or staked in the field. Quantities will be computed in cubic meters by the average end area method and the planimeter will be considered a precise instrument for measuring plotted cross sections. The Contractor has the option of using computer methods of quantity estimation, but all computer methods of quantity estimation shall be approved by the Contracting Officer.

1.6.2 Payment

1.6.2.1 Compacted Fill, Dam Embankment

Payment for Compacted Fill, Dam Embankment will be made at the applicable contract price, which payment shall constitute full compensation for shaping, grading, and compacting **the fill for the dam embankment and turnarounds, complete.**

1.6.2.2 Compacted Fill, Basin

Payment for Compacted Fill, Basin will be made at the applicable contract price, which payment shall constitute full compensation for shaping, grading and compacting the fills, complete.

1.6.2.3 Backfill, Toe

Payment for Backfill, Toe, will be made at the applicable contract price, which payment shall constitute full compensation for backfill for the dam riprap toe-downs and backfill for the slope stabilizer toe-down including shaping, grading, and compacting the backfills, complete.

1.6.2.4 Fill for Structures

No separate payment will be made for fill or backfill about structures or pipes. All such costs shall be included in the applicable contract prices for items to which the work applies.

1.6.2.5 Trenches

No separate payment will be made for backfilling utility or pipe trenches. All costs in connection therewith shall be included in the contract prices for items to which the work applies.

1.6.2.6 Subgrade Preparation

No separate payment will be made for subgrade preparation and all costs in connection therewith shall be included in the contract prices for items to which the work applies.

1.7 FILTER MATERIAL

1.7.1 Measurement

Measurement of Filter Material will be by the cubic meter of filter material placed within the lines and grades indicated on the drawings or as directed.

1.7.2 Payment

Payment for Filter Material will be made at the applicable contract price which payment shall constitute full compensation for furnishing and placing the filter material, complete including subgrade preparation.

1.8 DRAIN MATERIAL

1.8.1 Measurement

Measurement of Drain Material will be by the cubic meter of drain material placed within the lines and grades indicated on the drawings or as directed.

1.8.2 Payment

Payment for Drain Material will be made at the applicable contract price which payment shall constitute full compensation for furnishing and placing the filter material, complete including subgrade preparation.

1.9 SUBDRAINAGE SYSTEM

Payment for Subdrainage System will be made at the applicable contract price, which payment shall constitute full compensation for materials, and installation of the Subdrainage System, complete including applicable **earthwork, drain pipes, filter fabric, concrete encasements and appurtenances, complete.** Payment for subdrainage system shall not include drain material and filter material for which separate payments are provided.

1.10 RIPRAP AND STONE PROTECTION

1.10.1 Measurement

The quantity of Riprap and Stone Protection to be paid for will be the number of metric tonne (1,000 kilograms), determined by scale weights, acceptably placed within the lines and grades shown on the drawings or directed by the Contracting Officer.

1.10.2 Payment

Payment for Riprap and Stone Protection, of the various types will be made at the applicable contract unit prices, per metric tonne (1000 kg), which prices shall constitute full compensation for furnishing and placing the riprap and stone protection, complete. **Payment for riprap and stone protection shall not include stone used for grouted stone items for which separate payments are provided.**

1.11 GROUTED STONE, SLOPE STABILIZER

1.11.1 Measurement

Measurement of Grouted Stone, Slope Stabilizer will be by the cubic meter of grouted stone placed within the lines and grades indicated on the drawings or as directed.

1.11.2 Payment

Payment for Grouted Stone, Slope Stabilizer will be made at the applicable contract price which payment shall constitute full compensation for all materials, equipment and labor for construction of the slope stabilizer grouted stone, including furnishing and placing stone and furnishing, placing and curing grout and all incidentals, complete as shown on the drawings.

1.12 ROLLER-COMPACTED CONCRETE

1.12.1 Measurement

Measurement of Roller-Compacted Concrete will be made on the basis of actual cubic meters of Roller-Compacted Concrete placed within the lines and grades indicated on the drawings.

1.12.2 Payment

Payment for Roller-Compacted Concrete will be at the applicable contract price, which payment shall constitute full compensation for the Roller Compacted Concrete including all materials (except Portland cement and pozzolan for which separate payments is provided), formwork, batching, hauling, placing, compacting, finishing, curing and all equipment and tools to complete the roller compacted concrete in place. Embedded items shall be included in the cost of the roller-compacted concrete except when other payment is specifically provided.

1.13 PORTLAND CEMENT

1.13.1 Measurement

Quantity of Portland Cement to be paid for will be the number of metric tonnes (1,000 kilograms) of Portland cement used for roller compacted concrete 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 weight of Portland cement in kilograms per cubic meter of roller compacted concrete by the number of accepted cubic meters of roller compacted concrete placed within the lines and grades indicated on the drawings and dividing by 1,000.

1.13.2 Payment

Payments for Portland Cement for Roller Compacted Concrete will be made at the applicable contract price, which payment shall constitute full compensation for furnishing the Portland cement ready for use in the work, complete. No payment will be made for Portland cement used for structures for which separate payment is provided.

1.14 POZZOLAN

1.14.1 Measurement

Quantity of Pozzolan to be paid for will be the number of metric tonnes (1,000 kilograms) of pozzolan used for Roller Compacted Concrete. The quantity to be paid for will be determined by multiplying the approved weight of pozzolan in kilograms per cubic meters of roller compacted concrete by the number of accepted cubic meters of roller compacted

concrete placed within the lines and grades indicated on the drawings and dividing by 1,000.

1.14.2 Payment

Payments for Pozzolan for Roller Compacted Concrete will be made at the applicable contact price, which payment shall constitute full compensation for furnishing the pozzolan, complete. No payment will be made for pozzolan used for structures for which separate payment is provided.

1.15 CONCRETE

1.15.1 Measurement

Measurement of Concrete will be made on the basis of the actual volume, in cubic meters, of concrete within the pay lines of the concrete invert slab, concrete walls and concrete top slab of the outlet conduit and the concrete within the pay lines of the ogee weir structure as shown on the drawings. 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 structures. No deductions will be made for rounded or beveled edges or space occupied by metalwork, nor voids or embedded items which are either less than 0.15 cubic meter in volume or one-tenth of square meter in cross section. Concrete placed in items of work other than those specifically mentioned above, and concrete wasted or used for the convenience of the Contractor will not be included in measurement for payment.

1.15.2 Payment

Payment for the Concrete items will be made at the applicable contract prices for the various items of the bidding schedule, which payments shall constitute full compensation for labor, materials (except reinforcing steel for which separate payment is provided), forming, placing, finishing, curing, and for all equipment and tools to complete the concrete work. Embedded items including fence and pipe railing sleeves shall be included in the 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.

1.15.2.1 Concrete Walls

Payment for Concrete Walls will be made at the applicable contract price, which payment shall constitute full compensation for all concrete placed in the vertical walls of the outlet conduit above the invert slab or the starter walls, if used, complete.

1.15.2.2 Concrete Invert Slab

Payment for Concrete, Invert Slab will be made at the applicable contract price, which payment shall constitute full compensation for all concrete placed for the invert slab of the outlet conduit, including keys, and starter walls, if used, complete.

1.15.2.3 Concrete Top Slab

Payment for Concrete Top Slab will be made at the applicable contract price, which payment shall constitute full compensation for all concrete placed for the top slab of the outlet conduit, complete.

1.16 OGEE WEIR STRUCTURE

Payment for Ogee Weir Structure will be made at the applicable contract price, which payment shall constitute full compensation for all concrete placed for the ogee weir including applicable foundation preparation, and appurtenances as shown on the drawing.

1.17 STEEL REINFORCEMENT

1.17.1 Measurement

Measurement of Steel Reinforcement in metric tonnes (1000 kilograms) is limited to reinforcement in concrete structures paid for on a cubic meters basis and will be computed from the lengths of bars actually placed in the completed work in accordance with the plans and specifications, approved bar schedules, or as directed. The measured lengths will be converted to weights for the bar numbers listed by the unit weights per linear foot contained in ASTI A 615. Steel in laps indicated on the drawings, in the specifications, or required by the Contracting Officer will be included in measurement for payment. 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 or spacers. All costs for furnishing and installing supports and spacers shall be included in the various structures requiring the reinforcement.

1.17.2 Payment

Payment for Steel Reinforcement will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and installing steel reinforcement, complete. No payment will be made for steel reinforcement which is placed in structures for which payment is made on a lump sum basis.

1.18 DAM INTAKE STRUCTURE

Payment for Dam Intake Structure will be made at the applicable contract price, which payment shall constitute full compensation for materials and installation of dam intake structure, complete, including applicable earthwork, reinforced concrete and concrete embedded items, pipe trash rack, steel deck grating, steel flow constriction structure and all appurtenances as shown on the drawings.

1.19 DAM OUTLET STRUCTURE

Payment for Dam Outlet Structure will be made at the applicable contract price, which payment shall constitute full compensation for materials and installation of the dam outlet structure as shown on the drawings, complete, including applicable earthwork, reinforced concrete and concrete embedded items, and all appurtenances except pipe safety railing for which separate payment is made.

1.20 BASIN BYPASS CONDUIT INLET STRUCTURE

Payment for Basin Bypass Conduit Inlet Structure will be made at the applicable contract price, which payment shall constitute full compensation for materials and installation of the basin bypass conduit intake structure as shown on the drawings, complete, including applicable earthwork, reinforced concrete and concrete embedded items, and all appurtenances except pipe safety railing for which separate payment is provided.

1.21 BASIN BYPASS CONDUIT OUTLET STRUCTURE

Payment for Basin Bypass Conduit Outlet Structure will be made at the applicable contract price, which payment shall constitute full compensation for materials and installation of the basin bypass conduit outlet structure as shown on the drawings, complete, including applicable earthwork, reinforced concrete and concrete embedded items, and all appurtenances except pipe safety railing for which separate payment is provided.

1.22 BASIN BYPASS CONDUIT

Payment for Basin Bypass Conduit will be made at the applicable contract price, which payment shall constitute full compensation for all materials, equipment and labor for construction of the basin bypass conduit, complete, including all excavation, foundation preparations, concrete, steel reinforcing, manhole structures, trench backfill, and all appurtenances as shown on the drawings. No payment will be made under this item for compacted fill, dam embankment and compacted fill, basin which is placed around the bypass conduit and for which separate payment is provided.

1.23 SPILLWAY ACCESS ROADS

Payment for Spillway Access Road will be made at the applicable contract price, which payment shall constitute full compensation for materials and installation of Spillway Access Road No.1 and Spillway Access Road No.2 as shown on the drawings, complete, including applicable earthwork, reinforced concrete and concrete embedded items, and all appurtenances except pipe safety railing for which separate payment is provided.

1.24 CONCRETE ENCASEMENT, GAS LINE

Payment for Concrete Encasement, Gas Line will be made at the applicable contract price, which payment shall constitute full compensation for materials and construction of the concrete encasement for the gas line, complete, including excavation, pipe supports and protection, reinforced concrete, and backfill as shown on the drawings.

1.25 GROUTED STONE COLLECTOR CHANNEL

Payment for Grouted Stone Collector Channel will be made at the applicable contract price, which payment shall constitute full compensation for materials and construction of the grouted stone collector channel, complete, including all excavation, furnishing and placing riprap, furnishing and placing grout, curing grout and back filling as shown on the drawings.

1.26 ACCESS ROADS

Payment for Access Roads will be made at the applicable contract price, which payment shall constitute full compensation for construction of Access Road No.1 and Access Road No.2, complete, including Traffic control for Blue Diamond Road, applicable earthwork and subgrade preparations, grading for drainage upstream and downstream of access road No.2 along Blue Diamond Road, furnishing and placing aggregate base course, furnishing and placing Asphaltic Concrete Pavement and furnishing and installing CMP culvert pipes, and all appurtenances as shown on the drawings.

1.27 AGGREGATE BASE COURSE

1.27.1 Measurement

Measurement of Aggregate Base Course will be by the metric tonne (1,000 kilograms) of aggregate base course placed within the lines and grades indicated on the drawings.

1.27.2 Payment

Payment for Aggregate Base Course will be made at the applicable contract price which payment shall constitute full compensation for furnishing and placing aggregate base course for the turnaround surfacing, top of dam surfacing and as directed, complete including subgrade preparation. No payment will be made under this item for aggregate base course used for access roads for which separate payment is provided.

1.28 ACCESS GATES

1.28.1 Measurement

Measurement of Access Gates will be the number of Access Gates acceptably installed.

1.28.2 Payment

Payment for Access Gates will be made at the applicable contract price, which payment shall constitute full compensation for fabricating and installing the access gate, complete, including applicable earthwork and concrete as shown on the drawings.

1.29 TEMPORARY TORTOISE FENCING

1.29.1 Measurement

Measurement of Temporary Tortoise Fencing will be by the linear meters of temporary tortoise fencing constructed as shown on the drawings or as directed by the Contracting Officer.

1.29.2 Payment

Payment for Temporary Tortoise Fencing will be made at the applicable contract price, which payment shall constitute full compensation for temporary tortoise fencing, including applicable earthwork, posts, steel mesh fabric, tension wire, tie wire, fabrication and installation of tortoise proof gates, concrete, and all incidentals, complete. Payment for Temporary Tortoise Fencing will also include compensation for maintaining and repairing the tortoise fencing during construction and the removal and disposal of the temporary tortoise fencing and gates at the end of construction of the Blue Diamond Detention Basin.

1.30 CHAIN LINK FENCING

1.30.1 Measurement.

Measurement of Chain Link Fencing will be by the linear meters of chain link fencing constructed as shown on the drawings or as directed.

1.30.2 Payment

Payment for Chain Link Fencing will be made at the applicable contract price, which payment shall constitute full compensation for chain link fencing including applicable earthwork, concrete, boring of post holes in roller compacted concrete, sleeves, posts, fence fabric, tension wire, grout or dry pack, and all incidentals, complete.

1.31 PIPE SAFETY RAILING

1.31.1 Measurement

Measurement of Pipe Safety Railing will be by the linear meter of pipe safety railing constructed as shown on the drawings or as directed.

1.31.2 Payment

Payment for Pipe Safety Railing will be made at the applicable contract price, which payment shall constitute full compensation for fabricating and installing pipe safety railing, including pipe railing and post, grout or dry pack, and all incidentals, complete. No payment will be made for sleeves for pipe railing installed on concrete structures under this item; price of sleeves shall be included in the individual concrete items.

1.32 GUARD RAIL

1.32.1 Measurement

Measurement of Guard Rail will be by the linear meter of guard rail constructed as shown on the drawings or as directed.

1.32.2 Payment

Payment for Guard Rails will be made at the applicable contract price, which payment shall constitute full compensation for the guard rails, complete including earthwork, posts, blocks, steel W-beams and all incidentals.

