Guadalupe Dam
Plans & Specs.
SCS 1974

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY

3325 West Durango Street
Phoenix, Arizona 85009
July 19, 1974

ADDENDUM NO. 2 TO INVITATION NO. FCD-74-2 SCHEDULED TO BE OPENED AT 2:00 P.M., LOCAL TIME AT THE PLACE OF BID OPENING, AUGUST 8, 1974, COVERING ONE EARTH FILLED FLOODWATER RETARDING STRUCTURE IN THE GUADALUPE WATERSHED.

1. Prospective bidders are hereby advised of the following addition to the Special Provision:

   14. Western Canal: All work within the canal right-of-way shall be done in accordance with Salt River Project's permit and specification.

2. All other conditions of this invitation for bids remain the same.

3. Bidders must acknowledge receipt of this addendum. Acknowledgement must be shown in the spaces provided herein or on the bid form in the Invitation for Bids, and must be received before the time set for receiving bids, 2:00 p.m., local time, at place of bid opening, August 8, 1974.

4. FAILURE TO ACKNOWLEDGE RECEIPT OF THIS ADDENDUM WILL CAUSE REJECTION OF BID.

Contracting Officer

ACKNOWLEDGED:

BIDDER: _____

BY: _____

TITLE: _____

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY

3325 West Durango Street
Phoenix, Arizona 85025
July 8, 1974

ADDENDUM NO. 1 TO INVITATION NO. FCD-74-2 SCHEDULED TO BE OPENED AT 2:00 P.M., LOCAL TIME AT THE PLACE OF BID OPENING, AUGUST 8, 1974, COVERING ONE EARTH FILLED FLOODWATER RETARDING STRUCTURE IN THE GUADALUPE WATERSHED.

1. Prospective bidders are hereby advised of the following changes on the drawings:

(a) Sheet 12, PLAN AND PROFILE OF OUTLET CONDUIT

(1) Plan - Change 52nd Street (Dirt Road) to 52nd Street (Paved Road)

(2) Add the following:

Note: Paved road begins at Station 47+50±

(3) Profile - Delete the word "Planned" from the notes "Planned centerline grade for 52nd Street."

(b) Sheet 13, PLAN AND PROFILE OF OUTLET CONDUIT

(1) Profile - Add the following:

Note: End paved road at Station 61+50±

(2) Profile - Delete the word "Planned" from the notes "Planned centerline grade line of 52nd Street."

(c) Sheet 28, DETAILS OF OUTLET CONDUIT APPURTENANCES

Typical section of outlet conduit trench

Sta. 14+09 to Sta. 30+70
Sta. 31+05 to Sta. 61+00

Change Sta. 61+00 to Sta. 47+50±

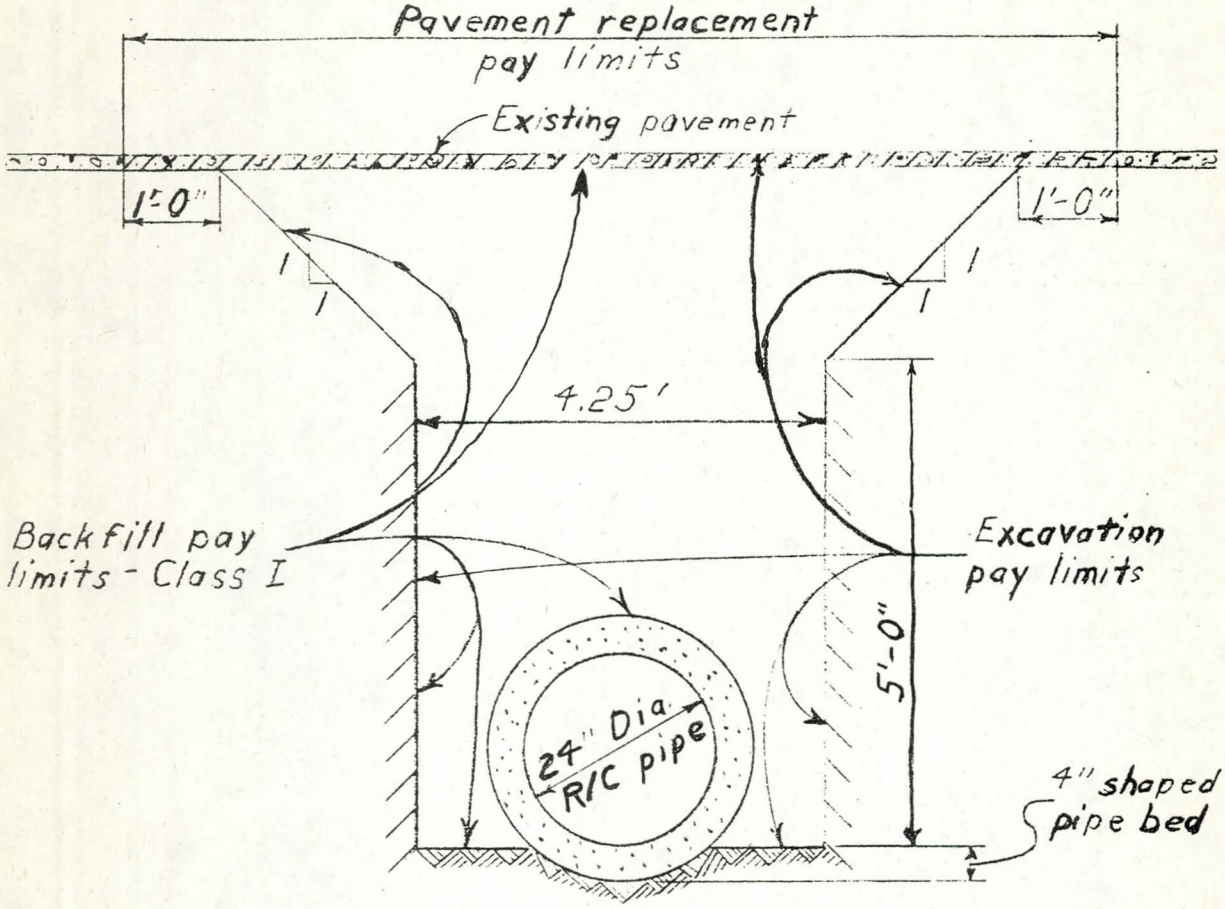
(d) Add the attached typical section of outlet conduit trench - Sta. 47+50± to Sta. 61+00±

2. Prospective bidders are hereby advised of the following Addition on the Bid Schedule.

ITEM NO.	WORK OR MATERIAL	SPEC. NO.	QUANTITY	UNIT	UNIT PRICE	AMOUNT
36	Pavement Replacement	401	1700	Sq.Yd.	$_____	$_____

3. Prospective bidders are hereby advised of the addition of pages 401-1 through 401-3 (attached) to the Construction Specifications.

4. All other conditions of this Invitation for Bids remain the same.



TYPICAL SECTION OF OUTLET CONDUIT TRENCH STA. 47+50± TO STA 61+00±

1 0 1 2

Scale in feet

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
DESIGNED BY PJM 6-74	APPROVED BY
CHECKED BY LLB 6-74	DRAWING NO. 7-E-22659
DATE: 6-20-74	SHEET 1 OF 1

CONSTRUCTION SPECIFICATION

401. PAVEMENT REPLACEMENT

1. SCOPE

The work shall consist of replacement of existing road pavement after the installation of the permanent works.

2. APPLICABLE STANDARD SPECIFICATIONS

All the work specified herein shall comply with the requirements of the following referenced specifications except as modified herein.

City of Tempe, Arizona
Public Works Department
Division of Engineering
Standard Specifications Nos. 8, 9, 12 and 19
Standard Detail 351

3. GENERAL

Type and time of construction required at roads subject to interference by the contract work shall be determined by those authorities responsible for maintenance of such roads. The authority within the project limits is:

City of Tempe
Public Works Department
31 East 5th Street
Tempe, Arizona 85281

It shall be the responsibility of the Contractor to determine the nature and extent of all such requirements.

4. EARTHWORK

Base material shall be compacted to the grading plane of the existing road base or to the grading plane of the road base as shown on the drawings, whichever depth is greater. Embankment for shoulders and other untraveled portions of the roadway shall be compacted to the lines and grades as shown on the drawings or as directed by the Engineer.

5. AGGREGATE BASE COURSE

Aggregate base course shall be Class 1. Compensation for aggregate base course shall be included in payment for Bid Item 10, Pipe Backfill, Class 1.

6. ROAD SURFACING

The road surfacing shall be asphalt concrete.

7. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the dimensions of the surface of the asphaltic concrete will be measured to the neat lines shown on the drawing and the surface area will be computed to the nearest square yard. Payment will be made at the contract unit price for pavement replacement. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the work.

Compensation for any item of work described in the contract, but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary.

8. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 36, Pavement Replacement

(1) This item shall consist of furnishing and placing all asphalt concrete required for the replacement of the existing pavement between Sta. 33+50± and Sta. 34+50± and Sta. 47+50± and Sta. 61+50± centerline outlet conduit, removed for the construction of the outlet conduit as shown on the drawings and as staked in the field.

(2) Payment will be made in accordance with Section 7.

INVITATION FOR BIDS
(Construction Contract)

INVITATION NO. FCD-74-2

DATE: JULY 8, 1974

GUADALUPE WATERSHED
APPROXIMATELY 7 MILES SOUTHEAST
OF PHOENIX, MARICOPA COUNTY, ARIZONA

ISSUED BY THE CONTRACTING
LOCAL ORGANIZATION:
FLOOD CONTROL DISTRICT OF
MARICOPA COUNTY

Sealed bids, in single copy for the work described herein will be received until 2 p.m., local time at the place of bid opening, August 8, 1974, in the office of the Flood Control District, Maricopa County Highway Department Building, 3325 West Durango Street, Phoenix, Arizona 85009, and at that time publicly opened.

Prospective bidders may assemble at the Parish Center, 9002 South 54th Place, Guadalupe, Arizona on Thursday, July 18, and Thursday, August 1, 1974, for a group showing of the work site. The group will leave the Parish Center at 10:00 a.m., on each of the above days. If you are unable to attend one of the group showings, arrangements to inspect the site may be made with Mr. Herbert P. Donald, Contracting Officer for Flood Control District of Maricopa County, 3325 West Durango Street, Phoenix, Arizona 85009 (Phone: 278-7682).

Bid security in an amount of not less than twenty percent (20%) of the total bid price, must be submitted with bid. Security may be in the form of a bid bond, cashier's or certified check, postal money order, or cash. If a bid bond is used it must be executed on Form SCS-AS-158 (copies enclosed). If a check or money order is used, it must be made payable to the Flood Control District of Maricopa County. Bid security, other than bid bonds, submitted by unsuccessful bidders will be returned as soon as practicable after award of contract.

The successful bidder will be required to execute contract, Form SCS-AS-41. Also he will be required to furnish to the Contracting Local Organization a performance bond on Form SCS-AS-161 and a payment bond on Form SCS-AS-160 in penal sums of not less than one hundred percent (100%) and fifty percent (50%), respectively, of the original amount of the contract.

DESCRIPTION OF WORK: Construction of an earthfilled floodwater retarding structure, composed of East Dam, North Dam No. 1 and North Dam No. 2, including landscaping, fencing and drip irrigation system, in the Guadalupe Watershed involving the estimated quantities shown in the attached bid schedule.

The work shall be commenced within twenty (20) calendar days and be completed within 174 calendar days after the date of receipt of the Notice to Proceed.

NOTICE: The Bid Schedule, General Provisions, Special Provisions, Equal Opportunity Clause, Certification of Nonsegregated Facilities, Instructions to Contractors, Contractor's Affirmative Action Plan, Specifications, and Drawings listed under contents will be incorporated in and become a part of the resultant contract.

CONTENTS

Invitation FCD-74-2

Number	Title
CONSTRUCTION	
201	Treatment of Rock Surfaces
202	Plastic Pipe Conduits
400	Landscaping
MATERIALS	
302	Plastic Pressure Pipe
521	Aggregates for Drain Fill and Filters
522	Aggregate for Portland Cement Concrete
523	Rock for Riprap
531	Portland Cement
532	Air-entraining Admixtures (for concrete)
533	Water-reducing and set-retarding Admixtures for Portland Cement Concrete
534	Curing Compound (for concrete)
535	Preformed Expansion Joint Filler
536	Sealing Compound for Joints in Concrete and Concrete Pipe
537	Non-Metallic Waterstops
538	Metal Water Stops
539	Steel Reinforcement (for concrete)
541	Reinforced Concrete Pressure Pipe
542	Concrete Culvert Pipe
553	Steel Pipe and Fittings
572	Slide Gates (Sluice Gates), Metal Moderate Duty
581	Metal
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591	Farm Field Fencing Materials
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7-E-22659	Sheets 1 through 39

SCS-AS-39
Rev. 11-70
File Code AS-14

U.S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service

INSTRUCTIONS TO BIDDERS (LOCAL CONTRACT)

1. EXPLANATIONS TO BIDDERS

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

2. CONDITIONS AFFECTING THE WORK

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

3. BIDDER'S QUALIFICATIONS

Before a bid is considered for award, the bidder may be requested by the Contracting Local Organization to submit a statement regarding his previous experience in performing comparable work, his business and technical organization, financial resources, and plant available to be used in performing the work.

4. BID GUARANTEE

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

A bid guarantee shall be in the form of a firm commitment, such as a bid bond, postal money order, certified check, or cashier's check. Bid guarantees, other than bid bonds, will be returned (a) to unsuccessful bidders as soon as practicable after the opening of bids, and (b) to the successful bidder upon execution of such further contractual documents and bonds as may be required by the bid as accepted.

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

5. PREPARATION OF BIDS

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

(b) No bid will be considered unless all items in the bid schedule are priced. In case of error in the extension of price, the unit price shall

5. PREPARATION OF BIDS–Continued

govern. The quantities listed in the bid schedule on which unit prices are requested are estimates only.

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

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

6. SUBMISSION OF BIDS

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

7. LATE BIDS AND MODIFICATIONS OR WITHDRAWALS

(a) Bids and modifications or withdrawals thereof received at the office designated in the invitation for bids after the exact time set for opening of bids will not be considered unless: (1) They are received before award is made; and either (2) they are sent by registered mail, or by certified mail for which an official dated post office stamp (postmark) on the original Receipt for Certified Mail has been obtained and it is determined by the Contracting Local Organization that the late receipt was due solely to delay in the mails for which the bidder was not responsible; or (3) if submitted by mail (or by telegram if authorized), it is determined by the Contracting Local Organization that the late receipt was due solely to mishandling by the Contracting Local Organization after receipt at the Contracting Local Organization installation: PROVIDED, That timely receipt at such installation is established upon examination of an appropriate date or time stamp (if any) of such installation, or of other documentary evidence of receipt (if readily available) within the control of such installation or of the post office serving it. However, a modification which makes the terms of the otherwise successful bid more favorable to the Contracting Local Organization will be considered at any time it is received and may thereafter be accepted.

(b) Bidders using certified mail are cautioned to obtain a Receipt for Certified Mail showing a legible, dated postmark and to retain such receipt against the chance that it will be required as evidence that a late bid was timely mailed.

(c) The time of mailing of late bids submitted by registered or certified mail shall be deemed to be the last minute of the date shown in the postmark on the registered mail receipt or registered mail wrapper or on the Receipt for Certified Mail unless the bidder furnishes evidence from the post office station of mailing which establishes an earlier time. In the case of certified mail, the only acceptable evidence is as follows: (1) Where the Receipt for Certified Mail identifies the post office station of mailing, evidence furnished by the bidder which establishes that the business day of that station ended at an earlier time, in which case the time of mailing shall be deemed to be the last minute of the business day of that station; or (2) an entry in ink on the Receipt for Certified Mail showing the time of mailing and the initials of the postal employee receiving the item and making the entry, with appropriate written verification of such entry from the post office station of mailing, in which case the time of mailing shall be the time shown in the entry. If the postmark on the original Receipt for Certified Mail does not show a date, the bid shall not be considered.

8. WITHDRAWAL OF BIDS

Bids may be withdrawn by written or telegraphic request received from bidders prior to the time set for opening of bids.

9. PUBLIC OPENING OF BIDS

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

10. AWARD OF CONTRACT

(a) Award of contract will be made to that responsible bidder whose bid, conforming to the

10. AWARD OF CONTRACT–Continued

invitation for bids, is most advantageous to the Contracting Local Organization, price and other factors considered.

(b) The Contracting Local Organization may, when in its interest, reject any or all bids or waive any informality in bids received.

(c) Only one contract will be awarded and the award will be based on the total bid, corrected if necessary, for errors in price extensions and/or addition.

11. CONTRACT, BONDS AND INSURANCE

The bidder whose bid is accepted will, within the time established in the bid, enter into a written contract with the Contracting Local Organization, and if required, furnish performance and payment bonds on forms furnished by the Contracting Officer in the amounts indicated in the invitation for bids or the specifications. The bidder whose bid is accepted will secure and maintain such insurance as is required by statute and/or ordnance.

12. SPECIFICATIONS

Specifications referred to herein shall include all revisions and amendments in effect on the date of issuance of the invitation for bids. Information as to where these specifications may be obtained can be acquired from the office issuing this invitation.

13. RECORDS

Records of the site investigation and soil mechanics testing report may be reviewed by prospective bidders by contacting the office issuing this invitation.

SPECIAL INSTRUCTION TO BIDDERS

1. Workweek - Construction Schedule

The Contractor shall, within 10 days after receipt of a written request from the Contracting Officer, and prior to award, submit in writing for approval: (a) a construction schedule showing the order in which he proposes to carry on the work indicating the periods during which he will perform work on each item listed in the bid schedule; and (b) the hours and days he proposes to carry out the work. The maximum workweek that will be approved is 10 hours a day, Monday through Saturday. The Contractor's proposed hours of work shall include daily starting and stopping times. Failure to submit the proposed construction schedule, and days and hours of work, within the time specified may be cause for rejection of the bid.

2. Landscaping

Due to the unavailability of the plants required for the landscaping, the Contractor shall order the plants when the contract is awarded.

SCS-AS-819
Rev. 2-71

NOTICE TO PROSPECTIVE FEDERALLY ASSISTED CONSTRUCTION CONTRACTORS

(a) A Certification of Nonsegregated Facilities must be submitted prior to the award of a federally assisted construction contract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause.

(b) Contractors receiving federally assisted construction contract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause will be required to provide for the forwarding of the following notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity clause.

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

(a) A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause.

(b) Contractors receiving subcontract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause will be required to provide for the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity clause.

SCS-AS-51

U.S. Department of Agriculture
Soil Conservation Service

BID FORM
(CONSTRUCTION CONTRACT)

NAME AND LOCATION OF PROJECT	
GUADALUPE WATERSHED APPROXIMATELY 7 MILES SOUTHEAST OF PHOENIX MARICOPA COUNTY, ARIZONA	INVITATION NO. FCD-74-2 Date July 8, 1974

TO: Flood Control District of Maricopa County
3325 West Durango Street
Phoenix, Arizona 85009

_____
Date

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

the construction of an earthfilled floodwater retarding structure, composed of East Dam, North Dam No. 1 and North Dam No. 2, including landscaping, fencing and drip irrigation system, in the Guadalupe Watershed.

in strict accordance with the terms, conditions, provisions, schedules, specifications, and drawings, for the following amoumt

Total Price Bid: _____ **dollars**
(Words)

$ _____
(Figures)

The undersigned agrees that, upon written acceptance of this bid, mailed or otherwise furnished within _____ **calendar days** *(60 calendar days unless a different period be inserted by the bidder)* **after the date of opening of bids, he will within 10 calendar days** *(unless a longer period is allowed)* **after receipt of the prescribed forms, execute Form SCS-410, Construction Contract and, if required by this invitation for bids, give performance and payment bonds on forms furnished by the Contracting Local Organization with good and sufficient surety.**

The undersigned agrees, if awarded the contract, to commence the work within 20 **calendar days after the date of receipt of notice to proceed, and to complete the work within** 174 **calendar days after the date of receipt of notice to proceed.**

The bidder certifies that no official of the Sponsoring Local Organizations, the Contracting Local Organization, or any member of such official's immediate family, has direct or indirect interest in the pecuniary profits or contracts of this firm.

(Continue on other side)

The bidder represents *(Check appropriate boxes):*

(1) That he ( ) has, ( ) has not, participated in a previous contract or subcontract subject to the Equal Opportunity clause herein, the clause originally contained in section 301 of Executive Order No. 10925, or the clause contained in section 201 of Executive Order No. 11114; that he ( ) has, ( ) has not, filed all required compliance reports; and that representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards. (The above representation need not be submitted in connection with contracts or subcontracts which are exempt from the clause.)

(2) That he operates as an ☐ individual, ☐ partnership, ☐ joint venture, ☐ corporation, incorporated in State of _____

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

ENCLOSED IS BID GUARANTEE IF REQUIRED, CONSISTING OF	IN THE AMOUNT OF $
NAME OF BIDDER (Type or print)	FULL NAME OF ALL PARTNERS (Type or print)
BUSINESS ADDRESS (Type or print)	
BY (Signature in ink. Type or print name under signature)	
TITLE (Type or print)	

DIRECTIONS FOR SUBMITTING BIDS	ENVELOPES CONTAINING BIDS, GUARANTEE, ETC, MUST BE SEALED, MARKED, AND ADDRESSED AS FOLLOWS:
	Invitation for Bid No. FCD-74-2 for opening August 8, 1974, at 2 p.m., local time at the place of bid opening
	Contracting Officer Flood Control District of Maricopa County 3325 West Durango Street Phoenix, Arizona 85009

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

The bidder represents (check appropriate blocks):

(3) That (1) he ☐ has developed and has on file ☐ has not developed and does not have on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or (2) he ☐ has not previously had contracts subject to the written affirmative action program requirement of the rules and regulations of the Secretary of Labor.

BID SCHEDULE		GUADALUPE FLOODWATER RETARDING STRUCTURE				Sheet 1 of 2
ITEM NO.	WORK OR MATERIAL	SPEC. NO.	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1.	Clearing and Grubbing	2	42	Acres	$_____	$_____
2.	Mobilization	8	1	Job	$ XXXX	$_____
3.	Channel Excavation, Common	21	19,100	C.Y.	$_____	$_____
4.	Emergency Spillway Excavation, Unclassified	21	9,500	C.Y.	$_____	$_____
5.	Cutoff Trench Excavation, Unclassified	21	9,560	C.Y.	$_____	$_____
6.	Foundation Excavation, Common	21	66,850	C.Y.	$_____	$_____
7.	Pipe Trench Excavation, Common	21	6,760	C.Y.	$_____	$_____
8.	Structure Excavation, Unclassified	21	1,410	C.Y.	$_____	$_____
9.	Earth Fill, Class A	23	253,520	C.Y.	$_____	$_____
10.	Pipe Backfill, Class I	23	2,760	C.Y.	$_____	$_____
11.	Pipe Backfill, Class II	23	2,980	C.Y.	$_____	$_____
12.	Structure Backfill	23	791	C.Y.	$_____	$_____
13.	Concrete, Class 4000X	31	182	C.Y.	$_____	$_____
14.	Cement	31	278	Bbl.	$_____	$_____
15.	Steel Reinforcement	34	16,000	Lbs.	$_____	$_____
16.	30-Inch Diameter R/C Pressure Pipe	41	212	L.F.	$_____	$_____
17.	24-Inch Diameter R/C Pipe	42	4,661	L.F.	$_____	$_____
18.	30-Inch Diameter R/C Pipe	42	617	L.F.	$_____	$_____
19.	24-Inch Diameter R/C Pipe	42	35	L.F.	$_____	$_____
20.	60-Inch Diameter R/C Pipe	42	136	L.F.	$_____	$_____
21.	Loose Rock Riprap	61	875	C.Y.	$_____	$_____
22.	24-Inch Slide Gate Assembly	71	1	Each	$_____	$_____
23.	24-Inch Slide Gate Assembly	71	1	Each	$_____	$_____
24.	Metal Work	81	1	Job	$ XXXX	$_____

B I D S C H E D U L E	GUADALUPE FLOODWATER RETARDING STRUCTURE				Sheet 2 of 2
ITEM NO.	WORK OR MATERIAL	SPEC. NO.	QUANTITY	UNIT	UNIT PRICE	AMOUNT
25.	Identification Sign	81	1	Job	$ XXXX	$
26.	Chain Link Fence	91	830	L.F.	$	$
27.	Woven Wire Fence	92	8,510	L.F.	$	$
28.	Dental Grout	201	240	C.Y.	$	$
29.	Rock Surface Preparation and Cleaning	201	2,865	S.Y.	$	$
30.	1/2-Inch Diameter Plastic Pipe (PE)	202	17,350	L.F.	$	$
31.	3/4-Inch Diameter Plastic Pipe (PE)	202	4,210	L.F.	$	$
32.	1 1/4-Inch Diameter Plastic Pipe (PVC)	202	630	L.F.	$	$
33.	1-Inch Diameter Plastic Pipe (PVC)	202	2,900	L.F.	$	$
34.	3/4-Inch Diameter Plastic Pipe (PVC)	202	215	L.F.	$	$
35.	Landscaping	400	1	Job	$ XXXX	$
					TOTAL BID:	$

SCS-AS-43
Rev. 8-73
File Code AS-14

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GENERAL PROVISIONS

(CONSTRUCTION CONTRACT)

1. DEFINITIONS

Terms used or referred to herein are defined as follows:

(a) Contracting Local Organization: The organization or agency awarding the contract.

(b) Contracting Officer: The person who is designated and authorized to enter into and administer this contract on behalf of the Contracting Local Organization or his duly appointed successor or authorized representative.

(c) Engineer: The person or his representative who is responsible for determining that the construction work conforms to the technical requirements as set forth in the drawings and specifications.

2. SPECIFICATIONS AND DRAWINGS

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

3. CHANGES

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

(1) In the specifications (including drawings and designs);

(2) In the method or manner of performance of the work;

(3) In the Contracting Local Organization-furnished facilities, equipment, materials, services, or site; or

(4) Directing acceleration in the performance of the work.

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

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

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

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

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

4. DIFFERING SITE CONDITIONS

(a) The Contractor shall promptly, and before such conditions are disturbed, notify the Contracting Officer in writing of: (1) subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as

inhering in work of the character provided for in this contract. The Contracting Officer shall promptly investigate the conditions, and if he finds that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under this contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the contract modified in writing accordingly.

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

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

5. TERMINATION FOR DEFAULT—DAMAGES FOR DELAY—TIME EXTENSIONS

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

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

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

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

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

(2) The Contractor, within 10 days from the beginning of any such delay (unless the Contracting Officer grants a further period of time before the date of final payment under the contract), notifies the Contracting Officer in writing of the causes of delay.

The Contracting Officer shall ascertain the facts and the extent of the delay and extend the time for completing the work when, in his judgment, such an extension is justified.

(e) The rights and remedies of the Contracting Local Organization provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

(f) As used in paragraph (d)(1) of this clause, the term 'Subcontractors and Suppliers' means Subcontractors and Suppliers at any tier.

6. CLAIMS

Any claim by the Contractor arising by virtue of this contract which is not disposed of by agreement shall be submitted in writing, together with any written and oral evidence in support thereof, to the Contracting Officer for decision. Before making a decision the Contracting Officer shall notify the Contractor that any additional written and/or oral evidence in support of the claim may be presented to the Contracting Officer within 30 days from receipt by the Contractor of such notification, or within such further period of time as may be granted by the Contracting Officer. The Contracting Officer shall make his decision in writing and mail or otherwise furnish a signed copy thereof to the Contractor. Pending the decision of the Contracting Officer the Contractor shall proceed diligently with the performance of this contract.

7. PAYMENTS TO CONTRACTOR

(a) The Contracting Local Organization will pay the contract price as hereinafter provided.

(b) The Contracting Local Organization will make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates approved by the Contracting Officer. If requested by the Contracting Officer, the Contractor shall furnish a breakdown of the total contract price showing the amount included therein for each principal category of the work, in such detail as requested, to provide a basis for determining progress payments. In the preparation of estimates the Contracting Officer, at his discretion, may authorize material delivered on the site and

preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site may also be taken into consideration (1) if such consideration is specifically authorized by the contract and (2) if the Contractor furnishes satisfactory evidence that he has acquired title to such material and that it will be utilized on the work covered by this contract.

(c) In making such progress payments, there shall be retained 10 percent of the estimated amount until final completion and acceptance of the contract work. However, if the Contracting Officer, at any time after 50 percent of the work has been completed, finds that satisfactory progress is being made, he may authorize any of the remaining progress payments to be made in full. Also, whenever the work is substantially complete, the Contracting Officer, if he considers the amount retained to be in excess of the amount adequate for the protection of the Contracting Local Organization, at his discretion, may release to the Contractor all or a portion of such excess amount. Furthermore, on completion and acceptance of each separate building, public work, or other division of the contract on which the price is stated separately in the contract, payment may be made therefor without retention of a percentage.

(d) All material and work covered by progress payments made shall thereupon become the sole property of the Contracting Local Organization, but this provision shall not be construed as relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work, or as waiving the right of the Contracting Local Organization to require the fulfillment of all of the terms of the contract.

(e) Upon completion and acceptance of all work, the amount due the Contractor under this contract shall be paid after the Contractor shall have furnished the Contracting Local Organization with a release of all claims against the Contracting Local Organization arising by virtue of this contract, other than claims in stated amounts as may be specifically excepted by the Contractor from the operation of the release. If the Contractor's claim to amounts payable under the contract has been assigned, a release may also be required of the assignee.

8. MATERIAL AND WORKMANSHIP

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

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

9. INSPECTION AND ACCEPTANCE

(a) Except as otherwise provided in this contract, inspection and test by the Contracting Local Organization of material and workmanship required by this contract shall be made at reasonable times and at the site of the work, unless the Contracting Officer determines that such inspection or test of material which is to be incorporated in the work shall be made at the place of production, manufacture or shipment of such material. To the extent specified by the Contracting Officer at the time of determining to make off-site inspection or test, such inspection or test shall be conclusive as to whether the material involved conforms to the contract requirements. Such off-site inspection or test shall not relieve the Contractor of responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of the Contracting Local Organization after acceptance of the completed work under the terms of paragraph (f) of this clause, except as hereinabove provided.

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

(c) If the Contractor does not promptly replace rejected material or correct rejected workmanship, the Contracting Local Organization (1) may, by contract or otherwise, replace such material or correct such workmanship and charge the cost thereof to the Contractor, or (2) may terminate the Contractor's right to proceed in accordance with Clause 5 of these General Provisions.

(d) The Contractor shall furnish promptly, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspec-

tion and test as may be required by the Contracting Officer. All inspection and test by the Contracting Local Organization shall be performed in such manner as not unecessarily to delay the work. Special, full size, and performance tests shall be performed as described in this contract. The Contractor shall be charged with any additional cost of inspection when material and workmanship are not ready at the time specified by the Contractor for its inspection.

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

(f) Unless otherwise provided in this contract, acceptance by the Contracting Local Organization shall be made as promptly as practicable after completion and inspection of all work required by this contract. Acceptance shall be final and conclusive except as regards latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Contracting Local Organization's rights under any warranty or guarantee.

10. SUPERINTENDENCE BY CONTRACTOR

The Contractor shall give his personal superintendence to the work or have a competent foreman or superintendent, satisfactory to the Contracting Officer, on the work at all times during progress, with authority to act for him.

11. PERMITS AND RESPONSIBILITIES

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

12. CONDITIONS AFFECTING THE WORK

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

13. OTHER CONTRACTS

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

14. PATENT INDEMNITY

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

15. ADDITIONAL BOND SECURITY

If any surety upon any bond furnished in connection with this contract becomes unaccpttable to the Contracting Local Organization, or if any such surety fails to furnish reports as to his financial condition from time to time as requested by the Contracting Local Organization, the Contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the Contracting Local Organization and of persons supplying labor or materials in the prosecution of the work contemplated by this contract.

16. LAND RIGHTS

(a) Adequate land rights needed in order to perform the work under this contract have been acquired by or on behalf of the Contracting Local Organization. The right to enter, remove, or otherwise make use of adjacent property, roads, utility lines, fences, and other improvements not included within the land rights provided shall be the sole responsibility of the Contractor.

(b) Where ingress and egress is not defined on the drawings, the Contracting Officer shall designate the right-of-way to be used.

17. RECORDS OF TEST PITS AND BORINGS

The Contracting Local Organization does not represent that the available records show completely the existing conditions and does not guarantee any interpretation of these records. The Contractor assumes all responsibility for deductions and conclusions as to the nature of 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, dikes, and other structures.

18. MATERIALS TO BE FURNISHED BY THE CONTRACTOR

(a) Unless otherwise specified in this contract, the Contractor shall furnish all materials required for the completion of the contract.

(b) Unless otherwise waived in writing by the Contracting Officer, the Contractor shall furnish the Contracting Local Organization with certifications dated and signed by the manufacturer and/or supplier to the effect that the items listed therein meet the requirements of this contract. Such certifications shall be furnished prior to the use of the material in any part of the construction and shall identify the project on which the material is to be used.

19. WATER

Unless otherwise specified in this contract, the Contractor shall provide and maintain at his own expense an adequate supply of water suitable for construction purposes.

20. WORKWEEK—CONSTRUCTION SCHEDULE

(a) Unless furnished prior to contract award, the Contractor shall, prior to commencement of work, submit to the Contracting Officer for approval (1) a construction schedule showing the order in which he proposes to carry on the work indicating the periods during which he will perform work on each item listed in the bid schedule; and (2) the hours and days in which he proposes to carry on the work.

(b) If, in the opinion of the Contracting Officer, the Contractor falls behind the approved construction schedule, the Contractor shall take such steps as may be necessary to improve his progress and the Contracting Officer may require him to either increase the number of shifts, days or hours of work, or the amount of construction plant, or all of them, and to submit for approval such revised construction schedule as may be deemed necessary to show the manner in which the agreed rate of progress will be regained, all without additional cost to the Contracting Local Organization. If the Contractor fails to submit a revised construction schedule within the time specified by the Contracting Officer, the Contracting Officer may withhold approval of progress payments and/or take such other actions as provided in this contract until such time as the Contractor submits the required construction schedule.

(c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for determination by the Contracting Officer that the Contractor is not prosecuting the work with such diligence as will insure completion within the time specified. Upon such determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part thereof, in accordance with Clause 5 of these General Provisions.

21. SUBCONTRACTORS

(a) Work shall not be subcontracted in whole or in part without the prior written approval of the Contracting Officer. The request shall be in writing with the name of the proposed subcontractor and a description of the work to be done.

(b) If at any time the Contracting Officer determines that any subcontractor is incompetent or undesirable, he shall notify the Contractor accordingly and the Contractor shall take immediate steps for cancellation of the subcontract.

(c) Subcontracting by subcontractors shall be subject to the above requirements.

(d) Nothing contained in this contract shall create any contractual relationship between any subcontractor and the Contracting Local Organization.

22. SURVEYS

(a) Unless otherwise stated in the Invitation for Bids, only the basic staking shall be done by the Contracting Local Organization. If the Contracting Local Organization does the staking, the Contractor shall notify the Contracting Officer in advance of any staking required in order that such work can be properly scheduled.

(b) Bench marks shall be preserved by the Contractor, and in the case of their destruction or removal by him or his employees they shall be replaced by the Contracting Local Organization at the Contractor's expense.

(c) Survey stakes destroyed or removed by the carelessness of the Contractor or his employees shall be replaced by the Contracting Local Organization at the Contractor's expense. Stakes removed or destroyed in the due course of the work shall be replaced by the Contracting Local Organization without cost to the Contractor.

(d) If the Contractor finds any errors or omissions in the layout as given by survey points or staking, he shall immediately inform the Contracting Officer in writing.

23. SUSPENSION OF WORK

(a) The Contracting Officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as he may determine to be appropriate for the convenience of the Contracting Local Organization.

(b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted by an act of the Contracting Officer in the administration of this contract, or by his failure to act within the time specified in this contract (or if no time is specified, within a reasonable time), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent (1) that performance would have been so suspended, delayed, or interrupted by any other cause including the fault or negligence of the Contractor or (2) for which an equitable adjustment is provided for or excluded under any other provision of this contract.

(c) No claim under this clause shall be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order), and (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of such suspension, delay, or interruption, but not later than the date of final payment under the contract.

24. CLEANUP WORK

(a) During construction the Contractor shall keep the work site, areas adjacent to the work site and access roads in an orderly condition, free and clear from debris and discarded materials. Care shall be taken to prevent spillage when hauling is being done. Any spillage or debris resulting from the Contractor's operations shall be immediately removed.

(b) Upon completion of the work the Contractor shall remove from the work site, areas adjacent to the work site and access roads: all plant, buildings, debris, unused materials, concrete forms and other like material belonging to him or used under his direction during the construction. He shall grade all access roads, other than public, removing wheel tracks and smoothing up such roads.

25. ASSIGNMENT

The Contractor shall not assign in whole or in part this contract without the prior written consent of the Contracting Local Organization. The Contractor shall not assign any moneys due or to become due to him under this contract without the prior written consent of the Contracting Local Organization.

26. WEATHER

(a) The Contracting Officer may order suspension of the work in whole or in part, commencing with the day after receipt of the Notice to Proceed by the Contractor, due to weather or the effects of weather at the site, for such time as he considers it unfavorable for satisfactory prosecution of the work.

(b) When the Contracting Officer orders suspension under (a) of this clause, the contract completion date shall be extended a full calendar day for each calendar day during suspension of the work if:

(1) All work is suspended except minor items as may be designated in this contract (work of an emergency, protective or maintenance nature may be performed at any time); and

(2) The hours lost in any one workday of the authorized workweek through suspension equal one-half or more of the hours of an authorized workday.

(c) If the Contracting Officer orders suspension of work as provided in (b) of this clause and the hours lost in the workday immediately preceding a nonworkday equal one-half or more of the hours in an authorized workday, the contract completion date shall be extended a full calendar day for each nonworkday during suspension of the work.

(d) When the Contracting Officer orders any suspension of the work under this clause, the Contractor shall not be entitled to any cost or damages resulting from such suspension.

(e) When the contract completion date is extended under this clause, the contract shall be modified in writing accordingly.

27. NONCOMPLIANCE WITH CONTRACT REQUIREMENTS

(a) The Contracting Officer may order suspension of the work in whole or in part for such time as he deems necessary because of the failure of the Contractor to comply with any of the requirements of this contract, and the contract completion date shall not be extended on account of any such suspension of the work.

(b) When the Contracting Officer orders any suspension of the work under (a) of this clause, the Contractor shall not be entitled to any costs or damages resulting from such suspension.

(c) The rights and remedies of the Contracting Local Organization provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

28. QUANTITY VARIATIONS

(a) Where the quantity of work shown for an item in the bid schedule, including any modification thereof, is estimated, no adjustment of the contract price nor of the

performance time shall be made for overruns or underruns which are within 25 percent of the estimated quantity of any such item.

(b) For overruns of more than 25 percent, the Contracting Officer shall re-estimate the quantity for the item, establish an equitable contract price for the overrun of more than 25 percent, adjust contract performance time equitably, and modify the contract in writing accordingly; this clause to thereafter be applicable to the total re-estimated item quantity.

(c) For underruns of more than 25 percent, the Contracting Officer shall determine the quantity for the item, establish an equitable contract price therefor, adjust contract performance time equitably, and modify the contract in writing accordingly.

29. FEDERAL, STATE, AND LOCAL TAXES

Except as otherwise provided, contract unit prices shall include all applicable Federal, State, and local taxes.

SPECIAL PROVISIONS

1. Liquidated Damages: If the work, or any part thereof, is not completed within the time agreed upon in this contract or any extension thereof, the Contractor shall be liable to the Contracting Local Organization in the amount of $172.00 per day for each and every calendar day the completion of the work is delayed beyond the time provided in this contract, as fixed and agreed liquidated damages and not as a penalty; and the Contracting Local Organization shall have the right to deduct from and retain out of moneys which may be then due or which may become due and payable to the Contractor, the amount of such liquidated damages; and if the amount so retained by the Contracting Local Organization is insufficient to pay in full such liquidated damages, the Contractor shall pay to the Contracting Local Organization the amount necessary to effect payment in full of such liquidated damages.

2. Accident Prevention and Safety Measures: The Contractor shall comply with the manual, Safety and Health Regulations for Construction, published by the United States Department of the Interior, Bureau of Reclamation, in effect on the date of issuance of the invitation for bids, with the following modifications:

   (a) Reference to the Bureau of Reclamation shall be interpreted as reference to the Contracting Local Organization.

   (b) Paragraph 3B, page ii, is changed by the addition of: "Requests shall be made in writing supported by evidence that every reasonable effort has been made to comply with the contractual requirements. The Contractor shall hold and save the Contracting Local Organization free from any claims or causes of action whatsoever resulting from the Contractor or his subcontractors proceeding under a waiver or approved adaptation."

   (c) Subsection 9.7.1 of Part II is applicable regardless of the year in which the equipment was manufactured. Subsection 9.9.1 of Part II is applicable regardless of the year in which the equipment was manufactured, or the struck capacity of the equipment. Subsection 9.9.4 of Part II is applicable regardless of the struck capacity of the equipment.

   (d) Subsection 9.9.5 of Part II is deleted in its entirety.

   (e) Subparagraph 1518.550(a)(3) of Part I is changed to "A boom angle indicator in good working order shall be provided."

3. Clause 5, Termination For Default - Damages For Delay - Time Extensions, of the General Provisions is amended by adding the following;

(g) Delay in completion of the work due to unavailability of fuel from suppliers because of a general fuel shortage will be considered unforseeable.

4. Minor Items of Work: The following bid items are designated as minor items of work. These items may be performed without charge to performance time during periods when all other work is suspended if such items are excepted in the Suspend Work Order:

Item No. 1 - Clearing and Grubbing

5. Order of Work: The contractor shall pursue all work under the contract in an orderly manner. However, the Contractor's schedule of operations for construction shall be guided by the following criteria:

(a) Construction of North Dam No. 2 which may result in the impoundment of Floodwaters shall not proceed until the Outlet Conduit has been installed or approval has been granted by the Engineer.

6. Dust abatement and Haul Road Maintenance: Water shall be applied to haul roads and other dust-producing areas as needed to prevent excessive dust and to maintain the roads in good condition for efficient operation while they are in use.

7. Utilities: The Contracting Local Organization's engineering representatives have endeavored to locate and indicate on the drawing all underground utilities which exist within the limits of the work. However, the accuracy or completeness of the utilities indicated on the drawings is not guaranteed. The contractor shall be responsible for locating and preserving the utilities.

All utilities that need relocated will be done by their respective owners. The Contractor shall notify the Engineer three (3) weeks in advance of beginning construction near the following utilities:

(a) The Arizona Public Service's overhead power lines at Sta. 53+90± of the Outlet Conduit.

(b) El Paso Natural Gas Company's buried lines at Sta. 0+60± North Dam No. 1 and at Sta. 21+60± of the Outlet Conduit.

(c) The Arizona Public Service's buried gas line at Sta. 33+80± of the Outlet Conduit.

(d) American Telephone & Telegraph Company's buried cable at Sta. 25+10± of the East Dam.

(e) Mountain State's buried telephone cable at Sta. 67+12± of the Outlet Conduit.

(f) The City of Tempe's water lines at Sta. 48+85± East Dam and Sta. 21+04± and Sta. 34+25± of the Outlet Conduit.

(g) The City of Tempe's sewer lines at Sta. 52+72±, Sta. 55+43± and Sta. 66+68 of the Outlet Conduit.

(h) The Salt River Project's irrigation water pipelines at Sta. 33+90±, Sta. 34+70±, Sta. 40+91±, Sta. 47+47±, Sta. 54+12± and Sta.60+75± of the Ourlet Conduit.

The backfill for the utilities shall conform to requirements per Bid Item 10, Pipe Backfill, Class I.

8. The Contractor shall furnish all water required for the testing and use of the irrigation system before completion of the project.

9. In the event that the Contractor is unable to obtain plants of the size specified for the landscaping and is able to show proof to the Contracting Officer that he made a reasonable effort to obtain the plants, a suspension of work will be issued and the contract completion date shall be extended for each calendar day work is suspended.

10. No bid will be accepted or Contract awarded unless the Contractor is registered under the applicable provision of Arizona statutes, with the Registrar of Contractors of the State of Arizona.

11. In no event will the 5% differential be allowed in evaluating bids as provided by Arizona revised statutes 34-241; the provisions of Arizona revised statutes 34-244 being applicable.

12. The Contractor shall not disturb Legal Survey Monuments during construction unless otherwise authorized by the Contracting Officer and after Witness Markers have been set by the Engineer.

13. Geological Report: The test pits and borings made for the geological investigations are shown on the drawings. The complete geological investigation is available for inspection at the Soil Conservation Service, Construction Office, at 3556 west Buckeye Road, Phoenix, Arizona. Following is a Standard List of Geological Abbreviations used on the Geological Sheets shown on the drawings.

ARIZONA STATE

STANDARD LIST OF GEOLOGIC ABBREVIATIONS

* National Standards

* ang. - angular
aq. - aquifer
* bld. - boulder
* calc. - calcareous
* cali. - caliche
* cav. - cavities
* cmt. - cemented
$\mathbb{C}_L$ - centerline
* C - clay
* cse. - coarse
bl. - cobble
* cpt. - compact
* con. - concretion
cong. - conglomerate
* xln. - crystalline
* dns. - dense
* dip. - dipping
* D. - disturbed sample
* d.s. - downstream
* fn. - fine
* frm. - firm
flg. - flagstone
* frac. - fractured
* frg. - fragment
* fri. - friable
grad. - graded
* grn. - grain
G - gravel
* gyp. - gypseous
* hd. - hard
* h. - highly
* lam. - laminated
L.L. - Liquid Limit
ls. - limestone
* lse. - loose
* mas. - massive
* med. - medium
* mic. - micaceous
* mod. - moderately
* n.r. - no recovery
* O - organic
* per. - permeable
P.L. - Plastic Limit
P.I. - Plasticity Index
* po. - poorly
* p - poorly graded
qtz. - quartz
qtzite. - quartzite
* rdd. - rounded
* S - sand
ss - sandstone
sh. - shale
S.L. - Shrinkage Limit
* M - silt
Ms. - siltstone
* sl/. - slightly
* sft. - soft
* s/. - some
* slo. - slowly
Sta. - Station
* stf. - stiff
* T.B. - thin bedded
TD - total depth
t. - tough
tr. - trace
* tuff. - tuffaceous
* U. - Undisturbed Sample
* u.s. - upstream
* var. - variable
* v/. - very
vug. - vugular
* w.l. - water level
*wea. - weathered
* W - well graded
* w/. - with

14. EQUAL EMPLOYMENT OPPORTUNITY - AFFIRMATIVE ACTION REQUIREMENTS ARIZONA "HOMETOWN" PLAN.

BID CONDITIONS

AFFIRMATIVE ACTION REQUIREMENTS

EQUAL EMPLOYMENT OPPORTUNITY

For all Non-Exempt Federal and Federally-Assisted Construction Contracts to be Awarded in the Area of Jurisdiction of the Phoenix Building and Construction Trades Council.

Part I: The provisions of this Part I apply to bidders, contractors and subcontractors with respect to those construction trades for which they are parties to collective bargaining agreements with a labor organization or organizations and who together with such labor organizations have agreed to the Arizona Plan on minority employment dated November 24, 1970, (but only as to those trades as to which there are commitments by labor organizations to specific goals of minority manpower utilization) among the Phoenix Building and Construction Trades Council, general and specialty contractors associations and representatives of the minority community, together with all implementing agreements that have been and may hereafter be developed pursuant thereto, all of which documents are incorporated herein by reference and are hereinafter cumulatively referred to as the Arizona Plan.

Any bidder, contractor or subcontractor using one or more trades of construction employees must comply with either Part I or Part II of these Bid Conditions as to each such trade. Thus, a bidder, contractor or subcontractor may be in compliance with these conditions by its inclusion, with its union, in the Arizona Plan as to trade "A", provided there is set forth in the Arizona Plan a specific commitment by that union to a goal of minority manpower utilization for such trade "A", thereby meeting the provisions of this Part I, and by its commitment to Part II in regard to trade "B" in the instance in which it is not included in the Arizona Plan and, therefore, cannot meet the provisions of this Part I.

To be eligible for award of a contract under Part I of this Invitation for Bids, a bidder must execute and submit as part of its bid the following certification, which will be deemed a part of the resulting contract:

(See Over)

_____ certifies that:
(Name of Bidder)

(a) it intends to use the following listed construction trades in the work under the contract, either itself or through subcontractors at any tier _____

_____

_____

(b) the labor organizations with whom it has collective bargaining agreements who are signatories to the Arizona Plan and as to which trades there are set forth in the Arizona Plan specific commitments to goals of minority manpower utilization are as follows: _____

_____

_____

(c) the labor organizations with whom it has collective bargaining agreements who are <u>not</u> signatories to the Arizona Plan or who are signatories thereto but with respect to trades for which no specific commitments to goals of minority manpower utilization are set forth in the Arizona Plan are as follows: _____

_____

_____;

(d) the following is a full list of all present construction work or contracts (both federal and non-federal) to which it is a party in any capacity in the area of jurisdiction of the Phoenix Building and Construction Trades Council: _____

_____

_____;

(e) it will comply, and require its subcontractors to comply, with all of the terms of the Arizona Plan on all work (both federal and non-federal) in the area described in the preceding paragraph (d) hereof, in any trade as set forth in paragraph (b) hereof for which it or its subcontractors are committed to the Arizona Plan, and will be bound by the provisions of Part II of these Bid Conditions on all work in such area, for all other trades as set forth in paragraph (c) hereof; and (f) in the event the bidder is no longer participating in an affirmative action plan acceptable to the Director of the Office of Federal Contract Compliance, including the Arizona Plan, or it or the union with whom it maintains a collective bargaining agreement ceases to be a participating signatory to the Arizona Plan, the bidder will comply with Part II of these Bid Conditions.

_____

(Signature of authorized representative of bidder.)

1. Are not or hereafter cease to be signatories to the Arizona Plan referred to in Part 1 hereof;

2. Are signatories to the Arizona Plan but are not parties to collective bargaining agreements;

3. Are signatories to the Arizona Plan but are parties to collective bargaining agreements with labor organizations who are not or hereafter cease to be signatories to the Arizona Plan;

4. Are signatories to the Arizona Plan but as to which no specific commitment to goals of minority manpower utilization by labor organization have been executed pursuant to the Arizona Plan; or

5. Are no longer participating in an affirmative action plan acceptable to the Director, OFCC, including the Arizona Plan.

B. Requirement -- An Affirmative Action Plan. The bidders, contractors and subcontractors described in paragraphs 1 through 5 above will not be eligible for award of a contract under this Invitation for Bids, unless it has submitted as part of its bid, and has had approved by the Flood Control District a written affirmative action plan, embodying both (1) goals and timetables of minority manpower utilization, 1/ and (2) specific affirmative action steps directed at increasing minority manpower utilization by means of applying good faith efforts to carrying out such steps or is deemed to have submitted such a program pursuant to Section 3 of this Part II. Both the goals and timetables, and the affirmative action steps must meet the requirements of this Part II as set forth below for all trades which are to be utilized on the project, whether subcontracted or not.

1. Goals and Timetables. The plan must set forth goals of minority manpower utilization for the bidder and all contractors and subcontractors for those trades not otherwise bound by the provisions of Part I hereof in terms of manhours, within at least the following ranges, for the following time periods, for each trade which will be used on the project within the area of jurisdiction of the Phoenix Building and Construction Trades Council (hereinafter referred to as the Phoenix area).

1/ "Minority" is defined as including Negroes, Spanish Surnamed Americans, Orientals and American Indians.

The bidder shall cause the following certification to be included in all bid invitations to prospective subcontractors, regardless of whether they are signatories to the Arizona Plan and regardless of tier; and shall cause the following certification, as executed, to be made a part of all subcontracts, regardless of tier:

_____ certifies that
(Name of Subcontractor)
it understands the equal employment opportunity requirements of the Arizona Plan regarding equal employment opportunity in the construction industry in the area of jurisdiction of the Phoenix Building and Construction Trades Council; that it either individually or through an association and the labor organizations with whom it has collective bargaining agreements are signatories and agree to comply with the Arizona Plan and there are set forth in the Arizona Plan specific commitments to goals of minority manpower utilization as to such trades or if such is not the case it agrees to comply with the requirements of Part II of the Bid Conditions; that in the event the subcontractor is no longer participating in an affirmative action plan acceptable to the Director of the Office of Federal Contract Compliance, including the Arizona Plan, the subcontractor will comply with Part II of these Bid Conditions; that it shall require the execution of this certification by any of its subcontractors, regardless of tier; and that this certification shall be a part of any subcontract.

_____
(Signature of authorized representative of subcontractor)

In order to ensure that the said subcontractor certification becomes a part of all subcontracts under the prime contract of a prime contractor with respect to whom this Part I is applicable, no subcontract shall be executed until an authorized representative of the Flood Control District has determined, in writing, that the said certification has been incorporated in such subcontract, regardless of tier. Any subcontract executed without such written approval shall be void.

Part II: A. Coverage. The provisions of this Part II shall be applicable to those bidders, contractors and subcontractors, who, in regard to such construction trades:

(See Over)

A contractor or subcontractor shall be deemed to be in compliance with the terms and requirements of this Part II by the employment and training of minorities in the appropriate percentage of his aggregate work force in the Phoenix area for each trade for which it is committed to a goal under this Part II.

However, no contractor or subcontractor shall be found to be in noncompliance solely on account of its failure to meet its goals within its timetables, but such contractor shall be given the opportunity to demonstrate that it has instituted all of the specific affirmative action steps specified in this Part II and has made every good faith effort to make these steps work toward the attainment of its goals within its timetables, all to the purpose of expanding minority manpower utilization on all of its projects in the Phoenix area.

In all cases, the compliance of a bidder, contractor or subcontractor will be determined in accordance with its respective obligations under the terms of these Bid Conditions. Therefore, contractors or subcontractors who are governed by the provisions of this Part II shall be subject to the requirements of that Part regardless of the obligations of its prime contractor or lower tier subcontractors.

All bidders and all contractors and subcontractors performing or to perform work on projects subject to these Bid Conditions hereby agree to inform their subcontractors of their respective obligations under the terms and requirements of these Bid Conditions, including the provisions relating to goals of minority employment and training.

