STATE OF UTAH
UTAH WATER AND POWER BOARD

BID FORMS, SPECIFICATIONS, AND DRAWINGS

LITTLE DEER CREEK DAM
KAMAS PROJECT

BIDS WILL BE RECEIVED AT THE AUDITORIUM OF THE
STATE OFFICE BUILDING, SALT LAKE CITY, UTAH,
UNTIL 2 P.M. MOUNTAIN STANDARD TIME,
JULY 20, 1961
MAILED BIDS SHOULD BE ADDRESSED TO THE
UTAH WATER AND POWER BOARD, 425 STATE CAPITOL,
SALT LAKE CITY, UTAH

INF ORMATION FOR BIDDERS

NAME OF PROJECT:	LITTLE DEER CREEK DAM
WATER COMPANY:	SOUTH KAMAS-WASHINGTON IRRIGATION COMPANY
President's Name:	John A. Lambert, Kamas, Utah Telephone: Kamas 2787
Secretary's Name:	T.W. McNeil, Kamas, Utah Telephone: Kamas 3151
ENGINEER:	UTAH WATER AND POWER BOARD 425 State Capitol Building Salt Lake City, Utah
BIDS TO BE OPENED:	2:00 p.m. M.S.T. July 20, 1961 Auditorium New State Office Building Salt Lake City, Utah
MAIL BIDS TO:	UTAH WATER AND POWER BOARD 425 State Capitol Building Salt Lake City, Utah
PLANS AVAILABLE - $10 Charge - FROM:	UTAH WATER AND POWER BOARD 425 State Capitol Building Salt Lake City, Utah
CONTRACTOR WILL BE SHOWN OVER THE WORK BY CONTACTING:	UTAH WATER AND POWER BOARD Telephone: DAvis 8-5831 , or JOHN LAMBERT, Kamas, Utah Telephone: Kamas 2787
MAJOR ITEMS OF WORK: (See Bid Schedule for Detail)	CONSTRUCTION OF EARTH FILL DAM, - 25 miles East of Kamas, Utah. Headwaters of Duchesne River. Stripping and Excavation, Common - 8,600 c.y. Excavation, Rock - 4,800 c.y. Earth Fill - 76,000 c.y. Riprap - 3,500 c.y. Reinf.Conc. -80 c.y. Misc. Steel - 2,400 lbs. Reinforced Conc. pipe, 18" - 400 L.F. Slide Gate, Lift and Stem - 1 Job.
COMPLETION TIME:	75 working days (Sundays excluded). Liquidated damages - $25 per additional working day. Completion incentive - Contractor will be paid $75 per day for each day prior to 75 working days.

H.36. p-140 to 142a

INVITATION TO BID

To Intended Bidder:

The Water Company whose name appears on the page marked "Information to Bidders" invites your bid to contract for performing work and furnishing materials for the construction of a water conservation project.

1. Bids will be received and opened at the place and time as indicated in the "Information to Bidders."

2. Bids shall be submitted in a sealed envelope which is marked on the outside "Sealed Bid." The date of the opening shall also be shown on the envelope. If submitted by mail, the sealed envelope containing the bid shall be enclosed in a mailing envelope. Bids shall be submitted on form "Bid Proposal" accompanying the specifications and shall be properly executed as indicated thereon.

3. The bid is to be accompanied by a bid bond in the form of a certified check, cashier's check or bid bond drawn in the name of the Water Company as defined herein in the amount of 5% of the total bid price. All checks or bonds received with the bids will be retained until the final signing and approval of the contract or the rejection of all bids, then they will be returned to the proper parties.

4. The Bidder, who is awarded this construction contract, will be required to execute the form of contract provided by the Water & Power Board and furnish a 100% Performance and Payment Bond to the Water Company.

5. The right is reserved, as the interests of the Water Company and the Utah Water & Power Board may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any or all items of any bid, unless such bid is qaulified by specific limitation. The decision of the Water Company as to the Bidder selected for this construction contract will be conclusive.

6. Copies of plans, specifications, information to bidders, forms of contract, performance bonds, proposal and bid schedule, and other papers pertaining thereto may be obtained at the office of the Utah Water & Power Board, State Capitol Building; from the Water Company; or from the Engineer. A deposit charge of 10.00 will be made for each set of documents and will be refunded on return of the documents in good condition.

7. Bidders are required to carefully examine the contract, plans, and specifications, visit the site of the work, and fully inform themselves as to all conditions and matters which can in any way affect the work or cost thereof. Should

a Bidder find discrepancies in or omission from any plans or documents or have any questions pertaining thereto, he should contact the Engineer for clarification prior to submitting any bid.

8. This project is a cooperative effort between the Water Company and the Utah Water & Power Board in which each shall pay an agreed percentage of the total construction cost. Utah Water & Power Board will pay its share directly to the Water Company. The relationship of the Water Company to construction contractor is similar to the usual owner-contractor with the exception that the Utah Water & Power Board exercises final control on technical phases of the work by virtue of its financial interest in the project.

The contract documents shall not be construed as creating any contractual relation between any successful bidder and the Utah Water & Power Board.

BID PROPOSAL

To the Water Company:

The undersigned states and warrants that he has carefully examined the plans, specifications, form of contract, form of bond, instructions and other contract papers relating to the construction for which this proposal is made, and that he has examined the site of the work and has given attention to and carefully considered all of the matters which affect the nature and the cost of construction and its several parts.

If this proposal as given on the attached Bid Schedule is accepted, the undersigned will, within ten days after notice thereof, in writing, by the Water Company, furnish a bond in accordance with the form of bond herewith attached, for the full amount of the total contract price correctly computed from the unit prices bid, and executed in favor of the Water Company by ....., surety, whose address is..... and will sign and execute the accompanying form of construction contract.

.....
Name of Bidder, Construction Contractor

.....
Signature of Representative

.....
Position of Representative

.....

.....
Address

Date:.....

LITTLE DEER CREEK DAM
UTAH

Bids will be considered on the following schedule, but no bid will be considered for only a part of the schedule:

SCHEDULE

Item No.	Work or Material	Quantity and Unit	Unit Price	Amount
1.	Diversion and care of creek and unwatering cutoff trench	For the lump sum of $_____		
2.	Clearing reservoir spillway and borrow areas	35 acres	$_____	$_____
3.	Stripping embankment foundation	8000 cy	$_____	$_____
4.	Excavation common for cutoff trench outlet works and spillway channel	600 cy	$_____	$_____
5.	Excavation, rock for outlet works and spillway channel	2500 cy	$_____	$_____
6.	Compact backfill about outlet works	600 cy	$_____	$_____
7.	Procuring and placing earth embankment, Zone 1	59,000 cy	$_____	$_____
8.	Procuring and placing earth embankment, Zone 2	16,000 cy	$_____	$_____
9.	Procuring and placing rock in toe drain	1,000 cy	$_____	$_____
10.	Procuring and placing dumped riprap on upstream face of dam above Elev. 9,200 and in spillway channel	1800 cy	$_____	$_____
11.	Furnishing and installing 18-inch diameter, class V, reinforced concrete pipe	400 L.F.	$_____	$$_____

SCHEDULE (continued)

Item No.	Work or Material	Quantity and Unit	Unit Price	Amount
12.	Furnishing and installing Armco 100-30C, flanged slidegate, C2E-4 pedestal lift, (4:1 gear ratio) complete with 8" thimble, 235 feet of 2" cold rolled steel shaft, 10 feet of 2" bronze shaft, complete with 2.5 in. galvanized pipe shaft cover and stem guides			For the lump sum of$_____
13.	Furnishing and placing concrete in outlet pipe cradle, and cutoff collars	65 cy	$_____	$_____
14.	Furnishing and placing concrete in outlet structures, pedestals and gate lift structure	15 cy	$_____	$_____
15.	Furnishing and placing reinforcing steel	5000 lbs.	$_____	$_____
16.	Furnishing and installing steel trashracks and steel Parshall flume			For the lump sum of $_____
	TOTAL FOR SCHEDULE			$_____

BID BOND

Date Bond Executed.....

Principal.....

Surety.....

Sum of Bond.....Date of Bid.....

KNOW ALL MEN BY THESE PRESENTS, That we, the PRINCIPAL and SURETY above named, are held and firmly bound unto the Water Company herein known as the obligee, in the sum of the amount stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THE OBLIGATION IS SUCH, that whereas the principal has submitted the accompanying bid, dated as shown above, for

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that if the said principal shall execute a contract and give bond to be approved by the obligee for the faithful performance thereof within ten days after being notified in writing of such contract to the principal, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

IN WITNESS WHEREOF, the above-bounded parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

INDIVIDUAL OR PARTNERSHIP PRINCIPAL	Corporate Principal
	Business Address
	By — Affix Corporate Seal
	Title
	Corporate Surety
Note: If cash, certified or cashier's check is used in lieu of bid bond, a certificate from an approved surety company guaranteeing execution of a full performance bond must accompany bid.	Business Address
	By — Affix Corporate Seal
	Title Attorney-in-Fact

STATE OF UTAH }
County of Salt Lake } ss.

Salt Lake City, Utah

....., being first duly sworn, on oath deposes and says that he is the Attorney-in-Fact of the above-named Surety Company, and that he is duly authorized to execute and deliver the foregoing obligations; that said company is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings, and obligations.

Subscribed and sworn to before me
this.....day of....., 19.....

.....
Attorney-in-Fact

My Commission Expires .....

.....
Notary Public

CONTRACT BOND

KNOW ALL MEN BY THESE PRESENTS, That we, ...

.....

as Principal, and.....

.....

a Surety Company authorized to do business in the State of Utah, as Surety, are held and firmly bound unto the.....and the Utah Water and Power Board, hereinafter called the Obligee, and the Board, as their interest may appear, in the full and just sum of.....

.....Dollars ($.....), lawful money of the United States of America, to the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, assigns, and successors jointly and severally, firmly by these presents.

The conditions of the above obligation are such that:

WHEREAS, The above bounded Principal is about to enter into a contract with the said Obligee for the construction as described therein of .....

.....

.....

.....

in.....County, State of Utah, for the approximate sum of.....

.....Dollars ($.....), and

WHEREAS, it was one of the conditions of the award of the Obligee pursuant to which said contract is entered into, that these presents should be executed.

NOW THEREFORE, If the above-bounded Principal as Construction Contractor, shall well, truly, and faithfully comply with, keep and perform each and all of the terms, covenants, and conditions of such contract on his, its, or their part to be kept and performed according to the tenor thereof, and within the time prescribed, and shall perform the work embraced therein upon the terms proposed, and within the time prescribed and in accordance with the plans, specifications, and estimate furnished therefor, to which reference is hereby made, the same being a part hereof as if fully incorporated herein; and shall indemnify the Obligee and the Board, their officers, agents, and employees against any direct or indirect damages that shall be suffered or claimed, or injuries to persons or property during the construction of said work; and shall save and keep harmless the Obligee against and from any cause whatever, including patent, trademark, and copyright infringement or whatever kind or nature, and shall also pay or cause to be paid all claims of subcontractors, laborers, mechanics, materialmen, ranch-

men, farmers, merchants, and any other person or persons who supply the principal or any of the subcontractors of the principal with labor, work, material, ranch or farm products, provisions, goods, and supplies of any kind including tools, machinery, and equipment to the extent of their use and depreciation on this contract; and shall pay all just debts incurred therefor in carrying on such work and all insurance premiums, including compensation and all other kinds of insurance applicable to said work; then this obligation shall be null and void, otherwise it shall remain in full force and effect. It is further expressly understood that as part of the consideration for the acceptance of this bond by said Obligee that said Surety does hereby waive any and all defense which it may have against the enforcement of this bond by reason of any provisions herein contained in excess of the provisions as provided for by the laws of this State.

