Specifications No. 651

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

SCHEDULE, SPECIFICATIONS, AND DRAWINGS

SPILLWAY FOR STEWART MOUNTAIN DAM

SALT RIVER PROJECT, ARIZONA
(FEDERAL WORKS PROGRESS ADMINISTRATION PROJECT)

Bids will be received by the Bureau of Reclamation at the office of the Salt River Valley Water Users' Association, Phoenix, Arizona, until 10 a. m., November 25, 1935.

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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 price	Amount
1	Excavation, class 1, for spillway and structures	27,500 cu. yds., at .... (words) .... ($..........) per cu. yd.	$..........
2	Excavation, class 2, for spillway and structures	52,500 cu. yds., at .... (words) .... ($..........) per cu. yd.	....
3	Excavation, class 3, for spillway and structures	1,500 cu. yds., at .... (words) .... ($..........) per cu. yd.	....
4	Excavation of river channel, other than for concrete aggregate	5,000 cu. yds., at .... (words) .... ($..........) per cu. yd.	....
5	Excavation of old concrete	40 cu. yds., at .... (words) .... ($..........) per cu. yd.	....
6	Removing top of existing concrete deflecting wall	60 cu. yds., at .... (words) .... ($..........) per cu. yd.	....
7	Chipping and roughening old concrete surfaces	360 sq. yds., at .... (words) .... ($..........) per sq. yd.	....
8	Back fill about structures	7,000 cu. yds., at .... (words) .... ($..........) per cu. yd.	....
9	Constructing 12-inch diameter sewer pipe drains	70 lin. ft., at .... (words) .... ($..........) per lin. ft.	....
10	Constructing 8-inch diameter sewer pipe drains	420 lin. ft., at .... (words) .... ($..........) per lin. ft.	....

SCHEDULE (Continued)

Item No.	Work or material	Quantity and price	Amount
11	Constructing 6-inch diameter sewer pipe drains	1,620 lin. ft., at .... (words) .... ($........) per lin. ft.	$........
12	Concrete in spillway walls, bucket, piers, and supported floor	3,700 cu. yds., at .... (words) .... ($........) per cu. yd.	....
13	Concrete in spillway paving slab and cut-off wall	4,000 cu. yds., at .... (words) .... ($........) per cu. yd.	....
14	Concrete in motor-generator house	22 cu. yds., at .... (words) .... ($........) per cu. yd.	....
15	Placing reinforcement bars	750,000 pounds, at .... (words) .... ($........) per pound	....
16	Construction of motor-generator house, except concrete	For the lump sum of .... (words) .... dollars	....
17	Reconditioning existing radial gates and hoists, and installing new operating mechanisms	For the lump sum of .... (words) .... dollars	....
18	Installing pipe handrails	4,550 pounds, at .... (words) .... ($........) per pound	....
19	Installing miscellaneous metalwork	500 pounds, at .... (words) .... ($........) per pound	....
20	Installing electrical circuits and apparatus	For the lump sum of .... (words) .... dollars	....
		TOTAL FOR SCHEDULE	$........

STATEMENT OF EQUIPMENT

Each bidder shall fill in the following blanks, stating the equipment with which it is proposed to do the work:

Excavating equipment:

Power shovels ....

Draglines ....

Hauling equipment:

Tractors ....

Trucks ....

Grading tools:

Grading plows ....

Slip scrapers ....

Fresno scrapers ....

Wheel scrapers ....

Air compressors ....

Concrete mixers ....

Pumps ....

Other equipment ....

....

....

....

SPECIFICATIONS

GENERAL CONDITIONS

1. **Bonds**. The contractor shall furnish the bonds as follows:

(a) Performance bond.—Unless another sum is specified in the invitation for bids, the contractor shall furnish a performance bond in an amount not less than 20 percent of the estimated aggregate payments to be made under the contract. Bonds in amounts of $1,000 or less will be made in multiples of $100; in amounts exceeding $1,000 but not exceeding $5,000, in multiples of $500; in amounts exceeding $5,000 in multiples of $1,000: **Provided**, That the amount of the bond shall be fixed by the contracting officer at the lowest sum that fulfills all conditions of the contract.

(b) Payment bond.—If the amount of the contract exceeds $2,000, the contractor shall furnish to the United States, in addition to the bond required under (a) hereof, a payment bond with a surety or sureties satisfactory to the officer awarding the contract, for the protection of all persons supplying labor and material in the prosecution of the work provided for in the contract, for the use of each such person. Whenever the total amount payable by the terms of the contract shall be not more than $1,000,000, the payment bond shall be in the sum of one half of the total amount payable by the terms of the contract. Whenever the total amount payable by the terms of the contract shall be more than $1,000,000 and not more than $5,000,000, the payment bond shall be in the sum of 40 percent of the total amount payable by the terms of the contract. Whenever the total amount payable by the terms of the contract shall be more than $5,000,000, the payment bond shall be in the sum of $2,500,000.

2. **Mongolian labor prohibited**. Pursuant to section 4 of the act of June 17, 1902 (32 Stat. 388, 389), no Mongolian labor shall be employed under this contract.

3. **Climatic conditions**. The contracting officer may order the contractor to suspend any work that may be subject to damage by climatic conditions.

4. **Rights of way**. The site for the installation of machinery or the right of way for the works to be constructed under this contract and for necessary borrow pits, channels, spoil banks, ditches, roads, etc., will be provided by the Government.

5. **Quantities and unit prices**. The quantities noted in the schedules are approximations for comparing bids, and no claim shall be made against the Government for excess or deficiency therein, actual or relative. Payment at the prices agreed upon will be in full for the completed work and will cover materials, supplies, labor, tools, machinery, and all other expenditures incident to satisfactory compliance with the contract, unless otherwise specifically provided.

6. **Staking out work**. The work to be done will be staked out for the contractor who shall, without cost to the Government, provide such material and give such assistance as may be required by the contracting officer.

7. **Bench marks and survey stakes**. Bench marks and survey stakes shall be preserved by the contractor, and in case of their destruction or removal by him or by his employees, they will be replaced by the contracting officer at the contractor's expense, and his sureties shall be liable therefor.

8. Data to be furnished by contractor. The contractor shall furnish the contracting officer reasonable facilities for obtaining such information as he may desire respecting the character of the materials and the progress and manner of the work, including all information necessary to determine its cost, such as the number of men employed, their pay, the time during which they worked on the various classes of construction, etc. The contractor shall also furnish the contracting officer copies of freight bills on all machinery, materials, and supplies shipped to or from the project in connection with the work under the contract.

9. **Sanitation.** The contracting officer may establish sanitary and police rules and regulations for all forces employed under this contract, and if the contractor fails to enforce these rules the contracting officer may enforce them at the expense of the contractor.

10. **Extras.** The contractor shall, when ordered in writing by the contracting officer, perform extra work and furnish extra material, not covered by the specifications or included in the schedules, but forming an inseparable part of the work contracted for. Extra work and material will ordinarily be paid for at a lump-sum or unit price agreed upon by the contractor and the contracting officer and stated in the order. Whenever in the judgment of the contracting officer it is impracticable because of the nature of the work or for any other reason to fix the price in the order, the extra work and material shall be paid for at actual necessary cost as determined by the contracting officer, plus 10 per cent for superintendence, general expense and profit. The actual necessary cost will include all expenditures for material, labor (including compensation insurance), and supplies furnished by the contractor, and a reasonable allowance for the use of his plant and equipment, where required, to be agreed upon in writing before the work is begun, but will in no case include any allowance for office expenses, general superintendence, or other general expenses.

11. **Cleaning up.** Upon completion of the work the contractor shall remove from the vicinity of the work all plant, buildings, rubbish, unused materials, concrete forms, and other like material, belonging to him or used under his direction during construction, and in the event of his failure to do so the same may be removed by the Government at the expense of the contractor, and his surety or sureties shall be liable therefor.

12. **Failure of Congress to appropriate funds.** If the operations of this contract extend beyond the current fiscal year or exceed in volume the amount of money made available for its completion through appropriation by Congress, or allocation under the provisions of the Emergency Relief Appropriation Act of 1935, it is understood that the contract is made contingent upon Congress making the necessary appropriation for expenditures thereunder after such previous appropriation or allocation has been exhausted. In case such appropriation as may be necessary to carry on this contract is not made, the contractor hereby releases the Government from all liability due to the failure of Congress to make such appropriation.

13. **Patents and/or copyrights.** The contractor shall hold and save the Government, its officers, agents, servants, and employees, harmless from liability of any nature or kind, including costs and expenses, for or on account of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article or appliance manufactured or used in the performance of this contract, including their use by the Government, unless otherwise specifically stipulated in this contract.

14. **Protests.** If the contractor considers any work demanded of him to be outside the requirements of the contract, or considers any record or ruling of the contracting officer or of the inspectors to be unfair, he shall immediately upon such work being demanded or such record or ruling being made, ask for written instructions or decision, whereupon he shall pro-

ceed without delay to perform the work or to conform to the record or ruling, and, within ten (10) days after date of receipt of the written instructions or decision, he shall file a written protest with the contracting officer, stating clearly and in detail the basis of his objections. Except for such protests or objections as are made of record in the manner herein specified and within the time limit stated, the records, rulings, instructions, or decisions of the contracting officer shall be final and conclusive. Instructions and/or decisions of the contracting officer contained in letters transmitting drawings to the contractor shall be considered as written instructions or decisions subject to protest or objection as herein provided.

15. **Payments**. In preparing estimates for partial payments the material delivered on the site and preparatory work done will not be taken into consideration.

SPECIAL CONDITIONS

16. **The requirement**. It is required that there be constructed and completed, in accordance with these specifications and drawings listed in paragraph 21 hereof, the spillway channel, lining, retaining walls, motor-generator house, gate repairs, and such additional work as is described herein for the completion of the spillway for the Stewart Mountain Dam, and the excavation of the river channel downstream from the dam, Salt River Project, Arizona. The work is located on the Salt River about 25 miles northeast of Mesa, Arizona, the nearest railroad point, as shown on the location map.

17. **Wage rates.** Pursuant to the provisions of Executive Order No. 7119, the following minimum hourly wage scale has been approved by the Secretary of the Interior for the work covered by these specifications:

Classification	Minimum rate per hour
Blacksmith, skilled	$1.00
Blacksmith, helper	.55
Carpenter, skilled	1.00
Carpenter, rough	.75
Carpenter, helper	.55
Concrete finisher	1.00
Driller, jackhammer	.65
Electrician	1.00
Electrician, helper	.55
Laborer	.40
Mechanic, repairman	1.00
Mechanic, helper	.55
Machinist	1.00
Miner, machineman	.70
Miner, chucktender	.55
Motorman	.65
Mucker	.40
Operator, cableway	1.00
Operator, compressor	.65
Operator, concrete equipment	.65
Operator, crane or derrick	1.00
Operator, engine	.65
Operator, mucking machine	1.00

Classification	Minimum rate per hour
Operator, mucking machine, helper	.55
Operator, pump	.65
Operator, power shovel or dragline	1.00
Operator, power shovel or dragline, helper	.55
Pipefitter	.70
Pipefitter, helper	.55
Powderman	.70
Rigger	1.00
Steel worker, structural	1.00
Steel worker, structural, helper	.55
Steel placer, reinforcement	.75
Steel placer, reinforcement, helper	.55
Tractor driver	.70
Truckdriver, 4-ton and under	.65
Truckdriver, over 4-ton	.70
Welder	1.00
Welder, helper	.55

Rates for semi-skilled labor in classifications other than shown in the above wage scale shall be fixed so as to fall between the minima fixed for skilled and unskilled labor and shall bear the normal relation to these as exists in the locality.

18. **Wage deductions not permissible.** (a) The contractor shall not induce any person employed in the prosecution or completion of this contract to give up any part of the compensation to which he is entitled under his contract of employment, by force, intimidation, threat of procuring dismissal from such employment, or in any other manner whatsoever. The contractor and each subcontractor, if any, shall furnish weekly a sworn affidavit with respect to the wages paid each employee during the preceding week, as provided by the act of June 13, 1934, 48 Stat., 948, which affidavit shall be in the following form:

State of .... }
County of .... } ss:

I, ...(name of party signing affidavit) .... (title), do hereby certify that I am (the employee of).. ....(name of contractor or subcontractor) who supervises the payment of the employees of said contractor (subcontractor); that the attached pay roll is a true and accurate report of the full weekly wages due and paid to each person employed by the said contractor (subcontractor) for the construction of ....(project), for the weekly pay roll period from the .... day of ...., 193......; to the ....day of ...., 193......; that no rebates or deductions from any wages due any such person as set out on the attached pay roll have been directly or indirectly made; and that, to the best of my knowledge and belief, there exists no agreement or understanding with any person employed on the project, or any person whatsoever, pursuant to which it is contemplated that I or anyone else shall, directly or indirectly, by force, intimidation, threat or otherwise, induce or receive any deductions or rebates in any manner whatsoever from any sum paid or to be paid to any person at any time for labor performed or to be performed under the contract for the above-named project.

....

Sworn to before me this .... day of ...., 193......

....

(b) Said affidavit shall be executed and sworn to by the officer or employee of the contractor or subcontractor who supervises the payment of its employees. Said affidavit shall be delivered, within three days after the payment of the pay roll to which it is attached, to the Government representative in charge at the site of the particular project in respect of which it is furnished, who shall forward the same promptly to the Federal agency having control of such project. If no Government representative is in charge at the site, such affidavit shall be mailed within such three-day period to the Federal agency having control of the project.

(c) At the time upon which the first affidavit with respect to the wages paid to employees is required to be filed by a contractor or subcontractor pursuant to the requirements of these regulations, there shall also be filed in the manner required by (b) hereof a statement under oath by the contractor or subcontractor, setting forth the name of its officer or employee who supervises the payment of employees, and that such officer or employee is in a position to have full knowledge of the facts set forth in the form of affidavit required by (a) hereof. A similar affidavit shall be immediately filed in the event of a change in the officer or employee who supervises the payment of employees. In the event that the contractor or subcontractor is a corporation, such affidavit shall be executed by its president or vice-president. In the event that the contractor or subcontractor is a partnership, such affidavit shall be executed by a member of the firm (Joint regulations of the Secretary of the Treasury and the Secretary of the Interior effective January 15, 1935, under the act of June 13, 1934, 48 Stat., 948.)

19. Employment services. Pursuant to authorization of the Works Progress Administration, skilled labor in all or any number of the following classifications will be exempted from the requirement of article 19 (a) of the contract that 90 percent of the persons employed on the project shall be taken from the public relief rolls, if the United States Employment Service or other employment agency designated by the Works Progress Administration certifies in writing to the Bureau of Reclamation that skilled labor in such classifications is not available from relief sources:

Blacksmith, drill sharpener
Mechanic, repairman
Operator, bulldozer
Operator, cableway
Operator, concrete equipment, one cubic yard or larger
Operator, crane or derrick
Operator, drill sharpener
Operator, Deisel engine
Operator, locomotive
Operator, mucking machine
Operator, power shovel or dragline

Operator, tractor, 60 hp. or larger
Operator, truck, five ton or larger
Operator, Lynn truck
Operator, Letorneau scraper
Operator, pile driver
Rigger
Timberman, tunnel
Welder

20. General description. The work covered by these specifications consists of the construction of a concrete-lined spillway channel below the existing concrete spillway in the left abutment of the Stewart Mountain Dam, the installation of individual operating motors and the reconditioning of the operating mechanism of the nine radial gates, the construction of a motor-generator house at the left abutment of the dam, the installation of two gasoline-engine-driven generators and electrical conduit and conductors, and the excavation of a portion of the river channel downstream from the dam. The spillway channel will be constructed on a compound curve and the floor will be superelevated on the outside. The bottom and sides of the channel will be lined with concrete for about 450 feet downstream from the centerline of the crest of the spillway. The nine radial gates will be reconditioned by installing individual hoist motors, limit switches, stop lugs, changing the worm drive, and replacing the lifting chains and sprockets with flat, steel rope and rope-drums.

21. Drawings. The following drawings are made a part of these specifications:

1. *(27759)* 25-D-711—Location map.
2. *(27760)* 25-D-712—Location and logs of test holes.
3. *(27761)* 25-D-713—General plan.
4. *(27762)* 25-D-714—Plan and sections.
5. *(27763)* 25-D-715—Channel lining details.
6. *(27764)* 25-D-716—Motor-generator house.
7. *(27765)* 25-D-717—Radial gate hoist—Installation—Plan and sections.
8. *(27766)* 25-D-718—Radial gate hoist—Mountings and replacement parts.
9. *(27767)* 25-D-719—Radial gate hoist—Gate position indicator.
10. *(27768)* 25-D-720—Radial gate motor control—Electrical installation.
11. *(27769)* 25-D-721—Construction program.

The drawings show the approximate dimensions and general arrangement of all features. Where necessary, as determined by the contracting officer, additional drawings showing details of the work will be furnished to the contractor. The contractor will be furnished such additional copies of the specifications and drawings as may be required for carrying out the work. Contact prints of the original drawings from which the attached reductions were made will be furnished to the contractor for construction purposes, upon request.

22. Commencement, prosecution, and completion of work. The contractor shall begin work within thirty (30) calendar days after date of receipt of notice to proceed, and shall complete all of the work within one hundred and eighty (180) calendar days from the date of receipt of such notice. The contractor shall at all times during the continuance of the contract prosecute the work with such forces and equipment as in the judgment of the contracting officer are sufficient to complete it within the specified period of time.

23. Liquidated damages. The damages that may result from any delay in completion of the work by the time agreed upon will be difficult, if not impossible, of ascertainment. If the work is not completed on or before the date fixed for its completion by the terms of the contract, the contractor shall pay to the Government as fixed, agreed, and liquidated damages the sum of fifty dollars ($50) per day for each calendar day's delay until the work is satisfactorily completed, or until such time as the Government may reasonably procure the completion of the work by another contractor or complete the work itself. Whatever sums may be due as liquidated damages for delay may be deducted from payments due to the contractor or may be collected from the contractor or the contractor's surety or sureties. The provision for liquidated damages shall not prevent the Government from terminating the right of the contractor to proceed in case of default, as provided in article 9 of the contract.

24. Construction program. The contractor's construction program shall be at all times subject to the approval of the contracting officer. The capacity of the construction plant, sequence of operations, and methods of operation shall be such as to insure the completion of the work within the period of time specified. A tentative construction program has been prepared by the Government and is included in the drawings, which program, if followed, will result in the completion of the work within the period of time specified in paragraph 22. The program is based on an assumption that notice to proceed will be received by the contractor on December 15, 1935. The construction program shown on the drawings is tentative only and the Government assumes no responsibility for any use that bidders or the contractor may make thereof or for any deductions or conclusions that may be made from the program as shown on the drawings. The tentative construction program is included in the drawings solely to assist bidders and the contractor in preparing their own construction programs. None of the statements in this paragraph nor anything on the tentative construction program shall relieve the contractor from the obligation to commence, prosecute, and complete the work as provided in paragraph 22. Within thirty (30) calendar days after date of receipt of notice to proceed, the contractor shall submit to the contracting officer a complete construction program showing in detail his proposed program of operations. The contractor shall advise the contracting officer immediately of any proposed change in his construction program.

25. Materials furnished by the Government. The Government will furnish cement for use in concrete, mortar, and grout; diatomaceous silica or other powdered admixtures, if required, for use in concrete; reinforcement bars; anchor bars, rods, and bolts, including cinch anchors; pipe and fittings for handrails; clay sewer pipe for drains; parts for reconditioning the existing radial gates and hoists, and for installing new operating and control mechanisms; tar paper for use over drains; bituminous materials for contraction joints; doors, windows, metalwork, and roofing materials for the motor-generator house; manhole frames and covers; ladders and ladder rungs; cast-iron strainers; fuel tank and gasoline-engine-driven generators; paint materials; electrical equipment, conduits, fittings, and conductors; and also all other materials not specifically mentioned in this paragraph or in paragraph 26 that will become a part of the completed construction work. All materials furnished by the Government will be delivered to the contractor f.o.b. cars at Mesa, Arizona. The contractor shall haul all materials from the point of delivery to the work; shall provide suitable warehouses or other means of protection satisfactory to the contracting officer for such of the materials as, in the opinion of the contracting officer, require storage or protection; and will be charged for any materials lost or damaged after delivery, except as otherwise specifically provided, the same amounts that the materials cost the Government at the point of delivery to the contractor. The contractor shall be responsible for the prompt unloading of materials delivered on cars and the proper care of the materials, and will be held liable for any demurrage charges incurred due to failure to unload cars promptly. The contractor shall report to the contracting officer in writing, within 24 hours after unloading, any shortage in or damage to materials when delivered. The cost of unloading, hauling, storing, and caring for all materials furnished by the Government shall be included in the prices bid for the work in which the materials are to be used. The cost of handling and installing minor miscellaneous items of timber, metal, or other work, for which specific prices are not provided in the schedule, shall be included in the prices bid for work to which they are appurtenant, as determined by the contracting officer. The contractor shall return to the Government, at points in the vicinity of the Stewart Mountain Dam, as directed by the contracting officer, all unused materials, and will be charged for any materials not used and not returned the same amounts that the materials cost the Government at the point of delivery to the contractor. The contractor shall return to the Government at Mesa, Arizona, as directed by the contracting officer, all returnable oil barrels, spools, reels, and other returnable shipping accessories, and will be charged for any such accessories not returned, or damaged to such an extent that they are not returnable, the same amounts that the Government is required to pay for such accessories.