2. Specific Affirmative Action Steps. The plans for the bidders, contractors and subcontractors must set forth specific affirmative action steps directed at increasing minority manpower utilization, which steps must be at least as extensive and as specific as the following:

a. The contractor shall notify community organizations that the contractor has employment opportunities available and shall maintain records of the organizations' responses.

b. The contractor shall maintain a file of the names and addresses of each minority worker referred to him and what action was taken with respect to each such referred worker, and if the worker was not employed, the reasons therefor. If such worker was not sent to the

Until 11/30/71	5.0% - 10.0%
From 12/1/71 Until 11/30/72	10.0% - 15.0%
From 12/1/72 Until 11/30/73	15.0% - 20.0%
From 12/1/73 Until 11/30/74	20.0% - 25.0%
From 12/1/74 Until 11/30/75	25.0% - 30.0%

In the event that under a contract which is subject to these Bid Conditions any work is performed in a year later than the latest year for which acceptable ranges of minority manpower utilization have been determined herein, the ranges for 1974-1975 shall be applicable to such work.

The percentages of minority manpower utilization above are expressed in terms of manhours of training and employment as a proportion of the total manhours to be worked by the bidder's, contractor's and subcontractor's entire work force in that trade on all projects (both federal and non-federal) in the Phoenix area during the performance of its contract or subcontract. The manhours for minority work and training must be substantially uniform throughout the length of the contract, on all projects and for each of the trades. Further, the transfer of minority employees or trainees from employer-to-employer or from project-to-project for the sole purpose of meeting the contractor's or subcontractor's goal shall be a violation of these conditions.

In reaching the goals of minority manpower utilization required of bidders, contractors and subcontractors pursuant to this Part II, every effort shall be made to find and employ qualified journeymen. However, where minority journeymen are not available, minority trainees in pre-apprenticeship, apprenticeship, journeyman training or other training programs may be used.

In order that the nonworking training hours of trainees may be counted in meeting the goal, such trainees must be employed by the contractor during the training period, the contractor must have made a commitment to employ the trainees at the completion of their training and the trainees must be trained pursuant to established training programs which must be the equivalent of the training programs now or hereafter provided for in the Arizona Plan with respect to the nature, extent and duration of training offered.

(See Over)

l. The contractor shall continually inventory and evaluate all minority personnel for promotion opportunities and encourage minority employees to seek such opportunities.

m. The contractor shall make sure that seniority practices, job classifications, etc., do not have a discriminatory effect.

n. The contractor shall make certain that all facilities and company activities are non-segregated.

o. The contractor shall continually monitor all personnel activities to ensure that his EEO policy is being carried out.

p. The contractor shall solicit bids for subcontracts from available minority subcontractors engaged in the trades covered by these Bid Conditions, including circulation to minority contractor associations.

3. Contractors and Subcontractors Deemed to be Bound by Part II. In the event a contractor or subcontractor, who is at the time of bidding eligible under Part I of these Bid Conditions, is no longer participating in an affirmative action plan acceptable to the Director of the Office of Federal Contract Compliance, including the Arizona Plan, he shall be deemed to be committed to Part II of these Bid Conditions. Further, whenever a contractor or subcontractor, who at the time of bidding is eligible under Part II of these Bid Conditions, uses trades not contemplated at the time he submits his bid, he shall be committed to Part II for those trades. Whenever a contractor or subcontractor is deemed to be committed to Part II of these Bid Conditions, he shall be considered to be committed to a manpower utilization goal of the minimum percentage range for that trade for the appropriate year.

4. Subsequent Signatory to the Arizona Plan. Any contractor or subcontractor subject to the requirements of this Part II for any trade at the time of the submission of his bid who together with the labor organization with whom it has a collective bargaining agreement subsequently becomes a signatory to the Arizona Plan, either individually or through an association, may meet its requirements under these Bid Conditions for such trade, if such contractor or subcontractor executes and submits the appropriate certification required by Part I of these Bid Conditions. No contractor or subcontractor shall be deemed to be

union hiring hall for referral or if such worker was not employed by the contractor, the contractor's file shall document this and the reasons therefor.

c. The contractor shall promptly notify the Flood Control District when the union or unions with whom the contractor has a collective bargaining agreement has not referred to the contractor a minority worker sent by the contractor or the contractor has other information that the union referral process has impeded him in his efforts to meet his goal.

d. The contractor shall participate in training programs in the area, especially those funded by the Department of Labor.

e. The contractor shall disseminate his EEO policy within his own organization by including it in any policy manual; by publicizing it in company newspapers, annual reports, etc.; by conducting staff, employee and union representatives' meetings to explain and discuss the policy; by posting of the policy; and by specific review of the policy with minority employees.

f. The contractor shall disseminate his EEO policy externally by informing and discussing it with all recruitment sources; by advertising in news media, specifically including minority news media; and by notifying and discussing it with all subcontractors and suppliers.

g. The contractor shall make specific and constant personal (both written and oral) recruitment efforts directed at all minority organizations, schools with minority students, minority recruitment organizations and minority training organizations, within the contractor's recruitment area.

h. The contractor shall make specific efforts to encourage present minority employees to recruit their friends and relatives.

i. The contractor shall validate all man specifications, selection requirements, tests, etc.

j. The contractor shall make every effort to promote after-school, summer and vacation employment to minority youth.

k. The contractor shall develop on-the-job training opportunities and participate and assist in any association or employer-group training programs relevant to the contractor's employee needs consistent with its obligations under this Part II.

(See Over)

construction contracts pursuant to the Executive Order. The bidder, contractor or subcontractor shall carry out such sanctions and penalties for violation of the equal opportunity clause including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered by the administering agency, the contracting agency or the Office of Federal Contract Compliance pursuant to the Executive Order. Any bidder, or contractor or subcontractor who shall fail to carry out such sanctions and penalties shall be deemed to be in noncompliance with these Bid Conditions and Executive Order 11246.

Nothing herein is intended to relieve any contractor or subcontractor during the term of its contract on this project from compliance with Executive Order 11246 and the Equal Employment Opportunity Clause of its contract, with respect to matters not covered in the Arizona Plan or in Part II of these Bid Conditions.

Violation of any substantial requirement in the Arizona Plan by a contractor or subcontractor covered by Part I of these Bid Conditions including the failure of such contractor or subcontractor to make a good faith effort to meet its fair share of the trade's goals of minority manpower utilization, or of the terms of the Affirmative Action Plan by a contractor or subcontractor who is covered by Part II hereof shall be deemed to be noncompliance by such contractor or subcontractor with the Equal Opportunity Clause of the contract, and shall be grounds for imposition of the sanctions and penalties provided at Section 209(a) of Executive Order 11246.

Each agency shall review its contractors' and subcontractors' employment practices during the performance of the contract. If the agency determines that the Arizona Plan no longer represents effective affirmative action, it shall so notify the Office of Federal Contract Compliance which shall be solely responsible for any final determination of that question and the consequences thereof.

In regard to Part II of these conditions if the contractor or subcontractor meets its goals or if the contractor or subcontractor can demonstrate that it has made every good faith effort to meet these goals, the contractor or subcontractor shall be presumed to be in compliance with Executive Order 11246, the implementing regulations and its obligations

subject to the requirements of Part I until such certification is executed and submitted.

5. Non-discrimination. In no event may a contractor or subcontractor utilize the goals, timetables or affirmative action steps required by this Part II in such a manner as to cause or result in discrimination against any person on account of race, color, religion, sex or national origin.

6. Contractors and Subcontractors Bound. The affirmative action plan required by Part II shall be deemed a part of the resulting contract specifications. A successful bidder as to whom Part II is applicable, shall cause the affirmative action plan as established and approved, to be a part of all subcontracts, where necessary, regardless of tier, under his contract. No subcontract shall be executed until an authorized representative of the Flood Control District has determined, in writing, that such subcontractor has executed the certification required by Part I hereof, or that the affirmative action plan required by Part II, as applicable, has been incorporated into such subcontract, regardless of tier. Any subcontract executed without such written approval shall be void.

Part III: Materiality and Responsiveness

Any equal employment opportunity submission required to be made by the prospective contractor pursuant either to Part I or Part II of these Bid Conditions which is material and which will govern the contractor's performance on the project shall be made a part of his bid. Failure to submit a Part I certification or a Part II affirmative action plan, as applicable, will render the bid nonresponsive.

Part IV: Compliance and Enforcement

Contractors are responsible for informing their subcontractors (regardless of tier) as to their respective obligations under Parts I and II hereof (as applicable). Bidders, contractors and subcontractors hereby agree to refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who is determined not to be a "responsible" bidder for, Government contracts and federally assisted

(See Over)

under these Bid Conditions and no formal sanctions or proceedings leading toward sanctions shall be instituted unless the agency otherwise determines that the contractor or subcontractor is not providing equal employment opportunities. In judging whether a contractor or subcontractor has met its goals, the agency will consider each contractor's or subcontractor's minority manpower utilization and will not take into consideration the minority manpower utilization of its subcontractors. Where the agency finds that the contractor or subcontractor has failed to comply with the requirements of Executive Order 11246, the implementing regulations and its obligations under these Bid Conditions, the agency shall take such action and impose such sanctions as may be appropriate under the Executive Order and the regulations. When the agency proceeds with such formal action it has the burden of proving that the contractor has not met the requirements of these Bid Conditions, but the contractor's failure to meet his goals shall shift to him the requirement to come forward with evidence to show that he has met the "good faith" requirements of these Bid Conditions by instituting at least the Specific Affirmative Action steps listed above and by making every good faith effort to make those steps work toward the attainment of its goals within its timetables. The pendency of such formal proceedings shall be taken into consideration by Federal agencies in determining whether such contractor or subcontractor can comply with the requirements of Executive Order 11246 and is therefore a "responsible prospective contractor" within the meaning of the Federal procurement regulations.

It shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.

The procedures set forth in these conditions shall not apply to any contract when the head of the contracting or administering agency determines that such contract is essential to the national security and that its award without following such procedures is necessary to the national security. Upon making such a determination, the agency head will notify, in writing, the Director of the Office of Federal Contract Compliance within thirty days.

(See Over)

Requests for exemptions from these Bid Conditions must be made in writing, with justification, to the Director, Office of Federal Contract Compliance, U. S. Department of Labor, Washington, D.C. 20210, and shall be forwarded through and with the endorsement of the agency head.

Contractors and subcontractors must keep such records and file such reports relating to the provisions of these Bid Conditions as shall be required by the contracting or administering agency or the Office of Federal Contract Compliance.

For the information of bidders, a copy of the Arizona Plan may be obtained from the contracting officer.

SCS-AS-85
Rev. 2-71

APPLICABILITY OF THE EQUAL OPPORTUNITY CLAUSE

Equal Opportunity (Federally Assisted Construction) is applicable in any contract which exceeds $10,000 and any contract for less than $10,000 which is later increased by modification to more than $10,000.

EQUAL OPPORTUNITY (FEDERALLY ASSISTED CONSTRUCTION)

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

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

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

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

4. The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

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

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

7. The Contractor will include this Equal Opportunity (Federally Assisted Construction) clause in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

SCS-AS-818
Rev. 4-70
File Code AS-14

CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to federally assisted construction contracts and related subcontracts exceeding $10,000 which are not exempt from the Equal Opportunity clause.)

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

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

_____
Contractor

_____
Signature

_____
Title Date

UNITED STATES DEPARTMENT OF AGRICULTURE

INSTRUCTIONS TO CONTRACTORS

FOR COMPLIANCE WITH EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS UNDER EXECUTIVE ORDER 11246 AND EXECUTIVE ORDER 11375 FOR FEDERAL PROCUREMENT OF CONSTRUCTION, PERSONAL PROPERTY, NONPERSONAL SERVICES, AND FEDERALLY-ASSISTED CONSTRUCTION.

Your obligation under the Equal Opportunity clause of Executive Order 11246, as amended by Executive Order 11375, is to take affirmative action in providing equal employment opportunity. Reviews made by this Department as the Equal Employment Opportunity Compliance Agency for your Company or by the Office of Federal Contract Compliance, U. S. Department of Labor, may disclose the need for special commitments on your part to achieve equal employment opportunity compliance. Their proper discharge will be essential to performance of your contract.

As a minimum, your obligations under the Equal Opportunity clause of your contract requires you to observe the following:

1. NOTICE. The notice "Equal Employment Opportunity is the Law" is to be displayed in conspicuous places, available to all employees and applicants for employment. It must be similarly displayed by you in the performance of your contract. The notice is available from the contracting officer.

2. EQUAL OPPORTUNITY POLICY. Your equal employment opportunity policy is to be put in writing and communicated to all employees, offices, plants or other facilities. It is most important that this policy be fully understood by supervisory personnel and effectively implemented.

3. NOTICE TO LABOR UNIONS AND OTHER ORGANIZATIONS OF WORKERS. The requirement in paragraph (c) of the Equal Opportunity clause that you will send a notice to each labor union or representative of workers with which you have a collective bargaining agreement or other contract or understanding, will be satisfied whenever you or your subcontractors post a copy of the notice "Equal Employment Opportunity is the Law" in conspicuous places.

4. CERTIFICATE OF NON-SEGREGATED FACILITIES. If your contract exceeds $10,000 you must certify that you do not maintain or allow in a workplace under your control employee facilities which are segregated on basis of race, color, religion, or national origin, whether by directive or through custom.

5. INCLUSION OF EQUAL OPPORTUNITY CLAUSE IN SUBCONTRACTS. If your contract is in excess of $10,000 you are required to include the Equal Opportunity clause in subcontracts and purchase orders in excess of $10,000. If the subcontract is less than $50,000 the clause may be incorporated by reference.

6. APPLICATION FORMS. Application forms used in employment must not request or record information which can be used to identify an applicant's race, color, religion, sex, or national origin.

7. AFFIRMATIVE ACTION PLAN. The Equal Opportunity clause of your contract obligates you to take affirmative action to assure applicants and employees that there will be no discrimination on account of race, color, religion, sex, or national origin. Guidelines for the requirements of this plan are contained on the reverse side of this form. The plan must be updated annually.

8. REPORTS. If you employ 100 or more persons you are required to file annually, on or before the 31st day of March, complete and accurate reports on Standard Form 100 - (EEO - 1). A prime contractor is responsible for seeing that his non-exempt first tier subcontractors file the report and each prime subcontractor shall cause its subcontractors to file the report.

UNITED STATES DEPARTMENT OF AGRICULTURE

CONTRACTOR'S AFFIRMATIVE ACTION PLAN FOR EQUAL EMPLOYMENT OPPORTUNITY UNDER EXECUTIVE ORDER 11246 AND EXECUTIVE ORDER 11375 FOR FEDERAL PROCUREMENT OF CONSTRUCTION, PERSONAL PROPERTY, NONPERSONAL SERVICES, AND FEDERALLY-ASSISTED CONSTRUCTION

Employers of more than 50 persons who hold Government Contracts or subcontracts of $50,000 or more are required to have at each installation, within 120 days from the commencement of a contract, a written program (hereinafter referred to as the "plan") of affirmative action to assure that all employment and the conditions of employment at each installation are free of discrimination on account of race, color, religion, sex or national origin. Detailed requirements with which the contractor must comply are stated in Title 41, Code of Federal Regulations, Part 60, sections 2, 3, and 20. The plan must provide for the following actions:

1. Analyze all major job classifications to determine if minorities or women are currently being underutilized in any one or more job classifications (job "classification" meaning one or a group of jobs having similar content, wage rates and opportunities). "Underutilization" is defined as having fewer minorities or women in a particular job classification than would reasonably be expected by their availability. Separate work force analysis shall be made for minorities and women.

2. Establish specific goals and timetables to correct any deficiencies and record progress toward these goals.

3. Identify and analyze, by job classification, minority and female components of the labor pool available to the contractor facility. Sources of information are local Boards of Trade, Chamber of Commerce, U. S. Employment Service, minority and female group leaders, school authorities, vocational services, and women's organizations.

4. Require all personnel actions to be in accord with the plan.

5. Inform all employees and job applicants of the companies' equal employment opportunity policy.

6. Assure that personnel policies and practices are in compliance with the Sex Discrimination Guidelines (41 CFR Part 60-20).

7. Support local and national community service programs (e.g., programs of National Alliance of Businessmen, Urban Coalition and other organizations concerned with employment opportunities for minorities and women).

8. Whenever tests are used as a basis for making a decision to hire, promote, transfer, train, or to retain employees, insure that the test fairly predicts whether the applicant can perform the job for which tested and does not result in rejection for reasons unrelated to his capability to do the job. Additional detailed information concerning the use of tests and other selection procedures can be found in Title 41, Code of Federal Regulations, Part 60-3.

9. All solicitations for applicants shall include the phrase, "an equal opportunity employer." Advertisements shall be placed so as to reach all population elements in the community.

Form AD-425 (1-72)
AGPR (41 CFR) 4-12.810

SCS-158
Rev. 12-64

BID BOND (See Instructions on reverse)	Date Bond Executed (Must not be later than bid opening date)
Principal (Legal name and business address)	Type of Organization ("X" one) ☐ Individual ☐ Partnership ☐ Joint Venture ☐ Corporation State of Incorporation
Surety(ies) (Name and business address)	

Penal Sum of Bond					Bid Identification	
Percent of Bid Price	Amount not to exceed				Bid Date	Invitation No.
	Million(s)	Thousand(s)	Hundred(s)	Cents	7/8/74	FCD-74-2
					For (Construction, Supplies or Services)	

KNOW ALL MEN BY THESE PRESENTS, That we, the Principal and Surety(ies) hereto, are firmly bound to the _____, hereinafter called the Contracting
(Name of Contracting Local Organization)
Local Organization, in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally: Provided, That where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the bid identified above.

NOW, THEREFORE, if the Principal, upon acceptance by the Contracting Local Organization of his bid identified above, within the period specified therein for acceptance (sixty (60) days if no period is specified), shall execute such further contractual documents, if any, and give such bond(s) as may be required by the terms of the bid as accepted within the time specified (ten (10) days if no period is specified) after receipt of the forms by him, or in the event of failure so to execute such further contractual documents and give such bonds, if the Principal shall pay the Contracting Local Organization for any cost of procuring the work which exceeds the amount of his bid, then the above obligation shall be void and of no effect.

Each Surety executing this instrument hereby agrees that its obligation shall not be impaired by any extension(s) of the time for acceptance of the bid that the Principal may grant to the Contracting Local Organization, notice of which extension(s) to the Surety(ies) being hereby waived; provided that such waiver of notice shall apply only with respect to extensions aggregating not more than sixty (60) calendar days in addition to the period originally allowed for acceptance of the bid.

IN WITNESS WHEREOF, the Principal and Surety(ies) have executed this bid bond and have affixed their seals on the date set forth above.

Principal		
Signature(s)	1. (Seal)	2. (Seal)
Name(s) & Title(s) (Typed)	1.	2.

Corporate Surety(ies)				
SURETY A	Name & Address		State of Inc.	Liability Limit
	Signature(s)	1. (Seal)	2. (Seal)	
	Name(s) & Title(s) (Typed)	1.	2.	
SURETY B	Name & Address		State of Inc.	Liability Limit
	Signature(s)	1. (Seal)	2. (Seal)	
	Name(s) & Title(s) (Typed)	1.	2.	
SURETY C	Name & Address		State of Inc.	Liability Limit
	Signature(s)	1. (Seal)	2. (Seal)	
	Name(s) & Title(s) (Typed)	1.	2.	
SURETY D	Name(s) & Address		State of Inc.	Liability Limit
	Signature(s)	1. (Seal)	2. (Seal)	
	Name(s) & Title(s) (Typed)	1.	2.	
SURETY E	Name(s) & Address		State of Inc.	Liability Limit
	Signature(s)	1. (Seal)	2. (Seal)	
	Name(s) & Title(s) (Typed)	1.	2.	

INSTRUCTIONS

1. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of this form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved, evidence of his authority must be furnished.

2. The penal sum of the bond may be expressed as a percentage of the bid price if desired. In such cases, a *maximum* dollar limitation may be stipulated (e.g., 20% of the bid price but the amount not to exceed _____ dollars).

3. The name of each person signing this bid bond should be typed in the space provided.

4. The person signing the bond for the surety must submit evidence of his authority to act for the surety.

5. The corporate surety must be approved by the state in which the services or supplies are to be delivered or in which construction is to be performed.

CONSTRUCTION SPECIFICATION

2. CLEARING AND GRUBBING

1. SCOPE

The work shall consist of the clearing and grubbing of designated areas by removal and disposal of trees, snags, logs, stumps, shrubs and rubbish.

2. MARKING

The limits of the areas to be cleared and grubbed will be marked by means of stakes, flags, tree markings or other suitable methods. Trees to be left standing and uninjured will be designated by special markings placed on the trunks at a height of about six feet above the ground surface.

3. REMOVAL

All trees not marked for preservation and all snags, logs, brush, stumps, shrubs and rubbish shall be removed from within the limits of the marked areas. Unless otherwise specified, all stumps, roots and root clusters having a diameter of one inch or larger shall be grubbed out to a depth of at least two feet below subgrade elevation for concrete structures and one foot below the ground surface at embankment sites and other designated areas.

4. DISPOSAL

Unless otherwise specified, all materials removed from the cleared and grubbed areas shall be burned or buried at locations approved by the Engineer or otherwise disposed of as approved by the Engineer.

5. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, the cleared and grubbed areas will be measured to the nearest 0.1 acre. Payment for clearing and grubbing will be made at the contract unit price and shall constitute full compensation for all labor, equipment, tools and all other items necessary and incidental to the completion of the work.

(Method 2) For items of work for which specific unit prices are established in the contract, each tree, stump and snag having a diameter of 4 inches or greater and each log having a diameter of 4 inches or greater and a length of 10 feet or greater will be measured prior to removal. The size of each tree and snag will be determined by measuring its trunk at breast height above the natural ground surface. The size of each log will be determined by measuring the butt and by measuring its length from butt to tip. The size of each stump will be measured at the top. Diameter shall be determined by dividing the measured circumference by 3.14.

Payment for clearing and disposal of each tree, stump and snag having a diameter of 4 inches or greater and each log having a diameter of 4 inches or greater and a length of 10 feet or greater will be made at the contract unit price for its size designation as determined by the following schedule:

Measured Diameter	Size Designation
4 inches to 8 inches	6-inch size
Over 8 inches to 12 inches	10-inch size
Over 12 inches to 24 inches	18-inch size
Over 24 inches to 36 inches	30-inch size
Over 36 inches to 60 inches	48-inch size
Over 60 inches	60-inch size

The sum of such payments shall constitute full compensation for all labor, equipment, tools and all other items necessary and incidental to the work of completely clearing and grubbing the designated areas, including clearing, grubbing and disposal of smaller trees, stumps, snags and logs and brush, shrubs, roots and rubbish.

(Method 3) For items of work for which specific lump sum prices are established in the contract, payment for clearing and grubbing will be made at the contract lump sum price. Such payment shall constitute full compensation for all labor, equipment, tools and all other items necessary and incidental to completion of the work.

(Use with all Methods) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 6 of this specification.

6. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 1, Clearing and Grubbing

(1) This item shall consist of the clearing and grubbing for the following items as shown on the drawings and as staked in the field:

(a) North Dam No. 1, North Dam No. 2, East Dam and their appurtenances.

(b) The diversion channels, grader ditches, and dikes.

(c) The emergency spillway, outlet channel and baffle chute.

(d) The outlet conduit and its appurtenances.

(e) The borrow area.

(2) All waste material that is disposed of by burying shall be covered by a minimum of 18 inches of soil. After disposal, the waste areas shall be graded to blend into the surrounding terrain.

(3) If materials removed from the cleared and grubbed areas are to be burned, burning must be carried out in accordance with Maricopa County Health Department regulations.

(4) Measurement and payment will be by Method 1.

CONSTRUCTION SPECIFICATION

3. STRUCTURE REMOVAL

1. SCOPE

The work shall consist of the removal, salvage and disposal of structures (including fences) from the designated areas.

2. MARKING

(Method 1) Each structure unit to be removed will be marked by means of stakes, flags, painted markers or other suitable methods.

(Method 2) The limits of the areas from which structures must be removed will be marked by means of stakes, flags or other suitable methods. Structures to be preserved in place or salvaged will be designated by special markings.

3. REMOVAL

(Method 1) All structures designated in the contract for removal shall be removed to the specified extent and depth.

(Method 2) Within the areas so marked all visible structures and attachments and all buried structures located and identified by survey stakes shall be removed to the specified extent and depth.

4. SALVAGE

Structures that are designated to be salvaged shall be carefully removed and neatly placed in the specified storage areas. Salvaged structures that are capable of being disassembled shall be dismantled into individual members or sections. Such structures shall be neatly matchmarked with paint prior to disassembly. All pins, nuts, bolts, washers, plates and other loose parts shall be marked or tagged to indicate their proper locations in the structure and shall be fastened to the appropriate structural member or packed in suitable containers. Materials from fences designated to be salvaged shall be placed outside the work area on the property from which they were removed. Wire shall be rolled into uniform rolls of convenient size. Posts and rails shall be neatly piled.

5. DISPOSAL OF REFUSE MATERIALS

Unless otherwise specified, refuse materials resulting from structure removal shall be burned or buried at locations approved by the Engineer or otherwise disposed of as specified or as approved by the Engineer.

6. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, payment for the removal of each structure unit, except fences, will be made at the contract unit price. Fences removed or removed and salvaged will be measured to the nearest linear foot. Payment for fence removal or removal and salvage will be made at the contract unit prices appropriate to each type and size of fence. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

(Method 2) For items of work for which specific lump sum prices are established in the contract, payment for structure removal will be made at the contract lump sum price. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

(Use with Either Method) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Subsidiary Item, Structure Removal

(1) This item shall consist of the removal of the two-inch diameter waterline in the reservoir area and the fences that are within the rights-of-way limits of the outlet conduit at Sta. 21+00±, Sta. 21+40±, Sta. 60+95±, to Sta. 61+20± and any others that hinder the construction, or as directed by the Engineer.

(2) In Section 2, Marking, Method 2 shall apply.

(3) In Section 3, Removal, Method 2 shall apply.

(4) The excavation required to complete this work will be considered as part of the excavation required to complete Bid Items 5 and 8 as appropriate.

(5) The pipe and fences shall be placed within the rights-of-way at locations designated by the Engineer.

(6) No separate payment will be made for structure removal. Compensation for this work will be included in the payment for Bid Item 1, Clearing and Grubbing.

CONSTRUCTION SPECIFICATION

8. MOBILIZATION

1. SCOPE

The work shall consist of the mobilization of the Contractor's forces and equipment necessary for performing the work required under the contract.

It shall include the purchase of contract bonds; transportation of personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary facilities at the site; and other preparatory work at the site.

It shall not include mobilization for any specific item of work for which payment for mobilization is provided elsewhere in the contract.

The specification covers mobilization for work required by the contract at the time of award. If additional mobilization costs are incurred during performance of the contract as a result of change or added items of work for which the Contractor is entitled to an adjustment in contract price, compensation for such costs will be included in the price adjustment for the items of work changed or added.

2. PAYMENT

Payment will be made as the work proceeds, after presentation of invoices by the Contractor showing his own mobilization costs and evidence of the charges of suppliers, subcontractors, and others for mobilization work performed by them. If the total of such payments is less than the contract lump sum for mobilization, the unpaid balance will be included in the final contract payment. Total payment will be the lump sum contract price for mobilization, regardless of actual cost to the Contractor.

Payment will not be made under this item for the purchase costs of materials having a residual value, the purchase costs of materials to be incorporated in the project, or the purchase costs of operating supplies.

Payment of the lump sum contract price for mobilization will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 3 of this specification.

3. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 2, Mobilization

(1) This item shall consist of the mobilization of the Contractor's forces and equipment, as defined in Section 1, that are required to construct the project as specified.

(2) There are no additional construction details.

(3) Payment will be made in accordance with Section 2.

CONSTRUCTION SPECIFICATION

11. REMOVAL OF WATER

1. SCOPE

The work shall consist of the removal of surface water and ground water as needed to perform the required construction in accordance with the specifications. It shall include (1) building and maintaining all necessary temporary impounding works, channels, and diversions, (2) furnishing, installing and operating all necessary pumps, piping and other facilities and equipment, and (3) removing all such temporary works and equipment after they have served their purposes.

2. DIVERTING SURFACE WATER

The Contractor shall build, maintain, and operate all cofferdams, channels, flumes, sumps, and other temporary diversion and protective works needed to divert streamflow and other surface water through or around the construction site and away from the construction work while construction is in progress. Unless otherwise specified, a diversion must discharge into the same natural drainageway in which its headworks are located.

Unless otherwise specified, the Contractor shall furnish to the Engineer, in writing, his plan for diverting surface water before beginning the construction work for which the diversion is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

3. DEWATERING THE CONSTRUCTION SITE

Foundations, cutoff trenches and other parts of the construction site shall be dewatered and kept free of standing water or excessively muddy conditions as needed for proper execution of the construction work. The Contractor shall furnish, install, operate and maintain all drains, sumps, pumps, and other equipment needed to perform the dewatering as specified. Dewatering methods that cause a loss of fines from foundation areas will not be permitted.

Unless otherwise specified, the Contractor shall furnish to the Engineer, in writing, his plan for dewatering before beginning the construction work for which the dewatering is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

4. DEWATERING BORROW AREAS

Unless otherwise specified in Section 7, the Contractor shall maintain the borrow areas in drainable condition or otherwise provide for timely and effective removal of surface waters that accumulate, for any reason, within the borrow areas.

5. REMOVAL OF TEMPORARY WORKS

After the temporary works have served their purposes, the Contractor shall remove them or level and grade them to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

Except as otherwise specified, pipes and casings shall be removed from temporary wells and the wells shall be filled to ground level with gravel or other material approved by the Engineer.

6. MEASUREMENT AND PAYMENT

For items of work for which specific lump sum prices are established in the contract, payment for diverting surface water, dewatering construction sites, and dewatering borrow areas will be made at the contract lump sum prices. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Subsidiary Item, Removal of Water

(1) This item shall consist of the removal of surface and ground water from the construction area as shown on the drawings.

(2) In Section 2, Diverting Surface Water, and Section 3, Dewatering the Construction Site, no written plan for accomplishing the work will be required.

(3) No separate payment will be made for the removal of water. Compensation for this work will be included in the payment for Bid Items 3-8.

CONSTRUCTION SPECIFICATION

21. EXCAVATION

1. SCOPE

The work shall consist of the excavation required by the drawings and specifications and disposal of the excavated materials.

2. CLASSIFICATION

Excavation will be classified as common excavation or rock excavation in accordance with the following definitions or will be designated as unclassified.

Common excavation shall be defined as the excavation of all materials that can be excavated, transported, and unloaded by the use of heavy ripping equipment and wheel tractor-scrapers with pusher tractors or that can be excavated and dumped into place or loaded onto hauling equipment by means of excavators having a rated capacity of one cubic yard and equipped with attachments (such as shovel, bucket, backhoe, dragline or clam shell) appropriate to the character of the materials and the site conditions.

Rock excavation shall be defined as the excavation of all hard, compacted or cemented materials the accomplishment of which requires blasting or the use of excavators larger than defined for common excavation. The excavation and removal of isolated boulders or rock fragments larger than one cubic yard in volume encountered in materials otherwise conforming to the definition of common excavation shall be classified as rock excavation.

Excavation will be classified according to the above definitions by the Engineer, based on his judgment of the character of the materials and the site conditions.

The presence of isolated boulders or rock fragments larger than one cubic yard in size will not in itself be sufficient cause to change the classification of the surrounding material.

For the purpose of this classification, the following definitions shall apply:

Heavy ripping equipment shall be defined as a rear-mounted, heavy duty, single-tooth, ripping attachment mounted on a tractor having a power rating of 200-300 net horsepower (at the flywheel).

Wheel tractor-scraper shall be defined as a self-loading (not elevating) and unloading scraper having a struck bowl capacity of 12-20 yards.

Pusher tractor shall be defined as a track type tractor having a power rating of 200-300 net horsepower (at the flywheel) equipped with appropriate attachements.

3. UNCLASSIFIED EXCAVATION

Items designated as "Unclassified Excavation" shall include all materials encountered regardless of their nature or the manner in which they are removed. When excavation is unclassified, none of the definitions or classifications stated in Section 2 of this specification shall apply.

4. BLASTING

The transportation, handling, storage, and use of dynamite and other explosives shall be directed and supervised by a person of proven experience and ability in blasting operations.

Blasting shall be done in such a way as to prevent damage to the work or unnecessary fracturing of the foundation and shall conform to any special requirements in Section 12 of this specification.

5. USE OF EXCAVATED MATERIALS

(Method 1) To the extent they are needed, all suitable materials from the specified excavations shall be used in the construction of required permanent earth fill or rock fill. The suitability of materials for specific purposes will be determined by the Engineer. The Contractor shall not waste or otherwise dispose of suitable excavated materials.

(Method 2) Suitable materials from the specified excavations may be used in the construction of required earth fill or rock fill. The suitability of materials for specific purposes will be determined by the Engineer.

6. DISPOSAL OF WASTE MATERIALS

(Method 1) All surplus or unsuitable excavated materials will be designated as waste and shall be disposed of at the locations shown on the drawings.

(Method 2) All surplus or unsuitable excavated materials will be designated as waste and shall be disposed of by the Contractor at sites of his own choosing away from the site of the work.

7. BRACING AND SHORING

Excavated surfaces too steep to be safe and stable if unsupported shall be supported as necessary to safeguard the work and workmen, to prevent sliding or settling of the adjacent ground, and to avoid damaging existing improvements. The width of the excavation shall be increased if necessary to provide space for sheeting, bracing, shoring, and other supporting installations. The Contractor shall furnish, place and subsequently remove such supporting installations.

8. STRUCTURE AND TRENCH EXCAVATION

Structure or trench excavation shall be completed to the specified elevations and to sufficient length and width to include allowance for forms, bracing and supports, as necessary, before any concrete or earth fill is placed or any piles are driven within the limits of the excavation.

9. BORROW EXCAVATION

When the quantities of suitable materials obtained from specified excavations are insufficient to construct the specified fills, additional materials shall be obtained from the designated borrow areas. The extent and depth of borrow pits within the limits of the designated borrow areas shall be as directed by the Engineer.

Borrow pits shall be excavated and finally dressed in a manner to eliminate steep or unstable side slopes or other hazardous or unsightly conditions.

10. OVEREXCAVATION

Excavation in rock beyond the specified lines and grades shall be corrected by filling the resulting voids with portland cement concrete made of materials and mix proportions approved by the Engineer. Concrete that will be exposed to the atmosphere when

construction is completed shall contain not less than 6 sacks of cement per cubic yard of concrete. Concrete that will be permanently covered shall contain not less than 4½ sacks of cement per cubic yard. The concrete shall be placed and cured as specified by the Engineer.

Excavation in earth beyond the specified lines and grades shall be corrected by filling the resulting voids with approved compacted earth fill, except that, if the earth is to become the subgrade for riprap, rock fill, sand or gravel bedding, or drain fill, the voids may be filled with material conforming to the specifications for the riprap, rock fill, bedding or drain fill.

11. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the volume of each type and class of excavation within the specified pay limits will be measured and computed to the nearest cubic yard by the method of average cross-sectional end areas. Regardless of quantities excavated, the measurement for payment will be made to the specified pay limits, except that excavation outside the specified lines and grades directed by the Engineer to remove unsuitable material will be included, but only to the extent that the unsuitable condition is not a result of the Contractor's operations.

(Method 1) The pay limits shall be as designated on the drawings.

(Method 2) The pay limits shall be defined as follows:

a. The upper limit shall be the original ground surface as it existed prior to the start of construction operations except that where excavation is performed within areas designated for previous excavation or fill the upper limit shall be modified ground surface resulting from the specified previous excavation or fill.

b. The lower and lateral limits shall be the neat lines and grades shown on the drawings.

(Method 3) The pay limits shall be defined as follows:

a. The upper limit shall be the original ground surface as it existed prior to the start of construction operations except that where excavation is performed within areas designated

for previous excavation or fill the upper limit shall be the modified ground surface resulting from the specified previous excavation or fill.

b. The lower and lateral limits shall be the true surface of the completed excavation as authorized by the Engineer.

(Method 4) The pay limits shall be defined as follows:

a. The upper limit shall be the original ground surface as it existed prior to the start of construction operations except that where excavation is performed within areas designated for previous excavation or fill the upper limit shall be the modified ground surface resulting from the specified previous excavation or fill.

b. The lower limit shall be at the bottom surface of the proposed structure.

c. The lateral limits shall be 18 inches outside of the outside surfaces of the proposed structure or shall be vertical planes 18 inches outside of and parallel to the footings, whichever gives the larger pay quantity, except as provided in d, below.

d. For trapezoidal channel linings or similar structures that are to be supported upon the sides of the excavation without intervening forms, the lateral limits shall be at the under side of the proposed lining or structure.

e. For the purpose of the definitions in b, c, and d, above, any specified bedding or drain fill directly beneath or beside the structure will be considered to be a part of the structure.

(Use with all Methods) Payment for each type and class of excavation will be made at the contract unit price for that type and class of excavation. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to the performance of the work, except that extra payment for backfilling required overexcavation will be made in accordance with the following provisions:

a. Payment for backfilling overexcavation, as specified in Section 10 of this specification, will be made only if the excavation outside specified lines and grades is directed by the Engineer to remove unsuitable material and if the unsuitable condition is not a result of the Contractor's operations.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 12 of this specification.

12. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 3, Channel Excavation, Common

(1) This item shall consist of all common excavation required to construct the diversion channel and grader ditch along the East Dam between Sta. 13+11± and Sta. 22+21± and between Sta. 23+57± and Sta. 38+00± as shown on sheets 4 and 6 of the drawings, the diversion channel around the west side of the borrow excavation area between Sta. 1+90± and Sta. 9+70± as shown on sheets 4, 5, and 7 of the drawings and the outlet channel between Sta. 11+54± and Sta. 14+00± as shown on sheets 4 and 9 of the drawings.

(2) In Section 5, Use of Excavated Materials, Method 1 shall apply.

(3) In Section 6, Disposal of Waste Materials, Method 1 shall apply.

(4) Measurement and payment will be by Method 2.

b. Bid Item 4, Emergency Spillway Excavation, Unclassified

(1) This item shall consist of all excavation required to construct the emergency spillway between Sta. 9+34± and Sta. 11+35± to the lines and grades shown on the drawings.

(2) In Section 5, Use of Excavated Materials, Method 1 shall apply.

(3) In Section 6, Disposal of Waste Materials, Method 1 shall apply.

(4) Measurement and payment will be by Method 2.

c. Bid Item 5, Cutoff Trench Excavation, Unclassified

(1) This item shall consist of all excavation required to construct the cutoff trenches required for the following:

(a) The East Dam between Sta. 37+40± and Sta. 55+60± as shown on sheets 4 and 5 of the drawings.

(b) The North Dam No. 1 between Sta. 0+60± and Sta. 44+20± as shown on sheets 4 and 5 of the drawings.

(c) The North Dam No. 2 between Sta. 10+80± and Sta. 17+15± as shown on sheets 4 and 5 of the drawings.

(2) The approximate depths of the excavation are shown on the drawings. Final depths will be determined by the Engineer after examining the materials encountered.

(3) In Section 5, Use of Excavated Materials, Method 1 shall apply.

(4) In Section 6, Disposal of Waste Material, Method 1 shall apply.

(5) Measurement and payment will be by Method 3.

d. Bid Item 6, Foundation Excavation, Common

(1) This item shall consist of all common excavation required to remove all surface and unconsolidated or unsuitable materials from the foundation area of the East Dam, North Dam No. 1 and North Dam No. 2 to the lines and grades shown on the drawings.

(2) The depths of excavation shown on the drawings are approximate. Final depths will be determined by the Engineer after examining the materials encountered.

(3) In Section 5, Use of Excavated Materials, Method 1 shall apply.

(4) In Section 6, Disposal of Waste Material, Method 1 shall apply.

(5) Measurement and payment will be by Method 3.

e. Bid Item 7, Pipe Trench Excavation, Common

(1) This item shall consist of all common excavation required for the installation of the 24-inch diameter outlet conduit between Sta. 14+08± and Sta. 30+70± and between Sta. 31+05± and Sta. 61+04± and the 30-inch diameter outlet conduit between Sta. 61+04± and Sta. 67+21± as shown on the drawings.

(2) In Section 5, Use of Excavated Materials, Method 1 shall apply.

(3) In Section 6, Disposal of Waste Materials, Method 1 shall apply.

(4) Where the trench excavation is in the paved section of any street, alley or driveway, the pavement shall be cut in such a manner that the pavement adjacent to the excavation limits is not disturbed. No ripping or rooting will be permitted in these areas. All of the pavement and unsuitable materials excavated from these areas shall be removed from the job site immediately and will not be permitted in the backfill.

(5) The maximum amount of open trench that will be allowed at any given time is 600 feet, unless proof of prior approval by the Engineer can be shown.

(6) Measurement and payment will be by Method 1.

f. Bid Item 8, Structure Excavation, Unclassified

(1) This item shall consist of all excavation required for the installation of the following:

(a) The principal spillway between Sta. 9+20± and Sta. 11+55±, including the inlet structure, concrete cradle, cutoff collars and outlet structure, to the lines and grades shown on sheet 14 of the drawings.

(b) The baffle chute between Sta. 38+00 and Sta. 38+37.75 centerline channel to the lines and grades shown on sheets 24 and 25 of the drawings.

(c) The inlet and outlet structures for the outlet conduit between Sta. 14+00 and Sta. 14+09 and between Sta. 67+21 and Sta. 67+28 as shown on sheets 26 and 28 of the drawings.

(2) In Section 5, Use of Excavated Materials, Method 1 shall apply.

(3) In Section 6, Disposal of Waste Materials, Method 1 shall apply.

(4) Measurement and payment will be by Method 4.

g. Subsidiary Item, Borrow Excavation

(1) This item shall consist of all common excavation required to obtain fill material not available from the required excavations to complete the construction of the permanent works.

(2) In Section 5, Use of Excavated Materials, Method 1 shall apply.

(3) In Section 6, Disposal of Waste Materials, Method 1 shall apply.

(4) The borrow area shall be graded to permit unrestricted flow from the baffle chute at Sta. 38+00 centerline channel and the diversion channel at Sta. 1+89 to the principal spillway through North Dam No. 2. Estimated lines and grades are shown on the drawings. The final lines and grades will be as directed by the Engineer. All final slopes shall not be steeper than 2 horizontal to 1 vertical.

(5) No separate payment will be made for borrow excavation. Compensation will be included in the payment for Bid Item 9.

CONSTRUCTION SPECIFICATION

23. EARTH FILL

1. SCOPE

The work shall consist of the construction of earth embankments and other earth fills required by the drawings and specifications.

2. MATERIALS

All fill materials shall be obtained from required excavations and designated borrow areas. The selection, blending, routing and disposition of materials in the various fills shall be subject to approval by the Engineer.

Fill materials shall contain no sod, brush, roots or other perishable materials. Rock particles larger than the maximum size specified for each type of fill shall be removed prior to compaction of the fill.

The types of materials used in the various fills shall be as listed and described in the specifications and drawings.

3. FOUNDATION PREPARATION

Foundations for earth fill shall be stripped to remove vegetation and other unsuitable materials or shall be excavated as specified.

Except as otherwise specified, earth foundation surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill or otherwise acceptably scored and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the earth fill, and the surface materials of the foundation shall be compacted and bonded with the first layer of earth fill as specified for subsequent layers of earth fill.

Earth abutment surfaces shall be free of loose, uncompacted earth in excess of two inches in depth normal to the slope and shall be at such a moisture content that the earth fill can be compacted against them to effect a good bond between the fill and the abutments.

Rock foundation and abutment surfaces shall be cleared of all loose materials by hand or other effective means and shall be

free of standing water when fill is placed upon them. Occasional rock outcrops in earth foundations for earth fill, except in dams and other structures designed to restrain the movement of water, shall not require special treatment if they do not interfere with compaction of the foundation and initial layers of the fill or the bond between the foundation and the fill.

Foundation and abutment surfaces shall be not steeper than 1 horizontal to 1 vertical unless otherwise specified. Test pits or other cavities shall be filled with compacted earth fill conforming to the specifications for the earth fill to be placed upon the foundation.

4. PLACEMENT

Fill shall not be placed until the required excavation and foundation preparation have been completed and the foundation has been inspected and approved by the Engineer. Fill shall not be placed upon a frozen surface, nor shall snow, ice, or frozen material be incorporated in the fill.

Fill shall be placed in approximately horizontal layers. The thickness of each layer before compaction shall not exceed the maximum thickness specified. Materials placed by dumping in piles or windrows shall be spread uniformly to not more than the specified thickness before being compacted. Hand compacted fill, including fill compacted by manually directed power tampers, shall be placed in layers whose thickness before compaction does not exceed the maximum thickness specified for layers of fill compacted by manually directed power tampers.

Adjacent to structures, fill shall be placed in a manner which will prevent damage to the structures and will allow the structures to assume the loads from the fill gradually and uniformly. The height of the fill adjacent to a structure shall be increased at approximately the same rate on all sides of the structure.

Earth fill in dams, levees and other structures designed to restrain the movement of water shall be placed so as to meet the following additional requirements:

a. The distribution of materials throughout each zone shall be essentially uniform, and the fill shall be free from lenses, pockets, streaks or layers of material differing substantially in texture or gradation from the surrounding material.

b. If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed.

c. The top surfaces of embankments shall be maintained approximately level during construction, except that a crown or cross-slope of not less than 2 percent shall be maintained to insure effective drainage, and except as otherwise specified for drain fill zones. If the drawings or specifications require or the Engineer directs that fill be placed at a higher level in one part of an embankment than another, the top surface of each part shall be maintained as specified above.

d. Dam embankments shall be constructed in continuous layers from abutment to abutment except where openings to facilitate construction or to allow the passage of stream flow during construction are specifically authorized in the contract.

e. Embankments built at different levels as described under c or d above shall be constructed so that the slope of the bonding surfaces between embankment in place and embankment to be placed is not steeper than 3 feet horizontal to 1 foot vertical. The bonding surface of the embankment in place shall be stripped of all loose material, and shall be scarified, moistened and recompacted when the new fill is placed against it as needed to insure a good bond with the new fill and to obtain the specified moisture content and density in the junction of the in place and new fill.

5. CONTROL OF MOISTURE CONTENT

During placement and compaction of fill, the moisture content of the materials being placed shall be maintained within the specified range.

The application of water to the fill materials shall be accomplished at the borrow areas insofar as practicable. Water may be applied by sprinkling the materials after placement on the fill, if necessary. Uniform moisture distribution shall be obtained by discing, blading or other approved methods prior to compaction of the layer.

Material that is too wet when deposited on the fill shall either be removed or be dried to the specified moisture content prior to compaction.

If the top surface of the preceding layer of compacted fill or a foundation or abutment surface in the zone of contact with the fill becomes too dry to permit suitable bond it shall be scarified and moistened by sprinkling to an acceptable moisture content prior to placement of the next layer of fill.

6. COMPACTION

Earth fill shall be compacted according to the following requirements for the class of compaction specified:

Class A compaction. Each layer of fill shall be compacted as necessary to make the density of the fill matrix not less than the minimum density specified. The fill matrix is defined as the portion of the fill material finer than the maximum particle size used in the compaction test method specified.

Class B compaction. Each layer of fill shall be compacted to a mass density not less than the minimum density specified.

Class C compaction. Each layer of fill shall be compacted by the specified number of passes of the type and weight of roller or other equipment specified, or by an approved equivalent method. Each pass shall consist of at least one passage of the roller wheel or drum over the entire surface of the layer.

Fill adjacent to structures shall be compacted to a density equivalent to that of the surrounding fill by means of hand tamping if permitted by the Contracting Officer, or manually directed power tampers or plate vibrators. Heavy equipment shall not be operated within 2 feet of any structure. Vibrating rollers shall not be operated within 5 feet of any structure. Compaction by means of drop weights operating from a crane or hoist will not be permitted.

The passage of heavy equipment will not be allowed: (1) over cast-in-place conduits prior to 14 days after placement of the concrete; (2) over cradled precast conduits prior to 7 days after placement of the concrete cradle; or (3) over any type of conduit until the backfill has been placed above the top surface of the structure to a height equal to one-half the clear span width of the structure or pipe or 2 feet, whichever is greater.

Compacting of fill adjacent to structures shall not be started until the concrete has attained the strength specified in Section 10 for this purpose. The strength will be determined by compression testing of test cylinders cast by the Engineer for this purpose and cured at the work site in the manner specified in ASTM Method C 31 for determining when a structure may be put into service.

When the required strength of the concrete is not specified as described above, compaction of fill adjacent to structures shall not be started until the following time intervals have elapsed after placement of the concrete.

Structure	Time Interval
Retaining walls and counterforts	14 days
Walls backfilled on both sides simultaneously	7 days
Conduits and spillway risers, cast-in-place (with inside forms in place)	7 days
Conduits and spillway risers, cast-in-place (inside forms removed)	14 days
Conduits, precast, cradled	2 days
Conduits, precast, bedded	1 day
Antiseep collars and cantilever outlet bents	3 days

7. REMOVAL AND PLACEMENT OF DEFECTIVE FILL

Fill placed at densities lower than the specified minimum density or at moisture contents outside the specified acceptable range of moisture content or otherwise not conforming to the requirements of the specifications shall be reworked to meet the requirements or removed and replaced by acceptable fill. The replacement fill and the foundation, abutment and fill surfaces upon which it is placed shall conform to all requirements of this specification for foundation preparation, approval, placement, moisture control and compaction.

8. TESTING

During the course of the work, the Engineer will perform such tests as are required to identify materials, to determine compaction characteristics, to determine moisture content, and to determine density of fill in place. These tests performed by the Engineer will be used to verify that the fills conform to the requirements of the specifications. Such tests are not intended to provide the Contractor with the information required by him for the proper execution of the work and their performance shall not relieve the Contractor of the necessity to perform tests for that purpose.

Densities of fill requiring Class A compaction will be determined by the Engineer in accordance with ASTM Method D 1556 (or by equivalent methods), except that the volume and moist weight of included rock particles larger than those used in the compaction test method specified for the type of fill will be determined and deducted from the volume and moist weight of the total sample prior to computation of density. The density so computed will be used to determine the percent compaction of the fill matrix.

9. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the volume of each type and compaction class of earth fill within the specified zone boundaries and pay limits will be measured and computed to the nearest cubic yard by the method of average cross-sectional end areas. Unless otherwise specified, no deduction in volume will be made for embedded conduits and appurtenances.

The pay limits shall be as defined below, with the further provision that earth fill required to fill voids resulting from overexcavation of the foundation, outside the specified lines and grades, will be included in the measurement for payment only where such overexcavation is directed by the Engineer to remove unsuitable material and where the unsuitable condition is not a result of the Contractor's operations.

(Method 1) The pay limits shall be as designated on the drawings.

(Method 2) The pay limits shall be the measured surface of the foundation when approved for placement of the fill and the specified neat lines of the fill surface.

(Method 3) The pay limits shall be the measured surface of the foundation when approved for placement of the fill and the measured surface of the completed fill.

(Method 4) The pay limits shall be the specified pay limits for excavation and the specified neat lines of the fill surface.

(Method 5) The pay limits shall be the specified pay limits for excavation and the measured surface of the completed fill.

(Use method 6 or 7 with all methods 1 through 5)

(Method 6) Payment for each type and compaction class of earth fill will be made at the contract unit price for that type and compaction class of fill. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the performance of the work.

(Method 7) Payment for each type and compaction class of earth fill will be made at the contract unit price for that type and compaction class of fill. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the performance of the work, except furnishing, transporting, and applying water to the foundation and fill materials.

Water applied to the foundation and fill materials will be measured and payment will be made as specified in Construction Specification 10.

(Use with All Methods) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 10 of this specification.

10. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 9, Earth Fill, Class A

(1) This item shall consist of placing and compacting the earth fill required to construct the following permanent works as shown on the drawings:

(a) The East Dam, including the banquettes.

(b) The East and West Dikes adjacent to the baffle chute.

(c) North Dam No. 2, access road and outlet channel.

(d) North Dam No. 1

(e) The diversion dike on the west side of the borrow area.

(2) Material for the earth fill shall be suitable silty sands and sandy silts obtained from the borrow area and from the required excavations.

(3) Compaction shall be Class A. The fill matrix shall be compacted to at least 95 percent of the maximum dry density obtained in compaction tests of the fill materials performed by Method A, ASTM D 698.

(4) The fill shall be placed in layers not exceeding eight inches in thickness before compaction. The maximum size of rock fragments incorporated in the fill shall be six inches.

(5) The moisture content of the fill matrix at the time of compaction shall be maintained within the range of three percentage points below to two percentage points above optimum moisture content.

(6) In Section 4, Placement, sectional construction will be permitted on the East Dam and diversion dikes.

(7) Measurement and payment will be by Methods 2 and 6.

b. Bid Item 10, Pipe Backfill, Class I

(1) This item shall consist of placing and compacting the materials required to backfill the outlet conduit, including manholes, between Sta. 33+50 and Sta. 67+21.

(2) Backfill material shall be suitable silty sands and sandy silts obtained from the borrow area or from the required excavations.

(3) All backfill placed in the pipe trenches that have been excavated in or across paved streets, alleys or driveways under the jurisdiction of the City of Tempe shall meet the requirements of their Specification No. 9, "Pavement and Surfacing Replacement."

(4) Compaction shall be by hand operated mechanical tampers. The fill matrix shall be compacted to at least 95 percent of the maximum dry density obtained in compaction tests of the fill materials performed by Method A, ASTM D 698.

(5) The maximum size of rock fragments to be incorporated in the backfill shall not exceed two (2) inches.

(6) The backfill material shall be placed in layers not exceeding six (6) inches before compaction and shall be placed by hand shoveling or other approved methods to the elevation two (2) feet above the top of the pipe. The remaining backfill required to reach the finished elevation may be placed by equipment.

(7) The moisture content of the fill matrix at the time of compaction shall be maintained within the range of three percentage points below to two percentage points above optimum moisture content.

(8) Measurement and payment will be by Methods 1 and 6. Such payment shall include the cost of replacing road surfaces and the Western canal lining that have been excavated and shall exclude the volume occupied by the pipe.

c. Bid Item 11, Pipe Backfill, Class II

(1) This item shall consist of placing and compacting the materials required to backfill the outlet conduit, including manholes, between Sta. 14+09 and Sta. 30+70 and between Sta. 31+05 and Sta. 33+50.

(2) Backfill material shall be suitable silty sands and sandy silts obtained from the borrow area or from the required excavations.

(3) Compaction shall be by hand operated mechanical tampers. The fill matrix shall be compacted to at least 90 percent of the maximum dry density obtained in compaction tests of the fill materials performed by Method A, ASTM D 698.

(4) The maximum size of rock fragments to be incorporated in the backfill shall not exceed two (2) inches.

(5) The fill material shall be placed in layers not exceeding six (6) inches before compaction and shall be placed by hand shoveling or other approved methods to the elevation two (2) feet above the top of the pipe. The remaining backfill required to reach the finished elevation may be placed by equipment.

(6) The moisture content of the fill matrix at the time of compaction shall be maintained within the range of three percentage points below to two percentage points above optimum moisture content.