1.33 DETENTION BASIN HYDROLOGIC INSTRUMENTATION SYSTEM

Payment for the Detention Basin Hydrologic Instrumentation System will be made at the applicable contract price, which payment constitute full compensation for materials, and installation of the Detention Basin Hydrologic Instrumentation System including applicable earthwork, reinforced concrete vault, metal frame and cover, wood shelving, pipe supports, pull **boxes, grout, steel conduits, pull strings, sensor protection box, drain pipes, CMU block walls and footings, enclosure gate and all appurtenances, complete.**

1.34 DETENTION BASIN DEPTH GAGES

Payment for Detention Basin Depth Gages will be made at the applicable contract price which payment shall constitute full compensation for installing the depth gages, complete, including applicable earthwork, reinforced concrete, and placing numerical markings as shown on the drawing.

1.35 SEDIMENT RANGE MONUMENTS & SEDIMENT STAFF GAGES

Payment for Sediment Range Monuments & Sediment Staff Gages will be made at applicable contract price, which payment shall constitute full compensation for fabricating and installing the sediment monuments and staff gages,

including applicable earthwork, pipes and concrete, complete. Payment for sediment range monuments & sediment staff gages will also include compensation for fabricating, installing and painting metal spillway staff gages (2 each) at the top of spillway.

1.36 SOIL STABILIZER

1.36.1 Measurement

Measurement of Soil Stabilizer will be made on the basis of the actual area in hectares of exposed excavation and fill surfaces in the construction areas treated with soil stabilizer as indicated or directed..

1.36.2 Payment

Payment for Soil Stabilizer will be at the applicable contract price, which payment shall constitute full compensation for the soil stabilizer including furnishing materials, processing, hauling, and placing, complete in place.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION					CONTRACTOR										SPECIFICATION SECTION											
BLUE DIAMOND DETENTION BASIN															01200											
ACTIVITY NO a.	TRANSMITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL										CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOVERNMENT ACTION		REMARKS aa.				
					DRAWINGS	INSTRUMENTS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	MANUALS	INFORMATION	GOVERNMENT	REVIEWER	DATE	DATE	DATE	DATE						
					f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.	s.	t.	u.	v.	w.	x.	y.	z.	
			3.9.6.4	Access and Haul Roads	X											X										
			3.13	Heavy Equipment	X											X										
			3.16.3	Storm Water Pollution Prevention Plan	X										X											
			3.16.3	Notice of Intent	X										X											
			3.19.1	As-built Drawings		X										X										

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CONTRACT NO.

TITLE AND LOCATION					CONTRACTOR										SPECIFICATION SECTION											
BLUE DIAMOND DETENTION BASIN															02741											
ACTIVITY NO a.	TRANSMITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL										CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOVERNMENT ACTION		REMARKS aa.				
					DRAWINGS	INSTRUMENTS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAAMPLES	RECORDS	MANUALS	INFORMATION	GOVERNMENT	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE		SUBMIT TO GOVERNMENT	CODE	DATE	
					f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.	s.	t.	u.	v.	w.	x.	y.	z.	
			1.3	Job Mix Formula	X											X										
			1.3	Physical Properties of Asphalt						X						X										
				Concrete Mix																						
			1.3	Asphalt Cement							X					X										
			3.4	Bituminous Coating							X					X										

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CONTRACT NO.

TITLE AND LOCATION										CONTRACTOR		SPECIFICATION SECTION														
BLUE DIAMOND DETENTION BASIN												03301														
ACTIVITY NO. a.	TRANSMITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL										CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOVERNMENT ACTION		REMARKS aa.				
					DRAWINGS	INSTRUMENTS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	MANUALS	INFORMATION	GOVERNMENT	REVIEWER	DATE	APPROVAL NEEDED BY	MATERIAL NEEDED BY	DATE	SUBMIT TO GOVERNMENT		DATE			
					f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.	s.	t.	u.	v.	w.	x.	y.	z.	
			2.2	Concrete Mixture Proportioning	X										X											
			3.1.3	Concrete Mixers	X										X											
			3.1.4	Conveying Equipment	X										X											
			3.1.1	Placing Equipment	X										X											
			3.7.1	Testing Technicians				X							X											
			1.2	Concrete Construction Inspector				X							X											
			3.2.4	Construction Joint Treatment				X								X										
			3.5	Curing and Protection				X							X											
			3.3.4	Cold-Weather Placing				X							X											
			3.3.5	Hot-Weather Placing				X							X											
			1.2	Aggregate Quality					X						X											
			1.2	Uniformity of Concrete Mixing					X						X											
			3.7	Tests and Inspections					X						X											
			2.1.1	Cementitious Materials						X					X											
			1.2	Other Chemical Admixtures						X					X											
			2.1.4.2	Membrane-Forming Curing Compound						X					X											
			1.2	Epoxy Resin						X					X											
			2.1.6	Latex Bonding Compound						X					X											
			2.1.8	Non-shrink Grout						X					X											

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CONTRACT NO.

TITLE AND LOCATION					CONTRACTOR											SPECIFICATION SECTION										
BLUE DIAMOND DETENTION BASIN																03360										
ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL											CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOVERNMENT ACTION		REMARKS aa.			
					DRAWINGS	INSTRUMENTS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	MANUALS	INFORMATION	GOVERNMENT	REVIEWER	DATE	APPROVAL NEEDED BY	MATERIAL NEEDED BY	DATE	SUBMIT TO GOVERNMENT	DATE				
					f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.	s.	t.	u.	v.	w.	x.	y.	z.	
			3.2.2.3	Batch Plant	X											X										
			3.2.3	Mixers	X											X										
			3.2.5	Transporting and Conveying Equipment	X										X											
			3.2.6	Spreading and Remixing Equipment	X										X											
			3.2.7	Compaction Equipment	X											X										
			1.5	Aggregate and Concrete Production					X							X										
			1.5	Joint Cleanup and Waste Disposal					X							X										
			1.5	Curing					X							X										
			3.9	Vertical Facings					X						X											

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SECTION 01440

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740 (1994a) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

ASTM E 329 (1993b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause entitled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence.

3.2 QUALITY CONTROL PLAN

3.2.1 General

The Contractor shall furnish for review by the Government, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause entitled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. The Government will consider an interim plan for the first 15 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until

acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.2 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters will also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01300 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities will be approved by the Contracting Officer.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. It could be identified by different trades or disciplines, or it could be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 10 calendar days prior to the Coordination Meeting.

During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 General

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within his organization at the site of the work who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 3 years construction experience on construction similar to this contract. This CQC System Manager shall be on the site at all times during construction and will be employed by the prime Contractor. The CQC System Manager shall be separate from the Production Manager or supervisory staff.

An alternate for the CQC System Manager will be identified in the plan to serve in the event of the System Manager's absence. The requirements for

the alternate will be the same as for the designated CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: civil, structural, and materials technician. These individuals may be directly employed by the prime Contractor or be contracted for from outside sources on a contingent basis. The individuals shall be responsible to the CQC System Manager and shall not be an employee or representative of a subcontractor performing work elsewhere under this contract. The Individuals shall have the necessary education and/or experience in accordance with the experience matrix listed herein.

Experience Matrix

Area	Qualifications
a. Civil	Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 years related experience
b. Structural	Graduate Structural Engineer with 2 years experience or person with 5 years related experience
c. Concrete, Pavements and Soils	Materials Technician with 2 years experience for the appropriate areas and meet the qualifications specified in Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE

3.4.4 Additional Requirement

In addition to the above experience and education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management For Contractors".

3.4.5 Organizational Changes

The Contractor shall maintain his CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS

Submittals shall be made as specified in Section 01300 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable

feature of work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

- a. A review of each paragraph of applicable specifications.
- b. A review of the contract drawings.
- c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.
- d. Review of provisions that have been made to provide required control inspection and testing.
- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- g. A review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
- j. Discussion of the initial control phase.
- k. The Government shall be notified at least 72 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

- a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.
- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The Government shall be notified at least 24 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
- g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon or conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if the quality of on-going work is unacceptable, if there are changes in the applicable CQC staff, onsite production supervision or work crew, if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.

- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Results of all tests taken, both passing and failing tests, will be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility will be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of \$675.00 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 On-Site Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to sampling and transportation of samples or materials will be born by the Contractor. Samples or materials for test verification and acceptance shall be delivered to a commercial materials testing laboratory selected and approved by the Government.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Special Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the CQC System Manager shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the

approved drawings and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished the Contractor shall notify the Government that the facility is ready for the Government "Pre-Final" inspection.

3.8.2 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected and so notify the Government so that a "Final" inspection with the customer can be scheduled. Any items noted on the "Pre-Final" inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time slated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, his superintendent or other primary management person and the contracting Officer's representative will be in attendance at this inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice will be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and must include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause entitled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

- a. Contractor/subcontractor and their area of responsibility.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

- d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals reviewed, with contract reference, by whom, and action taken.
- g. Off-site surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and/or specifications.
- j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 72 hours after the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every seven days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 CONTRACTOR PROJECT MANAGEMENT SYSTEM.

3.10.1 General

- a. The Contractor Project Management System is included to assure adequate planning and execution of the work, to assist the Contracting Officer on appraising the reasonableness of the schedule, to evaluate progress of the work, and make progress payments, and to make decisions relative to time and/or cost adjustments which may result from changes in the work.
- b. The management system is to be based on a computerized Network Analysis (Critical Path Method) operated by on-site personnel at terminals located in the Contractor's on-site office. On-site management shall be capable of using the system to address all project activities and resources on a real time inactive basis and be capable of rapidly evaluating alternative scenarios which will optimize project management. Evidence of technical expertise of on-site personnel with the proposed computerized Network Analysis System shall be submitted for Contracting Officer's approval prior to on-site work. The

Contractor's Scheduling system shall be capable of downloading fully and completely to the Corps of Engineers Standard Data Exchange Format.

c. The Contractor shall resource load all work activities. As a minimum, resource loading shall identify equipment, management, skilled and unskilled labor requirements. The Contractor may at his option decide on greater detail for his own purposes, but if this option is elected, the system must be able to consolidate resources into the above defined categories for use by the Contracting Officer.

d. The Contractor shall incorporate any and all milestone and contract required events which may be specified elsewhere within these specifications. Should milestone events be not specifically identified by the Government within these specifications, the Contractor shall identify at least five percent of the network activities and designate them as milestone activities.

e. The Contractor Project Management System is to be staffed and prepared pursuant of CONTRACT CLAUSE: SCHEDULE FOR CONSTRUCTION CONTRACTS, and CONTRACT CLAUSE: SUPERINTENDENT BY THE CONTRACTOR. In preparing this system the Contractor assume responsibility for conformance with contract requirements, planning, sequencing of work, and determining the construction means and methods.

3.10.2 Submission and Approval

Submission and approval of the system shall be as follows:

a. The complete network system consisting of the detailed network mathematical analysis (including on-site manpower loading schedule) and network logic diagrams shall be submitted for approval within thirty (30) calendar days after receipt of Notice to Proceed. This shall be submitted in assembled hardcopy paper format and software computer disk to allow restoring on Government Computers.

b. The Contractor shall participate in a review and evaluation of the proposed network logic diagrams and mathematical analysis by the Contracting Officer. Any revisions necessary as a result of this review shall be resubmitted for approval of the Contracting Officer within three (3) calendar days after the conference. The approved schedule shall be used by the Contractor for planning, organizing and directing the work, reporting progress, and requesting payment for work accomplished.

3.10.3 Network Modifications.

a. In those cases where the contract performance is delayed due to causes beyond the control of the Contractor, and a time extension may be allowable under one or more of the CONTRACT CLAUSES: CHANGES, or DIFFERING SITE CONDITIONS, or DEFAULT (FIXED PRICE CONSTRUCTION), or SUSPENSION OF WORK, or other applicable clauses, as a proposal in such format as to identify the specific subnet diagram and activities affected.

b. Change order proposals shall include description or listing of all proposed changes to the network, by activity, and demonstrate the effect on the contract required completion date. A complete list of activities changed and subnet of activities affected by the change shall be submitted.

c. Float or slack is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the NAS schedule. Float of slack is not time for the exclusive use or benefit of either the Government or the Contractor. Extensions of time for performance may be granted to the extent that equitable time adjustment for the activities affected exceed the total float or where otherwise justified, effect on contract completion can be shown. The contract completion date is fixed, and will be amended only the modifications which include time and are signed by the Contracting Officer.

d. Rapid resolution of change orders and the granting of other time extensions where authorized by the Contracting Officer is a critical part of the overall management system. Implementation of all justified activity and logic changes shall be made and reflected on the next monthly update after approval of the Contracting Officer.

e. If, in the opinion of the Contracting Officer, the current schedule no longer accurately reflects the Contractor's real plan for accomplishing the work, or no longer reflects a viable way of finishing the work on schedule, the Contractor shall be directed to revise the schedule and submit it for approval within seven (7) calendar days of direction.

3.10.4 Logic Diagrams and Reports.

3.10.4.1 Logic diagrams.

a. Logic diagrams shall show the order and interdependency of activities and sequence in which the work is to be accomplished as planned by the Contractor.

b. Detailed networks need not be timed scaled, but drafted to have a continuous flow from left to right, showing how the start of a given activity is dependent on the completion of preceding activities, and how its completion restricts the start of the following activities.

c. An assembled logic diagram of the complete project shall be submitted with the initial NAS, showing each activity identifying numbers, duration, description, with the critical path easily identified. Updated assembled diagrams will be provided as required by logic changes (but not more frequently than the monthly update). The logic diagram shall be plotted on architectural size E paper.

d. In addition to the detailed schedule, a summary schedule shall be developed by the Contractor. The summary schedule shall consist of minimum thirty (30) activities and be updated monthly.