IN WITNESS WHEREOF, the Principal and Surety have caused these presents to be duly signed and sealed, this ..... day of ....., 19.....

WITNESS: .....

....

.....
Principal

By .....

WITNESS: .....
Surety

..... By .....
Attorney-in-Fact

STATE OF UTAH }
} ss.
County of }

....., being first duly sworn on oath, deposes and says, that he is the Attorney-in-Fact of the ....

.....

and that he is duly authorized to execute and deliver the foregoing obligation, that said Company is authorized to execute the same, and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings, and obligations.

.....

Subscribed and sworn to before me this ..... day of ....., 19.....

.....
Notary Public

My Commission Expires: .....
Approved as to form:

.....
Attorney General

CONTRACT

THIS AGREEMENT, entered into this.....day of....., 19....., by and between.....

hereinafter called the "Water Company," first party, and .....

.....

hereinafter called the Construction Contractor, second party,

WITNESSETH: That for and in consideration of payments hereinafter mentioned to be made by the Water Company, the Construction Contractor agrees to furnish all labor and equipment; to furnish and deliver all materials not specifically mentioned as being furnished by the Water Company, and to perform all work in construction of a Water & Power Board water conservation project in .....

..... County, described or known as .....

.....

for the approximate sum of.....Dollars ($.....).

The Construction Contractor further covenants and agrees that all of said work and labor shall be performed in the most workmanlike manner and in strict conformity with the plans and specifications. The said plans and technical specifications, notice to bidders, information to bidders, proposal and bid schedule, general provisions, and contract bond are hereby made a part of this agreement as fully and to the same effect as if the same had been set forth at length.

The Construction Contractor shall commence work on or before the..... day of ....., 19.....; shall pursue the work with diligence, and shall complete it on or before the.....day of....., 19.....

Time shall be considered the essence of this contract and if the Contractor, without fault of the Water Company, shall have failed to complete the said performance as required under this Contract by the time above set forth, the Construction Contractor shall forfeit as liquidated damages to the Water Company the sum of .....Dollars per day for each and every calendar day that said performance shall remain incomplete.

The Water Company shall pay to the Construction Contractor for the performance of work in accordance with the unit prices bid on the bid schedule, a copy of which is hereby attached and made a part hereto. Partial payments shall be made in accordance with Paragraphs 38 and 39 of the General Conditions on the basis

of estimates prepared by the Engineer. 10% of each approved estimate shall be withheld by the Water Company pending final approval of the completed work by the Engineer and the Utah Water & Power Board.

Final payment, including the 10% withheld on partial payments shall be made within ..... days after final approval of work and after Conditions of the specifications have been satisfied, or as follows:

.....

.....

.....

IN WITNESS WHEREOF, the parties have subscribed their names through their proper officers thereunto duly authorized as of the day and year first above written.

.....	.....
Witness	Water Company
.....	By.....
Witness	President
	.....
	Contractor
	By.....

GENERAL CONDITIONS OF THE CONTRACT

UTAH WATER & POWER BOARD

DRAFT OF JANUARY, 1960

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UTAH WATER & POWER BOARD

Draft of January, 1960

DEFINITIONS

1. BOARD, as used in these specifications and contract documents, means the UTAH WATER AND POWER BOARD, an agency of the State of Utah.

2. WATER COMPANY means the irrigation company, water company, or other non-profit organization whose name appears on the first page of these specifications and who has entered into a repayment contract with the UTAH WATER AND POWER BOARD, acting for the State of Utah, for the construction of the project as defined in the accompanying plan and specifications.

3. CONSTRUCTION CONTRACTOR means a person or firm who enters into a contract with the Water Company, as defined above, for the performance of construction of all or part of the work items listed in the accompanying bid schedule. The Construction Contractor is required to comply with all general and special conditions of the specifications, and all technical specifications which are applicable to the construction contract. The Construction Contractor will furnish performance and payment bonds acceptable to the Water Company and the Utah Water and Power Board.

4. ENGINEER means an engineer employed by the UTAH WATER AND POWER BOARD or an engineer designated by it who is responsible for laying out and supervising the construction in accordance with the plans and specification. The construction of the project performed by the Water Company, Construction Contractor, or any representative thereof will be subject to the approval and final control by the UTAH WATER AND POWER BOARD.

5. INSPECTOR means a person acting for the Board under the direction of the Engineer.

SCOPE — PLANS — SPECIFICATIONS

6. SCOPE OF WORK: The work to be performed under this contract is described in the Technical Specifications and consists of furnishing all plant equipment, materials, supplies, and labor, if necessary; and performing all work as required by the contract in strict accordance with the specifications, schedules, and drawings, all of which are made a part hereof. Detail drawings may be furnished by the supervising Engineer from time to time during construction in explanation of said drawings. The work shall be complete and any item not expressly called for in the specifications, or not shown on the drawings which is obviously necessary for complete and proper construction to carry out the contract in good faith, shall be furnished by the Contractor at no increase in cost of the contract.

7. PLANS AND SPECIFICATIONS: These specifications and plans attached are hereby made a part of the construction contract and all construction will be in accordance thereto. A list of drawings is given in the technical specifications.

Such specifications can be used by the Water Company to obtain bids from the Construction Contractors. The invitation to bid, information to bidders, and bid proposal, set forth with the specifications are to be used for that purpose and the Construction Contractors will comply with conditions thereon.

The Contractor shall keep on the work a copy of the drawings and specifications and shall at all times give the Engineer 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.

8. BASE LINE AND GRADES: The Contractor shall lay out his work from base lines and grades established by the Engineer and shall be responsible for all measurements in connection therewith. The Contractor shall, at his own expense, furnish all stakes, templates, and labor that may be required in setting and cutting or laying out any part of the work. The Contractor will be responsible for the proper execution of the work to such lines and grades as may be established or indicated by the Engineer in charge, and all stakes or other marks thus established shall be preserved by him until their removal is authorized by the Engineer. The Engineer will furnish all location and limit marks reasonably necessary for the conduct of the work. Any grade or alignment stakes set by the Engineer and not preserved by the Contractor shall be replaced at the expense of the Contractor.

RELATIONSHIPS

9. AUTHORITY OF ENGINEER: All work shall be done under the general supervision of the Engineer. The Engineer shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, rate of progress of work, interpretation of drawings and specifications, and all questions as to the acceptable fulfillment of the contract on the part of the Contractor. All claims of the Contractor or subcontractors shall be presented to the Engineer for decision, and all decisions of the Engineer shall be final except in cases where time and/or financial considerations are involved which shall be subject to arbitration.

10. CONSTRUCTION CONTRACTORS: The Water Company shall notify the Board in writing of the names of all construction contractors proposed for the work, the extent of the work to be done by each, and the general terms and conditions of each proposed construction contract. The report shall be accompanied by the contract agreement between the Water Company and the Construction Contractor and the performance and payment bond of the Construction Contractor. If, for sufficient reasons, at any time during the progress of the work the Board determines that any Construction Contractor is incompetent and undesirable, it will notify the Water Company accordingly and the Water Company will take immediate steps for cancellation of such Construction Contract. The Water Company may let all or part of the Construction Contract to one or more construction contractors. The Construction Contractor may not sublet more than 50% of the construction contract. Nothing contained in the contract shall create any contract relation between any construction contractor and the Board.

11. INSPECTION: The Board will have an inspector on the job who will work under the direction of the Engineer.

12. SUPERINTENDENCE BY CONTRACTOR: The Contractor shall give his personal superintendence to the work or have a competent foreman or superintendent on the work at all times during progress with authority to act for him. Subcontractors shall each be bound by this specification also.

13. SUSPENSION OF WORK: The Engineer in charge may order the Contractor to suspend all or any part of the work for such period of time as may be determined by him to be necessary or desirable, in order that the work may be protected and proper progress assured. Unless such suspension unreasonably delays the progress of the work and causes additional expense or loss to the Construction Contractor, no increase in the contract price will be allowed. In case of suspension of all or any part of the work for an unreasonable length of time which causes additional expense or loss not due to the fault of the Contractor, the Board shall make an equitable adjustment in the contract price and modify the contract accordingly. An equitable extension of time for the completion of the work, in the event of any such suspension, will be allowed the Contractor; provided, however, that the suspension was not due to the fault or negligence of the Contractor.

14. DISPUTE: All questions of dispute under this contract not resolved by the Engineer shall be submitted to arbitration at the request of either party to the dispute. There shall be three arbitrators; one to be named in writing by each party, and the third chosen by the two arbitrators so selected. A demand for arbitration shall be directed in writing to the Board who shall promptly notify the other party in writing. The arbitrators shall act with promptness. The decision of any two shall be binding on both parties to the contract. The decision of the arbitrators upon any question submitted to arbitration upon this contract shall be a condition precedent to any right of legal action. The decision of the arbitrators may be filed in court to carry it into effect. The compensation for the arbitrators will be fixed by the Board and the Contractor before the arbitrators are engaged. Parties to this contract shall pay the arbitrators selected by it. Compensation for the third arbitrator shall be paid jointly and equally by the two parties to the contract.

15. MATERIALS TO BE FURNISHED BY THE CONTRACTOR: The cost of hauling, storage, and handling all of the materials required to be furnished for the Contract shall be included in the unit price bid in the schedule for the work for which the materials are required.

In the case of sand and gravel to be used for concrete construction, the Contractor shall notify the Engineer in writing the sources of the available material and secure source approval in writing prior to placing order for delivery of this material to the job site.

16. PROTECTION AND STORAGE OF MATERIAL: The Contractor shall take care to protect and preserve all materials, supplies, and equipment of every description. All reasonable requests of the Engineer to enclose or specifically protect such property shall be complied with.

Operations and storage by the Contractor shall not infringe on private lands or rights of way, and any storage space or right-of-way not expressly stated by the Engineer as to be open and free for operation by the Contractor must be provided by the Contractor to avoid infringements. Protection of any private or public property such as bridges, roads, curbs, buildings, etc., shall be guaranteed by the Contractor in the performance of the work of the contract.

MATERIALS AND WORKMANSHIP

17. MANUFACTURER'S DIRECTIONS: Manufactured articles, material, and equipment shall be applied and conditioned as directed by the manufacturer unless herein specified to the contrary.

18. REJECTION OF MATERIALS: All materials which do not conform to the requirements of the Contract Document, are not equal to samples approved by the Engineer, or are in any way unsatisfactory or unsuited to the purpose for which they are intended shall be rejected. Any defective work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause shall be removed within ten days after written notice is given by the Engineer, and the work shall be re-executed by the Contractor. The fact that the Engineer may have previously overlooked such defective work shall not constitute an acceptance of any part of it.