(7) Measurement and payment will be by Methods 1 and 6. Such payment shall exclude the volume that is occupied by the pipe.

d. Bid Item 12, Structure Backfill

(1) This item shall consist of the placement and compaction of the earth fill required for the principal spillway conduit including the inlet and outlet structures, cutoff collars, gate stem pedestals, the inlet and outlet structures for the outlet conduit and the baffle chute.

(2) Backfill material shall be suitable silty sands and sandy silts obtained from the required excavation or from the borrow area.

(3) Compaction shall be Class A. The fill matrix shall be compacted to at least 95 percent of the maximum dry density obtained in the compaction tests of the fill materials performed by Method A, ASTM D 698.

(4) The maximum size of rock fragments to be incorporated in the backfill shall not exceed two (2) inches.

(5) The moisture content of the fill matrix at the time of compaction shall be maintained within the range of three percentage points below to two percentage points above optimum moisture content.

(6) The thickness of each layer of fill material shall not exceed six (6) inches before compaction.

(7) Measurement and payment will be by Methods 1, 4 and 6, as applicable. Such payments will not include the volume occupied by the conduit and structures.

e. Subsidiary Item, Waste Fill

(1) This item shall consist of the disposal of excess or unsuitable materials from the required excavations as shown on the drawings or staked in the field.

(2) No compaction will be required.

(3) The fill shall be placed in the areas shown on the drawings or as directed by the Engineer.

(4) Before the job is completed, all waste areas will be graded so as to blend in with the surrounding area and allow good drainage of the area.

(5) No separate payment will be made for waste fill. Compensation will be included in the payment for Bid Items 3-8.

CONSTRUCTION SPECIFICATION

31. CONCRETE

1. SCOPE

The work shall consist of furnishing, forming, placing, finishing and curing portland cement concrete as required to build the structures named in Section 26 of this specification.

2. MATERIALS

Portland cement shall conform to the requirements of Material Specification 531 for the specified type. One brand only of any type of cement shall be used in any single structure as defined in Section 26.

Aggregates shall conform to the requirements of Material Specification 522 unless otherwise specified. The grading of coarse aggregates shall be as specified in Section 26.

Water used in mixing or curing concrete shall be clean and free from injurious amounts of oil, salt, acid, alkali, organic matter or other deleterious substances.

Air-entraining admixtures shall conform to the requirements of Material Specification 532. If air-entraining cement is used, any additional air-entraining admixture shall be of the same type as that in the cement.

Water-reducing, set-retarding admixtures shall conform to the requirements of Material Specification 533.

Shear plates shall conform to the requirements of Material Specification 581 for structural quality or commercial or merchant quality steel. Structural quality shall be used if specifically designated in the drawings or specifications.

Preformed expansion joint filler shall conform to the requirements of Material Specification 535.

Waterstops shall conform to the requirements of Material Specifications 537 and 538 for the specified kinds.

Curing compound shall conform to the requirements of Material Specification 534.

3. CLASSES OF CONCRETE

(Method 1)

Concrete shall be classified according to the required compressive strength. The strength of the concrete at 28 days shall equal or exceed the Minimum Compressive Strength tabulated below for the class of concrete specified.

Class of Concrete	Minimum Compressive Strength at 28 days (psi)
5000	5000
4000	4000
3000	3000
2500	2500

(Method 2)

Concrete shall be classified as follows:

Class of Concrete	Maximum Net Water Content (gallons/bag)	Minimum Cement Content (bags/cu. yd.)
5000X	5	7
4000X	6	6
3000X	7	5
2500X	8	4 1/2

4. AIR CONTENT AND CONSISTENCY

Unless otherwise specified the air content (by volume) of the concrete at the time of placement shall be:

Maximum Size Aggregate	Air Content (%)
3/8 inch to 1/2 inch	6 to 9
Over 1/2 inch to 1 inch	5 to 8
Over 1 inch to 2 1/2 inches	4 to 7

The consistency of the concrete shall be such as to allow it to be worked into place without segregation or excessive laitance. Unless otherwise specified, the slump shall be:

Type of Structure	Slump (inches)
Massive sections, pavements, footings	2 ± 1/2
Heavy beams, thick slabs, thick walls (over 12 in.)	3 ± 1/2
Columns, light beams, thin slabs, thin walls (12 in. or less)	4 ± 1

5. DESIGN OF THE CONCRETE MIX

(Method 1) (For use with Method 1 in Section 3.)

The Contractor will be responsible for the design of the concrete mixtures. At least 5 days prior to any placement of concrete he shall furnish the Contracting Officer a statement of the materials and mix proportions (including admixtures, if any) he intends to use for each specified class of concrete. The statement shall include evidence satisfactory to the Engineer that the materials and proportions selected will produce concrete of the quality, consistency and strength specified. The materials and proportions so stated shall constitute the "job mix." After a job mix has been designated, neither the source, character or grading of the aggregates nor the type or brand of cement or admixture shall be changed without prior notice to the Engineer.

When specified, a water-reducing, set-retarding admixture shall be used. When conditions are such that the temperature of the concrete at the time of placement is consistently above 75°F, a water-reducing, set-retarding admixture may be used, at the option of the Contractor. The cement content shall be same as that required in the mix without the admixture.

The use of calcium chloride or other accelerators or antifreeze compounds will not be allowed.

Before placing concrete containing a water-reducing, set-retarding admixture, the Contractor shall furnish test results to the Engineer showing that its performance in the job mix meets the requirements of Material Specification 533, Section 4.

(Method 2) (For use with Method 2 in Section 3.)

At least 35 days prior to any placement of concrete the Contractor shall inform the Contracting Officer in writing of the source and grading of aggregates and the brand and type of cement and the brand and type of admixture, if any, he proposes to use for each class of concrete, and shall furnish certifications or other

evidence satisfactory to the Engineer that the proposed materials meet the requirements of the specifications.

When acceptable sources, types and gradings of aggregates are designated in the contract, certifications for such aggregates will not be required.

Job mix proportions and batch weights will be determined by the Engineer. During the course of the work, the Engineer will adjust the job mix proportions and batch weights whenever necessary.

After the job mix has been designated, neither the source, character or grading of the aggregates nor the type or brand of cement or admixture shall be changed without prior notice to the Engineer.

If such changes are necessary, no concrete containing such new or altered materials shall be placed until the Engineer has designated a revised job mix.

When specified, a water reducing, set-retarding admixture shall be used. When conditions are such that the temperature of the concrete at the time of placement is consistently above 75°F, a water-reducing, set-retarding admixture may be used, at the option of the Contractor. The cement content shall be same as that required in the mix without the admixture.

The use of calcium chloride or other accelerators or antifreeze compounds will not be allowed.

When it is anticipated that a water-reducing, set-retarding admixture will be used, the Contractor shall furnish to the Engineer a sample of the admixture he proposes to use sufficient for the tests required by Material Specification 533, Section 4. Concrete containing the admixture shall not be placed until test results have been obtained showing that its performance in the job mix meets the requirements of Material Specification 533, Section 4.

6. INSPECTING AND TESTING

The following tests will be performed by the methods indicated:

Test	Method (ASTM Designation)
Sampling	C 172[1]
Slump Test	C 143[1]

Test	Method (ASTM Designation)
Air Content	C 231[1] or C 173[1]
Compression Test Specimens	C 31[1] or C 42
Compressive Strength	C 39[2] or C 42
Unit Weight	C 138

[1]Tests of a portion of a batch may be made on samples representative of that portion for any of the following purposes:

(1) Determining uniformity of the batch.

(2) Checking compliance with requirements for slump and air content when the batch is discharged over an extended period of time.

(3) Checking compliance of the concrete with the specifications when the whole amount being placed in a small structure, or a distinct portion of a larger structure, is less than full batch.

[2]For each strength test of specimens made according to ASTM Designation C 31, 3 standard test specimens shall be made. The test result shall be the average of the strengths of the 3 specimens, except that if one specimen in the test shows manifest evidence of improper sampling, molding or testing, it shall be discarded and the strengths of the remaining 2 specimens shall be averaged. Should more than one specimen representing a test show such defects, the entire test shall be discarded.

The Engineer shall have free entry to the plant and equipment furnishing concrete under the contract. Proper facilities shall be provided for the Engineer to inspect materials, equipment and processes and to obtain samples of the concrete. All tests and inspections will be conducted so as not to interfere unnecessarily with the manufacture and delivery of the concrete.

7. HANDLING AND MEASUREMENT OF MATERIALS

Aggregates shall be stored or stockpiled in such a manner that separation of coarse and fine particles of each size will be avoided and that various sizes will not become intermixed before proportioning. Methods of handling and transporting aggregates shall be such as to avoid contamination, excessive breakage, segregation or degradation, or intermingling of various sizes.

Scales for weighing aggregates and cement shall be beam type or springless dial type. They shall be accurate within 1 percent under operating conditions. All exposed fulcrums, clevises and similar working parts of scales shall be kept clean.

The quantities of cement and aggregates in each batch of concrete, as indicated by the scales, shall be within the following percentages of the required batch weights:

Cement - plus or minus 1.0 percent

Aggregates - plus or minus 2.0 percent

Measuring tanks for mixing water shall be of adequate capacity to furnish the maximum amount of mixing water required per batch and shall be equipped with outside taps and valves to provide for checking their calibration unless other means are provided for readily and accurately determining the amount of water in the tank.

Cement shall be measured by weight or in bags of 94 lbs. each. When cement is measured by weight, it shall be weighed on a scale separate from that used for other materials, and in a hopper entirely free and independent of the hopper used for weighing the aggregates. When cement is measured in bags, no fraction of a bag shall be used unless weighed.

Aggregates shall be measured by weight. Mix proportions shall be based on saturated, surface-dry weights. The batch weight of each aggregate shall be the required saturated, surface-dry weight plus the weight of surface moisture it contains.

Mixing water shall consist of water added to the batch, ice added to the batch, water occurring as surface moisture on the aggregates and water introduced in the form of admixtures. The added water shall be measured by weight or volume to an accuracy of 1 percent of the required total mixing water. Added ice shall be measured by weight. Wash water shall not be used as a portion of the mixing water for succeeding batches.

Dry admixtures shall be measured by weight, and paste or liquid admixtures by weight or volume, within a limit of accuracy of 3 percent.

8. MIXERS AND MIXING

Concrete may be furnished by batch mixing at the site of the work or by ready-mix methods.

Mixers shall be capable of thoroughly mixing the concrete ingredients into a uniform mass within the specified mixing time and

of discharging the mix without segregation. Each mixer or agitator shall bear a manufacturer's rating plate indicating the rated capacity and recommended speeds of rotation, and shall be operated in accordance with these recommendations.

Concrete shall be uniform and thoroughly mixed when delivered to the work. Variations in slump of more than 1 inch within a batch will be considered evidence of inadequate mixing and shall be corrected by changing batching procedures, increasing mixing time, changing mixers or other means. Mixing time shall be within the limits specified below unless the Contractor demonstrates by mixer performance tests that adequate uniformity is obtained by different times of mixing. For this purpose the testing program and uniformity requirements shall be as set forth in ASTM Designation C 94.

No mixing water in excess of the amount called for by the job mix shall be added to the concrete during mixing or hauling or after arrival at the delivery point.

Batch mixing at the site. For concrete mixed at the site of the work with paving mixers or stationary construction mixers, the time of mixing after all cement and aggregates are in the mixer drum shall be not less than 1-1/2 minutes.

The batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates and all mixing water shall be introduced into the drum before one-fourth of the mixing time has elapsed.

Controls shall be provided to insure that the batch cannot be discharged until the required mixing time has elapsed.

If truck mixers are used, the requirements below for truck mixers and truck-mixed concrete shall apply.

Ready-mixed concrete. Ready-mixed concrete shall be mixed and delivered to the site of the work by one of the following methods:

a. Truck-mixed concrete--Mixed completely in a truck mixer.

b. Shrink-mixed concrete--Mixed partially in a stationary mixer, and the mixing completed in a truck mixer.

c. Central-mixed concrete--Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in a truck agitator or in a truck mixer operating at agitating speed or in nonagitating equipment.

Truck mixers and agitators shall be equipped with revolution counters by which the number of revolutions of the drum or blades may be readily verified.

When ready-mixed concrete is furnished, the Contractor shall furnish the Engineer a statement-of-delivery ticket showing the time of loading, the revolution counter reading at the time of loading and the quantities of materials used for each load of concrete.

Truck-mixed concrete. When concrete is mixed in a truck mixer loaded to its maximum capacity, the number of revolutions of the drum or blades at mixing speed shall be not less than 70 nor more than 100. If the batch is at least 1/2 cubic yard less than maximum capacity, the number of revolutions at mixing speed may be reduced to not less than 50. Mixing in excess of 100 revolutions shall be at the speed designated by the manufacturer of the equipment as agitating speed. The mixing operation shall begin within 30 minutes after the cement has been added to the aggregates and the water shall be added during mixing. When mixing is begun during or immediately after charging, a portion of the mixing water shall be added ahead of, or with, the other ingredients.

Shrink-mixed concrete. When concrete is partially mixed at a central plant and the mixing is completed in a truck mixer, the mixing time in the central plant mixer shall be the minimum required to intermingle the ingredients and shall be not less than 30 seconds. The mixing shall be completed in a truck mixer and the number of revolutions of the drum or blades at mixing speed shall be not less than 50 nor more than 100. Mixing in excess of 100 revolutions shall be at the speed designated by the manufacturer of the equipment as agitating speed.

Central-mixed concrete. For central-mixed concrete, mixing in the stationary mixer shall meet the same requirements as batching mixing at the site.

When an agitator, or truck mixer used as an agitator, transports concrete that has been completely mixed in a stationary mixer, mixing during transportation shall be at the speed designated by the manufacturer of the equipment as agitating speed.

The use of nonagitating equipment to transport concrete to the site of the work will be permitted only if the consistency and uniformity of the concrete as discharged

at the point of delivery meet the requirements of this specification. Bodies of nonagitating hauling equipment shall be so constructed that leakage of the concrete mix, or any part thereof, will not occur. Concrete hauled in open-top vehicles shall be protected against access of rain, and against exposure to the sun of more than 20 minutes when the air temperature is above 75° F.

9. FORMS

Forms shall be of wood, plywood, steel or other approved material and shall be mortar tight. The forms and associated falsework shall be substantial and unyielding and shall be constructed so that the finished concrete will conform to the specified dimensions and contours. Form surfaces shall be smooth and free from holes, dents, sags or other irregularities. Forms shall be coated with a nonstaining form oil before being set into place.

Metal ties or anchorages within the forms shall be equipped with cones, she-bolts or other devices that permit their removal to a depth of at least one inch without injury to the concrete. Ties designed to break off below the surface of the concrete shall not be used without cones.

All edges that will be exposed to view when the structure is completed shall be chamfered, unless finished with molding tools as specified in Section 20.

10. PREPARATION OF FORMS AND SUBGRADE

Prior to placement of concrete the forms and subgrade shall be free of chips, sawdust, debris, water, ice, snow, extraneous oil, mortar or other harmful substances or coatings. Any oil in the reinforcing steel or other surfaces required to be bonded to the concrete shall be removed. Rock surfaces shall be cleaned by air-water cutting, wet sandblasting or wire brush scrubbing, as necessary, and shall be wetted immediately prior to placement of concrete. Earth surfaces shall be firm and damp. Placement of concrete on mud, dried earth, uncompacted fill or frozen subgrade will not be permitted.

Unless otherwise specified, when concrete is to be placed over drain fill, the contact surface of the drain fill shall be covered with a layer of asphalt-impregnated building paper or polyvinyl sheeting prior to placement of the concrete. Forms for weepholes shall extend through this layer into the drain fill.

Items to be embedded in the concrete shall be positioned accurately and anchored firmly.

Weepholes in walls or slabs shall be formed with nonferrous materials.

11. CONVEYING

Concrete shall be delivered to the site and discharged into the forms within 1-1/2 hours after the introduction of the cement to the aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85° F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 45 minutes. The Engineer may allow a longer time, provided the setting time of the concrete is increased a corresponding amount by the addition of an approved set-retarding admixture. In any case, concrete shall be conveyed from the mixer to the forms as rapidly as practicable, by methods that will prevent segregation of the aggregates or loss of mortar. Concrete shall not be dropped more than 5 feet vertically unless suitable equipment is used to prevent segregation.

12. PLACING

Concrete shall not be placed until the subgrade, forms and steel reinforcement have been inspected and approved.

The Contractor shall have all equipment and materials required for curing available at the site ready for use before placement of concrete begins.

No concrete shall be placed except in the presence of the Engineer. The Contractor shall give reasonable notice to the Engineer each time he intends to place concrete. Such notice shall be far enough in advance to give the Engineer adequate time to inspect the subgrade, forms, steel reinforcement and other preparations for compliance with the specifications before concrete is delivered for placing.

The concrete shall be deposited as closely as possible to its final position in the forms and shall be worked into the corners and angles of the forms and around all reinforcement and embedded items in a manner to prevent segregation of aggregates or excessive laitance. The depositing of concrete shall be regulated so that the concrete may be consolidated with a minimum of lateral movement.

Internal stays and braces, serving temporarily to hold the forms in correct shape and alignment prior to placement of concrete at their locations, shall be removed when the concrete has been placed to an elevation such as to render their service unnecessary.

13. LAYERS

Unless otherwise specified, slab concrete shall be placed to design thickness in one continuous layer. Formed concrete shall be placed in horizontal layers not more than 20 inches thick. Hoppers and chutes, pipes or "elephant trunks" shall be used as necessary to prevent splashing of mortar on the forms and reinforcing steel above the layer being placed.

Successive layers shall be placed at a fast enough rate to prevent the formation of "cold joints." If the surface of a layer of concrete in place sets to the degree that it will not flow and merge with the succeeding layer when vibrated, the Contractor shall discontinue placing concrete and shall make a construction joint according to the procedure specified in Section 15.

If placing is discontinued when an incomplete layer is in place, the unfinished end of the layer shall be formed by a vertical bulkhead.

14. CONSOLIDATING

Unless otherwise specified, concrete shall be consolidated with internal type mechanical vibrators capable of transmitting vibration to the concrete at frequencies not less than 6000 impulses per minute.

The location, manner and duration of the application of the vibrators shall be such as to secure maximum consolidation of the concrete without causing segregation of the mortar and coarse aggregate, and without causing water or cement paste to flush to the surface.

The Contractor shall provide a sufficient number of vibrators to properly consolidate the concrete immediately after it is placed in the work. Vibration shall be applied in the freshly deposited concrete by slowly inserting and removing the vibrator at points uniformly spaced and not farther apart than twice the radius over which the vibration is visibly effective. The vibrator shall extend into the previously placed layer of fresh concrete, at all points, to insure effective bond between layers.

Vibration shall not be applied directly to the reinforcement steel or the forms nor to concrete that has hardened to the degree that it does not become plastic when vibrated.

The use of vibrators to transport concrete in the forms or conveying equipment will not be permitted.

Vibration shall be supplemented by spading and hand tamping as necessary to insure smooth and dense concrete along form surfaces, in corners and around embedded items.

15. CONSTRUCTION JOINTS

Construction joints shall be made at the locations shown on the drawings. If construction joints are needed which are not shown on the drawings, they shall be placed in locations approved by the Engineer.

Where a feather edge would be produced at a construction joint, as in the top surface of a sloping wall, an insert form shall be used so that the resulting edge thickness on either side of the joint is not less than 6 inches.

In walls and columns as each lift is completed, the top surfaces shall be immediately and carefully protected from any condition that might adversely affect the hardening of the concrete.

Steel tying and form construction adjacent tc concrete in place shall not be started until the concrete has cured at least 12 hours. Before new concrete is deposited on or against concrete that has hardened, the forms shall be retightened. New concrete shall not be placed until the hardened concrete has cured at least 12 hours.

(Method 1)

Surfaces of construction joints shall be cleaned of all unsatisfactory concrete, laitance, coatings, stains or debris by either wet sandblasting after the concrete has gained sufficient strength to resist excessive cutting, or air-water cutting as soon as the concrete has hardened sufficiently to prevent the jet from displacing the coarse aggregates, or both. The surface of the concrete in place shall be cut to expose clean, sound aggregate but not so deep as to undercut the edges of larger particles of the aggregate. After cutting, the surface shall be thoroughly washed to remove all loose material. If the surface is congested by reinforcing steel, is relatively inaccessible, or it is considered undesirable to disturb the concrete before it is hardened, cleaning of the joint by air-water jets will not be permitted and the wet sandblasting method will be required after the concrete has hardened.

(Method 2)

Surfaces of construction joints shall be cleaned of all unsatisfactory concrete, laitance, coatings, stains, or debris by washing and scrubbing with a wire brush or wire broom or by other means approved by the Engineer.

(Use with Either Method)

The surfaces shall be kept moist for at least one hour prior to placement of new concrete. The new concrete shall be placed directly on the cleaned and washed surface.

16. EXPANSION AND CONTRACTION JOINTS

Expansion and contraction joints shall be made only at locations shown on the drawings.

Exposed concrete edges at expansion and contraction joints shall be carefully tooled or chamfered, and the joints shall be free of mortar and concrete. Joint filler shall be left exposed for its full length with clean and true edges.

When open joints or weakened plane "dummy" joints are specified, the joints shall be constructed by the insertion and subsequent removal of a wood strip, metal plate or other suitable template in such a manner that the corners of the concrete will not be chipped or broken. The edges of the concrete at the joints shall be finished with an edging tool prior to removal of the joint strips.

Preformed expansion joint filler shall be held firmly in the correct position as the concrete is placed.

17. WATERSTOPS

Waterstops shall be held firmly in the correct position as the concrete is placed. Joints in metal waterstops shall be brazed or welded. Joints in rubber or plastic waterstops shall be cemented, welded or vulcanized as recommended by the manufacturer.

18. REMOVAL OF FORMS

Forms shall be removed only when the Engineer is present and shall not be removed without his approval. Forms shall be removed in such a way as to prevent damage to the concrete. Supports shall be removed in a manner that will permit the concrete to take the stresses due to its own weight uniformly and gradually.

(Method 1)

Forms shall not be removed sooner than the following minimum times after the concrete is placed. These periods represent cumulative number of days and fractions of days, not necessarily consecutive, during which the temperature of the air adjacent to the concrete is above 50°F.

Element	Time
Beams, arches - supporting forms and shoring	14 days
Conduits, deck slabs - supporting (inside) forms and shoring	7 days
Conduits (outside forms), sides of beams, small structures	24 hours
Columns, walls, spillway risers - with side or vertical load	7 days
Columns, walls, spillway risers - with no side or vertical load:	
Concrete supporting more than 30 feet of wall in place above it	7 days

Element	Time
Concrete supporting 20 to 30 feet of wall in place above it[1]	3 days
Concrete supporting not more than 20 feet in place about it[1]	24 hours

[1]Age of stripped concrete shall be at least 7 days before any load other than the weight of the column or wall itself is applied.

(Method 2)

Forms, supports and housings shall not be removed until the concrete has attained the strength specified in Section 26 for this purpose. The strength will be determined by compression testing of test cylinders cast by the Engineer for this purpose and cured at the work site in the manner specified in ASTM Method C 31 for determining form removal time.

19. FINISHING FORMED SURFACES

All concrete surfaces shall be true and even, and shall be free from open or rough spaces, depressions or projections.

Immediately after the removal of forms:

All bulges, fins, form marks or other irregularities which in the judgment of the Engineer will adversely affect the appearance or function of the structure shall be removed. All form bolts and ties shall be removed to a depth at least 1 inch below the surface of the concrete. The cavities produced by form ties and all other holes of similar size and depth shall be thoroughly cleaned and, after the interior surfaces have been kept continuously wet for at least 3 hours, shall be carefully packed with a dry patching mortar (preshrunk) mixed not richer than 1 part cement to 3 parts sand.

Holes left by form bolts or straps which pass through the wall shall be filled solid with mortar.

Patching mortar shall be thoroughly compacted into place to form a dense, well-bonded unit, and the in-place mortar shall be sound and free from shrinkage cracks.

All patched areas shall be cured as specified in Section 21.

20. FINISHING UNFORMED SURFACES

All exposed surfaces of the concrete shall be accurately screeded to grade and then float finished, unless specified otherwise.

Excessive floating or troweling while the concrete is soft will not be permitted.

The addition of dry cement or water to the surface of the screeded concrete to expedite finishing will not be allowed.

Joints and edges on unformed surfaces that will be exposed to view shall be chamfered or finished with molding tools.

21. CURING

Concrete shall be prevented from drying for a curing period of at least 7 days after it is placed. Exposed surfaces shall be kept continuously moist for the entire period or until curing compound is applied as specified below. Moisture shall be maintained by sprinkling, flooding or fog spraying, or by covering with continuously moistened canvas, cloth mats, straw, sand or other approved material. Wood forms (except plywood) left in place during the curing period shall be kept wet. Formed surfaces shall be thoroughly wetted immediately after forms are removed and shall be kept wet until patching and repairs are completed. Water or covering shall be applied in such a way that the concrete surface is not eroded or otherwise damaged.

Water for curing shall be clean and free from any substances that will cause discoloration of the concrete.

Except as otherwise specified in Section 24, and except for construction joint surfaces, concrete may be coated with curing compound in lieu of the continued application of moisture.

The compound shall be sprayed on the moist concrete surfaces as soon as free water has disappeared, but shall not be applied to any surface until patching, repairs and finishing of that surface are completed.

The curing compound shall be thoroughly mixed immediately before applying, and shall be applied at a uniform rate of not less than one gallon per 150 square feet of surface. It shall form a uniform, continuous, adherent film that shall not check, crack or peel, and shall be free from pin holes or other imperfections.

Curing compound shall not be applied to surfaces requiring bond with subsequently placed concrete, such as construction joints, shear plates, reinforcing steel and other embedded items.

Surfaces subjected to heavy rainfall or running water within 3 hours after the compound has been applied, or surfaces damaged by subsequent construction operations during the curing period shall be resprayed in the same manner as for the original application.

22. REMOVAL OR REPAIR

When concrete is honeycombed, damaged or otherwise defective, the Contractor shall remove and replace the structure or structural member containing the defective concrete, or correct or repair the defective parts. The Engineer will determine the required extent of removal, replacement or repair.

Prior to starting repair work the Contractor shall obtain the Engineer's approval of his plan for making the repair. Such approval shall not be considered a waiver of the Contracting Officer's right to require complete removal of defective work if the completed repair does not produce concrete of the required quality and appearance.

Repair work shall be performed only when the Engineer is present.

Repair of formed surfaces shall be started within 24 hours after removal of the forms.

Except as otherwise approved by the Engineer, the appropriate methods described in Chapter VII of the Concrete Manual, Bureau of Reclamation, U. S. Department of the Interior, shall be used. If approved in writing by the Contracting Officer, proprietary compounds for adhesion or as patching ingredients may be used. Such compounds shall be used in accordance with the manufacturer's recommendations.

Curing as specified in Section 21 shall be applied to repaired areas immediately after the repairs are completed.

23. CONCRETING IN COLD WEATHER

When the atmospheric temperature may be expected to drop below 40°F at the time concrete is delivered to the work site, during placement, or at any time during the curing period, the following provisions also shall apply:

a. The temperature of the concrete at time of placing shall not be less than 50°F nor more than 90°F. The temperature of neither aggregates nor mixing water shall be more than 100°F just prior to mixing with the cement.

b. When the daily minimum temperature is less than 40°F, concrete structures shall be insulated or housed and heated after placement. The temperature of the concrete and air adjacent to the concrete shall be maintained at not less than 50°F nor more than 90°F for the duration of the curing period.

c. Methods of insulating, housing and heating the structure shall conform to "Recommended Practice for Cold Weather Concreting," ACI Standard 306.

d. When dry heat is used to protect concrete, means of maintaining an ambient humidity of at least 40 percent shall be provided unless the concrete has been coated with curing compound as specified in Section 21 or is covered tightly with an approved impervious material.

24. CONCRETING IN HOT WEATHER

When climatic or other conditions are such that the temperature of the concrete may reasonably be expected to exceed 90°F at the time of delivery at the work site, during placement, or during the first 24 hours after placement, the following provisions also shall apply;

a. The Contractor shall maintain the temperature of the concrete below 90°F during mixing, conveying, and placing. Methods used shall conform to "Recommended Practice for Hot Weather Concreting," ACI Standard 605.

b. The concrete shall be placed in the work immediately after mixing. Truck mixing shall be delayed until only time enough remains to accomplish it before the concrete is placed.

c. Exposed concrete surfaces which tend to dry or set too rapidly shall be continuously moistened by means of fog sprays or otherwise protected from drying during the time between placement and finishing, and after finishing.

d. Finishing of slabs and other exposed surfaces shall be started as soon as the condition of the concrete allows and shall be completed without delay.

e. Concrete surfaces exposed to the air shall be covered as soon as the concrete has hardened sufficiently and shall be kept continuously wet for at least the first 24 hours of the curing period, and for the entire curing period unless curing compound is applied as specified in subsection g, below.

f. Formed surfaces shall be kept completely and continuously wet for the duration of curing period (prior to, during and after form removal) or until curing compound is applied as specified in subsection g, below.

g. If moist curing is discontinued before the end of the curing period, white pigmented curing compound shall be applied immediately, following the procedures specified in Section 21.

25. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, concrete will be measured to the neat lines or pay limits shown on the drawings, and the volume of concrete will be computed to the nearest 0.1 cubic yard. No deduction in volume will be made for chamfers, rounded or beveled edges, or for any void or embedded item that is less than five cubic feet in volume. Where concrete is placed against the sides or bottom of an excavation without intervening forms, drain fill, or bedding, the volume of concrete required to fill voids resulting from overexcavation outside the neat lines or pay limits will be included in the measurement for payment where such overexcavation is directed by the Engineer to remove unsuitable foundation material; but only to the extent that the unsuitable condition is not a result of the Contractor's operations.

(Method 1)

Payment for each item of concrete will be made at the contract unit price for that item. The payment for concrete will constitute full compensation for all labor, materials, equipment, transportation, tools, forms, falsework, bracing and all other items necessary and incidental to completion of the concrete work, such as joint fillers, waterstops, dowels or dowel assemblies and shear plates, but not including reinforcing steel or other items listed for payment elsewhere in the contract.

Measurement and payment for furnishing and placing reinforcing steel will be made as specified in Construction Specification 34.

(Method 2)

Payment for each item of concrete will be made at the contract unit price for that item. The payment for concrete will constitute full compensation for all labor, materials, equipment, transportation, tools, forms, falsework, bracing and all other items necessary and incidental to completion of the concrete work, such as joint fillers, waterstops, dowels or dowel assemblies, and shear plates, but not including furnishing and placing reinforcing steel or furnishing and handling cement or other items listed for payment elsewhere in the contract.

Measurement and payment for furnishing and placing reinforcing steel will be made as specified in Construction Specification 34.

Cement will be measured by dividing the volume of concrete accepted for payment by the yield of the applicable job mix. The yield will be determined by the procedure specified in ASTM Designation C 138. If the amount of cement actually used per batch exceeds the amount in the job mix specified by the Engineer, the measurement will be based on the latter. One barrel of cement will be considered equal to 4 bags or 376 pounds. Payment for each type of cement will be made at the contract unit price for furnishing and handling that type of cement and such payment will constitute full compensation for all materials, labor, equipment, storage, transportation and all other items necessary and incidental to furnishing and handling the cement.

(Use with Either Method)

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 26 of this specification.

26. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 13, Concrete, Class 4000X
Bid Item 14, Cement

(1) These items shall consist of the furnishing and placing of the concrete required to construct the following:

(a) The baffle chute at Sta. 38+00 centerline channel.

(b) The inlet structure at Sta. 9+28.67 of the principal spillway.

(c) The pipe cradle, yokes and anti-seep collars for the principal spillway.

(d) The gate stem and gate lift pedestals.

(e) The outlet structure at Sta. 11+45± of the principal spillway.

(f) The drop inlet structure at Sta. 14+00 of the outlet channel.

(g) The outlet structure at Sta. 67+21± of the outlet conduit.

(2) Cement shall be Type II or IIA.

(3) Coarse aggregate shall be size #467 (1½" to #4.)

(4) In Section 3, Classes of Concrete, Method 2 shall apply.

(5) In Section 5, Design of Concrete Mix, Method 2 shall apply.

(6) In Section 15, Construction Joints, Method 2 shall apply.

(7) In Section 18, Removal of Forms, Method 1 shall apply.

(8) Preformed expansion joint filler shall be Type I.

(9) Measurement and payment will be by Method 2.

CONSTRUCTION SPECIFICATION

34. STEEL REINFORCEMENT

1. SCOPE

The work shall consist of furnishing and placing steel reinforcement for reinforced concrete or pneumatically applied mortar.

2. MATERIALS

Steel reinforcement shall conform to the requirements of Material Specification 539. Before reinforcement is placed the surfaces of the bars and fabric and any metal supports shall be cleaned to remove any loose, flaky rust, mill scale, oil, grease or other coatings or foreign substances. After placement the reinforcement shall be maintained in a clean condition until it is completely embedded in the concrete.

3. BAR SCHEDULE, LISTS AND DIAGRAMS

Any supplemental bar schedules, bar lists or bar-bending diagrams required to accomplish the fabrication and placement of reinforcement shall be provided by the Contractor. Prior to placement of reinforcement, the Contractor shall furnish three prints or copies of any such lists or diagrams to the Contracting Officer. Acceptance of the reinforcement will not be based on approval of these lists or diagrams but will be based on inspection of the reinforcement after it has been placed.

4. BENDING

Reinforcement shall be cut and bent in compliance with the requirements of the American Concrete Institute Standard 315. Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks, cracks or improper bends will be rejected.

5. SPLICING BAR REINFORCEMENT

Unless otherwise specified on the drawings, splices of reinforcing bars shall provide an overlap equal to at least 30 times the diameter of the smaller bar in the splice but not less than 12 inches.

6. SPLICING WELDED WIRE FABRIC

Welded wire fabric shall be spliced in the following manner:

a. Adjacent sections shall be spliced end to end by either:

(1) Overlapping the two pieces of fabric one full mesh (measured from the ends of the longitudinal wires in one piece to the ends of the longitudinal wires in the other piece) and securing the two pieces together with wire ties placed at intervals of 18 inches; or,

(2) Overlapping the two pieces of fabric so that the end crosswire of each piece comes in contact with the next-to-end crosswire of the other piece and securing the two pieces together only as required to keep the fabric in place and to prevent it from curling.

b. Adjacent sections of fabric shall be spliced side to side by either:

(1) Placing the two selvage wires (the longitudinal wires at the edges of the fabric) one along side and overlapping the other and securing the two pieces together with wire ties placed at intervals of 3 feet; or,

(2) Placing each selvage wire in the middle of the first mesh of the other section of fabric and securing it to the other section at intervals of 10 feet by means of wire ties placed on the selvage wires alternately at intervals of 5 feet.

(3) Placing each selvage wire in contact with the next-to-edge longitudinal wire and securing them together only as required to keep the fabric in place or to prevent it from curling.

7. PLACING

Reinforcement shall be accurately placed and secured in position in a manner that will prevent its displacement during the placement of concrete. Tack welding of bars will not be permitted. Metal chairs, metal hangers, metal spacers and concrete chairs

may be used to support the reinforcement. Metal hangers, spacers and ties shall be placed in such a manner that they will not be exposed in the finished concrete surface. The legs of metal chairs that may be exposed at the lower face of slabs or beams shall be galvanized as specified for iron and steel hardware in Material Specification 582. Precast concrete chairs shall be manufactured of the same class of concrete as that specified for the structure and shall have tie wires securely anchored in the chair or a V-shaped groove at least 3/4 inch in depth molded into the upper surface to receive the steel bar at the point of support. Precast concrete chairs shall be moist at the time concrete is placed.

Reinforcement shall not be placed until the prepared site has been inspected and approved by the Engineer. After placement of the reinforcement, concrete shall not be placed until the reinforcement has been inspected and approved by the Engineer.

8. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, the weight of reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest pound by computation from the placing drawings. Measurement of hooks and bends will be based on the requirements of ACI Standard 315. Computation of weights of reinforcement will be based on the unit weights established in Tables 34-1, 34-2, and 34-3. The area of welded wire fabric reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest square foot by computation from the placing drawings with no allowance for laps. The weight of steel reinforcing in extra splices or extra-length splices approved for the convenience of the Contractor or the weight of supports and ties will not be included in the measurement for payment.

Payment for furnishing and placing reinforcing steel will be made at the contract unit price. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work including preparing and furnishing bar schedules, lists or diagrams; furnishing and attaching ties and supports; and furnishing, transporting, cutting, bending, cleaning and securing all reinforcement.

(Method 2) For items of work for which specific unit prices are established in the contract, the weight of bar reinforcement placed in the concrete in accordance with the drawings will be determined

to the nearest pound by computation from the placing drawings. Measurement of hooks and bends will be based on the requirements of ACI Standard 315. Computation of weights of bar reinforcement will be based on the unit weights established in Table 34-1. The weight of steel reinforcing in extra splices or extra-length splices approved for the convenience of the Contractor or the weight of supports and ties will not be included in the measurement for payment.

The area of welded wire fabric reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest square foot by computation from the placing drawings with no allowance for laps.

Payment for furnishing and placing bar reinforcing steel will be made at the contract unit price for bar reinforcement. Payment for furnishing and placing welded wire fabric reinforcing steel will be made at the contract unit price for welded wire fabric reinforcement. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work including preparing and furnishing bar schedules, lists or diagrams; furnishing and attaching ties and supports; and furnishing, transporting, cutting, bending, cleaning and securing all reinforcement.

(Use with Either Method) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and items to which they are made subsidiary are identified in Section 9 of this specification.

TABLE 34-1. STANDARD REINFORCING BARS

Bar Size No.	2	3	4	5	6	7	8	9	10	11
Wt. (lb./ft.)	0.167	0.376	0.668	1.043	1.502	2.044	2.670	3.400	4.303	5.313

TABLE 34-2. RECTANGULAR WELDED WIRE FABRIC [1]

Style Designation	Wt. in Lb. Per 100 Sq. Ft.	Style Designation	Wt. in Lb. Per 100 Sq. Ft.	Style Designation	Wt. in Lb. Per 100 Sq. Ft.
24-1414	16	312- 711	39	48- 912	23
212- 04	169	312- 812	32	48-1012	20
212- 15	144	412- 26	69	48-1112	17
212- 26	124	412- 37	59	48-1212	14
212- 37	107	412- 48	51	48-1214	12
212- 48	91	412- 59	43	612-3/04	91
212- 59	77	412- 610	36	612-2/04	78
212- 610	66	412- 711	31	612- 00	81
212- 711	56	412- 810	27	612- 03	72
312- 04	119	412- 812	25	612- 11	69
312- 15	102	412- 912	22	612- 14	61
312- 26	87	412-1012	19	612- 22	59
312- 37	75	412-1112	16	612- 25	52
312- 48	64	412-1212	13	612- 33	51
312- 59	54	48- 711	33	612- 44	44
312- 610	46	48- 812	27	612- 66	32
				612- 77	27

[1] Style designation is defined in ACI Standard 315 of the American Concrete Institute.

TABLE 34-3. SQUARE WELDED WIRE FABRIC[1]

Style Designation	Wt. in Lb. Per 100 Sq. Ft.	Style Designation	Wt. in Lb. Per 100 Sq. Ft.
2 x 2 - 10/10	60	4 x 4 - 14/14	11
2 x 2 - 12/12	37	6 x 6 - 0/0	107
2 x 2 - 14/14	21	6 x 6 - 1/1	91
2 x 2 - 16/16	13	6 x 6 - 2/2	78
3 x 3 - 8/8	58	6 x 6 - 3/3	68
3 x 3 - 10/10	41	6 x 6 - 4/4	58
3 x 3 - 12/12	25	6 x 6 - 4/6	50
3 x 3 - 14/14	14	6 x 6 - 5/5	49
4 x 4 - 4/4	85	6 x 6 - 6/6	42
4 x 4 - 6/6	62	6 x 6 - 7/7	36
4 x 4 - 8/8	44	6 x 6 - 8/8	30
4 x 4 - 10/10	31	6 x 6 - 9/9	25
4 x 4 - 12/12	19	6 x 6 - 10/10	21
4 x 4 - 13/13	14		

[1]Style designation is defined in ACI Standard 315 of the American Concrete Institute.

9. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 15, Steel Reinforcement

(1) This item shall consist of furnishing and placing of the reinforcing steel required to construct the following:

(a) The baffle chute at Sta. 38+00 centerline channel.

(b) The inlet structure at Sta. 9+28.67 of the principal spillway.

(c) The anti-seep collars, yokes and cradle for the principal spillway.

(d) The gate stem and gate lift pedestals.

(e) The outlet structure at Sta. 11+45± of the principal spillway.

(f) The drop inlet structure at Sta. 14+00 of the outlet channel.

(g) The outlet structure at Sta. 67+21± of the outlet conduit.

(2) Measurement and payment will be by Method 1.

CONSTRUCTION SPECIFICATION

41. REINFORCED CONCRETE PRESSURE PIPE SPILLWAY CONDUITS

1. SCOPE

The work shall consist of furnishing and installing reinforced concrete pressure pipe, fittings and accessories in principal spillway conduits appurtenant to earth dams.

2. MATERIALS

Reinforced concrete pressure pipe, fittings and accessories shall conform to the requirements of Material Specification 541.

Portland cement concrete for bedding and cradles shall conform to the requirements of Construction Specification 31 for the specified class of concrete.

Joint sealing compound shall conform to the requirements of Material Specification 536.

Preformed expansion joint filler shall conform to the requirements of Material Specification 535.

3. LAYING THE PIPE

The pipe shall be set to the specified line and grade and temporarily supported on precast concrete blocks or wedges. Bell and spigot pipe shall be laid with the bell upstream.

Just before each joint is connected the connecting surfaces of the bell and spigot or spigots and sleeve shall be thoroughly cleaned and dried, and the rubber gasket and the inside surface of the bell or sleeve shall be lubricated with a light film of soft vegetable soap compound (flax soap). The rubber gasket shall be stretched uniformly as it is placed in the spigot groove to insure a uniform volume of rubber around the circumference of the pipe.

(Method 1) The joint shall be connected by means of a pulling or jacking force so applied to the pipe that the spigot enters squarely into the bell.

(Method 2) The joint shall be connected in accordance with the manufacturer's instructions.

(Use with Either Method) When the spigot has been seated to within 1/2-inch of its final position, the position of the gasket in the joint shall be checked around the entire circumference of the pipe by means of a metal feeler gage. In any case where the gasket is found to be displaced, the joint shall be disengaged and properly reconnected. After the position of the gasket has been checked, the spigot shall be completely pulled into the bell and the section of pipe shall be adjusted to line and grade.

4. FILLING JOINTS

Before the placement of the bedding or cradle, the exterior annular space between the ends of the pipe sections shall be cleaned and completely filled with joint sealing compound. Before the compound is applied, the surfaces against which it is to be placed shall be cleaned of all dust, lubricant and other substances that would interfere with a bond between the compound and the pipe. If recommended by the manufacturer of the compound, the concrete surfaces shall be coated with a primer in accordance with the manufacturer's recommendations. Primers shall be applied to the concrete surfaces only and shall not come in contact with the gasket or gasket sealing surfaces. Unless the compound or primer is specifically recommended for use on moist concrete, the surfaces shall be dry when it is applied.

The joint sealing compound shall be allowed to cure until it is sufficiently firm to prevent the entry of concrete or earth into the joint before concrete, bedding or backfill is placed against it. Unless otherwise specified, where bedding or backfill containing particles larger than one-fourth inch in maximum dimension is to be placed within 6 inches of the joint sealing compound, the compound shall be covered before the bedding or backfill is placed with a strip of 16-gage to 24-gage metal at least 2 inches wider than the space between the ends of the pipe sections.

5. PRESSURE TESTING

(Method 1) Pressure testing of the completed conduit will not be required.

(Method 2) Prior to the placement of any concrete or earth fill around the conduit or filling of the pipe joints, the conduit shall be tested for leaks in the following manner: The ends of the conduit shall be plugged and a standpipe with a minimum diameter of two (2) inches shall be attached to the upstream plug. The conduit shall be braced at each end to prevent slippage. The conduit and the standpipe shall be filled with water. The water level in the standpipe shall be maintained by continuous pumping a minimum of

10 feet above the invert of the upstream end of the conduit for a period of not less than two hours. Any leaks that occur during this period shall be repaired by a method satisfactory to the Engineer. After repair, the conduit shall be tested again as described above and the procedure shall be repeated until the conduit is accepted as watertight by the Engineer.

The pipe joints shall show no leakage. Damp spots developing on the surface of the pipe will not be considered as leakage.

6. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, the quantity of each size, type and class of pipe will be determined to the nearest 0.1 foot by measurement of the laid length of pipe along the invert centerline of the conduit. Payment for each size, type and class of reinforced concrete pressure pipe will be made at the contract unit price for that size, type and class of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe complete in place including accessories such as wall fittings, joint gaskets, coupling bands, sleeves or collars and all other items necessary and incidental to the completion of the work.

(Method 2) For items of work for which specific unit prices are established in the contract, the quantity of each size, type and class of pipe will be determined as the sum of the nominal laying lengths of the pipe sections used. Payment for each size, type and class of reinforced concrete pressure pipe will be made at the contract unit price for that size, type and class of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe complete in place including accessories such as wall fittings, joint gaskets, coupling bands, sleeves or collars and all other items necessary and incidental to the completion of the work.

(Use with Either Method) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 16, 30-Inch Diameter R/C Pressure Pipe

(1) This item shall consist of furnishing and installing the 30-inch diameter R/C pressure pipe between Sta. 9+33.5 and Sta. 11+45.5 for the principal spillway as shown on the drawings.

(2) The pipe shall be a steel cylinder type conforming to the requirements of Material Specification 541 and AWWA Standard C300 or C301.

(3) In Section 3, Laying the Pipe, Method 1 shall apply. Coupling bands are not required.

(4) In Section 5, Pressure Testing, Method 1 shall apply.

(5) Measurement and payment will be by Method 1.

CONSTRUCTION SPECIFICATION

42. CONCRETE PIPE CONDUITS AND DRAINS

1. SCOPE

The work shall consist of furnishing and installing concrete pipe or concrete drain tile and the necessary fittings as shown on the drawings.

2. MATERIALS

Reinforced concrete pressure pipe shall conform to the requirements of Material Specification 541 for the type and strength specified.

Concrete culvert pipe shall conform to the requirements of Material Specification 542 for the kind of pipe specified.

Concrete irrigation pipe, drainage pipe and drain tile shall conform to the requirements of Material Specification 543 for the kind of pipe or tile specified.

Pipe fittings shall conform to the requirements of the applicable pipe specifications.

Sealing compound for filling rubber gasket joints shall conform to the requirements of Material Specification 536.

Hot-pour joint sealer shall conform to the requirements of Federal Specification SS-S-169.

Cold-applied sealing compound shall conform to the requirements of Federal Specification SS-S-168.

Preformed sealing compound shall conform to the requirements of Interim Federal Specification SS-S-00210.

Joint packing shall conform to the requirements of Federal Specification HH-P-119 for mastic sealed joints and Federal Specification HH-P-117 for cement mortar sealed joints.

Preformed expansion joint filler shall conform to the requirements of Material Specification 535.

3. LAYING AND BEDDING

Pipe and tile shall be laid to the line and grade shown on the drawings. Pipe shall be laid with the bell or groove at the upstream end of each section.

a. Concrete Cradles or Bedding. Pipe to be cradled or bedded on concrete shall be set to the specified line and grade and temporarily supported on precast concrete blocks or wedges until the cradle or bedding concrete is placed. Concrete blocks or wedges used to temporarily support the pipe during placement of bedding or cradle shall be of a class of concrete equal to or better than that used in the bedding or cradle.

b. Earth, Sand, or Gravel Bedding. The pipe shall be firmly and uniformly bedded throughout its entire length to the depth and in the manner specified on the drawings. The pipe shall be loaded sufficiently during backfilling around the sides to prevent its being lifted from the bedding.

Perforated pipe shall be laid with the perforations down and oriented symmetrically about a vertical centerline. Perforations shall be clear of any obstructions when the pipe is laid.

4. JOINTS

Pipe joints shall conform to the details shown on the drawings and to the requirements of Section 5 and 6 of this specification applicable to the type of joint specified. Except where unsealed joints are indicated, pipe joints shall be sound and watertight at the pressure specified.

5. JOINING BELL AND SPIGOT PIPE

a. Rubber Gasket Joint, Pressure Pipe. Just before the joint is connected the connecting surfaces of the spigot and the bell or coupling band, sleeve or collar shall be thoroughly cleaned and dried, and the rubber gasket and the inside surface of the bell or coupling band, sleeve or collar shall be lubricated with a light film of soft vegetable soap compound (flax soap). The rubber gasket shall be stretched uniformly as it is placed in the spigot groove to insure a uniform volume of rubber around the circumference of the pipe.

(Method 1) The joint shall be connected by means of a pulling or jacking force so applied to the pipe that the spigot enters squarely into the bell.

(Method 2) The joint shall be connected in accordance with the manufacturer's recommnedations.

(Use with Either Method) When the spigot has been seated to within 1/2 inch of its final position, the position of the gasket in the joint shall be checked around the entire circumference of the pipe by means of metal feeler gage. In any case where the gasket is found to be displaced, the joint shall be disengaged and properly reconnected. After the position of the gasket has been checked, the spigot shall be completely pulled into the bell and the section of the pipe shall be adjusted to line and grade.

b. Rubber Gasket Joints, Sewer and Culvert Pipe or Irrigation Pipe. The pipe shall be joined in accordance with the gasket manufacturer's recommendations except as otherwise specified.

c. Mastic Sealed Joints. At the time of assembly the inside surfaces of the bell and the outside surfaces of the spigot shall be clean, dry and primed as recommended by the manufacturer of the sealing compound. A closely twisted gasket of joint packing of the diameter required to support the spigot at the proper grade and to make the joint concentric shall be made in one piece of sufficient length to pass around the pipe and lap at the top. The gasket shall be laid in the bell throughout the lower third of the circumference. The end of the spigot shall be laid on the gasket and the spigot shall be fully inserted into the bell so that the pipe sections are closely fitted and aligned. The gasket then shall be lapped at the top of the pipe and thoroughly packed into the annular space between the bell and the spigot.

(1) Hot-Pour Joint Sealer. The sealing compound shall be heated to within the temperature range recommended by the manufacturer and shall not be overheated or subjected to prolonged heating. After the joint is assembled, with the pipe in its final location, a suitable joint runner shall

be placed around the joint with an opening left at the top. Molten sealing compound shall be poured into the joint as rapidly as possible without entrapping air until the annular space between bell and spigot is completely filled. After the compound has set, the runner may be removed. Alternate joints may be poured before the pipe is lowered into the trench. In this case, the joint shall be poured with the pipe in a vertical position without the use of the runner. The compound shall have thoroughly set before the pipe is placed in the trench, and the pipe shall be handled so as to cause no deformation of the joint during placement.

(2) Cold-Applied Sealing Compound. The annular space between bell and spigot shall be completely filled with the sealing compound. The compound shall be mixed on the job in accordance with the manufacturer's recommendations and in relatively small quantities so that setting will not be appreciable before application.

(3) Preformed Sealing Compound. Joint packing will not be required, except as recommended by the manufacturer of the sealing compound. Preformed strips or bands of the sealing compound shall be applied to the bell and spigot prior to assembly of the joint in accordance with the manufacturer's recommendations. Any compound extruded from the interior side of the joint during assembly shall be trimmed even with the interior surface of the pipe.

d. Cement Mortar Sealed Joints. Cement mortar for joints shall consist of one part by weight of portland cement and two parts by weight of fine sand with enough water added to produce a workable consistency. At the time of assembly the inside surface of the bell and the outside surface of the spigot shall be clean and moist.

(1) With Packing. A closely twisted gasket of joint packing of the diameter required to support the spigot at the proper grade and to make the joint concentric shall be made in one piece of sufficient

length to pass around the pipe and lap at the top. The gasket shall be saturated with neat cement grout, laid in the bell throughout the lower third of the circumference and covered with mortar. The end of the spigot shall be fully inserted into the bell so that the pipe sections are closely fitted and aligned. A small amount or mortar shall be placed in the annular space throughout the upper two-thirds of the circumference. The gasket then shall be lapped at the top of the pipe and thoroughly packed into the annular space between the bell and the spigot. The remainder of the annular space then shall be filled completely with mortar and beveled off at an angle of approximately forty-five (45) degrees with the outside of the bell. If the mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. After the mortar has set slightly, the joint shall be wiped inside the pipe. In pipe too small for a man to work inside, wiping may be done by dragging an approved swab through the pipe as the work progresses.

(2) Without Packing. The lower portion of the bell shall be filled with stiff mortar of sufficient thickness to make the inner surface of the abutting sections flush. The spigot end of the pipe to be joined shall be fully inserted into the bell so that the sections are closely fitted and aligned. The remaining annular space between the bell and spigot shall then be filled with mortar and the mortar neatly beveled off at an angle of approximately forty-five (45) degrees with the outside of the bell. After the mortar has set slightly, the joint shall be wiped inside the pipe. In pipe too small for a man to work inside, wiping may be done by dragging an approved swab through the pipe as the work progresses.

e. Unsealed Joints. When unsealed joints are specified, they shall conform to the details shown on the drawings.

6. JOINING TONGUE AND GROOVE PIPE

a. Cement Mortar Sealed Joint. Mortar shall be as specified for bell and spigot joints. The tongue end of the section

being placed shall be covered with mortar and firmly pressed into the groove of the laid section in such a manner that the tongue fits snugly and truly in the groove and that mortar is squeezed out both on the interior and exterior of the joint. Care shall be taken that no mortar falls from the groove end during the abutting operation. Immediately after the pipe sections have been abutted, exposed external surface mortar shall be pressed into the joint and any excess mortar removed, after which the interior surface of the joint shall be carefully pointed and brushed smooth, and all surplus mortar removed.

b. Mastic Sealed Joints. Strips or bands of preformed sealing compound shall be applied to the tongue and groove prior to assembly of the joint in accordance with the manufacturer's recommendations. Any compound extruded from the interior side of the joint during assembly shall be trimmed even with the interior surface of the pipe.

c. Rubber Gasket Joints. The pipe shall be joined in accordance with the gasket manufacturer's recommendations except as otherwise specified.

d. Unsealed Joints. When unsealed joints are specified, they shall conform to the details shown on the drawings.

7. BANDING

When external mortar bands are specified, they shall conform to the details shown on the drawings.

8. CURING MORTAR JOINTS AND BANDS

The external surfaces of mortar joints shall be covered with moist earth, sand, canvas, burlap or other approved materials and shall be kept moist for 10 days or until the pipe is backfilled.

Water shall not be turned into the conduit within 24 hours after the joints are finished. Hydrostatic pressure shall not be applied to the conduit prior to 14 days after the joints are finished.