3.10.4.2 Reports.

a. After the network approval, the Contractor shall review and evaluate the actual progress with the Contracting Officer's representative on a weekly basis, and submit any updated weekly reports three (3) workdays after the meeting.

b. Three (3) weekly reports, selected from specific items of the menu will be required, for specified time window of the project (such as the next two weeks). These reports must be flexible in format, allowing

generation of reports relating specifically to critical work areas, or areas of particular interest. The Government will identify the subject of the requested reports for the following week at a weekly review meeting. All activities involving the Government that affect progress will be coded to allow to separate report.

c. Monthly update reports will be submitted at midmonth showing status and actual start and finish dates of project activities, and will be capable of comparing the current status with the approved base schedule. Each monthly update report shall be uniquely identified and shall be stored on the Contractor's computer until the final pay estimate is processed. The content of the monthly update shall be flexible to show items listed in the menu. The midmonth report shall be used for partial payments.

d. A meeting shall be held three (3) workdays before the delivery of the midmonth report to discuss all input data. If the Contractor desires to make changes in his method of operation and scheduling, he shall clearly present the proposed changes.

e. A narrative report shall be submitted with midmonth report indicating current and anticipated problems, delaying factors, and conditions that are impacting the Contractor's work effort. An analysis showing the reasons for the delay/gain and their impact upon the current schedule shall be included. When it is apparent the scheduled milestone(s) and completion date(s) will not be met, the Contractor shall propose specific methods he intends to implement to bring the project back on schedule at not cost to the Government. Such measure may include but are not limited to:

- (1) Increasing construction manpower in such quantities and crafts as will substantially eliminate the backlog of work effort.
- (2) Increasing the number of working hours per shift; shifts per workday; workdays per week; the amount of construction equipment; or any combination thereof.
- (3) Rescheduling of activities to achieve maximum practical concurrence of work shifts.

f. The Contractor shall implement such procedures as may be necessary for the active participation by his subcontractors in preparing and updating the schedule. Subcontractors shall be provided with schedules which identify the interfaces of their work with the work of others. At minimum, the Contractor shall provide bar graphs to each major subcontractor showing activity times with plots on an Early Start basis. Copies of these schedules shall also be provided to the Contracting Officer. The relationship between subcontractor and interdependency or work shall be managed by the Contractor. When these interdependencies are violated or impaired, the Contractor shall identify the problem, resolve it, and provide the information to the Contracting Officer as part of the monthly report.

3.10.5 Forecasting Expenditures

The contracting Officer will provide a spreadsheet to the Contractor showing the different funding categories and their respective categories for each bid item for the total contract amount (see attached FIGURE 1 at end of this Section). Each pay period the Contractor shall forecast his

expenditures for the following three (3) pay periods, indicating funding requirements for each category. The updated worksheet (see FIGURE 2) shall be submitted with each partial pay estimate (e.g. submittal for the period 15 DEC to 15 JAN will include a forecast or expenditures for the period 15 JAN to 15 APR). Forecasting of expenditures is needed to assure sufficient funding for future progress payments.

3.10.6 Payment Requests.

a. The monthly update report shall be used as a basis for the monthly partial pay estimate. The report will state the cost, actual percent complete, and current value of partially completed or completed work. Subtotals from subnets representing separate areas of construction will be given, along with a grand dollar value of work completed for the project.

b. The first payment shall not be made until the Network Analysis Schedule has been approved by the Contracting Officer. If, in the judgment of the Contracting Officer, The Contractor fails or refuses to provide an approved schedule and other progress or input data specified, the Contractor shall be deemed not to have provided the required information upon which progress payments may be made, and no payment request will be honored.

c. Activities submitted for payment shall be based on the approved network activities and monetary amount. No payment shall be made for activities conducted in deviation of the approved logic.

d. Payment for activities conducted when previously dependent activities have not been completed or accepted due to quality defects shall be restricted at the discretion of the Contracting Officer.

3.11 IMPLEMENTATION OF GOVERNMENT RESIDENT MANAGEMENT SYSTEM.

The Contractor shall utilize a Government furnished CQC Programming Module (A computerized executable file which is DOS based and operates on a minimum of 80386 IBM compatible computers). The Module includes a Daily CQC Reporting System form which must also be used. This form may be in addition to other Contractor desired reporting forms. However, all other such reporting forms shall be consolidated into this one Government specified Daily CQC Report Form. The Contractor will also be required to complete Government-furnished Module elements which includes, but is not limited to, Prime Contractor staffing; letter codes; planned cumulative progress earnings; subcontractor information showing trade, name, address, point-of-contact, and insurance expiration dates; definable features of work; pay activity and activity information; required Quality Control tests tied to individual activities; planned User Schooling tied to specific specification paragraphs and contractor activities; Installed Property Listing, Transfer Property Listing and submittal information relating to specification section, description, activity number, review period and expected procurement period. The sum of all activity values shall equal the contract amount, and all Bid Items, Options and Additives shall be separately identified, in accordance with the "Bidding Schedule". Bid Items may include multiple Activities, but Activities may only be assigned to one such Bid Item. This Module shall be completed to the satisfaction of the Contracting Officer prior to any contract payment (except for Bonds, Insurance and/or Mobilization, as approved by the Contraction Officer) and shall be updated as required.

3.11.1 Quality Assurance Comments

During the course of the contract, the Contractor will receive various Quality Assurance comments from the Government that will reflect corrections needed to Contractor activities or reflect outstanding or future items needing the attention of the Contractor. The Contractor will acknowledge receipt of these comments by specific number reference on his Daily CQC Report and will also reflect on his Daily CQC Report when these items are specifically completed or corrected to permit Government verification..

3.11.2 Contractor's Schedule System

The Contractor's schedule system shall include, as specific and separate activities, all Preparatory Phase Meetings (inspections); all O&M Manuals; and all Test Plans of Electrical and Mechanical Equipment or Systems that require validation testing or instructions to Government Representatives.

3.12 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the worksite, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

**FIGURE 1
SAMPLE SPREAD SHEET**

**BLUE DIAMOND DETENTION BASIN
CLARK COUNTY, NEVADA**

ITEM #	DESCRIPTION	TOTAL \$	FED		O.C.		S.B.C.		R.C.	
		AMOUNT	BE069	%	NON-FED FW090	%	NON-FED FW093	%	NON-FED FW092	
1.	MOB & DEMOB	\$1,000,000.00	\$941,797.00	94.1797	\$51,044.00	0.4092	\$4,092.00	0.3067	\$3,067.00	
2.	DIV & CONTROL WA	\$2,000,000.00	\$1,883,594.00	94.1797	\$102,088.00	0.4092	\$8,184.00	0.3067	\$6,134.00	
3.	CLEAR SITE	\$1,000,000.00	\$941,797.00	94.1797	\$51,044.00	0.4092	\$4,092.00	0.3067	\$3,067.00	
4.	SCALING	\$2,000,000.00	\$1,883,594.00	94.1797	\$102,088.00	0.4092	\$8,184.00	0.3067	\$6,134.00	
5.	EXC., FOUND ALLU	\$1,000,000.00	\$1,883,594.00	94.1797	\$102,088.00	0.4092	\$20,460.00	0.3067	\$15,335.00	
6.	EXE., FOUND ROCK	\$5,000,000.00	\$4,708,985.00	94.1797	\$255,220.00	0.4092	\$20,460.00	0.3067	\$15,335.00	
					NON-FED VW090	%	NON-FED VW093	%	NON-FED VW092	
7.	PROTECT-IN-PLACE	\$1,000,000.00		87.699	\$876,999.00	7.0306	\$70,306.00	5.2695	\$52,295.00	
8.	RELOCATE NEW PO	\$2,000,000.00		87.699	\$1,753,998.00	7.0306	\$140,612.00	5.2695	\$105,390.00	

**FIGURE 2
SAMPLE WORKSHEET**

**BLUE DIAMOND DETENTION BASIN
CLARK COUNTY, NEVADA**

EXPENDITURES FORCAST

	<u>JAN 15 –FEB 15</u>	<u>FEB 15-MAR 15</u>	<u>MAR 15-APR 15</u>
BE069	\$5,660,000.00	\$7,540,000.00	\$9,420,000.00
FW090	\$310,000.00	\$410,000.00	\$520,000.00
FW093	\$30,000.00	\$40,000.00	\$50,000.00
FW092	\$20,000.00	\$30,000.00	\$40,000.00
VW090	\$62,000.00	\$53,000.00	\$44,000.00
VW093	\$5,000.00	\$5,000.00	\$4,000.00
VW092	\$4,000.00	\$4,000.00	\$3,000.00

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SECTION 02241

AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 127	(1988; R 1993) Specific Gravity and Absorption of Coarse Aggregate
ASTM C 128	(1993) Specific Gravity and Absorption of Fine Aggregate
ASTM C 131	(1989) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1995a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(1987; R 1992) Sampling Aggregates
ASTM D 422	(1963; R 1990) Particle-Size Analysis of Soils
ASTM D 1556	(1990) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/cu.m.)
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 4318	(1993) Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM E 11	(1995) Wire-Cloth Sieves for Testing Purposes

1.2 DEFINITIONS

1.2.1 Aggregate Base

Aggregate base as used herein is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated

hereinafter as percent laboratory maximum density.

1.3 GENERAL

The work specified herein consists of the construction of an aggregate base course. The work shall be performed in accordance with this specification and shall conform to the lines, grades, notes and typical sections shown in the plans. Sources of all materials shall be selected well in advance of the time that materials will be required in the work.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Plant, Equipment, Machines, and Tools; FIO.

List of proposed equipment to be used in performance of construction work including descriptive data.

SD-09 Reports

Sampling and Testing; FIO. Field Density; FIO.

Calibration curves and related test results prior to using the device or equipment being calibrated. Copies of field test results within 24 hours after the tests are performed. Certified copies of test results for approval not less than 30 days before material is required for the work.

SD-18 Records

Waybills and Delivery Tickets; FIO. Coarse Aggregate; FIO.

Copies of waybills and delivery tickets during the progress of the work. Certified waybills and delivery tickets for all materials actually used. A notification stating which type of coarse aggregate is to be used.

1.5 WAYBILLS AND DELIVERY TICKETS

Copies of waybills and delivery tickets shall be submitted during the progress of the work. Before the final payment is allowed, waybills and certified delivery tickets shall be furnished for all aggregates actually used in the construction.

1.6 WEATHER LIMITATIONS

Base shall not be constructed when the atmospheric temperature is less than 2 degrees C. Base shall not be constructed on subgrades that are frozen or contain frost. If the temperature falls below 2 degrees C, completed areas shall be protected against any detrimental effects of freezing.

1.7 PLANT, EQUIPMENT, MACHINES, AND TOOLS

1.7.1 General Requirements

Plant, equipment, machines, and tools used in the work shall be subject to approval and shall be maintained in satisfactory working condition at all times. Other compacting equipment may be used in lieu of that specified, where it can be demonstrated that the results are equivalent. The equipment shall be adequate and have the capability of producing the results specified.

1.7.2 Steel-Wheeled Rollers

Steel-wheeled rollers shall be the self-propelled type weighing not less than 9 metric tons, with a minimum weight of 135 kilograms per millimeter width of rear wheel. Wheels of the rollers shall be equipped with adjustable scrapers. The use of vibratory rollers is optional.

1.7.3 Pneumatic-Tired Rollers

Pneumatic-tired rollers shall have four or more tires, each loaded to a minimum of 13,600 kilograms and inflated to a minimum pressure of 1035 kPa. The loading shall be equally distributed to all wheels, and the tires shall be uniformly inflated. Towing equipment shall also be pneumatic-tired.

1.7.4 Sprinkling Equipment

Sprinkling equipment shall consist of tank trucks, pressure distributors, or other approved equipment designed to apply controlled quantities of water uniformly over variable widths of surface.

1.7.5 Tampers

Tampers shall be of an approved mechanical type, operated by either pneumatic pressure or internal combustion, and shall have sufficient weight and striking power to produce the compaction required.

1.7.6 Straightedge

The Contractor shall furnish and maintain at the site, in good condition, one 3.05 meter straightedge for use in the testing of the finished surface. Straightedge shall be made available for Government use. Straightedges shall be constructed of aluminum or other lightweight metal and shall have blades of box or box-girder cross section with flat bottom reinforced to ensure rigidity and accuracy. Straightedges shall have handles to facilitate movement on pavement.

1.8 STOCKPILING MATERIALS

Materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at locations designated. Before stockpiling of material, storage sites shall be cleared, and sloped to drain. Materials obtained from different sources shall be stockpiled separately.

1.9 SAMPLING AND TESTING

1.9.1 General Requirements

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing shall be permitted until the facilities have been inspected and approved. The first inspection shall be at the expense of the Government.

Cost incurred for any subsequent inspection required because of failure of the facilities to pass the first inspection will be charged to the Contractor. Tests shall be performed in sufficient numbers and at the locations and times directed to insure that materials and compaction meet specified requirements. Copies of test results shall be furnished to the Contracting Officer within 24 hours of completion of tests.

1.9.2 Test Results

Results shall verify that materials comply with this specification. When a material source is changed, the new material will be tested for compliance.

When deficiencies are found, the initial analysis shall be repeated and the material already placed shall be retested to determine the extent of unacceptable material. All in-place unacceptable material shall be replaced or modified as directed by the Contracting Officer.

1.9.3 Sampling

Aggregate samples for laboratory tests shall be taken in accordance with ASTM D 75.

1.9.4 Sieve Analysis

Before starting work, at least one sample of material shall be tested in accordance with ASTM C 136 and ASTM D 422 on sieves conforming to ASTM E 11.

After the initial test, a minimum of one analysis shall be performed for each 1000 metric tons of material placed, with a minimum of three analyses for each day's run until the course is completed.

1.9.5 Liquid Limit and Plasticity Index

One liquid limit and plasticity index shall be performed for each sieve analysis. Liquid limit and plasticity index shall be in accordance with ASTM D 4318.

1.9.6 Laboratory Density

Tests shall provide a moisture-density relationship for the aggregate. Tests shall be conducted in accordance with ASTM D 1557.

1.9.7 Wear Tests

Wear tests shall be performed in accordance with ASTM C 131. One test shall be run per 1000 square meters of completed base course. A minimum of one test per aggregate source shall be run.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Aggregates

Aggregates shall consist of stone, crushed stone, crushed gravel, angular sand, or other approved material. Aggregates shall be durable and sound, free from lumps of clay, organic matter, objectionable coatings, and other foreign material. Material retained on a 4.75 mm sieve shall be known as coarse aggregate and that passing the 4.75 mm sieve shall be known as binder material.

2.1.1.1 Coarse Aggregate

Only one type of coarse aggregate shall be used on the project. Coarse aggregates, consisting of angular fragments of uniform density and quality, shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested in accordance with ASTM C 131. 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.

a. Crushed Gravel: Crushed gravel shall be manufactured from gravel particles 50 percent of which by weight are retained on the maximum size gradation sieve specified.

b. Crushed Stone: Crushed stone 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.

2.1.2 Binder Material

Binder material shall consist of screenings, angular sand, or other finely divided mineral matter processed or naturally combined with the coarse aggregate. Liquid-limit and plasticity-index requirements 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 0.075 mm sieve shall be either nonplastic or have a plasticity index as specified below:

Percentage by Weight Passing No. 200 Sieve	Plasticity Index Maximum
0.1 to 3.	15
3.1 to 4.	12
4.1 to 5.	9
5.1 to 8.	6
8.1 to 10.	4

2.1.3 Gradation

Requirements for gradation specified shall apply to the completed base course. The aggregates shall have a 25 millimeter (1 inch) maximum size and shall be continuously graded within the following limits:

Sieve Designation	Percentage by Weight Passing Square-mesh Sieve (a) (b)
25.0 mm	100
19.0 mm	90-100
4.75 mm	35-65
1.18 mm	15-40

Sieve Designation	Percentage by Weight Passing	
	(a)	(b)
0.075 mm	2-10	

(a) Particles having diameters less than 0.02 millimeter shall not be in excess of 3 percent by weight of the total sample tested.