Should the Contractor fail to remove rejected work or materials within ten days after written notice to do so, the Board may remove them and may store the materials and charge the Contractor for any cost in connection therewith.

19. CUTTING AND PATCHING: The Contractor shall do all necessary cutting and patching of the work that may be required to properly receive the work of the various trades or as required by the Drawings and Specifications to complete the structure. He shall restore all such cut or patched work as directed by the Engineer. Cutting of existing structure that shall endanger the work, adjacent property, workmen, or the public shall not be done unless approved by the Engineer and under his direction.

20. CLEAN UP: The Contractor shall remove all temporary structures, rubbish, and waste materials resulting from his operation or caused by his employees, and shall remove all surplus materials from the project site and from all public and private property, leaving the site smooth, clean, and true to line and grade.

LEGAL RESPONSIBILITY AND SAFETY

21. INSURANCE: The Contractor shall execute and carry insurance policies with a reliable Surety and Insurance Company to cover Public Liability to an amount of $50,000 and $100,000 and for Property Damage to an amount of $50,000.

22. PERFORMANCE AND PAYMENT BOND: The Construction Contractor, at the time of his execution of the construction contract, shall furnish bond in the sum equal to the contract amount to guarantee performance of all work connected with the project in accordance with the plans and specifications and for the full payment of all labor and material. The form of the bond shall be as the Board may prescribe.

23. EASEMENTS: Rights-of-way, and/or easements, have been secured for work sites, borrow and disposal areas, and for such trails and roadways considered necessary for ingress and egress to the work site. The right to enter, remove, alter, or otherwise make use of adjacent property, roads, utility lines, fences, and improvements not included within the rights-of-way provided, shall be the sole responsibility of the Contractor.

24. FENCES: Where construction included in the contract crosses existing

fences requiring their removal, the Contractor shall remove same and install temporary fences during the construction. Permanent repair of the fences shall be considered the Contractor's responsibility and shall be included in the bid price for the item of work listed in the schedule.

25. LAWS: The Contractor shall give all notices and comply with all Federal, State, and local laws in any manner affecting the work and shall indemnify and save harmless the Board against any claim or liability arising from or based on the violation of any such law whether by himself or his employees.

26. WATER AND ELECTRICITY: The Contractor shall provide and maintain at his own expense an adequate supply of water suitable for construction purposes. Electric power and other utilities will also be furnished by the Contractor at his expense.

27. LIGHTING REQUIREMENTS: Work carried on between the hours of sunset and sunrise shall be done only upon the approval of the Engineer. Construction areas shall be adequately lighted to provide safe working conditions while work is in progress. The lighting plan shall be acceptable to the Engineer.

28. SAFETY REQUIREMENTS: The Contractor shall put into execution and vigorously prosecute a definite systematic plan of accident prevention which will infuse the element of safety into each phase of all work operation. Safety and convenience of the public shall be provided for.

29. SANITARY PROVISIONS: The Contractor shall provide and maintain such sanitary accommodations for use of his employees as may be necessary to comply with the requirements and regulations of the local and State Departments of Health and as directed by the Engineer.

PROGRESS AND COMPLETION

30. NOTICE TO PROCEED: Written notice to proceed with the work shall be given to the Contractor who shall begin and prosecute the work with diligence thereafter with such force as to secure the completion of the work within the time stated in the Contract.

Where possible, the completion date will be set as a specific calendar date. Where the completion date is set as a number of calendar days, computation of the contract time shall commence on the seventh day following the date of mailing by regular mail of the Notice to Proceed and every calendar day following, except as herein provided, shall be counted as a working day.

31. SCHEDULE OF COMPLETION: The Contractor shall submit, at such times as may reasonably be requested by the Engineer, schedules which shall show the order in which the Contractor proposes to carry on the work with dates at which the Contractor will start the several parts of the work and estimated dates of completion of the several parts.

32. CHANGES AND EXTRA WORK: The Engineer may, at any time by a written order, and without notice to sureties, make changes in the drawings and/or the specifications of this contract and the general scope thereof. If such changes cause an increase or decrease in the amount due under this contract or in the time required for its performance, an equitable adjustment shall be made and the contract shall be modified in writing accordingly.

Such alterations or changes shall not be considered as a waiver of any conditions of the contract, nor to invalidate any of the provisions thereof, provided, however, that if demand is made in writing by either party to the contract, a supplemental agreement acceptable to both parties will be necessary before any alterations are made which involves any one of the following:

(a) An extension or shortening of the length of the project of more than 25%.

(b) An increase or decrease of more than 25% of the total cost of the work calculated from the original proposal quantities at the unit contract prices.

(c) A substantial change in the nature of the design or in the type of construction which materially increases or decreases the cost of performing any item of the work.

Within the limits specified above, the Contractor shall furnish and perform such quantities as are required to complete the construction as specified and intended, be they more or less than the quantities scheduled. Payment shall be made on the actual quantities involved but only on the items listed in the bid schedule.

33. LIQUIDATED DAMAGES: If the work is not complete on or before the date fixed for its completion by the terms of the contract or any extension thereof, the Construction Contractor shall pay to the Water Company the fixed and agreed liquidated damages as set forth in the construction contract for each and every calendar day until the work is completed.

34. EXTENSION OF TIME: A delay beyond the Contractor's control occasioned by an act of God, or act or omission on the part of the Board or by strikes, lockouts, fire, etc., may entitle the Contractor to an extension of time in which to complete the work as determined by the Engineer, provided, however, that the Contractor shall immediately give written notice to the Engineer of the cause of such delay.

35. USE OF COMPLETED PORTIONS: The Water Company have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding that the time for completing the entire work or such portions may not have expired; but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of or delays the completion of uncompleted work or causes refinishing of completed work, the Contractor shall be entitled to such extra compensation, or extension of time or both, as the Engineer may determine.

MEASUREMENT AND PAYMENT

36. UNIT PRICES: Payments will be made on the basis of unit prices bid by the Contractor or the Subcontractor and the Contractor shall within ten days of receipt of notice to proceed, submit a complete breakdown of the Contract amount showing the value assigned to each part of the work. Upon approval of the breakdown of unit prices by the Board, such breakdown shall be used as the basis for all requests for payment.

37. PAYMENTS TO CONTRACTOR: All payments due to be paid by the Utah Water & Power Board under the terms of this contract shall be made to the Water Company as herein defined, Payments due to the Construction Contractor will be made by the Water Company in accordance with the terms of the construction contract.

38. PARTIAL PAYMENTS: Partial payments will be made in accordance with the terms of the contract. In every case, payment shall be made on the basis of partial estimates of completion of the items of work done, which estimates shall be made by the Engineer designated by the Board. Ten percent of the above estimates will be withheld during the life of the construction.

Final payment including the 10% withheld, will be made by the Utah Water and Power Board to the Water Company when final acceptance has been made by the Board and when the Contractor has satisfied the Board that all payments have been made to suppliers for labor, equipment and materials.

39. REQUESTS FOR PAYMENT: The Water Company may submit periodically, but not more than once each month, a request for payment for work done and materials installed. No payment will be made for materials delivered and stored at the site. The Engineer shall jointly certify with the Water Company as to work completed.

40. PAYMENT FOR UNCORRECTED WORK: Should the Engineer direct the Contractor not to correct work that has been damaged or that was not performed in accordance with the Contract Documents, an equitable deduction from the Contract Amount shall be made to compensate the Board for the uncorrected work.

41. PAYMENTS FOR EXTRA WORK: Written notice of claims for payments for extra work shall be given by the Contractor within ten days after receipt of instruction from the Engineer to proceed with the extra work and also before any work is commenced, except in emergency endangering life or property. No claim shall be valid unless so made. In all cases, the Contractor's itemized estimate showing all labor and material shall be submitted to the Engineer.

42. RELEASE OF LIENS: The Contractor shall deliver to the Board a complete release and waiver of all liens arising out of this Contract before the retained percentage or before the final Request for Payment is paid.

43. ACCEPTANCE AND FINAL PAYMENT: When the Contractor shall have completed the work in accordance with the terms of the Contract Documents, the Engineer shall certify his acceptance to the Board and his approval of the Contractor's final Request for Payment which shall be the Contract amount plus all approved additions less all approved deductions and less previous payments made. The Contractor shall furnish evidence that he has fully paid all debts for labor, materials, and equipment incurred in connection with the work, following which the Board shall accept the work and release the Contractor except as to the conditions of the Performance Bond, any legal rights of the Board required guarantees, and Correction of Faulty Work after Final Payment, and shall authorize payment of the Contractor's final Request for Payment. The Contractor must allow sufficient time between the time of completion of the work and approval of the final Request for Payment for the Engineer to assemble and check the necessary data.

44. CORRECTION OF FAULTY WORK AFTER FINAL PAYMENT: The approval of the final Request for Payment by the Engineer and the making of the final payment by the Board to the Water Company shall not relieve the Contractor of responsibility for faulty materials or workmanship. The Board shall promptly give

notice of faulty materials or workmanship and the Contractor shall promptly replace any such defects discovered within one year from the date of written acceptance of the work. The Engineer shall decide all questions arising under this paragraph, and all such decisions shall be subject to arbitration.

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For

LITTLE DEER CREEK DAM

Wasatch County, Utah

SOUTH KAMAS -WASHINGTON IRRIGATION COMPANY

UTAH WATER AND POWER BOARD
425 State Capitol
Salt Lake City, Utah

Description of Work

LITTLE DEER CREEK DAM

These Specifications are for the construction of an earth fill dam, located about 25 miles east of Kamas, Utah, on the Little Deer Creek, a tributary of the Duchesne River in Section 28, T3N, R9W, Uintah Special Meridian.

Access to the proposed damsite area is by unimproved Forest Service Road leaving State Highway 150, between Kamas, Utah and Mirror Lake Lodge.

The dam will be approximately 86 feet high, with a crest length of about 360 feet, composed of a modified homogeneous earth fill, protected on the upstream surface with 2 feet of dumped riprap facing. The outlet conduit will be 18-inch reinforced concrete pipe embedded in a concrete cradle, with a gate and trashrack structure on the upstream face of the dam and a stilling basin structure at the downstream toe of the dam embankment. The spillway channel will be excavated over the left abutment, returning to Little Deer Creek below the dam.

There will be approximately 75,800 cubic yards of compacted embankment in the dam.

LITTLE DEER CREEK DAM

SPECIAL SPECIFICATIONS
For
CONSTRUCTION & CONSTRUCTION
MATERIALS

The items of work listed in the following paragraphs have been established to cover construction of all phases of the project herein specified and shown on the drawings. Compensation for all work incidental to accomplishment of construction in accordance with plans and specifications shall be considered as included in the price bid for each item of work.

Where the proposed construction is located within the National Forest boundary, the contractor will contact the Forest Service Supervisor responsible for that area and obtain the necessary "Special Use Permits" required for all construction activities within the Forest Service boundary and comply with the National Forest Service standards.

The item numbers in these Special Specifications correspond to the item numbers listed in the Bid Schedule.