9. PRESSURE TESTING

(Method 1) Pressure testing of the completed conduit will not be required.

(Method 2) Prior to the placement of concrete or earth fill around the conduit, the conduit shall be tested for leaks in the following manner: The ends of the conduit shall be plugged and a standpipe with a minimum diameter of two (2) inches shall be attached to the upstream plug. The conduit shall be braced at each end to prevent slippage. The conduit and the standpipe shall be filled with water. The water level in the standpipe shall be maintained, by continuous pumping, a minimum of 10 feet above the invert of the upstream end of the conduit for a period of not less than two hours. Any leaks shall be repaired and the conduit shall be retested as described above. The procedure shall be repeated until the conduit is watertight.

The pipe joints shall show no leakage. Damp spots developing on the surface of the pipe will not be considered as leaks.

(Method 3) Prior to the placement of concrete or earth fill around the conduit, the conduit shall be tested at the specified test pressure for a period of at least 2 hours. Any leaks shall be repaired and the conduit shall be retested. The procedure shall be repeated until the conduit is watertight.

The pipe joints shall show no leakage. Damp spots developing on the surface of the pipe will not be considered as leaks.

10. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, the quantity of each kind, size, and class of pipe or tile will be determined to the nearest foot by measurement of the laid length along the invert centerline of the conduit. Payment for each kind, size, and class of pipe or tile will be made at the contract unit price for that kind, size, and class. Such payment will constitute full compensation for furnishing, transporting and installing the pipe or tile complete in place.

(Method 2) For items of work for which specific unit prices are established in the contract, the quantity of each kind, size, and class of pipe or tile will be determined as the sum of the nominal laying lengths of the sections used. Payment for each kind, size, and class of pipe or tile will be made at the contract unit price for that kind, size, and class. Such payment will constitute full compensation for furnishing, transporting and installing the pipe or tile complete in place.

(Use with Either **Method**) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 11 of this specification.

11. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 17, 24-Inch Diameter R/C Pipe
Bid Item 18, 30-Inch Diameter R/C Pipe

(1) These items shall consist of furnishing and installing the following items to the lines and grades shown on the drawings.

(a) The 24-inch diameter R/C pipe, including manholes and 3-inch diameter vent pipe, between Sta. 14+08.50 and Sta. 30+70 and between Sta. 31+05 and Sta. 61+04.

(b) The 30-inch diameter R/C pipe between Sta. 61+04 and Sta. 67+21.

(c) The 24-inch by 30-inch transition section between Sta. 61+00 and 61+04.

(2) The pipe shall be either a steel cylinder or non cylinder type conforming to the requirements of Material Specification 541 and to either AWWA Standard C 300 or C 302, or to Material Specification 542 and ASTM C 76. Elliptical reinforcement will not be allowed.

(3) The manhole frames and covers shall conform to the requirements of the City of Tempe's Standard Detail No. 293, 24-Inch Manhole Frame and Cover.

(4) The three-inch diameter vent pipe shall be type S, Grade A, Schedule 40, conforming to the requirements of ASTM A 53.

(5) In Section 5, Joining Bell and Spigot Pipe, Method 1 shall apply.

(6) In Section 9, Pressure Testing, Method 1 shall apply.

(7) Measurement and payment will be by Method 1. Such payment shall include compensation for the manholes, vent pipe and transition section.

b. Bid Item 19, 24-Inch Diameter R/C Pipe

(1) This item shall consist of furnishing and installing the 24-inch diameter R/C pipe, including jacking, excavation and backfill, under the Highline Canal between Sta. 30+70 and Sta. 31+05 to the lines and grades shown on the drawings.

(2) The installation shall be done by jacking the pipe under the canal in such a manner that the existing improvements are not damaged.

(3) The excavation shall not exceed the outside diameter of the pipe more than one-tenth (0.1) of a foot.

(4) The pipe shall be either a steel cylinder or non cylinder type conforming to the requirements of Material Specification 541 and either AWWA Standard C 300 or C 302, or Material Specification 542 and ASTM C 76. Elliptical reinforcement will not be allowed.

(5) The joints shall be double spigot and sleeve type as shown on sheet 6 of the drawings.

(6) In Section 5, Joining Bell and Spigot Pipe, Method 1 shall apply.

(7) In Section 9, Pressure Testing, Method 1 shall apply.

(8) Measurement and payment will be by Method 1. Such payment shall include the cost of excavation, jacking and backfilling required to complete the installation.

c. Bid Item 20, 60-Inch Diameter R/C Pipe

(1) This item shall consist of furnishing and installing the 60-inch diameter R/C pipe, including jacking, excavation and backfill under the Guadalupe Road between Sta. 22+21 and Sta. 23+57 to the lines and grades shown on the drawings.

(2) The installation shall be done by jacking the pipe under the road in such a manner that the existing fill and pavement is not damaged.

(3) That portion of the excavation that is done by trenching shall not exceed the limits as shown on sheet 6 of the drawings.

(4) The excavation for the jacking shall not exceed the outside diameter of the pipe more than one-tenth (0.1) of a foot.

(5) The backfill for the pipe in the excavated trench shall be placed in accordance with Construction Specification 23, Bid Item 10.

(6) The pipe shall conform to the requirements of Material Specification 541 and either AWWA Standard C 300, C 301 or C 302, or Material Specification 542 and ASTM C 76. Elliptical reinforcement will not be allowed.

(7) The joints shall be a double spigot and sleeve type as shown on sheet 6 of the drawings.

(8) In Section 9, Pressure Testing, Method 1 shall apply.

(9) Measurement and payment will be by Method 1. Such payment shall include the cost of excavating, jacking and backfilling required to complete the installation.

CONSTRUCTION SPECIFICATION

52. STEEL PIPE CONDUITS

1. SCOPE

The work shall consist of furnishing and installing steel pipe complete with the fittings and appurtenances specified on the drawings.

2. MATERIALS

Steel pipe and fittings shall conform to the requirements of Material Specification 553.

Unless otherwise specified, special fittings and appurtenances shall be of the same materials as the pipe.

Welding electrodes shall conform to the requirements of Material Specification 581.

3. LAYING AND BEDDING THE PIPE

Pipe shall be laid to the line and grade shown on the drawings. Unless otherwise specified, the pipe shall be installed in accordance with the manufacturer's recommendations. The pipe shall be firmly and uniformly bedded throughout its entire length to the depth and in the manner specified on the drawings.

The pipe shall be loaded sufficiently during backfilling around the sides to prevent its being lifted from the bedding.

4. JOINTS

Pipe joints shall conform to the details shown on the drawings and shall be sound and watertight at the pressures specified.

Welding and welded joints shall conform to the welding procedure details and the requirements for repair of welds of AWWA Standard C206 for Field Welding of Steel Water Pipe Joints (AWS D7.0). Field welding shall be done in such a way as to avoid burning the protective coating on the pipe except in the immediate vicinity of the weld.

The ends of pipe to be connected with mechanical couplings shall be machined so as to allow coupling the pipe sections without

damaging or displacing the gaskets and to insure uniform end separation of the pipes. Machined ends of the pipe that receive the coupling sleeves shall be free from dents, gouges, rust, scale, or protective coating (except coal tar-epoxy paint). The pipe and couplings shall be assembled with continuous rubber ring gaskets conforming to the dimensions and tolerances recommended by the pipe manufacturer. Coupling followers shall be drawn up evenly to insure uniform pressure on the gaskets.

5. FIELD COATING AND WRAPPING

When coal tar enamel coated pipe is specified, joints and couplings shall be primed and coated in the manner specified in AWWA Standard C203, Section 4. Joints and couplings shall be primed, coated, and wrapped where wrapped pipe is used. The use of coal tar tapes, applied in compliance with the manufacturer's instructions, is acceptable for coating joints and couplings if the resulting coating is equivalent in durability and watertightness to the coating on the pipe.

When it is specified that the pipe be coated with coal tar-epoxy paint, couplings shall be coated with coal tar-epoxy paint prior to assembly. Field application of coal tar-epoxy paint will be limited to touchup required to repair damage that occurs during assembly.

6. HANDLING THE PIPE

The Contractor shall furnish such equipment as is necessary to place the pipe without damaging the pipe or coating. Coated pipe shall be handled in the manner specified in AWWA Standard C203, Section 4.

7. PRESSURE TESTING

If pressure testing of the conduit is specified, it shall be performed as follows:

Prior to placement of the final backfill around the conduit, the total conduit or the section to be tested shall be filled with water and tested at the specified pressure for a period of 2 hours during which the amount of water loss shall be measured.

Before performing the test, all concrete anchors and thrust blocks shall be in place and shall have been cured at least 3 days, the

ends of the pipe shall be plugged and braced to prevent movement, and backfill around the pipe between joints shall be placed as required to prevent movement. All joints and connections shall be completely exposed for visual inspection during the test.

If the amount of water loss exceeds the limit specified, the leaks shall be repaired and the conduit shall be retested as described above. The procedure shall be repeated until the amount of water loss is within the specified limit.

8. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, the quantity of each type and size of pipe will be determined to the nearest 0.1 foot by measurement of the laid length of pipe along the centerline of the pipe. Payment for each type and size of pipe will be made at the contract unit price for that type and size of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe, including the necessary fittings and all other items necessary and incidental to the completion of the work.

(Method 2) For items of work for which specific unit prices are established in the contract, the quantity of each type and size of pipe will be determined to the nearest 0.1 foot by measurement of the laid length of pipe along the centerline of the pipe. Payment for each type and size of pipe will be made at the contract unit price for that type and size of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe, complete in place, including the necessary fittings and all other items necessary and incidental to the completion of the work except the special fittings and appurtenances listed separately in the bid schedule. Payment for each special fitting and appurtenance will be made at the contract unit price for that type and size of fitting or appurtenance.

(Use with Either Method) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 9 of this specification.

9. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Subsidiary Item, Drip Irrigation System Connection to Supply Line

(1) This item shall consist of furnishing and installing all the galvanized steel pipe, including excavation and backfill, with all appurtenances such as fittings, valves and filters required to connect the drip irrigation system for the East Dam, North Dam No. 2 and North Dam No. 1 to the existing two (2) inch diameter supply line as shown on sheet 30 of the drawings.

(2) The pipe and fittings shall be Type S, Grade A, Schedule 40, conforming to the requirements of ASTM A 53.

(3) The valves shall be standard brass globe valves.

(4) The filter shall have a 200-mesh (74 microns) per inch double screen, a minimum capacity of 30 GPM, maximum head loss of 5 psi and the capability to be back flushed.

(5) No separate payment will be made for the connection. Compensation will be included in the payment for Bid Items 30-33.

CONSTRUCTION SPECIFICATION

61. LOOSE ROCK RIPRAP

1. SCOPE

The work shall consist of the construction of loose rock riprap revetments and blankets, including filter layers or bedding where specified.

2. MATERIALS

Rock for loose rock riprap shall conform to the requirements of Material Specification 523 or, if so specified, shall be obtained from designated sources.

Rock from designated sources shall be excavated, selected and handled as necessary to meet the quality and grading requirements in Section 8 of this specification. The rock shall conform to the specified grading limits when installed in the riprap.

Filter material shall conform to the requirements of Material Specification 521 unless otherwise specified.

Bedding shall be obtained from the designated sources and shall be selected to meet the quality and grading requirements in Section 8 of this specification.

At least 30 days prior to delivery of material from other than designated sources, the Contractor shall notify the Contracting Officer in writing of the sources from which he intends to obtain the material. The Contractor shall provide the Engineer free access to the sources for the purpose of obtaining samples for testing.

3. SUBGRADE PREPARATION

The subgrade surfaces on which the riprap or bedding course is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it shall consist of approved materials and shall conform to the requirements of the specified class of fill.

Riprap shall not be placed until the foundation preparation is completed and the subgrade surfaces have been inspected and approved by the Engineer.

4. EQUIPMENT-PLACED ROCK RIPRAP

The rock shall be placed by equipment on the surfaces and to the depths specified. The riprap shall be constructed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials. The rock shall be delivered and placed in a manner that will insure that the riprap in place shall be reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks.

Riprap shall be placed in a manner to prevent damage to structures. Hand placing will be required to the extent necessary to prevent damage to the permanent works.

5. HAND-PLACED RIPRAP

The rock shall be placed by hand on the surfaces and to the depths specified. It shall be securely bedded with the larger rocks firmly in contact one to another. Spaces between the larger rocks shall be filled with smaller rocks and spalls. Smaller rocks shall not be grouped as a substitute for larger rock. Flat slab rock shall be laid on edge.

6. FILTER LAYERS OR BEDDING

When the drawings specify filter layers or bedding beneath riprap, the filter or bedding material shall be spread uniformly on the prepared subgrade surfaces to the depth specified. Compaction of filter layers or bedding will not be required, but the surface of such layers shall be finished reasonably free of mounds, dips or windrows.

7. TESTING

The Engineer will perform such tests as are required to verify that the riprap, filter, and bedding materials and the completed work meet the requirements of the specifications. These tests are not intended to provide the Contractor with the information he needs to assure that the materials and workmanship meet the requirements of the specifications, and their performance will not relieve the Contractor of the responsibility of performing his own tests for that purpose.

8. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, the volume of each type of riprap, including filter layers and bedding, will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. Payment for each type of riprap, including filter layers and bedding, will be made at the contract unit price for that type of riprap. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the riprap, filter layers and bedding.

(Method 2) For items of work for which specific unit prices are established in the contract, the volume of each type of riprap and the volume of each type of filter layer or bedding will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. Payment for each type of riprap will be made at the contract unit price for that type of riprap. Payment for each type of filter or bedding will be made at the contract unit price for that type of filter or bedding. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the riprap, filter layers and bedding.

(Method 3) For items of work for which specific unit prices are established in the contract, the quantity of each type of riprap placed within the specified limits will be measured to the nearest ton by actual weight, and the volume of each type of filter layer or bedding will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. For each load of rock placed as specified, the Contractor shall furnish to the Engineer a statement-of-delivery ticket showing the weight, to the nearest 0.1 ton, of rock in the load.

Payment for each type of riprap will be made at the contract unit price for that type of riprap. Payment for each type of filter or bedding will be made at the contract unit price for that type of filter or bedding. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the riprap, filter layers and bedding.

(Method 4) For items of work for which specific unit prices are established in the contract, the quality of each type of riprap placed within the specified limits will be measured to the nearest ton by actual weight, and the volume of each type of filter

material or bedding delivered and placed within the specified limits will be measured to the nearest cubic yard by measurement of the hauling equipment. For each load of material placed as specified, the Contractor shall furnish to the Engineer a statement-of-delivery ticket showing the weight, to the nearest 0.1 ton, of rock in the load; or the volume, to the nearest 0.1 cubic yard, of filter material or bedding in the load.

Payment for each type of riprap will be made at the contract unit price for that type of riprap. Payment for each type of filter or bedding will be made at the contract unit price for that type of filter or bedding. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to completion of the riprap, filter layers and bedding.

(Use with All Methods) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 9 of this specification.

8. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 21, Loose Rock Riprap

(1) This item shall consist of furnishing and placing the riprap, including excavation, at the following locations:

(a) The upstream face of the North Dam No. 1, North Dam No. 2 and East Dam from the toe to elevation 1,260.

(b) The outlet of the 60-inch diameter R/C pipe under the Guadalupe Road between Sta. 23+57± and Sta. 23+67± of the channel.

(c) Along the sidewalls of the baffle chute.

(2) The riprap shall be equipment placed.

(3) The rock shall be well graded within the limits of 18-inch diameter maximum to 3-inch diameter minimum.

(4) Rock for the riprap shall be selected from the excavation of the emergency spillway and cutoff trench.

(5) Measurement and payment will be by Method 1.

CONSTRUCTION SPECIFICATION

71. WATER CONTROL GATES

1. SCOPE

The work shall consist of furnishing and installing water control gates including gate stems, hoists, lifts and other appurtenances.

2. MATERIALS

The gates furnishes shall conform to the requirements specified in Section 8 or on the drawings. All gates shall be furnished complete with hoisting equipment and other specified appurtenances.

3. INSTALLING GATES

The Contractor shall install the gates in a manner that will prevent leakage around the seats and binding of the gates during operation.

Surfaces of metal against which concrete will be placed shall be free from oil, grease, loose mill scale, loose paint, surface rust, and other debris or objectionable coatings.

Anchor bolts, thimbles and spigot frames shall be secured in true position in the forms and held in alignment during the placement of concrete.

Concrete surfaces against which rubber seals will bear or against which flat frames or plates are to be installed shall be finished to provide a smooth and uniform contact surface.

When a flat frame is installed against concrete, a layer of bedding mortar shall be placed between the frame and the concrete.

When a gate is attached to a wall thimble, a mastic or resilient gasket shall be applied between the gate frame and the thimble, in accordance with the recommendation of the gate manufacturer.

For radial gates, wall plates, sills and pin brackets shall be adjusted and fastened by grouting and bolting after the gates have been completely assembled in place.

4. INSTALLING HOISTS AND LIFTS

Gate stems, stem guides and gate lifts shall be carefully aligned so that the stem shall be parallel to the guide bars or angles on the gate frame after installation.

Radial gate hoists shall be installed in correct alignment with relation to the gate shaft.

5. RADIAL GATE SEALS

The rubber seals on radial gates shall be installed so that the seals contact the walls or wall plates throughout their entire length when the gates are closed.

6. OPERATIONAL TESTS

After the gate and hoist (or lift) have been installed, they shall be cleaned, lubricated and otherwise serviced by the Contractor in accordance with the manufacturer's instructions. The Contractor shall test the gate and hoist by operating the system several times throughout its full range of operation. He shall make any changes and adjustments necessary to insure satisfactory operation of the gate system.

7. MEASUREMENT AND PAYMENT

The number of each type, size and class of gate will be counted. Payment for furnishing and installing each type, size and class of gate shall be made at the contract unit price for that type, size and class of gate. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work including furnishing and installing anchor bolts and all specified appurtenances and fittings.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and items to which they are made subsidiary are identified in Section 8 of this specification.

8. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 22, 24-Inch Slide Gate Assembly
Bid Item 23, 24-Inch Slide Gate Assembly

(1) These items shall consist of furnishing and installing the 24-inch diameter slide gates on the inlet structure as shown on sheets 14, 15 and 16 of the drawings.

(2) The 24-inch slide gate assemblies shall consist of the following items:

(a) Drawdown Gate, Bid Item 22

1. Gate, complete with frame and anchor bolts.

2. Stem, stem splices, encasement, weather seals, oil, straps, supports, anchor bolts and all other miscellaneous hardware required to complete the installation of the stem assembly.

3. Handwheel, gate lift, anchor bracket, anchor bolts and all other miscellaneous hardware required to complete the installation of the lift assembly.

(b) Auxiliary Gate, Bid Item 23

1. Gate, complete with frame and anchor bolts.

2. Stem, stem splices, straps, guides, anchor bolts and all other miscellaneous hardware required to complete the installation of the stem assembly.

3. Handwheel, gate lift, anchor bracket, anchor bolts and all other miscellaneous hardware required to complete the installation of the lift assembly.

(3) The gates shall be flat back type slide gates and shall conform to the requirements specified in Material Specification 572.

(4) The gates shall be Class 50-10, Type MMS-1.

(5) The stem shall be a rising stem of the length shown on the drawings.

(6) The stem encasement shall be galvanized pipe.

(7) In Section 15, Painting, painting of the gates will not be required.

(8) Measurement and payment will be made in accordance with Section 7.

CONSTRUCTION SPECIFICATION

81. METAL FABRICATION AND INSTALLATION

1. SCOPE

The work shall consist of furnishing, fabricating and erecting metalwork, including the metal parts of composite structures.

2. MATERIALS

Unless otherwise specified, materials shall conform to the requirements of Material Specification 581. Steel shall be structural quality unless otherwise specified. Castings shall be thoroughly cleaned and subjected to careful inspection before installation. Finished surfaces shall be smooth and true to assure proper fit. Galvanizing shall conform to the requirements of Material Specification 582.

3. FABRICATION

Fabrication of structural steel shall conform to the requirements of Section 1.23 of the "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings (Riveted, Bolted and Arc-Welded Construction)," American Institute of Steel Construction.

Fabrication of structural aluminum shall conform to the requirements in the Aluminum Construction Manual, "Specifications for Aluminum Structures," Section 6 and Section 7, The Aluminum Association, November 1967.

4. ERECTION

The frame of metal structures shall be carried up true and plumb. Temporary bracing shall be placed wherever necessary to resist all loads to which the structure may be subjected, including those applied by the installation and operation of equipment. Such bracing shall be left in place as long as may be necessary for safety.

As erection progresses the work shall be securely bolted up, or welded, to resist all dead load, wind and erection stresses. The Contractor shall furnish such fitting up bolts, nuts and washers as may be required.

No riveting or welding shall be done until as much of the structure as will be stiffened thereby has been properly aligned.

Rivets driven in the field shall be heated and driven with the same care as those driven in the shop.

All field welding shall be done in conformance to the requirements for shop fabrication, except those that expressly apply to shop conditions only.

Galvanized items shall not be cut, welded or drilled after the zinc coating is applied.

5. PROTECTIVE COATINGS

Items specified to be galvanized shall be completely fabricated for field assembly before the application of the zinc coatings.

Items specified to be painted shall be painted in conformance to the requirements of Construction Specification 82 for the specified paint systems.

6. MEASUREMENT AND PAYMENT

(Method 1) The work will not be measured. Payment for metal fabrication and installation will be made at the contract lump sum price. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work, including connectors and appurtenances such as rivets, bolts, nuts, pins, studs, washers, hangers and weld metal.

(Method 2) The weight of metal installed complete in place shall be determined to the nearest pound. Unless otherwise provided, the weight of metal shall be computed by the method specified in Section 3 of the "Code of Standard Practice for Steel Buildings and Bridges," American Institute of Steel Construction, except that the following unit weights shall also be used, as appropriate, as the basis of computation:

Material	Unit Weight Pounds per Cubic Foot
Aluminum alloy	173.0
Bronze or copper alloy	536.0
Iron, malleable	470.0
Iron, wrought	487.0

Payment for furnishing, fabricating and installing metalwork will be made at the contract unit price for the specified types of metals. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work.

(Method 3) The work will not be measured. Payment for furnishing, fabricating and installing each item of metalwork will be made at the contract price for that item. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work, including connectors and appurtenances such as rivets, bolts, nuts, pins, studs, washers, hangers and weld metal.

(Use with all Methods) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS:

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 24, Metal Work

(1) This item shall consist of the fabrication and installation of the following:

(a) The louvres for the inlet structure as shown on sheet 16 of the drawings.

(b) The metal plates and gratings on the inlet structure as shown on sheet 15 of the drawings.

(c) All miscellaneous metal fabrication required for installation of slide gates on the inlet structure and pedestals as shown on sheets 15 and 21 of the drawings.

(d) The metal trash rack for the drop inlet structure.

(2) Painting shall be in accordance with Construction Specification 82.

(3) Measurement and payment will be made by Method 1.

b. Bid Item 25, Identification Sign

(1) This item shall consist of the fabrication and installation of the identification sign as shown on sheet 33 of the drawings.

(2) Painting shall be in accordance with Construction Specification 82.

(3) Measurement and payment will be made by Method 1.

CONSTRUCTION SPECIFICATION

82. CLEANING AND PAINTING METALWORK

1. SCOPE

The work shall consist of cleaning metal surfaces and applying paints and protective coatings.

2. PAINTS

For the purposes of this specification paints shall be designated by types as defined below:

Type 1 paint shall conform to the requirements of Federal Specification TT-P-86, Type IV, Red Lead Base Paint.

Type 2 paint shall conform to the requirements of Federal Specification TT-P-86, Type II or Type III, Red Lead Base Paint.

Type 3 paint shall conform to the requirements of Federal Specification TT-P-86, Type I, Red Lead Base Paint.

Type 4 paint shall conform to the requirements of Federal Specification TT-P-636, Synthetic Primer.

Type 5 paint shall be prepared by mixing aluminum paste conforming to the requirements of Federal Specification TT-P-320, Type II, Class 2 with phenolic resin spar varnish conforming to the requirements of Federal Specification TT-V-119 at the rate of two pounds of aluminum paste per gallon of varnish. The paint shall be mixed at the time of use.

Type 6 paint shall be prepared by mixing aluminum paste conforming to Federal Specification TT-P-320, Type II, Class 2 with mixing varnish conforming to the requirements of Federal Specification TT-V-81, Type II, Class B (Class 2) at the rate of two pounds of aluminum paste per gallon of varnish. The paint shall be mixed at the time of use.

Type 7 paint shall conform to the requirements of Federal Specification TT-E-489, Class A, Alkyd Gloss Enamel.

Type 8 paint shall conform to the requirements of Federal Specification TT-E-529, Alkyd Semi-Gloss Enamel.

Type 9 paint shall conform to the requirements of Federal Specification TT-P-641, Type I or Type II, Zinc Dust-Zinc Oxide Primer.

Type 10 paint shall conform to the requirements of Federal Specification TT-P-641, Type III, Zinc Dust-Zinc Oxide Primer.

Type 11 paint shall conform to the requirements of Material Specification 583. The paint shall be mixed at the time of use.

Paints of Types 1, 2, 3, 5 and 6 may be thinned with mineral spirits as necessary for proper application but the amount of thinner used shall not exceed one pint per gallon of paint. Other paints may be thinned in accordance with the manufacturer's instructions only if such thinning is approved by the Engineer.

When tinting is required, it shall be accomplished by the addition of pigment-in-oil tinting colors conforming to the requirements of Federal Specification TT-P-381.

Mineral spirits shall conform to the requirements of Federal Specification TT-T-291, Grade 1, Light Thinner.

3. SURFACE PERPARATION

Surfaces to be painted shall be thoroughly cleaned prior to the application of the paint. For the purposes of this specification methods of surface preparation shall be designated as defined below:

Method 1 surface preparation shall consist of the removal of all grease and oil by means of steam cleaning or solvent cleaning methods and removal of all dirt, rust, mill scale and other coatings by means of sandblasting, grit blasting or pickling. The finished surface shall uniformly expose the base metal and shall present an etched, but not polished or peened, appearance. Not more than 5 percent of the surface may exhibit very light shadows, light streaks, or slight discolorations caused by rust stain, mill scale oxides, or slight, tight residues of paint or coating.

Method 2 surface preparation shall consist of the removal of all grease and oil by means of steam cleaning or solvent cleaning and the removal of all dirt, surface rust and loose scale by means of wire brushing, flame cleaning, use of rotary abrading tools or light sandblasting.

Method 3 surface preparation shall consist of the treatment of the surface with a dilute acid solution. The surface shall be thoroughly wetted with a dilute (about 5 percent strength) phosphoric acid solution. After the acid has dried, the surface shall be thoroughly rinsed with clear water and allowed to dry. Dirt, grease and oil shall be removed from the surface by solvent cleaning prior to the acid treatment.

Cleaning solvent shall be mineral spirits. Cleaning cloths and solvents shall be discarded before they become contaminated to the extent that a greasy film would remain on the surface being cleaned. The final cleaning and wiping shall be done with clean solvent and clean cloths. Grit blasting shall be accomplished using compressed air blast nozzles and grit made of steel, malleable iron or cast iron crushed shot. Abrasives used shall have a maximum particle size that will pass the No. 16 sieve (U. S. Standard) and a minimum size that will be retained on the No. 50 sieve (U. S. Standard). The equipment used for sandblasting shall be equipped with adequate separators and traps to insure that the compressed air shall be free of detrimental amounts of water and oil. Blast cleaned surfaces shall be brushed, blown or vacuum cleaned to remove any trace of blast products or abrasives prior to painting.

Surfaces that are not to be painted immediately after cleaning shall be treated with one brush coat of metal conditioner conforming to the requirements of Military Specification MIL-M-10578, except that surfaces cleaned by pickling in phosphoric acid solution shall not require such treatment.

Surfaces shall be thoroughly dry when paint is applied.

No field coats of paint shall be applied until the prepared surfaces have been inspected and approved by the Engineer.

4. PAINT SYSTEMS

For the purposes of this specification, systems of preparing and painting metalwork will be designated as defined below:

Paint System A shall consist of the preparation of the surfaces to be painted by Method 1 and the application of two priming coats of Type 1 paint and two or more top coats of Type 5 paint as necessary to provide a total dry paint film thickness of 6 mils.

Paint System B shall consist of the preparation of the surfaces to be painted by Method 1 and the application of one priming coat of Type 1 paint and two top coats of Type 5 paint.

Paint System C shall consist of the preparation of the surfaces to be painted by Method 2 and the application of one priming coat of Type 2, Type 3 or Type 4 paint and two top coats of Type 6 paint.

Paint System D shall consist of the preparation of the surfaces to be painted by Method 2 and the application of one priming coat of Type 2 paint and two top coats of Type 7 paint.

Paint System E shall consist of the preparation of the surfaces to be painted by Method 2 and the application of one priming coat of Type 2 paint and two top coats of Type 8 paint.

Paint System F shall consist of the preparation of the surfaces to be painted by Method 3 and the application of two coats of Type 9 paint.

Paint System G shall consist of the preparation of the surfaces to be painted by Method 3 and the application of two coats of Type 10 paint.

Paint System H shall consist of the preparation of the surfaces to be painted by Method 1 and the application of four or more coats of Type 1 paint as necessary to provide a total dry paint film thickness of 6 mils.

Paint System I shall consist of the preparation of the surfaces to be painted by Method 1 and the application of two or more coats of Type 11 paint as necessary to provide a total dry paint film thickness of at least 16 mils.

5. APPLICATION OF PAINT

Surfaces shall be painted immediately after preparation (or within two days after preparation and treatment with metal conditioner) with at least one coat of the type of priming paint required by the specified paint system. Surfaces not required to be painted shall be protected against contamination and damage during the cleaning and painting operation.

Paints shall be thoroughly mixed at the time of application.

After erection or installation of the metalwork, all damage to shop applied coats shall be repaired and all bolts, nuts, welds and field rivet heads shall be cleaned and painted with one coat of the specified priming paint.

Except on surfaces accessible only to spray equipment, initial priming coats shall be applied by brush. All other coats may be applied by brush or spray. Each coat shall be applied in such a manner as to produce a paint film of uniform thickness with a rate of coverage within the limits recommended by the paint manufacturer.

The drying time between coats shall be as prescribed by the manufacturer of the paint but not less than that required for the paint film to dry through. The elapsed time between the application of the first and second prime coats of Paint System A shall not exceed 60 hours. In the application of Paint System I, if, for any reason, the first coat dries hard before the second coat is applied or the elapsed time between coats exceeds 48 hours, the method of application must be modified in any of the following ways: (1) the first coat must be wiped down with MIBK with the application of the second coat following the wipedown by not more than 6 feet; or (2) the first coat must be lightly brush blasted or given a fog coat of the paint before application of the full second coat; or (3) a special bonding additive supplied by the paint manufacturer must be mixed with the paint applied in the second coat.

The finished surface of each coat shall be free from runs, drops, ridges, laps or excessive brushmarks and shall present no variation in color, texture and finish.

The surface of each dried coat shall be cleaned as necessary before application of the next coat.

Except for Paint System I, the first coat of each two-coat system shall be tinted for contrast. The first coat of red-lead paint shall be tinted by the addition of 3 ounces per gallon of 1B

black pigment. The first coat of machinery paint shall be tinted off color with 3 ounces per gallon of a pigment suitable to the color of the paint.

6. ATMOSHPERIC CONDITIONS

Paint shall not be applied when the temperature of the item to be painted or of the surrounding air is less than 50°F. For Paint System I, the temperature of the coated surface must be maintained at not less than 50°F for 6 hours after the application of each coat. Painting shall be done only when the humidity and temperature of the surrounding air and the temperature of the metal surfaces are such that evaporation rather than condensation will result during the period of time required for application and drying. Surfaces protected from adverse atmospheric conditions by special cover, heating or ventilation shall remain so protected until the paint is dry.

7. TESTS

Acceptance of dry paint film thickness for Paint Systems A, H, and I will be based on the measurement of paint film thickness by means of an Elcometer or other suitable dry film thickness gage.

8. PAYMENT

For items of work for which specific lump sum prices are established in the contract, payment for painting metalwork will be at the contract lump sum price. Such payment will constitute full compensation for furnishing, preparing and applying all materials and for the cleaning, painting and coating of metalwork including labor, tools, equipment and all other items necessary and incidental to the completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 9 of this specification.

9. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Subsidiary Item, Cleaning and Painting Metal Work

(1) This item shall consist of the cleaning and painting of the metal work specified in Bid Item 24, Metal Work, and the Identification Sign, Bid Item 25.

(2) In Section 4, Paint Systems, Paint System C shall apply for the Metal Work in Bid Item 24.

(3) Paint System E shall apply for the Identification Sign. The two top coats of paint on the identification sign shall be white and the letters painted with a dark green enamel.

(4) No separate payment will be made for cleaning and painting. Compensation for this work will be included in the payment for Bid Item 24, Metal Work and for Bid Item 25, Identification Sign.

CONSTRUCTION SPECIFICATION

91. CHAIN LINK FENCE

1. SCOPE

The work shall consist of furnishing and installing chain link fencing complete with all posts, braces, gates and all other appurtenances.

2. MATERIALS

Fence posts, gates and accessories shall conform to the requirements of Federal Specification RR-F-183.

Fencing, chain link fabric shall conform to the requirements of Federal Specification RR-F-191 for the type and grade specified. Unless otherwise specified, the fencing shall be Class 1, Coating A, B, or C, 2-inch mesh, 9 gage.

Barbed wire shall conform to the requirements of Federal Specification RR-F-221 for 4-point, 12½-gage barbed wire with Class 2 zinc coating.

3. INSTALLING FENCE POSTS

Unless otherwise specified, line posts shall be placed at intervals of 10 feet measured from center to center of adjacent posts. In determining the post spacing, measurement will be made parallel with the ground surface.

Post will be set in concrete backfill in the manner shown on the drawings.

Posts set in the tops of concrete walls shall be grouted into preformed holes to a depth of 12 inches.

All corner posts, end posts, gate posts, and pull posts shall be embeded, braced and trussed as shown on the drawings.

4. INSTALLING WIRE FABRIC

Fencing fabric shall not be stretched until at least 4 days after the posts are grouted into walls or 14 days after the posts are set in the concrete backfill.

Fencing shall be installed on the side of the posts designated on the drawings.

The fabric shall be stretched taut and securely fastened, by means of tie clips, to the posts at intervals not exceeding 15 inches and to the top rails or tension wires at intervals not exceeding 2 feet. Care shall be taken to equalize the tension on each side of each post.

Barbed wire shall be installed as shown on the drawings and shall be pulled taut and fastened to each post with tie wires or metal tie clips.

5. MEASUREMENT AND PAYMENT

(Method 1) The length of fence will be measured to the nearest 0.1 foot along the fence, including gates. Payment will be made at the contract unit price for the specified height of fence. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work.

(Method 2) The length of fence will be measured to the nearest 0.1 foot along the fence, excluding gate openings. Payment will be made at the contract unit price for the specified height of fence. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work except furnishing, fabricating and installing gates. Payment for furnishing, fabricating and installing each type and size of gate will be made at the contract unit price for that type and size of gate.

(Use with Either Method) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 6 of this specification.

6. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 26, Chain Link Fence

(1) This item shall consist of furnishing and installing the chain link fence, including all concrete anchors, gates and appurtenances, around the outlet channel as shown on sheets 9, 29 and 32 of the drawings.

(2) The chain link fencing shall be 9-gage, Type I, Grade A, having a two-inch mesh and a nominal height of seven feet. The fence shall have an industrial type top with three (3) lines of zinc-coated steel barbed wire which is to be of the four-point pattern composed of two (2) strands of 12½-gage line wires with 14-gage barbs spaced on approximately five (5) inch centers.

(3) The concrete for post anchors shall be Class 4000X.

(4) Measurement and payment will be by Method 1.

CONSTRUCTION SPECIFICATION

92. FARM FIELD FENCES

1. SCOPE

The work shall consist of furnishing and installing farm field fences, including gates and fittings.

2. MATERIALS

Materials for farm field fences shall conform to the requirements of Material Specification 591. All wooden posts shall be of the same species.

3. SETTING POSTS

Concrete or wood posts shall be set in holes and backfilled with earth except where otherwise specified. Steel posts shall be driven unless otherwise specified.

Posts holes shall be at least 6 inches larger than the diameter or side dimension of the posts.

Earth backfill around posts shall be thoroughly tamped in layers not thicker than 4 inches and shall completely fill the post hole up to the ground surface. Concrete backfill around posts shall be rodded into place in layers not thicker than 12 inches and shall completely fill the post hole up to the ground surface. Backfill, either earth or concrete, shall be crowned up around posts at the ground surface.

No stress shall be applied to posts set in concrete until at least 24 hours after the concrete has set.

4. CORNER ASSEMBLY

Unless otherwise specified, corner assemblies shall be installed at all points where the fence alignment changes 15 degrees or more.

5. END PANELS

End panels shall be built at gates and fence ends.

6. PULL POST ASSEMBLY

Pull post assemblies shall be installed at the following locations:

a. In straight fence sections, at intervals of no more than 660 feet.

b. At any point where the vertical angle described by two adjacent reaches of wire is upward and exceeds 10 degrees (except as provided in Section 9 of this specification).

c. At the beginning and end of each curve.

7. ATTACHING FENCING TO POSTS

The fencing shall be stretched and attached to posts as follows:

a. The fencing shall be placed on the side of the post opposite the area being protected, except on curves.

b. The fencing shall be placed on the outside of curves.

c. The fencing shall be fastened to each end post, corner post and pull post by wrapping each horizontal strand around the post and tying it back on itself with not less than three tightly wound wraps.

d. The fencing shall be fastened to wooden line posts by means of staples. Woven wire fencing shall be attached at alternate horizontal strands. Each strand of barbed wire shall be attached to each post. Staples shall be driven diagonally with the grain of the wood and at a slight downward angle and shall not be driven so tightly as to bind the wire against the post.

e. The fencing shall be fastened to steel or concrete line posts with either two turns of 14 gage galvanized steel or iron wire or the post manufacturer's special wire clips.

f. Wire shall be spliced by means of a Western Union splice having not less than 8 wraps of each end about the other. All wraps shall be tightly wound and closely spaced.

8. STAYS

Stays shall be attached to the fencing in a manner to insure maintenance of the proper spacing of the fence wire strands.

9. CROSSINGS AT DEPRESSIONS AND WATERCOURSES

Where fencing is installed across small depressions or watercourses, either of the following methods of installation shall be used:

a. If the fence wire is installed parallel to the ground surface, the line posts subject to upward pull shall be anchored by means of extra embedment or by special anchors as detailed on the drawings.

b. If the wire fence is installed with the top wire straight and parallel to the ground surface on either side of the depression, extra length posts shall be used to allow normal post embedment. Unless otherwise specified, excess space between the bottom of the fence and the ground shall be closed with extra strands of barbed wire.

10. MEASUREMENT AND PAYMENT

(Method 1) The length of each type and kind of fence will be measured to the nearest foot along the profile of the fence, including gate openings. Payment for each type and kind of fence will be made at the contract unit price for that type and kind of fence. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the performance of the work including fabricating and installing gates.

(Method 2) The length of each type and kind of fence will be measured to the nearest foot along the profile of the fence, excluding gate openings. Payment for each type and kind of fence will be made at the contract unit price for that type and kind of fence. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work, except fabricating and installing gates. Payment for each type and size of gate will be made at the contract price each for fabricating and installing that type and size of gate.

(Use with Either **Method**) Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 11 of this specification.

11. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 27, Woven Wire Fence

(1) This item shall consist of furnishing and installing the woven wire fence, including all concrete anchors, gates and appurtenances around the construction site, as shown on sheets 29 and 32 of the drawings.

(2) The woven wire fencing shall be standard woven wire No. 11, farm fence design #832-6-11. The fences shall have two (2) lines of zinc-coated steel barbed wire which is to be of the four-point pattern composed of two (2) strands of 12½-gage line wires with 14-gage barbs spaced on approximately five (5) inch centers.

(3) The concrete for post anchors shall be Class 4000X.

(4) Measurement and payment will be by Method 1.

10. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 28, Dental Grout

(1) This item shall consist of furnishing and placing the dental grout on the bottoms of the cutoff trenches for the East Dam, North Dam No. 1, and North Dam No. 2 where fractured rock is encountered below elevation 1,259 as shown on the drawings and directed by the Engineer.

(2) Where conditions permit, the minimum penetration of the grout in all cracks and joints shall be twelve (12) inches.

(3) Dental grout shall be three (3) parts sand to one (1) part cement and of such consistency that the grout can be poured and broomed into the joints and cracks.

(4) Measurement and payment will be made in accordance with Section 9.

b. Bid Item 29, Rock Surface Preparation and Cleaning

(1) This item shall consist of the preparation and cleaning of all rock in the bottoms of the cutoff trenches for the East Dam, North Dam No. 1 and North Dam No. 2 below elevation 1,259, as shown on the drawings and directed by the Engineer.

(2) When possible, all faults or seams in the rock shall be cleaned to a minimum depth of twelve (12) inches and to firm rock on the sides.

(3) The prepared rock surfaces shall be kept free of all soil and loose rock particles prior to the placement of the dental grout.

(4) Measurement and payment will be made in accordance with Section 9.

CONSTRUCTION SPECIFICATION

202. PLASTIC PIPE CONDUITS

1. SCOPE

The work shall consist of furnishing and installing plastic pressure pipe conduits and the necessary fittings and appurtenances as shown on the drawings.

2. MATERIALS

Plastic pressure pipe and fittings shall conform to the requirements of MATERIAL SPECIFICATION 302 for the type, grade and class specified.

3. LAYING AND BEDDING THE PIPE

Plastic pressure pipe conduits complete with fittings and other related appurtenances shall be installed to the lines and grades shown on the drawings and specified in Section 7. During installation the pipe shall be firmly and uniformly bedded throughout its entire length, to the depth and in the manner specified on the drawings. Blocking or mounding beneath the pipe shall not be used to bring the pipe to final grade.

Bedding and backfill materials shall meet the requirements for the class of materials specified in Section 7 and shown on the drawings.

Bedding and backfill materials shall be placed and spread in uniform layers in such a manner as to fill the trench completely so that there will be no unfilled spaces under or about rocks or lumps of earth in the backfill. Large rocks, frozen clods or other debris shall be removed.

After the pipe has been assembled in the trench, it shall be allowed to cool to ground temperature before backfilling to prevent pull out of joints due to thermal contraction.

4. JOINTS

Pipe joints shall conform to the details shown on the drawings and to the requirements specified in Section 7. Except where unsealed joints are indicated, pipe joints shall be sound and watertight at the pressure specified. The joints shall be made in such manner that the inside of the line is left free of any obstructions that reduce the capacity of the line.

Where fittings made of steel or other metals subject to corrosion are used in the conduit or drain, they shall be protected by wrapping with plastic tape. Where plastic tape is used, all surfaces to be wrapped shall be thoroughly cleaned and then coated with primer compatible with the tape before wrapping.

5. PRESSURE TESTING

General

a. The pipe conduit shall be pressure tested for strength and leakage before backfill operations are performed except that backfill adjacent to thrust blocks, bends and other designated points shall be completed before pressure testing.

b. In some cases, it may be necessary to partially backfill the line before testing in order to hold the line in place. Where this occurs the partial backfill shall be in accordance with CONSTRUCTION SPECIFICATION 23, Earth Fill, and only the body of the pipe sections shall be covered leaving the joints and connections uncovered for inspection purposes.

c. When cemented or chemically welded joints are used, the assembled pipeline shall be allowed to lie in the trench for approximately 12 hours before flushing and testing, to insure complete setting of the joints.

(Method 1) Pressure testing of the completed conduit will not be required.

(Method 2) Prior to the placement of concrete or earth fill around the conduit, the conduit shall be tested at the pressure specified in Section 7 for a period of at least 2 hours. Any leaks shall be repaired and the conduit shall be retested. The procedure shall be repeated until the conduit is watertight. The pipe joints shall show no leakage.

6. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, the quantity of each kind, size and class of pipe will be determined to the nearest foot by measurement of the laid length along the invert centerline of the conduit. Payment for each kind, size and class of pipe will be made at the contract unit price for that kind, size and class. Such payment will constitute full compensation for furnishing, transporting and installing the pipe complete in place.

(Method 2) For items of work for which specific unit prices are established in the contract, the quantity of each kind, size and class of pipe will be determined as the sum of the nominal laying lengths of the sections used. Payment for each kind, size and class of pipe will be made at the contract unit price for that kind, size and class. Such payment will constitute full compensation for furnishing, transporting and installing the pipe complete in place.

(Use with Either Method) Compensation for any items of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 30, 1/2-inch Diameter Plastic Pipe (PE)
Bid Item 31, 3/4-inch Diameter Plastic Pipe (PE)

(1) This item shall consist of furnishing and installing the plastic pipe including excavation and backfill with all appurtenances such as fittings, pressure reducers, emitters and pressure gages required for the drip irrigation system for the East Dam, North Dam No. 2 and North Dam No. 1 as shown on the drawings and staked in the field.

(2) The pipe and fittings shall be polyethylene (PE) plastic having a maximum SDR of 15.0 and a minimum pressure rating of 80 psi, conforming to the requirements of ASTM D 2239.

(3) The pipe shall have a minimum of two (2) inches and a maximum of four (4) inches of cover.

(4) The emitters shall be installed so that one is located at every tree or shrub. They shall be capable of discharging one (1) GPH and being flushed manually.

(5) The pressure reducers shall be capable of reducing the pressure from 50 psi to a pressure between 12 psi and 18 psi.

(6) The pressure gages shall be capable of measuring fifty (50) psi in increments of two (2) psi or less.

(7) Joining the pipe shall be done according to the manufacturer's recommendations.

(8) Pressure testing shall be by Method 2.

(9) Measurement and payment will be by Method 1.

b. Bid Item 32, 1 1/4-inch Diameter Plastic Pipe (PVC)
Bid Item 33, 1-inch Diameter Plastic Pipe (PVC)
Bid Item 34, 3/4-inch Diameter Plastic Pipe (PVC)

(1) These items shall consist of furnishing and installing the plastic pipe including excavation and backfill with all appurtenances such as fittings, and valves required for the drip irrigation system main and sub-main lines for the East Dam, North Dam No. 2 and North Dam No. 1

(2) The pipe and fittings shall be poly vinyl chloride (PVC) plastic having a maximum SDR of 26.0 and a minimum pressure rating of 80 psi, conforming to ASTM D 2241.

(3) The valves shall be standard brass globe valves.

(4) The pipe shall have a minimum of eight (8) inches and a maximum of ten (10) inches of cover.

(5) Joining the pipe shall be done according to the manufacturer's recommendations.

(6) Pressure testing shall be by Method 2.

(7) Measurement and payment will be by Method 1.

CONSTRUCTION SPECIFICATION

400. LANDSCAPING

1. SCOPE

The work shall consist of the preparation and planting of the areas to be landscaped as shown on the drawings.

2. MATERIALS

Plants - shall be well rooted one-gallon container size of the species and quantity listed on the drawings. All plants shall be healthy, vigorous and free of disease and insect pests.

Fertilizer - shall be tablet form, each weighing 21 grams and having the nitrogen, phosphate and potash designation of 20-10-0.

3. PLANTING

The trees and shrubs shall be planted at the spacings and locations as specified or shown on the drawings.

All trees and shrubs shall be fertilized at the time of planting by placing one fertilizer tablet in the root area of each plant.

Site preparation and planting will be suspended whenever the soil moisture condition is such that it is detrimental to the work.

4. DISPOSAL OF WASTE MATERIALS

Plant containers and other waste material shall be disposed of by the Contractor at sites of his own choosing away from the construction site.

5. MEASUREMENT AND PAYMENT

For items of work for which specific prices are established in the contract, payment for landscaping will be made at the lump sum price established in the contract. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

6. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid Item 35, Landscaping

(1) This item shall consist of furnishing, planting and fertilizing the trees and shrubs required for landscaping the East Dam, North Dam No. 1 and North Dam No. 2 as shown on the drawings and directed by the Engineer.

(2) Measurement and payment will be in accordance with Section 5.

MATERIAL SPECIFICATION

302. PLASTIC PRESSURE PIPE

1. SCOPE

This specification covers the quality of plastic pressure pipe and fittings.

2. PRESSURE PIPE

All pipe shall be plastic pressure pipe suitable for underground use. The pipe shall conform to the requirements of the following ASTM specifications:

D 1785 Poly(Vinyl Chloride) (PVC) Plastic pipe, Schedules 40, 80 and 120.

D 2104 Polyethylene (PE) Plastic Pipe, Schedule 40

D 2241 Poly(Vinyl Chloride) (PVC) Plastic Pipe, (SDR-PR and Class T)

D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80

D 2282 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, (SDR-PR and Class T)

D 2239 Polyethylene (PE) Plastic Pipe, (SDR-PR)

D 2447 Polyethylene (PE) Plastic Pipe, Schedules 40 and 80 Based on Outside Diameter

D 2672 Bell-End Poly(Vinyl Chloride) (PVC) Pipe

3. PRESSURE PIPE FITTINGS

Pressure pipe fittings shall conform to the requirements of the following ASTM specifications:

D 2466 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Socket-Type, Schedule 40

D 2467 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Socket-Type, Schedule 80

D 2464 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Threaded, Schedule 80

D 2468 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Socket-Type, Schedule 40

D 2469 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Socket-Type, Schedule 80

D 2465 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Threaded, Schedule 80

D 2609 Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe

D 2610 Butt Fusion Polyethylene (PE) Plastic Pipe Fittings, Schedule 40

D 2611 Butt Fusion Polyethylene (PE) Plastic Pipe Fittings, Schedule 80

4. SOLVENTS AND GASKETS

Solvents for solvent welded pipe joints shall conform to the following ASTM specifications:

D 2564 Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings

D 2235 Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

D 2855 Making Solvent Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings

Rubber gaskets for pipe joints shall conform to the requirements of ASTM Specification D 1869.

MATERIAL SPECIFICATION

521. AGGREGATES FOR DRAIN FILL AND FILTERS

1. SCOPE

This specification covers the quality of mineral aggregates for the construction of drain fill and filters.

2. QUALITY

Drain fill and filter aggregates shall be sand, gravel or crushed stone or mixtures thereof. They shall be composed of clean, hard, durable mineral particles free from organic matter, clay balls, soft particles or other substances that would interfere with their free-draining properties. Not more than 15 percent, by weight, shall be flat, elongated particles.

Unless otherwise specified, not more than 5 percent of the material finer than a No. 4 sieve shall be crushed limestone.

Aggregates shall be tested for soundness according to ASTM Method C 88, and shall have a weighted average loss in five cycles of not more than 12 percent when sodium sulfate is used or 18 percent when magnesium sulfate is used.

3. GRADING

Drain fill and filter aggregates shall conform to the specified grading limits after being placed in the work, and after being compacted if compaction is specified. Grading shall be determined by ASTM Method C 136, but the percentage of material finer than a No. 200 sieve shall be not more than 3 percent when determined by ASTM Method C 117.

4. STORING AND HANDLING

Drain fill and filter aggregates shall be stored and handled by methods that prevent segregation of particle sizes or contamination by mixing with other materials.

MATERIAL SPECIFICATION

522. AGGREGATE FOR PORTLAND CEMENT CONCRETE

1. SCOPE

This specification covers the quality of fine aggregate and coarse aggregate for use in the manufacture of portland cement concrete.

2. QUALITY

Aggregate shall conform to the requirements of ASTM Specification C-33 for the specified sizes. Aggregates that fail to meet any requirement may be accepted only when: (1) the specified alternate conditions of acceptance can be proved prior to the use of the aggregates on the job and within a period of time such that no work under the contract will be delayed by the requirements of such proof; or, (2) the specification for concrete expressly contains a provision of special mix requirements to compensate for the effects of the deficiencies.

3. REACTIVITY WITH ALKALIES

The potential reactivity of aggregates with the alkalies in cement shall be evaluated by petrographic examination and, where applicable, the chemical method of test, ASTM Designation C 289, or by the results of previous tests or service records of concrete made from similar aggregates from the same source. The standards for evaluating potential reactivity shall be as described in ASTM Specification C 33, Appendix A1.

Aggregates indicated by any of the above to be potentially reactive shall not be used, except under one of the following conditions:

a. Applicable test results of mortar bar tests, made according to ASTM Method C 227, are available which indicate an expansion of less than 0.10 percent at six months in mortar bars made with cement containing not less than 0.8 percent alkalies expressed as sodium oxide; or

b. Concrete made from similar aggregates from the same source has been demonstrated to be sound after 3 years or more of service under conditions of exposure to moisture and weather similar to those anticipated for the concrete under these specifications.

Aggregates indicated to be potentially reactive, but within acceptable limits as determined by mortar bar test results or service records, shall be used only with "low alkali" cement, containing less than 0.60 percent alkalies expressed as sodium oxide.

4. STORING AND HANDLING

Aggregate of each class and size shall be stored and handled by methods that prevent segregation of particle sizes or contamination by intermixing with other materials.

MATERIAL SPECIFICATION

523. ROCK FOR RIPRAP

1. SCOPE

This specification covers the quality of rock to be used in the construction of rock riprap.

2. QUALITY

Individual rock fragments shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock fragments shall be angular to subrounded in shape. The least dimension of an individual rock fragment shall be not less than one-third the greatest dimension of the fragment.

Except as provided below, the rock shall have the following properties:

a. Bulk specific gravity (saturated surface-dry basis) not less than 2.5.

b. Absorption not more than 2 percent.

c. Soundness: Weight loss in 5 cycles not more than 10 percent when sodium sulfate is used or 15 percent when magnesium sulfate is used.

The bulk specific gravity and absorption shall be determined by ASTM Method C 127. The test for soundness shall be performed according to the procedure for ledge rock in Federal Specification SS-R-406c, Method 203.01.

Rock that fails to meet the requirements stated in a, b, and c above, may be accepted only if similar rock from the same source has been demonstrated to be sound after 5 years or more of service under conditions of weather, wetting and drying, and erosive forces similar to those anticipated for the rock to be installed under this specification.

3. GRADING

The rock shall conform to the specified grading limits after it has been placed in the riprap.

MATERIAL SPECIFICATION

531. PORTLAND CEMENT

1. SCOPE

This specification covers the quality of portland cements.

2. QUALITY

Portland cement shall conform to the requirements of ASTM Specification C 150 for the specified types of cement, except that, whenever Type I portland cement is specified, portland blast furnace slag cement conforming to the requirements of ASTM Specification C 595 may be used in lieu thereof.

If air-entraining cement is to be used, the Contractor shall furnish the manufacturer's written statement giving the source, amount and brand name of the air-entraining addition.

3. STORAGE AT THE CONSTRUCTION SITE

Cement shall be stored in such a manner as to be protected from weather, dampness or other destructive agencies. Cement that is partially hydrated or otherwise damaged will be rejected.