(b) The values are based on aggregates of uniform specific gravity, and the percentages passing the various sieves are subject to appropriate correction in accordance with ASTM C 127 and ASTM C 128 when aggregates of varying specific gravities are used.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the base is constructed in more than one layer, the previously constructed layer shall be cleaned of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Aggregates shall be obtained from off-site sources.

3.3 PREPARATION OF UNDERLYING COURSE

3.3.1 General Requirements

Before constructing aggregate base course, the previously constructed underlying course shall be cleaned of foreign substances. Surface of underlying course shall meet the specified compaction and surface tolerances. Subgrade shall conform to Section 02250 FILLS AND SUBGRADE PREPARATION. Ruts or soft, yielding spots that may appear in the underlying course, areas having inadequate compaction, and deviations of the surface from requirements specified shall be corrected. For cohesionless underlying materials containing sands, sand gravels, or any other cohesionless material in harmful quantities, the surface shall be mechanically stabilized with aggregate prior to placement of the aggregate course. Stabilization may be accomplished by mixing base course material into the underlying course and compacting by approved methods. Properly compacted material will be considered as part of the underlying course and shall meet all requirements for the underlying course. Finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until base course is placed.

3.3.2 Grade Control

Underlying material shall be excavated to sufficient depth for the required base course thickness so that the finished base course with the subsequent surface course will meet the fixed grade. Finished and completed area

shall conform to the lines, grades, cross section, and dimensions indicated.

3.4 INSTALLATION

3.4.1 Mixing and Placing

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 water content for compaction. The Contractor shall make such adjustments in mixing or placing procedures or in equipment to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to ensure a satisfactory base course.

3.4.2 Edges of Base Course

Approved material shall be placed along edges of aggregate base course in such quantities as will compact to thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 300 mm width of the shoulder to be rolled and compacted simultaneously with rolling and compacting of each layer of base course.

3.4.3 Compaction

Each layer of aggregate base course including shoulders shall be compacted.

Water content shall be maintained at optimum. Density of compacted mixture shall be at least 100 percent of laboratory maximum density. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths.

Speed of the roller shall be such that displacement of the aggregate does not occur. Areas inaccessible to the rollers shall be compacted with mechanical tampers, and shall be shaped and finished by hand methods.

3.4.4 Layer Thickness

Compacted thickness of the aggregate course shall be as indicated. No layer shall be in excess of 200 mm nor less than 75 mm in compacted thickness.

3.4.5 Finishing

The surface of the top layer shall be finished to grade and cross section shown. Finished surface shall be of uniform texture. Light blading during compaction may be necessary for the finished surface to conform to the lines, grades, and cross sections. Should the surface for any reason become rough, corrugated, uneven in texture, or traffic marked prior to completion, such unsatisfactory portion shall be scarified, reworked, recompacted, or replaced as directed.

3.4.5.1 Smoothness

Surface of each layer shall show no deviations in excess of 9.5 mm when tested with the 3.05 meter straightedge. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting, as directed.

3.4.5.2 Thickness Control

Compacted thickness of the base course shall be within 12.7 mm of the thickness indicated. Where the measured thickness is more than 12.7 mm deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 12.7 mm thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 7 mm of the thickness indicated.

3.5 FIELD QUALITY CONTROL

3.5.1 Field Density

Field in-place density shall be determined in accordance with ASTM D 1556 or ASTM D 2167. Calibration curves and calibration test results shall be furnished within 24 hours of the conclusion of the tests. At least one field density test shall be performed for each 1000 square meters (yards) of each layer of base material.

3.5.2 Smoothness

Measurements for deviation from grade and cross section shown shall be taken in successive positions parallel to the road centerline with a 3.05 meter straightedge. Measurements shall also be taken perpendicular to the road centerline at 15 meter intervals.

3.5.3 Thickness

Thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square meters of base course. Measurements shall be made in 75 mm diameter test holes penetrating the base course.

3.6 TRAFFIC

Completed portions of the area may be opened to traffic, provided there is no marring or distorting of the surface by the traffic. Heavy equipment shall not be permitted except when necessary to construction, and then the area shall be protected against marring or damage to the completed work.

3.7 MAINTENANCE

The aggregate base course shall be maintained in a satisfactory condition until accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Removed in-place materials that are unsuitable for the base course material that is removed for the required correction of defective areas, and waste material and debris shall be disposed of as directed.

-- End of Section --

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SECTION 02250

FILLS AND SUBGRADE PREPARATION

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SECTION 02250

FILLS AND SUBGRADE PREPARATION

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 422	(1963; R 1990) Particle-Size Analysis of Soils
ASTM D 1556	(1990) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft ³ (2,700 kN-m/m))
ASTM D 2216	(1992) Laboratory Determination of Water (Moisture) Content of Soil, and Rock
ASTM D 2487	(1993) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.1 SUBMITTALS

Government approval is required for all submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES.

SD-01 Data

Moisture-density relations; GA.

Moisture-density relations shall be determined by the Contractor, in accordance with the requirements in paragraph LABORATORY CONTROL.

Survey Data; FIO.

The settlement monument survey data shall be provided to the Contracting Officer for review to determine the need for further, in accordance with the requirements in paragraph SETTLEMENT MONITORING.

SD-04 Drawings

Settlement Monument Plan; FIO.

The settlement monument plan along with the plan to protect the monument during construction shall be provided by the Contractor as required in paragraph SETTLEMENT MONITORING.

SD-09 Reports

Field Density Tests; FIO.

Field density tests shall be performed by the Contractor. The Contractor shall submit reports as required in paragraph CONTROL.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 COMPACTION EQUIPMENT

Compaction shall be accomplished by tamping roller, rubber tired roller vibratory compactor or mechanical tampers. 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.

3.2 GENERAL REQUIREMENTS FOR COMPACTED FILLS AND COMPACTED BACKFILLS

3.2.1 Control

Moisture-density relations shall be established by the Contractor. The soil used for each maximum density test shall be classified in accordance with ASTM D 2487 and shall include a particle size analysis in accordance with ASTM D 422. At least one five point maximum density test shall be made for every 10 field density tests. Field density tests shall be performed by the Contractor at the frequency established in paragraph FIELD CONTROL, 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 determinations 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.

3.2.1.1 Laboratory Control

Moisture-density relations shall be established by the Contractor. 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 compacting of any material in the work. The moisture-density relations shall be determined in a laboratory in accordance with ASTM D 1557.

- a. 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.

3.2.1.2 Field Control

Field in-place density shall be determined in accordance with ASTM D 1556. The field moisture content shall be determined in accordance with ASTM D

2216. Determination of in-place densities using the nuclear method (ASTM D 2922) may be used to supplement the sand cone density tests (ASTM D 1556). When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. At least one adjacent sand cone test shall be performed for every five nuclear density tests performed. If field density tests determined by the nuclear method vary by more than 0.5 kilonewtons per cubic meter from comparison sand-cone tests, and are consistently high or low, adjustment of the calibration curve is necessary.

a. In-Place Densities

(1) One test per 750 cubic meters, for the first 7,500 cubic meters of material and one test for each 1,500 cubic meters thereafter, or fraction thereof, shall be made of each lift of fill or backfill areas compacted by other than hand-operated machines. At least one test shall be made in each 0.6 meter layer of compacted fill or backfill processed as a unit and not less than one test shall be made in each area.

(2) One test per 400 cubic meters, or fraction thereof, shall be made of each lift of fill or backfill areas compacted by hand-operated machines.

3.2.1.2.1 Test Logs

The Contractors CQC shall maintain a log of all tests which will be updated and submitted to the Contracting Officer on a weekly basis. The test log shall include: Test number (if retest, shall include retest number), date, feature of work, station and offset, weight of wet soil, weight of dry soil, percent of compaction, optimum moisture content, maximum dry unit weight, soil classification, in-place density test methods either sand-cone or nuclear densimeter.

3.3 Settling of Fills or Backfills with Water

Settling of fills or backfills with water will not be permitted.

3.4 Fill Material

Fill material shall be obtained from the basin excavation, foundation excavation or stockpiles. Materials considered unsatisfactory for use as compacted fill include but are not limited to those materials containing roots and other organic matter, trash, debris, oversize chunks or clumps of cemented material. Fill material shall contain no stone whose greatest dimension is more than 3/4 the lift thickness. The contractor shall be expected to break-down, crush, or otherwise process the excavated material for use as fill material due to the cementation of in-situ soil. Materials classified in ASTM D 2487 as MH, CH, Pt, OH, and OL are also considered unsuitable for use as compacted fill. Material for compacted fill behind concrete structures shall contain less than 30 percent by weight passing the 0.075 mm sieve and shall contain no stone larger than 0.1 meters.

3.5 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 17.2 megapascals when tested in accordance with the Section 03301

CAST-IN-PLACE STRUCTURAL CONCRETE. Heavy equipment shall not be operated over pipes and buried structures until at least 0.6 meters of fill material has been placed and compacted over them. Material from the top of the pipe or buried structure to 0.6 meters above pipe or buried structure shall be compacted by mechanical tampers or other equipment approved by the Contracting Officer. Compacted fill and backfill shall be placed with suitable equipment in horizontal layers which before compaction, shall not exceed 0.3 meters in depth for rubber-tired or vibratory rollers, 0.2 meters in depth for tamping rollers, and 0.1 meters 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.

3.6 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 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 2 percent below optimum.

3.7 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 0.3 meters of outlet conduit or structure walls or over buried structures until the compacted fill over the top of the structures has reached a depth of 0.6 meters. 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.

3.8 COMPACTED FILL

3.8.1 Dam Embankment

3.8.1.1 Preparation for Placing

Before placing material for dam embankment, the foundation surface shall be cleared of all existing obstructions, vegetation and debris. Within the dam embankment footprint, the following shall be removed: (1) the upper 1.5 meters of foundation soil within the footprint of dam embankment within the main and tributary washes, (2) the upper 0.610 meters of foundation soil within the footprint of the dam embankment outside of the main and tributary washes', (3) material shall be removed in accordance with Section 02150 CLEAR SITE AND REMOVE OBSTRUCTIONS and Section 02200 EXCAVATION. The inspection trench and the banks of the existing wash shall be excavated as shown on the plans and in accordance with Section 02200 EXCAVATION. Unsuitable or unstable (too wet) material not meeting the requirements for fill material shall be removed where directed. The existing surfaces, including the excavated inspection trench and bank, shall be scarified to a

depth of 0.15 meters and proofrolled by four passes of the compaction equipment before placing the fill. 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 layer.

3.8.1.2 Compaction

Each layer of the materials shall be compacted to not less than 95 percent of maximum density, per ASTM D 1557.

3.8.1.3 Settlement

The Contractor shall delay RCC placement between STA 2+10.903 and STA 7+69.097 for a maximum settlement period of 60 days after embankment in that area reaches full height in order to monitor anticipated settlement of the embankment. The Contractor shall install three surface settlement monuments at STA 4+00.000, STA.5+00.000, and STA.7+00.000; the location with respect to the dam centerline will be determined by the Contracting Officer.

3.8.1.4 Settlement Monitoring

The monuments shall be surveyed by the Contractor within 24 hours of installation and the elevation surveyed on a weekly basis. The survey data shall be provided to the Contracting Officer for review to determine the need for further monitoring. If the survey data indicates there is inconsequential settlement, the Contracting Officer may approve RCC placement between STA 2+10.903 and STA 7+69.097 before the 60 day settlement period expires. A settlement monument plan including typical details of the surface settlement monuments along with the plan to protect the monument during construction shall be provided by the Contractor for review not less than 14 calendar days prior to installation of the monument.

3.8.1.5 Settlement Monument Protection Plan

The location of the settlement monument shall be clearly marked and readily visible (red flagged) to equipment operators. In the event of damage to settlement monument or extension resulting from equipment operating within the specified area, the Contractor shall immediately notify the Contracting Officer and shall be responsible for restoring the settlement monument to working order.

3.8.1.6 Regrading of Embankment Crest

If the dam embankment crest settles as anticipated, the embankment shall be regraded to the lines and grades indicated after the settlement period is completed.

3.8.2 Compacted Fill, Basin

3.8.2.1 Preparation for Placing

The foundation for the compacted fill to be placed in the basin, compacted fill for the outlet conduit and compacted fill for the basin bypass pipe shall be cleared of all existing obstructions, vegetation and debris. Any trash or debris shall be removed in accordance with Section 02150 CLEAR SITE AND REMOVE OBSTRUCTIONS and Section 02200 EXCAVATION. Unsuitable or unstable (too wet) material not meeting the requirements for fill material

shall be removed where directed. The existing surfaces for the compacted fill in the basin shall be proofrolled by four passes of the compaction equipment. The subgrade for the outlet conduit and basin bypass pipe shall be prepared in accordance with paragraph: Subgrade Preparation.

3.8.2.2 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 and within 1.2 meters of outlet conduit walls shall not exceed 16 000 kilograms, including dynamic forces produced by vibratory equipment. Equipment used to compact the fill behind the outlet conduit walls shall be of such size as to be capable of operating in the area between the cut slope and the wall.

3.8.2.3 Compaction

Each layer of fill behind outlet conduit walls and pipe backfill around the basin by-pass pipe through the dam embankment shall be compacted to not less than 95 percent of maximum density, per ASTM D 1557. Pipe backfill and trench backfill around the basin by-pass pipe outside the dam embankment and fill placed in the basin shall be compacted to not less than 90 percent of maximum density, per ASTM D 1557.

3.8.3 Filter Material

3.8.3.1 Preparation for Placing

Foundation for the filter material shall be cleared of all existing obstructions, vegetation and debris. Any trash or debris shall be removed in accordance with Section 02150 CLEAR SITE AND REMOVE OBSTRUCTIONS and Section 02200 EXCAVATION. Unsuitable or unstable (too wet) material not meeting the requirements for fill material shall be removed where directed.

The existing surfaces shall be scarified to a depth of 0.15 meters and proofrolled by four passes of the compaction equipment before placing the filter material. The subgrade for Filter Material shall be prepared in accordance with paragraph SUBGRADE PREPARATION.

3.8.3.2 Material

Filter material shall be processed from materials obtained from the required excavations or may be obtained from commercial sources. Filter material gradation shall be in accordance with SECTION 02710 SUBDRAINAGE SYSTEM.

3.8.3.3 Placement and Compaction

Filter material shall be spread by motor graders or other approved means in approximately horizontal layers to the lines and grades indicated on the plans, the thickness of the layers before compaction shall not be more than 0.3 meters, the entire surface of the layer shall be compacted by not less than four complete passes of the 9-ton vibratory roller. Each trip of the roller shall overlap the adjacent trip not less than 0.3 meters. The finished surface of the filter material shall not vary more than 12.5 millimeters above or below the indicated grades.