In addition to the Specifications, work shall comply to the following drawings by the Utah Water and Power Board:

LITTLE DEER CREEK DAM

1. Plan, Profile, & Structures
2. Outlet Conduit & Structures
3. Miscellaneous Items

BID ITEM NO. 1

DIVERSION AND CARE OF CREEK AND UNWATERING CUTOFF TRENCH

1.1 Scope

The contractor shall construct and maintain all necessary cofferdams, channels, flumes, drains, sumps and/or other temporary diversions and protective works to divert the creek, unwater the cutoff trench, and drain the surface of the embankment foundation. All cofferdams or other protective works constructed upstream from the dam and not a part of the permanent embankment shall be removed or leveled and graded to prevent obstruction to the flow of water to the outlet works. The Contractor shall be responsible for and shall repair at his expense any damage to the foundation, embankment, structures or any other part of the work caused by floods, water or failure of any part of the diversion or protective works.

1.2 Diversion Plan

The Contractor's plan for diversion and care of the stream during construction shall be subject to approval. The plan may be placed in operation upon approval, but nothing in this paragraph shall release the Contractor from full responsibility for the adequacy of the diversion and protective works. The Contractor shall be permitted to by-pass the flow of thecreek through the outlet works upon approval by the Engineer.

1.3 Measurement and Payment

This item will be measured on a lump sum job basis and payment will be made in accordance with the price bid in the bidding schedule.

BID ITEM NO. 2

CLEARING RESERVOIR, SPILLWAY AND BORROW AREAS

2.1 Scope

The work covered by this specification includes the necessary clearing of all trees, brush, shrubs, logs, trash, rubbish and the disposal of all materials resulting from the clearing operations. The timber not marketable shall be piled and burned.

2.2. Requirement

The reservoir area below the maximum water surface, the dam foundation spillway and materials borrow area, shall be cleared of all logs, trees, rubbish and vegetation (other than grass) growing higher than one foot above the ground level. The burning of all combustible materials removed in clearing and stripping operations (except for salable timber) shall be piled

and burned completely as directed by the Engineer in accordance with "Agreements with the Forest Service" and the laws of the State of Utah. All burning shall be accomplished in such a manner and locations as to minimize any fire risk and the materials shall be reduced to ashes.

All tree stumps shall be removed as directed by the Engineer and in accordance with Forest Service regulations.

2.3 Payment

Payment will be made in accordance with the lump sum bid in the schedule.

BID ITEM NO. 3

STRIPPING EMBANKMENT FOUNDATION

3.1 Scope

The work covered by this item consists of furnishing all labor, material, and equipment, and performing all operations in connection with stripping.

3.2 Requirement

The Contractor shall strip the embankment, outlet works and spillway, areas as directed and specified. Stripping in borrow areas will be required only to the extent of obtaining the necessary borrow material. The areas shall be stripped to the depth required to remove all materials not suitable for foundation or fill. The unsuitable material to be removed, includes but is not limited to topsoil and boulders.

3.3 Disposal

Except as otherwise specified, stripped materials shall be disposed of as directed by the Engineer and approved by the Forest Service.

3.4 Measurement and Payment

Measurement for payment for stripping will be made in excavation only and will be based on surveys taken before and after the stripping operations, and will be computed by the method of average cross-sectional end areas.

Stripping will be paid for at the contract unit price in the Bid Schedule. No payment will be made as such for stripping the borrow areas. This work shall be considered subsidiary to the "Earth Embankment" item of work.

BID ITEMS NOS. 4 & 5

EXCAVATION

4.1 Scope

This item covers all excavation for the outlet conduit, gate structure, stilling basin, cutoff collars, spillway channel and reservoir gage.

4.2 Specifications

The "Standard Construction Specifications No. 4 - 'Excavation', shall apply except as modified herein.

4.3 Common Excavation

Common excavation from cutoff trench, outlet, spillway and other items of excavation suitable for embankment material may be placed in one of the embankment zones. The selection of material suitable for fill for each zone of embankment shall, at all times be as directed by the Engineer.

4.4 Excavation - Rock

All necessary rock excavation from spillway, outlet, roadway and borrow will be measured by cross sections before and after to the nearest cubic yard and payment will be made at the unit price bid for Item 5, which will include full payment for excavation, loading and transportation to place of use or disposal. Rock excavation, where suitable, may be used for riprap or rock toe drain.

BID ITEM NO. 6

COMPACTED BACKFILL

6.1 Scope

This item covers backfill around outlet conduit, cutoff collars, gate and stilling basin structures, reservoir gage, gate pedestals and gate lift structure.

Standard Specifications for Construction No. 5 shall apply with the the following modifications:

6.2 Reservoir Gage

Compacted backfill will be placed level with the top of the concrete reservoir gage.

6.3 Measurement and Payment

Bid Item No. 6 will be measured to authorized limits and to the nearest cubic yard, and payment will be made on the cubic yard price bid in the schedule.

BID ITEM NO. 7
PROCURING AND PLACING
EARTH EMBANKMENT, ZONE 1

7.1 Scope

This item of work covers stripping the borrow area, excavating, hauling, placing, spreading, watering, compacting and all work for constructing the earth fill in the dam embankment, Zone 1.

7.2 Requirement

Standard Construction Specifications No. 5, Earth Fill, shall apply with the following modifications and additions:

The earth fill shall be compacted to attain a field density 95% of laboratory density as determined by A.S.T.M. - D - 1557 - 58T, or AASHO T180 - 57.

The fill material shall be placed and spread over the embankment surface in layers not greater than eight (8) inches in thickness. The distribution of materials throughout the Zone shall be such that the rocks, six (6) inches in diameter and larger, shall be moved by rock rakes, 'dozer blades, or other suitable equipment to the upstream surface of the embankment to form a uniform gradation of material sizes from soil mixed with rock smaller than six (6) inches to the larger rocks at the outside edge of a five (5) foot wide Zone of predominately rock and will be the riprap for the 3:1 slope of the embankment below elevation 9200. The steeper slope $2\frac{1}{2}$:1 above elevation 9200 shall have quarried riprap placed on the upstream surface of the embankment in addition to the foregoing procedure.

7.3 Measurement and Payment

All earth fill will be measured in embankment to the nearest cubic yard in accordance with paragraph 5.10 of the Standard Construction Specifications for earth fill. No payment will be made for excavation of this material unless otherwise specifically outlined ina seperate bid item. The cost for moving the larger rocks to the surface of the embankment shall be included in the unit bid for earth embankment, Zone 1.

BID ITEM NO. 8

PROCURING AND PLACING EARTH EMBANKMENT, ZONE 2

8.1 Scope

This item of work covers stripping the borrow area, excavating, hauling, placing, spreading, watering, compacting and all work for constructing the earth fill in the dam embankment, Zone 2.

8.2 Requirement

The general provisions of the Standard Construction Specifications No. 5, Earth Fill, shall apply except as modified hereafter.

The pervious material shall be obtained from the borrow areas as directed by the Engineer and shall consist of material intermediate in character between Zone 1 and the rock and gravel toe drain. Moisture content shall be asdirected. The material shall be placed in layers not greater than 12 inches thick and compacted by controlled movement of the hauling and spreading equipment over the area so that the entire surface area of each lift will be traversed by not less than one tread track of the loaded earth moving equipment traveling in a direction parallel to the axis of the fill. The outside five (5) foot width of Zone 2 shall be predominately rock, obtained by direct dumping or by moving the larger rock to the outside edge by rock rakes or other suitable equipment.

No density requirement is specified for this type of fill. The acceptability of Zone 2 will be based on adherence to the specified procedure.

8.3 Measurement and Payment

Measurement for earth fill in Zone 2 will be made to the nearest cubic yard in accordance with paragraph 5.10 of the Standard Construction Specifications for Earth Fill. No payment will be made for excavation of this material unless otherwise specifically outlined in a seperate bid item.

BID ITEM NO. 9

PROCURING AND PLACING ROCK IN TOE DRAIN

9.1 Scope

This item covers the placement only of rock toe drain under Zone 2 of the downstream portion of the dam embankment as determined by the Engineer.

9.2 Specifications

The downstream portion of the dam embankment shall be constructed with rock fill of suitable free draining mixture of rock fragments, boulders and cobbles from other required excavation or from rock borrow pit. The largest rock in the foundation drainage blanket shall not be more than one cubic foot in volume. The voids in the coarser material shall be filled with gravel or rock spalls. The completed blanket will have a reasonably uniform surface and be sufficiently stable to support the Zone 2 material of dam embankment.

The foundation for the rock blanket drain material shall be so prepared by leveling and rolling, after stripping is completed, that the surface material of the foundation will be compact and well bonded.

9.3 Measurement and Payment

Measurement for payment of the rock toe drain material will be to the nearest cubic yard within the neat lines shown on the drawings or as altered by the Engineer. Payment for placing rock toe drainage material will be made at the unit price bid per cubic yard for bid item No. 9.

BID ITEM NO. 10

PROCURING AND PLACING DUMPED RIPRAP

10.1 Scope

This item of work covers the procurement and placement of a Two (2) foot thick layer, measured normal to the surface, of dumped rock riprap on the upstrem face of the dam above elevation 9,200. Also placing rock riprap two (2) feet thick in the spillway channel and stilling basins downstream from the ledge rock outcrop. The outlet channel will also be lined with rock riprap as directed.

10.2 Requirement

The rock shall be obtained from borrow areas designated by the Engineer. or from required spillway excavation if the rock is suitable.

The rock shall consists of a gradation of sizes of which at least 25% has a diameter equal to or larger than 12 inches.

Standard Construction Specifications, No. 17, shall apply as herein modified.

10.3 Measurement and Payment

Rock riprap will be measured to the nearest cubic yard and will be determined by the specified thickness shown on the drawings and the area on which acceptable placement has been made. Payment will be made to the nearest cubic yard at the unit price bid therefor in the schedule.

BID ITEM NO. 11

Furnishing and Installing 18-inch Diameter, Class V, Reinforced Concrete Pipe

11.1 Scope:

This item of work consists of furnishing and placing reinforced concrete pipe in the outlet conduit as shown on the drawings.

11.2 Requirement:

The ASTM designation C-76-57T for class V reinforced rubber gasket concrete pipe, Section I, shall apply as modified herein. The pipe shall be installed in a cradle of bedding concrete as shown on the drawings, and supported by means of precast or "poured in place" concrete blocks or bricks. Cutoff collars shall be constructed as shown on the drawings, except when the foundation is solid rock, the cutoff collars will be anchored in bedrock as directed and extend around the pipe conduit and concrete cradle on the three sides only.

11.3 Measurement and Payment

Measurement shall be made to the nearest linear foot of pipe in place measured along the centerline of the pipe. Payment will be made at the unit price per linear foot bid therefor in the schedule. Payment for concrete in the pipe cradle and cutoff collars will be made separately under bid item No. 13 of the schedule.

BID ITEM NO. 12

Furnishing and Installing Armco 100-30G Flanged Slide Gate

12.1 Scope

The contractor shall furnish and install control gate and accessories for a complete installation on the upstream face of the dam as shown on the drawings and in accordance with the manufacture's instructions and specifications.

12.2 Specifications

The Armco specifications for slide gates and accessories shall apply.

12.3 Gate Assembly

The gate shall be, or equal, to Armco Model 100-30G, heavy duty slide gate, 18-inches in diameter, complete with 8-inch wall thimble. The thimble shall be installed in the trashrack (intake) structure when concrete is being placed.