26. Materials to be furnished by the contractor. The contractor will be required to furnish sand and broken rock or gravel for concrete; gravel for embedding drain pipes; all materials, except cement, for porous concrete for embedding drain pipes; all back fill materials; all form materials including oil for oiling forms; all spikes and nails for forms and other uses; all wire, wire ties, or other appliances used for holding forms and for securing reinforcement bars; metal or other supports, if used, for reinforcement bars, pipe, and other metalwork; all water used for mixing, cleaning, and curing concrete; all insulating tape and compounds, solder and flux for electrical installations; and also all other materials not a part of the completed construction work required for the completion of the contract. The contractor shall haul all these materials as well as all materials delivered to the contractor by the Government. The cost of hauling, storing, and handling all the materials described above and of furnishing all the materials required to be furnished by the contractor shall be included in the prices bid in the schedule for the work for which the materials are required. In accordance with the provisions of Section 14 (b) of the Bituminous Coal Conservation Act of 1935 (Public No. 402, 74th Congress, approved August 30, 1935) the contractor agrees that he will buy no bituminous coal to use on or in the carrying out of this contract from any producer except such producer be a member of the Bituminous Coal Code set out in accordance with Section 4 of said Act as certified to by the National Bituminous Coal Commission.

27. Use of domestic materials. In the performance of this work the contractor, subcontractors, material men, or suppliers shall use only such unmanufactured articles, materials, and supplies as have been mined or produced in the United States, and only such manufactured articles, materials, and supplies as have been manufactured in the United States, all from articles, materials, or supplies mined, produced, or manufactured, as the case may be, in the United States. This provision shall not apply with respect to articles, materials, or supplies of the class or kind to be used, or to the articles, materials, or supplies from which they are manufactured, if such articles, materials, or supplies are not mined, produced, or manufactured, as the case may be, in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality or if the Secretary of the Interior shall find that, in respect to some particular articles, materials, or supplies, this provision would unreasonably increase the cost. Each bidder shall submit with his bid a list of all articles, materials, or supplies which he proposes to use which are not mined, produced, or manufactured in the United States, in order to permit a determination whether such articles, materials, or supplies, or the articles, materials, or supplies from which they are manufactured, are mined, produced, or manufactured, as the case may be, in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality, and if the above provision would unreasonably increase the cost. If the Secretary of the Interior finds that in the performance of this contract there has been a failure to comply with the foregoing provision with respect to domestic material, he will make public the name of the contractor obligated under this contract, and no other contract for the construction, alteration, or repair of any public building or public work in the United States or elsewhere shall be awarded to such contractor, subcontractors, material men, or suppliers with which such contractor is associated or affiliated within a period of three years after such finding is made public.

28. Records of test pits and borings. The drawings included in these specifications show the available records of test pits dug and borings made at or near the spillway channel site. The Government does not guarantee any interpretation of these records, nor the correctness of any information shown on the drawings relative to geological conditions. Bidders and the contractor must assume all responsibility for deductions and conclusions as to the nature of the rock and other materials to be excavated, the difficulties of making and maintaining the required excavations and of doing other work affected by the geology of the site of the work, and for the final preparation of the foundations for the spillway paving, walls, piers, and motor-generator house.

29. Right to change location and plans. When additional information regarding foundation or other conditions becomes available as a result of the excavation work, further testing, or otherwise, it may be found desirable to change the location, alinement, dimensions, or design of the spillway or other structures to conform to such conditions. The Government reserves the right to make such reasonable changes as, in the opinion of the contracting officer, may be considered necessary or desirable, and the contractor shall be entitled to no extra compensation because of such changes, except that any increase in the amount of excavation, concrete, or other required work, for which items are provided in the schedule, will be paid for at the unit prices bid therefor in the schedule. The contractor's plant shall be laid out and his operations shall be so conducted as to accommodate any reasonable change in the location and design of the spillway and other structures, or any part thereof, without additional cost to the Government.

30. Lines and grades. The contractor shall provide such drill holes, forms, ladders, spikes, nails, light, and such assistance as may be required by the contracting officer in giving lines and grades. The contracting officer's marks shall be carefully preserved by the contractor until they have served their purpose. Work shall be suspended at such points and for such reasonable time as the contracting officer may require to transfer lines and to mark points for line and grade. No additional compensation will be paid to the contractor for required assistance in setting lines and grades or for loss of time on account of such necessary suspension of work or otherwise on account of the requirements of this paragraph.

31. Camp sites. The contractor will be permitted to use for construction camp purposes any land available in the vicinity of the work that is the property of the Government: **Provided**, That such use shall not interfere with any part of the work or of the work of other contractors or of the Government in the vicinity. If private land is used by the contractor for camp or construction purposes the contractor shall make all necessary arrangements with the owner and pay all rentals or other costs connected therewith. The location, construction, maintenance, operation, and removal of the contractor's camps and of the camps or establishments of all persons or parties in the vicinity, operating or associated with the contractor, shall be subject to the approval of the contracting officer.

32. Roads. The approximate locations of existing roads in the vicinity of the work are shown on the drawings. Access to the work from existing roads shall be provided by the contractor at his own expense. The Government assumes no responsibility for the condition or maintenance of any road or structure thereon that may be used by the contractor in performing the work under these specifications, or in traveling to and from the site of the work. No payment will be made to the contractor by the Government for any work performed in improving, repairing, or maintaining any road, highway, or structure thereon for use in the performance of the work under these specifications. Roads subject to interference by the work shall be kept open. The contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient red lights, danger signals and signs, and shall take all necessary precautions for the protection of the work and the safety of the public. Highways and roads closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning and detour signs. All barricades and obstructions shall be illuminated at night and all lights shall be kept burning from sunset until sunrise.

33. Sand and gravel deposits. To the extent that suitable material is available, all concrete aggregate shall be obtained from required excavation in the river channel immediately downstream from the dam, and no payment will be made to the contractor for the excavation of such material. If sufficient quantity of suitable concrete aggregate is not available from required excavation in the river channel, additional materials may be obtained from natural deposits in the river channel approximately 1,500 feet downstream from the dam. No charge will be made to the contractor for sand and gravel taken from the deposits for use in the work covered by these specifications. The fact that the Government is hereby designating certain deposits from which the aggregate may be obtained shall not be construed as constituting the approval of all materials taken from the deposits, and the contractor will be held responsible for the specified quality of all such material used in the work. The contractor shall carefully strip the site of the deposits, or so much thereof as may be required, of top soil, vegetation, roots, brush, sod, loam, unsuitable sand and gravel, and other objectionable matter. The disposal of all materials wasted by stripping shall be subject to the approval of the contracting officer. Payment for stripping and disposal of materials wasted by stripping as described in this paragraph will be made at the unit price per cubic yard bid in the schedule for "Excavation of river channel, other than for concrete aggregate." No payment will be made for any other material wasted from the gravel deposits, including excess material of any of the sizes into which the aggregates are required to be separated by the contractor and materials which have been discarded by reason of being below the minimum or above the maximum sizes specified for use. The contractor shall develop and maintain the deposits in a suitable condition for the excavation and removal of the required material, in a manner satisfactory to the contracting officer, and so as to utilize at all times the greatest practicable yield of suitable materials in the portion of the deposits being worked. The location, time, sequence, and method of the washing operations shall be such as to insure that each of the various sizes of aggregate has a reasonably uniform and stable moisture content when delivered to the mixing plant. The water used for washing aggregate for concrete shall be reasonably clean and shall be free from objectionable quantities of silt, organic matter, alkali, salts, and other impurities. The cost of all work required by this paragraph, except as otherwise provided for stripping, shall be included in the unit prices bid in the schedules for the items of work in which the materials obtained are used, which unit prices shall also include all expenses of the contractor in screening, washing, hauling, storing, mixing, and other necessary operations on the materials.

EARTHWORK

34. Classification of excavation. Except as otherwise provided in these specifications, all materials moved in required excavations for the spillway and other structures will be measured in excavation only, to the neat lines shown on the drawings or prescribed by the contracting officer, and will be classified for payment as follows:

Class 1.—Material that can be plowed to a depth of six inches or more by a six-horse or six-mule team, each animal weighing not less than 1,400 pounds, attached to a suitable plow, all well handled by four men; also material that is loose and can be handled with team-drawn scrapers, and material that can be excavated efficiently, without blasting, by power shovels or dragline excavators of recognized standard manufacture, equipped with suitable dippers or buckets having minimum capacities of ¾ and 1 cubic yard, respectively, well handled by skilled operators; also all boulders or pieces of rock not exceeding two cubic feet in volume, that are detached or are embedded in class 1 material.

Class 2.—All material other than class 1 and class 3; including, but not restricted to, such hard and compact material as hardpan, cemented gravel, and soft or disintegrated rock, which cannot be excavated efficiently by power shovels or dragline excavators of the size and class above described, or by the use of plows and team-drawn scrapers, until loosened by blasting; also all boulders or detached pieces of solid rock more than two cubic feet and not exceeding one half cubic yard in volume, and all slide rock or similar loose rock occurring in masses which cannot be excavated efficiently by the use of team-drawn scrapers, except pieces exceeding one half cubic yard in volume.

Class 3.—All solid rock in place which cannot be removed until loosened by blasting, barring, or wedging, and all boulders or detached pieces of solid rock more than one half cubic yard in volume. Solid rock under this class, as distinguished from soft or disintegrated rock under class 2, which also requires blasting before removal, is defined as sound rock of such hardness and texture that it cannot be loosened or broken down by hand drifting picks. No material, except boulders or detached pieces of solid rock, will be classified as class 3, which is not actually loosened by blasting before removal, unless blasting is prohibited, and barring, wedging, or similar methods are prescribed by written order of the contracting officer.

No additional allowance above the unit prices bid in the schedule for the excavation of the several classes of materials will be made on account of any of the materials being wet or frozen. It is desired that the contractor or the contractor's representative be present during measurement of materials excavated. On written request of the contractor, made within 10 days after the receipt of any monthly estimate, a statement of the quantities and classifications between successive stations, or in otherwise designated locations, included in said estimate will be furnished the contractor within 10 days after the receipt of such request. This statement will be considered as satisfactory to the contractor unless specific written objections thereto with reasons therefor are filed with the contracting officer within 10 days after receipt of said statement by the contractor or the contractor's representative on the work. Failure to file such written objections with reasons therefor within said 10 days shall be considered a waiver of all claims based on alleged erroneous estimates of quantities or classification of materials for the work covered by such statement.

35. Blasting. Blasting will be permitted only when proper precautions are taken for the protection of persons, the work, or private property, and any damage done to the work or private property by blasting shall be repaired by the contractor at the contractor's expense. Caps or other exploders or fuses shall in no case be stored, transported, or kept in the same place in which dynamite or other explosives are stored, transported, or kept. The location and design of powder magazines, methods of transporting explosives, and, in general, the precautions taken to prevent accidents shall be subject to the approval of the contracting officer, but the contractor shall be liable for all injuries to or deaths of persons or damage to property caused by blasts or explosives.

36. Excavation, general. Except as otherwise provided in these specifications or as otherwise shown on the drawings, excavation will be measured for payment to slopes of 1 to 1 for common excavation and ¼ to 1 for rock excavation, and, in the case of excavation for structures, to lateral dimensions of one foot outside of the foundations of the structures: **Provided,** That where the character of the material cut into is such that it can be trimmed to the required lines of the concrete structure and the concrete placed directly against the sides of the excavation, measurement for payment will be made only for the excavation within the neat lines of the structure: **Provided further,** That for any required excavation where, in the opinion of the contracting officer, the conditions warrant, the excavation will be measured for payment to the most practicable dimensions and lines as staked out or otherwise established by the contracting officer: **And provided further,** That for trenches for pipe drains, measurement for payment will be made only to the neat lines required to provide for the thicknesses of gravel or porous concrete fill around the drainpipes as shown on the drawings or as directed by the contracting officer. The excavation of trenches for pipe drains in rock foundations shall be performed by means of line drilling and light blasting or by the use of hand tools or power cutting drills without blasting, and in such a manner as not to shatter or otherwise damage the sides or bottoms of the trenches. Where not to be covered with concrete, excavations shall be made to the full dimensions required and shall be finished to the prescribed lines and grades in a workmanlike manner, except that sharp points of undisturbed ledge rock will be permitted to extend within the prescribed lines not more than six inches. The contractor shall prepare the foundations for the various parts of the spillway and for the motor-generator house in a manner suitable for forming foundations for the concrete structures. The bottom and side slopes of common excavation upon or against which concrete is to be placed shall be accurately finished by hand to the dimensions shown on the drawings or prescribed by the contracting officer and the surfaces so prepared shall be moistened with water and tamped or rolled with suitable tools or equipment for the purpose of thoroughly compacting them and forming firm foundations upon or against which to place the concrete structures. If at any point in common excavation, material is excavated beyond the neat lines required to receive the structure, the over-excavation shall be filled with selected materials, in layers not more than six inches thick, moistened and thoroughly compacted by tamping or rolling in a manner satisfactory to the contracting officer. If at any point in common excavation the natural foundation material is disturbed or loosened during the excavation process or otherwise, it shall be consolidated in a manner satisfactory to the contracting officer; or where directed by the contracting officer, it shall be removed and replaced with selected material compacted to the satisfaction of the contracting officer. Where concrete is to be placed upon or against rock, the excavation shall be sufficient to provide for the minimum thickness of concrete at all points and the prescribed average thickness shall be exceeded as little as possible. Measurement of such excavation for payment will be limited to the excavation required for the prescribed average thicknesses of the concrete for which measurement for payment will be made as provided in these specifications. Any and all excess or over excavation performed by the contractor for any purpose or reason, except as may be ordered in writing by the contracting officer, and whether or not due to the fault of the contractor, shall be at the expense of the contractor. No blasting that might injure the work will be permitted, and any damage done to the work by blasting, including the shattering of the material beyond the required excavation lines, shall be repaired by and at the expense of the contractor and in a manner satisfactory to the contracting officer. All cavities in rock excavation, upon or against which concrete is to be placed, caused by careless excavation, as determined by the contracting officer, or by removal, as directed by the contracting officer, of rock or other foundation materials needlessly damaged by blasting or other operations of the contractor, shall be solidly filled with concrete entirely at the expense of the contractor, including the cost of all materials required therefor. The unit prices bid in the schedule for excavation shall include the cost of all labor and materials for coffer-dams and other temporary construction and of all pumping, bailing, draining, and all other work necessary to maintain the excavation in good order during construction and of removing such temporary construction, where required.

37. Excavation for spillway and structures. The items of the schedule for excavation for spillway and structures include all required excavation, except excavation of old concrete, shown on the drawings or ordered by the contracting officer for all parts of the spillway structure, including the spillway outlet channel, wing walls, retaining walls, cut-off walls, piers, and drains; and also includes all required excavation for the motor-generator house and fuel tank. All excavations shall be made to the lines, grades, and dimensions shown on the drawings or established by the contracting officer, and in accordance with the provisions of paragraph 36. It may be desirable during the progress of the work to vary the slopes and dimensions of the excavations from those shown on the drawings or established by the contracting officer. The contractor shall be entitled to no additional allowance above the unit prices bid in the schedule for excavation for spillway and structures by reason of changes in the lines, grades, and slopes of required excavations, although changes in the quantities of excavation will be covered in the estimates. Payment for excavation for spillway and structures will be made at the unit prices bid therefor in the schedule, which unit prices shall include the cost of all work described in this paragraph.

38. Excavation of river channel, other than for concrete aggregate. The item of the schedule for "Excavation of river channel, other than for concrete aggregate" includes all required excavation for the removal of the gravel bar and the excavation of the river channel downstream from the dam, except materials excavated from the gravel bar and river channel which are used for concrete aggregate. To the extent that they may be required, all materials excavated from the gravel bar and river channel which, in the opinion of the contracting officer, are suitable shall be used for concrete aggregate. The materials which are unsuitable for use as concrete aggregate shall be disposed of as provided in paragraph 42. All excavation shall be made to the lines and grades shown on the drawings or established by the contracting officer. Materials excavated from the gravel bar and river channel will not be classified for payment. Measurement, for payment, of the excavation in the river channel will be made to the lines and grades shown on the drawings or established by the contracting officer and payment therefor will be made at the unit price bid in the schedule for "Excavation of river channel, other than for concrete aggregate": **Provided**, That no payment will be made for materials excavated from the river channel which are used for concrete aggregate.

39. Excavation of old concrete. The item of the schedule for "Excavation of old concrete" includes all required excavation of old concrete from the ogee section of the existing concrete spillway, from the key-ways at the junctions of the new walls, and elsewhere as shown on the drawings or as directed by the contracting officer. The method of removing old concrete from the existing spillway shall be subject to the approval of the contracting officer. The work shall be carefully performed so as not to loosen, crack, or otherwise injure the concrete outside of the prescribed lines of excavation. Any material so loosened or injured shall be removed, and the new surface shall be cleaned and prepared to receive the new concrete as provided in paragraph 56. All excavated concrete shall be disposed of as provided in paragraph 42. Measurement, for payment, of excavation of old concrete will be made only to the neat lines shown on the drawings or established by the contracting officer, and payment therefor will be made at the unit price bid in the schedule for "Excavation of old concrete", which unit price shall include the cost of cleaning and preparing the excavated concrete surfaces to receive the new concrete.

40. Removing top of existing concrete deflecting wall. The item of the schedule for "Removing top of existing concrete deflecting wall" includes all work required for the removal and disposal of the concrete in the top of the existing deflecting wall. The top of the wall shall be removed to a depth of two feet below the top of the fill to be placed about the wall, or to such depth and lines as may be directed by the contracting officer. The method of removing the top of the wall will be optional with the contractor, and the contractor will not be required to avoid shattering or cracking the remaining portion of the wall: **Provided**, That the existing spillway training wall and other structures which adjoin the deflecting wall shall be protected from cracking, loosening, or other injury. Any damage to the training wall that is to become part of the right spillway wall, or to any other structures that are not to be removed, caused by careless or negligent operations of the contractor, as determined by the contracting officer, shall be replaced or repaired by the contractor, entirely at the expense of the contractor, and in a manner satisfactory to the contracting officer. Measurement for payment will be made only to the lines described herein or prescribed by the contracting officer. Payment for removal of the concrete in the existing deflection wall will be made at the unit price per cubic yard bid therefor in the schedule which unit price shall include the entire cost of removing and disposing of the concrete.

41. Chipping and roughening old concrete surfaces. Under the item of the schedule for "Chipping and roughening old concrete surfaces" the contractor shall roughen all areas of the existing ogee section of the spillway against which new concrete is to be placed, as shown on the drawings or as directed by the contracting officer. The roughening shall be done by chipping, bush-hammering, or other method satisfactory to the contracting officer. The work shall be so performed as not to loosen, crack, or shatter any parts of the concrete below the roughened surface, and any concrete so loosened shall be removed by the contractor. The roughened surface of the old concrete shall be left sound and hard and in such a condition as to provide good mechanical bond between the old and new concrete. Any method of chipping or roughening which in the opinion of the contracting officer causes disintegration or other damage to the existing concrete below the roughened surface will not be permitted. All concrete which, in the opinion of the contracting officer, is not hard, dense, and durable, shall be removed to such depth as to leave a surface satisfactory to the contracting officer. Immediately prior to placing the new concrete against the old concrete, the roughened surface of the old concrete shall be prepared as provided in paragraph 56. Debris from the roughening operations shall be disposed of as provided in paragraph 42. Measurement, for payment, for chipping and roughening old concrete surfaces will be made only of the areas of existing concrete surfaces required to be chipped and roughened, as shown on the drawings or as directed by the contracting officer, and will not include concrete surfaces which are the result of excavation of old concrete or the placing of concrete under these specifications. Payment for chipping and roughening old concrete surfaces will be made at the unit price per square yard bid therefor in the schedule, which unit price shall include the cost of all labor, equipment, and other expense incidental to completing the work as described herein.

42. Disposal of excavated materials. Suitable materials from required excavations, or so much thereof as may be required, shall be used for back fill about the structure. To the extent directed by the contracting officer, material excavated for the spillway structure shall be placed to form a fill on the outside of the left wall of the spillway structure. All other materials excavated for the construction of the spillway channel and structure shall be placed in the embankment about the left abutment pier of the dam and in the spoil area along the right wall of the spillway structure, as shown on the drawings or as directed by the contracting officer. The embankment shall be placed, trimmed, and leveled to reasonably regular lines with the top of the embankment level with the top of the spillway wall, and the contractor shall be entitled to no additional compensation on account of this requirement. Material excavated from the river channel downstream from the dam and not used for concrete aggregate shall be wasted. The disposal of the wasted material shall be subject to the approval of the contracting officer. All waste piles shall be located where, in the opinion of the contracting officer, they will not harmfully interfere with the natural flow of the river or with the operation of the reservoir, power house, or outlet works. Where required by the contracting officer, waste piles shall be leveled and trimmed to reasonably regular lines. The cost of disposing of all excavated materials that are placed in embankments or wasted as described in this paragraph shall be included in the unit prices bid in the schedule for excavation.