MATERIAL SPECIFICATION

532. AIR-ENTRAINING ADMIXTURES (FOR CONCRETE)

1. SCOPE

This specification covers the quality of air-entraining admixtures for concrete.

2. QUALITY

Air-entraining admixtures shall conform to the requirements of ASTM Specification C 260, except that the relative durability factor in the freezing and thawing test shall be not less than 95.

MATERIAL SPECIFICATION

533. WATER-REDUCING AND SET-RETARDING ADMIXTURES FOR PORTLAND CEMENT CONCRETE

1. SCOPE

This specification covers the quality of water-retarding and set-retarding admixtures for portland cement concrete.

2. QUALITY

Water-reducing and set-retarding admixtures shall conform to the requirements of ASTM Specification C 494, except that resistance to freezing and thawing shall be determined in all cases, and the minimum relative durability factor shall be 95.

3. TYPES

Admixtures shall be Type A, Water-Reducing or Type D, Water-Reducing and Retarding, as defined in ASTM Specification C 494.

4. PERFORMANCE IN THE JOB MIX

When added in the manner and amount recommended by the manufacturer to the concrete used on the job, with no change in the cement content or proportions of the aggregates, admixtures shall have the following effects:

Type A or Type D: The water content at the required slump shall be at least 5 percent less with the admixture than without. The air content shall remain within the range specified, but shall not exceed 8 percent in any case.

Type D: The time of initial setting, determined as prescribed in ASTM C 494, shall be from 1 to 3 hours longer with the admixture than without.

MATERIAL SPECIFICATION

534. CURING COMPOUND (FOR CONCRETE)

1. SCOPE

This specification covers the quality of liquid membrane-forming compounds suitable for spraying on concrete surfaces to retard the loss of water during the curing process.

2. QUALITY

The curing compound shall meet the requirements of ASTM Specification C 309.

Unless otherwise specified the compound shall be Type 2.

3. DELIVERY AND STORAGE

All curing compound shall be delivered to the site of the work in the original container bearing the name of the manufacturer and the brand name. The compound shall be stored in a manner to prevent damage to the containers and to protect water-emulsion types from freezing.

MATERIAL SPECIFICATION

535. PREFORMED EXPANSION JOINT FILLER

1. SCOPE

This specification covers the quality of preformed expansion joint fillers for concrete.

2. QUALITY

Preformed expansion joint filler shall conform to the requirements of ASTM Specification D 1752, Type I, Type II or Type III, unless bituminous type is specified. Bituminous type preformed expansion joint filler shall conform to the requirements of ASTM Specification D 994.

MATERIAL SPECIFICATION

536. SEALING COMPOUND FOR JOINTS IN CONCRETE AND CONCRETE PIPE

1. SCOPE

This specification covers the quality of sealing compound for filling joints in concrete pipe and concrete structures.

2. TYPE

The compound shall be a cold-application mastic, single component or multiple component type.

The single component type shall be a ready-mixed nondrying compound furnished in troweling consistency or in preformed rope or strip form.

The multiple component type shall be composed of two or more substances that are to be mixed prior to application.

3. QUALITY

Sealing compound shall conform to the requirements of one of the following specifications:

ASTM Specification D 1850; Concrete Joint Sealer, Cold-Application Type. Penetration, determined as specified in ASTM D 1850, shall be not greater than 120.

Federal Specification SS-S-00210; Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints.

Federal Specification TT-S-227; Sealing Compound; Rubber Base, Two Component (For Calking, Sealing and Glazing in Building Construction), Type II.

The compound shall be capable of being applied at a temperature of 70°F and shall be of such nature that it will adhere to dry, dust free concrete when applied either directly or over a suitable primer. After curing it shall be a resilient, adhesive material that is capable of filling joints and firm enough to prevent the entry of subsequently placed concrete or of earth during the bedding, cradling or backfilling operations.

4. COMPOSITION AND PROPERTIES

The compound, if used for pipe having rubber gaskets, shall have a composition such that it will not cause deterioration of the rubber gaskets.

MATERIAL SPECIFICATION

537. NON-METALLIC WATERSTOPS

1. SCOPE

This specification covers non-metallic waterstops for use in joints of concrete structures.

2. CLASSIFICATION

a. Classes. Non-metallic waterstops shall be of the following classes, as specified:

Class I shall be made of either natural or synthetic rubber.

Class II shall be made of vinyl chloride polymer or copolymer.

b. Types. Non-metallic waterstops may be either split or solid and shall conform to the following types, as specified (see Figure 1):

Type A shall have ribbed anchor flanges and a smooth web. Flanges may be of uniform thickness or may have either a converging or a diverging taper toward the edges.

Type B shall have ribbed anchor flanges and a smooth web containing a hollow tubular center bulb having: (1) a wall thickness equal to at least one-half the web thickness and (2) the inside diameter (D) specified in the contract. Flanges may be of uniform thickness or may have either a converging or a diverging taper toward the edges.

Type C shall have a single, circular, bulb-type anchor flange at each edge and a smooth web.

Type D shall have a single, circular, bulb-type anchor flange at each edge and a smooth web containing a hollow tubular center bulb having: (1) a wall thickness equal to at least one-half the thickness of the web and (2) the inside diameter (D) specified in the contract.

Type E shall have ribbed anchor flanges and a web molded or extruded in the form of a round or U-shaped bulb of the dimensions specified in the contract. The web bulb shall be connected at the open end of the "U" by a thin membrane (having a thickness of not less than 1/64-inch or more than 1/5 the web thickness) designed to: (1) prevent infiltration of wet concrete into the bulb and (2) tear when expansion of the joint occurs. Flanges may be of uniform thickness or may have either a converging or a diverging taper toward the edges. Auxilliary positioning or nailing flanges may be provided so long as they do not interfere with the functioning of the web bulb.

Type F shall have ribbed anchor flanges with at least two extra heavy ribs (designed to resist displacement of the waterstop during placement of concrete) on each flange and a smooth web having a positioning or nailing flange attached at the center.

Type G shall be of special design conforming to the details shown on the drawings.

c. Sizes. Waterstops of Types A through F shall be of the sizes listed herein, as specified (see Table 1). Type G waterstops shall have the dimensions shown on the drawings.

3. PHYSICAL REQUIREMENTS

The extruded or molded materials shall exhibit the properties specified herein when tested by the methods specified in Section 4 of this specification.

a. Class I Waterstops

(1) The hardness (Shore A durometer) shall be not less than 60.

(2) The specific gravity shall be not more than 1.2.

(3) The tensile strength shall be not less than 2500 pounds per square inch.

(4) The ultimate elongation shall be not less than 450 percent.

(5) The compression set shall be not more than 30 percent.

(6) The water absorption (by weight) shall be not more than 5 percent.

(7) The decrease in tensile strength and ultimate elongation after aging shall be not more than 20 percent.

(8) There shall be no sign of failure due to brittleness at a temperature of minus 35°F.

b. Class II Waterstops

(1) The hardness (Shore A durometer) shall be not less than 60.

(2) The specific gravity shall be not more than 1.4.

(3) The tensile strength shall be not less than 1400 pounds per square inch.

(4) The ultimate elongation of the web shall be not less than 280 percent and that of the flanges shall be not less than 200 percent.

(5) The water absorption (by weight) shall be not more than one percent.

(6) There shall be no sign of failure due to flange brittleness at a temperature of 0°F. nor of web brittleness at a temperature of minus 35°F.

(7) The decrease in either tensile strength or ultimate elongation after accelerated extraction shall be not greater than 15 percent.

(8) As a result of the effects of alkalies:

(a) After immersion for 7 days, the sample shall exhibit no loss of weight and not more than 0.25 percent increase in weight, and the hardness (Shore A) of the treated sample shall differ from that of the untreated sample by not more than plus 5 points or minus 5 points.

(b) After immersion for 30 days, the sample shall exhibit no loss of weight and not more than 0.40 percent increase in weight, and the dimensions of the treated sample shall not differ from those of the untreated sample by more than one percent.

4. TEST METHODS

Testing shall be done by the methods cited herein. All cited test methods are included in Federal Test Method Standard No. 601.

a. Hardness shall be determined by Method 3021.

b. Specific gravity shall be determined by Method 14011.

c. Tensile strength shall be determined by Method 4111.

d. Ultimate elongation shall be determined by Method 4121.

e. Compression set shall be determined by Method 3311.

f. Water absorption shall be determined by Method 6631.

g. Tensile strength and ultimate elongation after aging shall be determined by Method 7111.

h. Brittleness shall be determined by Method 5311.

i. Accelerated extraction shall be accomplished by Method 6111 under the following conditions:

(1) Samples shall be not less than 1/16-inch nor more than 1/8-inch in thickness;

(2) The immersion medium shall be a solution made by dissolving 5 grams of chemically pure sodium hydroxide and 5 grams of chemically pure potassium hydroxide in one liter of distilled water;

(3) The samples shall be immersed in the medium for 14 days at a temperature of $145^{\circ} \pm 5^{\circ}F$;

(4) During the immersion period, air shall be gently bubbled through the medium from a 1/4-inch glass tube at a rate of about one bubble per second;

(5) Fresh medium shall be susbtituted every day;

(6) Samples need not be dipped in acetone.

j. The effects of alkalies shall be determined by Method 6251 under the following conditions:

(1) Samples shall be not more than 1/4-inch in thickness;

(2) The immersion medium shall be as described in (i), above;

(3) Fresh medium shall be substituted every 7 days.

(4) The samples shall be immersed in the medium for a period of 30 days;

(5) Samples need not be dipped in acetone.

5. CONDITION

Waterstops shall be extruded or molded in such a manner that the material is dense and homogeneous throughout and free from voids, tears, thins, indentations, or other imperfections. Unless otherwise specified, waterstops shall be symetrical in shape and uniform in dimensions and shall be furnished in continuous strips at least 50 feet long. Factory splices shall have a tensile strength equal to at least one-half that of the unspliced section.

6. PACKAGING AND STORING

Waterstops shall be package and stored by methods that will protect them from prolonged exposure to direct sunlight or excessive heat.

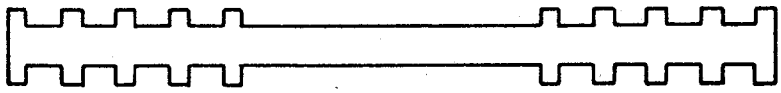
TABLE 1. SIZES OF WATERSTOPS

Size Designation	Web Thickness (T) (Inches)	Width (W) (Inches)
1	1/16	5 1/4
2	3/32	3 3/4
3	3/32	4
4	3/32	5 1/4
5	3/32	6
6	1/8	4
7	1/8	5 1/4
8	1/8	6
9	5/32	4
10	5/32	4 1/2
11	5/32	9
12	3/16	4
13	3/16	5
14	3/16	6
15	3/16	9
16	1/4	6
17	1/4	9
18	3/8	5
19	3/8	6
20	3/8	9
21	1/2	6
22	1/2	9
23	1/2	12

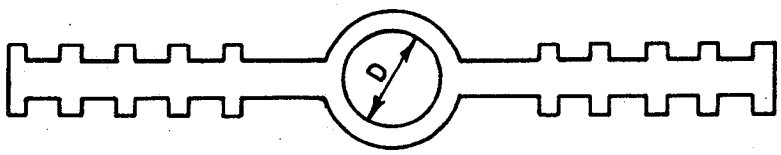
FIGURE 1

TYPES OF NON-METALLIC WATERSTOPS

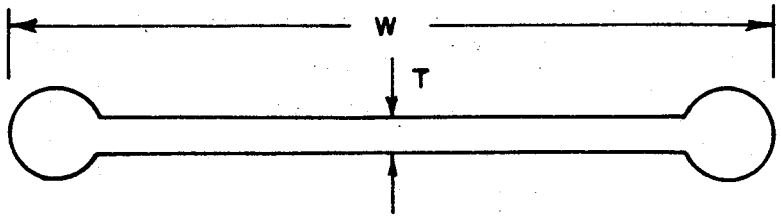
TYPE A



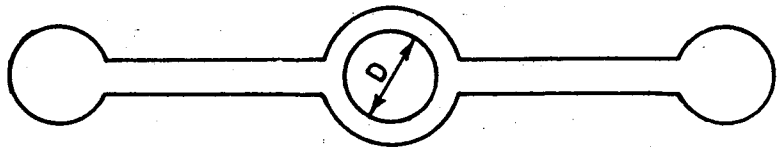
TYPE B



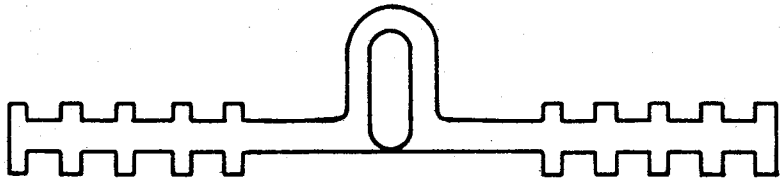
TYPE C



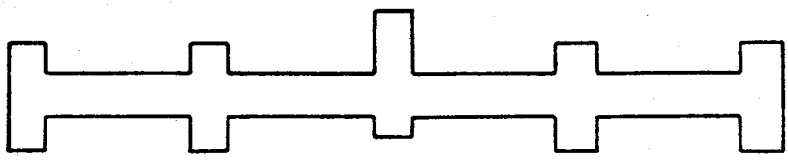
TYPE D



TYPE E



TYPE F



MATERIAL SPECIFICATION

538. METAL WATERSTOPS

1. SCOPE

This specification covers the quality of materials for metal waterstops.

2. MATERIALS

Metal waterstops shall be made of copper, wrought iron or galvanized steel as specified. Waterstops that require forming of the metal involving sharp bends shall be made of copper which shall be soft enough to stand being bent cold through 180 degrees at an inside radius equal to its thickness without cracking.

3. QUALITY

Metal for waterstops shall conform to the requirements of the applicable ASTM standard specifications below:

Copper - ASTM Specification B 152

Wrought iron - ASTM Specification A 162

Zinc-coated (Galvanized) wrought iron - ASTM Specification A 163

Zinc-coated (Galvanized) steel - ASTM Specification A 526

MATERIAL SPECIFICATION

539. STEEL REINFORCEMENT (FOR CONCRETE)

1. SCOPE

This specification covers the quality of steel reinforcement for reinforced concrete.

2. QUALITY

All reinforcement shall be free from rust, oil, grease, paint or other deleterious matter.

Steel bars for concrete reinforcement requiring bends shall be deformed billet-steel bars conforming to ASTM Specification A 615, Grade 40.

Straight steel bars shall be deformed bars conforming to one of the following specifications:

Deformed Billet-Steel Bars for Concrete Reinforcement (Grade 40 or Grade 60) - ASTM Designation A 615.

Rail-Steel Deformed Bars for Concrete Reinforcement (Grade 50 or Grade 60) - ASTM Designation A 616.

Axle-Steel Deformed Bars for Concrete Reinforcement (Grade 40 or Grade 60) - ASTM Designation A 617.

Fabricated steel bar mats shall conform to the requirements of ASTM Specification A 184.

Welded steel wire fabric reinforcement shall conform to the requirements of ASTM Specification A 185.

Welded deformed steel wire fabric for concrete reinforcement shall conform to the requirements of ASTM Specification A 497.

Cold-drawn steel wire reinforcement shall conform to the requirements of ASTM Specification A 82.

Deformed steel wire for concrete reinforcement shall conform to the requirements of ASTM Specification A 496.

3. DIMENSIONS OF WELDED WIRE FABRIC

Gages, spacing and arrangement of wires in welded steel wire fabric shall be as defined in ACI Standard 315 of the American Concrete Institute for the specified style designations.

4. STORAGE

Steel reinforcement stored at the site of the work shall be stored above the ground surface on platforms, skids or other supports and shall be protected from mechanical injury and corrosion.

MATERIAL SPECIFICATION

541. REINFORCED CONCRETE PRESSURE PIPE

1. SCOPE

This specification covers the quality of reinforced concrete pressure pipe and fittings.

2. DESIGN AND FABRICATION

The pipe and fittings shall be designed to withstand the specified external load and internal pressure. The pipe, the materials used in its manufacture, and the methods of fabrication shall conform to the requirements of the following specifications applicable to the specified type of pipe.

a. Steel Cylinder Type, Prestressed: AWWA Standard C301 for Prestressed Concrete Pressure Pipe, Steel Cylinder Type, for Water and Other Liquids.

b. Steel Cylinder Type, Not Prestressed: AWWA Standard C300, except that Section 2.6, Steel for Cylinders, paragraph 2.6.1 shall be:

> 2.6.1 Steel sheets for cylinders may be in coils or cut lengths, and shall meet the requirements of (1) the "Specification for Hot-Rolled Carbon Steel Sheets and Strip, Commercial Quality" (ASTM Designation A 569), except that the maximum carbon content may be 0.25 percent and the minimum yield point shall be 27,000 psi or (2) the "Specification for Hot-Rolled Carbon Steel Sheets and Strip, Structural Quality," Grade B or C (ASTM Designation A 570).

c. Noncylinder Type, Not Prestressed: AWWA Standard C302;

d. Low Head Pressure Pipe: ASTM Specifications C 361.

Sections 1.6 and 1.7 of AWWA Standards C300, C301 and C302 shall not apply.

3. STEEL REINFORCEMENT

The steel reinforcements shall conform to the requirements of the specifications cited in Section 2 for the specified type of pipe, except that elliptical reinforcing cages or other reinforcements that require special orientation of the pipe during placement will not be allowed.

4. JOINTS

The pipe joints shall conform to the requirements of the applicable specification for the pipe. They shall be bell-and-spigot type or double-spigot-and-sleeve type and shall have a positive groove in the spigot to contain the rubber gasket. The size and shape of the groove shall be such that it will prevent displacement of the gasket by either internal or external water pressure when the joint is in any position within the required range of movement capability. Joint sleeves, also referred to as "collars" or "coupling bands," shall conform to the requirements for bell rings in the applicable pipe specification.

The joints shall be constructed so as to permit relative movement of the adjoining pipe sections with no reduction of watertightness. The joint length and the limiting angle defining the required capability of relative movement at each joint shall be no less than specified.

Joint length refers to the permissible axial movement in the joint, and is defined as the maximum distance through which the spigot can move, relative to the bell or sleeve, from the fully engaged to the fully extended condition of the joint when the adjoining pipe sections are in parallel, concentric alignment. The joint is considered to be fully engaged when the spigot is inserted as far as it will go into the bell or sleeve, and fully extended when it is inserted the least amount that will insure full confinement of the gasket and complete watertightness. Joint length specified for double-spigot joints refers to the permissible movement in each of the spigot-to-sleeve connections, not the sum of the two.

The limiting angle of the joint is defined as the maximum deflection angle between adjoining pipe sections the joint will permit before the outer surface of the spigot comes into direct contact with inside of the mating bell or sleeve. If both spigot-to-sleeve connections of a double-spigot joint permit angular movement, the limiting angle of the joint is the sum of the two deflection angles permitted by the two connections.

5. GASKETS

The pipe joint gaskets shall conform to the requirements of the specifications cited in Section 2 of this specification. They shall be endless rubber gaskets having circular cross section. The cross-sectional diameter of the gaskets shall conform to the pipe manufacturer's recommendation for the type and size of pipe furnished.

6. MARKING

All pipe sections and special fittings shall be marked by the manufacturer with the manufacturer's name or trademark, the date of manufacture, the nominal size, design head, design external load and the structure site for which it was designed and manufactured.

7. INSPECTION, TESTING AND CERTIFICATION

The pipe shall be inspected by methods prescribed in the specifications cited herein, except that external crushing strength tests required as a basis for certification shall be performed by the three-edge bearing method described in ASTM Methods C 497.

The three-edge bearing load shall be defined as:

a. For pipe conforming to ASTM Specifications C 361, AWWA Standard C300 for AWWA Standard C302, the load required to produce a 0.01-inch crack one foot long; or,

b. For pipe conforming to AWWA Standard C301, the load required to produce a 0.001-inch crack one foot long.

The material certification will include:

a. The pipe manufacturer's certified statement of the design strength of the pipe, consisting of:

   (1) For types of pipe for which design curve have been approved by the Soil Conservation Service, (a) a copy of the appropriate design curve marked

to show the resultant concrete core stress and corresponding three-edge bearing load of the pipe furnished; and (b) a specification sheet for the pipe furnished showing all data and dimensions needed to compute the resultant concrete core stress; or

(2) Results of typical external crushing strength tests performed on pipe of equivalent size and design and composed of equivalent materials, or

(3) Results of external crushing strength tests performed on a specimen (at least two feet in length) of pipe identical in design and construction to the pipe furnished.

b. The pipe manufacturer's certified statement of results of the hydrostatic tests required by the reference specification appropriate to the type of pipe furnished.

c. The pipe manufacturer's certified statement of current typical test reports on steel and steel wire reinforcing and compression tests of the concrete used in the manufacture of the pipe.

d. Such drawings and descriptions of the pipe joint as may be necessary to show that the joint conforms to the specified requirements.

MATERIAL SPECIFICATION

542. CONCRETE CULVERT PIPE

1. SCOPE

This specification covers the quality of nonreinforced and reinforced concrete culvert pipe.

2. NONREINFORCED PIPE

Nonreinforced concrete culvert pipe shall conform to the requirements of ASTM Specifications C 14 for the class of pipe specified.

3. REINFORCED PIPE

a. Round pipe. Round reinforced concrete culvert pipe shall conform to the requirements of ASTM Specifications C 76 for the class of pipe specified.

b. Arch pipe. Reinforced concrete arch culvert pipe shall conform to the requirements of ASTM Specifications C 506 for the class of pipe specified.

c. Elliptical pipe. Reinforced concrete elliptical culvert pipe shall conform to the requirements of ASTM Specifications C 507 for the class of pipe specified.

4. RUBBER GASKET JOINTS

When rubber gasket joints are specified, the joints and gaskets shall conform to the requirements of ASTM Specifications C 443.

MATERIAL SPECIFICATION

553. STEEL PIPE AND FITTINGS

1. SCOPE

This specification covers the quality of steel pipe and fittings.

2. PIPE

Steel pipe shall conform to the requirements of the applicable specifications listed below for the kind of pipe and the type, weight, grade, and finish specified:

Kinds of Pipe	ASTM Specifications
Welded and seamless steel pipe (Standard Pipe)	A 53 or A 120
Electric-resistance-welded pipe (30-inch and under)	A 135
Arc-welded pipe (4-inch and over)	A 139
Arc-welded steel plate pipe (16-inch and over)	A 134
	AWWA Standard
Fabricated electrically welded steel water pipe	C201
Mill-type steel water pipe	C202

3. FITTINGS

Fittings shall conform to the requirements of Federal Specification WW-P-521 for the types and kinds specified.

MATERIAL SPECIFICATION

572. SLIDE GATES (SLUICE GATES), METAL, MODERATE DUTY

1. SCOPE

This specification covers the quality of moderate duty, metal slide gates (sluice gates) for water control.

2. CLASS AND TYPE OF GATE

The class of gate will be expressed as a numerical symbol composed of the seating head and unseating head which the gate must be built to withstand. The two numbers will be separated by a hyphen with the seating head listed first. For this purpose the heads shall be expressed in terms of feet of water.

The gates shall be of the specified types as defined below:

Type MMS-1 gates shall be cast iron with bronze seat facings, cast iron or galvanized structural steel guides, and galvanized steel, bronze, or stainless steel fasteners.

Type MMS-2 gates shall be cast iron with bronze seat facings, cast iron or stainless steel guides, and bronze or stainless steel fasteners. Guides and fasteners shall be stainless steel when so specified.

3. QUALITY OF MATERIALS

Materials in slide gates and appurtenances shall conform to the requirements of the applicable specifications listed below for the alloy, grade, type, or class of material and the condition and finish appropriate to the structural and operational requirements:

Material	Specification (ASTM)
Cast iron	A 48, Class 30, or A 126, Class B
Structural steel shapes, plates, and bars	A 36
Carbon steel bars	A 108 or A 575
Stainless steel	A 276, Type 302 or 304
Naval bronze	B 21

Material	Specification (ASTM)
Cast bronze	B 147
Rubber for gaskets and seals	D 2000, AA805 material

Galvanizing (zinc coating) shall conform to the requirements of Material Specification 582.

4. FRAME (OR SEAT)

The frame shall be cast iron and of the specified type. The front face shall be machined to receive the gate guides and the rear face shall be machined as required to match the specified attaching means.

5. GATE SLIDE

The gate slide shall be cast iron, rectangular in shape and shall have horizontal and vertical stiffening ribs of sufficient section to withstand the seating and unseating heads expressed by the gate class designation, as defined in Section 2 of this specification.

Tongues or grooves shall be cast or machined on the vertical sides of the slide along its entire height to match the guide grooves or angles.

A nut pocket with reinforcing ribs shall be integrally cast on the vertical centerline and above the horizontal centerline of the slide. The pocket shall be of a shape adequate to receive a flat-backed thrust nut or stem block and shall be built to withstand the opening and closing thrust of the stem.

6. GATE GUIDES

The gate guides shall be built to withstand the total thrust of the gate slide due to water pressure and wedge action.

Grooves shall be machined in cast iron guides to receive the tongue on the gate slide throughout the entire length of the guide.

The guides shall be of such length as to retain at least one-half the height of the gate slide when the gate is fully opened.

7. WEDGES AND WEDGE SEATS (OR BLOCKS)

Pads for supporting wedges, wedge seats and wedge loops (or stirrups) shall be cast as integral parts of the slide, frame or guides.

Wedges and wedge seats shall have smooth bearing surfaces. Wedges may be cast as integral parts of the slide. Removable wedges and wedge seats shall be fastened to the slide, frame or guides by means of suitable studs, screws, or bolts and shall be firmly locked in place after adjustment. Each interacting set of wedge and wedge seat shall be adjustable as needed to insure accurate and effective contact.

8. SEAT FACINGS

Seat facings shall be machined to a smooth finish to insure proper watertight contact. Bronze facings shall be securely attached by welding or by another approved method.

9. YOKE

When a self-contained gate is specified, the yoke shall be galvanized structural steel or cast iron and of such design as to capably withstand the loads resulting from operation of the gate. Cast iron yokes shall be provided with machined pads for connecting to the ends of the gate guides and to receive the stem thrust cap or handwheel lift.

10. GATE STEM AND LIFT (OR HOIST)

The gate stem and lift (or hoist) shall be of the specified type, size and capacity and, if hand operated, shall be capable of moving the gate slide under normal conditions, after it is unseated from its wedging device, with a pull on the handwheel or crank of not more than 25 pounds with the specified seating or unseating head of water against the gate.

Unless otherwise specified, the stem shall be carbon steel and shall be furnished in sections as necessary to permit reasonable ease in installation. Couplings shall be bolted, pinned or keyed to the stem. The stem shall be furnished with rolled or machine-cut right-hand 29° Acme threads of sufficient length to completely open the gate. The threads shall be smooth and of uniform lead and cross section, such that the nut can travel the full length without binding or excessive friction. The stem shall be threaded for connection to the stem block or thrust nut on the gate slide.

The lift shall be compatible with the type of stem furnished. Unless otherwise specified, the lift nut shall be cast bronze and shall be fitted with ball or roller thrust bearings designed to withstand the normal thrust developed during opening and closing

of the gate at the maximum operating heads. All gears, sprockets and pinions shall be machine-cut, with ratios and strength adequate to withstand operating loads. Sufficient grease fittings shall be provided to allow lubrication of all moving parts. An arrow and the word "open" shall be cast on the rim of the headwheel or on the lift housing to indicate the direction of opening. Unless otherwise specified, the lift for a non-rising-stem gate shall be provided with an indicator capable of showing both when the gate is fully open and when it is fully closed.

Provision shall be made to prevent stem rotation within the thrust nut at the connection with the gate slide.

Stop collars shall be provided on rising stems to prevent over-travel in opening and closing the gate.

11. STEM GUIDES

Unless otherwise specified, stem guides shall be cast iron with bronze bushed collars and adjustable in two directions.

12. WALL THIMBLE

When a wall thimble is specified it shall be cast iron and of the section, type and depth specified. The front flange shall be machined to match the gate frame and drilled and tapped to accurately receive the gate attachment studs.

Gaskets or mastic to be installed between the thimble and the gate frame shall conform to the recommendation of the gate manufacturer and shall be furnished with the thimble.

13. FASTENERS

All anchor bolts and other fasteners shall be galvanized or stainless steel or bronze, according to the type of gate specified as defined in Section 2 of this specification.

14. INSTALLATION INSTRUCTIONS

The Contractor shall supply the manufacturer's complete installation data, instructions for adjustments and drawings or templates showing the location of anchor bolts for each gate.

15. PAINTING

When specified, gates and accessories shall be painted by the designated systems.

16. CERTIFICATION

The material certification shall include the name of the manufacturer, and manufacturer's model number (for standard catalog items) or the seating and unseating heads for which the gate is designed together with such drawings and specifications as may be necessary to show that the gate conforms to the requirements of this specification.

MATERIAL SPECIFICATION

581. METAL

1. SCOPE

This specification covers the quality of steel and aluminum alloys.

2. STRUCTURAL STEEL

Structural steel shall conform to the requirements of ASTM Specification A 36.

High-strength low-alloy structural steel shall conform to ASTM Specification A 242 or A 588.

Carbon steel plates of structural quality to be bent or formed cold shall conform to ASTM Specification A 283, Grade C.

Carbon steel sheets of structural quality shall conform to ASTM Specification A 570, Grade D or A 611, Grade D.

Carbon steel strip of structural quality shall conform to ASTM Specification A 570, Grade C.

3. COMMERCIAL OR MERCHANT QUALITY STEEL

Commercial or merchant quality steel shall conform to the requirements of the applicable ASTM specifications listed below:

Product	ASTM Specification
Carbon steel bars	A 575, Grade M 1015 to Grade M 1031
Carbon steel sheets	A 569
Carbon steel strip	A 569
Zinc-coated carbon steel sheets	A 526

4. ALUMINUM ALLOY

Aluminum alloy products shall conform to the requirements of the applicable ASTM specifications listed below. Unless otherwise specified, Alloy 6061-T6 shall be used.

Product	ASTM Specification
Standard structural shapes	B 308
Extruded structural pipe and tube	B 429
Extruded bars, rods, shapes and tubes	B 221
Drawn seamless tubes	B 210
Rolled or cold-finished bars, rods and wire	B 211
Sheet and plate	B 209

5. BOLTS

Steel bolts shall conform to the requirements of ASTM Specification A 307. If high-strength bolts are specified they shall conform to the requirements of ASTM Specification A 325.

When galvanized or zinc-coated bolts are specified, the zinc coating shall conform to the requirements of ASTM Specification A 153; except that bolts 1/2 inch or less in diameter may be coated with electrodeposited zinc or cadmium coating conforming to the requirements of ASTM Specification A 164, Type RS, or ASTM Specification A 165, Type TS, unless otherwise specified.

6. RIVETS

Unless otherwise specified, steel rivets shall conform to the requirements of ASTM Specification A 502, Grade 1.

Unless otherwise specified, aluminum alloy rivets shall be Alloy 6061-T6 conforming to the requirements of ASTM Specification B 316.

7. WELDING ELECTRODES

Steel welding electrodes shall conform to the requirements of American Welding Society specification AWS A5.1, "Specification for Mild Steel Covered Arc-Welding Electrodes," except that they shall be uniformly and heavily coated (not washed) and shall be of such a nature that the coating will not chip or peel while being used with the maximum amperage specified by the manufacturer.

Aluminum welding electrodes shall conform to the requirements of American Welding Society specification AWS A5.10, "Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes."

MATERIAL SPECIFICATION

582. GALVANIZING

1. SCOPE

This specification covers the quality of zinc coatings applied to iron and steel products.

2. QUALITY

Zinc coatings shall conform to the requirements of the following specifications.

Zinc coatings on products fabricated from rolled, pressed, and forged steel shapes, plates, bars, and strip, 1/8 inch thick and heavier shall conform to ASTM Specification A 123.

Zinc coatings on assembled steel products shall conform to the requirements of ASTM Specification A 386 and shall be applied in conformance with the Recommended Practice for Providing High Quality Zinc Coatings (Hot-Dip) on Assembled Products (ASTM Designation A 385).

Zinc coatings on iron and steel hardware shall conform to the requirements of ASTM Specification A 153 except that bolts, screws and other fasteners 1/2 inch or less in diameter may be coated with electrodeposited zinc or cadmium coating conforming to the requirements of ASTM Specification A 164, Type RS, or ASTM Specification A 165, Type TS, unless otherwise specified.

MATERIAL SPECIFICATION

591. FARM FIELD FENCING MATERIALS

1. SCOPE

This specification covers the quality of materials used in the construction of farm field fences.

2. WIRE GAGE

When the size of steel wire is designated by gage number, the diameter shall be as defined for U. S. Steel Wire Gage.

3. FENCING

Barbed wire, woven wire and wire netting fencing shall conform to the requirements of Federal Specification RR-F-221 for the specified types and styles of fencing. Wire shall have Class 2 zinc coating unless otherwise specified.

4. STAYS, BRACING AND TENSION WIRE

Stays shall conform to the requirements of Federal Specification RR-F-221 unless otherwise specified. Bracing and tension wires shall have a tensile strength not less than 58,000 pounds per square inch. Stays and bracing and tension wire shall be zinc-coated as specified for the fencing wire.

5. WOOD FENCE POSTS AND BRACES

Wood posts shall be of black locust, red cedar, osage orange (Bois d'Arc), redwood, pressure treated pine or other wood of equal life or strength. At least half the diameter or diagonal dimension of red cedar or redwood posts shall be in heartwood. Pressure treatment shall conform to Material Specification 585. The posts shall be sound, new, free from decay, with all limbs trimmed substantially flush with the body. They shall be substantially straight throughout their length.

Wood braces shall be of material equal to or better than construction grade Douglas fir. They shall be pressure treated in conformance with Material Specification 585.

6. STEEL FENCE POSTS AND BRACES

Steel fence posts and braces shall conform to the requirements of Federal Specification RR-F-221. Posts with punched tabs for fastening the wires shall not be used.

7. CONCRETE FENCE POSTS

Concrete fence posts shall be manufactured to the specified requirements of size, shape, and strength.

8. PANEL GATES

Panel gates shall be the specified types, sizes, and quality and shall include the necessary fittings. The fittings shall consist of not less than two hinges and two latches or galvanized chains for fastening. Latches shall be of such design that a padlock may be used for locking. All fittings shall be equivalent to the gate manufacturer's standard.

9. WIRE GATES

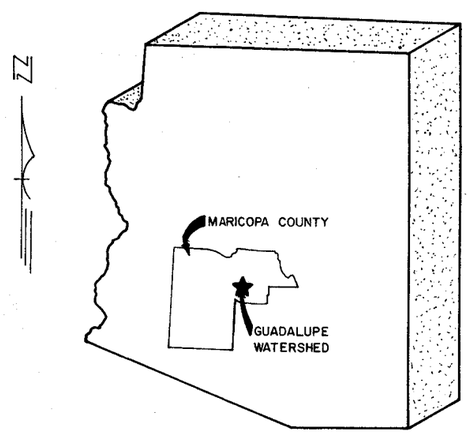
Wire gates shall be the type shown on the drawings, constructed in accordance with these specifications at the locations and to the dimensions shown on the drawings. The materials shall conform to the kinds, grades, and sizes specified for new fence, and shall include the necessary fittings and stays.

10. STAPLES

Staples used to fasten fence wire to wood posts shall be 9-gage galvanized wire with a minimum length of 1½ inches for soft woods and a minimum length of one inch for close-grain hardwoods.

11. GALVANIZING

All iron and steel fencing materials, except as otherwise specified, shall be zinc coated by the hot dip process, except that clips, tie wires, bands or other fabric fasteners may be protected by electrodeposited zinc or cadmium coating. Zinc or cadmium coating shall conform to the requirements of Material Specification 582.



GUADALUPE WATERSHED
PROTECTION AND FLOOD PREVENTION PROJECT
MARICOPA COUNTY, ARIZONA

PLANS FOR THE CONSTRUCTION OF

GUADALUPE FLOODWATER RETARDING STRUCTURE

PREPARED FOR THE FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
BY
SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

INDEX OF DRAWINGS

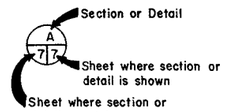
GENERAL NOTES

1. Elevations are in feet above mean sea level U.S.G.S. datum.
2. All stationing refers to centerline of construction and is the measured horizontal distance.
3. Soils are classified in accordance with the Unified Soils Classification System. Field logs are available in the Project Office, in Phoenix, Arizona.
4. All bearings are referenced to True North.

STRUCTURAL NOTES

1. Exposed concrete edges shall be chamfered one inch or rounded.
2. Reinforcing bar spacing is center to center of bars. Bar cover is clear distance between surface of bar and face of concrete and shall be two inches for formed and top surfaces and three inches for surfaces placed against the earth unless otherwise shown.
3. In sections with a single mat of reinforcing, the steel shall be positioned in the center of the section unless otherwise shown.
4. Reinforcing bars shall be continuous or spliced from floor and walls into adjacent floor and walls.
5. Bar splices shall be lapped a minimum of 30 bar diameters but not less than 12 inches, unless specifically shown otherwise.
6. All exposed metal including anchor bolts, nuts, washers, etc. shall be galvanized unless otherwise noted.

LEGEND



INDEX OF DRAWINGS
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DESIGNED	DATE	APPROVED BY	6/6/74
DRAWN D.K.T.	11/73	TITLE Head, ESWP Unit	
TRACED		TITLE State Conservation Engineer	
CHECKED	5/74	SHEET No. 1 of 38	DRAWING NO. 7-E-22659

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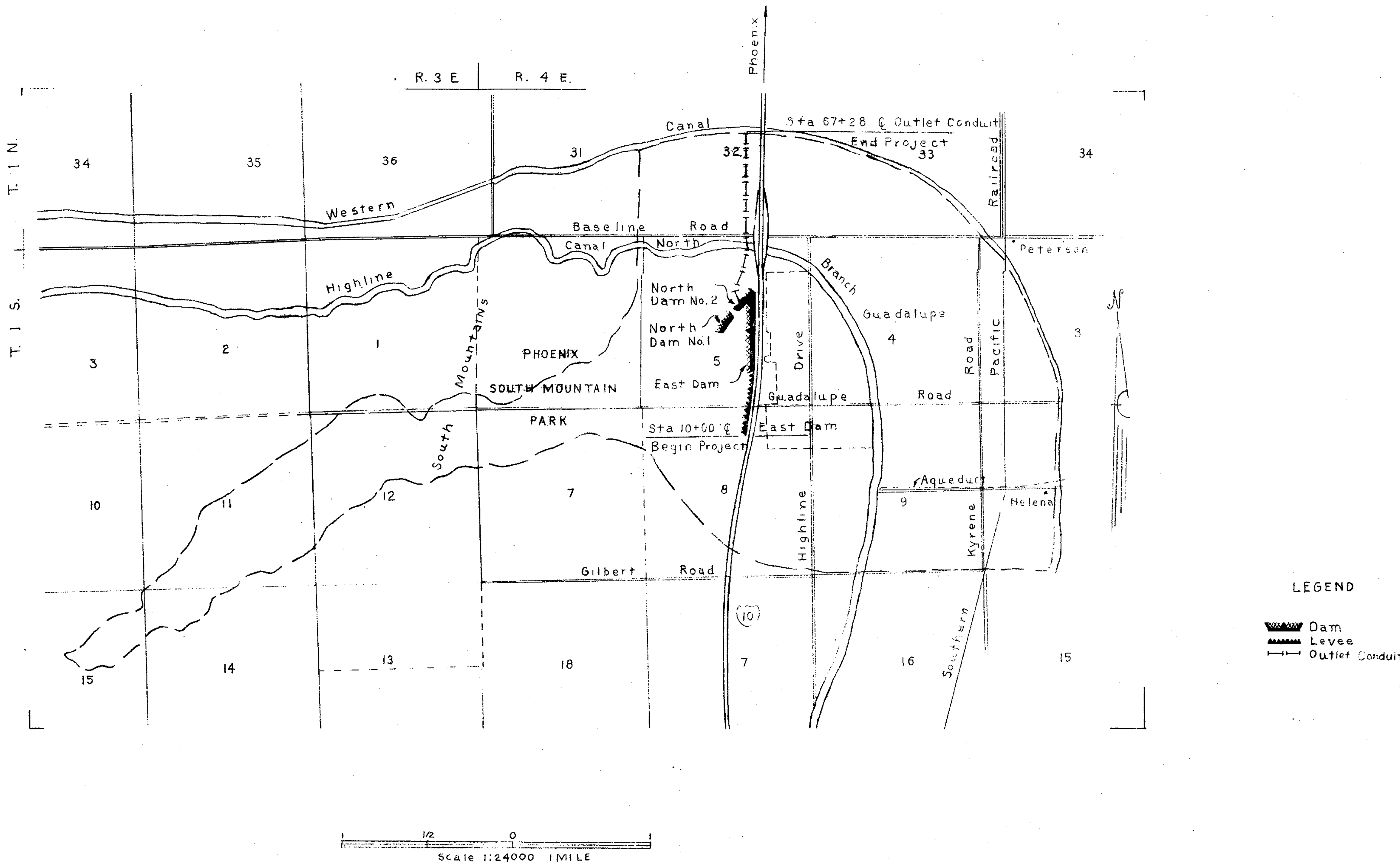
U.S. GOVERNMENT PRINTING OFFICE : 1997 OF—270-199
Form SCS-314 (November 1969)



LOCATION MAP

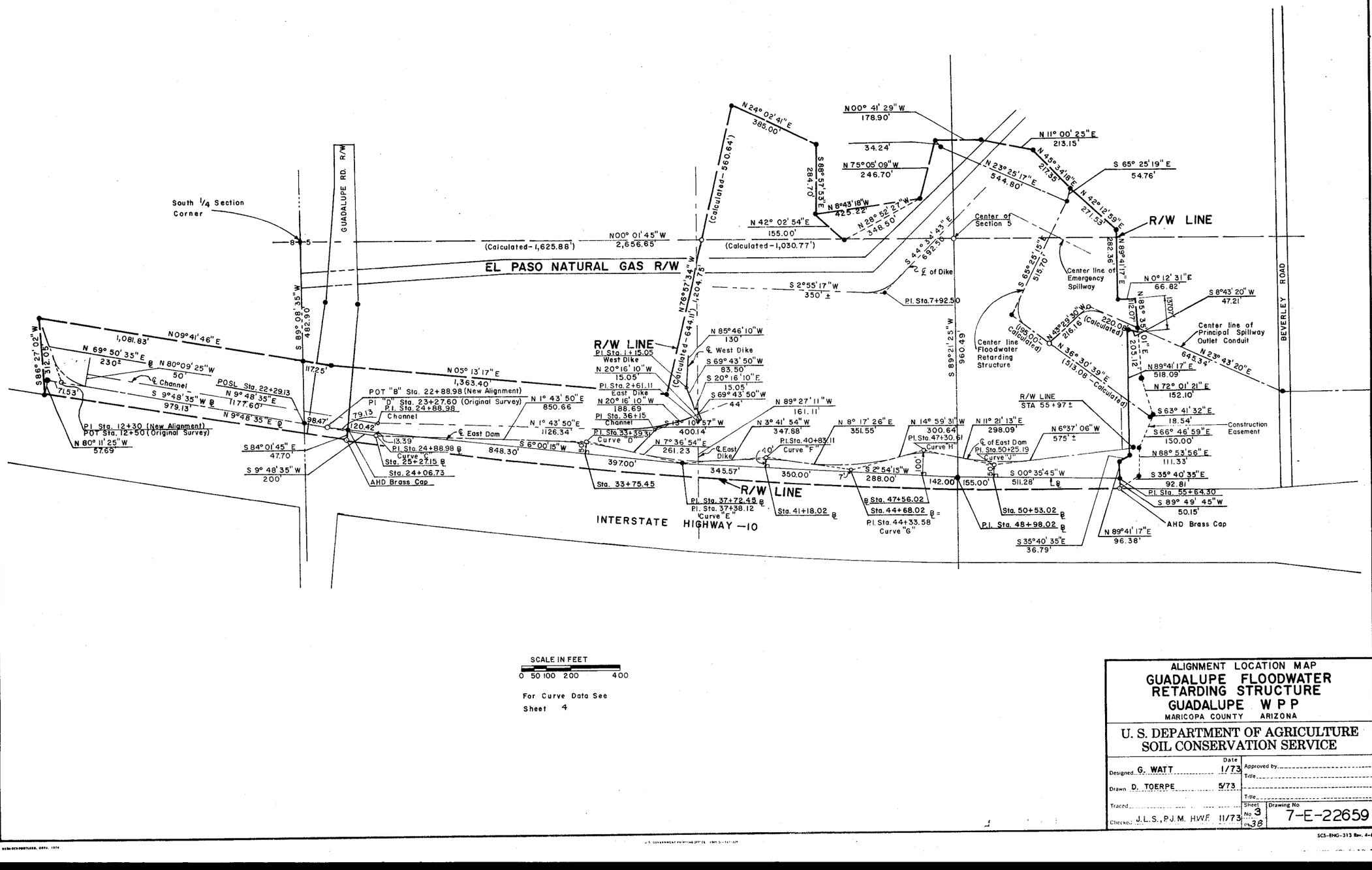
LOCATION MAP

GUADALUPE FLOODWATER
RETARDING STRUCTURE
GUADALUPE W.P.P.
MARICOPA COUNTY ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed G. Watt	Date 1/73	Approved by	
Drawn LMC	11/73	Title	
Traced		Title	
Checked JLS, PJM, HWF	11/73	Sheet No. 2 of 38	Drawing No. 7-E-22659

SCS-ENG-313 Rev. 6-69



SCALE IN FEET
0 50 100 200 400

For Curve Data See Sheet 4

ALIGNMENT LOCATION MAP
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W P P
MARICOPA COUNTY ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed G. WATT	Date 1/73	Approved by	
Drawn D. TOERPE	5/73	Title	
Traced		Title	
Checked J.L.S., P.J.M. H.W.F.	11/73	Sheet No. 3 of 38	Drawing No. 7-E-22659

SCS-ENG-313 Rev. 4-69

ALIGNMENT OF NORTH DAMS

DESCRIPTION					CURVE DATA				
CURVE	STATION	POINT	BEARING	DISTANCE	Δ	D	R	T	L
	0+00±	BEGIN	N 23°25'17"E	544.80'					
	5+44.80	P.I.			93°09'28"				
	9+60.50	P.C.	S 63°25'15" E	515.70'					
M	10+60.50	P.I.			80°04'06"	48°08'06"	119.03'	100.00'	166.34'
	11+26.84	P.T.	N 36°30'39"E	709.60'					
	17+36.44±	END							

ALIGNMENT OF EAST DAM

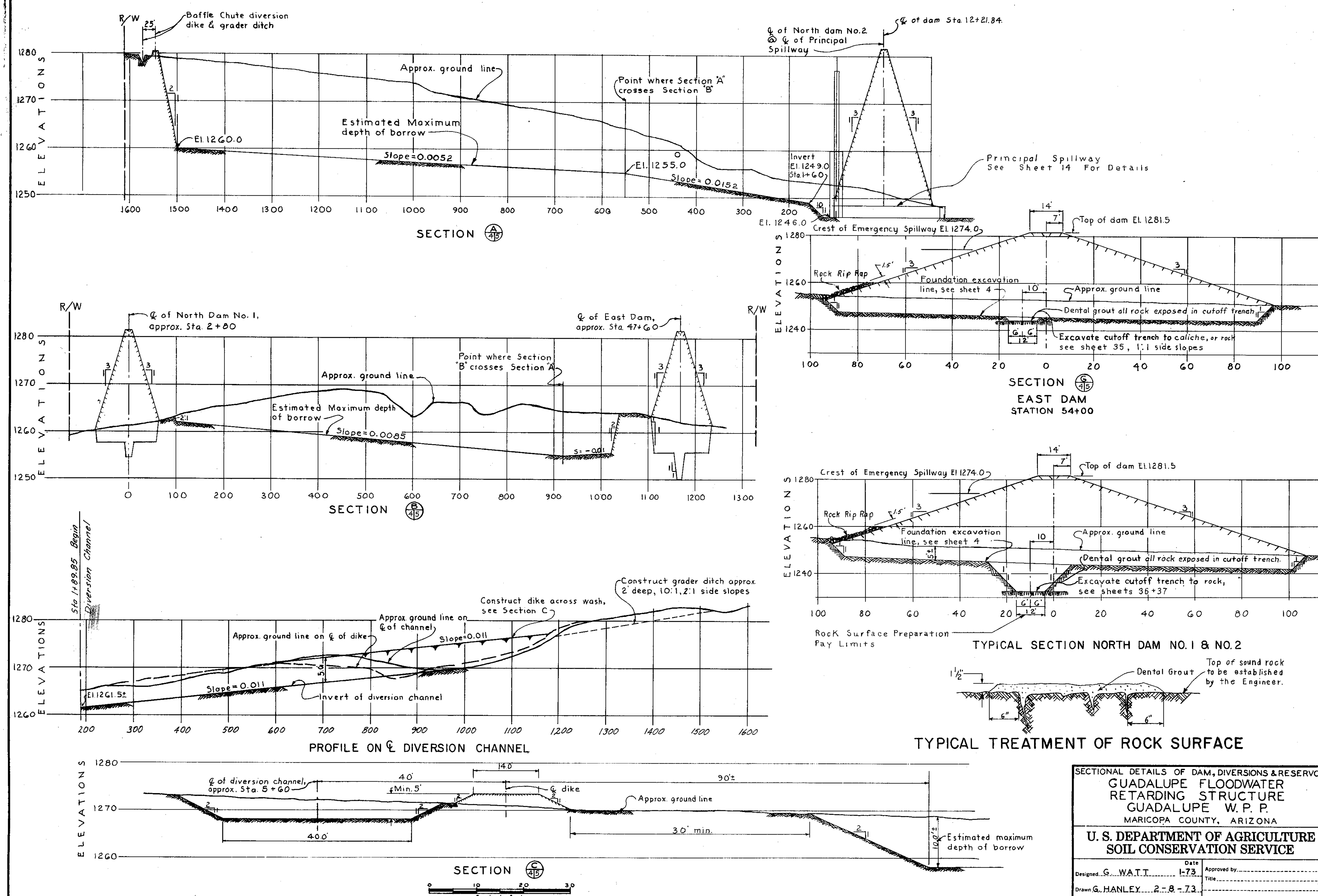
DESCRIPTION					CURVE DATA				
CURVE	STATION	POINT	BEARING	DISTANCE	Δ	D	R	T	L
	10+00±	BEGIN	N 69°50'35"E	230.00'					
	11+30.00	P.C.							
A	12+30.00	P.I.			60°00'00"	33°04'47"	173.21'	100.00'	181.38'
	13+11.38	P.T.	N 9°50'35"E	1277.60'					
	23+88.98	P.C.							
C	24+88.98	P.I.			8°06'45"	4°03'47"	1410.17'	100.00'	199.67'
	25+88.65	P.T.	N 1°43'50"E	850.66'					
	31+38.95	P.C.							
D	33+39.31	P.I.			11°27'07"	2°52'03"	1998.18'	200.36'	399.39'
	35+38.34	P.R.C.	N13°10'57"E	400.14'					
E	37+38.12	P.I.			16°52'51"	4°15'20"	1346.34'	199.78'	396.67'
	39+35.01	P.R.C.	N 3°41'54"W	347.88'					
F	40+83.11	P.I.			11°59'20"	4°03'45"	1410.38'	148.10'	295.12'
	42+30.13	P.R.C.	N 8°17'26"E	351.55'					
G	44+33.58	P.I.			23°16'57"	5°48'07"	987.52'	203.45'	401.29'
	46+31.42	P.R.C.	N14°59'31"W	302.64'					
H	47+30.61	P.I.			26°20'44"	13°31'10"	423.80'	99.19'	194.87'
	48+26.29	P.R.C.	N11°21'13"E	298.09'					
J	50+25.19	P.I.			17°58'19"	4°33'18"	1257.80'	198.90'	394.53'
	55+97±	END	N 6°37'06"W	575±					

PLAN AND PROFILE
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed G. Watt	Date 1/73	Approved by	
Drawn R. Slocum	1-5-73	Title	
Traced		Title	
Checked J.L.S., P.J.M. H.W.F.	11/73	Sheet No. 4 of 38	Drawing No. 7-E-22659

USDA-SCS-PORTLAND, OREG. 1974



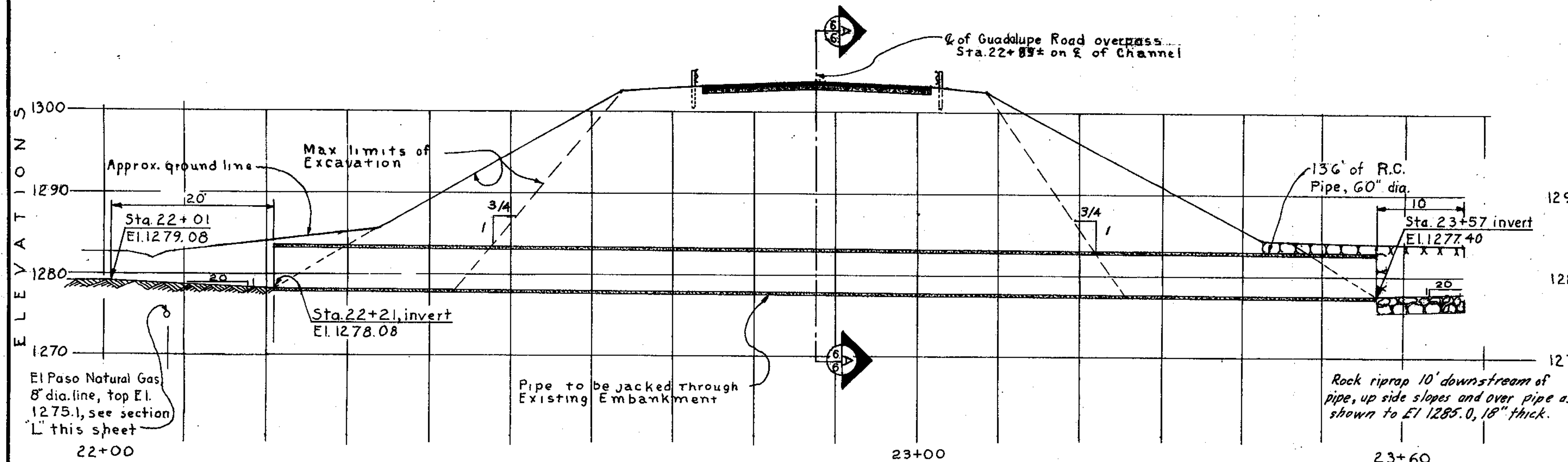
SECTIONAL DETAILS OF DAM, DIVERSIONS & RESERVOIR
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date
Designed	G. WATT	1-73
Drawn	G. HANLEY	2-8-73
Traced		
Checked	J.L.S. HWF.	11-73