3.8.4 Drain Material

3.8.4.1 Material

Drain material shall be processed from materials obtained from the required excavations or may be obtained from commercial sources. Filter material gradation shall be in accordance with SECTION 02710 SUBDRAINAGE SYSTEM.

3.8.4.2 Placement and Compaction

Drain materials shall be spread over the filter material by motor graders or other approved means in approximately horizontal layers to the lines and grades indicated on the plans, the thickness of the layers before compaction shall not be more than 0.3 meters, the entire surface of the layer shall be compacted by not less than 4 complete passes of the 9-ton vibratory roller. Each trip of the roller shall overlap the adjacent trip not less than 0.3 meters. Mechanical tampers shall be used for compaction of Drain materials over and adjacent to the drainage pipes. The finished surface of the drain material layers shall not vary more than 12.5 millimeters above or below the indicated grades.

3.9 BACKFILL

3.9.1 Structural Backfill

3.9.1.1 Location

Structural backfill shall consist of all fill against and/or around concrete structures.

3.9.1.2 Material

Structural backfill 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, and silty sands. Organic material, silt, clay, broken concrete or pavement, boulders and other objectionable material shall not be used. Backfill for structures shall not contain any stones larger than 0.1 meters.

3.9.1.3 Placing

Structural backfill 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 17.2 megapascals when tested in accordance with Section 03301 CAST-IN PLACE STRUCTURAL CONCRETE. Backfill shall be placed in 0.1 meter layers.

3.9.1.4 Compaction

Compaction shall be not less than 95 percent of maximum density, per ASTM D 1557.

3.10 BACKFILL, TOE

Backfill, Toe shall consist of suitable material from the required excavation. Stone with a maximum size of 0.2 meters may be used. Nesting of material shall be avoided. Broken concrete, asphalt, or chunks of cemented material shall not be permitted. Stones larger than 0.1 meters in the backfill shall not be allowed within 0.3 meters of the roller compacted concrete surface. Compaction of backfill, toe will not be required other than that obtained by the controlled movement of construction equipment.

3.11 SUBGRADE PREPARATION

Subgrade preparation shall include subgrade preparation for the dam, outlet works conduit, basin bypass pipe, and for areas to receive aggregate base course paving for access roads, maintenance roads and turnarounds. All trash and debris shall be removed in accordance with Section 02150 CLEAR SITE AND REMOVE OBSTRUCTIONS and Section 02200 EXCAVATION. After the outlet conduit has been excavated to rough grade, the entire subgrade for the outlet conduit invert, bypass conduit invert and other area indicated above shall be moisture conditioned and proofrolled by 4 passes of the compaction equipment and trimmed to a uniform grade and smoothed with a steel-wheeled roller to make the subgrade ready to receive concrete. If the subgrade is disturbed by the Contractor's operations or is overexcavated, or is soft or yielding, the subgrade shall be restored to grade and compacted to a density of 95 percent of maximum density, per ASTM D 1557. The finished surface of the subgrade shall not be more than 12.5 millimeters from the indicated grade at any point when tested with a 3 meter straightedge.

3.12 SOIL STABILIZER

Soil Stabilizer shall be placed on all exposed excavation and fill surfaces after construction is completed. The soil stabilizer shall be a mixture of plaster and natural cellulose fiber mulch. The cellulose fiber mulch shall be produced from grinding clean, whole wood chips, or fiber produced from ground newsprint with a labeled ash content not to exceed 7 percent. The plaster shall consist of natural occurring high purity processed gypsum and additives. The gypsum shall be produced from a mined or quarried source. The gypsum shall be processed to be composed of a crushed, dry calcium sulfate hemihydrate having a purity of not less than 88 percent. The gypsum and additives shall be furnished either in bags or bulk and be accompanied by bills of lading and shipping invoices. The shipping invoices for the gypsum shall state the gypsum's purity content, dry weight, and source of manufacture. Processed gypsum which has become partially air set, lumpy or caked shall not be used. The plaster/cellulose fiber mulch shall be applied at a rate of 6.725 tonnes of plaster mixed with 2.242 tonnes of fiber per hectare. The plaster/cellulose fiber mulch stabilizer shall formulate a protective crust-like barrier within 4 to 8 hours after application. Application of the plaster/cellulose fiber mulch stabilizer will not be permitted when weather conditions are unsuitable for concrete placement in accordance with Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE.

-- End of Section --

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SECTION 02600

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SECTION 02600

STONE PROTECTION

PART 1 GENERAL

1.1 REFERENCES

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

American Society for Testing and Materials (ASTM)

ASTM C 33	(1993) Concrete Aggregates
ASTM C 88	(1990) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 127	(1988; R 1993) Specific Gravity and Absorption of Coarse Aggregate
ASTM C 295	(1990) Petrographic Examination of Aggregates for Concrete
ASTM C 535	(1989) Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM D 1141	(1980) Substitute Ocean Water
ASTM D 5519	(1994) Particle Size Analysis of Natural and Man-Made Riprap Materials
ASTM E 548	(1989) General Criteria Used for Evaluating Laboratory Competence

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

SD-01 Data

Placing Method and Equipment; GA.

All placing methods and equipment shall be submitted for review by the Contracting Officer for conformance with paragraph PLACEMENT.

SD-09 Reports

Gradation Sampling and Testing; GA.

Copies of field test results within 24 hours after the tests are performed. Certified copies of test results shall be submitted for approval in

accordance to paragraph GRADATION SAMPLING AND TESTING.

SD-14 Samples

Stone Quality; GA.

Stone quality samples shall be submitted at least 45 days prior to start of stone placement, in accordance with paragraph STONE QUALITY.

SD-18 Records

Waybills and Delivery Tickets; FIO.

Copies of waybills and delivery tickets during the progress of the work. Certified waybills and delivery tickets for all materials actually used as required in paragraph WAYBILLS AND DELIVERY TICKETS.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Definitions

2.1.1.1 Rounded Stone.

Stone which is obtained from alluvial deposits and is well rounded to sub-rounded.

2.1.1.2 Angular Stone.

Stone which is obtained from bedrock deposits and is angular in shape.

2.1.2 General

The Contractor shall make all arrangements, pay all royalties, and secure all permits for the procurement, furnishing and transporting of stone. The Contractor shall vary the quarrying, processing, loading and placing operations to produce the sizes and quality of stone 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.

2.1.3 Stone Sources

2.1.3.1 Stone from Project Excavation

Stone conforming to these specifications will not be available from the required excavation due to variable stone quality and insufficient quantities of suitably large stone. Therefore, the required stone will need to be obtained from offsite sources. One offsite source is Sloan Quarry located about 7 miles to the southeast of the project site.

2.1.3.2 Source Authorization

Before any stone is produced from a source for completion of the work under this contract, the source of stone must be authorized by the Contracting Officer's Representative. Authorization of a stone source shall not be construed as a waiver of the right of the 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.

2.1.3.3 Source Development

Before a proposed source or sources of stone will be considered for sampling and testing, the Contractor must demonstrate that the source has sufficient stone to fulfill the contract requirements. If sufficient amounts of stone conforming to these specifications are not available from a source or sources used in the work, the Contractor shall submit stone from another source for authorization.

2.1.3.4 Source Documentation

Authorization of a proposed stone source will be based on test results and/or service records. In general, current Corps of Engineers test results shall be required as outlined in paragraph Quality Compliance Testing, below. In special cases, however, the Contracting Officer's Representative may elect to use either past Corps of Engineers test results, test results from other agencies or private laboratories, or service records. A service record is considered to be acceptable if stone from the proposed source has remained sound and functional after at least 10 years of exposure on a project similar to the one to be constructed under these specifications.

2.1.4 Stone Quality

2.1.4.1 Quality Compliance Testing

Samples for Corps of Engineers testing as specified in paragraph 2.1.3.4 (Source Documentation) shall be submitted a minimum of 45 days in advance of the time when the stone will be required in the work. Stone from a proposed source will be tested by the Government for quality compliance. The first test shall be at Government expense, however, if the stone fails the tests, or if the Contractor desires to utilize more than one source, additional testing will be performed by the Government at the Contractor's expense. The cost of additional testing will be deducted from payment due the Contractor in the amount of \$4500 for each sample tested. All test samples (136 kg minimum) shall be representative of the stone source and shall be obtained by the Contractor under the supervision of the Contracting Officer's Representative and delivered at the Contractor's expense to a testing laboratory approved by the Contracting Officer's Representative.

2.1.4.2 Stone Quality Testing Requirements

Stone shall be subjected to such tests as are necessary to demonstrate to the satisfaction of the Contracting Officer's Representative that the materials are acceptable for use in the work. At a minimum the stone shall meet the following test requirements.

Test	Test Method	Requirement
Specific Gravity (Bulk SSD)	ASTM C 127	2.60 minimum
Absorption	ASTM C 127	2.0% maximum
Wetting and Drying	SPD Test Procedure(1)	No fracturing(3)
Sulfate Soundness	ASTM C 88(2)	10% max. loss(4)

Test	Test Method	Requirement
Abrasion Loss	ASTM C 535	50% max. loss(4)

In addition to the above tests, the stone shall be subjected to a petrographic and X-ray diffraction analysis in accordance with ASTM C 295 (5). The stone must not contain any expansive clays. Stone for grouted stone protection shall not contain excessive amounts of deleterious minerals associated with alkali-silica or alkali-carbonate reactions as described in ASTM C 33.

NOTE: (1): Test procedure for wetting and drying test. The entire sample is carefully examined and representative test specimens are selected. The sample should be large enough to produce two cut slabs, 25 mm thick (+/-6 mm) with a minimum surface area of 0.019 square meters on one side. Two chunks approximately seventy-six by one-hundred and two millimeters 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 60 degrees C., 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 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 60 degrees C. After each cycle the specimens are examined with the low-power microscope to check for opening or movement of fractures, flaking along edges, swelling of clays, softening of rock surfaces, 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 actions 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 particles broken off during the test are oven dried, weighed and photographed.

NOTE: (2): The test shall be made on 50 particles each weighing 100 grams, +/-25 grams, in lieu of the gradation given in ASTM C 88.

NOTE: (3): Weakening and loss of individual surface particles is permissible unless bonding of the surface grains softens and causes general disintegration of the surface material.

NOTE: (4): Stone which has a loss greater than the specified limit will be accepted if the Contractor demonstrates that the stone has a satisfactory service record.

NOTE: (5): The test procedure for Petrographic and X-ray Diffraction is performed according to ASTM C 295, except for the following:

- a. A color, microscopic photograph shall be made of each stone type and the individual minerals within the stone shall be identified by labels and arrows upon the photograph.
- b. A very detailed macroscopic and microscopic description shall be made of the stone, to include the entire mineral constituents, individual sizes, their approximate percentages and mineralogical

histories. A description of stone hardness, texture, weathering, and durability factors shall also be discussed.

c. A written summary of the suitability of stone for use as riprap based on the Petrographic and X-ray tests and the results of ASTM C 535 shall be presented in the final laboratory report on stone quality.

2.1.4.3 Stone Acceptance Criteria

Prior to placement, all stone shall be subject to acceptance by the Contracting Officer's Representative. Acceptance of any stone shall not constitute acceptance of all stone from a source. All accepted stone shall be:

- a. of the same lithology as the original stone from which test results or service records were taken as a basis for authorization of the source;
- b. sound, durable and hard, and free from laminations, weak cleavages, undesirable weathering, or blasting or handling-induced fractures (or fracture zones which subtend more than 1/3 of the total circumference of the stone along the plane of fracturing);
- c. of such character that it will not disintegrate from the action of air, water, or the conditions of handling and placing; and,
- d. clean and free from earth, clay, refuse, or adherent coatings.

In addition, to be accepted, the greatest dimension of any stone piece shall not be greater than 3 times its least dimension.

2.1.4.3.1 Stone for Riprap

Stone for riprap protection of the embankment slopes shall be angular quarried material.

2.2 Stone for Spillway Toe Stone

Stone for spillway and **slope stabilizer** toe stone immediately downstream of the spillway stilling apron and downstream of the slope stabilizer shall be angular quarried material.

2.3 Stone for Grouted Riprap

Stone for grouted riprap in the collector channel upstream of the bypass inlet structure **and in the slope stabilizer at the upper portion of the basin shall be angular quarried material.** Grouting shall be conform to specifications SECTION 02650 GROUTING STONE PROTECTION.

2.4 Gradation

2.4.1 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. For the size-weight relationships used during gradation tests, within-specification weights will be determined based on a stone specific gravity of 2.58 and stone sizes (diameters) that result for stone shapes midway between that of a sphere and a cube.

2.4.1.1 Stone Riprap

Riprap for embankment slope protection and for grouted riprap of collector **channel and slope stabilizer structures** shall be reasonably well-graded within the limits specified below, when tested in accordance with ASTM D 5519, Test Method A.

2.4.1.2 Stone Riprap

Stone Riprap for embankment slope protection, spillway toe stone and slope stabilizer toe stone shall be reasonably well-graded within the limits specified below, when tested in accordance with ASTM D 5519, Test Method A.

0.460 Stone Riprap, upstream slope of dam embankment, **toe stone for the slope stabilizer** and for grouted stone

Approximate Average Diameter (mm)	Percent Smaller
460-340	100
300-270	50
240-180	15

0.300 Stone Riprap, downstream slope of dam embankment

Approximate Average Diameter (mm)	Percent Smaller
300-220	100
200-180	50
160-120	15

Spillway Toe Stone

Approximate Average Diameter (mm)	Percent Smaller
300-220	100
200-180	50
160-120	15

2.4.1.3 Grouted Riprap

Stone for grouted riprap shall be reasonably well-graded between 150 and 380 millimeters with not less than 25 nor more than 50 percent passing 230 millimeters in size, when tested in accordance with ASTM D 5519, Test Method A.

2.4.2 Gradation Sampling and Testing

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Tests shall be performed by an approved testing laboratory on samples selected by the Contracting Officer's Representative. Testing may be done by the Contractor, subject to approval by the Contracting Officer's Representative. If the Contractor elects to establish testing facilities, approval of such facilities shall be based on compliance with ASTM E 548, and no work requiring testing will be permitted, until the Contractor's facilities have been inspected and approved by the Contracting Officer's Representative. Testing shall be supervised by a registered Civil Engineer, experienced in rock-testing. The Government reserves the right to perform check tests and to use the Contractor's sampling and testing facilities to make the tests. One gradation test each shall be required for the 460 mm riprap and the 300 mm riprap/toe stone at the beginning of production prior to delivery of stone from the source to the project site. A minimum of one additional test each for the 460 mm riprap and the 300 mm riprap/toe stone shall be required for each 4535 metric tons of stone placed, respectively. All sampling and gradation tests performed by the Contractor shall be under the supervision of the Contracting Officer's Representative. Each sample shall consist of not less than 4.5 metric tons of stone, selected at random from the production run for the first test or from stone placed on grade or stockpiled on-site for required additional tests.