The gate stem shall be 2-inch diameter hot rolled steel with a 5-foot length of 2-inch bronze stem at both top and bottom end of the gate stem where it passes through the weather and oil seals respectively. The stem shall be encased in a $2\frac{1}{2}$-inch ID seamless galvanized steel pipe, containing an oil bath the full length of the stem. The pipe shall be compoete with weather-oil seals and other accessories. The $2\frac{1}{2}$-inch pipe shall be fitted with a one-inch diameter filler pipe nipple at the top end, for filling pipe with oil; covered with a standard screw cap.

12.4 Payment

Payment will be made at the lump sum bid in the schedule for installing all items for a complete assembly, except the concrete.

BID ITEMS NOS. 13 & 14

FURNISHING AND PLACING CONCRETE IN STRUCTURES

13.1 Scope

The concrete shall contain an air entraining agent and 1½-inch maximum size aggregate and be placed in the outlet pipe cradle, cutoff collars, outlet structures, gate stem pedestals, gate lift structure and reservoir gage as shown on the drawings or as directed by the Engineer.

13.2 Materials

The Contractor shall furnish all materials for use in concrete including cement, water, sand and coarse aggregate, calcium chloride, and air entraining agent, and shall furnish all reinforement bars, and materials for curing concrete. Air entraining agent, and sealing compound will be accepted on manufacturer's certification of compliance with specification requirements. The Contractor shall be responsible for the accuracy and completeness of certifications and mill test reports furnished.

13.2.1 Cement - Cement shall be Type 1, low alkali, in accordance with Federal Specifications SS-C-192d, and shall meet the false-set limitation specified therein.

13.2.2 Water - Water shall be free from objectional quantities of silt, organic matter, alkalies, salts, or other impurities.

13.2.3 Sand -

(a) General - The term "sand" is used to designate aggregate in which the maximum size of particles of 3/16 of an inch. Sand for concrete, mortar, and grout shall be furnished by the Contractor fron any approved source and shall be natural sand, that crushed sand may be used to make up deficiencies in the natural sand grading.

Sand, as delivered to the batching plant, shall have a uniform and stable moisture content.

(b) Quality - The sand shall consist of hard, dense, durable, uncoated rock fragments. The maximum percentages of deleterious substances in the sand as delivered to the mixer.

	Percent by weight
Material passing No. 200 screen (16)	3
Lightweight material (7)	2
Clay lumps	1
Total of other deleterious substances (such as alkali, mica, coated grains, soft flaky particles, and loam)	2

(c) Grading. - - The sand as batched shall be well graded, and when tested by means of standard screens, shall conform to the following limits:

Screen No.	Individual percent, by weight retained on screen
4	0 to 5
8	5 to 15 (1)
16	10 to 25 (1)
30	10 to 30
50	15 to 35
100	12 to 20
Pan	3 to 7

(1) If the individual percent retained on the No. 16 screen is 20 percent or less, the maximum limit for the individual percent retained on the No. 8 screen may be increased to 20 percent.

13.2.4 Coarse aggregate. - -

(a) General. - - The term "coarse aggregate" designates aggregate of sizes within the range of 3/16 of an inch to 1 and 1/2 inches or any size or range of sizes within such limits. The coarse aggregate shall be reasonably well graded within the nominal size ranges hereinafter specified. Coarse aggregate for concrete shall be furnished by the contractor from any approved source and shall consist of natural gravel or crushed rock or a mixture of natural gravel and crushed rock.

Coarse aggregate, as delivered to the batching plant, shall have a uniform and stable moisture content.

(b) Quality. - - The coarse aggregate shall consist of hard, dense, durable, uncoated rock fragments. The percentages of deleterious substances in any size of coarse aggregate, as delivered to the mixer, shall not exceed the following values:

	Percent, by weight
Material passing No. 200 screen	1
Lightweight material	3
Clay lumps	½
Other deleterious substances	1

The sum of the percentages of all deleterious substances in any size, as delivered to the mixer, shall not exceed 4 percent, by weight. Coarse aggregate may be rejected if it fails to meet the following test requirements:

(aa) Los Angeles rattler test. - - If the loss, using grading A, exceeds 10 percent, by weight, at 100 revolutions or 40 percent, by weight, at 500 revolutions.

(bb) Sodium-sulfate test for soundness. - - If the weighted average loss after 5 cycles, is more than 12 percent, by weight.

(c) Separation. - - The coarse aggregate shall be separated into nominal sizes and shall be graded as follows:

Designation of size	Nominal size range	Minimum percent retained on screens indicated
3/4 inch	3/16 to 3/4 inch	50 percent on 3/8 inch
1 and 1/2 inches	3/4 to 1 and 1/2 inches	25 percent on 1 and 1/4 inches

Air-entraining agent.

The air-entraining agent shall conform to ASTM Designation: C 26058T, except that the limitation and test on bleeding by concrete containing the agent shall not apply.

Sealing compound.

Sealing compound shall be white- pigmented compound conforming to ASTM Designation C-309, Type 2.

13.3 Composition.

Concrete shall contain not less than 5.75 sacks of cement per cubic yard and not more than 5.25 net gallons of water per sack of cement.

13.4 Strength

The minimum compressive strength at 28 days shall be 3600 pounds per square inch, as determined by ASTM Designation: C 31-57 and C 38-56T. In determining compliance with the strength requirement 90% of the tests made on 6-inch diameter by 12-inch in length cylinders shall exceed the 3600 pound per square inch requirement. The average of all 28-day strength tests as well as the average of any five consecutive tests shall be greater than the design strength. If any three consecutive tests shall fall below the design strength the concrete shall be rejected and replaced at the expense of the contractor.

Calcium chloride shall not be used in concrete which galvanized metalwork is to be embedded. The contractor shall use 1 percent of calcium chloride, by weight of the cement, in all other concrete placed when the weather is cold enough to require protection of the concrete from freezing. When calcium chloride is being used, the portion of mixing water containing the air-entraining agent shall be introduced separately into the mixer. The use of calcium chloride in the concrete shall in no way relieve the contractor of the responsibility for compliance with the requirements of these specifications governing protection and curing of the concrete.

Air-entraining agent shall be used in such amount as will effect the entrainment of from 4 to 6 percent of air, by volume, of the concrete as discharged from the mixer.

The slump of the concrete shall not exceed 3 inches.

13.5 Batching and Mixing.

The sand and coarse aggregate shall be weighed and shall be proportioned on the basis of integral sacks of cement unless the cement is weighed. Weighing equipment of the beam type may be used. The contractor shall provide equipment and shall maintain and operate the equipment as required to accurately determine and control the amount of each separate ingredient entering the concrete. Batching shall be such that combined inaccuracies in feeding and measuring the materials will not exceed 2 percent for water and weighed cement and 3 percent for sand and each size of coarse aggregate. The concrete shall be uniform in composition and consistency throughout the mixed batch, and from batch to batch, except where changes in composition or consistency are directed. The mixing time shall be at least 1 and 1/2 minutes. Excessive over-mixing requiring the addition of water to preserve the required consistency will not be permitted. Truck mixers will be permitted only when the mixers and their operation are such that the concrete throughout the mixed batch and from batch to batch is uniform with respect to consistency and grading.

13.6 Forms, preparation for placing and placing.

Forms shall be sufficiently tight to prevent loss of mortar from the concrete and shall be maintained rigidly in position until the concrete has hardened sufficiently to prevent damage by form removal. All surfaces of foundations upon or against which concrete is to be placed shall be free from standing water, mud, and debris. Earth foundations shall be free from frost or ice when concrete is placed upon or against them. The surfaces of absorptive foundations against which concrete is to be placed shall be moistened thoroughly so that moisture will not be drawn from the freshly placed concrete. The surfaces of construction joints shall be clean and damp when covered with fresh concrete or mortar. Cleaning shall consists of the removal of all laitance, loose or defective concrete, coatings, sand, sealing compound, if used, and other foreign material.

The methods and equipment used for transporting concrete, and the time that elapses during transportation shall be such as will not cause appreciable segregation of coarse aggregate or slump loss in excess of 1 inch in the concrete as it is delivered into the work. Formed concrete shall be placed in continuous approximately horizontal layers, the depths of which generally shall not exceed 20 inches. Concrete shall be vibrated until it has been consolidated to the maximum practicable density, is free from rock pockets of coarse aggregate, and closes snugly against all surfaces of forms and embedded materials. All porous and fractured concrete shall be removed by chipping openings into the concrete with dimensions as directed, and the chipped

openings shall be filled with drypack, mortar, or concrete, as directed. Exposed unformed surfaces of concrete shall be brought to uniform surfaces and worked with suitable tools, to a reasonably smooth wood-float or steel-trowel finish as directed.

13.7 Protection and curing.

The contractor shall protect all concrete against injury until final acceptance. Immediately following the first frost in the autumn, and until the mean daily temperature in the vicinity of the work site falls below 40° F for more than one day, the concrete shall be protected against freezing temperatures for not less than 48 hours after it is placed. Whenever the mean daily temperature in the vicinity of the work site falls below 40° F for more than one day, the concrete shall be maintained at a temperature not lower than 50° F for at least 72 hours after it is placed. Concrete cured by membrane curing will require no additional protection from freezing if the protection at 50° F for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces: otherwise, the concrete shall be protected against freezing temperatures for 72 hours immediately following the 72 hours of protection at 50° F. Concrete cured by water curing shall be protected against freezing for 3 days immediately following the 72 hours of protection at 50° F. Concrete cured by water curing shall be protected against freezing for 3 days immediately following the 72 hours. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying.

The concrete shall be cured by water curing or by membrane curing. If concrete is cured by water curing, the concrete shall be kept continously moist for at least 14 days after being placed by sprinkling or spraying or by other methods approved by the contracting officer. Membrane curing of concrete shall be by application of sealing compound, and application of the sealing compound shall be in accordance with the procedures contained in ASTM. Any concrete found to be damaged or defective by reason of the contractor's operations, at any time before completion and acceptance of the work shall be removed and replaced by the contractor with acceptable concrete at no cost to the Water Company.

13.8 Measurement and Payment.

Measurement, for payment, of concrete will be on the basis of concrete having the dimensions shown on the drawings or prescribed by the engineer. Payment for concrete will be made at the unit price per cubic yard bid therefor in the schedule, which unit price shall include the cost of all labor and materials, except that payment for furnishing and placing reinforcement will be made at the unit prices bid therefor in the schedule.

13.9 Reservoir Gage

The reservoir gage shall consist of a 6" x 12" concrete strip located on the left abutment as shown on the drawings.

Elevation marks shall be provided on the face of the concrete gage to show one-foot elevation marks with a horizontal groove one-inch deep and extending across the entire width of the gage. The horizontal groove shall be formed in the concrete with a suitable marking tool. The one-half foot elevation marks will be one-inch deep and extend halfway across the gage from the left edge. The one-quarter foot elevation marks shall be horizontal grooves one-inch deep - one-fourth of the width of the gage from the left side. The elevation numbers shall be imprinted in the concrete one-inch deep with the bottom of each number immediately above the foot elevation marks and about 6" high. Numbers shall be readable when ascending the gage.