43. Back fill about structures. Back fill is defined as excavation refill or embankment material required to be placed under these specifications and which cannot be deposited around the structures or in adjacent embankments until after completion of the structures. The item of the schedule for back fill about structures shall also include the selected porous gravel fill along the back of the retaining walls, and the hand placed stone at drain inlets. The contractor shall place all back fill about structures. The material used for back fill, the amount thereof, and the manner of depositing the material shall be subject to the approval of the contracting officer. The gravel fill along the back of the retaining walls shall be selected, porous material and shall be placed as shown on the drawings or as directed by the contracting officer. No special compaction of the back fill material will be required: **Provided,** That, if a gravel fill is required under the floor of the motor-generator house, special compacting of this fill will be required and payment therefor will be made as extra work under the provisions of article 5 of the contract and paragraph 10 of these specifications. So far as practicable, the material moved in excavating for the structure shall be used for back fill, but if sufficient suitable material is not available from this source, additional material shall be obtained from borrow pits selected by the contracting officer. Material used for back fill about structures will be measured in place about the structures and to the lines of the required back fill as established by the contracting officer, and payment will be made at the unit price per cubic yard bid therefor in the schedule, which unit price shall include the cost of all work connected therewith, including the excavation of the necessary material: **Provided,** That material required to be excavated to build the structure or the adjacent works and necessarily laid aside and afterwards used for back fill will be paid for both as excavation and back fill.

PIPE DRAINS

44. Constructing clay sewer pipe drains. Drains consisting of clay sewer pipe varying from 6 to 12 inches in diameter laid with uncemented joints and embedded in trenches filled with gravel or porous concrete shall be constructed under the spillway channel lining, about the spillway retaining walls, and elsewhere as shown on the drawings or as directed by the contracting officer. All pipe, cement for the porous concrete where required, and tar paper for covering will be furnished to the contractor by the Government as provided in paragraph 25. All other materials required for the construction of the drains shall be furnished by the contractor. In handling sewer pipe, care shall be used to avoid breakage, and the contractor will be charged for all sewer pipe in excess of one percent of the total amount of each size of pipe delivered to the contractor that is damaged in handling to such an extent that, in the judgment of the contracting officer, it is unfit for use. For pipe to be embedded in gravel, gravel bedding of the thickness shown on the drawings or as directed by the contracting officer shall be placed in the bottom of the pipe trenches. The pipe shall be carefully laid on the gravel bedding with the bell end up-grade and with partially open, uncemented joints, in a workmanlike manner, to the lines and grades established by the contracting officer. Gravel shall be carefully placed and tamped about the pipe so as not to disturb the pipe after being laid and to hold it securely in position while the embankment or concrete is being placed. The gravel shall be clean and well graded from ¼ inch to 2 inches in size. The entire trench outside of the drainpipe shall be filled with gravel to the bottom or outside surface of the concrete. The sewer pipe drains to be embedded in porous concrete shall be constructed in the same manner as above described except that the pipe shall be laid upon and back filled with porous concrete. The porous concrete shall be mixed in the proportion of one (1) part of portland cement to five and one-half (5½) parts of coarse aggregate, by weight, the amount of water used being such (a water-cement ratio of 0.33 plus or minus, by weight) that the resulting cement paste will not fill the voids of the aggregate but will thoroughly coat and bind the aggregate particles. The coarse aggregate shall conform to the provisions of paragraph 49, except that all of the aggregate shall pass a screen having ¾ inch square or equivalent round openings and shall be retained on a screen having 3/16 inch square or equivalent round openings. The compressive strength of the porous concrete at seven days, as determined by tests of 6- by 12-inch cylinders, made and tested in accordance with the latest standard specifications of the American Society for Testing Materials, shall be not less than 1,000 pounds per square inch. The porosity of the concrete shall be such that water will pass through a slab of the concrete 12 inches thick at the rate of not less than 10 gallons per minute per square foot of slab, with a constant 4-inch depth of water on the slab. Where concrete is to be placed over or against the gravel or porous concrete fill about drainpipes, the entire fill shall be covered with tar paper to prevent the concrete from entering the gravel or porous concrete fill about the pipe. Measurement for payment for constructing the sewer pipe drains will be made along the center lines of the pipe, from end to end of the pipe in place, and no allowance will be made for lap at joints. Payment for constructing sewer pipe drains will be made at the unit prices per linear foot bid therefor in the schedule, which unit prices shall include the cost of unloading, hauling, storing, handling, preparing an even bedding, and placing the pipe; furnishing, hauling, handling, and placing the gravel fill about the pipe where required; furnishing all materials (except cement) and mixing and placing the porous concrete fill about the pipe, where required; placing tarpaper covering, where required; and of all other operations, except the excavation of the trenches, required for the completion of the drains.

CONCRETE

45. Composition. Concrete shall be composed of cement, sand, broken rock or gravel, and water all well mixed and brought to the proper consistency. If required, as determined by the contracting officer, powdered admixture shall be added as provided in paragraph 47. The exact proportions in which these materials are to be used for different parts of the work shall be as determined by the contracting officer from time to time during the progress of the work, and as analyses and tests are made of samples of the aggregates and the resulting concrete. In general it is contemplated that concrete mix proportions, cement content, and limitations as to concrete strength and water-cement ratio for the major part of the work will be as shown in the following tabulation:

	Maximum Size of Aggregate		
	3-inch	1½-inch	¾-inch
Approximate mix proportions by weight	1-2.5-5.0	1-2.5-4.0	1-2.5-3.0
Approximate cement content in barrels per cubic yard	1.20	1.35	1.50
Minimum 28-day strength requirement in pounds per square inch	*3,000	3,500	3,500
Maximum allowable water-cement ratio by weight	0.60	0.60	0.60

*Strength of full mix in 8- by 16-inch cylinders, or approximately 3,500 pounds per square inch when wet-screened to 1½-inch maximum aggregate and tested in 6- by 12-inch cylinders.

The above stated proportions may be modified by the contracting officer to suit the work or the nature of the materials used, and the contractor shall be entitled to no extra compensation by reason of such modifications. The individual mixes will be based upon securing concrete having suitable workability, density, impermeability, and required strengths, without the use of an excessive amount of cement, and using, insofar as practicable, the entire yield of suitable materials from the natural deposits from which the concrete aggregates are obtained. If, in the opinion of the contracting officer, it is impracticable to utilize the entire pit-run yield of suitable materials, the contractor shall be entitled to no additional compensation due to the necessity of wasting any of the excess material. The contractor shall provide such means and equipment as are required to accurately determine and control the relative amounts of the various materials, including water and each individual size of aggregate entering the concrete, and these and their operation shall be subject at all times to the approval of the contracting officer. All batches of concrete shall be proportioned on the basis of integral sacks of cement, unless the cement is weighed, and the amount of each individual size of aggregate entering each batch of concrete shall be determined by direct weighing. The amount of water shall be determined by direct weighing or volumetric measurement. The measuring equipment shall comply with the following requirements:

(a) The construction and accuracy of the weighing equipment shall conform to the requirements of the United States Bureau of Standards for such equipment.

(b) Each weighing unit shall include a visible springless dial or equally suitable device which will register the scale load at any stage of the weighing operation from zero to full capacity.

(c) The equipment shall be capable of ready adjustment for compensating for the varying weight of any moisture contained in the smaller sizes of coarse aggregate, preferably without involving numerical computation, and for changing concrete mix proportions.

(d) The equipment shall be capable of controlling the delivery of material for weighing or volumetric measurement so that the combined inaccuracies in feeding and measuring during normal operation will not exceed $1\frac{1}{2}$ percent for water or cement, and $2\frac{1}{2}$ percent for each separate size of aggregate.

(e) Weighing hoppers shall be constructed so as to permit the convenient removal of overweight material in excess of the prescribed tolerances.

(f) The operating mechanism in the water measuring device shall be such that leakage will not occur when the valves are closed.

(g) Each dial and water measuring device shall be in full view of the operator and, if practicable, the weighing equipment shall be so arranged that the operator may conveniently observe the operation of the bin gates and also the materials discharged into the mixer hopper.

The amount of water used shall be changed as required to secure concrete of proper consistency and to adjust for any variation in moisture content of the aggregate as it enters the mixer. The quantity of water entering any batch of concrete shall be just sufficient, with a normal mixing period, to produce concrete of the required consistency as determined by the contracting officer. Excessive overmixing, requiring additions of water to preserve the required concrete consistency, will not be permitted. Uniformity in concrete consistency from batch to batch will be required and the consistency of each batch shall be controlled by direct observation of the concrete in the mixer, or by the use of a consistency meter or other apparatus satisfactory to the contracting officer and subject at all times to his approval. Tests and analyses of the aggregates and the resulting concrete will be made by the Government at frequent intervals and the mixes used shall be changed whenever necessary or desirable, in the opinion of the contracting officer, to secure the required economy, workability, density, impermeability, or strength and the contractor shall be entitled to no additional compensation because of such changes. The compressive strength of the concrete will be determined through the medium of tests of 6- by 12-inch cylinders, made and tested in accordance with the latest standard specifications of the American Society for Testing Materials, except that for samples of concrete having 3-inch maximum size aggregate, the pieces of aggregate larger than $1\frac{1}{2}$ inches will be removed by wet-screening or hand-picking. The contractor will be permitted, when approved by the contracting officer, to use proportions producing concrete of equal quality but of less economy than the proportions determined by the contracting officer: **Provided,** That any increase of cost as a result thereof shall be borne by the contractor. Only sufficient water shall be used to secure plastic concrete of suitable workability for the structure in which it is to be placed. Slump tests will be made in accordance with the "Tentative Method of Test for Consistency of Portland Cement Concrete" (A.S.T.M. Designation: D 138-32T) of the American Society for Testing Materials. For ordinary reinforced walls, beams, and slabs the slump shall not exceed $4\frac{1}{2}$ inches at point of placement. A greater slump than $4\frac{1}{2}$ inches at point of placement, but not exceeding a maximum of 6 inches, will be permitted only in exceptional cases and where specifically authorized by the contracting officer for concrete in positions especially difficult to place, as in thin and in heavily reinforced sections. The slumps stated herein are maximum slumps and the Government reserves the right to require lower slumps in any or all mixes whenever, in the opinion of the contracting officer, such lower slumps are practicable and will produce concrete of better quality or greater economy to the Government.

46. Cement. Cement for concrete and mortar will be furnished to the contractor by the Government, as provided in paragraph 25. The contractor shall give the contracting officer not less than thirty (30) days' notice in writing of his cement requirements. The requirements shall be stated, so far as practicable, in quantities of not less than carload lots. In order that cement may not become unduly aged after delivery, the contractor shall not use cement in the work direct from his freighting or other hauling or transporting operations whenever any cement is available that has been stored more than sixty (60) days after delivery to the contractor. The contractor shall return to the railway station at Mesa, Arizona, as the contracting officer may direct, all empty sacks cleaned of cement in a manner satisfactory to the contracting officer, securely bound in bundles in such manner and of such sizes as the contracting officer may direct. For all sacks not returned in serviceable condition the contractor will be charged the same amount that the sacks cost the Government.

47. **Admixtures**. It may be required that diatomaceous earth or other admixtures be used in the concrete to secure increased uniformity, workability, impermeability, or to otherwise improve it. The material to be used and the amount thereof shall be as directed by the contracting officer. Diatomaceous earth, if used, shall not be in excess of five percent by weight of the amount of cement used. Other admixtures, if used, shall be in like moderate proportions. Not more than one admixture shall be used at one time. Admixtures, if required, will be furnished by the Government as provided in paragraph 25. If the admixture is delivered in returnable cloth sacks, the contractor shall return to the railway station at Mesa, Arizona, as the contracting officer may direct, all empty sacks, cleaned in a manner satisfactory to the contracting officer, securely bound in bundles in such manner and of such sizes as the contracting officer may direct. For all cloth sacks not returned in serviceable condition the contractor will be charged the same amount that the sacks cost the Government.

48. **Sand**. Sand for concrete and mortar may be obtained from natural deposits, as provided in paragraph 33. The sand particles shall be hard, dense, durable, uncoated, nonorganic, rock fragments that will pass a screen having 3/16-inch square or equivalent round openings. The sand shall be free from injurious amounts of dust, lumps, soft or flaky particles, shale, alkali, organic matter, loam, mica, and other deleterious substances. The sand as it is used in the concrete shall be so graded that concrete of the required workability, density, impermeability, and strength can be made without the use of an excess of water or cement. The sand for concrete shall have a fineness modulus of not less than 2.50 nor more than 3.00, unless approval is given by the contracting officer to use sand not meeting this requirement. The fineness modulus will be determined by dividing by 100 the sum of the cumulative percentages retained on Tyler standard sieves, numbers 4, 8, 14, 28, 48, and 100. The suitability of the sand will be determined by the contracting officer with the aid of tests made in accordance with the standard specifications of the American Society for Testing Materials. The sand shall be such that 2-inch by 4-inch cylinders of 1 to 3 mortar of standard mortar consistency, when made and tested in accordance with the "Tentative Specifications and Tests for Compressive Strength of Portland Cement Mortar" (A.S.T.M. Designation: C 9-16T) of the American Society for Testing Materials shall develop a compressive strength not less than the strength of mortar cylinders made with standard Ottawa sand. The sand shall be washed unless specific written authority is given by the contracting officer to use unwashed sand. Any crushing, rolling, blending, screening, washing, or other operation on the sand required to meet the specifications shall be done by the contractor and the cost thereof shall be included in the unit prices bid in the schedule for the concrete in which the sand is used.

49. **Gravel**. Gravel for concrete may be obtained from natural deposits, as provided in paragraph 33. It shall consist of hard, dense, durable, uncoated, rock fragments free from injurious amounts of soft, friable, thin, elongated, or laminated pieces, alkali, organic, or other deleterious matter. It shall be so graded that concrete of the required workability, density, impermeability, and strength can be made without the use of an excess of sand, water, or

cement. The suitability of the gravel will be determined by the contracting officer with the aid of tests made in accordance with the standard specifications of the American Society for Testing Materials. Any crushing, blending, screening, washing, or other operation on the gravel required to meet these specifications shall be done by the contractor and the cost thereof shall be included in the unit prices bid in the schedule for the items of work in which the gravel is used. The gravel shall be washed unless specific written authority is given by the contracting officer to use unwashed gravel. The gravel shall all pass through a screen having 3-inch square openings and shall be retained on a screen having 3/16-inch square openings. It shall be separated into three intermediate sizes by screens having ¾-inch square and 1½-inch square openings. Screens having openings of other sizes and shapes may be used: **Provided,** That equivalent results, as determined by the contracting officer, are obtained. Separation of the gravel into the three sizes and handling the aggregate after separation shall be such that the amount of undersize material by weight at the time of batching will be the minimum and will not be more than 10 percent for the fine gravel, 12 percent for the intermediate gravel, and 14 percent for the coarse gravel. These percentages are maximum values and the Government reserves the right to require lower values if, in the opinion of the contracting officer, such lower values are practicable and warranted. The relative amounts of each size of gravel to be used in each mix of concrete and in all parts of the work will be determined by the contracting officer, and will be based on securing concrete having the required workability, density, impermeability, strength, and economy, without the use of an excess of sand, water, or cement and using insofar as practicable the entire yield of suitable material from the natural deposits from which the gravel is obtained. The maximum size of gravel to be used in each part of the work will be determined by the contracting officer. For very thin and for heavily reinforced parts, the maximum size will be that determined by the screen having ¾-inch square openings; for somewhat heavier portions of the work the maximum size will be that determined by the screen having 1½-inch square openings; and for the more massive parts, the maximum size will be that determined by the screen having 3-inch square openings.

50. **Water for mixing.** The water used in concrete and mortar shall be reasonably clean and free from objectionable quantities of silt, organic matter, alkali, salts, and other impurities.

51. **Mixing.** The cement, admixture if used, sand, and gravel shall be so mixed and the quantity of water added shall be such as to produce a homogeneous mass of uniform consistency. Dirt and other undesirable substances shall be carefully excluded. All concrete shall be thoroughly mixed in a batch mixer of approved type and size, and one so designed as to positively insure a uniform distribution of all the component materials throughout the mass during the mixing operation. Each mixer and its operation shall be subject to the approval of the contracting officer, and the use of any mixer that at any time produces, in the opinion of the contracting officer, unsatisfactory results shall be promptly discontinued until it is repaired or replaced. In general, only sufficient water shall be used in mixing to produce a workable mix. Water shall be added prior to, during, and following the mixer charging operation. The mixing of each batch shall continue not less than one and one-half (1½) minutes for mixers with a capacity of 2 yards and less, not less than two (2) minutes for mixers with a capacity of 3 yards, and not less than two and one-half (2½) minutes for mixers with a capacity of 4 yards, after all materials except water are in the mixer, during which time the mixer shall rotate at the speed for which it was designed or at such speed as will produce a mass of uniform consistency before the expiration of the mixing period. Overloading of mixers will not be permitted. Each mixer shall be equipped by the contractor with a mechanically-operated timing

and signaling (or locking) device satisfactory to the contracting officer for indicating and assuring the completion of the required mixing period.

52. Temperature of concrete. Concrete when deposited shall have a temperature of not more than 95° F., and not less than 40° F.

53. Forms. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. All exposed concrete surfaces having slopes of 1 to 1 or steeper shall be formed. Where the character of the material cut into to receive a concrete structure is such that it can be trimmed to the prescribed lines, the use of forms will not be required. The forms shall be of sufficient strength and rigidity to hold the concrete and to withstand the necessary pressure, ramming, and vibration without deflection from the prescribed lines. The surfaces of all forms in contact with the concrete shall be rigid, tight, and smooth. Suitable devices shall be used to hold adjacent ends and edges of panels or other forms together in accurate alignment. The lagging of wooden forms for concrete surfaces that will be exposed to view, and for all other concrete surfaces that are to be finished smooth, shall be bevel-edged or matched. Wooden forms to be used more than once shall be maintained in serviceable condition and thoroughly cleaned before being reused. Where metal sheets are used for lining forms the sheets shall be placed and maintained on the forms with the minimum amount of wrinkles, bumps, or other imperfections. When such metal-lined forms have been used repeatedly and are not acceptable to the contracting officer for further use they shall be discarded or satisfactorily repaired. Metal rods or other similar devices to hold the forms will be permitted in the structure if proper means are used to take out or omit all portions of the rods to a depth of not less than two inches from the surface of the concrete. All holes left after removal of the rods shall be immediately and completely filled with cement mortar and the surface left smooth and in good condition. Wire ties will be permitted only where approved by the contracting officer and will not be approved where permanently exposed finished surfaces are required, and if used they shall be cut off flush with the concrete surface after the forms are removed. Before placing concrete, the surfaces of all wooden, metal, and metal-faced forms shall be oiled with a suitable nonstaining oil of a quality satisfactory to the contracting officer, and immediately before placing concrete, precaution shall be taken to see that all form anchors are thoroughly secure and tight. Where forms are placed in successive units for continuous surfaces, care shall be taken to fit the forms tightly over the completed surface so as to prevent leakage of mortar from the concrete and to maintain accurate alignment of the surface. Forms shall be left in place until their removal is authorized by the contracting officer, and shall then be removed with care so as to avoid injury to the concrete. The forms for all structures shall provide for contraction joints as shown on the drawings, or as directed by the contracting officer.

54. Placing. Concrete shall be placed in the work before it has stiffened sufficiently to require retempering. If any concrete before placement has become so stiff that, in the opinion of the contracting officer, proper placement cannot be assured, the concrete shall be wasted. The contractor will be charged for any cement and admixtures contained in the wasted concrete at their cost to the Government at the point of delivery to the contractor. All earth and rock surfaces upon or against which concrete is to be placed shall be thoroughly moistened immediately before the concrete is placed, so that moisture will not be drawn from the concrete. The surfaces of all rock foundations upon or against which concrete is to be placed shall be roughened to provide adequate bond between the rock and the concrete. Immediately before placing concrete upon or against any rock surface, the surface shall be thoroughly cleaned by the use of stiff brooms, picks, jets of water and air applied at high velocity, wet sand-blasting, or other effective means satisfactory to the contracting officer, and all water shall be removed from depressions before the concrete is placed, so as to permit thorough inspection and proper bond of concrete with the foundation rock. After cleaning, and immediately before placing concrete, all approximately horizontal rock surfaces shall be covered with a layer of mortar ¾ inch thick, consisting of the regular concrete mixture without the coarse aggregate, or mixed in proportions as directed by the contracting officer. The concrete mortar shall be thoroughly worked with brooms or otherwise into all irregularities of the surface. Concrete shall then be placed immediately upon the fresh mortar. When the placing of concrete is to be interrupted long enough for the concrete to take its final set, the working face shall be given a shape as shown on the drawings or as directed by the contracting officer, by the use of forms or other means that will secure proper union with subsequent work. All concrete surfaces which have set for 12 hours or more, upon or against which concrete is to be placed and to which new concrete is to adhere, shall be cleaned of all laitance and loose or defective surface concrete, by means of jets of air and water applied at high velocity, by wet sand-blasting, chipping or by other means approved by the contracting officer. The surface of each lift or layer shall be washed immediately prior to the placing of the succeeding lift or layer of concrete and all water shall be removed from depressions before the concrete is placed: **Provided,** That where foreign matter cannot be removed by washing, wet sand-blasting or chipping will be required. All approximately horizontal concrete surfaces which have set and upon which concrete is to be placed, and to which the new concrete is to adhere, shall be covered with a layer of mortar approximately ½ inch thick, consisting of the regular concrete mixture without the coarse aggregate, or mixed in proportions as directed by the contracting officer. Concrete shall then be placed immediately upon the fresh mortar. Only methods of transporting and placing which will deliver concrete of the required consistency into the work, without segregation, shall be used. Methods of conveying concrete to any of the structures, by which the mixed batch or combination of batches is progressively loaded into chutes, belt conveyors, or other similar equipment and carried in a thin continuous exposed flow to the forms, will not be permitted: **Provided,** That such methods of conveyance may be used if approved in writing by the contracting officer, for very limited, isolated sections of the work. Concrete shall be deposited in all cases as nearly as practicable directly in its final position and shall not be caused to flow in the mass in a manner to permit or cause segregation. Dropping the concrete vertically a distance such as to result in undesirable segregation, or depositing a large quantity at any point and running or working it along the forms will not be permitted. Concrete shall be vibrated, rammed, tamped, or worked with suitable appliances until it completely fills the forms, closes snugly against all surfaces, and is in perfect and complete contact with all reinforcement bars and other metal embedded in the concrete. Wherever practicable, as determined by the contracting officer, the concrete shall be compacted with the aid of power vibrators of the internal type. Where smooth surfaces are required, for all surfaces which will be permanently exposed to the weather, and for all surfaces next to metal conduit or other embedded metal around which it is desired to prevent leakage, the adjacent concrete shall be vibrated, spaded, or tamped so as to produce a dense, impervious layer of concrete next to the surface or embedded metal. No concrete shall be placed except in the presence of a duly authorized Government inspector. No concrete shall be placed in water except with the written permission of the contracting officer and the method of depositing the concrete shall be subject to his approval. No concrete shall be placed in running water. Concrete which is not placed in accordance with these specifications and is of inferior quality, as determined by the contracting officer, shall be removed and replaced by the contractor. The entire cost of removing and replacing such rejected concrete shall be borne by the contractor, including the cost of all materials required in the replacement.