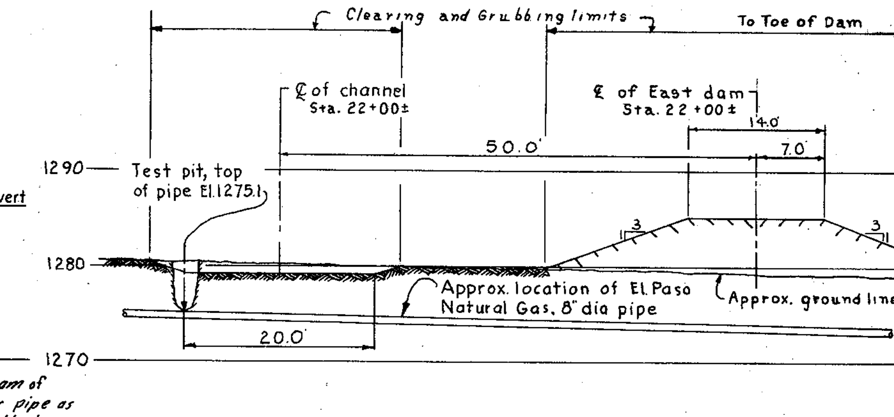
Approved by
Title
Title
Sheet No. 5 of 38
Drawing No. 7-E-22659

SCS-ENG-313-B Rev. 7-69

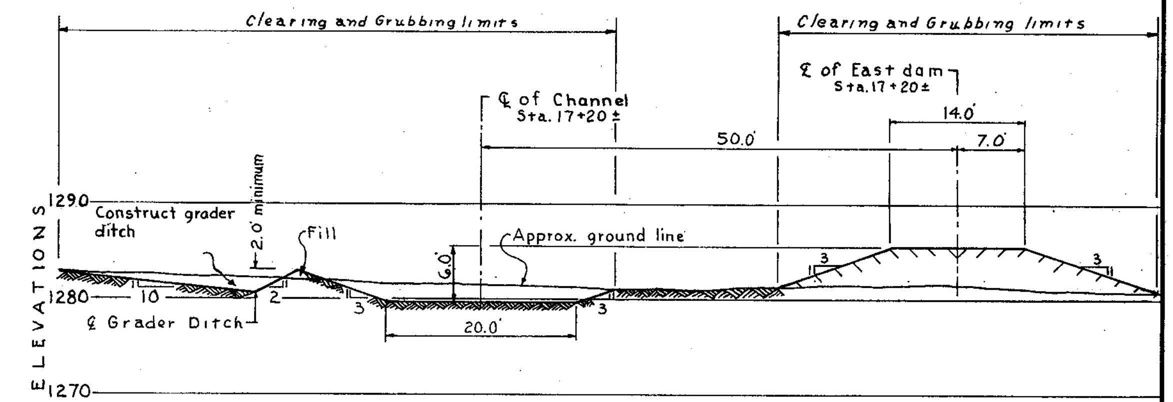


DETAIL SECTION OF GUADALUPE ROAD WITH PIPE CROSSING

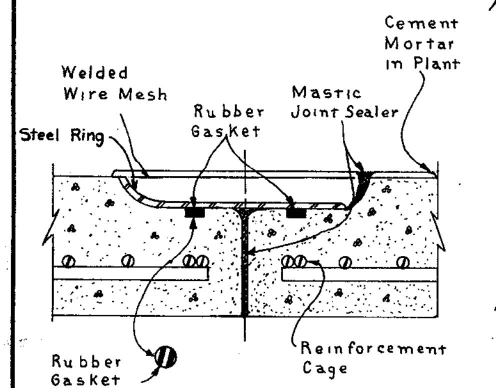
Scale in feet



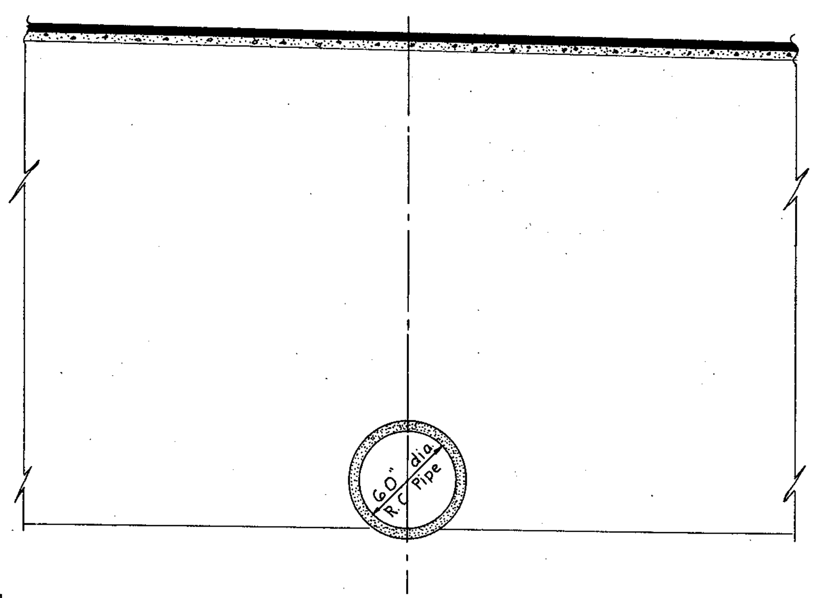
SECTION (L/6)



SECTION (E/6)

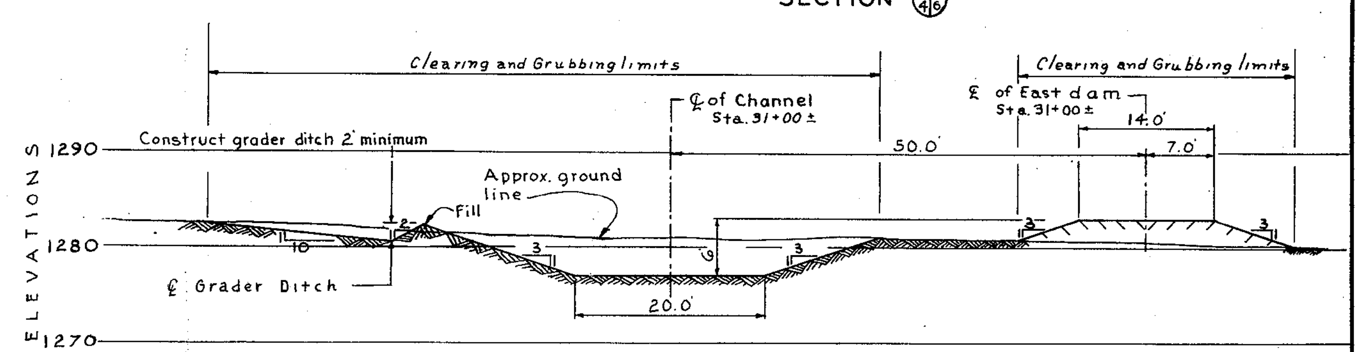


Typical Pipe Joint Detail For Jacking
Not to Scale



SECTION (A/6)

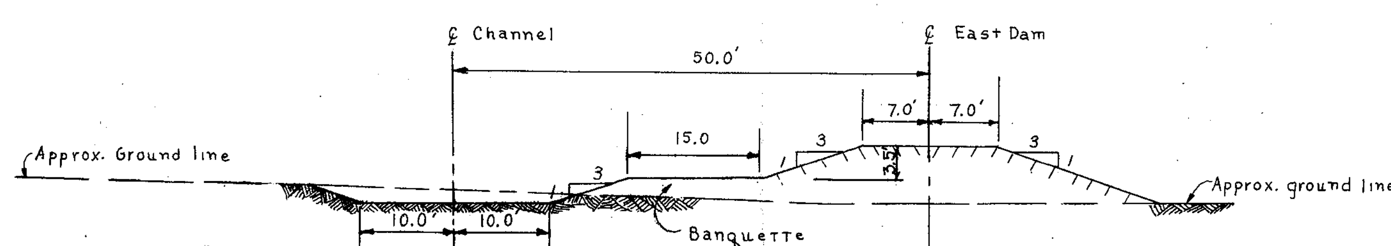
Scale in feet



SECTION (D/6)

Scale in feet

STRENGTH REQUIREMENTS			
Inside Diameter of Pipe	EXTERNAL LOAD		
	Minimum 3-Edge Bearing Strength in Pounds Per Lineal Foot of Pipe		
	Applicable Standard Specification		
	AWWA C-300 AWWA C-302	AWWA C-301	ASTM C-76
Inches	Load to Produce 0.01 Inch Crack One Foot Long	Load to Produce 0.001 Inch Crack One Foot Long	Class
60	6400	6400	III



TYPICAL DETAIL OF BANQUETTES

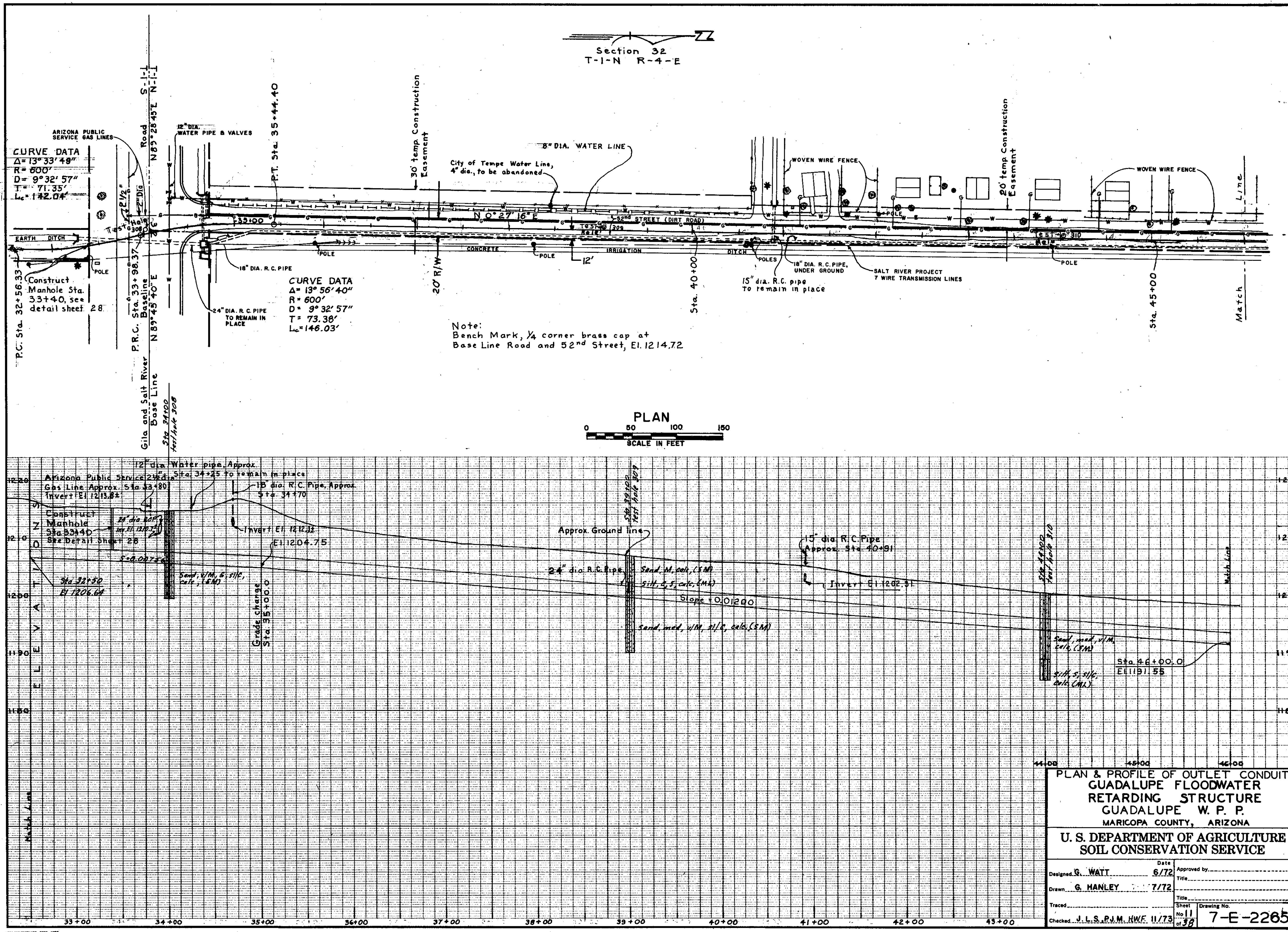
Scale in Feet

DETAILS OF GUADALUPE RD. CROSSING & DAM SECT'S
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed G. WATT Date 1/73
Drawn G. HANLEY 1-30-73
Traced
Checked J.L.S., P.J.M. HWF 11/73
Approved by
Title
Title
Sheet No. 6 of 38
Drawing No. 7-E-22659

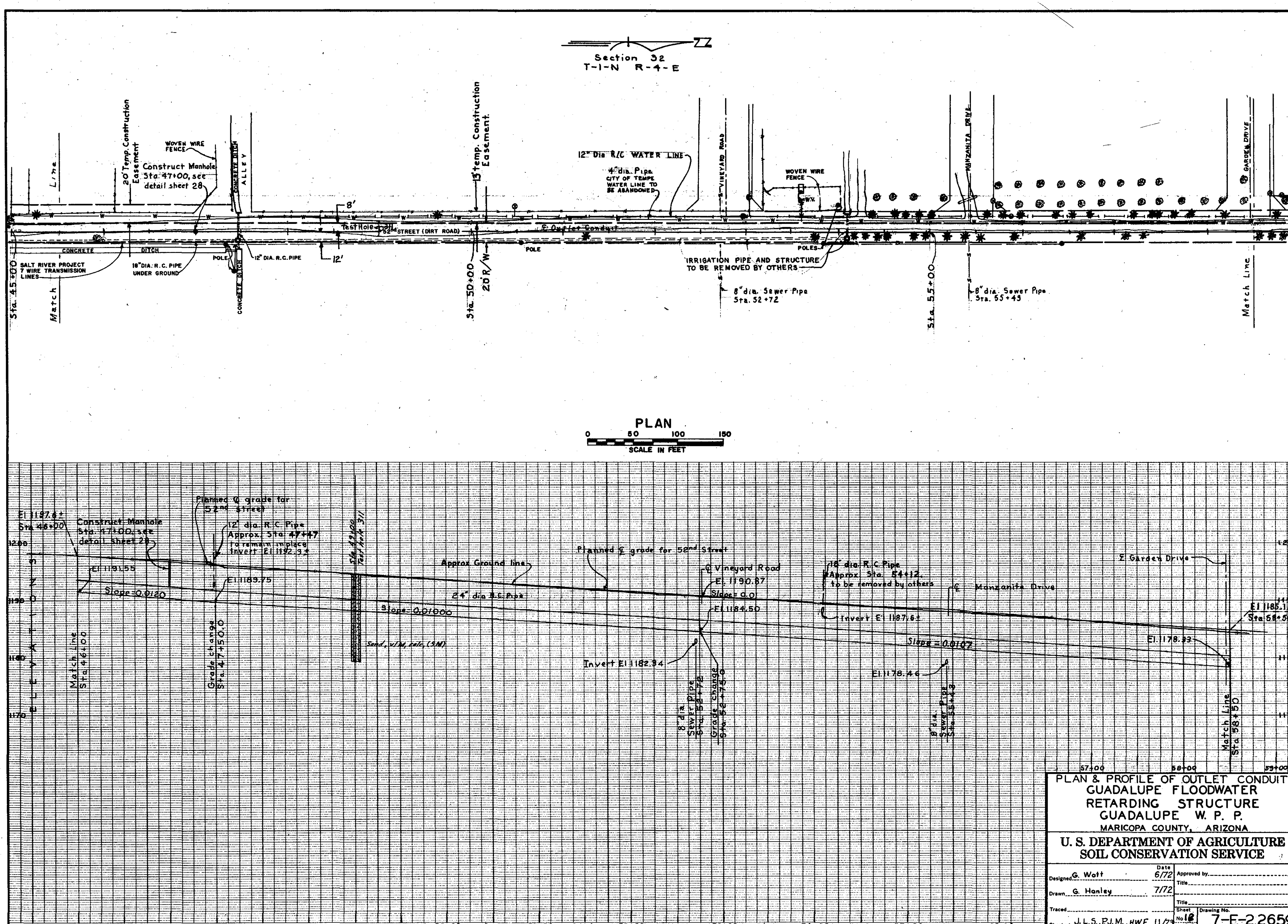
SCS-ENG-313-B Rev. 7-69



PLAN & PROFILE OF OUTLET CONDUIT
GUADALUPE FLOODWATER
RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date	
Designed	G. WATT	6/72	Approved by
Drawn	G. HANLEY	7/72	Title
Traced			Title
Checked	J.L.S. P.J.M. HWF. 11/73	Sheet No. 11 of 38	Drawing No. 7-E-22659



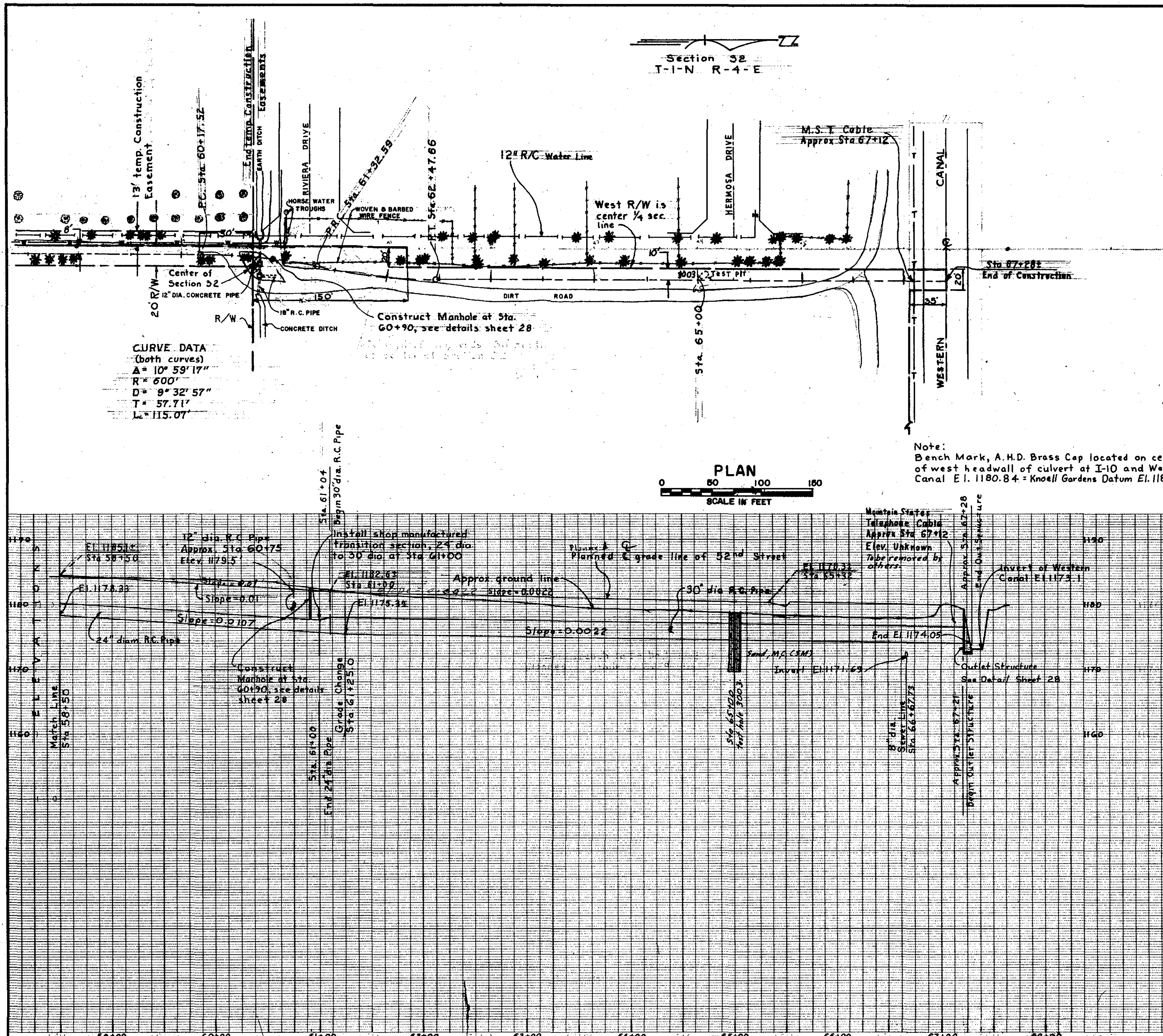
Section 32
T-1-N R-4-E
Match Line
Sta. 45+00
20' Temp. Construction Easement
WOVEN WIRE FENCE
Construct Manhole Sta. 47+00, see detail sheet 28
CONCRETE DITCH
ALLEY
8'
Test Hole 311
52nd STREET (DIRT ROAD)
12'
CONCRETE DITCH
POLE
12" DIA. R.C. PIPE
SALT RIVER PROJECT 7 WIRE TRANSMISSION LINES
18" DIA. R.C. PIPE UNDER GROUND
13' temp. Construction Easement
Sta. 50+00
20' R/W
12" Dia R/C WATER LINE
4" dia. Pipe CITY OF TEMPE WATER LINE TO BE ABANDONED
VINEYARD ROAD
WOVEN WIRE FENCE
℄ Outlet Conduit
IRRIGATION PIPE AND STRUCTURE TO BE REMOVED BY OTHERS
POLES
8" dia. Sewer Pipe Sta. 52+72
Sta. 55+00
MANZANITA DRIVE
8" dia. Sewer Pipe Sta. 55+45
GARDEN DRIVE
Match Line
PLAN
0 50 100 150
SCALE IN FEET
El 1197.6±
Sta 46+00
Construct Manhole Sta. 47+00, see detail sheet 28
Planned ℄ grade for 52nd Street
12" dia. R.C. Pipe Approx. Sta. 47+47 to remain in place Invert El 1192.3±
Sta. 49+00 Test hole 311
El 1191.55
El 1189.75
Slope=0.0120
Approx Ground line
24" dia R.C. Pipe
Slope=0.01000
Sand, s/m, silt (SM)
Planned ℄ grade for 52nd Street
℄ Vineyard Road
El 1190.87
Slope=0.0
El 1184.50
Invert El 1182.94
18" dia. R.C. Pipe Approx. Sta. 54+12 to be removed by others
Invert El 1187.6±
℄ Manzanita Drive
℄ Garden Drive
El 1185.1±
Sta 58+50
El 1178.33
Slope=0.0107
El 1178.46
ELEVATION
1200
1190
1180
1170
Match Line Sta 46+00
Grade change Sta. 47+50.0
8" dia. Sewer Pipe Sta. 52+72
Grade change Sta. 52+75.0
8" dia. Sewer Pipe Sta. 55+45
Match Line Sta 58+50
46+00
47+00
48+00
49+00
50+00
51+00
52+00
53+00
54+00
55+00
56+00
57+00
58+00
59+00

PLAN & PROFILE OF OUTLET CONDUIT
GUADALUPE FLOODWATER
RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date	
Designed	G. Watt	6/72	Approved by
Drawn	G. Hanley	7/72	Title
Traced			Title
Checked	J.L.S. P.J.M. HWF	11/73	Sheet No. 18 of 38 — Drawing No. 7-E-22659

FORM SCS-317 (NOV. 1966)



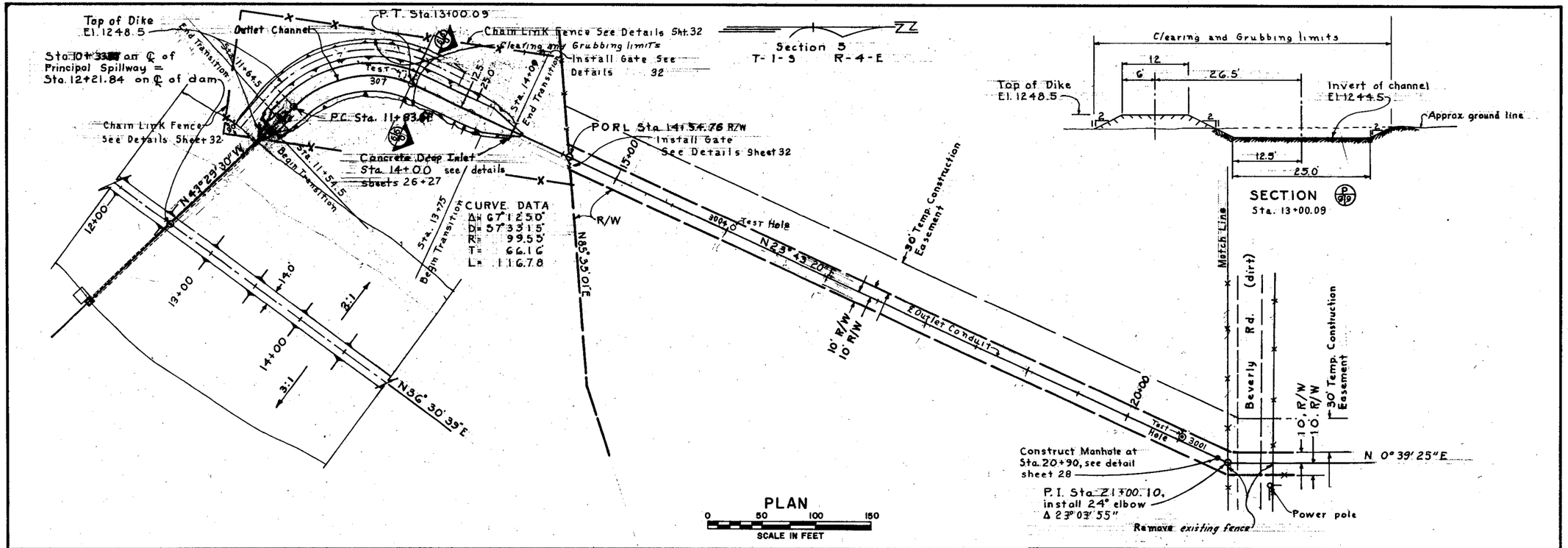
PLAN & PROFILE OF OUTLET CONDUIT
GUADALUPE FLOODWATER
RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

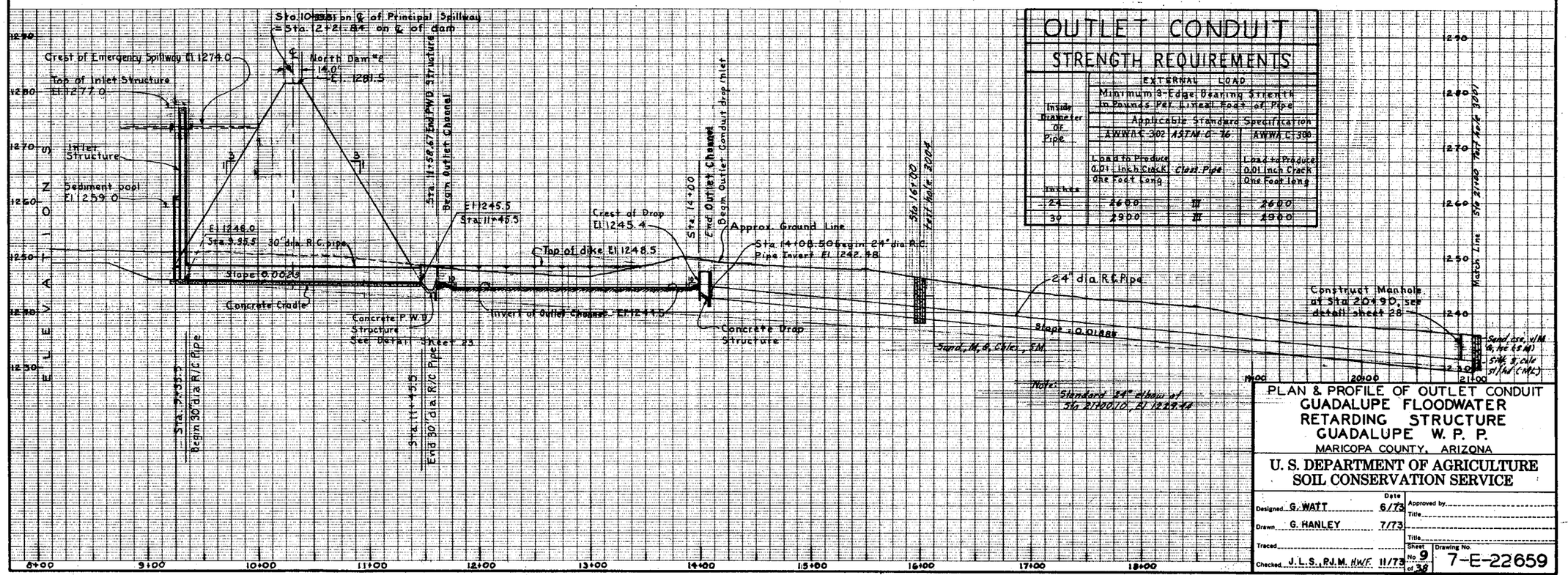
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed G. Watt	Date 6-72	Approved by
Drawn G. Hanley	7-18-72	Title
Traced		Title
Checked J.L.S., P.J.M., H.W.F.	11-73	Sheet No. 13 of 38 — Drawing No. 7-E-22659

U. S. GOVERNMENT PRINTING OFFICE

FORM SCS-317 (NOV. 1966)





OUTLET CONDUIT

STRENGTH REQUIREMENTS

Inside Diameter of Pipe	EXTERNAL LOAD Minimum 3-Edge Bearing Strength in Pounds Per Lineal Foot of Pipe		
	Applicable Standard Specification		
	AWWA C 302	ASTM C 76	AWWA C 300
Inches	Load to Produce 0.01 Inch Crack One Foot Long	Class Pipe	Load to Produce 0.01 Inch Crack One Foot Long
24	2600	III	2600
30	2900	III	2900

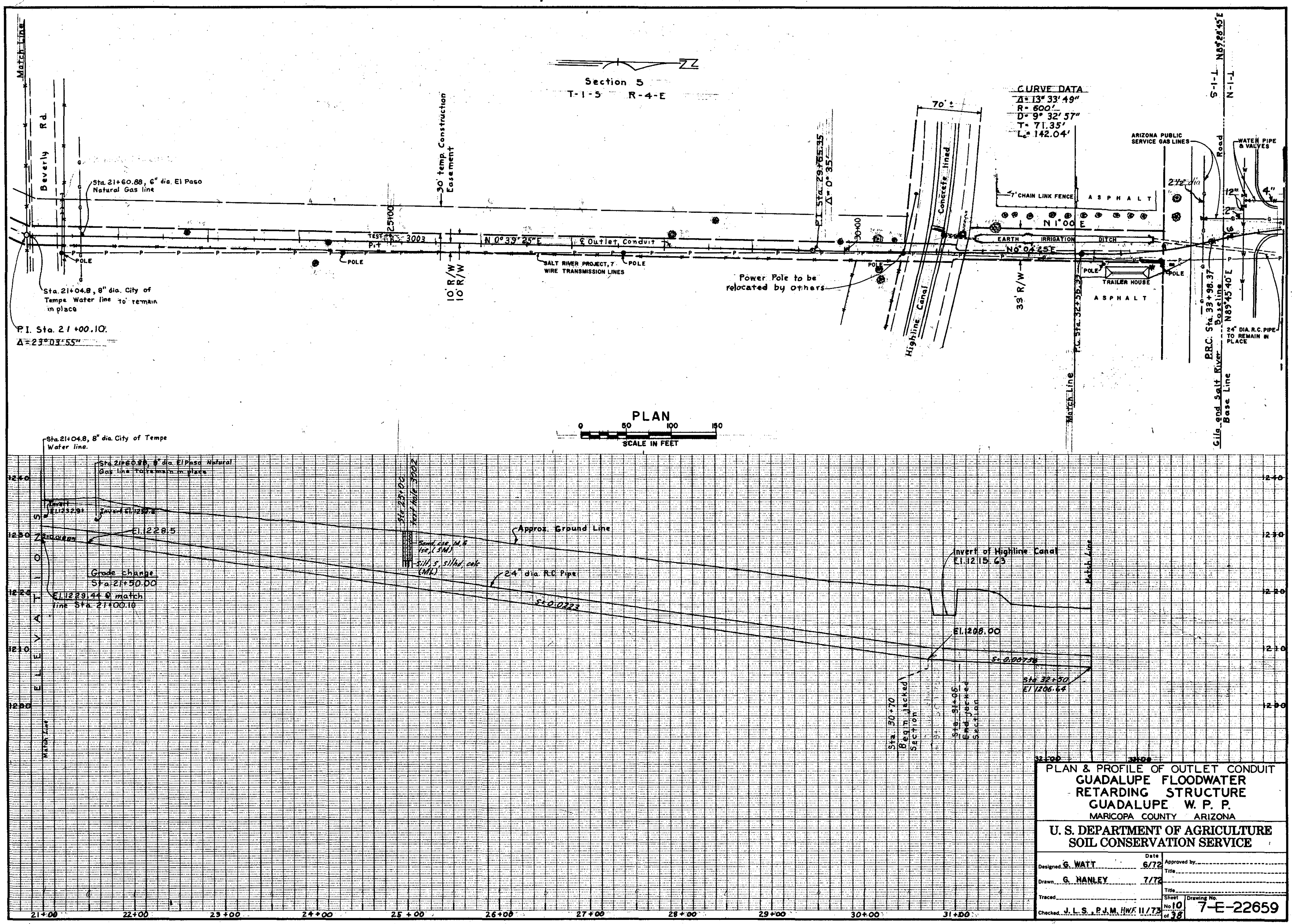
PLAN & PROFILE OF OUTLET CONDUIT
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed G. WATT	6/73	Approved by	
Drawn G. HANLEY	7/73	Title	
Traced		Title	
Checked J. L. S., P.J.M. H.W.F.	11/73	Sheet No. 9 of 38	Drawing No. 7-E-22659

FORM SCS – 317 (NOV. 1966)

U. S. GOVERNMENT PRINTING OFFICE : 1967 O - 270-331

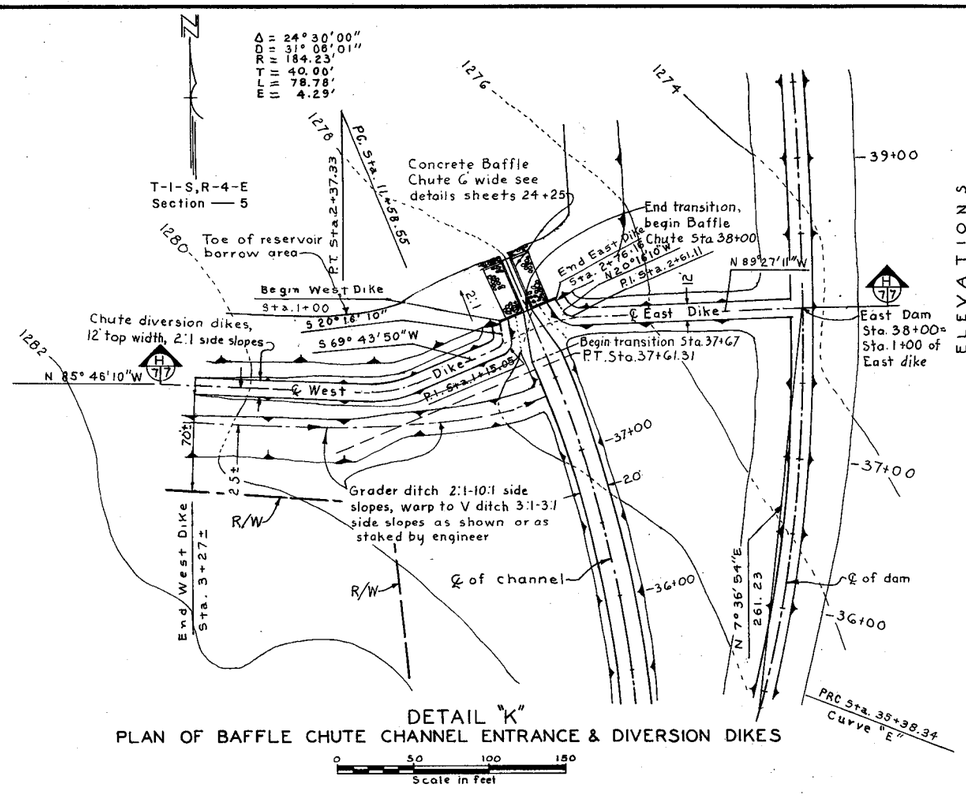


PLAN & PROFILE OF OUTLET CONDUIT
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

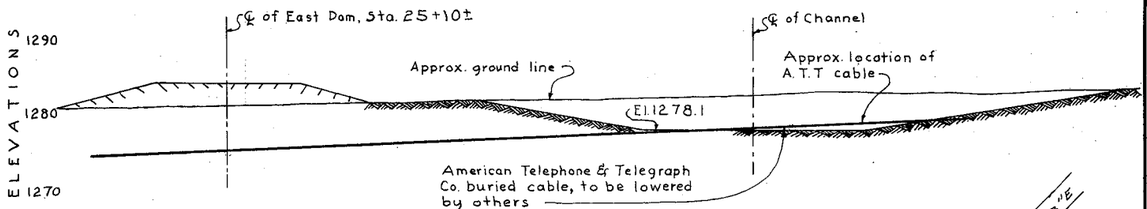
		Date	
Designed	G. WATT	6/72	Approved by
Drawn	G. HANLEY	7/72	Title
Traced			Title
Checked	J.L.S., P.J.M., HWF	11/73	Sheet No. 10 of 38 — Drawing No. 7-E-22659

FORM SCS-317 (NOV. 1966)



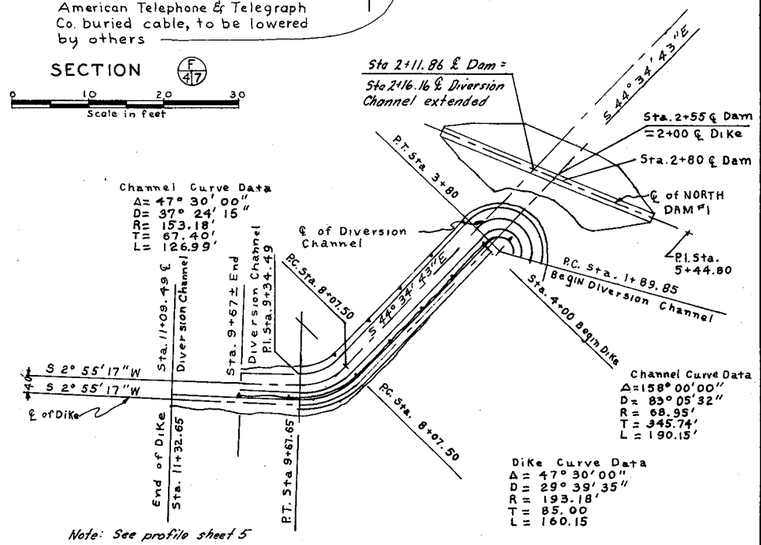
DETAIL "K"
PLAN OF BAFFLE CHUTE CHANNEL ENTRANCE & DIVERSION DIKES

Scale in feet: 0, 50, 100, 150



SECTION

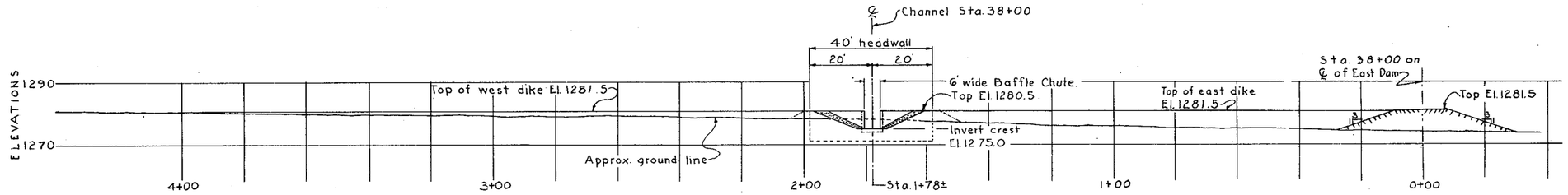
Scale in Feet: 0, 10, 20, 30



Note: See profile sheet 5

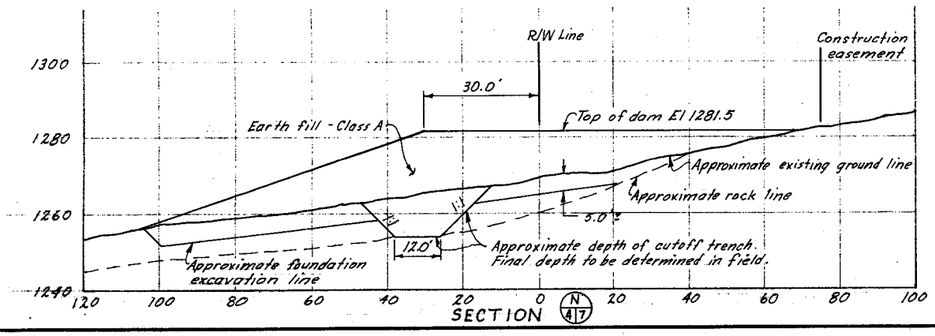
DIVERSION CHANNEL ℄ DIKE ALIGNMENT DETAIL

Scale in feet: 0, 50, 100, 200, 300, 400, 500



SECTION

Scale in feet: 0, 20, 40, 60



SECTION

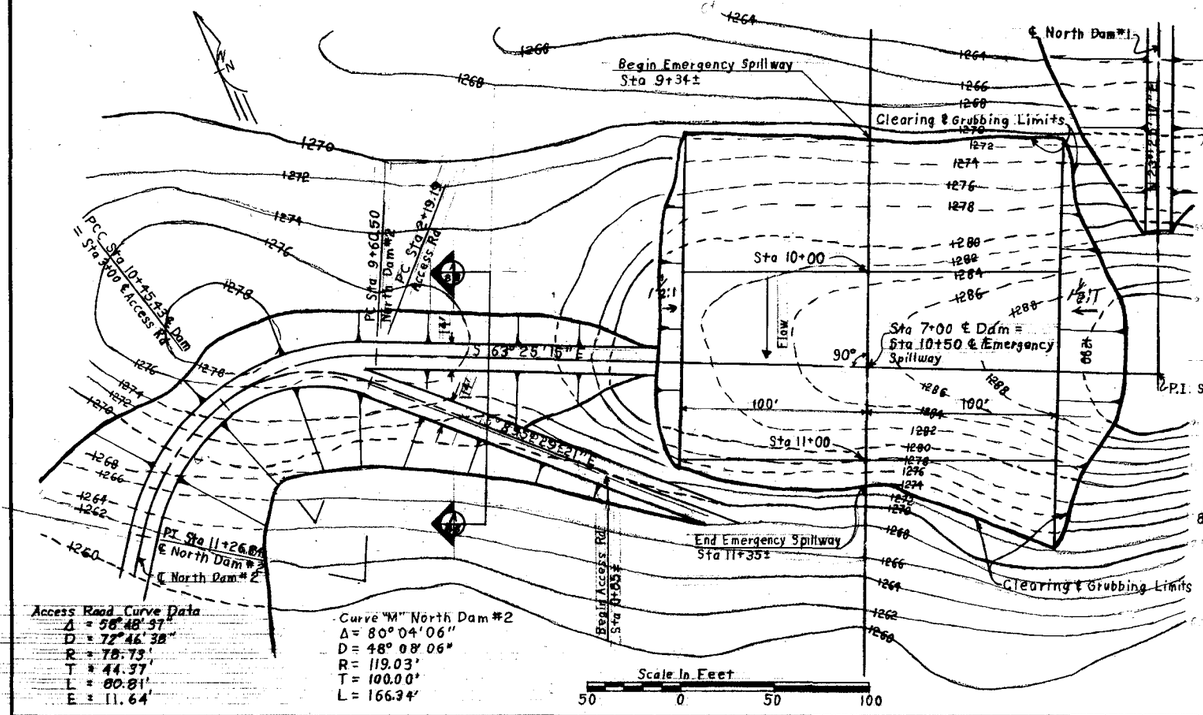
EARTHWORK DETAILS
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

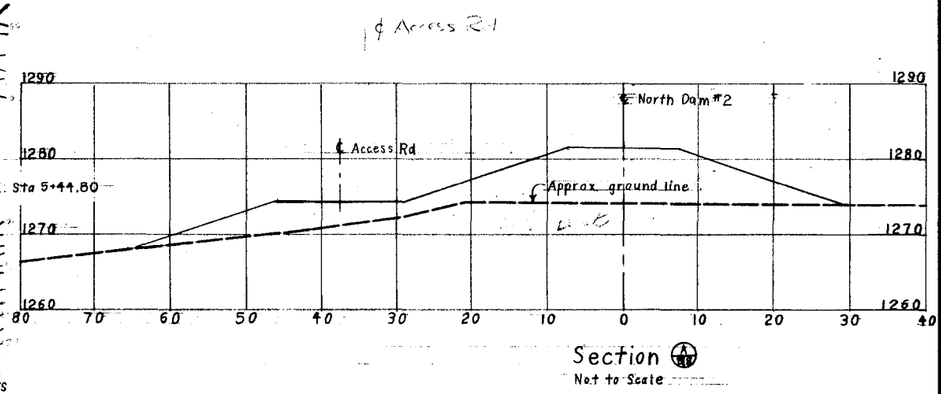
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed G. WATT	1/73	Approved by	
Drawn G. HANLEY 2-1-73		Title	
Traced		Title	
Checked J.L.S., P.J.M. HWF	11/73	Sheet No. 7 of 38	Drawing No. 7-E-22659

U.S. GOVERNMENT PRINTING OFFICE : 1969 O—356-743

SCS-ENG-313-B Rev. 7-69





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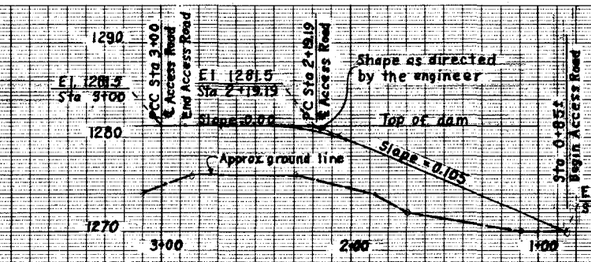
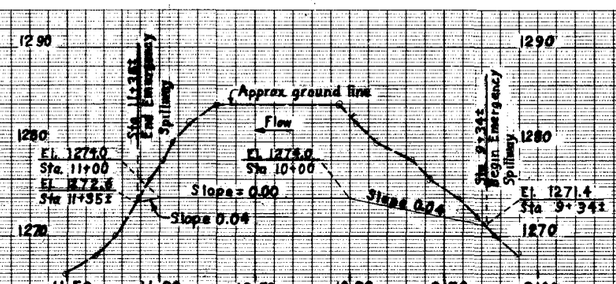
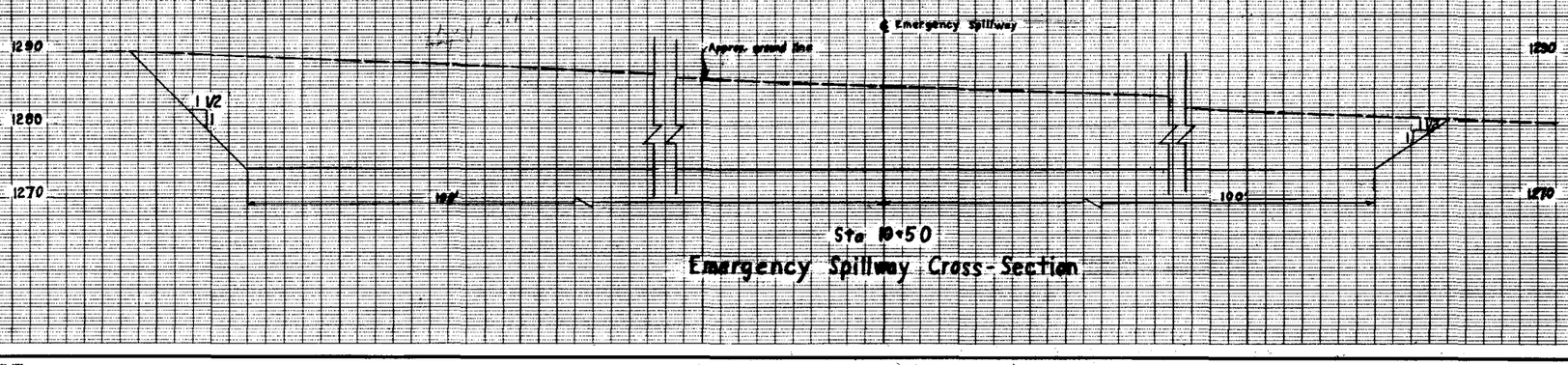


Access Road ℄ Profile



Emergency Spillway ℄ Profile



Sta 10+50

Emergency Spillway Cross-Section

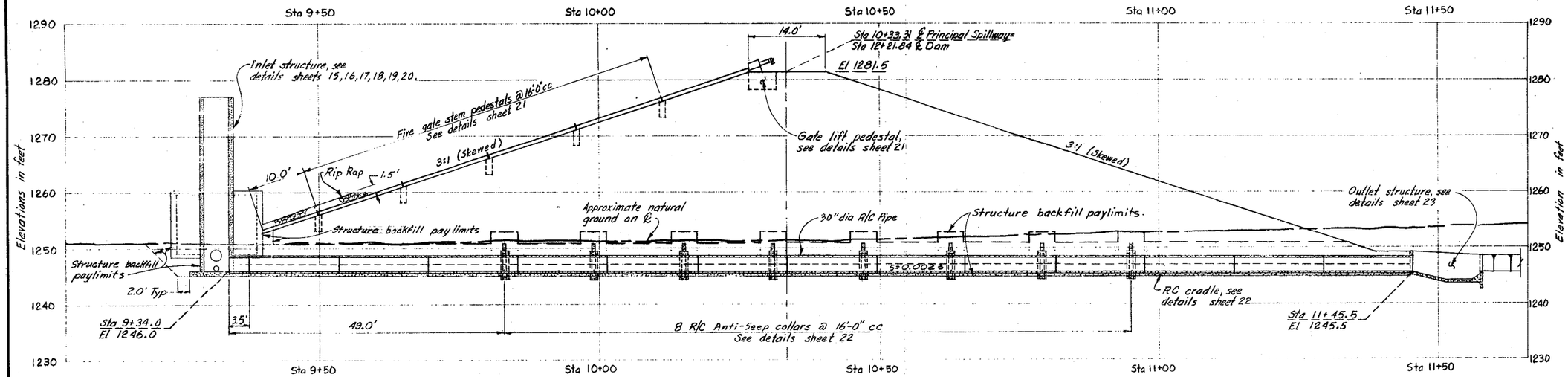
EMERGENCY SPILLWAY DETAILS
GUADALUPE FLOODWATER
RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

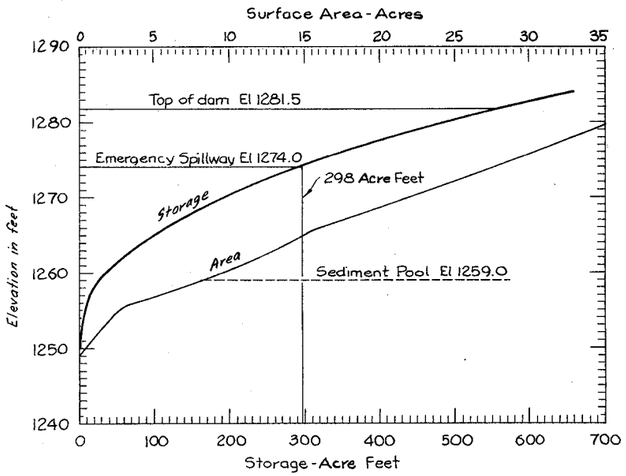
Designed G.W	Date 1/73	Approved by	
Drawn D. Toerpe	10-73	Title	
Traced		Title	
Checked J.L.S., P.J.M.	11/73	Sheet No 8 of 38	Drawing No. 7-E-22659

FORM SCS – 317 (NOV. 1966)

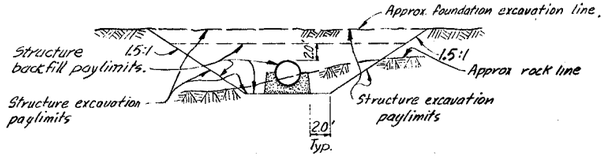
U. S. GOVERNMENT PRINTING OFFICE : 1967 O - 272-291



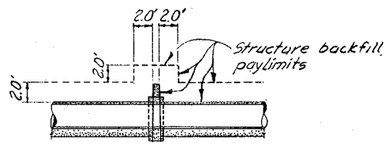
PROFILE ON ℄ PRINCIPAL SPILLWAY



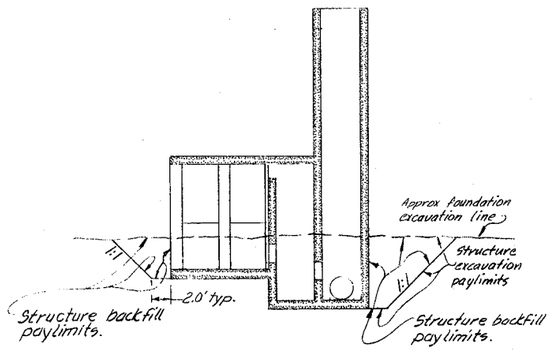
ADJUSTED SURFACE AREA ℄ STORAGE CURVES



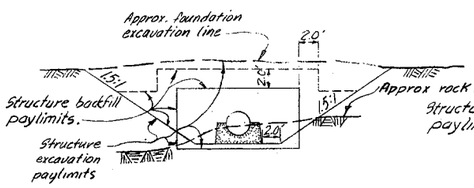
TYPICAL CRADLE



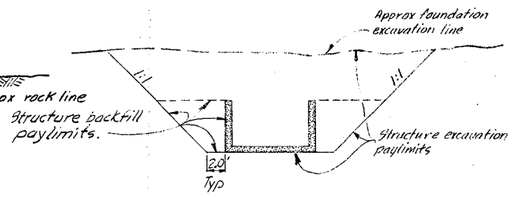
PROFILE CUTOFF COLLAR



INLET STRUCTURE



CROSS SECTION
CUTOFF COLLAR



PRINCIPAL SPILLWAY
OUTLET STRUCTURE

EXCAVATION AND STRUCTURE BACKFILL PAYLIMITS

10 5 0 10 20
SCALE IN FEET

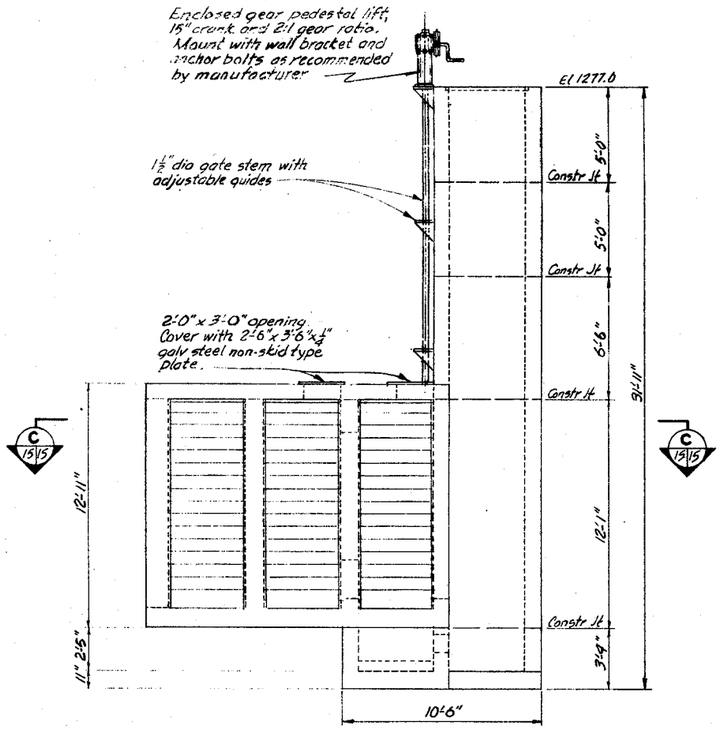
PROFILE ON ℄ PRINCIPAL SPILLWAY AND PAYLIMITS
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W.P.P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