The concrete reservoir gage will extend from the low water elevation to the maximum water surface elevation. The elevations will be numbered from zero at the bottom to the maximum water surface elevation at the top.

The foundation for the concrete water level reservoir gage shall be prepared prior to placing concrete. All loose, uncompacted earth shall be removed so there is a firm foundation on which to place the concrete. At intervals of 30 feet along the concrete gage, anchors shall be provided to prevent movement down the slope. The anchors shall be one cubic foot in size below the bottom of the gage.

The reinforcing steel in the gage shall consist of four (4) No. 4 round bars running the full length of the gage spaced three inches from the outside edges, tied together with short crossbars as shown on the drawings.

13.10 Measurement for Payment

Measurement of concrete shall be to the neat lines shown on the drawings to the nearest one-tenth of a cubic-yard.

Payment will be made at the unit price bid, Item No. 13, per cubic yard, and the unit price per pound for reinforcing steel in the bid schedule. The unit prices shall be full payment for the concrete and reinforcing steel in the reservoir gage which will include the marking of the elevation marks and numbers on the gage.

BID ITEM NO. 15

Reinforcing Steel Bars

15.1 Scope

Steel reinforcement bars shall be placed in the concrete where shown on the drawings and as directed.

15.2 Specifications

Reinforcement bars shall conform to Federal Specifications QQ-S-632, Type 11, Grade C through G.

15.3 Bar Placing and Bending Diagrams

The contractor will furnish supplemental bar placing diagrams, bar lists and bar bending diagrams. Any such additional drawings of this type which the contractor may require to facilitate the fabrication and placement of reinforcement shall be provided by the contractor. The cost of preparing such additional drawings and bar tests, if provided, shall be included in the unit price per pound bid in the schedule for furnishing and placing the reinforcement. Reinforcement will be inspected for compliance with requirement as to size, shape, length, splicing, position and amount after it has been placed. Reinforcement drawings and bar tests prepared by the contractor shall conform to the following requirements:

15.3.1 Laps Bars shall be lapped 24 bar-diameters at splices unless otherwise shown on the drawings.

15.3.2 Bends All reinforcement requiring bending shall be bent around a pin having a diameter of one inch less than eight times the nominal thickness of the bar, except that bars 1 inch or larger shall be bent around a pin having a diameter of eight times the nominal thickness of the bar to the nearest inch.

15.3.3 Hooks Hooks shall have a 180 degree bend and extensions of 4 bar diameters parallel to the main leg of the bar.

15.4 Placing Before reinforcement is placed, the surfaces shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease, or other foreign substances. Reinforcement shall be accurately placed and secured in position so that it will not be displaced during the placing of the concrete.

15.5 Measurement and Payment

Measurement, for payment, of reinforcement will be made only of the weight of the reinforcement placed in concrete, in accordance with the drawings or as directed. Payment for furnishing and placing reinforcement bars will be made at the unit price per pound bid therefore in the schedule, which unit price shall include the cost of furnishing and attaching wire ties and metal

supports, if used, and of cutting, bending, cleaning and securing and maintaining in position all reinforcement as shown on the drawings or as directed.

BID ITEM NO. 16

Steel Trashracks, and Parshall Flume

16.1 Scope

This item of work covers the furnishing of materials, fabrications, painting and installation of two trashracks and one parshall flume installed as shown on the drawings and as directed by the Engineer. Provisions shall be provided for anchoring the trash rack to the concrete structure.

16.2 Requirement

The material for construction of the trashracks and steel parshall flume shall be structural grade A-7 mild steel welded in a workmanlike manner according to standard shop practices. The 3/4-inch tie bolts shall be welded flush with the outside of the trashrack. After fabrication, the steel and welds shall be cleaned of all scale, dirt, grease and wire brushed to obtain a clean metal surface for applying paint. The surface shall be painted with a cold applied coal tar paint, CA-50 applied to a total minimum dried film thickness of 20 mils. This shall be obtained by applying three or more coats at a coverage of approximately 120 square feet per gallon per coat. The first coat shall be applied by hand brushing. Subsequent coats shall be applied either by brushing or spraying.

16.3 Payment

Payment for furnishing, fabricating, painting and installing trashracks and parshall flume will be made at the lump sum bid therefor in the schedule.

STANDARD CONSTRUCTION SPECIFICATIONS

4 - EXCAVATION

4.1 Scope

This specification covers the required excavation, the removal and proper utilization or disposal of all excavated materials, and the shaping and finishing of all excavation work to the required lines, grades and cross sections.

4.2 Classification

4.2.1 General

All excavation to be paid for will be shown on the drawings under one of the following classifications:

Excavation - Common
Excavation - Rock

When, in the opinion of the Contractor, materials encountered are other than as shown on the drawings, he shall notify the Engineer in writing. He shall not remove any such material until the Engineer has examined it and classified such excavation. Objections, on the part of the Contractor, to the Engineer's classification shall be filed in writing, withint 30 calendar days of receipt of notice in writing from the Engineer of his classification of such excavation. Failure on the part of the Contractor to file such objections will be considered his concurrence with the Engineer's classification.

4.2.2 Excavation: Common

Common excavation shall consist of and include all grass, sod, earth, clay, sand, silt, gravel, hard and compacted materials, such as hardpan, loosely cemented gravel, soft or disintegrated rock and similar materials that can be removed by hand, heavy ripping equipment, or common earthmoving equipment such as tractor-drawn scraper and push tractors, and shall also include all boulders and loose rock less than one (1) cubic yard in volume.

The heavy ripping equipment, as specified hereinbefore, shall consist of a ripper or rooter unit weighing not less than eight thousand five hundred (8,500) pounds, equipped with a hard faced steel tooth, as recommended by the manufacturer, and drawn by a track type tractor of not less than one hundred (100) draw-bar horsepower, in good condition and capable of developing not less than twenty-eight thousand (28,000) pounds drawbar pull in first gear.

4.2.3 Excavation: Rock

Rock excavation shall consist of and include all excavation which, in the opinion of the Engineer, cannot be removed by the methods described hereinbefore for common excavation, and shall also include all boulders and detached rock one (1) cubic yard or greater in volume. In areas where blasting is not permitted, materials of rock character which require the use of power operated drills for removal will be classified as rock excavation.

4.3 Types of Excavation

4.3.1 General

The types of excavation herein specified indicate the general character and location of the excavation work to be performed.

The types of excavation covered herein are:

Cutoff Trench Excavation
Structure Excavation
Foundation Drain and/or Toe Drain Trench Excavation
Stream Channel Clean-out Excavation
Channel Excavation
Emergency Spillway Excavation
Borrow Excavation

All excavations shall be completed to the lines and grades shown on the drawing or as directed by the Engineer. Unauthorized excavation beyond such limits and the backfill required to replace unauthorized excavation will not be paid for and the cost shall be borne by the Contractor.

No backfill shall be placed in an excavated area until the excavation has been approved by the Engineer.

The types of excavation that are considered subsidiaries of other items shall be so specified herein.

4.3.2 Cutoff Trench

Cutoff trench excavation shall consist of and include the removal of all materials encountered or involved in such excavation at the location shown on the drawings or as directed by the Engineer. The final depths and extent of the trench will be determined by the nature of the material revealed in the trench and by borings and/or soundings. The Contractor shall not be entitled to an increase in the unit price for cutoff trench excavation because of changes in depth or extent of excavation.

4.3.3 Structure

Structure excavation shall consist of the removal of all materials encountered or involved in the excavation and subgrade preparation for the placing of structures. The final depths and extent of structure excavation will be determined by the nature of the material revealed and by borings and/or soundings. The Contractor shall not be entitled to an increase in the unit price for structure excavation because of changes in the depth or extent of excavation.

4.3.4 Foundation Drain and/or Toe Drain Trench

Foundation drain or toe drain trench excavation shall consist of and include the removal of all materials encountered or involved in the construction of the drainage system as shown on the drawings.

No direct payment will be made for this type of excavation. It shall be considered a subsidiary of other items of work.

4.3.5 Stream Channel Cleanout

Stream channel cleanout excavation shall consist of the required excavation for the removal from the stream channel and banks within the embankment area, all unsuitable materials and sloping the channel banks to a slope not steeper then one (1) horizontal to one (1) vertical. The unsuitable materials to be removed include sand, silt, gravel, stones, boulders, roots, stumps, logs, debris, vegetable matter and all other materials that would interfere with the desired compaction or bonding of materials in the backfill.

4.3.6 Channel

Channel excavation shall consist of the required excavation for all channels and constructing, shaping and finishing all earth work involved for channels outside the embankment limits.

Overcutting will be allowed six (6) inches below grade, but no payment will be made for the yardage resulting from overcutting.

4.3.7 Emergency Spillway

Emergency spillway excavation shall consist of and include the required excavation to construct the emergency spillway as shown on the drawings or as directed by the Engineer and the proper utilization of such excavated material.

Suitable fill material excavated from the emergency spillway will not be paid for as excavation but will be paid for at the contract unit price for the class of fill in which it is placed. The selection of material suitable for fill shall at all times be as directed by the Engineer.

Unsuitable or surplus fill material other than rock excavated from the emergency spillway and required to be wasted will be paid for as common excavation.

4.3.8 Borrow

Borrow excavation shall consist of and include the required excavation and proper utilization of approved materials obtained from designated areas when sufficient quantities of suitable materials are not available from other required excavations.

The control of excavation in any borrow area and the selection of materials therefrom shall at all times be as directed by the Engineer. On completion of excavation, all borrow pits shall be left in a neat and sightly condition. Unless otherwise approved by the Engineer, all borrow pits shall be so graded and dressed that water will readily drain therefrom and away from all embankments, berms, and structures. When shown on the drawings, terraces, or diversions shall be constructed to protect the slopes of the borrow areas from erosion and shall be considered a subsidiary of this specification.

Borrow excavation will not be paid for as excavation but will be paid for at the contract unit price for the class of fill in which the material is placed.

4.4 Construction Methods

4.4.1 Utilization of Excavated Material.

All suitable material removed from the excavations shall be used insofar as procaticable, in constructing the permanent works and at such other places as directed. The Contractor shall not waste materials removed from excavations and suitable for use in the construction of the permanent works, without a written application to do so and a written approval from the Engineer.

4.4.2 Disposal of Surplus and/or Waste Material.

All surplus excavated material and/or all waste material shall be disposed of by widening embankments, fills, levees, or dikes, or by flattening slopes, or by depositing the material in other areas as designated or directed by the Engineer.

Waste material shall be placed in designated waste areas to the approximate elevations established by the Engineer, and the surfaces thereof shall be left in a neat and sightly condition and sloped to provide positive drainage. Compaction of the waste materials will not be required. The cost of disposal of all materials, unless otherwise specified, and all costs of placing and spreading the materials in the waste areas and dressing of the surfaces thereof shall be included in the respective contract unit prices for excavation, regardless of the source of materials, and no additional payment will be made therefor.