55. Finishing. The surface of concrete finished against forms shall be smooth, free from projections, and thoroughly filled with mortar. Immediately upon the removal of forms, all holes left by the removal of rods and all voids shall be neatly filled with cement mortar of the same proportions as the mortar in the concrete. All unsightly ridges or lips shall be removed, and undesirable local bulging on exposed surfaces shall be remedied by tooling and rubbing. All patching required shall be done as directed by the contracting officer and only by skilled workmen in the presence of a Government inspector. Exposed surfaces of concrete not finished against forms, such as horizontal or sloping surfaces, shall be brought to a uniform surface and worked with suitable tools to a smooth steel-trowel finish. All sharp angles on surfaces which will be exposed to view and on other surfaces where required, shall be rounded, beveled, or filleted by the use of molding strips or suitable molding or finishing tools. The addition of thin coats of mortar or neat cement to formed concrete surfaces to bring them to prescribed dimensions will not be permitted. Repairs to concrete surfaces and additions, where required, shall be made by chipping openings into the concrete, with dimensions as directed by the contracting officer, and placing fresh concrete to the required lines. The chipped openings shall be sharp-edged, shall be keyed, and shall be not less than 3 inches in depth. The fresh concrete shall be reinforced and keyed and doweled to the surfaces of the openings as directed by the contracting officer. Before final acceptance of the work the contractor shall clean all exposed concrete surfaces of all encrustations of cement, mortar, and grout. A hand rubbed finish will be required on concrete surfaces of portions of the motor-generator house, as provided in paragraph 64.

56. Curing and protection. The contractor shall protect all concrete against injury until final acceptance by the Government. Exposed surfaces of concrete shall be protected from the direct rays of the sun for at least three days. All concrete shall be kept continuously moist for at least two weeks after the concrete has been placed. The method of keeping concrete moist shall be by continuous sprinkling or spraying with water, or by other methods approved by the contracting officer. Where practicable, covering the concrete with damp earth of such nature and thickness that it will protect the concrete from drying for a period of two weeks will be acceptable: **Provided,** That before final acceptance of the work the contractor shall remove all such earth covering to the satisfaction of the contracting officer. All water used in curing shall be equal in quality to that required for mixing water, as provided in paragraph 50. The cost of furnishing, handling, hauling, and applying all materials used for protecting and curing concrete shall be included in the unit prices per cubic yard bid in the schedule for the concrete on which the protective material is used.

57. Damaged or defective concrete. Concrete damaged from any cause, and any concrete which shall be found defective at any time before the completion and acceptance of the work, shall be removed and replaced by the contractor with acceptable concrete as directed by the contracting officer, at no expense to the Government, and the contractor will be charged for the materials furnished by the Government and used in such concrete the same amount that the materials cost the Government at the point of delivery to the contractor.

58. Reinforcement bars. Steel reinforcement bars shall be placed in the concrete wherever shown on the drawings or where directed by the contracting officer. The reinforcement bars will be furnished to the contractor by the Government as provided in paragraph 25. Unless otherwise shown on the drawings or directed by the contracting officer, measurements made in placing the bars shall be to the center lines of the bars. If more than one grade of reinforcement bar is furnished, the contractor shall use proper precautions, satisfactory to the contracting officer, to prevent the use of the wrong grade in any part of the work. The exact position, size, and shape of reinforcement bars are not shown in all cases on the drawings, and where not shown they shall be in all respects as specified by the contracting officer, and where necessary, as determined by the contracting officer, the contractor will be furnished supplemental detailed drawings or lists which will give the information necessary for cutting, bending, and placing the reinforcement bars. The reinforcement bars shall be so secured in position that they will not be displaced during the placing of the concrete, and special care shall be exercised to prevent any disturbance of reinforcement bars in concrete that has already been placed. Metal chairs, metal hangers, metal spacers, or other metal supports satisfactory to the contracting officer, may at the option of the contractor, be furnished and used by the contractor for supporting reinforcement bars. Wherever necessary, in the opinion of the contracting officer, to prevent future damage to the concrete or unsightly rust stains on exposed concrete surfaces, all such metal supports for reinforcement bars shall be made of non-corrodible steel. Payment for placing reinforcement bars will be made at the unit price per pound bid therefor in the schedule, which unit price shall include the cost of furnishing and attaching wire ties and metal supports, if used, of unloading, hauling, sorting, storing, cutting, bending, placing, and securing and maintaining in position all reinforcement bars, as shown on the drawings or as directed by the contracting officer.

59. Anchors in concrete. Anchor bolts, structural shapes, plates, and bearings required in connection with the installation of gate operating machinery, gasoline-engine-driven generators and other apparatus will be furnished by the Government as provided in paragraph 25 and shall be placed in the concrete by the contractor as shown on the drawings or as directed by the contracting officer. Wherever practicable, as determined by the contracting officer, anchors shall be placed before the concrete is poured, and, except as otherwise provided in paragraph 72, drilling for placing anchors in the concrete after pouring will not be permitted. Where the placing of anchors before the concrete is poured is not practicable, as determined by the contracting officer, formed openings satisfactory to the contracting officer shall be provided and the anchors grouted into the openings at some later time, in a manner satisfactory to the contracting officer. Except as otherwise provided, payment for placing anchors will be made at the unit prices bid in the schedule for installing the gate operating machinery, gasoline-engine-driven generators, and other apparatus in connection with which the anchors are required.

60. Measurement of concrete. Except as otherwise specifically provided in these specifications, measurement of concrete for payment will be made only to the neat lines of the structures as shown on the drawings or as established by the contracting officer, and on the basis of the concrete having thicknesses shown on the drawings or prescribed by the contracting officer. Any thickness of concrete shown on the drawings may be changed by order of the contracting officer, in which case the changed thickness will be used as the basis of measurement for payment. In the event cavities resulting from careless excavation, as determined by the contracting officer, are required to be filled with concrete, the materials furnished by the Government and used for such refilling will be charged to the contractor at their cost to the Government at the point of delivery to the contractor. In measuring concrete for payment, the volume of all cavities, depressions, openings, embedded pipes, woodwork, and metal work, except reinforcement bars and anchor bolts and bars, will be deducted.

61. Payment. Payment for concrete in the various parts of the work will be made at the unit prices per cubic yard bid therefor in the schedule, which unit prices shall include the cost of all labor and materials required in the construction, except that cement and any admixtures required will be furnished by the Government as provided in paragraph 25, and payment for placing reinforcement bars will be made at the unit price per pound bid therefor in the schedule.

62. Concrete in spillway walls, bucket, piers, and supported floor. The item of the schedule for "Concrete in spillway walls, bucket, piers, and supported floor", includes all concrete in the footings, side walls, counterforts, wing walls, and cut-off walls which are constructed monolithically to form the spillway channel retaining walls; all concrete in the bucket between the existing ogee section and the supported floor; all concrete in the piers which support the floor slab immediately below the bucket; and all concrete in the supported floor of the spillway channel, but not including the concrete in the paving slab downstream from the supported floor and the concrete in the cut-off wall at the downstream end of the spillway lining. The concrete shall be accurately placed to the lines, grades, and dimensions shown on the drawings or prescribed by the contracting officer, and a high quality of workmanship and finish will be required. Contraction joints as shown on the drawings, or as directed by the contracting officer, shall be provided in the floor slabs, walls, and bucket. The contraction joints shall be formed as shown on the drawings or as directed by the contracting officer, and the surface of the side of the joint first completed shall be painted with one coat of bituminous primer before the concrete of the other part of the joint is placed. Bituminous primer for painting contraction joints will be furnished by the Government as provided in paragraph 25. Measurement for payment of all concrete described in this paragraph will be made to the dimensions shown on the drawings or as specified by the contracting officer, and payment therefor will be made at the unit price bid in the schedule for "Concrete in spillway walls, bucket, piers, and supported floor".

63. Concrete in spillway paving slab and cut-off wall. The item of the schedule for "Concrete in spillway paving slab and cut-off wall" includes all concrete in the spillway floor slab supported on natural rock or ground, and downstream from the supported floor of the spillway; and all concrete in the cut-off wall between the inside faces of the spillway retaining walls. The concrete shall be accurately placed to the lines, grades, and dimensions shown on the drawings or prescribed by the contracting officer, and a high quality of workmanship and finish will be required. Contraction joints, as shown on the drawings or as directed by the contracting officer, shall be provided in the paving. The contraction joints shall be formed as shown on the drawings or as directed by the contracting officer, and the surface of the side of the joint first completed shall be painted with one coat of bituminous primer before the concrete of the other part of the joint is placed. Bituminous primer for painting contraction joints will be furnished by the Government as provided in paragraph 25. Measurement, for payment, of all concrete described in this paragraph will be made to the dimensions shown on the drawings or as specified by the contracting officer, and payment therefor will be made at the unit price bid in the schedule for "Concrete in spillway paving slab and cut-off wall".

64. Concrete in motor-generator house. The item of the schedule for "Concrete in motor-generator house" includes all concrete required for the construction of the motor-generator house including foundation walls and footings. All work shall be accurately constructed to the lines and dimensions shown on the drawings or prescribed by the contracting officer and exceptional care shall be used to insure a high quality of workmanship. The entire surface of the exterior walls of the motor-generator house shall be given a special finish and for this purpose the forms may be removed while the concrete is yet green but not earlier than 24 hours after the placing of the concrete. Immediately after removing the forms, any required patching shall be done and major imperfections of finish removed or corrected to the satisfaction of the contracting officer. The entire surface shall then be thoroughly rubbed with a carborundum stone using plenty of clean water in the process. After this rubbing, the surface shall be thoroughly cleaned by washing. A sand-cement wash of a mixture determined by the contracting officer shall be applied during the rubbing process, if directed by the contracting officer. A smooth finish of uniform color will be required. The cost of the special finish for the outside walls as described in this paragraph shall be included in the unit price bid in the schedule for "Concrete in motor-generator house."

MOTOR-GENERATOR HOUSE

65. Construction of motor-generator house, except concrete. The item of the schedule for "Construction of motor-generator house, except concrete", includes all work required for the complete construction of the motor-generator house as shown on the drawings or as directed by the contracting officer, except concrete, placing reinforcement bars, installing the gasoline-engine-driven motor-generators, and installing electrical conduits, wiring, and fittings. All work shall be accurately constructed to the lines and dimensions shown on the drawings or prescribed by the contracting officer. All materials required for the construction of the completed house will be furnished by the Government as provided in paragraph 25. Payment for construction of the motor-generator house, except concrete, will be made at the lump-sum price bid therefor in the schedule, which lump-sum price shall be the entire cost to the Government of erecting and completing the house, except as above provided, and shall include but not be limited to the following:

(a) Metal doors and metal-sash windows.—Metal doors and metal-sash windows together with casings, plastic cement if used, clips, hardware, glass, putty, and all other parts, will be furnished by the Government as provided in paragraph 25. The contractor shall install, glaze, and paint the doors and windows in a workmanlike manner as shown on the drawings or as directed by the contracting officer. The metal sash and frames shall be accurately installed in truly vertical planes, without warping, and shall be rigidly and securely braced and held in position until the grout or plastic cement has set. All joints between the metal frames and the concrete shall be completely filled with cement grout or plastic cement and neatly finished. Window sash and glass will be furnished separately and glazing shall be done by the contractor. All metal frames and sash shall be adjusted to the satisfaction of the contracting officer before the windows are glazed. The glass shall be secured with metal stops, and the back and face puttied with putty firmly pressed into place and made smooth with a metal tool. All windows shall be cleaned before final acceptance of the work. Doors and door frames shall be completely installed in accordance with the manufacturer's specifications or as directed by the contracting officer. After installation the contractor shall test all doors and windows and shall correct any defects in operation to the satisfaction of the contracting officer.

(b) Asphalt-saturated-felt roofing.—Built-up asphalt-saturated felt roofing, consisting of five layers or plies of asphalt-saturated rag felt cemented together with asphalt, shall be placed on the concrete roof slab of the motor-generator house as shown on the drawings or as directed by the contracting officer. During the construction of the concrete walls which extend above the roof slab, metal reglets shall be installed in the walls above the roofs as shown on the drawings or as directed by the contracting officer. After the concrete of the walls and roofs has been placed and before the built-up asphalt-saturated roofing is placed, cants of nailing concrete shall be constructed at all intersections of the roof with vertical walls, as shown on the drawings or as directed by the contracting officer. Flashing of the type shown on the drawings shall be installed where required. The roofing felt, asphalt primer, asphalt, metal reglets, and all materials for flashing will be furnished by the Government as provided in paragraph 25. The metal reglets will be furnished completely fabricated ready for installation. Brazing and soldering materials for flashing shall be furnished by the contractor. Before applying the roof coverings, the concrete roof surface shall be smooth, firm, dry, and free from high spots, depressions, and all loose and foreign material. The roofing shall contain not less than the following quantities of material per 100 square feet:

	Federal specification symbol	Weight per 100 square feet
Asphalt primer	SS-A-701	7.5 pounds
Hard asphalt, melting point 165° F. to 190° F.	SS-A-666	170 pounds
5 layers 15-pound asphalt-saturated felt	HH-F-191	75 pounds

The asphalt shall not be heated above 400° F., shall be uniformly applied, and shall be hot when the felts are laid. The layers of felt shall be laid so as to be free from wrinkles and buckles. Felt laid over asphalt shall be rolled closely behind the mopping so that no voids or air pockets shall form under the felt. Felt shall be reversed; that is, laid with the curl down and shall, so far as practicable, be laid at right angles to the incline of the roof, starting at the low points. Ends of sheets shall be lapped six inches. Roofing shall be applied only during favorable weather conditions. The concrete and felt shall be dry during application. Counter-flashing and all connections with other work shall be completed before the final coating of asphalt is applied. The roofing shall be applied as follows:

First—Coat the entire surface of the roof and the cants to the under-side of the reglets with a uniform coating of asphalt primer, using not less than one gallon per 100 square feet, and allow to dry.

Second—Apply a uniform coating of hot asphalt using not less than 30 pounds per 100 square feet.

Third—Over this coating of asphalt, while hot, lay five layers of 15-pound felt, lapping each sheet 26 inches if 32-inch wide felt is used, or lapping each sheet 29 inches if 36-inch wide felt is used, and mop each of the sheets the full width of the lap with hot asphalt, using not less than 20 pounds per 100 square feet in each mopping. The two bottom layers of felt shall be cut off at the bottom of cants. The top layer shall extend to the back side of the reglet and the two layers under the top layer shall extend up the cant and each layer shall be cut off two inches from the top edge of the next succeeding layer.

Fourth—After all counter-flashing is installed, mop the entire surface with a uniform coating of asphalt, using not less than 60 pounds per 100 square feet.

Base flashing shall consist of three layers of 15-pound asphalt-saturated felt extending from the back side of the reglets, down over the cants, and out onto the roof. The under layer of base flashing shall extend out onto the roof not less than six inches from the lower edge of the cant and each succeeding layer shall extend at least four inches beyond the edge of the preceding layer. The felts shall be bonded in place and together with solid moppings of hot asphalt. The roofing felts and the two under layers of base flashing shall be nailed to the cants with 1½-inch barbed roofing nails through flat tin disks placed at 12-inch centers and three inches from the wall. The top layer of base flashing and the copper counter-flashing shall not be nailed to the cants but shall be mopped on with asphalt. Copper counter-flashing shall be cut and fitted by the contractor from copper sheets furnished by the Government, and the joints shall be riveted and soldered to form continuous watertight flashing. The upper edges of the copper sheets shall be bent into and around the back part of the reglets, and shall be tightly calked in place with oakum and lead wool, as shown on the drawings or as directed by the contracting officer. The reglets shall be completely and solidly filled with the calking materials for their entire length. The copper counter-flashing shall lap not less than three inches at joints, shall extend down over the cant strips as shown on the drawings, and shall fit closely to the cant strips.

(c) Painting.—All exposed surfaces of metal shall be painted in accordance with paragraph 70. All exposed surfaces of timber shall be given one priming coat and two additional coats of paint. The paint will be furnished by the Government as provided in paragraph 25. All painting shall be done in a workmanlike manner and each coat shall be allowed to dry before the succeeding coat is applied.

METALWORK

66. Reconditioning existing radial gates and hoists and installing new operating mechanisms. The item of the schedule for "Reconditioning existing radial gates and hoists, and installing new operating mechanisms" includes all work required to recondition the existing radial gates and operating mechanism, and to install the new operating mechanisms as shown on the drawings or as directed by the contracting officer. The existing operating mechanism shall be dismantled and new worm and worm gears installed, the drive sprockets replaced by rope drums, the idler sprockets removed, the shafts shortened and drilled and tapped if necessary; and the bearings rebabbited if required. Worm gears and rope drums shall be rebored where necessary and pressed on existing shafts over carefully fitted keys. The gates shall be equipped with stop lugs at each end, and the holes in the gate lifting lugs shall be reamed to 1¾ inches in diameter. The lifting chains shall be removed and replaced by flat steel ropes. The steel rails on the dwarf walls of the spillway bridge shall be removed and the tops of the dwarf walls left in a smooth condition, satisfactory to the contracting officer. All parts of the existing hoists shall be thoroughly cleaned and reassembled, and painted as provided in paragraph 70. Individual hoist motors, supports, flexible couplings, limit switches, position indicators, cinch anchors, flat steel lifting ropes, gate stops, and other equipment and material required for rebuilding the gates and hoists, as listed on the drawings, will be furnished by the Government as provided in paragraph 25 and shall be installed by the contractor in a workmanlike manner as shown on the drawings or as directed by the contracting officer. All moving parts, control mechanisms, and other machinery shall be carefully installed, tested for operation, and adjusted so that all parts move freely within each other and properly function to secure satisfactory operation, as determined by the contracting officer. Any changes or adjustments required to secure satisfactory operation shall be made by the contractor at his own expense: **Provided,** That if any part of the metal work is found to be defective, due to no fault of the contractor, as determined by the contracting officer, the contracting officer may order the contractor to correct such defects, and payment therefor will be made as extra work under the provisions of article 5 of the contract and paragraph 10 of these specifications. In the installation and reconditioning of mechanical equipment, none but mechanics skilled in their various trades shall be employed. The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all rust, dirt, grease, loose scale, grout, mortar, and other foreign substances immediately before the concrete is placed. Setting of anchors shall, where practicable, be provided for during the placing of concrete. Wherever it is impracticable to place anchors or anchor bolts required for the installation of metal accessories before the concrete is placed, holes shall be drilled in the concrete after it has thoroughly set and expansion bolts or lead cinch anchors shall be installed as directed by the contracting officer. Part of the new metal work as furnished will have been given one or more shop coats of paint. The paint coating shall be protected as much as practicable during the handling, storing, and installation of the metalwork, and after installation all unfinished surfaces of new metalwork not to be in contact with concrete shall be painted as provided in paragraph 70. Except as otherwise provided in these specifications, payment for reconditioning, installing, and painting metalwork, including anchor bolts and cinch anchors, will be made at the lump-sum price bid in the schedule for reconditioning existing radial gates and hoists, and installing new operating mechanisms, which lump-sum price shall include the cost of unloading, hauling, storing, handling, dismantling, assembling, installing, altering, erecting, adjusting, cleaning and painting, where required, all metalwork and machinery of the existing gates or metalwork and machinery furnished by the Government, and of maintaining the same in position and in proper operating condition until final acceptance by the Government. The contractor will not be required to paint the radial gates.

67. **Installing pipe handrails**. Galvanized pipe handrails shall be installed as shown on the drawings or as directed by the contracting officer. Pipe and fittings for pipe handrails will be furnished by the Government as provided in paragraph 25. The pipe will be furnished in random lengths and shall be cut to the required lengths, threaded, fitted, and placed by the contractor in a workmanlike manner, as shown on the drawings or as directed by the contracting officer. Pipe and fittings to be embedded in concrete shall either be completely assembled and placed when the concrete is poured, or recesses shall be left in the concrete to receive the railing posts and the rails completely assembled and grouted in position and alinement at some later time. Pipe and fittings shall not be painted but shall be thoroughly cleaned after installation. Payment for installing pipe handrails will be made at the unit price per pound bid therefor in the schedule, which unit price shall include the cost of unloading, storing, hauling, and handling the required materials and the complete installation of the handrails as described in this paragraph.