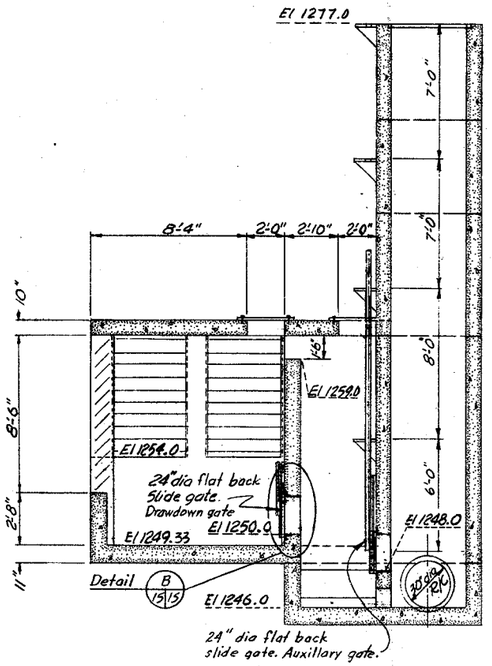
Designed W.H. ERION.	Date 2-73	Approved by.	
Drawn J.D.LAND	10-73	Title	
Traced		Title	
Checked H.W.F.	5-74	Sheet No 14 of 38	Drawing No. 7-E-22659

SCS-ENG-313-B Rev. 7-69

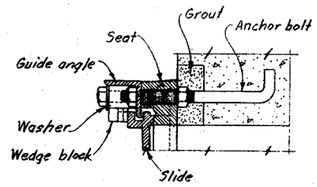
9253-502-PORTLAND, OREG. 1974
U.S. GOVERNMENT PRINTING OFFICE : 1969 O—354-762



ELEVATION

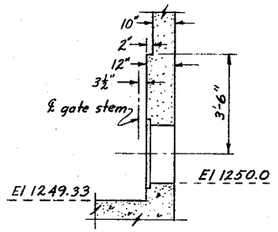


SECTION A 15/15

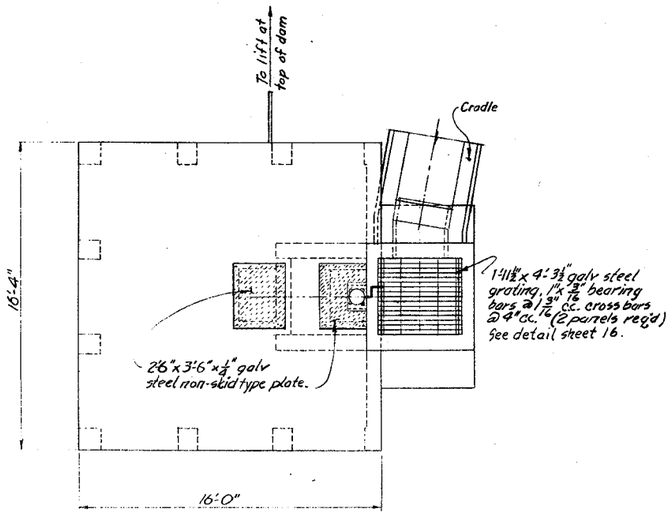


GATE ANCHOR DETAIL
(NOT TO SCALE)

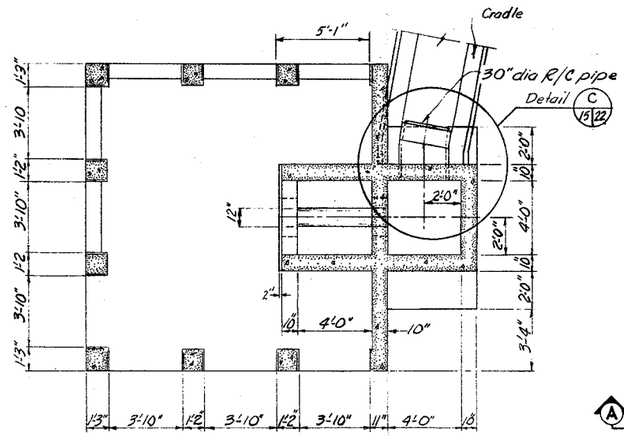
SECTION B 15/15



DETAIL B 15/15

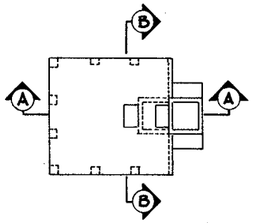


PLAN

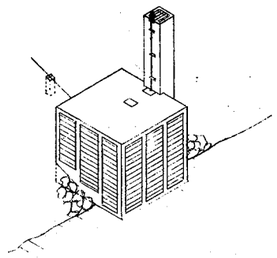


SECTION C 15/15

SCALE 1 0 5 10 FEET



KEY PLAN



ISOMETRIC VIEW

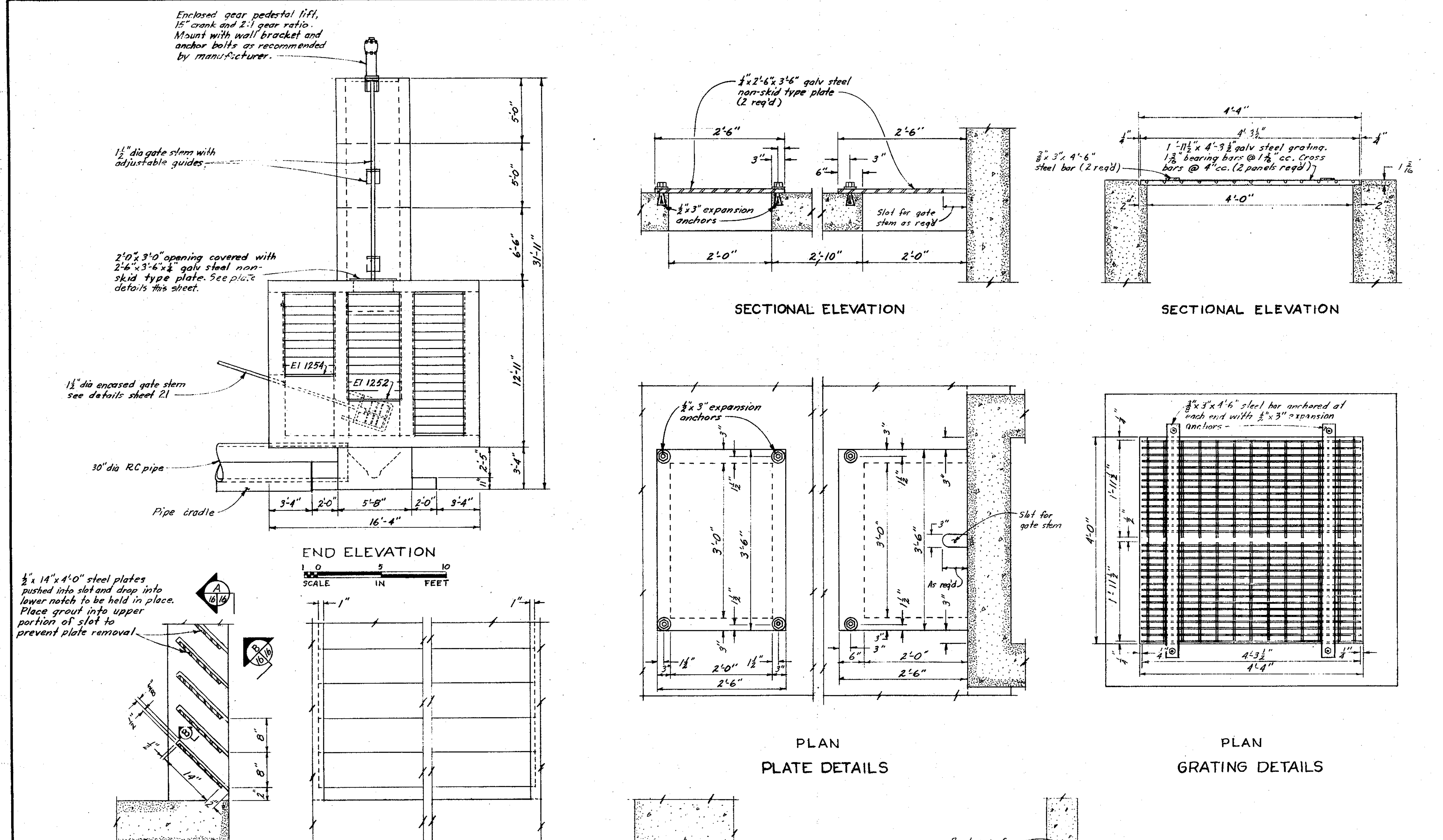
INLET STRUCTURE DETAILS

GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W.P.P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed W. H. Erion	9-73	Approved by	
Drawn J. D. Land	9-73	Title	
Traced		Title	
Checked H.W.F.	5-74	Sheet No 15 of 30	Drawing No 7-E-22659

SCS-ENG-313-B Rev. 7-69

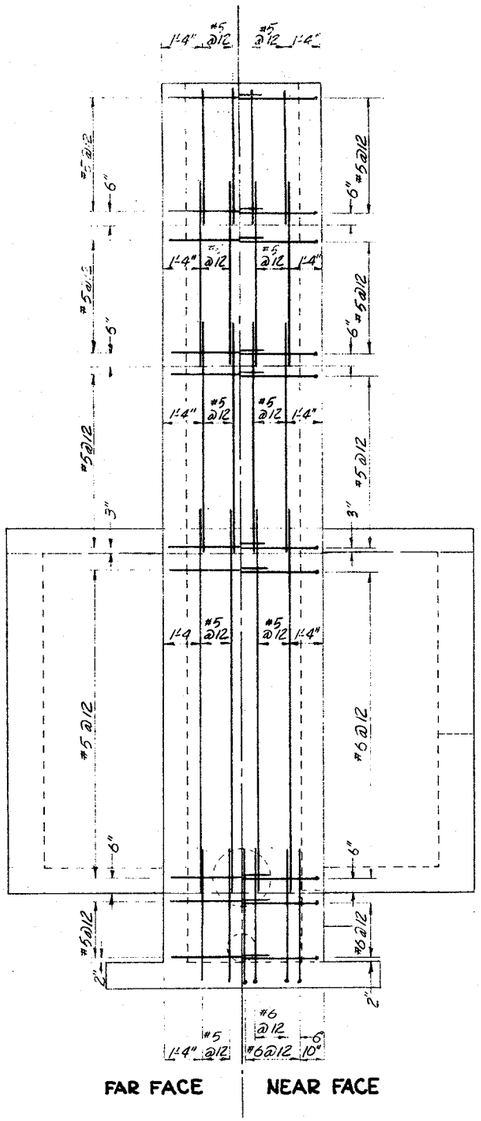


INLET STRUCTURE
LAYOUT AND DETAILS
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W.P.P.
MARICOPA COUNTY, ARIZONA

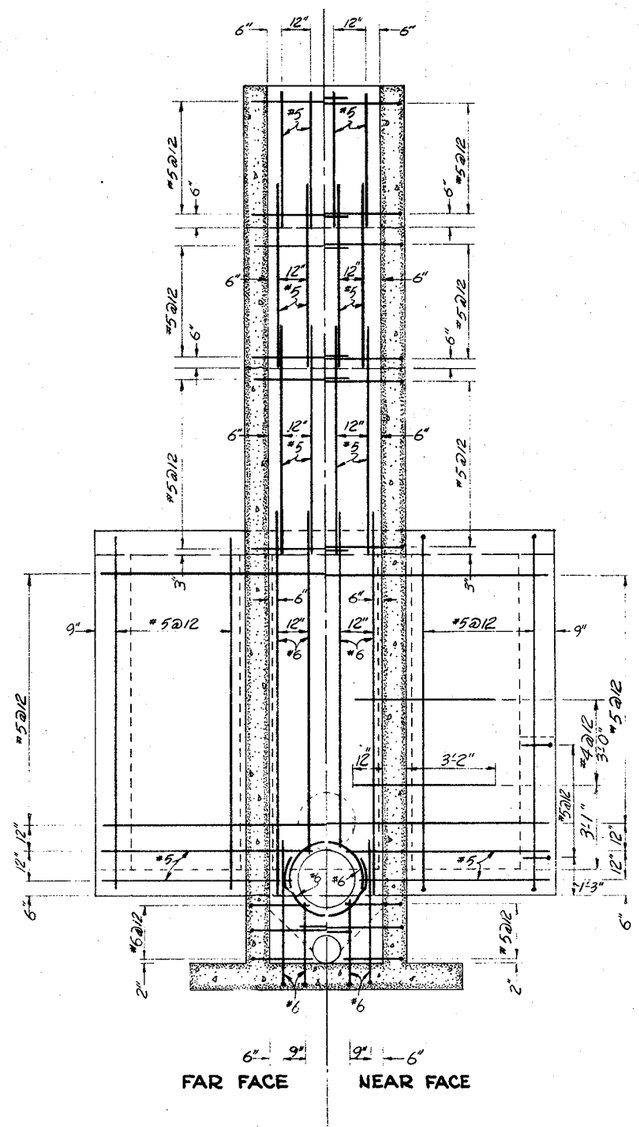
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed W. H. Erion	Date 9-73	Approved by
Drawn L. W. McClintock	9-73	Title
Traced		Title
Checked H.W.F.	5-74	Sheet No. 16 of 38 — Drawing No. 7-E-22659

SCS-ENG-313-B Rev. 7-69

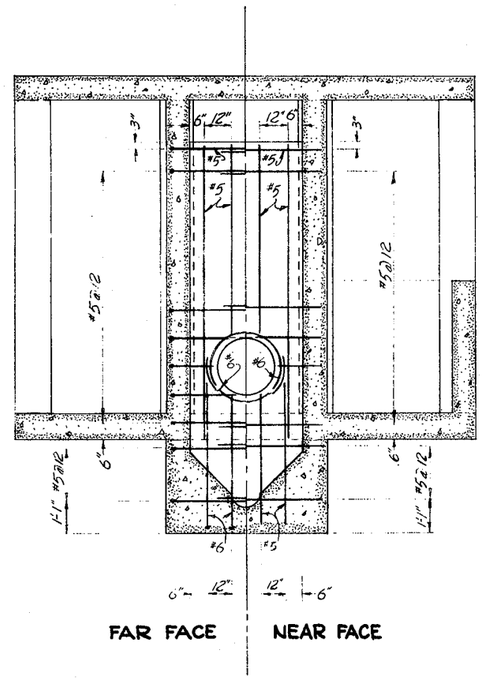


SECTION A 17/17



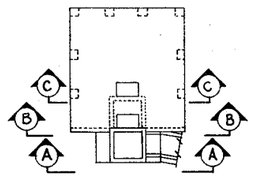
Cradle not shown.

SECTION B 17/17



SECTION C 17/17

SCALE 1 IN FEET 0 5



KEY PLAN

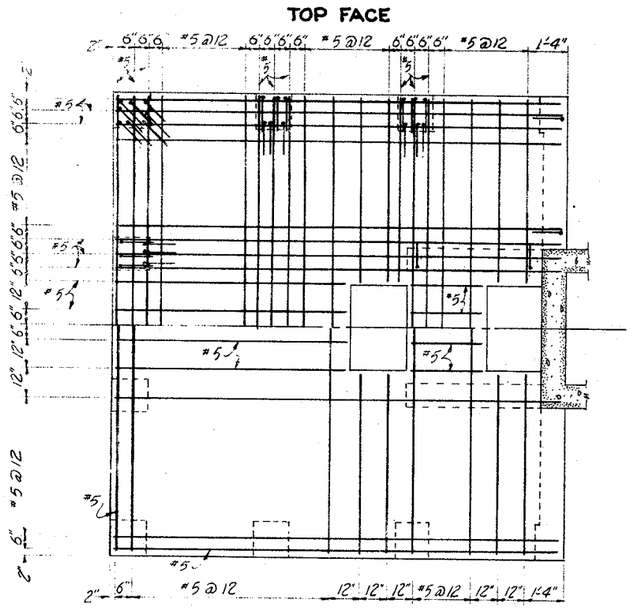
INLET STRUCTURE DETAILS

GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W.P.P
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed W. H. Erion	9-73	Approved by	
Drawn J.D. Land	10-73	Title	
Traced		Title	
Checked H.W.F.	5-74	Sheet No. 17 of 35	Drawing No. 7-E-22659

U.S. GOVERNMENT PRINTING OFFICE : 1969 O—354-745



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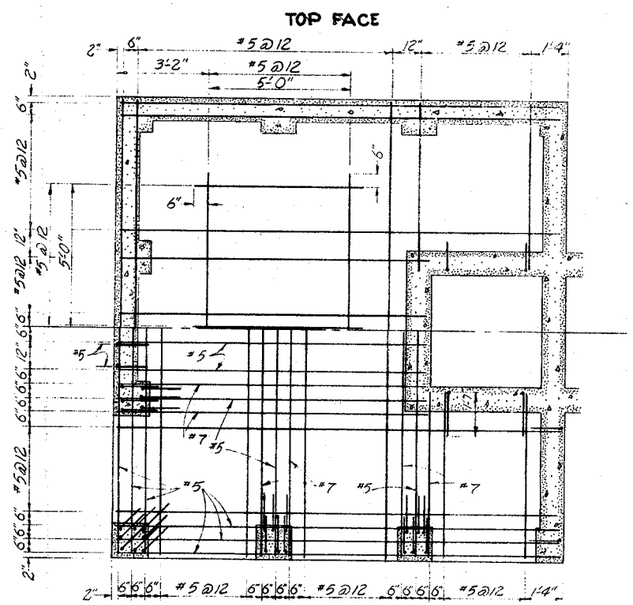

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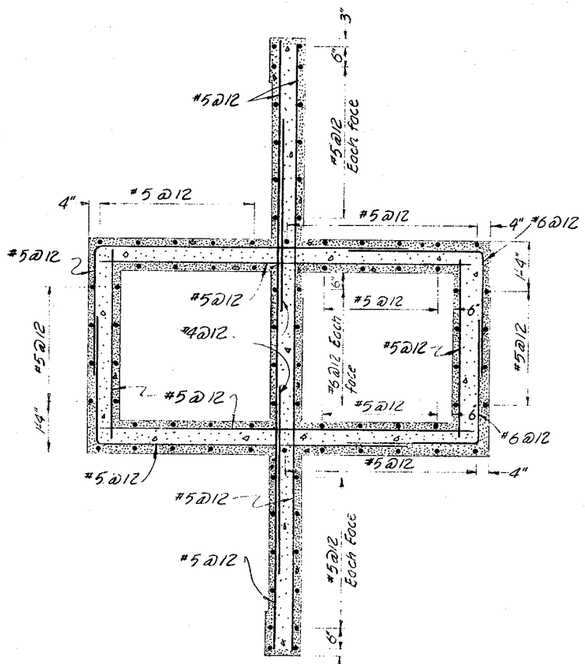

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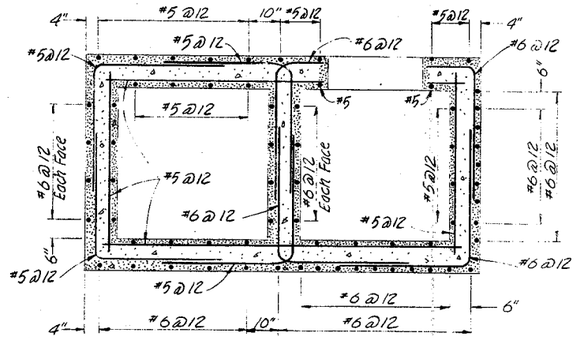

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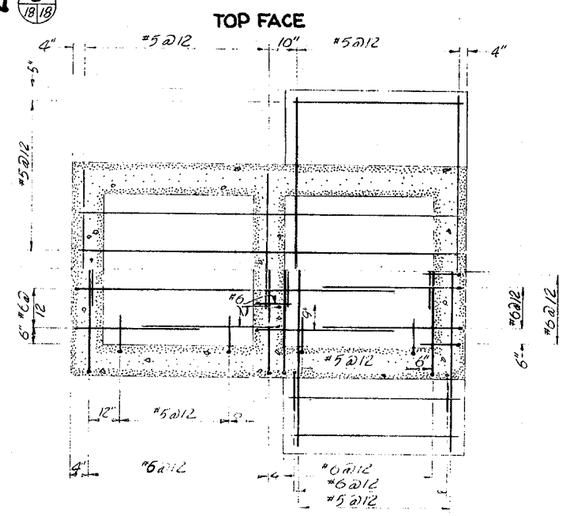

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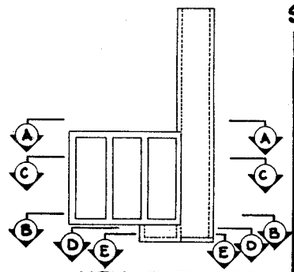


KEY ELEVATION

INLET STRUCTURE DETAILS

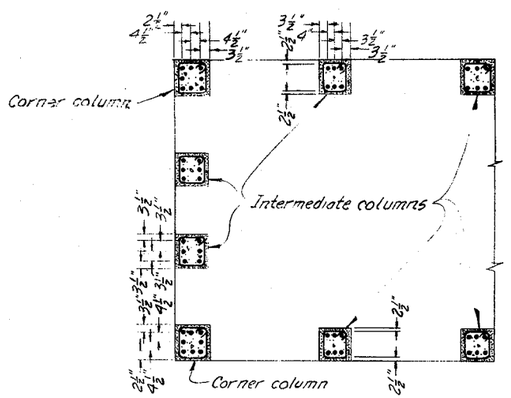
GUADALUPE FLOODWATER RETARDING STRUCTURE

GUADALUPE W.P.P.

MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

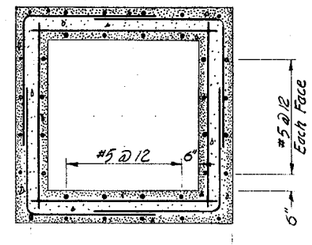
	Date		
Designed W. H. Erion	9-73	Approved by	
Drawn J. D. Land	9-73	Title	
Traced		Title	
Checked H.W.F.	5-74	Sheet No. 18 of 35	Drawing No. 7-E-22659



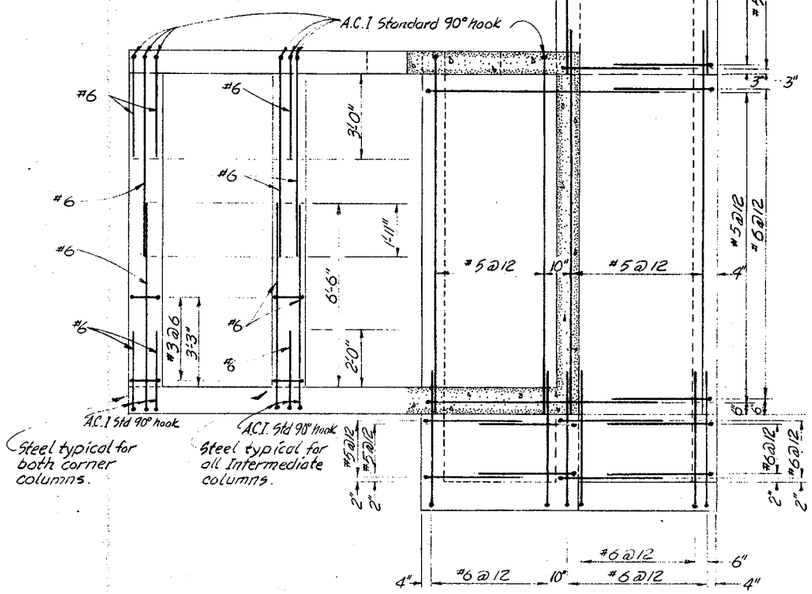
SECTION B 19|19

NOT TO SCALE

INSIDE FACE



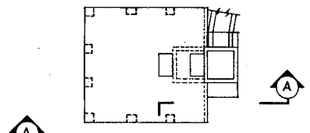
SECTION C 19|19



OUTSIDE FACE

SECTION A 19|19

SCALE 0 5 IN FEET



KEY PLAN

INLET STRUCTURE DETAILS

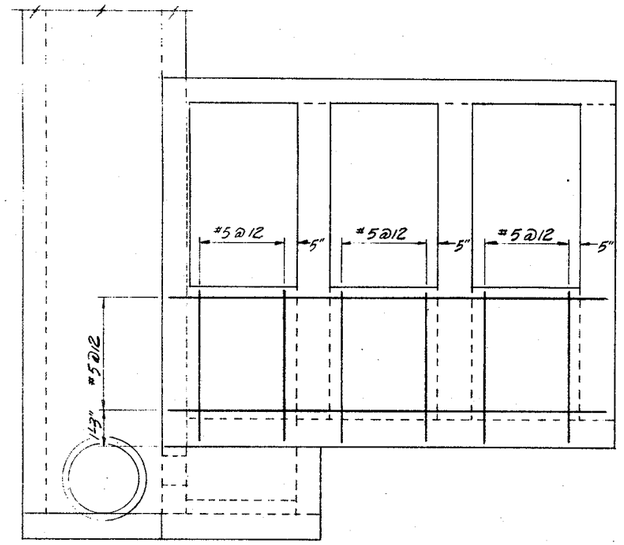
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W.P.P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

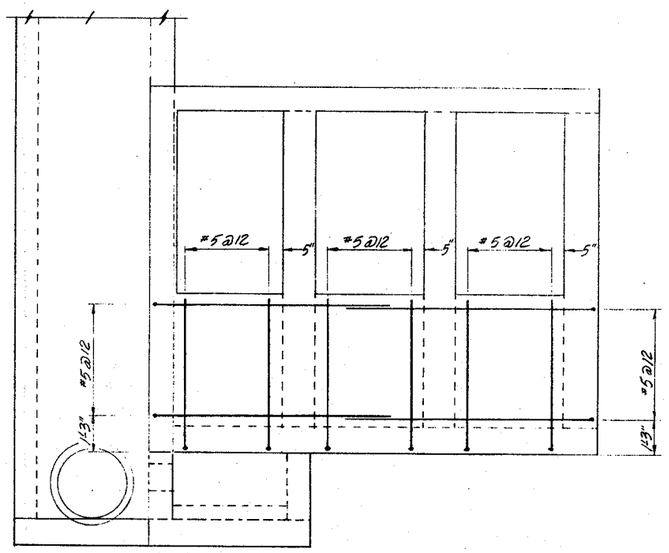
Designed W. H. Erion	Date 9-73	Approved by	
Drawn J. D. Land	9-73	Title	
Traced		Title	
Checked H.W.F.	5-74	Sheet No. 19 of 38	Drawing No. 7-E-22659

SCS-ENG-313-B Rev. 7-69

U.S. GOVERNMENT PRINTING OFFICE : 1969 O—354-783



INSIDE FACE



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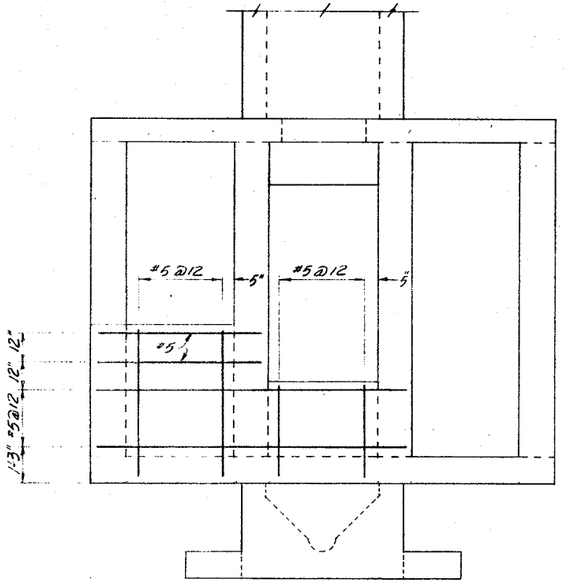
SECTION 8 / 20/20



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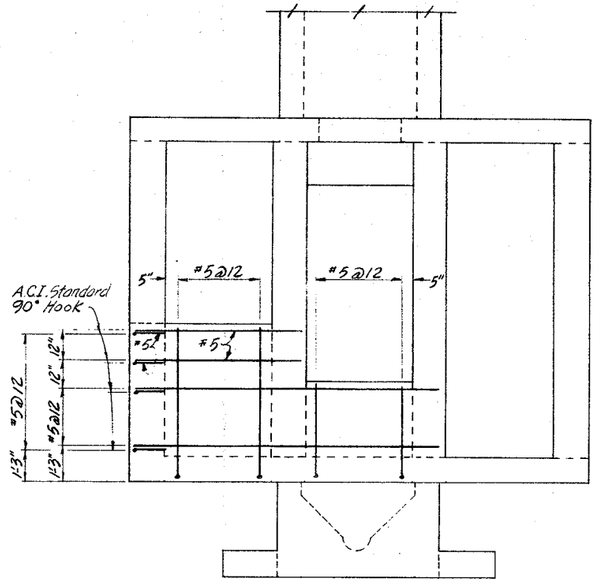

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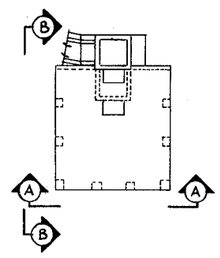
SECTION A / 20/20

SCALE 1 0 5 IN FEET



KEY PLAN

INLET STRUCTURE DETAILS

GUADALUPE FLOODWATER RETARDING STRUCTURE

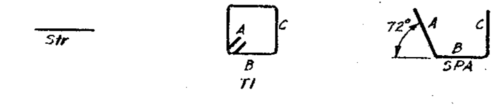
GUADALUPE W. P. P.

MARICOPA COUNTY, ARIZONA

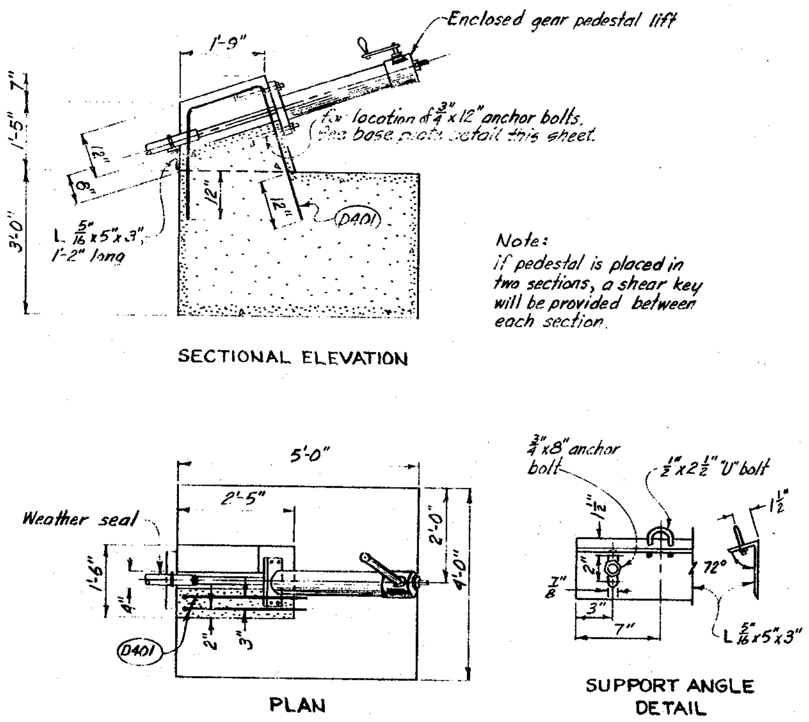
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed W. H. Erion	Date 10-73	Approved by	
Drawn J. D. Land	10-73	Title	
Traced		Title	
Checked H.W.F.	5-74	Sheet No 20 of 38	Drawing No. 7-E-22659

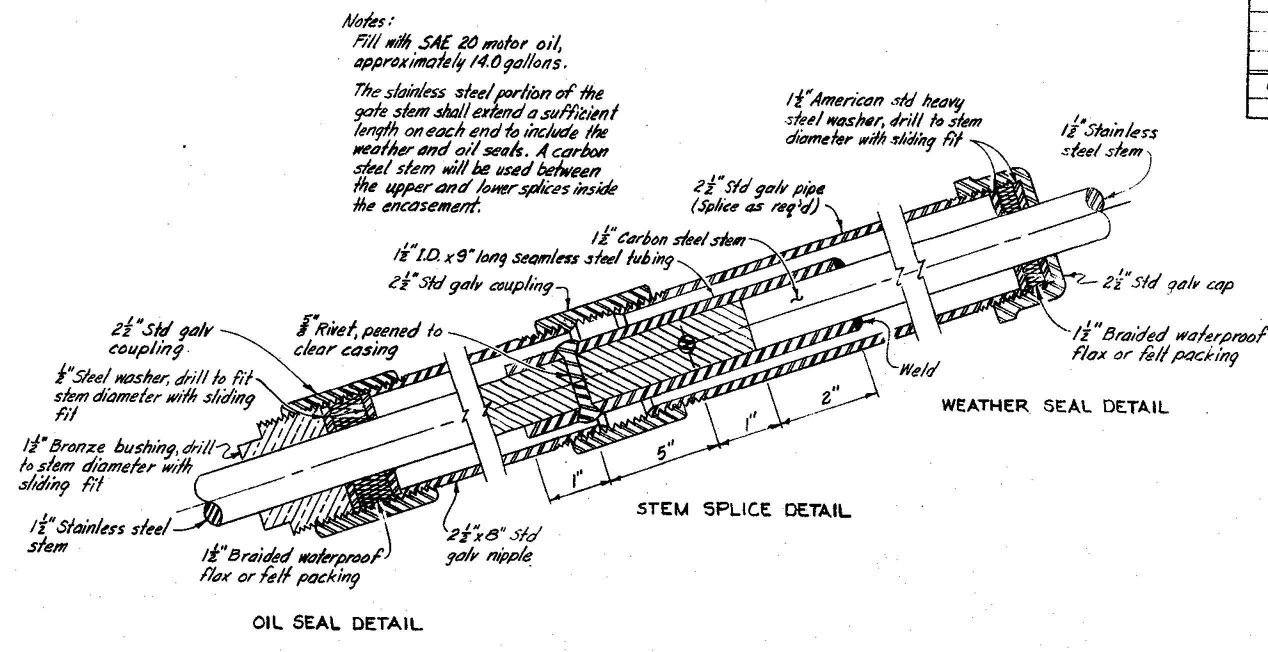
STEEL SCHEDULES									
LOCATION	MARK	SIZE	QUAN	LENGTH	TYPE	A	B	C	TOTAL LENGTH
GATE STEM PEDESTALS (5 req'd)									
	P401	4	15	3'-0"	T1	0'-2"	0'-8"	0'-8"	45'-0"
	P402	4	10	2'-3"	str				22'-6"
	P403	4	10	2'-9"	str				27'-6"
GATE LIFT PEDESTAL									
	D401	4	4	6'-9"	SPA	2'-3"	1'-6"	3'-0"	27'-0"



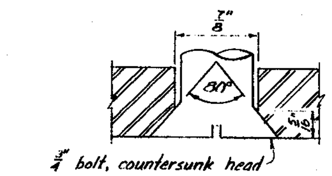
BAR TYPES



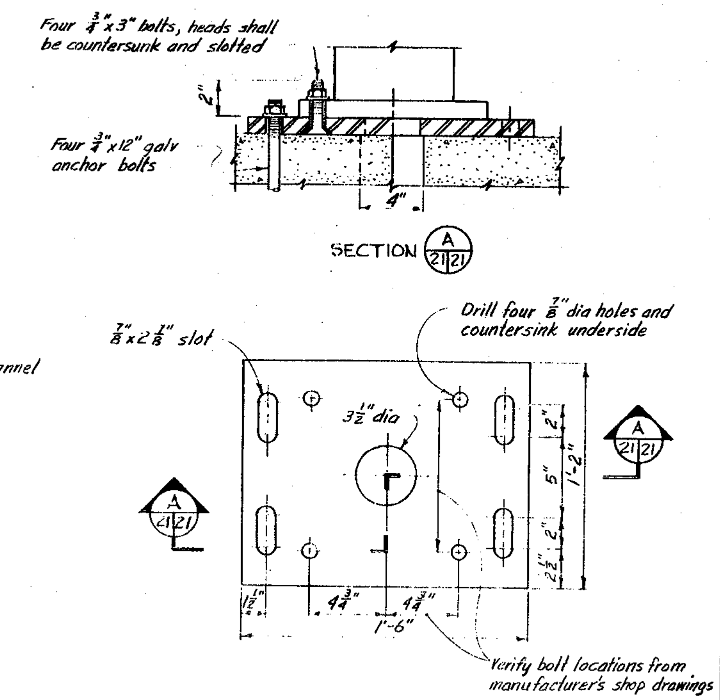
GATE LIFT PEDESTAL



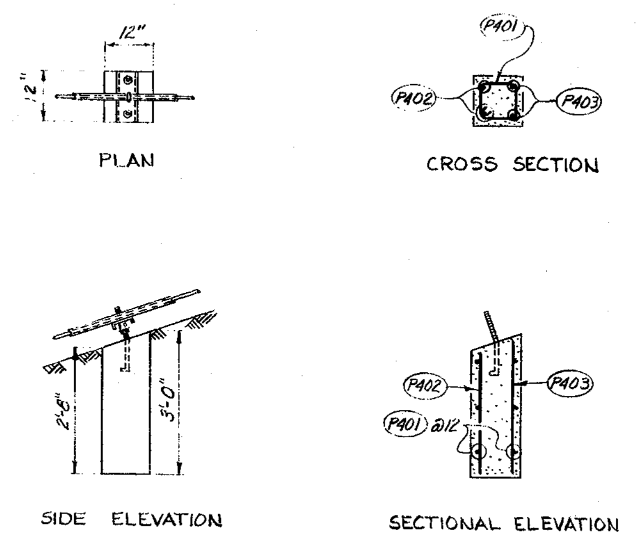
GATE STEM SPLICE



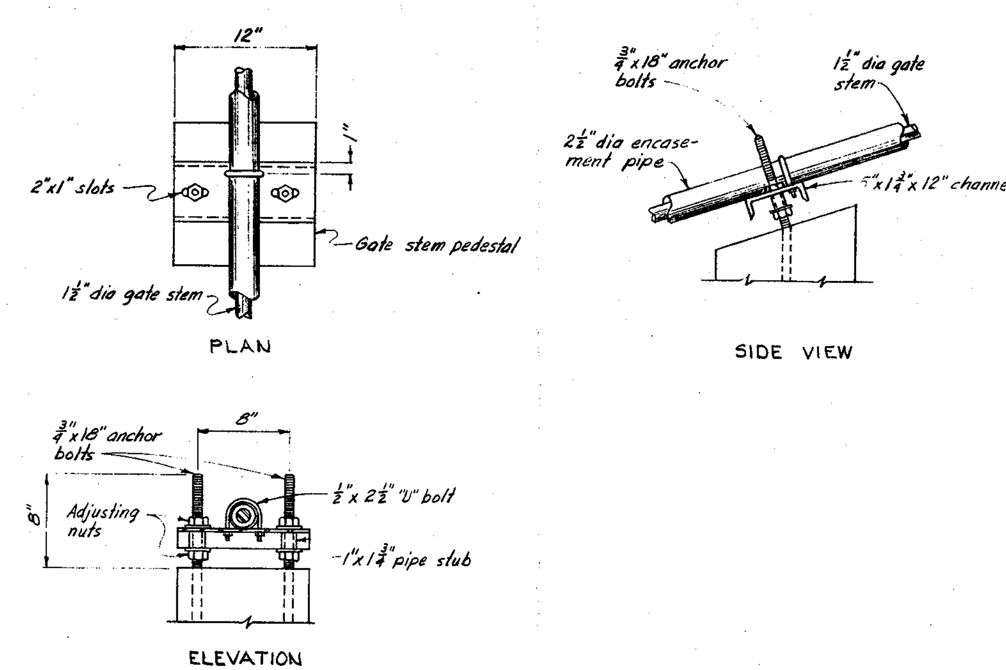
COUNTERSINK DETAIL



BASE PLATE
(For gate lift pedestal)



GATE STEM PEDESTAL

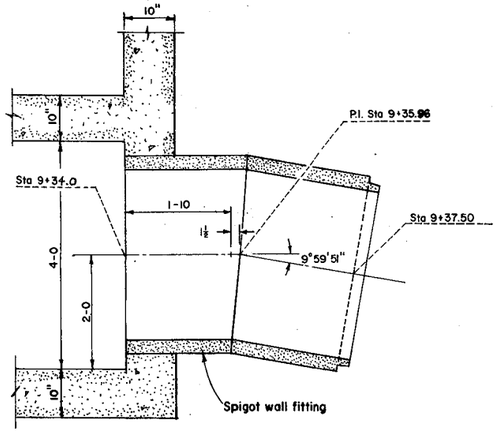


GATE STEM GUIDE

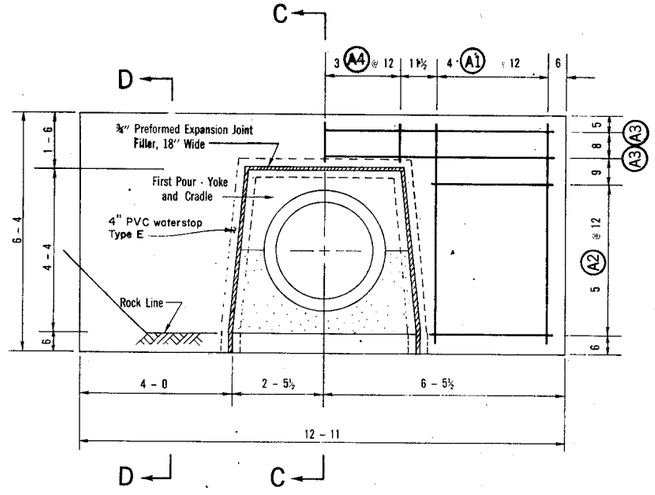
GATE CONTROL DETAILS
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W.P.P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed W.H. ERION	Date 2-73	Approved by
Drawn D.T. BRIONES, JR.	2-73	Title
Traced		Title
Checked H.W.E.	5-74	Sheet No 21 of 38 — Drawing No. 7-E-22659

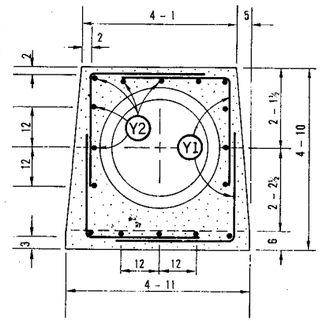


DETAIL C 15 22



DETAIL OF ANTI-SEEP COLLAR

Yoke steel not shown.

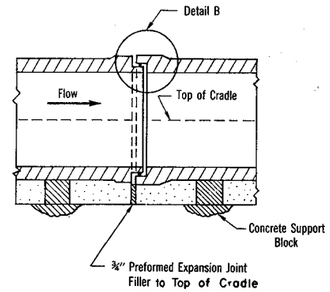


DETAIL OF ANTI-SEEP COLLAR YOKE

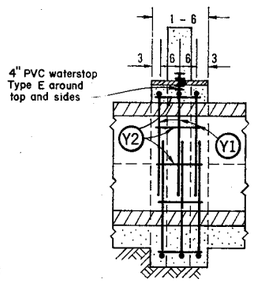
STEEL SCHEDULE

Anti-seep Collar and Yoke, 8 Required.

Mark	Size	Quantity per Collar	Length	Type	Total Quantity	Total Length
A1	4	8	5 - 10	1	64	373-4
A2	4	10	3 - 6	1	80	280-0
A3	4	2	12 - 5	1	16	198-8
A4	4	5	1 - 0	1	40	40-0
Y1	4	12	5 - 8	21	96	544-3
Y2	4	16	1 - 2	1	128	149-2

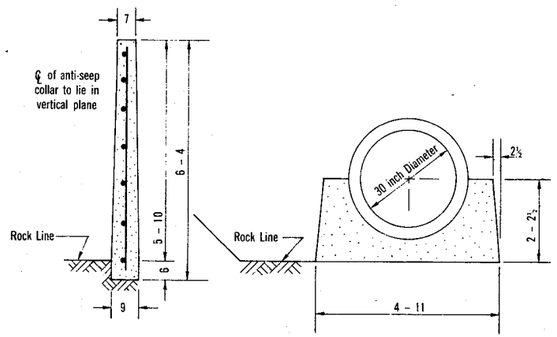


DETAIL OF PIPE JOINT



SECTION C-C

Anti-seep collar steel not shown.



SECTION D-D

DETAIL OF CRADLE

QUANTITIES

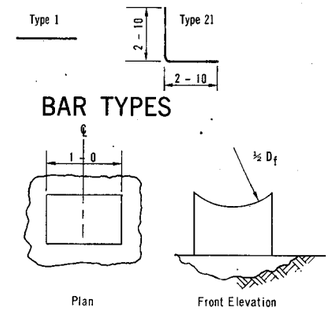
Concrete	Cu. Yds.
Anti-seep Collar including Yoke	
* Each, Additional to Cradle	1.88
Total	15.0
Cradle	
** Per Lineal Foot of Cradle	0.24
Total	51.0
Steel	**Pounds**
Anti-seep Collar including Yoke	1059
Cradle	—

Concrete quantities are based on an outside diameter of pipe of 37½ inches. Steel quantities do not change with outside diameter of pipe.

* This quantity is given by
$1.875 - 0.0001515\ (D_f + 38)\ (D_f - 38)$ cu. yds.

** This quantity is given by
$0.2392 - 0.0001010\ (D_f + 38)\ (D_f - 38)$ cu. yds.

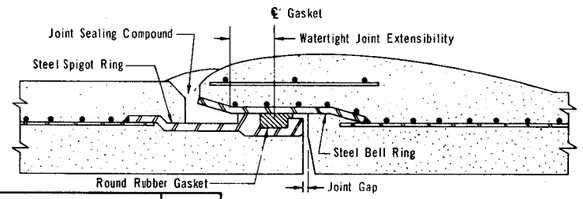
D_f = outside diameter of pipe furnished, inches.



BAR TYPES

SUGGESTED SUPPORT BLOCKS

Sufficient blocks shall be provided to support the pipe to the required line and grade. The Contractor shall determine the number and size of blocks required. Wedges may be used as an alternate.



DETAIL B

Joint length equals watertight joint extensibility plus joint gap.

The pipe shall be drawn together so that the maximum joint gap does not exceed ¼ inch for pipe laid on a straight line. For cambered pipe or pipe laid on a curved line, the joint gap at the closest point shall not exceed ½ inch.

JOINT REQUIREMENTS

Length of Pipe Section	Minimun Joint Length	Minimum Joint Limiting Angle	
feet	inches	radians	degrees
16	1.0	—	—

For pipe length other than shown, joint requirements will be determined by the Engineer.

Where pipes of different length are connected, adjoining pipes shall meet the requirements of the longer pipe.

Prior to delivery of pipe, the pipe joint detail proposed for use shall be submitted to the Engineer for approval.

STRENGTH REQUIREMENTS

Inside Diameter of Pipe	Internal Load	External Load	
	Hydrostatic Pressure	Minimum 3-Edge Bearing Strength in Pounds per Lineal Foot of Pipe	
		Applicable Standard Specification	
		AWWA C 301	AWWA C 300
	Head of Water	Load to produce 0.001 inch crack one foot long	Load to produce 0.01 inch crack one foot long
inches	feet		
30	36	6600	8800
—	—	—	—

The outside diameter of pipe assumed in design is 37½ inches. Where the pipe furnished has an outside diameter greater than assumed in design, the three-edge bearing strength of the pipe furnished must not be less than the specified three-edge bearing strength multiplied by the ratio of the outside diameter of the pipe furnished to the outside diameter assumed in design.