2.5 Rejected Stone

Stone of unsuitable quality and/or size distribution as required by these specifications shall be rejected. Any rejected stone shall be promptly removed from the project at no expense to the Government. Any portions of the work covered by these specifications containing rejected stone will be considered incomplete.

PART 3 EXECUTION

3.1 FOUNDATION PREPARATION

3.1.1 General

Subgrade preparation for material placement shall conform to the provisions of SECTION 02250 FILLS AND SUBGRADE 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 25.4 mm 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 earth 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's Representative and no material shall be placed thereon until that area has

been approved.

3.2 PLACEMENT

3.2.1 General

Except as otherwise specified, the limits of stone in place shall follow, with reasonable variation, the indicated lines and slopes, without continuous under- or overbuilding. Templates shall be placed at adequate intervals, as determined by the Contracting Officer's Representative, to accurately delineate the surface of the work being placed. For all stonework, the Contractor shall submit the placing method to the Contracting Officer's Representative for approval, before placement begins.

3.2.2 Stone Riprap

Stone Riprap shall be placed 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. Stone shall be placed to its full course thickness in one operation and in a manner to avoid displacing the underlying material. Material shall not be dropped from a height of more than 460 mm. The placing method shall be submitted to Contracting Officer's Representative for approval prior to commencement of placement operations. The Contractor shall maintain the stone protection until accepted and any material displaced by any cause shall be replaced at the Contractor's expense to the lines and grades shown on the drawings. Self propelled equipment shall not be used on the 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 be permitted. A tolerance of minus 25 mm to plus 50 mm from the indicated slope lines and grades will be allowed in the finished surface, except that either extreme of such tolerance shall not be continuous over an area greater than 20 square meters.

3.2.3 Toe Stone

Spillway and slope stabilizer toe stone shall be placed in a reasonably well-graded mass to the lines indicated or directed. Material shall not be dropped from a height of more than 460 mm. Barring of stone will be required only to the extent necessary to secure the results specified above. Hand placing will not be required. A tolerance of minus 25 mm to plus 51 mm from the indicated lines and grades will be allowed in the finished surface, except either extreme such tolerance shall not be continuous over an area greater than 18.6 square meters.

3.3 DEMONSTRATION SECTIONS

3.3.1 General

Prior to placement of stonework, the Contractor shall construct sections of embankment protection; spillway and slope stabilizer toe stone; slope stabilizer and channel protection consisting of sections of riprap, toe stone and grouted riprap, respectively, to demonstrate the proposed operations for production placement. The sections shall demonstrate procedure and capability of grading and placing riprap, grouted riprap, and toe stone within the tolerances specified. Unless the approved construction method precludes it, the demonstration section for riprap shall extend for the full height of the embankment. The demonstration

section for riprap and toe stone shall be 30 meters in length and shall conform to all applicable specifications. The demonstration section for grouted riprap shall be 10 meters in length. Methods and equipment employed for placement shall demonstrate the adequacy for use in placement of riprap, grouted riprap, and toe stone and shall conform to the requirements specified herein. The quantities of all materials placed within the sections shall be accurately tabulated and provided immediately to the Contracting Officer's Representative for comparison with the computed quantities.

3.3.2 Demonstration Sections Evaluation

The Contractor shall not proceed placing stonework prior to the approval of the demonstration sections. Within a period of 7 days after completion of the sections, the Contracting Officer's Representative shall determine the adequacy of the sections to function as part of the permanent construction.

The Contractor shall be notified as to the acceptability of the sections and may be directed to modify methods of construction, and remove the sections if necessary.

3.3.3 Removal of Demonstration Sections

If removal of the demonstration sections is required, it shall be conducted in such a manner as to maintain the integrity of the underlying subgrade. The Contractor shall make arrangements for removal and disposal, at the Contractor's expense, in areas not located on the site.

3.4 DELIVERY

All stone delivered by rail or truck shall be weighed and the scale tickets certified by authorized weighers. All railroad cars and trucks used for delivering stone shall be plainly numbered.

3.4.1 Scales

Scales used for measurement shall, at the option of the Contractor, be either public scales or approved scales provided by the Contractor. Weighing shall be at the point nearest the work at which the public scale is available or at which it is practicable for the Contractor to provide a scale. 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 the Contracting Officer's Representative considers 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's Representative.

3.4.2 Waybills and Delivery Tickets

Copies of waybills or delivery tickets shall be submitted to the Contracting Officer's Representative during the progress of the work. The Contractor shall furnish the Contracting Officer's Representative scale tickets for each load of material weighed; these tickets shall include tare weight, identification mark of each vehicle weighed, date, time, and location of the loading. Tickets shall be furnished at the point and time

individual loads arrive at the work site. A master log of all vehicle loading shall be furnished for each day of loading operation. The Contractor shall file with the Contracting Officer's Representative the master log of loadings, certified waybills and/or certified tickets within 24 hours of material delivery. Prior to the final payment, the Contractor shall furnish written certification that the material recorded on the submitted waybills and/or certified tickets was actually used in the construction covered by the contract.

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SECTION 02710

SUBDRAINAGE SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 131	(1989) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1995a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(1987; R 1992) Sampling Aggregates
ASTM D 2751	(1993) Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 3034	(1994) Type PSM (Polyvinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1992) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 4632	(1991) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4833	(1988) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

SD-01 Data

Pipe Laying Plan; GA.

Specimens identified to indicate the manufacturer, type of material, size and quantity of material, and shipment or lot represented. Each sample of subdrain pipe, both non-perforated and perforated, shall be a piece not less than 0.3 m in length.

SD-14 Samples

Filter Fabric; FIO.

Specimens identified to indicate the manufacturer, type of material, size and quantity of material, and shipment or lot represented. Each sample of filter fabric shall be a piece not less than 0.15 m X 0.15 m.

Subdrain Pipe; FIO.

Specimens identified to indicate the manufacturer, type of material, size and quantity of material, and shipment or lot represented. Each sample of subdrain pipe, both non-perforated and perforated, shall be a piece not less than 0.3 m in length.

PART 2 PRODUCTS

2.1 DRAIN MATERIAL

Drain material shall be durable, hard, tough, and free from adherent coatings. The material shall not contain corrosive agents, organic matter, or soft, friable, thin or elongated particles in quantities considered deleterious by the Contracting Officer. Drain material shall consist of gravel, crushed stone, or processed crushed concrete, and shall show a loss in weight of not more than 50 percent when tested in accordance with ASTM C 131, and shall be reasonably well graded within the following limits:

Sieve Size (millimeters)	Percent by Weight Passing
63 mm	100
50 mm	95-100
37.5 mm	35-70
25 mm	0-15
12.5 mm	0-5

2.2 FILTER MATERIAL

Filter material shall consist of natural sand, manufactured sand, or a combination of natural and manufactured sands, and shall be reasonably well graded within the following limits:

Sieve Size (millimeters)	Percent by Weight Passing
9.5 mm	100
4.75 mm	85-95
1.18 mm	35-45
0.15 mm	0-20
0.075 mm	0-15

2.3 SUBDRAIN PIPE

Subdrain pipe may be polyvinyl chloride (PVC) or acrylonitrile-butadiene-styrene (ABS), except that only one type shall be used for the entire project.

2.3.1 Non-Perforated Pipe

2.3.1.1 Non-Perforated Acrylonitrile-Butadiene-Styrene (ABS) Pipe

Non-perforated acrylonitrile-butadiene-styrene (ABS) pipe shall conform to ASTM D 2751, with a maximum SDR of 35.

2.3.1.2 Non-Perforated PolyVinyl Chloride (PVC) Pipe and Fittings

Non-perforated polyvinyl chloride (PVC) pipe and fittings shall conform to ASTM D 3034, Type PSM with a maximum SDR of 35, with flexible elastomeric joints.

2.3.2 Perforated Pipe

Perforations for pipe 0.15 meters in diameter shall have a combined area of at least 600 square millimeters per linear meter of pipe and shall be located within an arc of 120 degrees along the top of the pipe. Perforations may be either holes or slots with at least one perforation located in each linear 0.3 meters of pipe excluding joint areas. The diameter of holes shall be not less than 4.75 millimeters nor more than 6.35 millimeters. The slots shall be not less than 4.75 millimeters nor more than 6.35 millimeters wide and not more than 0.1 meters long. Perforations shall be made by the pipe fabricator using methods which will eliminate spalling insofar as practicable. Pipes having spalls extending more than 12.5 millimeters outside the perforations or more than 1/2 the wall thickness into the perforation shall be rejected.

2.3.2.1 Perforated Acrylonitrile-Butadiene-Styrene (ABS) Pipe

Perforated acrylonitrile-butadiene-styrene (ABS) pipe shall conform to ASTM D 2751, with a maximum SDR of 35, perforations shall be as specified hereinbefore.

2.3.2.2 Perforated PolyVinyl Chloride (PVC) Pipe and Fittings

Perforated polyvinyl chloride (PVC) pipe and fittings shall conform to ASTM D 3034, Type PSM with a maximum SDR of 35, with flexible elastomeric seal joints, perforations shall be as specified hereinbefore.

2.4 PIPE FITTINGS

Pipe fittings shall be acrylonitrile-butadiene-styrene or polyvinyl chloride and shall be suitable for use with the pipe furnished. Fittings shall be furnished with such adapters as are recommended by the manufacturers of the pipe.

2.5 PIPE PLUGS

Pipe plugs shall be suitable for use with the pipe furnished and shall be installed as recommended by the manufacturer's of the pipe.

2.6 FILTER FABRIC

Filter fabric shall be a nonwoven needle punch pervious sheet of plastic yarn. The filter fabric shall provide an apparent opening size no finer than the No. 100 sieve and no coarser than the No. 50 sieve. The filter fabric shall have a minimum tensile strength of 45 kilograms in any principal direction when tested in accordance with ASTM D 4632 grab test method using 25.4 millimeter square jaws and a 0.3 meter per minute constant rate of traverse. The filter fabric shall have a 15 percent minimum breaking elongation in any principal direction when tested in accordance with ASTM D 4632. The filter fabric shall have a 22.5 kilogram

minimum puncture strength when tested in accordance with ASTM D 4833. The filter fabric shall have no seams.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Drain Material

Drain material shall be placed, moistened, and spread to a uniform grade to the lines and grades indicated. Placing and spreading equipment shall be operated in such manner as to not disturb the underlying material. Water shall be added and the material manipulated with spreading equipment until a uniform density is achieved. After installation of the drain material, equipment shall not be operated over the blanket except for placement of the roller compacted concrete or downstream embankment, whichever applies. Any drain material contaminated or rutted by equipment shall be removed and replaced with fresh drain material. At pipe drains, drain material shall be placed to pipe bed elevation. Any pipe displaced or damaged during placement of the drain material shall be replaced and realigned by the Contractor at no additional cost to the Government.

3.1.2 Filter Material

Filter material shall be placed, moistened, and spread to a uniform grade to the lines and grades indicated. Placing and spreading equipment shall be operated in such manner as to not disturb the underlying material. Water shall be added and the material manipulated with spreading equipment until a uniform density is achieved. After installation of the filter material, equipment shall not be operated over the blanket except for placement of the drain material. Any filter material contaminated or rutted by equipment shall be removed and replaced with fresh filter material.

3.1.3 Pipe Laying

Installation of drainage pipe at drainage material and Roller Compacted Concrete (RCC) shall be in lines and **grades** shown on drawings. Drainage pipes shall be protected during placing and compacting operations of the RCC material by placing concrete surrounding the pipe as shown on the drawings. Each pipe shall be carefully inspected immediately before it is laid, and any damaged or defective pipe shall not be used. The perforated pipe shall be wrapped in filter fabric. The filter fabric shall be secured and have a minimum overlap of 0.15 meters. The pipe shall be placed in the bedding surface that is accurately shaped to conform to the lower 1/4 of the outside portion of the pipe. Perforated pipe shall be laid with the perforated side uppermost. Pipe shall be laid to the grades and alignment indicated or as directed. The laying shall proceed upgrade from the lower end of the pipe line. Pipe grade shall be maintained within 30 millimeters in 3 meters of that indicated. The Contractor shall submit his pipe laying plan (including the filter fabric wrap) to the Contracting Officer for approval.

3.1.3.1 Joints

The joints between sections of perforated pipe shall be of a type that will hold the pipe securely in alignment and maintain the inner surfaces of abutting pipes flush and even. Solvent cement or elastomeric joints for Acrylonitrile-Butadiene-Styrene pipe shall be in accordance with ASTM D 2751.

Dimensions and tolerances shall be in accordance with ASTM D 2751. Joints for PolyVinyl Chloride pipe shall be in accordance with ASTM D 3212.

3.2 TESTS

3.2.1 Drain Material and Filter Material

3.2.1.1 Points

Points on the individual grading curves obtained from representative samples of the drain material and filter material not only shall lie between the boundary limits as defined by smooth curves drawn through the tabulated grading limits plotted on a mechanical-analysis diagram but also shall exhibit no abrupt changes in slope denoting skip grading, scalping of certain sizes, or other irregularities which would be detrimental to the proper functioning of the drain and filter.

3.2.1.2 Sampling and Testing

Sampling and testing of the drain material shall be performed by the Contractor to determine compliance of the installed materials with specified requirements in conformance with ASTM C 131, ASTM C 136, and ASTM D 75. Sampling and testing of the filter material shall be performed by the Contractor to determine compliance of the installed materials with specified requirements in conformance with ASTM C 136. Sampling and testing shall be performed at regular intervals with at least three tests being made for both the drain and filter materials. The location of after placement tests shall be as directed.

3.2.1.3 Smoothness Test

The finished surface of both the drain material and filter material layers shall not vary more than 12.5 millimeters from the established grade and in addition every area shall show no deviation greater than 12.5 millimeters when tested with a 3 meter straightedge.

3.3 PROTECTION

The Contractor shall take all necessary precautions to avoid damage to the completed subdrainage system and drainage pipes from the movement of equipment during placing and compacting operations of the RCC material. Protection shall consist of 1.00 meter wide and 0.60 meters high concrete surrounding the drainage pipe and neatly finished at the finish grade of RCC protection. Drain material surrounding the drainage pipes shall be compacted with mechanical tampers during placement and compaction operations.