68. **Installing miscellaneous metalwork**. Manhole frames and covers, ladders and ladder rungs, and cast-iron strainers, will be furnished by the Government as provided in paragraph 25 and shall be installed by the contractor in a workmanlike manner, as shown on the drawings, or as directed by the contracting officer. Where required, the exposed unfinished surfaces of the metalwork shall be given two coats of paint or bituminous coating, applied hot if so specified, as directed by the contracting officer. Payment for installing and painting the above described miscellaneous metalwork will be made at the unit price per pound bid in the schedule for installing miscellaneous metalwork. The cost of installing all other miscellaneous items of metalwork for which specific prices are not provided in the schedule shall be included in the prices bid for the work to which they are appurtenant, as determined by the contracting officer.

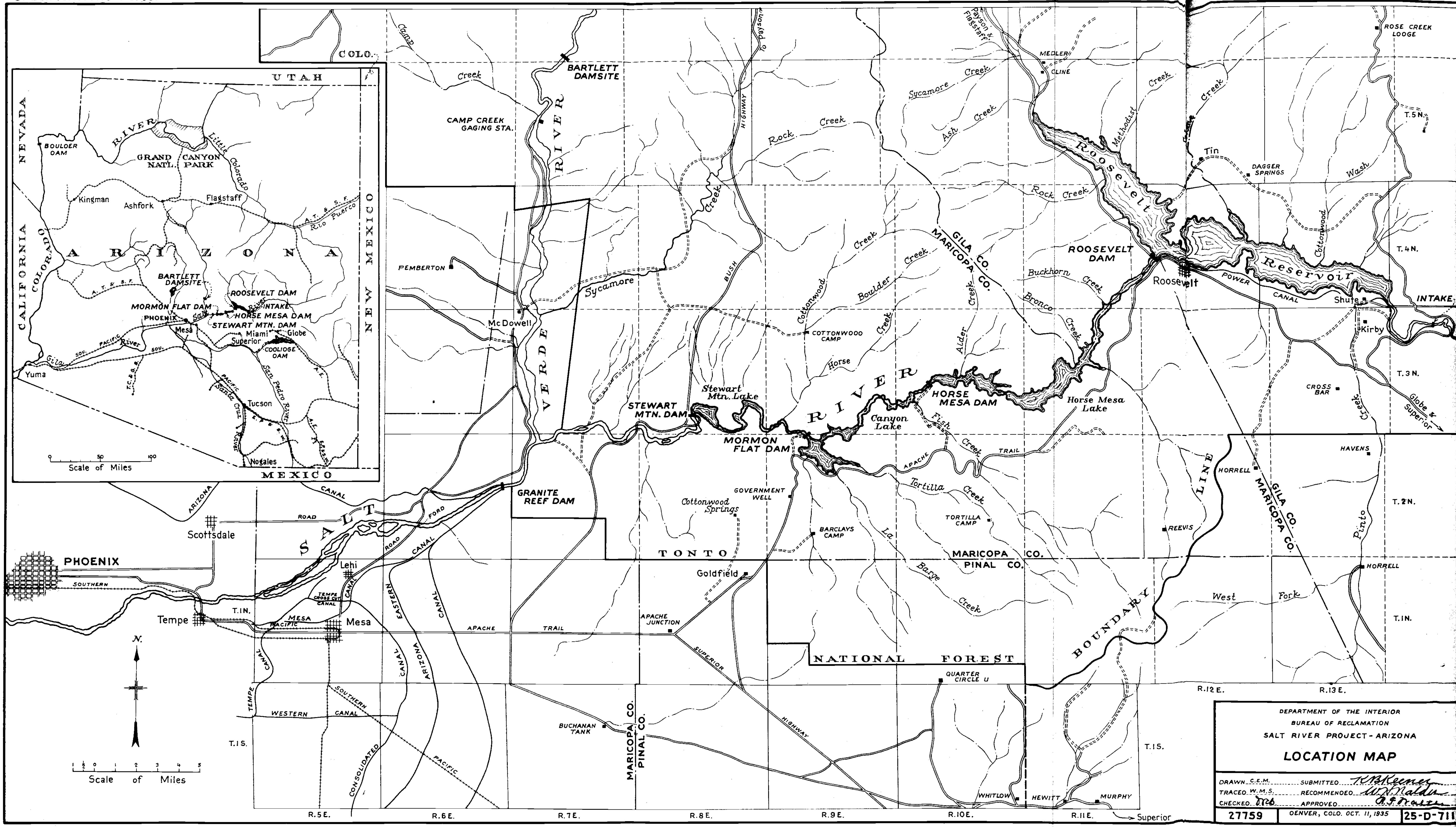
69. **Weights of machinery and metal parts**. The weights of machinery and other metal parts, the handling and placing of which are to be paid for on the basis of weight, will be determined by the contracting officer. The weights given in the schedules are advance estimates for the purpose of comparing bids only, and the actual weights may vary widely therefrom. The Government will not provide scales for actually weighing all the materials, and the contracting officer will determine the weight of each part or item involved in the most practicable manner and will use for that purpose railroad shipping weights, manufacturer's weights, catalog weights, and estimated weights, subject to the provisions of article 15 of the contract in case of dispute. Net weights only will be paid for and the weight of all tare, packing, and blocking will be deducted.

70. **Painting**. The exposed unmachined surfaces of ferrous materials of the existing operating mechanism and of all metalwork installed by the contractor shall be painted with two or more coats of paint, unless otherwise directed by the contracting officer, and the contractor

shall be entitled to no additional compensation on account of the kind of paint, number of coats, or method of application prescribed by the contracting officer. The contractor will not be required to paint the radial gates. In general, the new metalwork will have been given one coat of paint before delivery to the contractor, and care shall be taken in handling such parts to preserve the shop paint in the best practicable condition. After installation, the contractor shall thoroughly clean all metal surfaces to be painted and shall repair all damaged places in the original paint film in a manner satisfactory to the contracting officer. After the paint on the repaired areas has thoroughly set, one or more field coats of paint shall be applied to the exposed surfaces of all metalwork as herein provided, or as directed by the contracting officer. Machined surfaces shall not be painted. Exposed unmachined surfaces to be submerged shall be given one coat of bituminous primer, followed by a coating of bituminous enamel applied hot to a thickness of not less than 1/16 inch, or, where directed by the contracting officer, shall be painted with one or more coats of an equivalent metal-preservative paint applied hot or cold according to the specifications of the paint manufacturer. The outside unfinished surfaces of machinery, structural steel, gate operating mechanisms, and other metal surfaces not to be coated with bituminous enamel shall be given one or more coats of paint or enamel as directed by the contracting officer. All painting shall be performed in a skillful and workmanlike manner satisfactory to the contracting officer, and each coat of paint shall be permitted to properly dry before the succeeding coat is applied. Paint may be applied by dipping or spraying if approved by the contracting officer. No paint shall be applied in damp weather, except under cover, and the metal shall be free from moisture when the paint is applied. All paint and other coating materials will be furnished by the Government as provided in paragraph 25. The cost of unloading, hauling, storing, handling, and applying the paint and coating materials, and the cost of all work, operations, and equipment required for painting shall be included in the prices bid in the schedule for installing the materials painted, and the contractor shall be entitled to no additional compensation by reason of changes made in the kind of paint to be applied to the various parts as described in these specifications.

ELECTRICAL INSTALLATION

71. Installing electrical circuits and apparatus. The electrical installation will consist of copper conductors in exposed metal conduit running from the motor-generator house to the control apparatus of the nine radial gate hoists on the spillway, in accordance with the details as shown on the drawings. Embedded conduit will be required for the feeders from the generators in the house to the dam, for interior lights and a convenience outlet, and for the flood light mounted on the roof of the house. Electrical equipment, conduit, conduit boxes, conduit fittings, control cabinets, anchor bolts, conductors, wires, terminals, and all of the material except insulating paints, tape, solder, and flux, required for the electrical installation will be furnished by the Government as provided in paragraph 25. Insulating paints, tapes, solder, and flux shall be furnished by the contractor as provided in paragraph 26. The contractor shall install all electrical equipment in a workmanlike manner as shown on the drawings or as directed by the contracting officer and in accordance with the current National Electrical Code rules. All apparatus shall be grounded, and double locknuts shall be used on all cabinets to insure grounding. The contractor shall install all electrical conduit, conduit boxes, fittings, and control cabinets in their correct positions as shown on the drawings or as directed by the contracting officer. All exposed conduits shall be rigidly supported in place, using anchors set in drilled holes in the concrete, and the runs shall be straight and parallel with each other unless otherwise indicated on the drawings or directed by the contracting officer. All bends shall be of standard radii unless otherwise noted and shall be free from kinks, indentations, or flattened surfaces. Burrs and sharp corners at the ends of each piece of conduit shall be removed with a taper reamer. At outlet boxes and cabinets, locknuts and bushings shall be used to protect wires from abrasion. Provisions shall be made for draining conduits as directed by the contracting officer. The contractor shall install all conductors and terminals in the various conduits and make all required connections as directed by the contracting officer. The conductors shall be installed so that there will be no cuts or abrasions in the insulation or protective covering, or kinks in the conductors. No splices shall be made in the conductors except at pull boxes or outlets. For conductors larger than no. 12 A. W. G. solderless lugs or terminals shall be connected to the wire by a method satisfactory to the contracting officer. The contractor shall completely install two 10-kilowatt gasoline-engine-driven, direct-current, generator sets, including the fuel tank and interconnecting piping and other accessories for the motor-generators, together with a controller cabinet at each gate hoist. Payment for the installation of all electrical circuits and apparatus as described in this paragraph will be made at the lump-sum price bid in the schedule for installing electrical circuits and apparatus, which lump-sum price shall include the cost of unloading, hauling, storing, handling, installing, testing, and maintaining in position or operating condition all electrical circuits and apparatus until final acceptance by the Government: **Provided,** That the cost of installing limit switches and such other pieces of equipment as are a definite part of the control mechanism of the gates shall be included in the lump-sum price bid in the schedule for reconditioning existing radial gates and hoists, and installing new operating mechanism.


DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT - ARIZONA
LOCATION MAP
DRAWN C.E.M. SUBMITTED
TRACED W.M.S. RECOMMENDED
CHECKED APPROVED
27759
DENVER, COLO. OCT. 11, 1935
25-D-711
UTAH
NEVADA
CALIFORNIA
ARIZONA
NEW MEXICO
MEXICO
COLO.
BOULDER DAM
GRAND CANYON NATL. PARK
Kingman
Ashfork
Flagstaff
BARTLETT DAMSITE
ROOSEVELT DAM
MORMON FLAT DAM
HORSE MESA DAM
STEWART MTN. DAM
COOLIDGE DAM
PHOENIX
Mesa
Miami
Globe
Superior
Yuma
Tucson
Nogales
Scale of Miles
CAMP CREEK GAGING STA.
PEMBERTON
McDowell
VERDE RIVER
GRANITE REEF DAM
SALT RIVER
Scottsdale
Lehi
Tempe
Mesa
APACHE TRAIL
APACHE JUNCTION
Goldfield
GOVERNMENT WELL
Cottonwood Springs
BARCLAYS CAMP
STEWART MTN. DAM
Stewart Mtn. Lake
MORMON FLAT DAM
Canyon Lake
HORSE MESA DAM
Horse Mesa Lake
ROOSEVELT DAM
Roosevelt Reservoir
Roosevelt
POWER CANAL
Shute
INTAKE
Kirby
Tin
DAGGER SPRINGS
ROSE CREEK LODGE
MEDLER
CLINE
COTTONWOOD CAMP
TORTILLA CAMP
CROSS BAR
HAVENS
HORRELL
REEVIS
TONTO NATIONAL FOREST
BOUNDARY LINE
GILA CO.
MARICOPA CO.
PINAL CO.
QUARTER CIRCLE U
BUCHANAN TANK
WHITLOW
HEWITT
MURPHY
Superior
T.5N.
T.4N.
T.3N.
T.2N.
T.1N.
T.1S.
R.5E.
R.6E.
R.7E.
R.8E.
R.9E.
R.10E.
R.11E.
R.12E.
R.13E.
Scale of Miles

NOTES

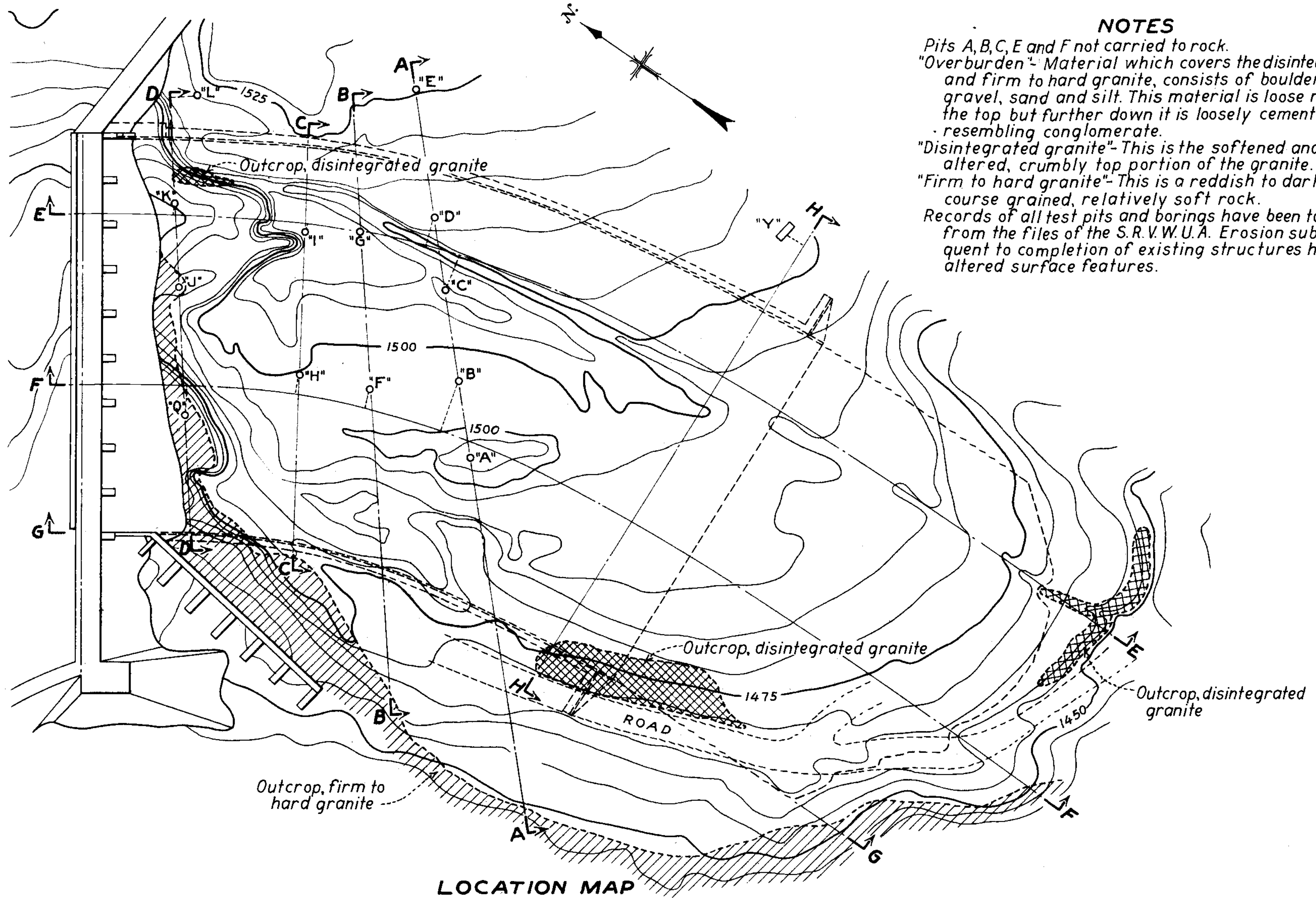
Pits A, B, C, E and F not carried to rock.

"Overburden" - Material which covers the disintegrated and firm to hard granite, consists of bouldery gravel, sand and silt. This material is loose near the top but further down it is loosely cemented resembling conglomerate.

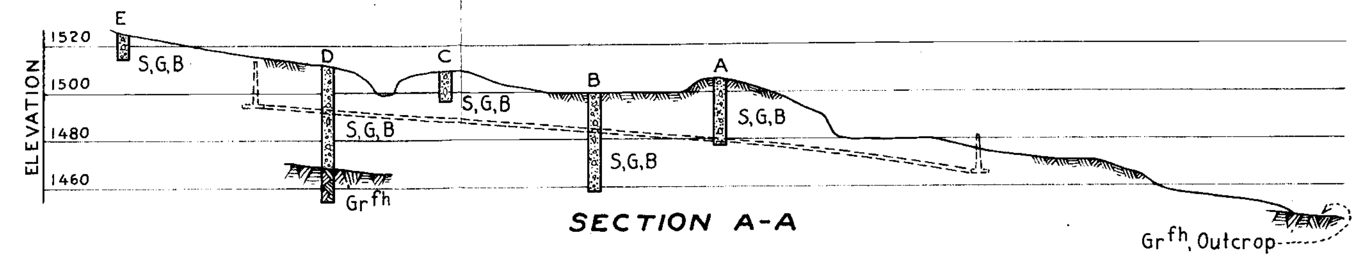
"Disintegrated granite" - This is the softened and altered, crumbly top portion of the granite.

"Firm to hard granite" - This is a reddish to dark grey, course grained, relatively soft rock.

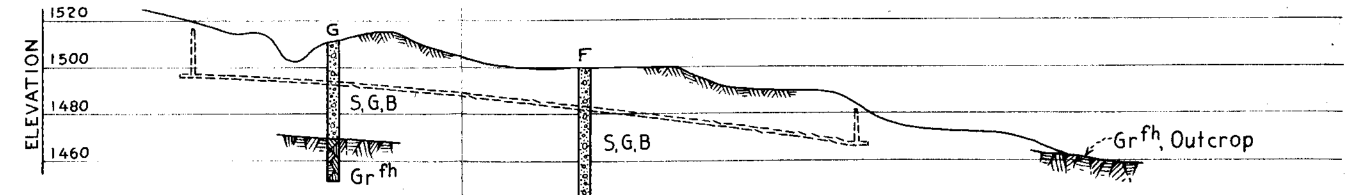
Records of all test pits and borings have been taken from the files of the S.R.V.W.U.A. Erosion subsequent to completion of existing structures has altered surface features.