4.4.3 Blasting for Excavation.

a. General. Blasting may be done only to the depth, amount and extent, and in such locations approved by the Engineer. Approval of the methods of blasting by the Engineer will not relieve the Contractor of his responsobility in blasting operation, and no payment will be made for any necessary extra excavation below or outside of the limit lines indicated on the drawings, or modifications thereof, due solely to injury caused by over-shooting, improper blasting, or carelessness on the part of the Contractor. All material thus removed shall be replaced by concrete when a concrete structure is to be placed upon or against such surface, or by compacted fill material when fill is to be placed thereon, at the expense of the Contractor and in a manner satisfactory to the Engineer.

b. Blasting in Cutoff Trench and/or Structure Excavation. The use of explosives or blasting material of any kind in the cutoff trench excavation and/or the structure excavation shall be carried out by using not over one-half (1/2) pound of explosives (equivalent in strength to 40 percent dynamite) per cubic yard of material to be blasted and by shooting only a few holes simultaneously.

c. Use of Explosives. The transportation, handling, storage, and use of dynamite and other explosives shall be directed and supervised by a person of proven experience and ability in blasting operations. All blasting operations shall be in accordance with applicable local, State and Federal laws. Before any explosives are brought on the job, permission to do so shall be obtained from the Engineer. All blasts shall be fired electrically with an electric blasting machine. Where detonating cord is used as a detonating agent, the detonation cord shall be fired with an electric blasting cap. Delay electric detonators shall be used for all delayed blasts. Blasting machines used for firing shall be known to be in good condition and of sufficient capacity to fire all charges. Rubber-covered or other adequately insulated copper wires in good condition shall be discontinued during approach of a thunderstorm or while it is in progress. Blasting operations in the proximity of overhead power lines, communication lines, utility lines, or other structures shall not be carried on until the operator and/or owner of such lines has been notified and precautionary measures deemed necessary have been taken. All holes loaded on a shift shall be fired on the same shift. The use of black powder is prohibited. Before any drilling operations in preparation for blasting are started, the Contractor shall furnish the Engineer a detailed plan of operations showing the method proposed for the prevention of damage. In order to assure adequate protection such plan may be modified to meet the conditions that may develop.

4.4.4 Rock For Slope Protection.

Where so required, suitable rock encountered in the excavation shall be conserved and used as shown on the drawings for constructing the sides of embankments, fills, levees, or dikes, or used where such materials may serve as protection against slope or channel erosion. Where placed within the neat lines of embankments, earth fills, levees, or dikes, as shown in the drawings, or as established by the engineer, the volume of rock so placed shall be included in the volume of embankment earth fill, levees, or dikes, as the case may be, and shall be paid for at the unit bid price for that particular earth fill item.

Where placed outside of the neat lines of embankments, earth fills, levees, or dikes, as slope protection and/or disposal of excavated materials, this work shall not be measured for direct payment and performance thereof is to be considered as subsidiary to work pertaining to the various contract items and the costs thereof shall be included in the unit prices bid for these items.

4.4.5 Sheeting and Bracing.

Sheeting and bracing as may be required to safely support the sides of excavation shall comply with the safety precautions as outlined in current and accepted safety manuals such as "Associated General Contractors Manual of Accident Prevention in

Construction." Where sheeting and bracing are necessary to prevent caving of the walls of excavations and to safeguard the workmen, the excavations shall be dug to such widths that proper allowance is made for the space occupied by the sheeting and bracing. The Contractor shall perform the additional excavation required and furnish and put in place the necessary sheeting and bracing and shall remove the same as the excavation is filled, at his own expense.

4.4.6 Removal of Water.

The Contractor shall construct and maintain all necessary cofferdams, channels, flumes, and/or other temporary diversion and protective works; shall furnish all materials required therefor; and shall furnish, install, maintain, and operate all pumping and other equipment for dewatering the various parts of the work, and for maintaining the foundations, cutoff trenches, and other parts of the work free from water as required for constructing each part of the work. After having served their purpose, all cofferdams and other temporary protective works shall be removed, or leveled, to give a sightly appearance and so as not to interfere in any way with the operation, usefulness or stability of the permanent structures. No separate payment will be made for construction of temporary diversion and protective works, furnishing and operating pumping equipment, or other dewatering costs, since performance of this work is to be considered as subsidiary to work pertaining to the various contract items.

4.5 Measurement and Payment

The volume of the classes and types of excavation to be paid for will be measured by cross-section surveys before and after the excavation operations. The volumes of the classes of excavation to be paid for will be computed to the nearest cubic yard by the method of average cross-sectional end areas.

Common excavation will be paid for at the contract unit price for "Excavation; Common." Rock excavation will be paid for at the contract unit price for "Excavation; Rock," Such payment shall be considered full compensation for furnishing all labor, materials, equipment, and incidentals necessary to complete the work as specified herein.

CONSTRUCTION SPECIFICATION

5 EARTH FILL

5.1 SCOPE

This specification covers the foundation preparation for embankments and the materials, material placement, spreading, moisture control and compaction requirements for compacted fill, semi-compacted fill, uncompacted fill and backfill.

5.2 DEFINITIONS

"Embankment." The earth and/or rock fill portion of the permanent work such as an earth dam, dike or levee.

"Backfill." The refill of excavated areas around or adjacent to a structure which cannot be placed until the structure is completed or until a specified time has elapsed after concrete has been placed.

"Foundation." The prepared or natural surface upon which the embankment or earth fill is to be placed.

"Compaction" A machanical process whereby the density of the soil is increased.

"Optimum Moisture Content." The moisture content at which a specified amount of compaction effort will produce the maximum density of the soil.

"Maximum Dry Density." The dry density of a soil obtained by a specified amount of compaction effort at the optimum moisture content.

5.3 GENERAL PROVISIONS

5.3.1 Lines and Grades. All classes of fills shall be constructed to the lines, grades, and cross sections indicated on the contract drawings unless otherwise directed by the Engineer. All finished surfaces shall be generally smooth and pleasing in appearance.

5.3.2 Conduct of Work. The contractor shall maintain and protect all fill in a satisfactory condition at all times until final completion of all work under the contract. Any approved fill material which is rendered unsuitable after being placed in the fill, and before final acceptance of the work, shall be replaced by the Contractor in a satisfactory manner and no additional payment will be made therefor. The Contractor may be required to remove, at his own expense, any fill material placed outside of the prescribed lines.

Access and haul roads shall be located and constructed as approved by the Engineer. They shall be constructed to be free draining and shall be maintained in good condition throughout the contract period, unless otherwise directed by the Engineer.

5.4 CLASSIFICATION

5.4.1 General. All authorized earth fill will be classified as

Compacted Fill
Semi-Compacted Fill

Classification will be shown on the drawings and/or specified in the bid schedule or ordered in writing by the Engineer under one of the classifications.

5.4.2 Compacted Fill. Compacted fill shall consists of and include all fill except backfill, deposited in layers and compacted by rolling and temping. Compacted fill placed under this specification shall be compacted to specified percent of maximum dry density as determined by the requirements of the American Society for Testing Materials, D-1557-587 or American Association of State Highway Officials T99-57 .

Each class of fill shall be used in such structures or in such portions of designated structures as called for on the drawings and/or in the bid schedule or as directed, in writing, by the Engineer.

5.4.3 Semi-Compacted Fill. Semi-Compacted fill shall consists of and include all fill deposited in layers and compacted by one or a combination of the following methods:

a. Controlled movement of the hauling and spreading equipment over the area so that the entire surface area of each lift will be traversed by not less than one tread track of the loaded earth-moving equipment traveling in a direction parallel to the axis of the fill.

b. Each lift shall be compacted by not less than two (2) complete passes of sheepsfoot tamping roller exerting a minimum pressure of one hundred (100) pounds per square inch.

5.4.4 Uncompacted Fill. Uncompacted fill shall consists of and include all fill, except backfill, deposited in gullies, depressions, and similar locations, without regard to selection of material, or spreading, or compaction, so long as the final grade of the filled area is left in a reasonably smooth condition.

5.4.5 Backfill. Backfill shall consists of and include the refilling of excavated areas around and/or adjacent to conduits and/or other structures and compacting such fill to the required density.

5.5 FOUNDATION PREPARATION

5.5.1 Compacted Fill. After completion of all required clearing, stripping, and grubbing operations, removal of topsoil and unsuitable foundation material, the foundation area shall be loosened thoroughly by scarifying or plowing to a minimum depth of six (6) inches, except in areas where this requirement is waived by the Engineer. After removal of roots or other debris turned up in the process of loosening, the entire surface area of such section of embankment foundation shall be compacted to the same density as hereinafter specified for the type of fill to be placed immediately above the foundation.

No separate payment will be made for preparing the foundation area, the entire cost thereof to be included in the contract price for the specified fill.

5.5.2 Semi-Compacted Fill. After completion of all required clearing and grubbing operations, the entire area to be occupied by the fill shall be stripped to a sufficient depth to remove all materials not suitable for the foundation, and this area roughened by plowing or scarifying. Such material will include grass, weeds, underbrush, and other matter that would be objectionable in the foundation for the fill. No separate payment will be made for foundation preparation under this classification, the entire cost thereof to be included in the contract price for the specified fill.

5.5.3 Uncompacted Fill. Existing trees, brush, down timber, and other obstructions to placing the fill shall be removed or knocked down and spread in these areas, as approved by the Engineer. All foundation preparation work shall be considered as subsidiary work to the placement of the fill.

5.6 MATERIALS

5.6.1 General. The suitability of materials and their disposition in the fill will at all times be subject to approval by the Engineer. Mixing of materials during the excavation process at the borrow source may be required. Pockets of material of uniform particle size, such as sand, when encountered, shall be proportionally mixed with other material to obtain an acceptable fill material or shall be wasted when so directed by the Engineer.

All fill materials shall be obtained from required excavations, designated borrow areas or other approved borrow sources.

5.6.2 Compacted Fill. Soil materials for compacted fill shall be free of sod, brush, roots, and other perishable material and stones having a

maximum dimension of more than six (6) inches. Should any of the above undesirable material be hauled onto the fill, it shall be removed prior to compaction operations.

5.6.3 Semi-Compacted Fill. The materials for semi-compacted fill shall meet the same requirements as for compacted fill.

5.6.3 Uncompacted Fill. Soil materials for uncompacted fill may contain sod, roots, brush, stones and other types of material. The amount and placement location of such material shall at all times be subject to approval by the Engineer.

5.6.5 Backfill. Backfill material shall be of the type and quality conforming to that specified for the adjoining fill material.

5.7 PLACEMENT AND SPREADING

5.7.1 General. No fill material shall be placed until the foundation, subgrade, and/or cutoff trench areas have been inspected and approved by the Engineer. The Contractor shall keep the foundation, subgrade, and/or cutoff trench free from water or unacceptable materials after filling operations have started. During construction, the top surface of all earth fills shall be kept crowned with grades of not less than two (2) percent in order that the fill will drain freely towards the slopes.

No material shall be deposited directly in place in compacted or semi-compacted fill by means of trucks, bottom-dump wagons, dozer, dragline, shovel, clamshell, or similar type of equipment. No fill shall be placed upon a frozen surface, nor shall snow, ice, or frozen material be incorporated in the fill.

Unless otherwise directed, the fill shall be maintained at approximately the same level regardless of the number of types of materials being placed, except that rock fills and filter blankets shall be so placed as to prevent mixing of earth fill material with filter blanket and/or rock materials.