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SECTION 03101

FORMWORK FOR CONCRETE

PART 1 GENERAL

1.1 REFERENCES

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

ACI INTERNATIONAL (ACI)

ACI 347R (1994) Guide to Formwork for Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31 1994) Making and Curing Concrete Test Specimens in the Field(

ASTM C 39 (1994) Compressive Strength of Cylindrical Concrete Specimens

ASTM C 1077 (1995a) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1 (1983) Construction and Industrial Plywood

1.2 DESIGN REQUIREMENTS

The design, engineering, and construction of the formwork 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. However, for surfaces with an ACI Class A surface designation, the allowable deflection for facing material between studs, for studs between walers and walers between bracing shall be limited to 0.0025 times the span. The formwork shall be designed as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others. The adequacy of formwork design and construction shall be monitored prior to and during concrete placement as part of the Contractor's approved Quality Control Plan.

1.3 SUBMITTALS

Government approval is required for all submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

SD-01 Data

Materials; FIO.

Manufacturer's literature shall be submitted for plywood, concrete form hard board, form accessories, prefabricated forms, form coating.

SD-04 Drawings

Shop Drawings; FIO.

Drawings and design computations for all formwork required shall be submitted at least 30 days either before fabrication on site or before delivery of prefabricated forms.

SD-09 Reports

Inspection; FIO.

The Contractor shall submit field inspection reports for concrete forms and embedded items.

1.4 SHOP DRAWINGS

The shop drawings 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.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Forms and Form Liners

Forms and form liners shall be fabricated with facing materials that will produce a finish meeting the specified construction tolerance requirements and the following surface classifications as defined in ACI 347R, and as adjusted in Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.1.1.1 Class "A" Finish

This class of finish shall apply to all concrete surfaces exposed to flowing water during the life of the structure. The form facing material shall be composed of new, well-matched tongue-and-groove lumber or new plywood panels conforming to DOC PS 1, Grade B-B concrete form, Class I.

2.1.1.2 Class "B" Finish

This class of finish shall apply to all surfaces except those specified to receive Class A or Class D. The form facing material shall be composed of tongue-and-groove or shiplap lumber, plywood conforming to DOC PS 1, Grade B-B concrete form, tempered concrete form hard board or steel. Steel lining on wood sheathing will not be permitted.

2.1.1.3 Class "D" Finish

This class of finish shall apply to concrete faces against which earthfill will be placed. The form facing may be of wood or steel.

2.1.2 Form Coating

Form coating shall be commercial formulation that will not bond with, stain, cause deterioration, or any other damage to concrete surfaces. The coating shall 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. If special form liners are to be used, the Contractor shall follow the recommendation of the form coating manufacturer.

2.2 ACCESSORIES

Ties and other similar form accessories to be partially or wholly embedded in the concrete shall be of a commercially manufactured type. After the ends or end fasteners have been removed, the embedded portion of metal ties shall terminate not less than 50 mm 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.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Form Construction

Forms shall be constructed true to the structural design and required alignment. The form surface and joints shall be mortar tight and supported to achieve safe performance during construction, concrete placement, and form removal. The Contractor shall continuously monitor the alignment and stability of the forms during all phases to assure the finished product will meet the required surface class or classes specified in paragraph FORMS AND FORM LINERS and tolerances specified in paragraph DESIGN REQUIREMENTS. Failure of any supporting surface either due to surface texture, deflection or form collapse shall be the responsibility of the Contractor as will the replacement or correction of unsatisfactory surfaces. When forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be re-used if there is any evidence of defects which would impair the quality of the resulting concrete surface. All surfaces of used forms shall be cleaned of mortar and any other foreign material before reuse.

3.1.2 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 300 mm outside the limit of the earth or rockfill so that the end of the chamfers will be clearly visible.

3.1.3 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 instructions. Forms for unexposed surfaces may be wet with water in lieu of coating immediately before placing concrete, except that, in cold weather when freezing temperatures are anticipated, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.2 FORM REMOVAL

Forms shall not be removed without approval. The minimal time required for concrete to reach a strength adequate for removal of formwork without risking the safety of workers or the quality of the concrete depends on a number of factors including, but not limited to, ambient temperature, concrete lift heights, type and amount of concrete admixture, and type and amount of cementitious material in the concrete. It is the responsibility of the Contractor to consider all applicable factors and leave the forms in place until it is safe to remove them. **In any case forms shall not be removed unless the minimum strength/time requirements below are met**, except as otherwise directed or specifically authorized. When conditions are such as to justify the requirement, forms will be required to remain in place for a longer period. All removal shall be accomplished in a manner which will prevent damage to the concrete and ensure the complete safety of the structure. Where forms support more than one element, the forms shall not be removed until the form removal criteria are met by all supported elements. Form removal shall be scheduled so that all necessary repairs can be performed as specified in Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE, paragraph FORMED SURFACES. Evidence that concrete has gained sufficient strength to permit removal of forms shall be determined by tests on control cylinders. All control cylinders shall be stored in the structure or as near the structure as possible so they receive the same curing conditions and protection methods as given those portions of the structure they represent. Control cylinders shall be removed from the molds at an age of no more than 24 hours. All control cylinders shall be prepared and tested in accordance with ASTM C 31 and ASTM C 39 at the expense of the Contractor by an independent laboratory that complies with ASTM C 1077 and shall be tested within 4 hours after removal from the site.

3.2.1 Formwork Not Supporting Weight of Concrete

Formwork for walls, columns, sides of beams, gravity structures, and other vertical type formwork not supporting the weight of concrete shall not be removed in less than 24 hours after concrete placement is completed.

3.2.2 Formwork Supporting Weight of Concrete

Formwork supporting weight of concrete and shoring shall not be removed until structural members have acquired sufficient strength to safely support their own weight and any construction or other superimposed loads to which the supported concrete may be subjected. As a minimum, forms shall be left in place until control concrete test cylinders indicate evidence the concrete has attained at least 70 percent of the compressive strength required for the structure in accordance with the quality and location requirements of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE, paragraph REQUIRED AVERAGE COMPRESSIVE STRENGTH.

3.3 INSPECTION

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.

-- End of Section --

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DIVISION 04 - MASONRY

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SECTION 04200

MASONRY

PART 1 GENERAL

1.1 REFERENCES

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

ACI INTERNATIONAL (ACI)

ACI SP-66 (1994) ACI Detailing Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 615M (1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM C 90 (1995) Load bearing Concrete Masonry Units

ASTM C 91 (1995) Masonry Cement

ASTM C 270 (1995) Mortar for Unit Masonry

ASTM C 476 (1991) Grout for Masonry

ASTM C 494 (1992) Chemical Admixtures for Concrete

ASTM C 641 (1982; R 1991) Staining Materials in Lightweight Concrete Aggregates

ASTM C 780 (1994) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

ASTM C 1019 (1989a; R 1993) Sampling and Testing Grout

ASTM E 447 (1992b) Compressive Strength of Masonry Prisms

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with SECTION 01300 SUBMITTAL PROCEDURES:

SD-01 Data

Concrete Masonry Units; GA.

Manufacturer's descriptive data.

SD-04 Drawings

Masonry Work; GA.

Drawings showing the location and layout of block units. Drawings including plans, elevations, and details of wall reinforcement; details of reinforcing bars at corners and wall intersections; offsets; tops, bottoms, and ends of walls; control and expansion joints; and wall openings. Bar splice locations shall be shown. Bent bars shall be identified on a bending diagram and shall be referenced and located on the drawings. Wall dimensions, bar clearances, and wall openings greater than one masonry unit in area shall be shown. No approval will be given to the shop drawings until the Contractor certifies that all openings, including those for mechanical and electrical service, are shown. If, during construction, additional masonry openings are required, the approved shop drawings shall be resubmitted with the additional openings shown along with the proposed changes. Location of these additional openings shall be clearly highlighted. The minimum scale for wall elevations shall be 1 to 50. Reinforcement bending details shall conform to the requirements of ACI SP-66.

SD-08 Statements

Cold Weather Installation; GA.

Cold weather construction procedures.

SD-09 Reports

Field Testing of Mortar; GA. Field Testing of Grout; GA. Prism tests; GA.

Test reports from an approved independent laboratory. Test reports on a previously tested material shall be certified as the same as that proposed for use in this project.

Special Inspection; GA.

Copies of masonry inspector reports.

SD-13 Certificates

Concrete Masonry Units (CMU); FIO. Bar Positioners; F10. Expansion-Joint Materials; FIO. Reinforcing Steel Bars and Rods; FIO. Masonry Cement; FIO. Mortar Coloring; FIO. Mortar Admixtures; FIO. Grout Admixtures; FIO.

Certificates of compliance stating that the materials meet the specified requirements.

SD-14 Samples

Concrete Masonry Units (CMU); GA.

Color samples of one unit for each type of block. Units shall show the full range of color and texture.

1.3 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered, handled, stored, and protected to avoid chipping, breakage, and contact with soil or contaminating material.

1.3.1 Masonry Units

Concrete masonry units shall be covered or protected from inclement weather and shall conform to the moisture content as specified in ASTM C 90 when delivered to the jobsite.

1.3.2 Reinforcement

Steel reinforcing bars shall be stored above the ground. Steel reinforcing bars shall be free of loose mill scale and rust.

1.3.3 Cementitious Materials, Sand and Aggregates

Cementitious and other packaged materials shall be delivered in unopened containers, plainly marked and labeled with manufacturers' names and brands. Cementitious material shall be stored in dry, weathertight enclosures or be completely covered. Cement shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Sand and aggregates shall be stored in a manner to prevent contamination or segregation.

1.4 SPECIAL INSPECTION

A qualified masonry inspector approved by the Contracting Officer shall perform inspection of the masonry work. Minimum qualifications for the masonry inspector shall be 5 years of reinforced masonry inspection experience or acceptance by a State, municipality, or other governmental body having a program of examining and certifying inspectors for reinforced masonry construction. The masonry inspector shall be present during preparation of masonry prisms, sampling and placing of masonry units, placement of reinforcement (including placement of dowels in footings and foundation walls), inspection of grout space, immediately prior to closing of cleanouts, and during grouting operations. The masonry inspector shall assure Contractor compliance with the drawings and specifications. The masonry inspector shall keep a complete record of all inspections and shall submit daily written reports to the Quality Control Supervisory Representative reporting the quality of masonry construction.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

The source of materials which will affect the appearance of the finished work shall not be changed after the work has started except with Contracting Officer's approval.

2.2 CONCRETE MASONRY UNITS (CMU)

Hollow and solid concrete masonry units shall conform to ASTM C 90, Type I, Normal weight. Cement shall have a low alkali content and be of one brand.

2.2.1 Aggregates

Lightweight aggregates and blends of lightweight and heavier aggregates in proportions used in producing the units, shall comply with the following requirements when tested for stain-producing iron compounds in accordance with ASTM C 641: by visual classification method, the iron stain deposited on the filter paper shall not exceed the "light stain" classification.

2.2.2 Kinds and Shapes

Units shall be modular in size and shall include closer, jamb, header, lintel, and bond beam units and special shapes and sizes to complete the work as indicated.

2.3 MORTAR

Mortar shall be Type S in accordance with the proportion specification of ASTM C 270 except Type S cement-lime mortar proportions shall be 1 part cement, 1/2 part lime and 4-1/2 parts aggregate; when masonry cement ASTM C 91 is used the maximum air content shall be limited to 12 percent and performance equal to cement-lime mortar shall be verified. Evaluation of performance shall be based on ASTM C 780 and ASTM C 1072. Pointing mortar in showers shall contain ammonium stearate, or aluminum tri-stearate, or calcium stearate in an amount equal to 3 percent by weight of cement used. Cement shall have a low alkali content and be of one brand. Aggregates shall be from one source.

2.3.1 Admixtures

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494, Type C.

2.3.2 Coloring

Mortar coloring shall be added to the mortar used for exposed masonry surfaces to produce a uniform color matching the concrete masonry units. Mortar coloring shall not exceed 3 percent of the weight of cement for carbon black and ten percent of the weight of cement for all other pigments. Mortar coloring shall be chemically inert, of finely ground limeproof pigment, and furnished in accurately pre-measured and packaged units that can be added to a measured amount of cement.

2.4 GROUT

Grout shall conform to ASTM C 476. Cement used in grout shall have a low alkali content. Grout slump shall be between 200 and 250 mm. Grout shall be used subject to the limitations of Table III. Proportions shall not be changed and materials with different physical or chemical characteristics shall not be used in grout for the work unless additional evidence is furnished that the grout meets the specified requirements.

2.4.1 Admixtures

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494, Type C.

2.5 BAR POSITIONERS

Bar positioners, used to prevent displacement of reinforcing bars during the course of construction, shall be factory fabricated from 9 gauge steel wire or equivalent, and coated with a hot-dip galvanized finish. Not more than one wire shall cross the cell.

2.6 REINFORCING STEEL BARS AND RODS

Reinforcing steel bars and rods shall conform to ASTM A 615M, Grade 420.

PART 3 EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

3.1.1 Hot Weather Installation

The following precautions shall be taken if masonry is erected when the ambient air temperature is more than 37 degrees C in the shade and the relative humidity is less than 50 percent. All masonry materials shall be shaded from direct sunlight; mortar beds shall be spread no more than 1.2 m ahead of masonry; masonry units shall be set within one minute of spreading mortar; and after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

3.1.2 Cold Weather Installation

Before erecting masonry when ambient temperature or mean daily air temperature falls below 4 degrees C, a written statement of proposed cold weather construction procedures shall be submitted for approval. The following precautions shall be taken during all cold weather erection.

3.1.2.1 Preparation

Ice or snow formed on the masonry bed shall be thawed by the application of heat. Heat shall be applied carefully until the top surface of the masonry is dry to the touch. Sections of masonry deemed frozen and damaged shall be removed before continuing construction of those sections.

a. Air Temperature 4 to 0 degrees C. Sand or mixing water shall be heated to produce mortar temperatures between 4 degrees C and 49 degrees C.

b. Air Temperature 0 to minus 4 degrees C. Sand and mixing water shall be heated to produce mortar temperatures between 4 degrees C and 49 degrees C. Temperature of mortar on boards shall be maintained above freezing.

c. Air Temperature minus 4 to minus 7 degrees C. Sand and mixing water shall be heated to provide mortar temperatures between 4 degrees C and 49 degrees C. Temperature of mortar on boards shall be maintained above freezing. Sources of heat shall be used on both sides of walls under construction. Windbreaks shall be employed when wind is in excess of 24 km/hour.

d. Air Temperature minus 7 degrees C and below. Sand and mixing water shall be heated to provide mortar temperatures between 4 degrees C and 49 degrees C. Enclosure and auxiliary heat shall be provided to maintain air temperature above 0 degrees C. Temperature of units when laid shall not be less than minus 7 degrees C.

3.1.2.2 Completed Masonry and Masonry Not Being Worked On

a. Mean daily air temperature 4 degrees C to 0 degrees C. Masonry shall be protected from rain or snow for 24 hours by covering with weather-resistive membrane.

b. Mean daily air temperature 0 degrees C to minus 4 degrees C.