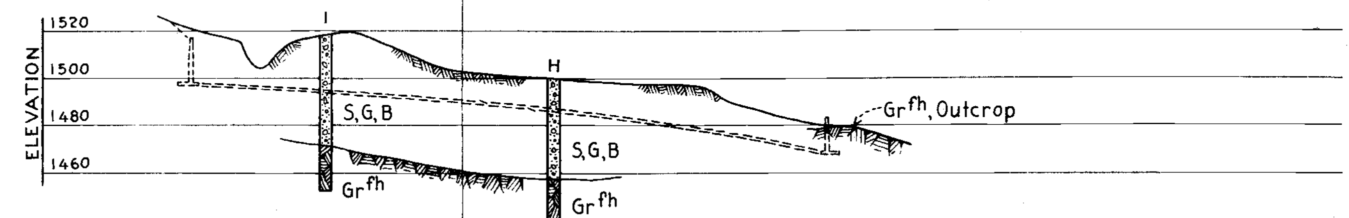
LOCATION MAP



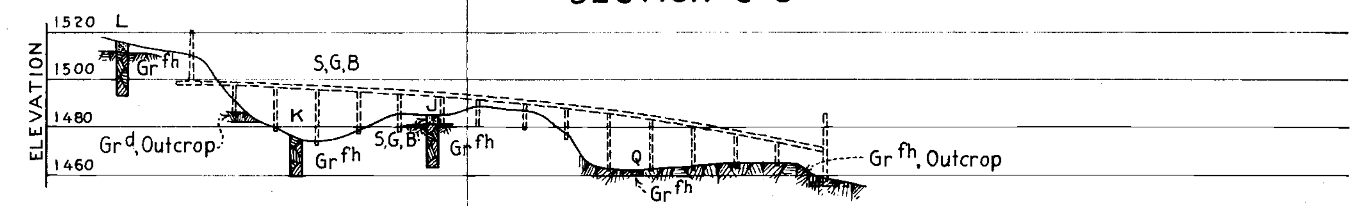
SECTION A-A



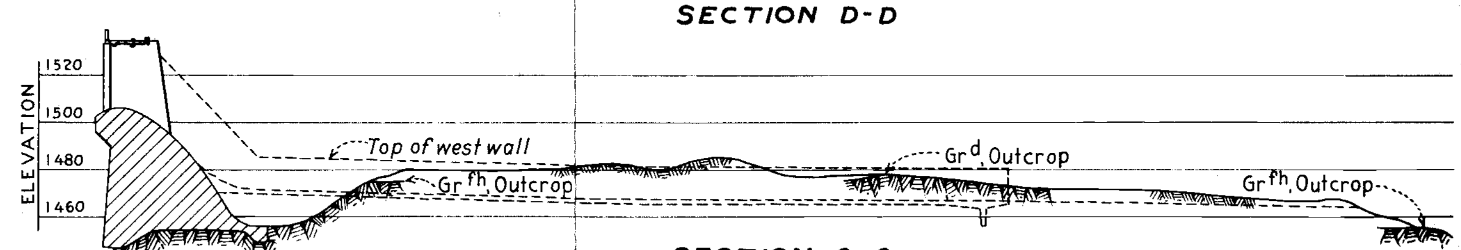
SECTION B-B



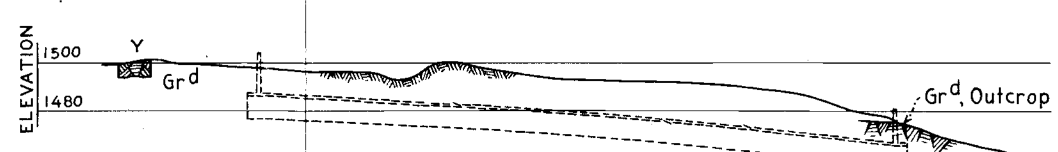
SECTION C-C



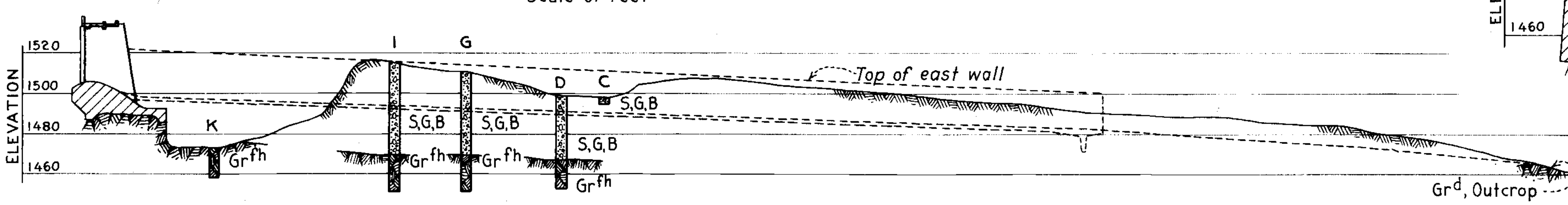
SECTION D-D



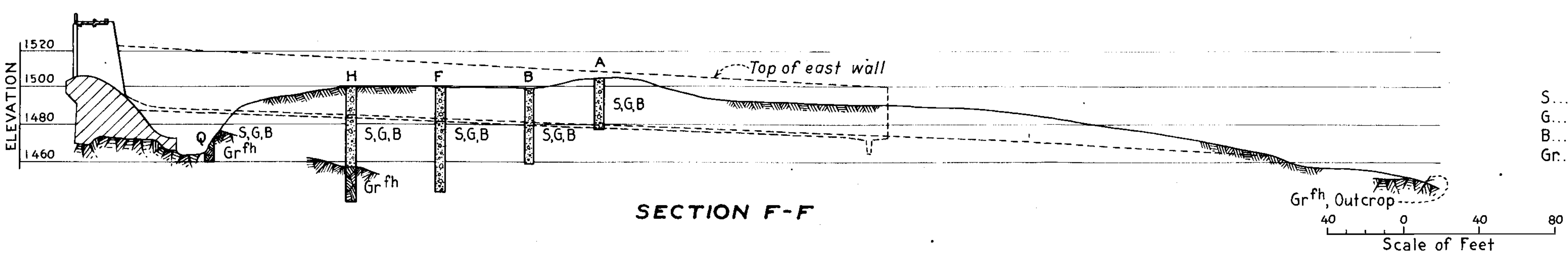
SECTION G-G



SECTION H-H



SECTION E-E



SECTION F-F

EXPLANATION

MATERIAL		DESCRIPTION
S......Sand	Overburden	fh........firm to hard
G......Gravel	Overburden	d.........disintegrated
B......Boulders	Overburden	
Gr.....Granite		

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT-ARIZONA

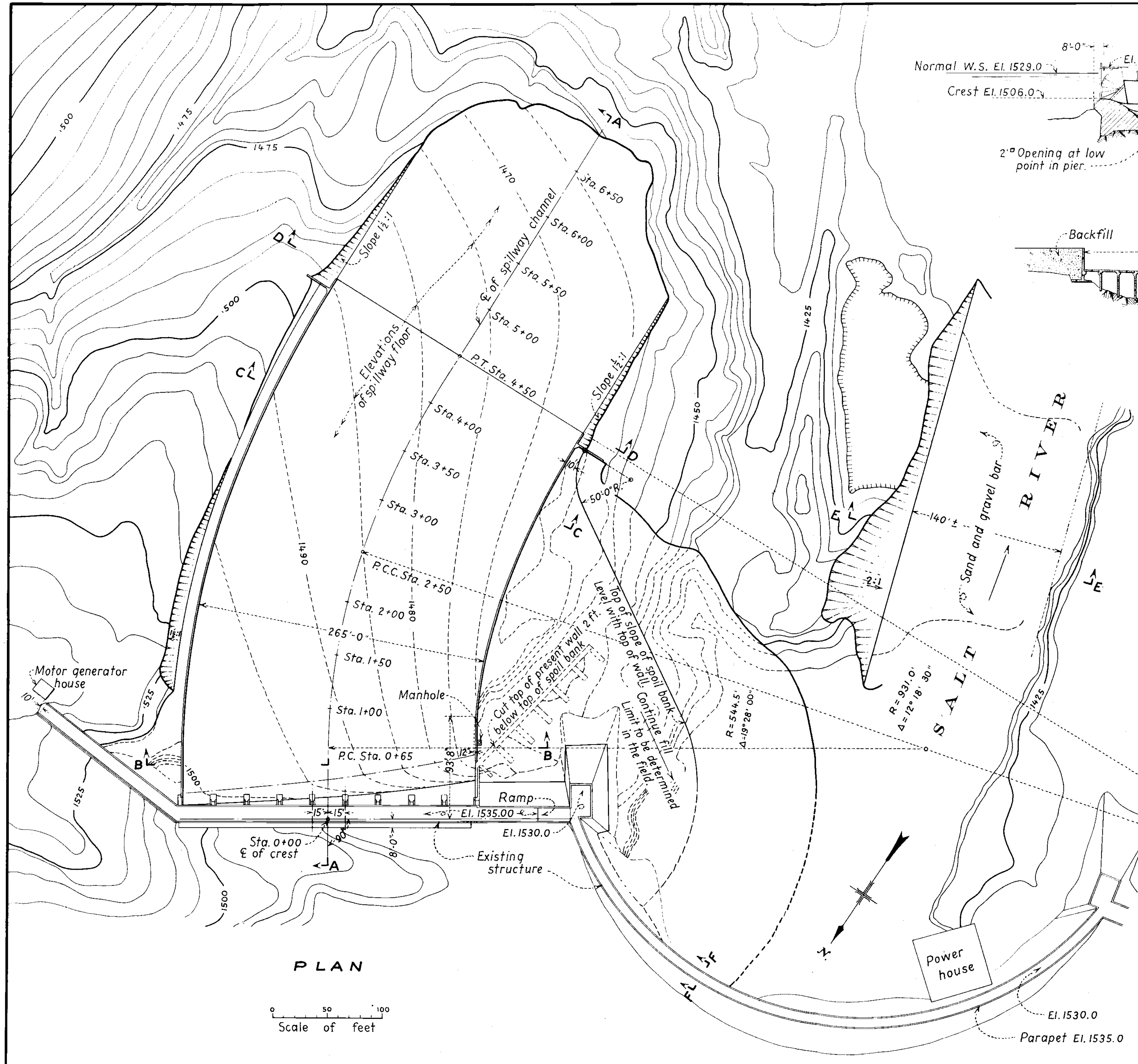
STEWART MOUNTAIN DAM

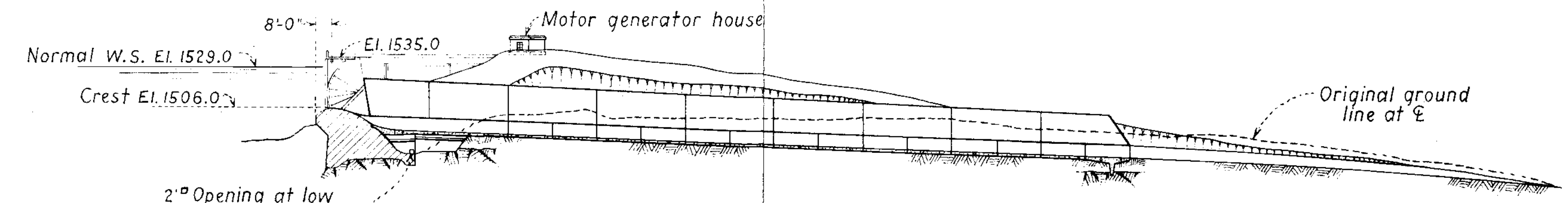
SPILLWAY

LOCATION AND LOGS OF TEST HOLES

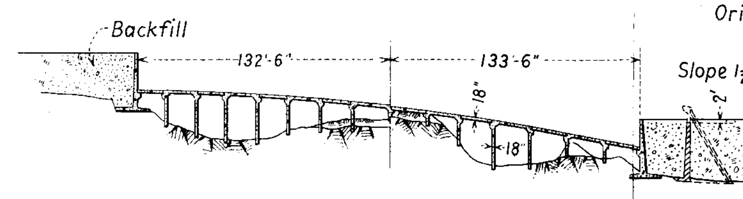
DRAWN D.J.S. SUBMITTED [signature]
TRACED F.H.C. RECOMMENDED [signature]
CHECKED E.S.H. APPROVED [signature]

27760 DENVER, COLORADO, OCT. 11, 1935 25-D-712

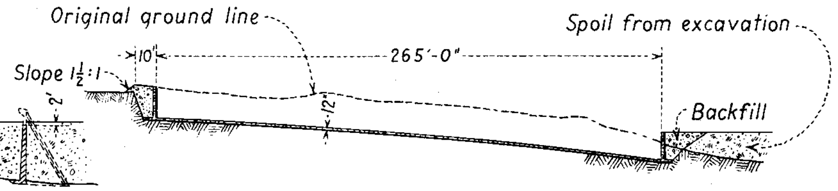




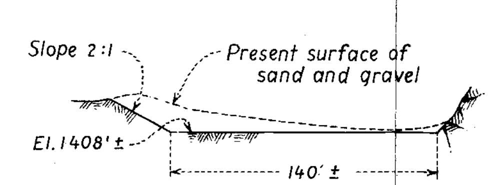
SECTION A-A



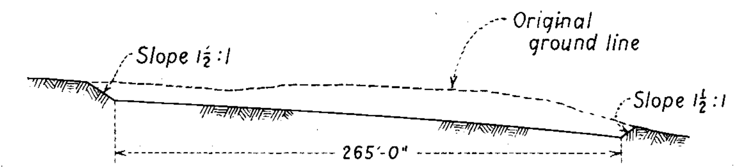
SECTION B-B



SECTION C-C



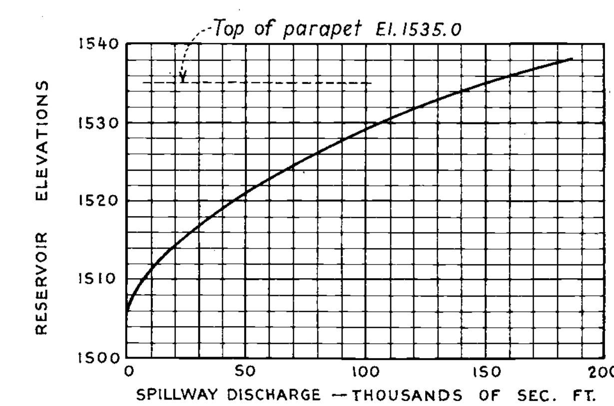
SEC. E-E



SECTION D-D

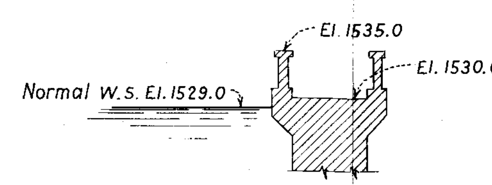
CHANNEL ELEVATIONS

STA. ON ℄	LEFT TOP OF WALL	GRADE ELEVATION LEFT AT WALL	GRADE ELEVATION LEFT ¼ POINT	GRADE ELEVATION ℄	GRADE ELEVATION RIGHT ¼ POINT	GRADE ELEVATION RIGHT AT WALL	RIGHT TOP OF WALL
0+50	1521.07	1500.07	1497.39	1492.83	1485.15		
1+00	1518.92	1498.83	1495.77	1490.88	1483.09	1470.49	1484.74
1+50	1516.87	1497.41	1494.03	1488.93	1481.20	1469.27	1483.52
2+00	1514.62	1495.80	1492.18	1486.97	1479.43	1468.28	1482.53
2+50	1512.24	1494.01	1490.23	1485.02	1477.78	1467.53	1481.78
3+00	1509.72	1492.04	1488.18	1483.07	1476.23	1466.96	1481.21
3+50	1507.06	1489.88	1486.03	1481.12	1474.79	1466.53	1480.78
4+00	1504.23	1487.52	1483.78	1479.16	1473.42	1466.20	1480.45
4+50		1484.99	1481.45	1477.21	1472.14	1466.00	
5+00		1482.0	1478.7	1475.0	1470.6	1465.5	
5+50		1478.3	1475.4	1472.2	1468.6	1464.5	
6+00		1473.6	1471.2	1468.7	1465.9	1462.8	
6+50		1468.1	1466.4	1464.6	1462.7	1460.8	



DISCHARGE CURVE.

(ALL GATES CLEAR OF WATER SURFACE)



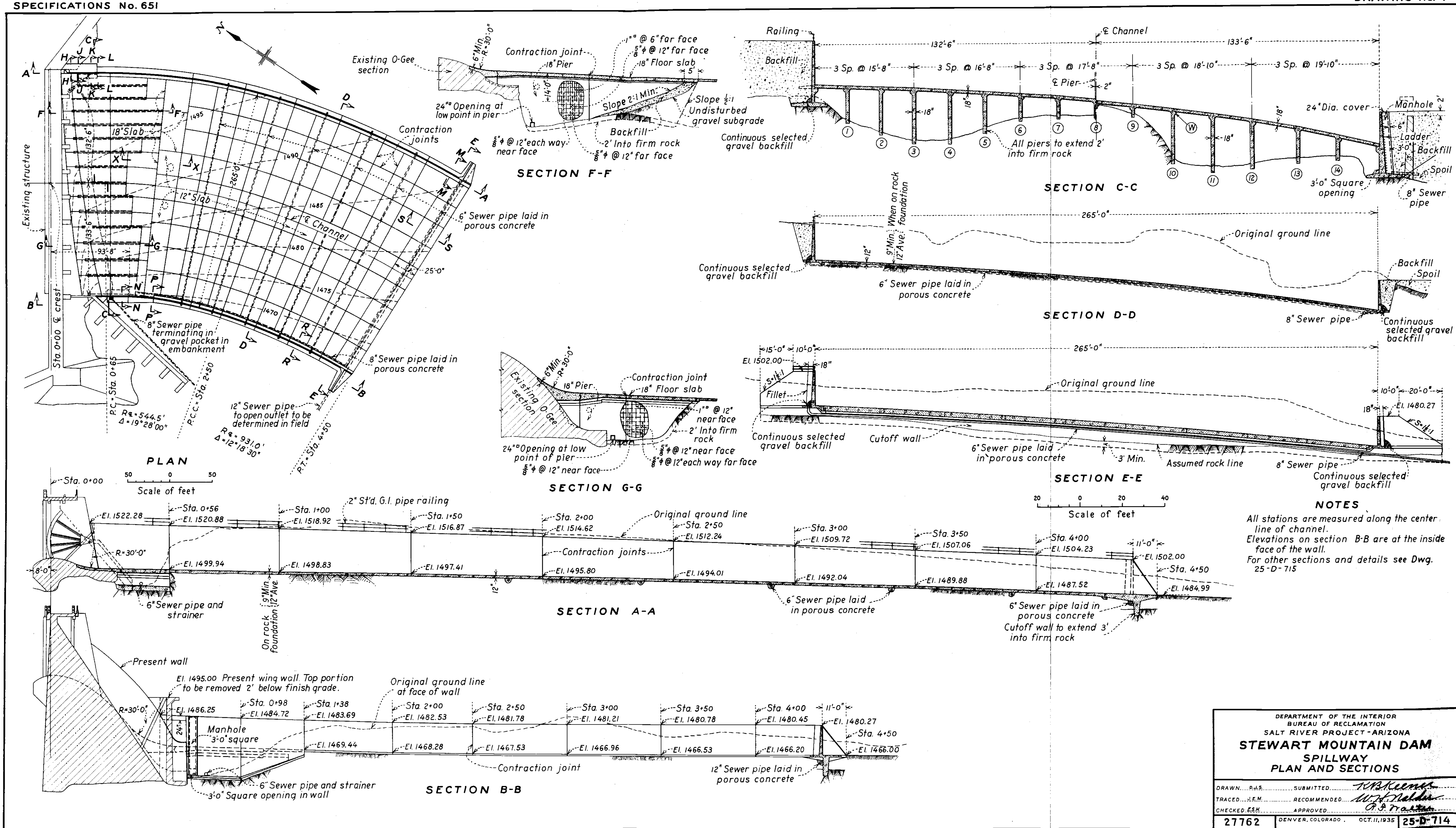
SEC. F-F

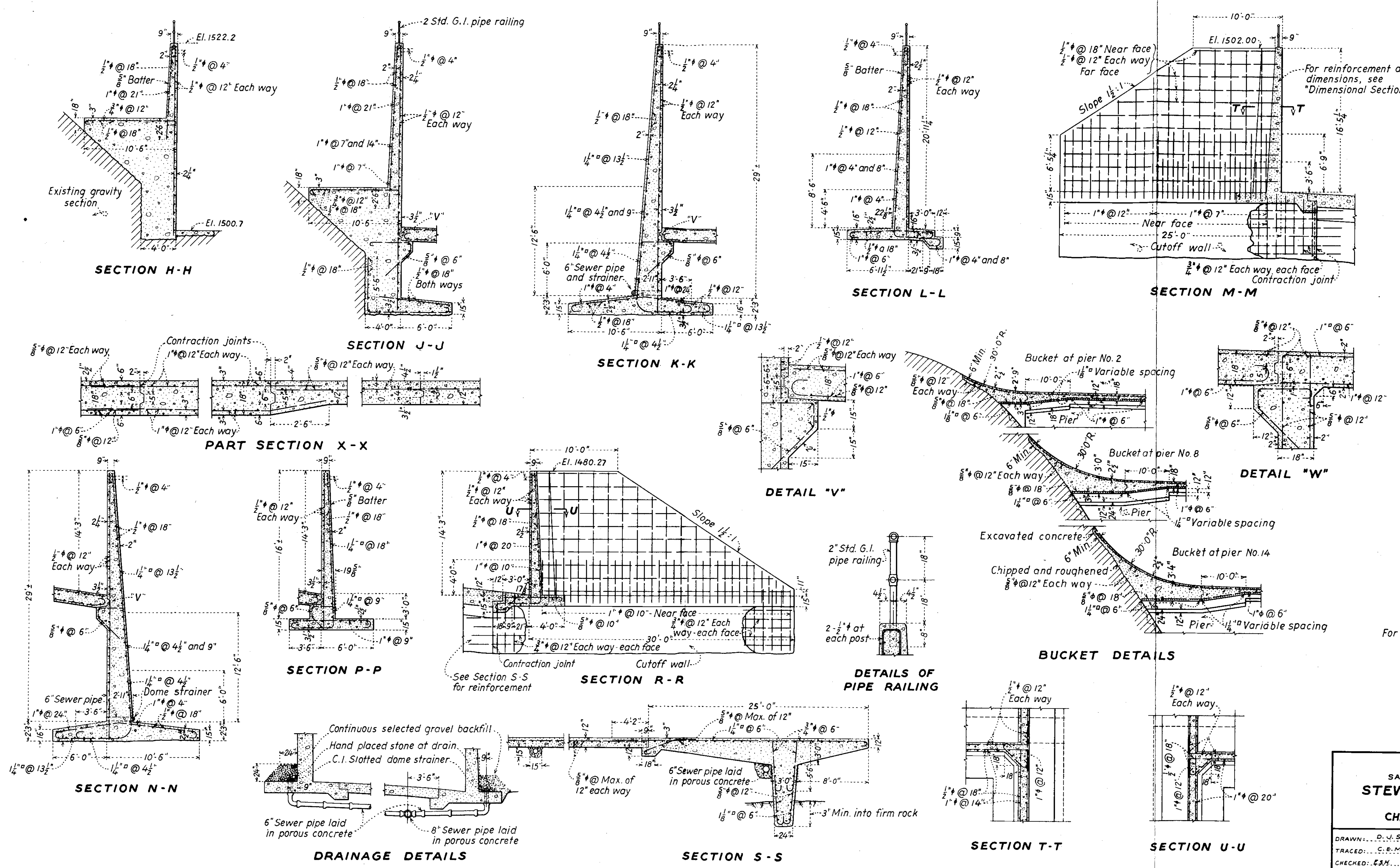
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT-ARIZONA