The Contractor shall construct the fill in approximately horizontal lifts extending the entire length of the fill unless notified in writing by the Engineer that the construction of the fill in sections is permitted. The lengths of the sections and the end slopes will be determined by the Engineer where operations are not continuous throughout the entire length of the fill.

5.7.2 Compacted Fill. The distribution of materials throughout a fill shall be such that there will be no lenses, pockets, streaks or layers of material differing substantially in texture or gradation from the surrounding material in the fill. After placement, the fill materials will be spread by motor grader or other approved equipment. The thickness of the layers before compaction with rollers shall not be more than eight (8) inches. No material placed in the fill by dumping in

piles or windrow shall be incorporated in a layer in that position, but shall be moved and spread by blading or similar approved methods. Compacted fill shall not be placed against a slope steeper than one (1) horizontal to one (1) vertical unless otherwise shown on the plans or approved by the Engineer.

5.7.3 Semi-Compacted Fill. The distribution of materials throughout a fill shall be such that there will be no lenses, pockets, streaks or layers of material differing substantially in texture or gradation from the surrounding material in the fill. The fill material will be placed and spread over the fill in layers not over twelve (12) inches thick.

5.7.4 Uncompacted Fill. Uncompacted fill material may be placed in any conventional manner. All roots, brush, stumps, stones and similar material shall be so placed that they will not cause voids in the fill and shall be placed a minimum of two (2) feet below the elevation of the finished grade. The final grade of the filled area shall be reasonably smooth and blend as nearly as practicable with the surrounding topography.

5.7.5 Backfill. Backfill material shall be placed and spread in layers not more than four (4) inches thick before compaction.

No backfill or other load shall be placed against or on top of concrete surfaces before the concrete has developed at least seventy percent (70%) of the specified ultimate strength or before expiration of the minimum period after placing the concrete as indicated below.

Wall and Vertical Faces	10 days
Conduit (Inside forms in place)	7 days
Cradle or Bedding	2 days

Subsequent to the number of days indicated above, but prior to fourteen (14) days after placing concrete, backfill operations may be initiated but no rolling or hauling equipment will be permitted to pass over the structure, or within two (2) feet of any part thereof. During this period backfill may be placed against and on top of concrete surfaces to a thickness of not more than two (2) feet if compaction is accomplished by power tampers. Before passage of hauling and rolling equipment over the top of the structure is permitted, the total curing period of 14 days shall have elapsed and the depth of the fill over the structure shall be at least two (2) feet or more so it will be sufficient to permit such passage without inducing harmful vibrations and stresses in the structure.

Backfill over and around structures shall be brought up uniformly on all sides in order to avoid distortional stresses in the structure.

5.7 MOISTURE CONTROL

5.8.1 Compacted Fill. During the compaction operations the abutments at the level of the fill surface, the surface of the fill and the materials being placed shall be maintained within the moisture content range required to permit proper compaction to the specified density with the equipment used. The moisture content shall be controlled in the

following manner.

Water may be added to the fill materials in the borrow areas or after the material has been brought onto the fill, whichever is the most practical. When material deposited on the fill is too dry, the Contractor shall be required to sprinkle each layer and obtain uniform moisture distribution in the layer by disking, blading or other approved methods. The amount of water applied shall be accurately controlled so that free water will not appear on the surface during or subsequent to compaction operations.

Material deposited on the fill that is too wet shall be removed or spread and permitted to dry, assisted by disking or blading, if necessary, until the moisture content is reduced to the specified limits.

When the top surface of a partial fill becomes too dry or compacted to permit suitable bond with the subsequent layer, the Contractor shall loosen the dried material by scarifying or disking. He shall then moisten the loosened material to an acceptable moisture content and recompact the material to the specified density.

Adjustments of moisture content will be made on the basis of determinations of moisture content by field tests as construction progresses.

5.8.2 Semi-Compacted Fill. Semi-compacted fill material shall have a moisture content such that when kneaded in the hand it will form a ball which does not readily separate when struck sharply with a pencil or which refuses to separate when pressed between the hands. The Contractor may be required to wet or dry the material to obtain the above specified moisture content.

5.8.3 Uncompacted Fill. No limit will be placed on the moisture content of uncompacted fill materials except in the event the water content causes deformation of the fill.

5.8.4 Backfill. Backfill materials shall contain the moisture which will permit compaction to the required density of the contiguous class of fill.

5.9 COMPACTION

5.9.1 Equipment. The Contractor shall furnish and operate the necessary types and kinds of equipment to perform the operations required to obtain the compaction specified herein for the classes of fill included in the contract. The equipment shall be in good working order and shall be of the capacity, weight and/or power necessary to perform the required operations in a workmen-like manner and produce satisfactory progress in construction.

5.9.2 Compacted Fill. After each layer of fill material has been placed, spread and contains the required moisture content specified in 5.8.1, it shall be compacted by passing a roller over the entire surface of the layer a sufficient number of times to obtain the density specified for that particular class of compacted fill.

Portions of the fill which are not accessible to the roller shall be be placed in four (4) inch layers and compacted with power tampers to a density equal to that required for other portions of the fill.

Densities of compacted fill will be determined by comparing field densities to densities obtained by compacting the same type of soil in the laboratory by the standard method of test for the moisture density relations of soils presented by ASTM and AASHO.

5.9.3 Semi-Compacted Fill. After each layer of fill material has been dumped, spread, and blended, and the moisture content is in accordance with the provisions of 5.8.2, compaction will be obtained by the method or methods specified in paragraph 5.4.3. The acceptability of "Semi-Compacted Fill" will be based on adherence to the specified procedure. No density requirement is specified for this type of fill.

5.9.4 Uncompacted Fill. No compaction is required other than that obtained by placing, spreading, and dressing the surface area.

5.9.5 Backfill. After each layer of backfill material has been placed and the moisture content is in accordance with the provisions of paragraph 5.8.4, it shall be compacted with power tampers to the same density requirements as specified for adjoining sections of compacted fill, or as otherwise specified.

5.10 Measurement and Payment

All earth fill will be measured between (1) the foundation lines as determined by a cross-section survey after accomplishment of the foundation preparation and making any excavation in the embankment foundation area, but prior to scarifying; and (2) the line, grades and slopes of the fill as shown on the drawings or as staked in the field.

Each class of fill will be measured between the classification lines as shown on the drawings or as otherwise established. No measurement will be made of additional fill resulting from above grade tolerance permitted. The volume of each class of fill will be computed to the nearest cubic yard by the method of average cross sectional end areas.

Payment for each class of fill will be made at the contract unit price for that class of fill.

CONSTRUCTION SPECIFICATION

17 - ROCK RIPRAP

17.1 SCOPE

This specification covers the foundation preparation for riprap and the placing of the filter blanket and rock riprap.

17.2 MATERIALS

17.2.1 Filter Material. Filter materials used as bedding for the rock riprap when indicated on the drawings shall be composed of tough, hard, durable particles; shall be reasonably free from thin, flat and elongated pieces, and shall contain no organic matter nor soft friable particles in quantities considered objectionable. Filter material shall consist of sand, sand and gravel mixture, gravel or crushed stone, well graded within the limits shown on the drawings or enumerated in the special specifications. Materials considered for use as a filter blanket shall have prior approval before delivery to the site.

17.2.2 Riprap Stone. The riprap stone shall be durable and of a suitable quality to assure permanence in the climate in which it is to be used. The stone shall be sound and dense, free from cracks, seams and other defects that would tend to increase deterioration from weathering, freezing, and thawing, or other natural causes. Riprap shall be reasonably well graded from the minimum size to the maximum size stone as shown on the drawings or given in the special specifications. Neither the breadth nor thickness of any piece of rock shall be less than 1/3 of its length.

Rock fragments or spalls shall be used to fill the voids between the larger rocks.

The inclusion of appreciable quantities of dirt, sand, clay and rock fines will not be permitted. All rock considered for use as riprap shall have prior approval by the Engineer before delivery to the site.

17.3 CONSTRUCTION

17.3.1 Foundation Preparation. Earth surfaces on which the filter blanket or rock riprap is to be placed shall be trimmed and graded to conform to the lines or sections shown on the drawings. Surfaces which are below grade shall be brought to grade by filling with well compacted materials similar to the adjacent materials. Prior to placing the filter blanket or rock riprap, the prepared earth foundation will be inspected, and no materials shall be placed thereon until approved by the Engineer.

17.3.2 Filter Blanket. When shown on the drawings, a filter blanket shall be placed underneath the rock riprap. The filter materials shall be spread uniformly on the prepared surface to the depth and lines indicated on the drawings or as established in the field.

Compaction of the filter blanket will not be required, but it shall
Compaction of the filter blanket will not be required, but it shall be finished to present a reasonably smooth surface free from mounds, dips or windrows.

17.3.3 Riprap. Dumped riprap composed of stone conforming to the requirements of this specification shall be placed by equipment on the surfaces and to the depths indicated on the drawings or as staked on the ground. The riprap shall be placed to the full course thickness at one operation and in such manner as to avoid serious displacement of the underlying materials. The riprap shall be delivered and spread so that the mass of stones in place shall be reasonably well graded, with the larger rocks uniformly distributed and the small rocks and spalls filling the voids between the larger rocks. The finished riprap shall be free from objectionable concentrations of large or of small stones. A tolerence of +12 inches or -6 inches from slope lines and grades shown on the drawings will be allowed in the finished surface of the riprap, except that the extreme minus tolerance shall not be continuous over an area exceeding 200 square feet. Placing riprap by dumping into chutes or by other means that are likely to cause segregation of the various sizes will not be permitted. The Contractor shall maintain the riprap protection until it has been accepted, and any materials displaced by any cause shall be replaced at the Contractor's expense to the lines and grades on the drawings.

When hand-placed riprap is called for on the drawings, riprap composed of stone conforming to the requirements of the specification shall be placed by hand on the surfaces and to the depths indicated on the drawings or as staked on the ground. The riprap shall be placed in such manner that adjacent stones are in close contact and in general have the greatest dimension across the slope. Spaces between the larger stones shall be filled with the smaller stones of acceptable size. The smaller stone shall not be grouped to serve in place of the larger size stone. Flat slab rocks shall be laid on the edge. A tolerance of +12 inches or -6 inches from the slope lines and grades shown on the drawings will be allowed in the finished surface of the riprap, provided the minus tolerance is not continuous over an area greater than 200 square feet.

17.4 MEASUREMENT AND PAYMENT

Method 1. The quantities of filter material and or rock riprap will be determined from the specified thickness shown on the drawings and the area on which acceptable placement has been made. The total quantities will be computed to the nearest cubic yard.

Payment will be made at the contract unit price per cubic yard for "Filter Material" and/or "Rock Riprap." Such payment shall be considered full compensation for all labor, materials, equipment and any incidentals required to complete the rock riprap as shown on the drawings and specified herein.

Method 2. The area of rock riprap will be measured in place on the areas shown on the drawings or as staked in the field by the Engineer. The total area of rock riprap will be computed to the nearest square yard.

Payment will be made at the contract unit price per square yard for "Rock Riprap." Such payment shall be considered full compensation for all labor, material, equipment and any incidentals required to complete the filter blanket and/or rock riprap as shown on the drawings and specified herein.