Masonry shall be completely covered with weather-resistant membrane for 24 hours.

c. Mean Daily Air Temperature minus 4 degrees C to minus 7 degrees C. Masonry shall be completely covered with insulating blankets or equally protected for 24 hours.

d. Mean Daily Temperature minus 7 degrees C and Below. Masonry temperature shall be maintained above 0 degrees C for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps, or other approved methods.

3.1.3 LAYING MASONRY UNITS

Masonry units shall be laid in running bond pattern. Each unit shall be adjusted to its final position while mortar is still soft and plastic. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned, and relaid with fresh mortar. Expansion joints and spaces to be grouted shall be kept free from mortar and other debris. Units used in exposed masonry surfaces shall be free from chipped edges or other imperfections detracting from the appearance of the finished work. Vertical joints shall be kept plumb. Units being laid and surfaces to receive units shall be free of water film and frost. Solid units shall be laid in a nonfurrowed full bed of mortar. Vertical face shells of concrete masonry units, except where indicated at control, expansion, and isolation joints, shall be completely filled with mortar. Mortar will be permitted to protrude up to 13 mm into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below.

3.1.4 Surface Preparation

Surfaces upon which masonry is placed shall be cleaned of laitance, dust, dirt, oil, organic matter, or other foreign materials and shall be slightly roughened to provide a surface texture with a depth of at least 3 mm. Sandblasting shall be used, if necessary, to remove laitance from pores and to expose the aggregate.

3.1.5 Forms and Shores

Forms and shores shall be sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Supporting forms and shores shall not be removed in less than 10 days.

3.1.6 Concrete Masonry Units

Units in piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout shall be full bedded in mortar under both face shells and webs. Other units shall be full bedded under both face shells. Head joints shall be filled solidly with mortar for a distance in from the face of the unit not less than the thickness of the face shell. Foundation walls below grade shall be grouted solid. Jamb units shall be of the shapes and sizes to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved. Walls and partitions shall be adequately reinforced for support of wall-hung plumbing fixtures when chair carriers are not specified.

3.1.7 Tolerances

Masonry shall be laid plumb, true to line, with courses level. Bond pattern shall be kept plumb throughout. Corners shall be square unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, masonry shall be laid within the following tolerances (plus or minus unless otherwise noted):

TABLE II
TOLERANCES

Variation from the plumb in the lines
and surfaces of columns, walls and arises

In adjacent masonry units	3 mm
In 3 m	6 mm
In 6 m	10 mm
In 12 m or more	13 mm

Variations from the plumb for external corners,
expansion joints, and other conspicuous lines

In 6 m	6 mm
In 12 m or more	13 mm

Variations from the level for exposed lintels,
sills, parapets, horizontal grooves, and other
conspicuous lines

In 6 m	6 mm
In 12 m or more	13 mm

Variation from level for bed joints and top
surfaces of bearing walls

In 3 m	6 mm
In 12 m or more	13 mm

Variations from horizontal lines

In 3 m	6 mm
In 6 m	10 mm
In 12 m or more	13 mm

Variations in cross sectional dimensions of columns

Minus 6 mm
Plus 13 mm

3.1.8 Cutting and Fitting

Full units of the proper size shall be used wherever possible, in lieu of cut units. Cutting and fitting, including that required to accommodate the work of others, shall be done by masonry mechanics using power masonry

saws. Concrete masonry units may be wet or dry cut. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall. Cut edges shall be clean, true and sharp. Openings in the masonry shall be made carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Reinforced masonry lintels shall be provided above openings over 300 mm wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

3.1.9 Jointing

Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as follows:

3.1.9.1 Tooled Joints

Joints in exposed exterior and interior masonry surfaces shall be tooled slightly concave. Joints shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.

3.1.9.2 Door and Window Frame Joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 10 mm. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 10 mm.

3.1.10 Joint Widths

Concrete masonry units shall have 10 mm joints.

3.1.11 Embedded Items

Spaces around built-in items shall be filled with mortar. Openings around flush-mount electrical outlet boxes in wet locations shall be pointed with mortar. Anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in shall be embedded as the masonry work progresses. Cells receiving anchor bolts and cells of the first course below bearing plates shall be filled with grout.

3.1.12 Unfinished Work

Unfinished work shall be stepped back for joining with new work. Tothing may be resorted to only when specifically approved. Loose mortar shall be removed and the exposed joints shall be thoroughly cleaned before laying new work.

3.1.13 Masonry Wall Intersections

Each course shall be masonry bonded at corners and elsewhere as shown. Masonry walls shall be anchored or tied together at corners and intersections with bond beam reinforcement as shown.

3.2 MORTAR

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes, but not more than 5 minutes. Measurement of ingredients for mortar shall be by volume. Ingredients not in containers, such as sand, shall be accurately measured by the use of measuring boxes. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Mortar that has stiffened because of loss of water through evaporation shall be retempered by adding water to restore the proper consistency and workability. Mortar that has reached its initial set or that has not been used within 2-1/2 hours after mixing shall be discarded.

3.3 REINFORCING STEEL

Reinforcement shall be cleaned of loose, flaky rust, scale, grease, mortar, grout, or other coating which might destroy or reduce its bond prior to placing grout. Bars with kinks or bends not shown on the drawings shall not be used. Reinforcement shall be placed prior to grouting. Unless otherwise indicated, vertical wall reinforcement shall extend to within 50 mm of tops of walls.

3.3.1 Positioning Bars

Vertical bars shall be accurately placed within the cells at the positions indicated on the drawings. A minimum clearance of 13 mm shall be maintained between the bars and masonry units. Minimum clearance between parallel bars shall be one diameter of the reinforcement. Vertical reinforcing may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement. Column and pilaster ties shall be wired in position around the vertical steel. Ties shall be in contact with the vertical reinforcement and shall not be placed in horizontal bed joints.

3.3.2 Splices

Bars shall be lapped a minimum of 48 diameters of the reinforcement. Welded or mechanical connections shall develop at least 125 percent of the specified yield strength of the reinforcement.

3.4 PLACING GROUT

All cells shall be filled with grout. Cells under lintel bearings on each side of openings shall be filled solid with grout for full height of openings. Walls below grade, lintels, and bond beams shall be filled solid with grout. Units other than open end units may require grouting each course to preclude voids in the units. Grout not in place within 1-1/2 hours after water is first added to the batch shall be discarded. Sufficient time shall be allowed between grout lifts to preclude displacement or cracking of face shells of masonry units. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, the wall shall be torn down and rebuilt.

3.4.1 Vertical Grout Barriers for Fully Grouted Walls

Grout barriers shall be provided not more than 10 m apart, or as required, to limit the horizontal flow of grout for each pour.

3.4.2 Cleanouts for Hollow Unit Masonry Construction

Cleanout holes shall be provided at the bottom of every pour in cores containing vertical reinforcement when the height of the grout pour exceeds 1.5 m. Where all cells are to be grouted, cleanout courses shall be constructed using bond beam units in an inverted position to permit cleaning of all cells. Cleanout holes shall be provided at a maximum spacing of 800 mm where all cells are to be filled with grout. A new series of cleanouts shall be established if grouting operations are stopped for more than 4 hours. Cleanouts shall not be less than 75 by 100 mm openings cut from one face shell. Manufacturer's standard cutout units may be used at the Contractor's option. Cleanout holes shall not be closed until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, cleanout holes shall be closed in an approved manner to match surrounding masonry.

3.4.3 Grouting Equipment

3.4.3.1 Grout Pumps

Pumping through aluminum tubes will not be permitted. Pumps shall be operated to produce a continuous stream of grout without air pockets, segregation, or contamination. Upon completion of each day's pumping, waste materials and debris shall be removed from the equipment, and disposed of outside the masonry.

3.4.3.2 Vibrators

Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the grout. At least one spare vibrator shall be maintained at the site at all times. Vibrators shall be applied at uniformly spaced points not further apart than the visible effectiveness of the machine. Duration of vibration shall be limited to time necessary to produce satisfactory consolidation without causing segregation.

3.4.4 Grout Placement

Masonry shall be laid to the top of a pour before placing grout. Grout shall not be placed in hollow unit masonry until mortar joints have set for at least 24 hours. Grout shall be placed using a hand bucket, concrete hopper, or grout pump to completely fill the grout spaces without segregation of the aggregates. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. The height of grout pours and type of grout used shall be limited by the dimensions of grout spaces as indicated in Table III. Low-lift grout methods may be used on pours up to and including 1.5 m in height. High-lift grout methods shall be used on pours exceeding 1.5 m in height.

3.4.4.1 Low-Lift Method

Grout shall be placed at a rate that will not cause displacement of the masonry due to hydrostatic pressure of the grout. Mortar protruding more than 13 mm into the grout space shall be removed before beginning the grouting operation. Grout pours 300 mm or less in height shall be consolidated by mechanical vibration or by puddling. Grout pours over 300 mm in height shall be consolidated by mechanical vibration and reconsolidated by mechanical vibration after initial water loss and settlement has occurred. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. Low-lift grout shall be used subject to the limitations of Table III.

3.4.4.2 High-Lift Method

Mortar droppings shall be cleaned from the bottom of the grout space and from reinforcing steel. Mortar protruding more than 6 mm into the grout space shall be removed by dislodging the projections with a rod or stick as the work progresses. Reinforcing, bolts, and embedded connections shall be rigidly held in position before grouting is started. CMU units shall not be pre-wetted. Grout, from the mixer to the point of deposit in the grout space shall be placed as rapidly as practical by pumping and placing methods which will prevent segregation of the mix and cause a minimum of grout splatter on reinforcing and masonry surfaces not being immediately encased in the grout lift. The individual lifts of grout shall be limited to 1.2 m (4 feet) in height. The first lift of grout shall be placed to a uniform height within the pour section and vibrated thoroughly to fill all voids. This first vibration shall follow immediately behind the pouring of the grout using an approved mechanical vibrator. After a waiting period sufficient to permit the grout to become plastic, but before it has taken any set, the succeeding lift shall be poured and vibrated 300 to 450 mm (12 to 18 inches) into the preceding lift. If the placing of the succeeding lift is going to be delayed beyond the period of workability of the preceding, each lift shall be reconsolidated by reworking with a second vibrator as soon as the grout has taken its settlement shrinkage. The waiting, pouring, and reconsolidation steps shall be repeated until the top of the pour is reached. The top lift shall be reconsolidated after the required waiting period. The high-lift grouting of any section of wall between vertical grout barriers shall be completed to the top of a pour in one working day unless a new series of cleanout holes is established and the resulting horizontal construction joint cleaned. High-lift grout shall be used subject to the limitations in Table III.

TABLE III

POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS

Minimum Dimensions of the Total Clear Areas
Within Grout Spaces and Cells (mm) (1,2)

Height (m) (3)	Grout Type	Maximum Grout Pour Grouting Procedure	Hollow-unit Masonry
0.3	Fine	Low Lift	40 x 50
1.5	Fine	Low Lift	50 x 75
2.4	Fine	High Lift	50 x 75
3.6	Fine	High Lift	65 x 75
7.3	Fine	High Lift	75 x 75
0.3	Coarse	Low Lift	40 x 75
1.5	Coarse	Low Lift	65 x 75
2.4	Coarse	High Lift	75 x 75
3.6	Coarse	High Lift	75 x 75
7.3	Coarse	High Lift	75 x 100

Notes:

(1) The actual grout space or cell dimension must be larger than the

sum of the following items:

- a) The required minimum dimensions of total clear areas given in the table above;
 - b) The width of any mortar projections within the space;
 - c) The horizontal projections of the diameters of the horizontal reinforcing bars within a cross section of the grout space or cell.
- (2) The minimum dimensions of the total clear areas shall be made up of one or more open areas, with at least one area being 20 mm or greater in width.
- (3) Where only cells of hollow masonry units containing reinforcement are grouted, the maximum height of the pour shall not exceed the distance between horizontal bond beams.

3.5 BOND BEAMS

Bond beams shall be filled with grout and reinforced as indicated on the drawings. Grout barriers shall be installed under bond beam units to retain the grout as required. Reinforcement shall be continuous, including around corners, except through control joints or expansion joints, unless otherwise indicated on the drawings. Where splices are required for continuity, reinforcement shall be lapped 48 bar diameters. A minimum clearance of 13 mm shall be maintained between reinforcement and interior faces of units. Bond beams that are continuous over openings will be reinforced to serve as lintels.

3.6 MASONRY LINTELS

Masonry lintels shall be constructed with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 4 bars in the bottom course unless otherwise indicated on the drawings. Lintel reinforcement shall extend beyond each side of masonry opening 40 bar diameters or 600 mm, whichever is greater. Reinforcing bars shall be supported in place prior to grouting and shall be located 15 mm above the bottom inside surface of the lintel unit.

3.7 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, mortar and grout daubs or splashings shall be completely removed from masonry-unit surfaces that will be exposed or painted. Before completion of the work, defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Immediately after grout work is completed, scum and stains which have percolated through the masonry work shall be removed using a high pressure stream of water and a stiff bristled brush. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Metal tools and metal brushes shall not be used for cleaning.

3.7.1 Concrete Masonry Unit and Concrete Brick Surfaces

Exposed concrete masonry unit surfaces shall be dry-brushed at the end of

each day's work and after any required pointing, using stiff-fiber bristled brushes.

3.8 TEST REPORTS

3.8.1 Field Testing of Mortar

At least three specimens of mortar shall be taken each day. A layer of mortar 13 to 16 mm thick shall be spread on the masonry units and allowed to stand for one minute. The specimens shall then be prepared and tested for compressive strength in accordance with ASTM C 780.

3.8.2 Field Testing of Grout

Field sampling and testing of grout shall be in accordance with the applicable provisions of ASTM C 1019. A minimum of three specimens of grout per day shall be sampled and tested. Each specimen shall have a minimum ultimate compressive strength of 13.8 MPa at 28 days.

3.8.3 Prism Tests

At least one prism test sample shall be made for each 465 square meters of wall but not less than three such samples shall be made for any building. Three prisms shall be used in each sample. Prisms shall be tested in accordance with ASTM E 447. Seven-day tests may be used provided the relationship between the 7- and 28-day strengths of the masonry is established by the tests of the materials used. Compressive strength shall not be less than 11 Mpa at 28 days. If the compressive strength of any prism falls below the specified value by more than 3.5 MPa, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. If the likelihood of low-strength masonry is confirmed and computations indicate that the load-carrying capacity may have been significantly reduced, tests of cores drilled, or prisms sawed, from the area in question may be required. In such case, three specimens shall be taken for each prism test more than 3.5 MPa below the specified value. Masonry in the area in question shall be considered structurally adequate if the average compressive strength of three specimens is equal to at least 85 percent of the specified value, and if the compressive strength of no single specimen is less than 75 percent of the specified value. Additional testing of specimens extracted from locations represented by erratic core or prism strength test results shall be permitted.

-- End of Section --