STEWART MOUNTAIN DAM
SPILLWAY
GENERAL PLAN

DRAWN D.J.S.	SUBMITTED H.B. Keener
TRACED W.M.S.	RECOMMENDED W.H. Nalder
CHECKED E.S.H.	APPROVED J.F. Walter

27761 | DENVER, COLO., OCT. 11, 1935 | 25-D-713


PLAN
Scale of feet
Existing structure
Sta. 0+00 ℄ crest
18" Slab
12" Slab
℄ Channel
Contraction joints
6" Sewer pipe laid in porous concrete
8" Sewer pipe terminating in gravel pocket in embankment
8" Sewer pipe laid in porous concrete
12" Sewer pipe to open outlet to be determined in field
P.C. = Sta. 0+65
P.C.C. = Sta. 2+50
P.T. = Sta. 4+50
Rc = 544.5'
Δ = 19°28'00"
Rc = 931.0'
Δ = 12°18'30"
SECTION F-F
Existing O-Gee section
Contraction joint
18" Pier
18" Floor slab
Slope 2:1 Min.
Slope ½:1
Undisturbed gravel subgrade
Backfill
2' Into firm rock
24" Opening at low point in pier
SECTION C-C
Railing
Backfill
℄ Channel
℄ Pier
3 Sp. @ 15'-8"
3 Sp. @ 16'-8"
3 Sp. @ 17'-8"
3 Sp. @ 18'-10"
3 Sp. @ 19'-10"
132'-6"
133'-6"
Continuous selected gravel backfill
All piers to extend 2' into firm rock
24" Dia. cover
Manhole
Ladder
Spoil
3'-0" Square opening
8" Sewer pipe
SECTION D-D
265'-0"
Original ground line
9" Min. When on rock
12" Ave. foundation
6" Sewer pipe laid in porous concrete
8" Sewer pipe
Continuous selected gravel backfill
SECTION G-G
Existing O-Gee section
18" Pier
Contraction joint
18" Floor slab
2' Into firm rock
24" Opening at low point of pier
SECTION E-E
El. 1502.00
El. 1480.27
Fillet
Cutoff wall
6" Sewer pipe laid in porous concrete
3' Min.
Assumed rock line
8" Sewer pipe
Continuous selected gravel backfill
SECTION A-A
2" St'd. G.I. pipe railing
Original ground line
Contraction joints
6" Sewer pipe and strainer
6" Sewer pipe laid in porous concrete
Cutoff wall to extend 3' into firm rock
On rock foundation 9" Min. 12" Ave.
SECTION B-B
Present wall
El. 1495.00 Present wing wall. Top portion to be removed 2' below finish grade.
Original ground line at face of wall
Manhole 3'-0" square
Contraction joint
6" Sewer pipe and strainer
3'-0" Square opening in wall
12" Sewer pipe laid in porous concrete
NOTES
All stations are measured along the center line of channel.
Elevations on section B-B are at the inside face of the wall.
For other sections and details see Dwg. 25-D-715
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT - ARIZONA
STEWART MOUNTAIN DAM
SPILLWAY
PLAN AND SECTIONS
DRAWN P.J.S.
TRACED J.E.M.
CHECKED E.S.H.
SUBMITTED
RECOMMENDED
APPROVED
27762
DENVER, COLORADO, OCT. 11, 1935
25-D-714



DIMENSIONAL SECTION LEFT WALL

STA.	H	A	B	C
0+56	20'-11¼"	6'-11½"	22⅛"	16"
1+00	20'-1⅛"	6'-9"	21½"	16"
1+50	19'-5½"	6'-6"	21⅛"	16"
2+00	18'-9⅞"	6'-3"	20¾"	15"
2+50	18'-2¾"	6'-0"	20⅜"	15"
3+00	17'-8⅛"	5'-9"	20"	15"
3+50	17'-1⅞"	5'-6"	19¾"	15"
4+00	16'-8½"	5'-3"	19 7/16"	15"
4+40.37	16'-6¼"	5'-0½"	19 5/16"	15"

SPACING OF 1"ϕ BARS

FROM STA.	TO STA.	D	E	F	G	J	K
0+56	1+10	4'-6"	8'-6"	4"	4" & 8"	12"	6"
1+10	1+75	4'-0"	8'-3"	4½"	4½" & 9"	13½"	7"
1+75	2+40	4'-0"	8'-0"	5"	5" & 10"	15"	8"
2+40	2+95	4'-0"	7'-9"	5½"	5½" & 11"	16½"	9"
2+95	3+50	4'-0"	7'-6"	6"	6" & 12"	18"	10"
3+50	3+95	4'-0"	7'-6"	6½"	6½" & 13"	19½"	12"
3+95	4+40.37	4'-0"	7'-6"	7"	7" & 14"	21"	14"

NOTES

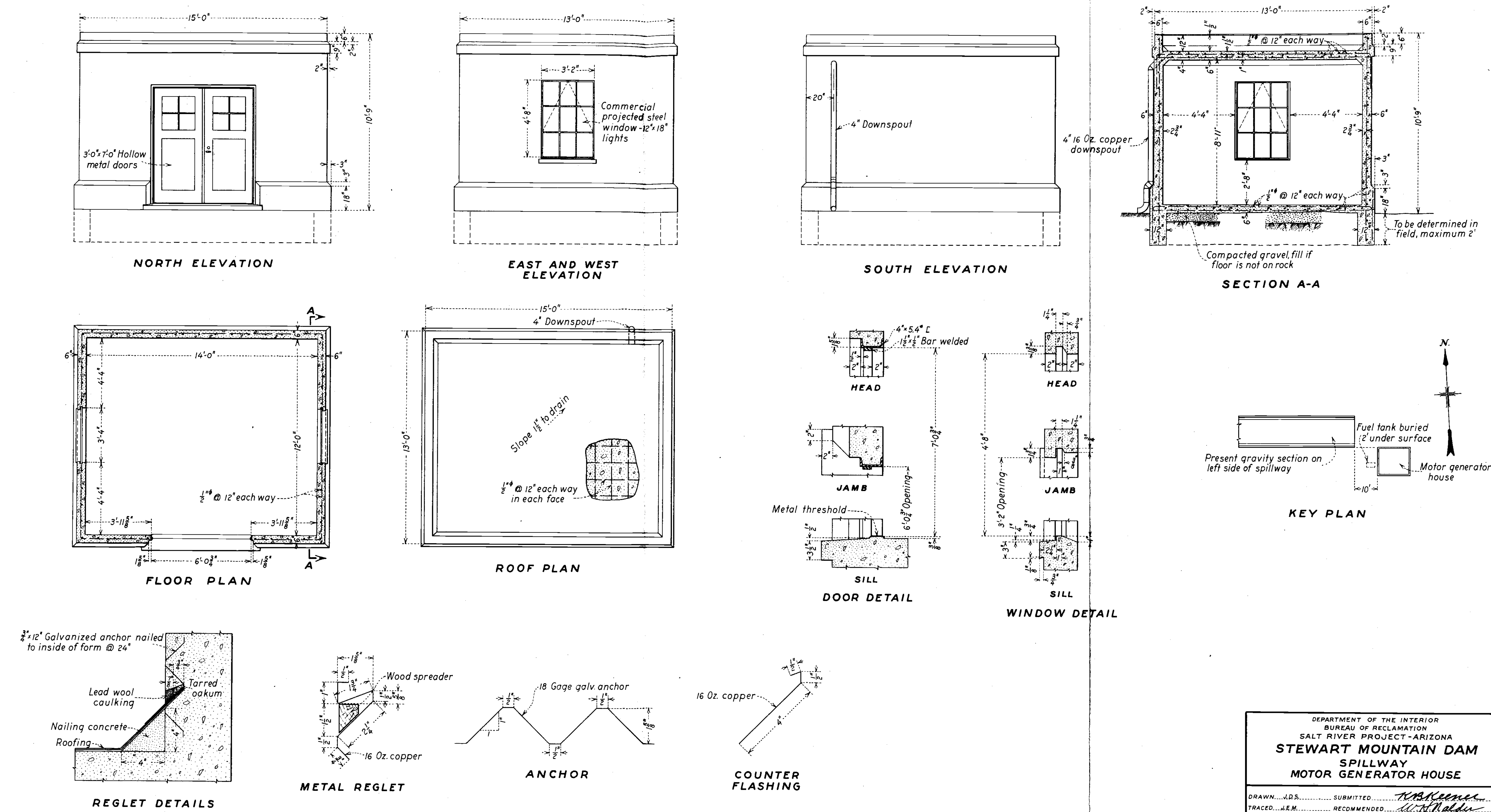
For location of sections see Dwg. 25-D-714

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT–ARIZONA

STEWART MOUNTAIN DAM
SPILLWAY
CHANNEL LINING DETAILS

DRAWN: D.J.S. SUBMITTED:
TRACED: C.E.M. RECOMMENDED:
CHECKED: E.S.H. APPROVED:

27763 DENVER, COLO., OCT. 11, 1935 25-D-715



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT - ARIZONA

STEWART MOUNTAIN DAM
SPILLWAY
MOTOR GENERATOR HOUSE

DRAWN J.D.S.	SUBMITTED K.B. Keener
TRACED J.E.M.	RECOMMENDED W. H. Nalder
CHECKED F.S.H.	APPROVED A. F. Master

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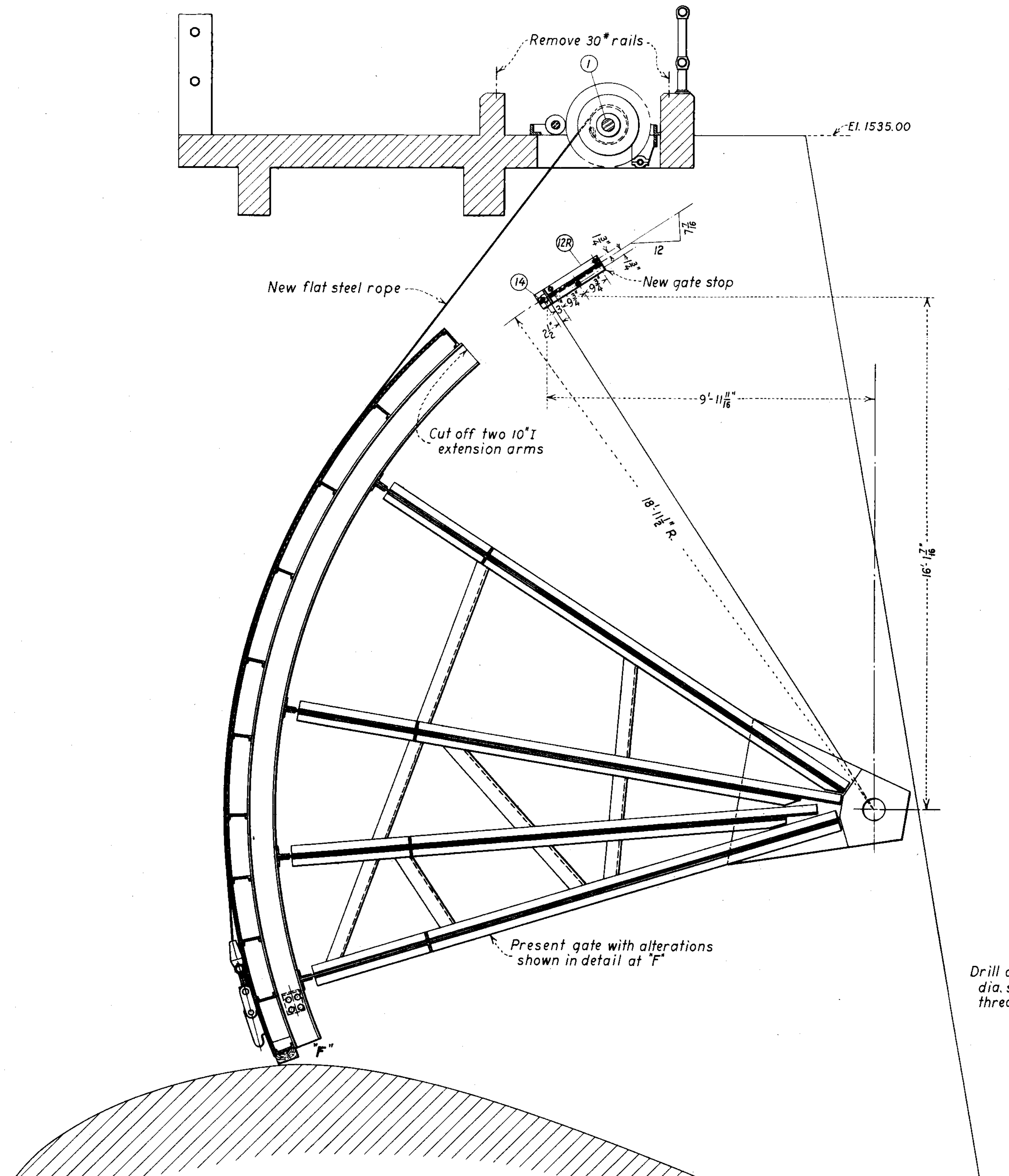
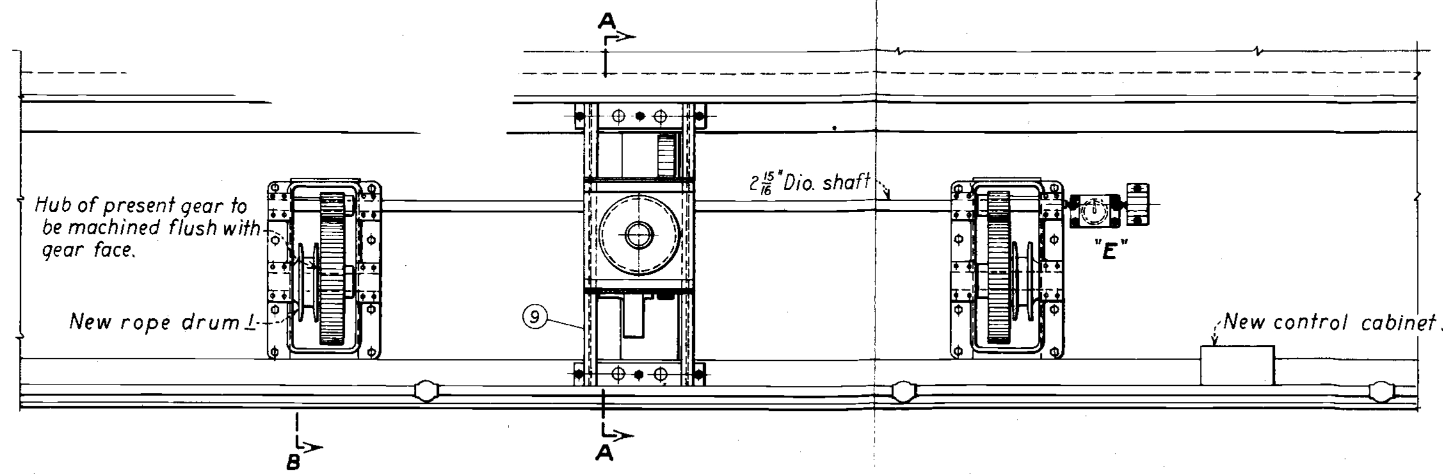
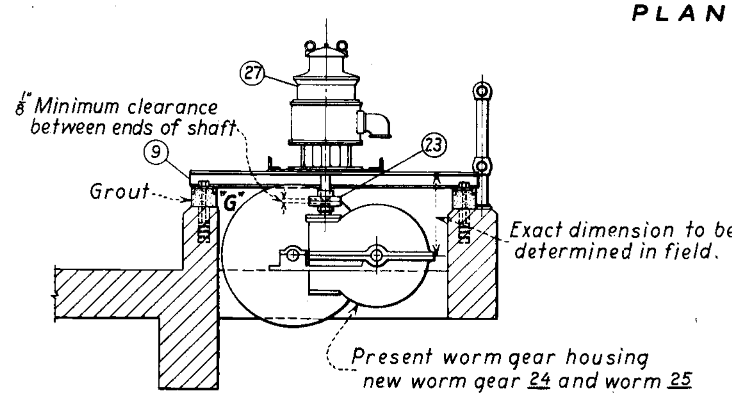


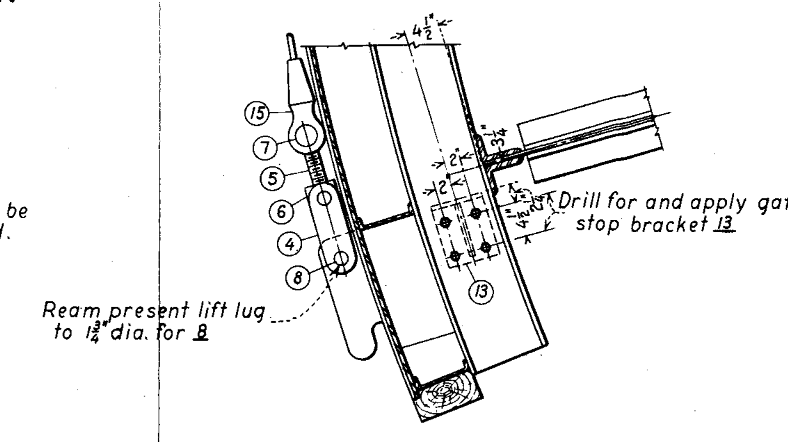
SECTION B-B



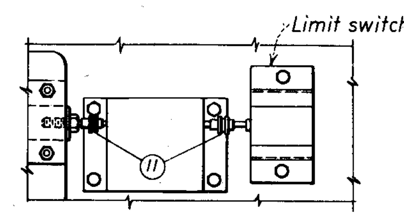
PLAN



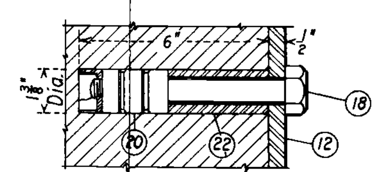
SECTION A-A



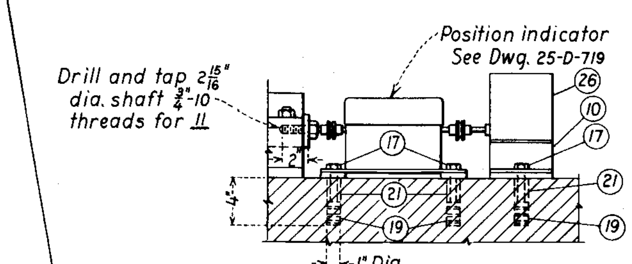
DETAIL "F"



PLAN

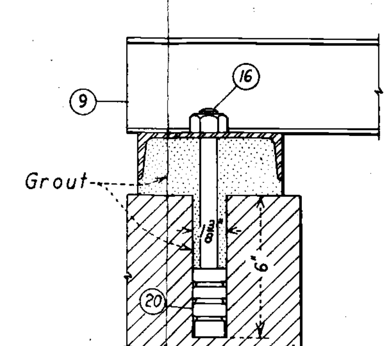


3/4" GATE STOP ANCHOR BOLT INSTALLATION



ELEVATION

DETAIL "E"



DETAIL "G"

NOTES

Alterations, additions and installations shown apply to nine gate and hoist units.

Contractor will drill present concrete to proper size and depth for cinch anchors, caulk cinch anchors, and cut tubing to proper length to fill the hole flush with face of concrete. Cinch anchors used in connection with stud 16 require no tubing; in this case the hole shall be filled with grout.

REFERENCE DRAWINGS

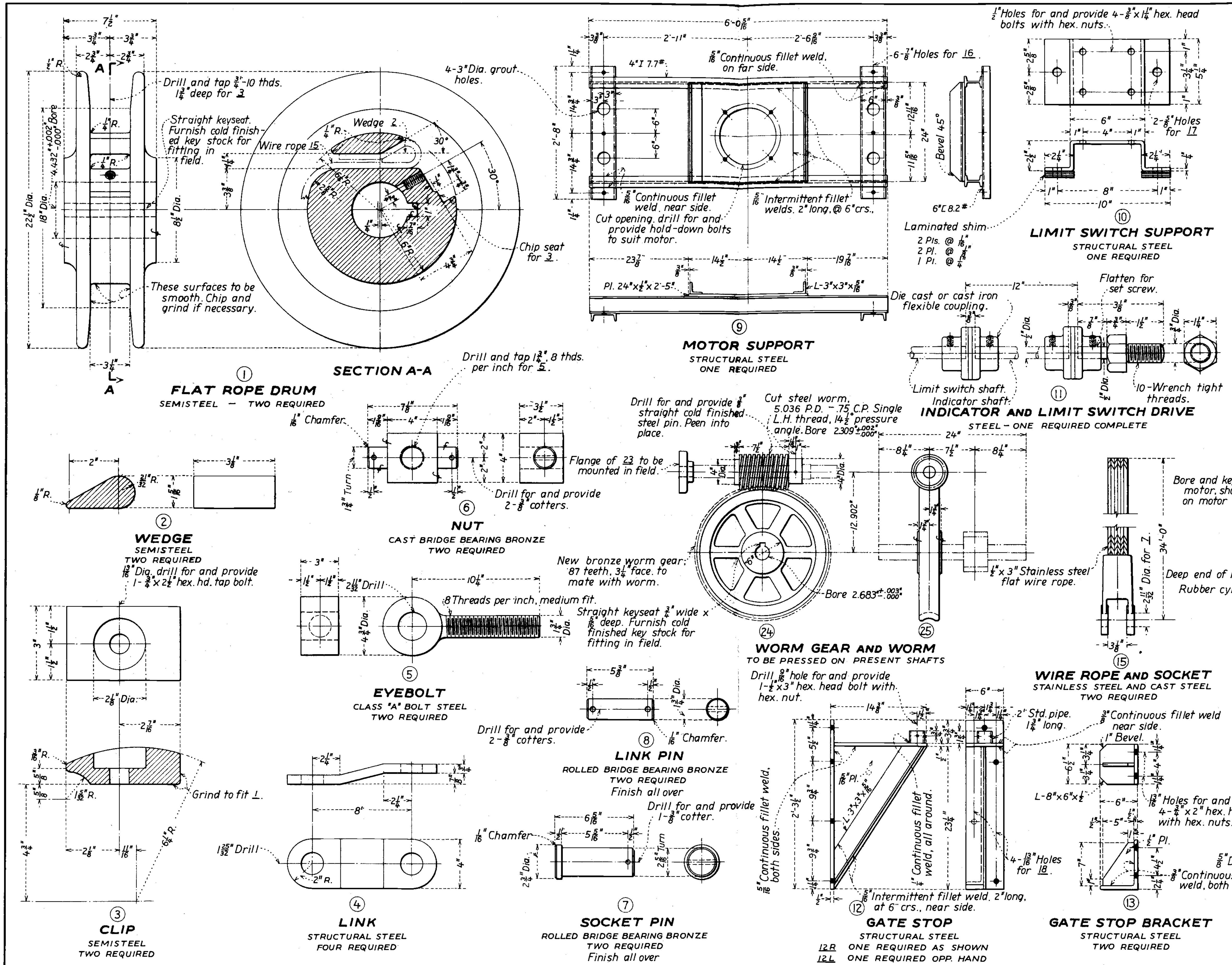
SPILLWAY - GENERAL PLAN	25-D-713
GATE POSITION INDICATOR	25-D-719
ELECTRICAL INSTALLATION	25-D-720

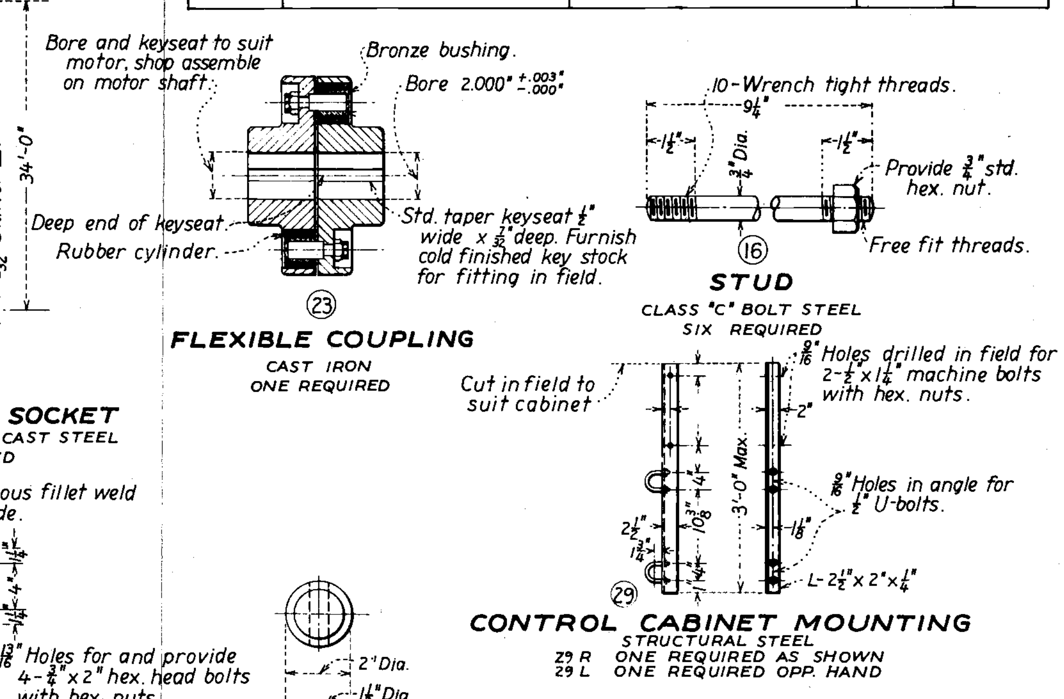
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT - ARIZONA

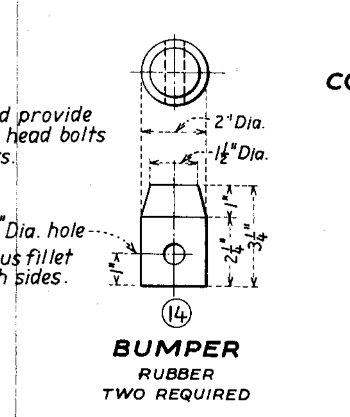
STEWART MOUNTAIN DAM
SPILLWAY
RADIAL GATE HOIST
INSTALLATION - PLAN AND SECTIONS

DRAWN C.W.B.-R.E.P.	SUBMITTED [illegible]
TRACED S.H.R.-J.E.M.	RECOMMENDED C.M. Day
CHECKED A.A.B.	APPROVED J.L. Savage

27765	DENVER, COLORADO, OCT. 11, 1935 SHEET 1 OF 2	25-D-717







LIST OF PARTS FOR ONE GATE ONLY

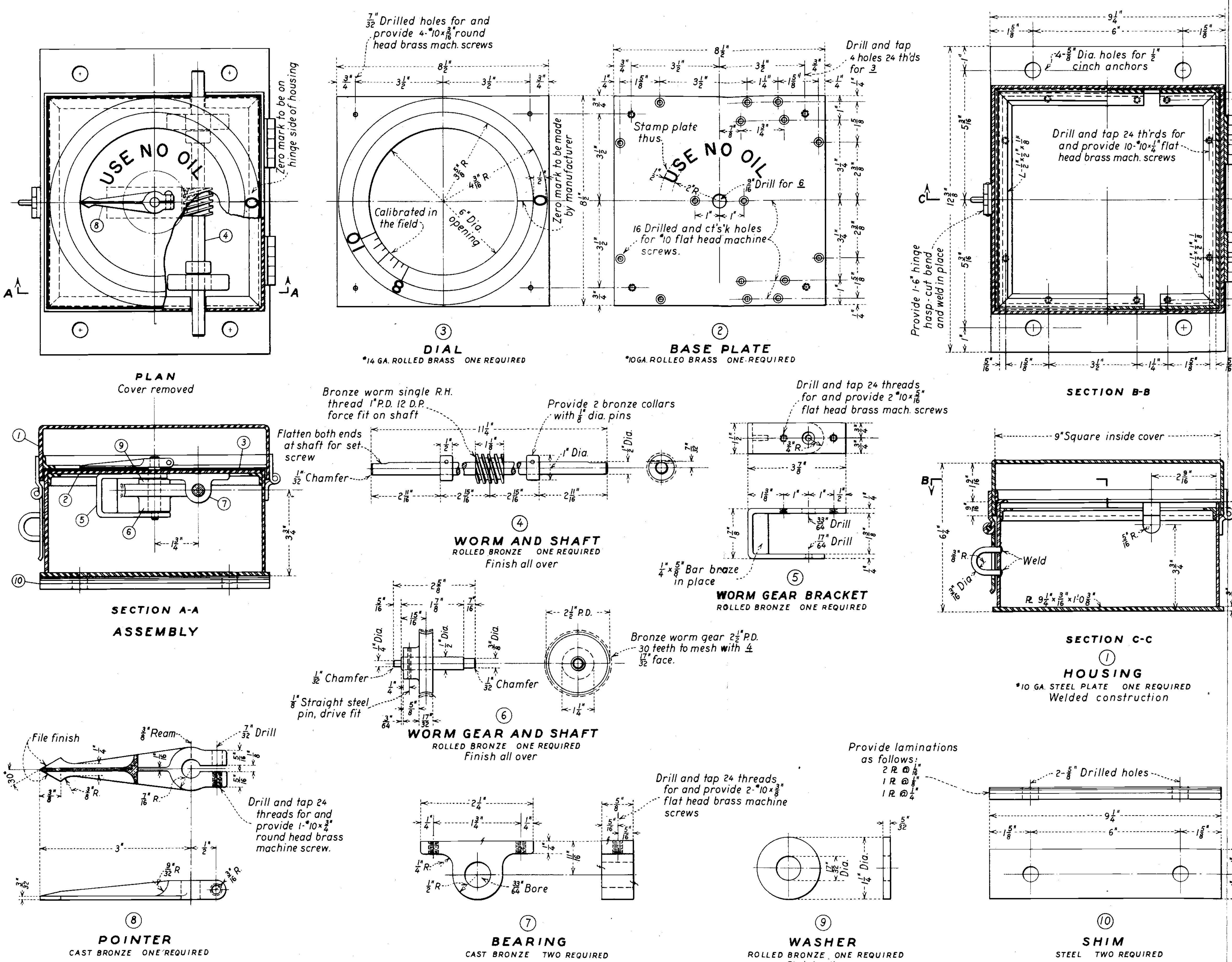
PART NUMBER	DESCRIPTION	MATERIAL	NUMBER REQUIRED	DRAWING NUMBER
1	Flat rope drum	Semisteel	2	25-D-718
2	Wedge	Semisteel	2	"
3	Clip	Semisteel	2	"
4	Link	Structural steel	4	"
5	Eyebolt	Class "A" bolt steel	2	"
6	Nut	Cast bridge bearing bronze	2	"
7	Socket pin	Rolled bridge bearing bronze	2	"
8	Link pin	Rolled bridge bearing bronze	2	"
9	Motor support	Structural steel	1	"
10	Limit switch support	Structural steel	1	"
11	Indicator and limit switch drive	Steel	1	"
12R/L	Gate stop	Structural steel	1	"
13	Gate stop bracket	Structural steel	2	"
14	Bumper	Rubber	2	"
15	Wire rope and socket	Cast steel and stainless stl.	2	"
16	Stud	Class "C" bolt steel	6	"
17	$\frac{1}{2}$" x $4\frac{1}{2}$" Hex. head bolt	Class "C" bolt steel	6	No detail
18	$\frac{3}{4}$" x 6" Hex. head bolt	Class "C" bolt steel	8	" "
19	$\frac{1}{2}$" Cinch anchor (three unit)	Lead and malleable iron	6	" "
20	$\frac{3}{4}$" Cinch anchor (three unit)	Lead and malleable iron	14	" "
21	Sleeve (1" O.D. x $\frac{7}{32}$" thick)	Seamless steel tubing	2 lin. ft.	" "
22	Sleeve ($1\frac{3}{8}$" O.D. x $\frac{9}{32}$" thick)	Seamless steel tubing	3 lin. ft.	" "
23	Flexible coupling	Cast iron	1	25-D-718
24	Worm gear	S.A.E. 65 bronze	1	"
25	Worm	S.A.E. 2315 steel-case hardened	1	"
26	Limit switch	CR9441-LS424S	1	No detail
27	Motor and control	See Specifications	1	" "
28	Control cabinet	See Specifications	1	" "
29R/L	Control cabinet mounting	Structural steel	1	25-D-718

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT-ARIZONA

STEWART MOUNTAIN DAM
SPILLWAY
RADIAL GATE HOIST
MOUNTINGS AND REPLACEMENT PARTS

DRAWN R.C.G. SUBMITTED Ray D. Hubbard
TRACED J.G.McK.-R.A.K. RECOMMENDED C.H. Day
CHECKED A.A.B. APPROVED J.L. Savage

27766 | DENVER, COLORADO-OCT. 11, 1935 SHEET 2 OF 2 | 25-D-718



LIST OF PARTS FOR ONE POSITION INDICATOR

PART NO.	DESCRIPTION	MATERIAL	NO. REQ'D
1	Housing	#10 Ga. steel plate	1
2	Base plate	#10 Ga. rolled brass	1
3	Dial	#14 Ga. rolled brass	1
4	Worm and shaft	Rolled bronze	1
5	Worm gear bracket	Rolled bronze	1
6	Worm gear and shaft	Rolled bronze	1
7	Bearing	Cast bronze	2
8	Pointer	Cast bronze	1
9	Washer	Rolled bronze	1
10	Shim	Steel	2

NOTES

Indicator housing will be given two shop coats of black enamel (inside and out) before assembling.
This indicator shall be completely assembled by the manufacturer.
After indicator has been installed on the hoist, the dial shall be calibrated by the contractor making the installation.

INSTRUCTIONS FOR CALIBRATING DIAL

1. Lower the gate to its seat on the spillway, allowing no excess slack in the lift ropes.
2. Loosen pointer on its spindle and set same to zero on the dial.
3. Raise gate to clear the spillway crest by exactly one foot (measured vertically).
4. Make temporary mark on brass dial to correspond with position of the pointer.
5. Repeat 3 and 4 for each foot of gate opening (measured vertically).
6. Lower the gate to its seat and raise again checking the indicator at several points.
7. If indicator fails to show the gate position within one sixth of a foot, repeat 3, 4, and 5 making new temporary marks.
8. After temporary marks have been established to the above limits, remove dial from indicator for marking.
9. The dial shall be permanently marked with a straight edge and a sharp scriber, the scriber being drawn toward the inside edge of dial making a deep mark.

The marks corresponding to gate openings in feet shall be $\frac{5}{8}$" long.
The dial will then be marked for one half foot intervals with marks $\frac{3}{8}$" long and for one quarter foot intervals with marks $\frac{3}{16}$" long.
The marks for fractions of a foot to be laid out as $\frac{1}{4}$ of the one foot intervals on the dial.
The numbers corresponding to the even feet of gate opening (2-4-6 etc.) will be stamped or etched on the dial using figures $\frac{1}{2}$" high, to read from center of the dial.
Each indicator shall be calibrated with the hoist on which it is installed.

REFERENCE DRAWINGS

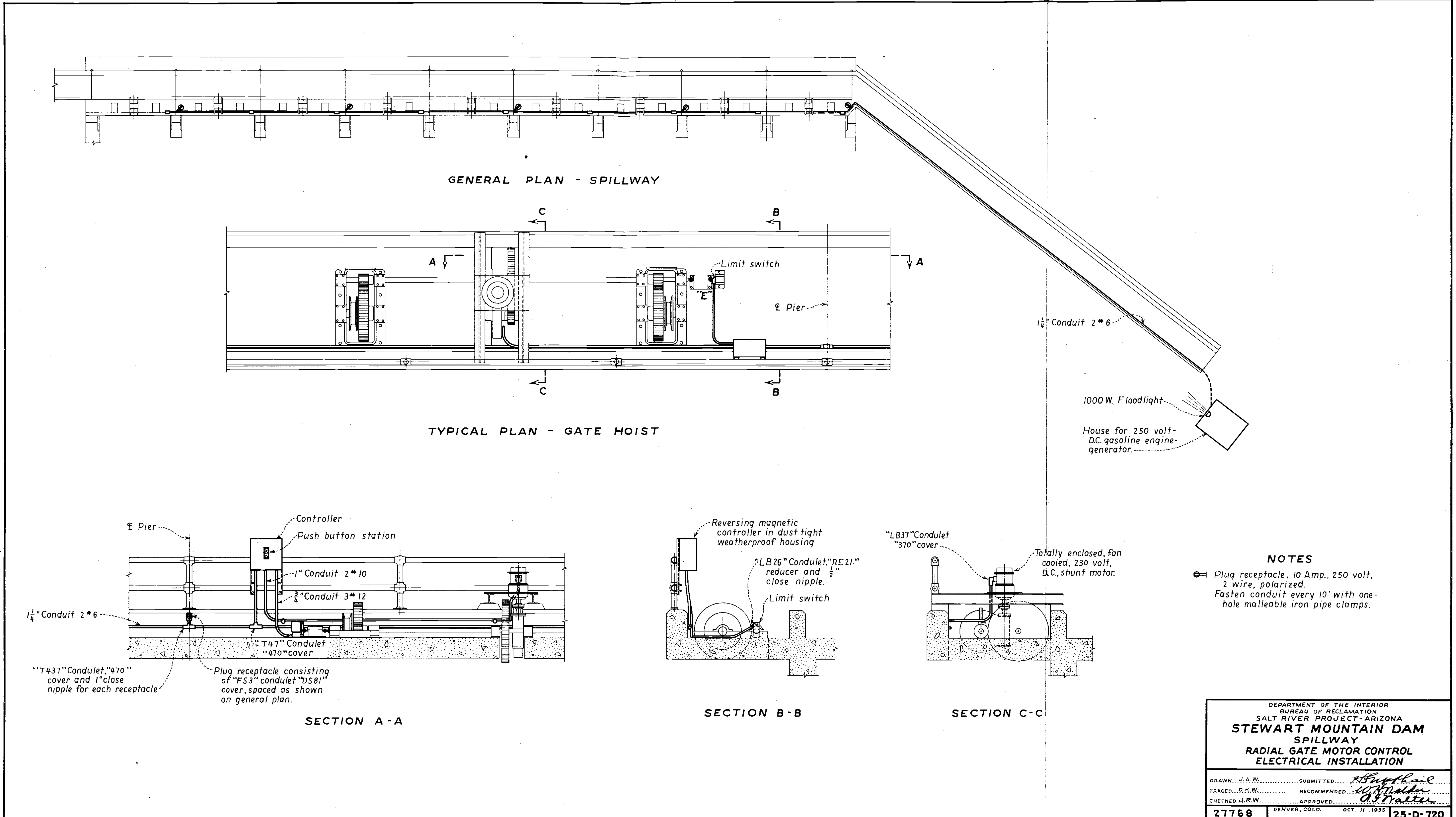
SPILLWAY - GENERAL PLAN 25-D-713
RADIAL GATE HOISTS - INSTALLATION - PLAN - SECTIONS 25-D-717

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT - ARIZONA

STEWART MOUNTAIN DAM
SPILLWAY
RADIAL GATE HOIST
GATE POSITION INDICATOR

DRAWN C.W.P.-R.C.G. SUBMITTED Ray [signature]
TRACED J.E.M. RECOMMENDED C.H. [signature]
CHECKED A.A.B. APPROVED [signature]

27767 | DENVER, COLORADO, OCT. 11, 1935 | 25-D-719


GENERAL PLAN - SPILLWAY
C
B
A
A
Limit switch
"E"
℄ Pier
C
B
1¼" Conduit 2 # 6
1000 W. Floodlight
House for 250 volt-D.C. gasoline engine-generator.
TYPICAL PLAN - GATE HOIST
℄ Pier
Controller
Push button station
1" Conduit 2 # 10
¾" Conduit 3 # 12
1¼" Conduit 2 # 6
"T47" Condulet "470" cover
"T437" Condulet, "470" cover and 1" close nipple for each receptacle
Plug receptacle consisting of "FS3" condulet "DS81" cover, spaced as shown on general plan.
SECTION A-A
Reversing magnetic controller in dust tight weatherproof housing
"LB26" Condulet, "RE21" reducer and ½" close nipple.
Limit switch
SECTION B-B
"LB37" Condulet "370" cover
Totally enclosed, fan cooled, 230 volt, D.C., shunt motor.
SECTION C-C
NOTES
Plug receptacle, 10 Amp., 250 volt, 2 wire, polarized.
Fasten conduit every 10' with one-hole malleable iron pipe clamps.
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT-ARIZONA
STEWART MOUNTAIN DAM
SPILLWAY
RADIAL GATE MOTOR CONTROL
ELECTRICAL INSTALLATION
DRAWN J.A.W.
TRACED O.K.W.
CHECKED J.R.W.
SUBMITTED
RECOMMENDED
APPROVED
27768
DENVER, COLO.
OCT. 11, 1935
25-D-720

ITEM No.	ITEM	QUANTITY		TENTATIVE CONSTRUCTION PERIOD	
		AMOUNT	UNIT	1935	1936
1	Excavation, class I, for spillway and structures.	27.500	C.Y.		
2	Excavation, class II, for spillway and structures.	52.500	C.Y.		
3	Excavation, class III, for spillway and structures.	1.500	C.Y.		
4	Excavation, of river channel other than for concrete aggregate.	5.000	C.Y.		
5	Excavation, of old concrete.	40	C.Y.		
6	Removing top of existing concrete deflecting wall.	60	C.Y.		
7	Chipping and roughening old concrete surfaces.	360	S.Y.		
8	Backfill about structures.	7.000	C.Y.		
9	Constructing 12-inch diameter sewer pipe drains.	70	L.F.		
10	Constructing 8-inch diameter sewer pipe drains.	420	L.F.		
11	Constructing 6-inch diameter sewer pipe drains.	1.620	L.F.		
12	Concrete in spillway walls, bucket, piers and supported floor.	3,700	C.Y.		
13	Concrete in spillway paving slab and cut-off wall.	4,000	C.Y.		
14	Concrete in motor-generator house	22	C.Y.		
15	Placing reinforcement bars.	750,000	Lbs.		
16	Construction of motor-generator house except concrete.	Lump sum			
17	Reconditioning existing radial gates and hoists, and installing new operating mechanism.	Lump sum			
18	Installing pipe handrailing.	4,550	Lbs.		
19	Installing miscellaneous metal work.	500	Lbs.		
20	Installing electrical circuits and apparatus.	Lump sum			

NOTE

This construction program is tentative. It is included in the drawings solely to assist bidders and the contractor in preparing a construction program for their use.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SALT RIVER PROJECT-ARIZONA

STEWART MOUNTAIN DAM

SPILLWAY

CONSTRUCTION PROGRAM

DRAWN R.F.H. SUBMITTED K.B. Keener
TRACED W.M.S. RECOMMENDED W. H. Nalder
CHECKED E.S.H. APPROVED A. J. Walter

27769 | DENVER, COLO. OCT. 26, 1935 | 25-D-721