I-73	Waterstop added to anti-seep collar	L.W.M.
DATE	REVISION	BY

STANDARD CONDUIT DETAILS
FOR
REINFORCED CONCRETE PRESSURE PIPE
PRINCIPAL SPILLWAY

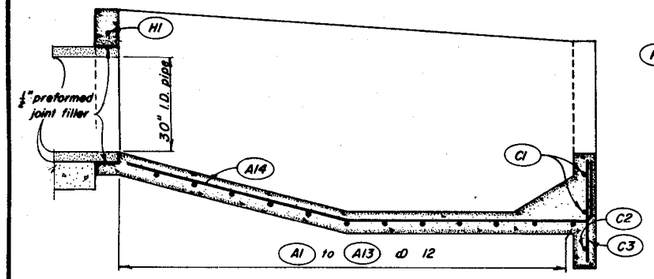
STANDARD DWG. NO. ES-5030-CR

DATE 2-70 SHEET 1 OF 1

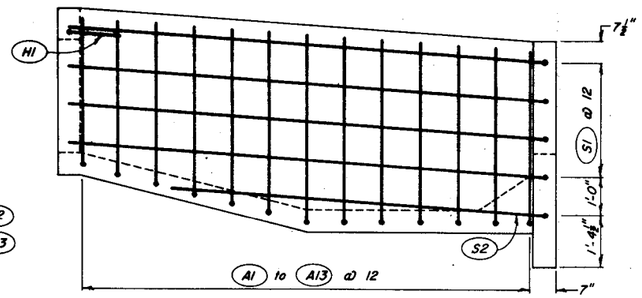
PRINCIPAL SPILLWAY CONDUIT DETAILS
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W.P.P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

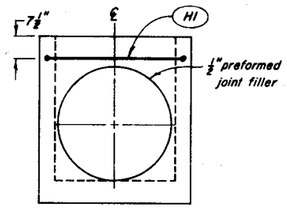
Designed	Date	Approved by
W.H. Erion	1-73	Title
Drawn		
P.D. Clough	2-73	Title
Traced		
Checked		Sheet No. 22 of 38
H.W.F.	5-74	Drawing No. 7-E-22659



SECTIONAL ELEVATION



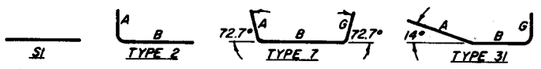
SIDEWALL ELEVATION



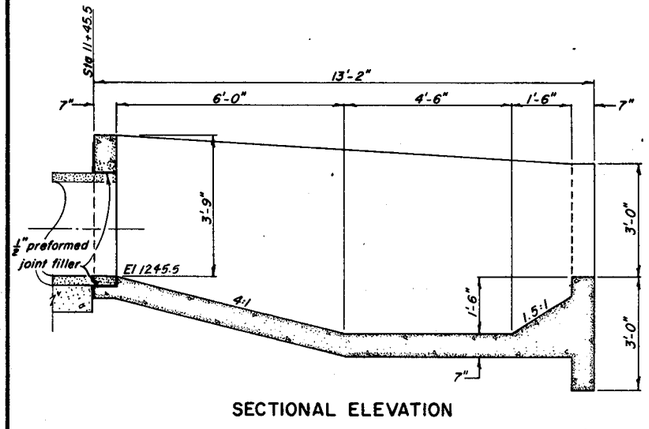
HEADWALL ELEVATION

STEEL SCHEDULE

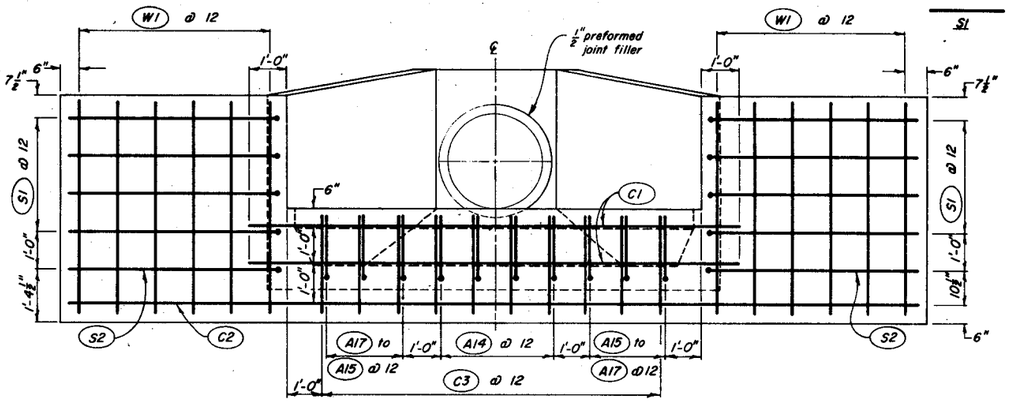
Location	Mark	Size	Quan.	Length	Type	A	B	G	Total Length
Apron	A1	4	2	6'-3"	2	3'-9"	2'-6"		12'-6"
"	A2	4	2	6'-9"	2	4'-0"	2'-9"		13'-6"
"	A3	4	2	7'-3"	2	4'-3"	3'-0"		14'-6"
"	A4	4	2	8'-0"	2	4'-6"	3'-6"		16'-0"
"	A5	4	2	8'-6"	2	4'-9"	3'-9"		17'-0"
"	A6	4	2	9'-0"	2	4'-9"	4'-0"		18'-0"
"	A7	4	2	9'-6"	2	5'-0"	4'-6"		19'-0"
"	A8	4	2	9'-6"	2	4'-9"	4'-9"		19'-0"
"	A9	4	2	9'-9"	2	4'-9"	5'-0"		19'-6"
"	A10	4	2	10'-3"	2	4'-9"	5'-6"		20'-6"
"	A11	4	2	10'-6"	2	4'-9"	5'-9"		21'-0"
"	A12	4	2	10'-6"	2	4'-6"	6'-0"		21'-0"
"	A13	4	2	10'-9"	2	4'-6"	6'-3"		21'-6"
"	A14	4	4	14'-0"	31	6'-0"	6'-6"	1'-6"	56'-0"
"	A15	4	2	12'-0"	31	4'-0"	6'-6"	1'-6"	24'-0"
"	A16	4	2	9'-0"	31	1'-0"	6'-6"	1'-6"	18'-0"
"	A17	4	2	5'-3"	2	1'-6"	3'-9"		10'-6"
Headwall	H1	4	1	6'-0"	7	1'-3"	3'-6"	1'-3"	6'-0"
Sidewall	S1	4	8	18'-0"	7	5'-6"	12'-6"		144'-0"
"	S2	4	2	15'-0"	7	5'-6"	9'-6"		30'-0"
Cutoff wall	C1	4	2	13'-0"	S1				26'-0"
"	C2	4	1	22'-6"	S1				22'-6"
"	C3	4	10	2'-6"	S1				25'-0"
Wingwall	W1	4	12	5'-6"	S1				66'-0"



BAR TYPES

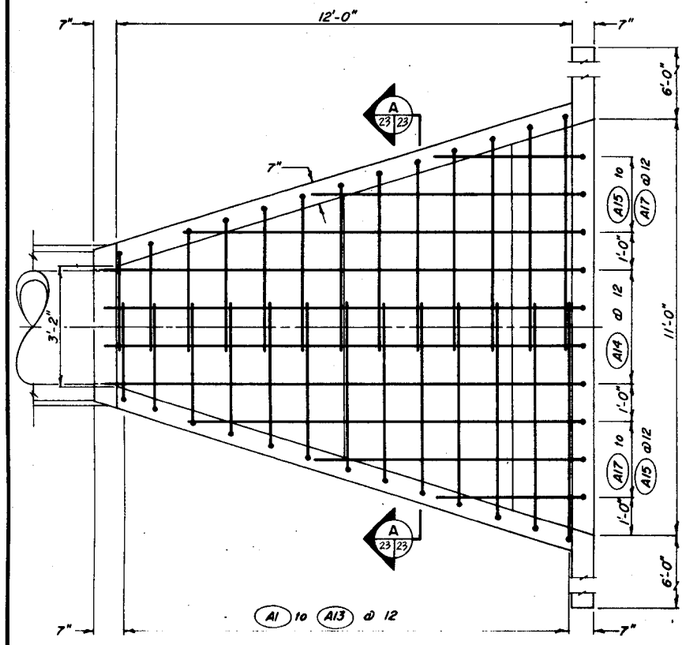


SECTIONAL ELEVATION

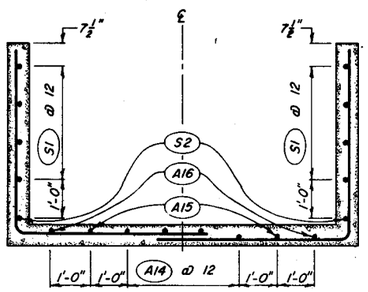


WINGWALL ELEVATION

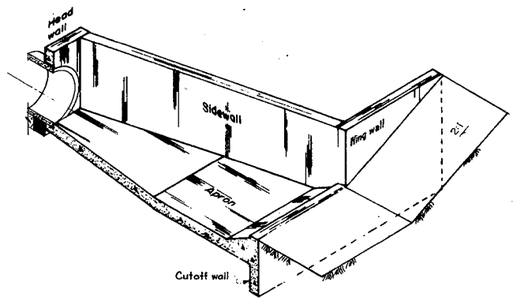
TABLE OF QUANTITIES		
	I.D. of pipe in.	Type of pipe AWWA C300 & C301 Cu. Yds.
Concrete	30	7.31
Reinf Steel		442 lbs



PLAN



SECTION A 23/23



HALF ISOMETRIC

P. W. D. BASIN 7-E-20463 SIZE E

E & WP UNIT PORTLAND, OREGON

PRINCIPAL SPILLWAY OUTLET DETAILS

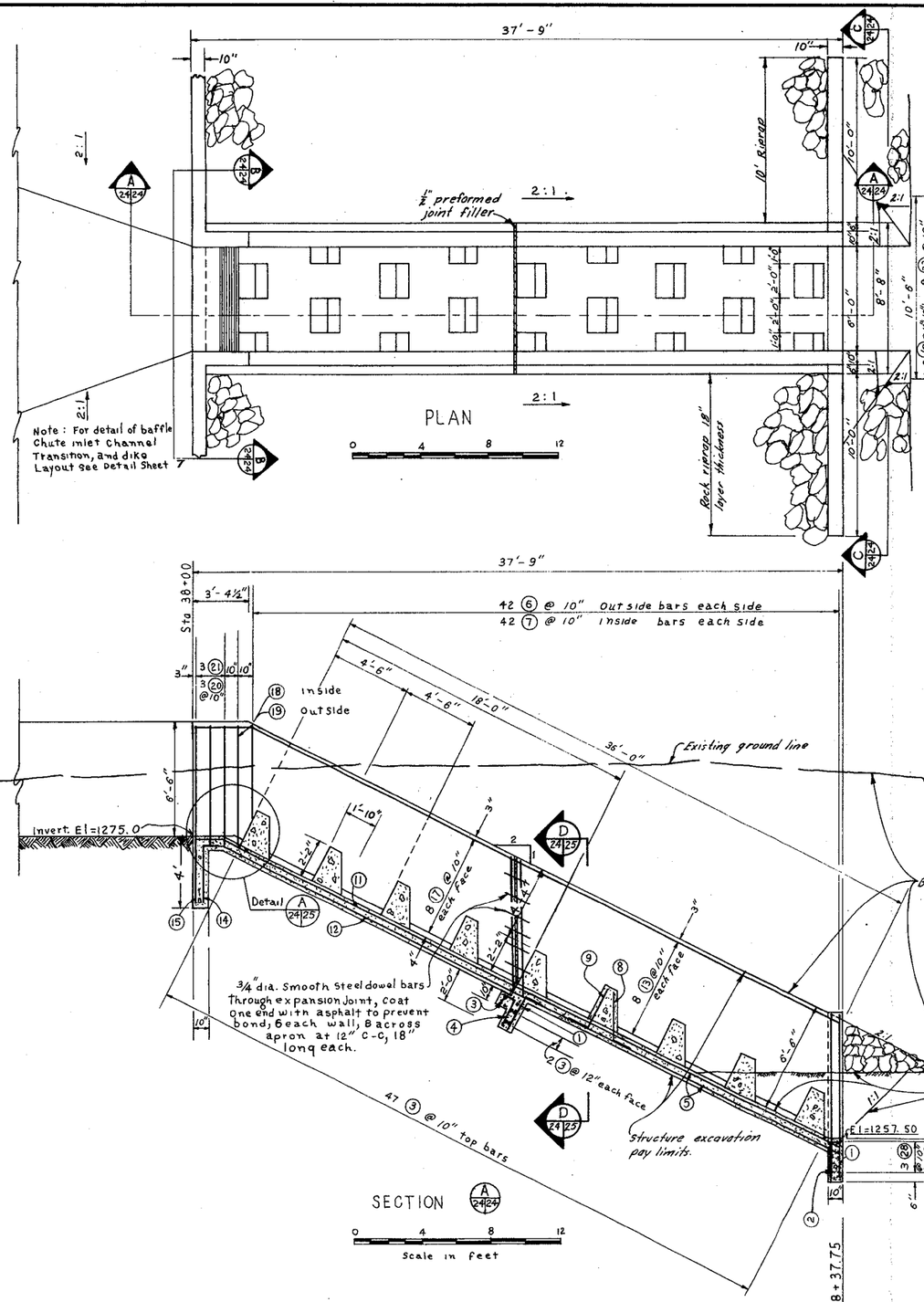
GUADALUPE FLOODWATER RETARDING STRUCTURE

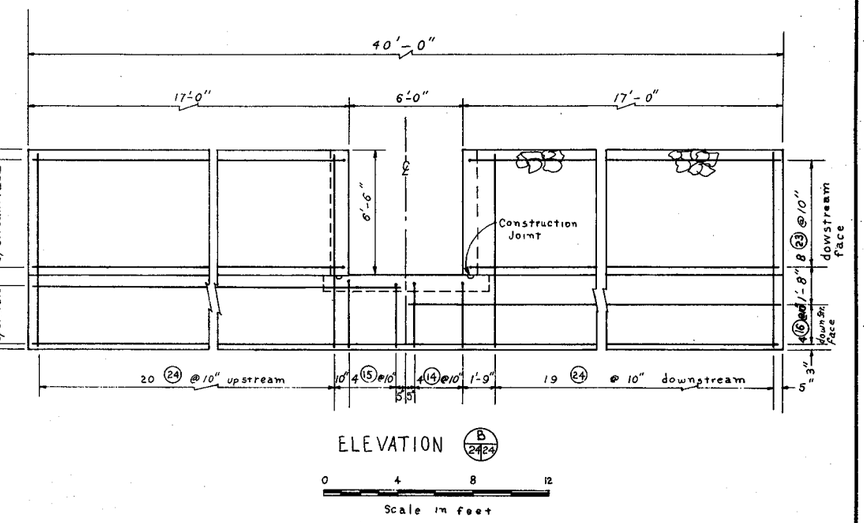
GUADALUPE W.R.P.

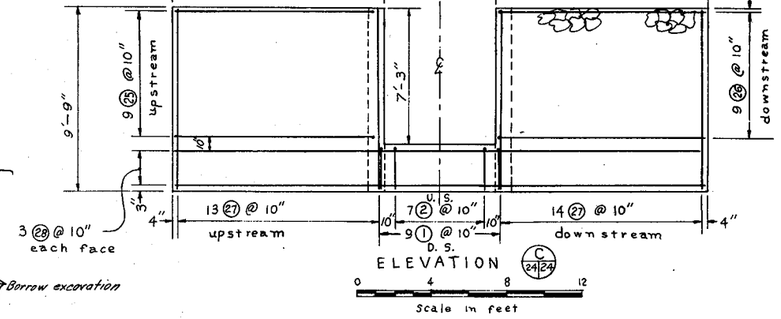
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date		
Designed	W. H. Erion	1-73	Approved by	
Drawn	P. D. Clough	2-73	Title	
Traced			Title	
Checked	HWF	5-74	Sheet No 23 of 38	Drawing No 7-E-22659







DETAILS OF BAFFLE CHUTE
GUADALUPE FLOODWATER RETARDING STRUCTURE
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed L. BURTON	1-18-73	Approved by	
Drawn LMC	5-28-73	Title	
Traced		Title	
Checked J.L.S., P.J.M., H.W.F.	11-12-73	Sheet No. 24 of 38	Drawing No. 7-E-22659

SCS-ENG-313-B Rev. 7-69

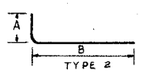
BAR SCHEDULE

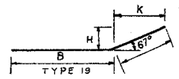
LOCATION	MARK NO	SIZE	Quantity	LENGTH	TOTAL LENGTH	TYPE	A	B	H	K
Toewall & Expansion Joint Beam	1	4	19	3'-3"	61'-9"	2	1'-3"	2'-0"		
Toewall & Chute Blocks	2	↑	61	1'-9"	106'-9"	Str.				
Apron & Expan. Joint Beam	3		54	8-3"	445'-6"	Str.				
Expansion Joint Beam	4		11	2'-6"	27'-6"	2	1'-0"	1'-6"		
Apron-Longitudinal, Lower Sect.	5		22	21'-0"	4'-0"	Str.				
Sidewall to Footing	6		84	9'-0"	756'-0"	2	1'-3"	7'-9"		
Sidewall to Apron	7		84	12'-3"	1029'-0"	2	4'-6"	7'-9"		
CHUTE Blocks	8		36	3'-9"	135'-0"	19	1'-3"	2'-6"	1'-2⅛"	0'-3⅜"
Chute Blocks	9		36	3'-6"	126'-0"	2	1'-3"	2'-3"		
Chute Blocks	10		54	1'-3"	67'-6"	Str.				
Apron-Longitudinal, Upper Sect.	11		11	20'-6"	225'-6"	20	1'-6"	21'-0"	0'-7¼"	1'-5¼"
" " " "	12		11	20'-0"	220'-0"	20	1'-3"	20'-9"	0'-6"	1'-2½"
Sidewalls-Longitudinal, Lower Sect.	13		32	20'-9"	663'-0"	Str				
Headwall	14		8	4'-6"	36'-0"	2	1'-2"	3'-4"		
Headwall	15		8	5'-0"	40'-0"	2	1'-3"	3'-9"		
Headwall	16		9	39'-6"	355'-6"	Str.				
Sidewall-Longitudinal, Upper Sect.	17		4 SETS OF 8 BARS	17'-0" to 18'-9" 3" incre.	572'-0"	Str.				
Sidewall to Footing	18		2	8'-9"	17'-6"	2	1'-3"	7'-6"		
Sidewall to Apron	19		2	12'-0"	24'-0"	2	4'-6"	7'-6"		
Sidewall to Footing	20		6	8'-0"	48'-0"	2	1'-2"	6'-10"		
Sidewall to Apron	21		6	11'-9"	70'-6"	2	4'-11"	6'-10"		
Headwall to Sidewall	22		16	20'-0"	320'-0"	2	3'-6"	16'-6"		
Headwall to Sidewall	23		16	19'-6"	312'-0"	2	3'-3"	16'-3"		
Headwall - Vertical	24		78	10'-3"	799'-6"	Str.				
Wingwall - Downstream	25		18	11'-0"	198'-0"	Str.				
"	26		18	12'-6"	225'-0"	2	1'-6"	11'-0"		
" Vertical	27		54	9'-3"	499'-6"	Str.				
End Sill "	28	4	6	28'-0"	168'-0"	Str.				

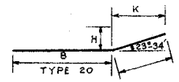
BAR TYPES

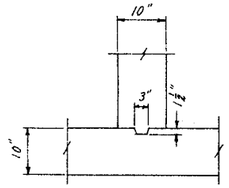
Straight

STR.

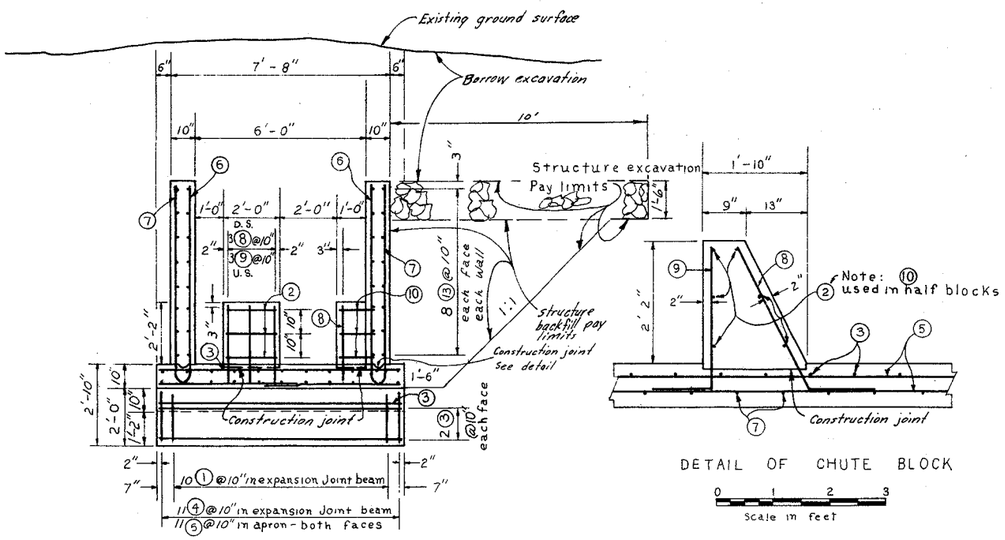








CONSTRUCTION JOINT DETAIL



SECTION (D 24/25)

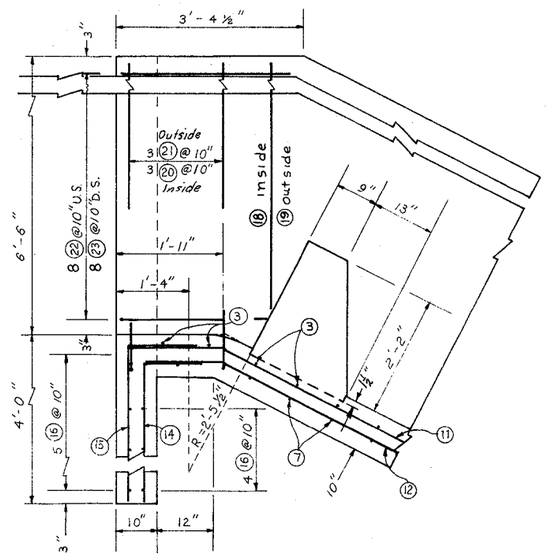
0 2 4 6

Scale in feet

DETAIL OF CHUTE BLOCK

0 1 2 3

Scale in feet



DETAIL (A 24/25)

0 1 2 3

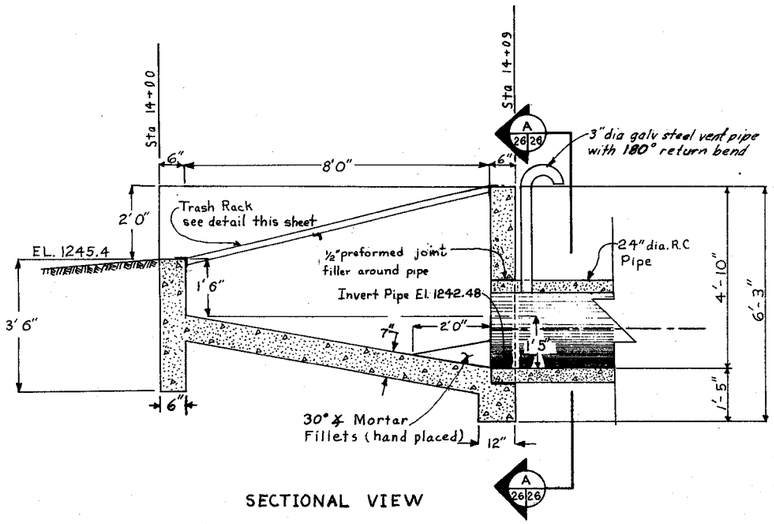
Scale in feet

DETAILS OF BAFFLE CHUTE
GUADALUPE FLOODWATER RETARDING STRUCTURE
MARICOPA COUNTY, ARIZONA

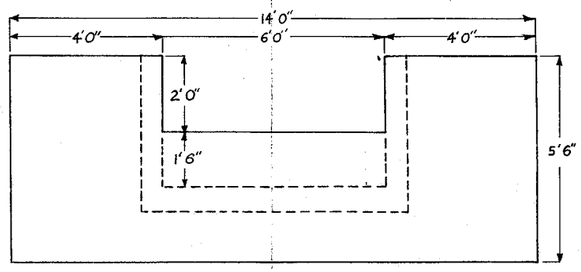
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed L. Burton	1/73	Approved by	
Drawn L. McCuin	5/73	Title	
Traced		Title	
Checked J.L.S., P.J.M., H.W.F.	11/73	Sheet No 25 of 38	Drawing No. 7-E-22659

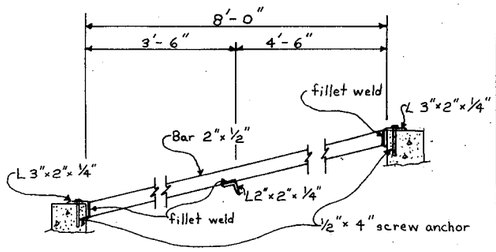
SCS-ENG-313-B Rev. 7-69



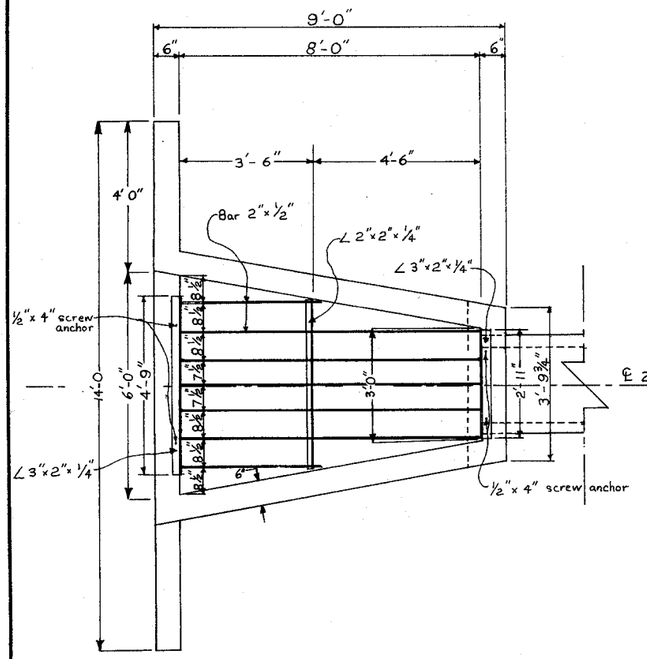
SECTIONAL VIEW



FRONT ELEVATION

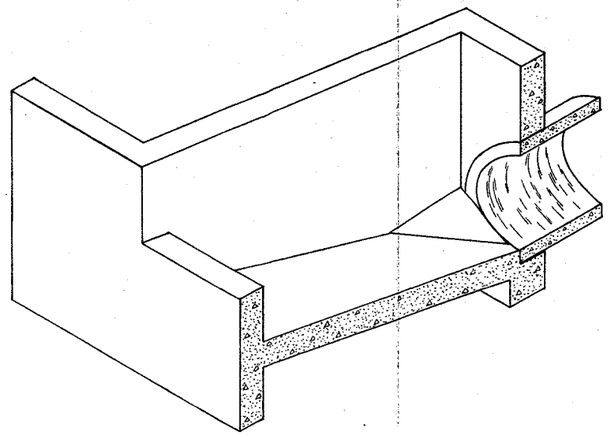


TRASH RACK DETAIL

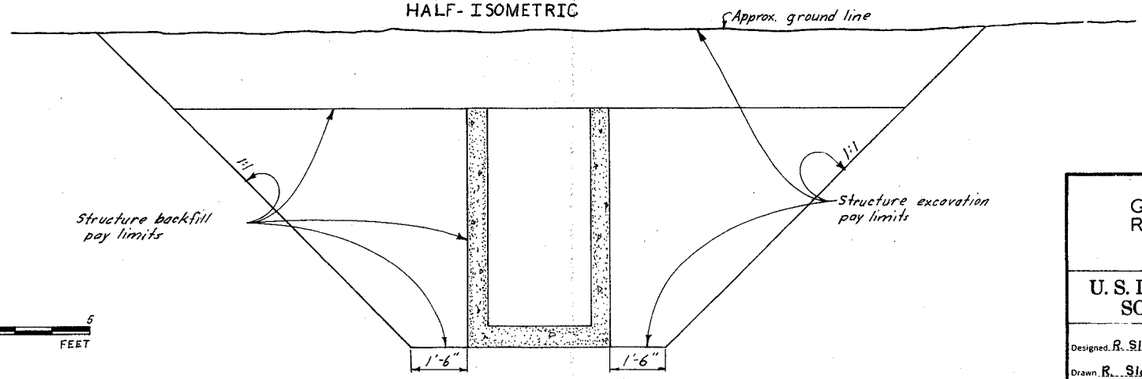


PLAN VIEW

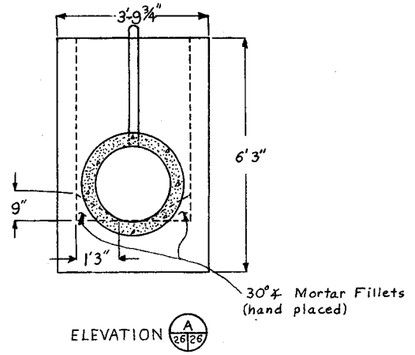
SCALE 1 0 5 IN FEET



HALF-ISOMETRIC



STRUCTURE EXCAVATION PAY LIMITS



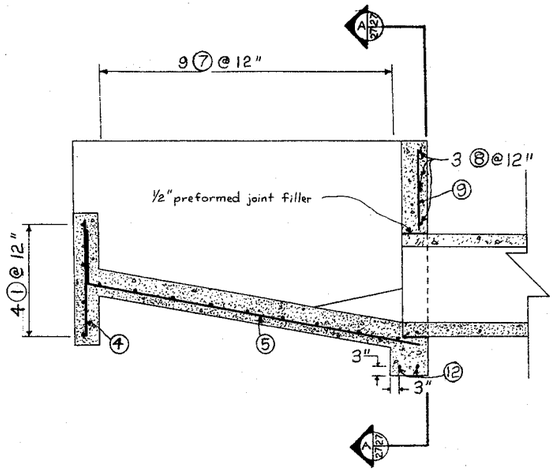
ELEVATION A 26/26

DETAILS OF DROP INLET STA. 14+00
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed R. Slocum	1/73	Approved by	
Drawn R. Slocum	1/73	Title	
Traced		Title	
Checked J.L.S. R.J.M. H.W.F.	11/73	Sheet No. 26 of 38	Drawing No. 7-E-22659

SCS ENG 212 P.D.

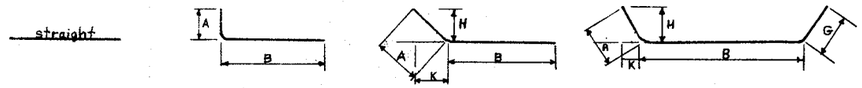


SECTIONAL ELEVATION

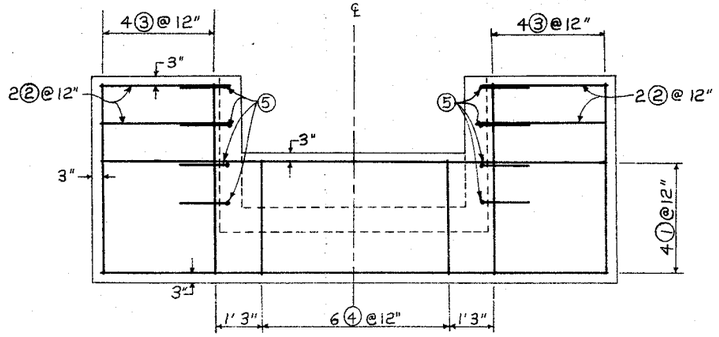
STEEL SCHEDULE

Location	Mark No.	Size	Quantity	Length	Total Length	Type	A	B	G	H	K
Head wall	1	4	4	13' 6"	54' 0"	str.					
Head wall	2		4	3' 6"	14' 0"	str.					
Head wall	3		8	5' 0"	40' 0"	str.					
Head wall	4		6	3' 0"	18' 0"	str.					
Side wall + Apron	5		12	10' 6"	126' 0"	19	1' 6"	9' 0"		1' 6"	3"
Apron	6		2	8' 0"	16' 0"	19	1' 6"	6' 6"		1' 6"	3"
Apron to Sidewall	7		18	7' 9"	139' 6"	2	3' 10" to 5' 3" @ 2" increments	3' 8" to 2' 6" @ 2" increments			
End wall	8		3	6' 10"	20' 6"	21	1' 8"	3' 6"	1' 8"	1' 8"	3"
End wall	9		1	2' 0"	2' 0"	str.					
End wall	10		2	2' 6"	5' 0"	str					
End wall	11		2	5' 9"	11' 6"	str.					
End wall	12		2	3' 6"	7' 0"	str.					
Side wall	13		2	4' 0"	8' 0"	str.					
End wall	14		4	3' 0"	12' 0"	str.					

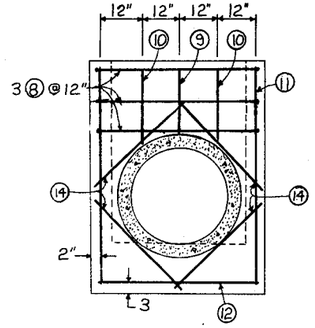
BAR TYPES



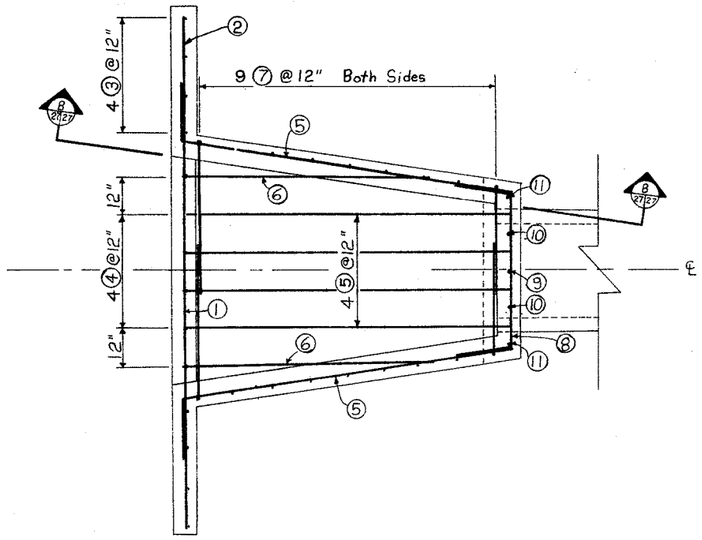
Str. Type 2 Type 19 Type 21



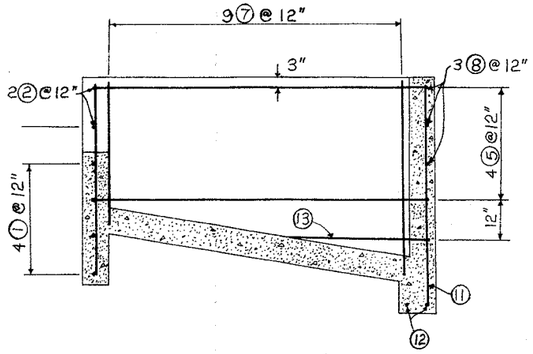
FRONT ELEVATION



ELEVATION A 27/27



PLAN VIEW



SECTION B 27/27

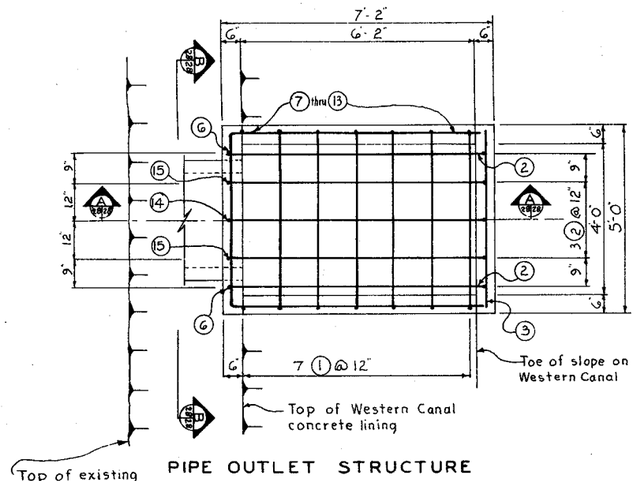
0 1 2 3 5
SCALE IN FEET

DETAILS OF DROP INLET
GUADALUPE FLOODWATER
RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

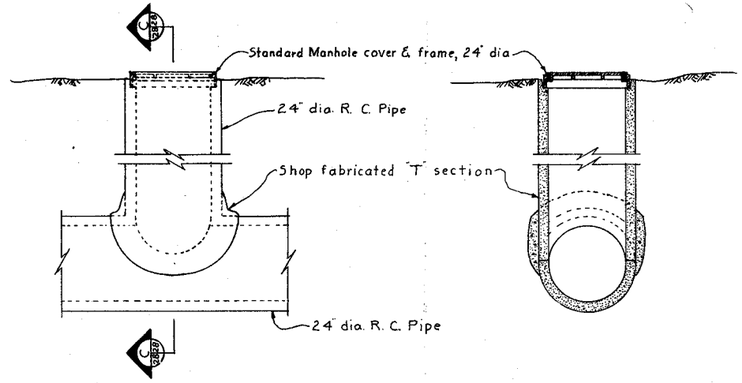
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date	
Designed L. Burton	1/73	Approved by
Drawn R. Slocum, L. Burton	1/73	Title
Traced L. Burton	1/73	Title
Checked J.L.S., P.J.M., H.W.F.	11/73	Sheet No. 27 of 38 — Drawing No. 7-E-22659

U.S. GOVERNMENT PRINTING OFFICE : 1966 O—234-763



PIPE OUTLET STRUCTURE

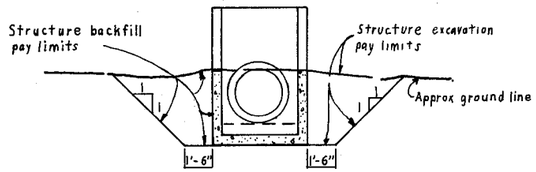


DETAIL OF STANDARD MANHOLE SECTION

Scale in feet

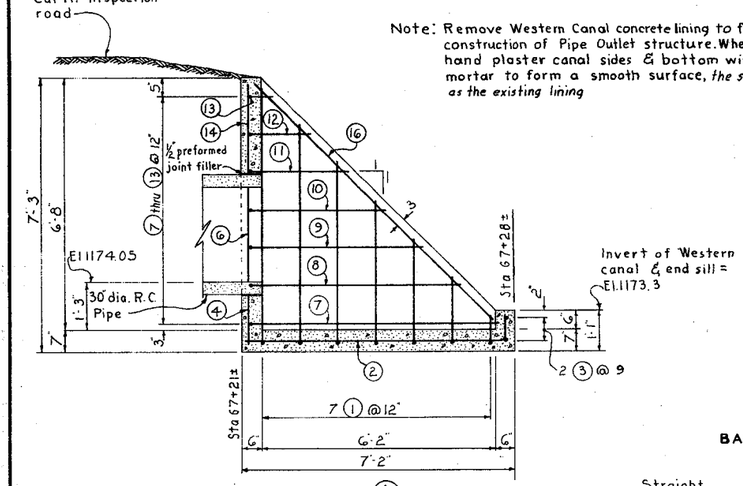
MANHOLE LOCATION	
Approx. Station	Height of riser from ℄ of pipe
20+90	6.0'
33+40	8.0'
47+00	* 5.2'
60+90	* 3.6'

* Approx. Riser height to top of pavement

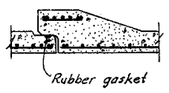


OUTLET STRUCTURE EXCAVATION AND BACKFILL PAY LIMITS
NOT TO SCALE

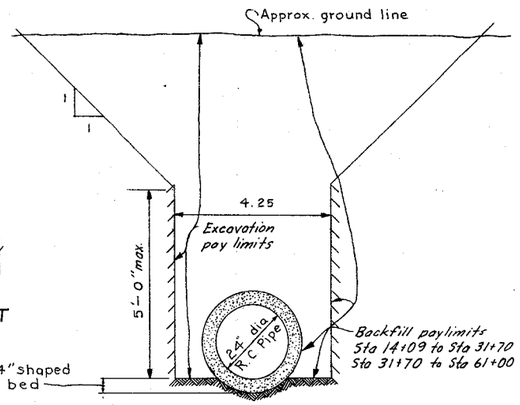
Note: Remove Western Canal concrete lining to facilitate construction of Pipe Outlet structure. When complete, hand plaster canal sides & bottom with cement mortar to form a smooth surface, *the same thickness as the existing lining*



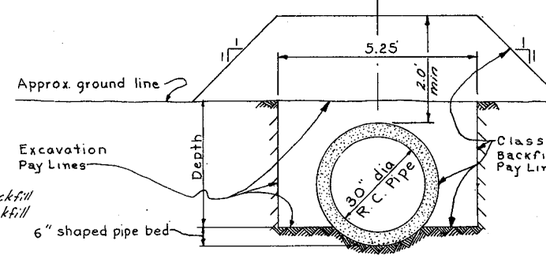
SECTION



TYPICAL PIPE JOINT OUTLET CONDUIT

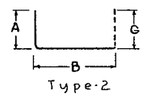


TYPICAL SECTION OF OUTLET CONDUIT TRENCH
STA. 14+09 TO STA. 30+70
STA. 31+05 TO STA 61+00

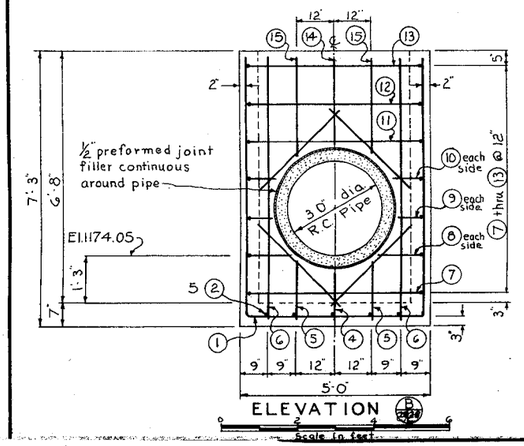


TYPICAL SECTION OF OUTLET CONDUIT TRENCH
STA. 62+50 TO STA. 66+90

BAR TYPES



Straight Str.

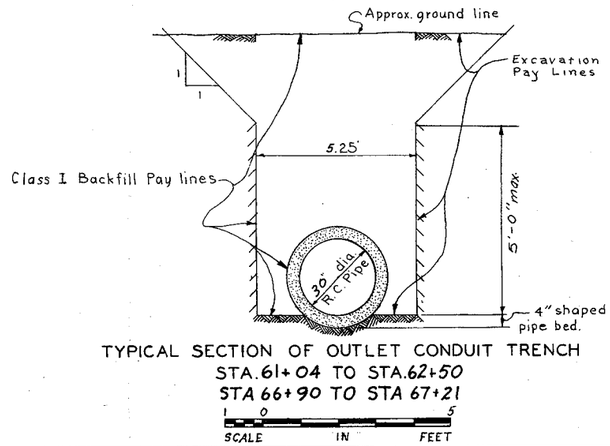


ELEVATION

Scale in feet

BAR SCHEDULE

Mark No.	Size	Quantity	Length	Total length	Type	A	B	G
1	4	7	6'-0" to 18'-0" @ 2" Increm.	84'-0"	2	0'-8" to 6'-8" @ 12" Increm.	4'-8"	0'-8" to 6'-8" @ 12" Increm.
2		5	7'-6"	37'-6"	2	0'-9"	6'-9"	
3		2	4'-9"	9'-6"	Str.			
4		1	1'-3"	1'-3"	"			
5		2	1'-6"	3'-0"	"			
6		2	7'-0"	14'-0"	"			
7		1	17'-9"	17'-9"	2	6'-7"	4'-7"	6'-7"
8		2	6'-9"	13'-6"	2	1'-2"	5'-7"	
9		2	5'-3"	10'-6"	2	0'-8"	4'-7"	
10		2	4'-6"	9'-0"	2	0'-10"	3'-8"	
11		1	9'-9"	9'-9"	2	2'-7"	4'-7"	2'-7"
12		1	7'-9"	7'-9"	2	1'-7"	4'-7"	1'-7"
13		1	5'-9"	5'-9"	2	0'-7"	4'-7"	0'-7"
14		1	2'-3"	2'-3"	Str			
15		2	2'-6"	5'-0"	"			
16	4	2	9'-0"	18'-0"	"			



TYPICAL SECTION OF OUTLET CONDUIT TRENCH
STA. 61+04 TO STA. 62+50
STA 66+90 TO STA 67+21

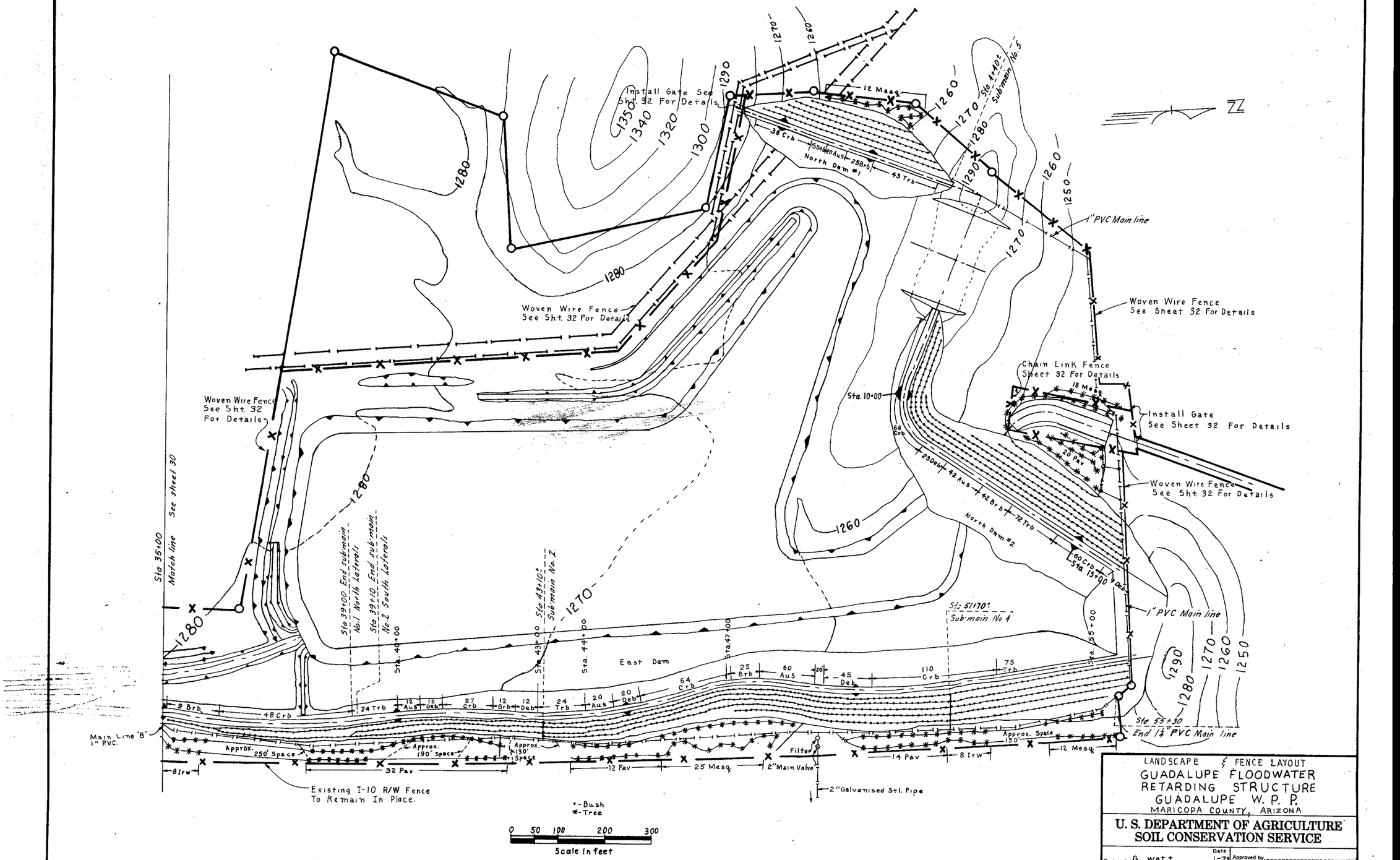
SCALE 0 5 IN FEET

DETAILS OF OUTLET CONDUIT APPURTENANCES
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed G. WATT Date 1/73 — Approved by
Drawn G. HANLEY 2-5-73 — Title
Traced — Title
Checked J.L.S., P.J.M., H.W.F. 11/73 — Sheet No 28 of 38 — Drawing No 7-E-22659

SCS-ENG-212 R Rev. 7-69



LANDSCAPE & FENCE LAYOUT
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed G. Watt	Date 1-73	Approved by	
Drawn R. Slocum	1-73	Title	
Traced D.F.T.	1-73	Title	
Checked J.L.S., P.J.M., H.W.F.	1-73	Sheet No. 29 of 38	Drawing No. 7-E-22659

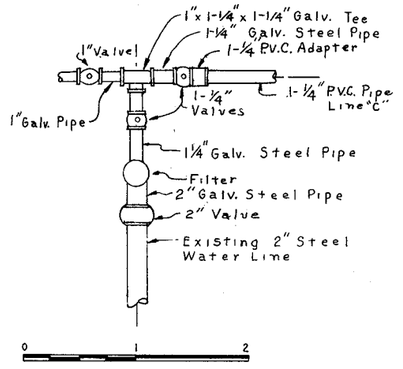
SCS-ENG-313-B Rev. 7-69

DRIP IRRIGATION SYSTEM MATERIALS

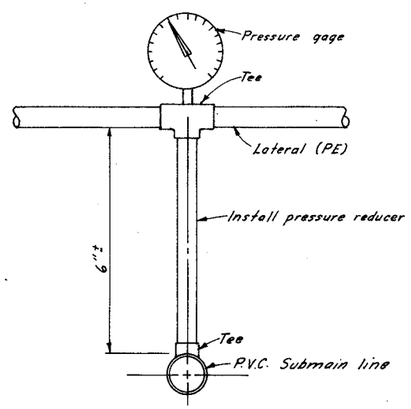
ITEMS	QUANTITY
½" Poly ethylene pipe	17,350
¾" Poly ethylene pipe	4,210
¾" P.V.C. pipe	215
1" P.V.C. pipe	2,900
1¼" P.V.C. pipe	630
½" Pressure reducers	27
1¼" Valves	2
2" Valves	1
1" Valves	1
Tees, elbows, reducers, nipples, etc.	Various
Filters	1
Pressure gages	27
Emitters 1 G.P.H.	1,323

SUB-MAIN LINES

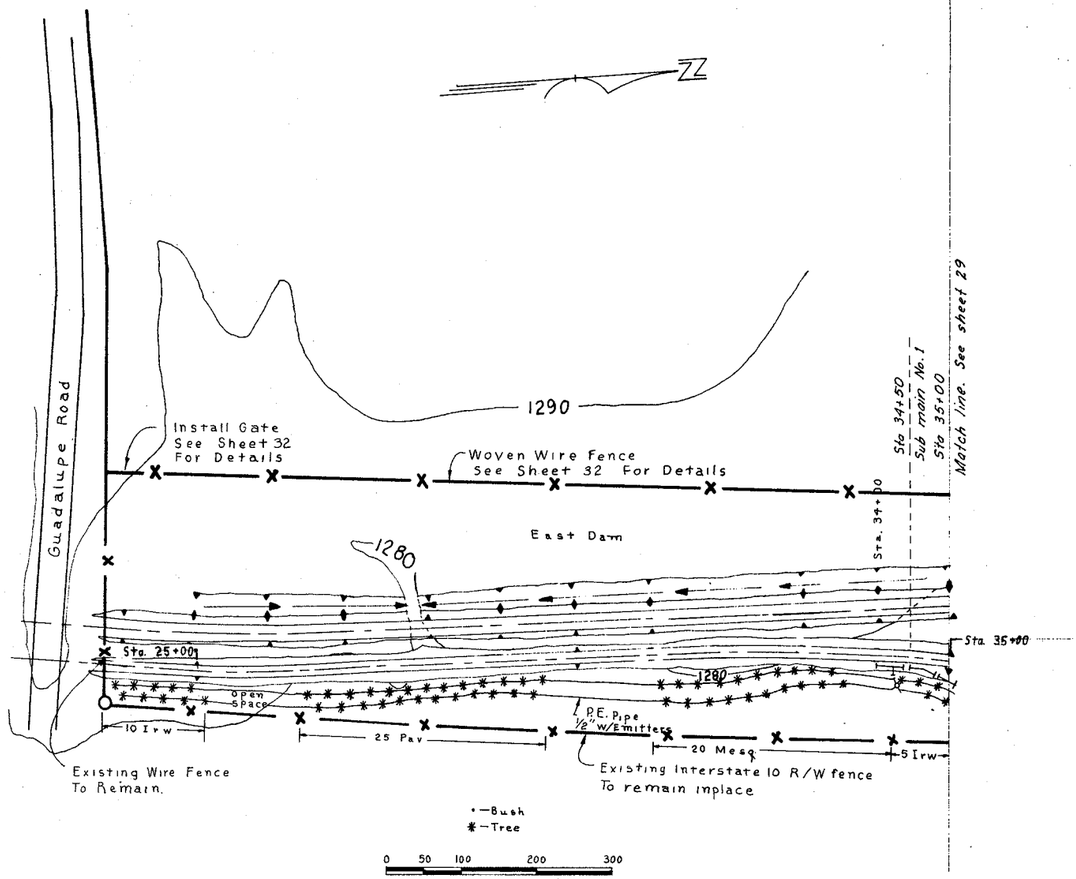
NUMBER	SIZE	LENGTH
1	¾"	35'
2	1"	90'
3	¾"	30'
4	1"	70'
5	¾"	150'



Supply Line Detail



LATERAL CONNECTION DETAILS



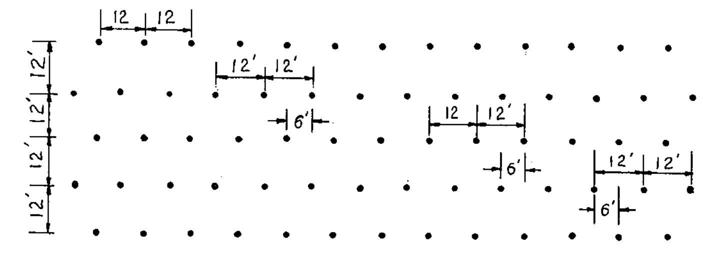
LANDSCAPE & FENCE LAYOUT
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

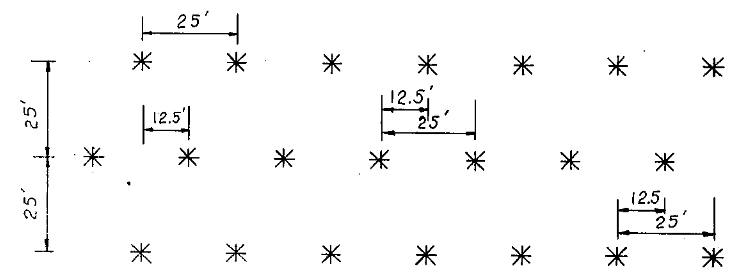
Designed G. Watt	Date 1-73	Approved by	
Drawn LMC	3/73	Title	
Traced DRT	4-73	Title	
Checked J.L.S. P.J.M. HWF 11/73		Sheet No. 30 of 38	Drawing No. 7-E-2 2659

SCS-ENG-313-B Rev. 7-69

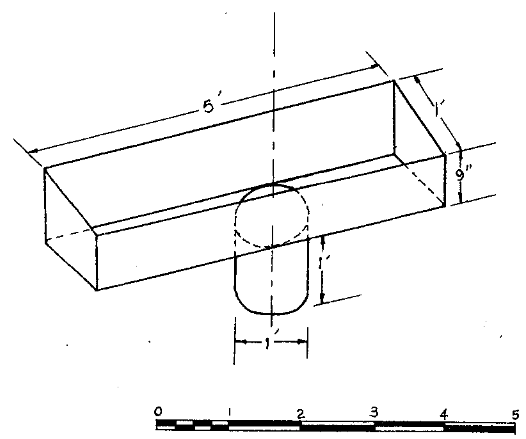
Plant Species	Common Name	Abbrev.	N. Dam #1	N. Dam #2	East Dam	Totals
Atriplex semibaccata	Australian saltbush	Aus	20	42	92	154
Baccharis sarothroides	Desert broom	Deb	15	32	89	136
Cercidium mycrophyllum	Paloverde (Littleleaf)	Pav		20	83	103
Encelia farinosa	Brittlebush	Brb	25	42	96	163
Franseria deltoidea	Triangle bursage	Trb	43	72	123	238
Larrea tridentata	Creosotebush	Crb	36	126	249	411
Olneya tesota	Ironwood	Irw			31	31
Prosopsis juliflora	Mesquite	Mesq	12	18	57	87
	1 Gallon Size Plants		151	382	820	1,323



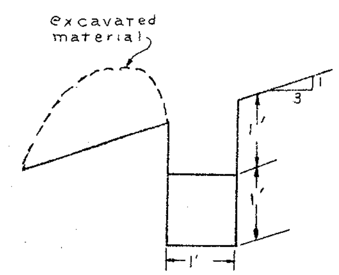
SHRUB LAYOUT DETAIL
Not to Scale



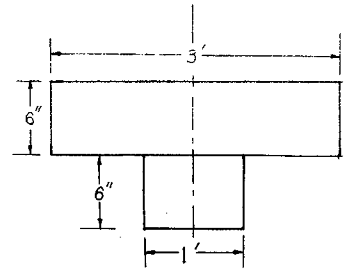
TREE LAYOUT DETAIL
Not to Scale

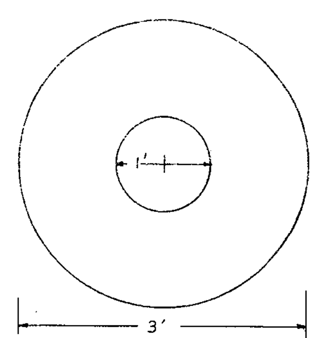


Shrub Trench Isometric View



Shrub Trench Elevation





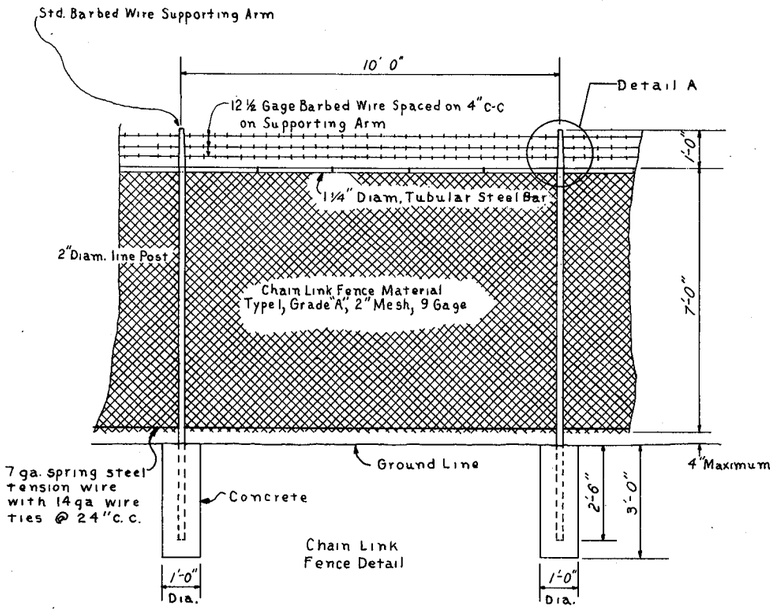
Tree Trench Elevation

Tree Trench Plan

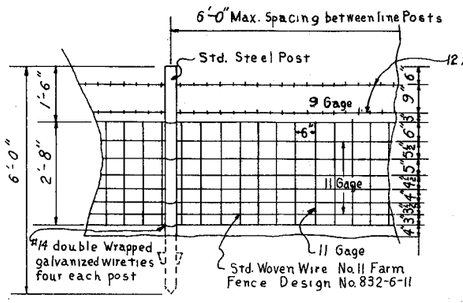
LANDSCAPE DETAIL
GUADALUPE FLOODWATER
RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

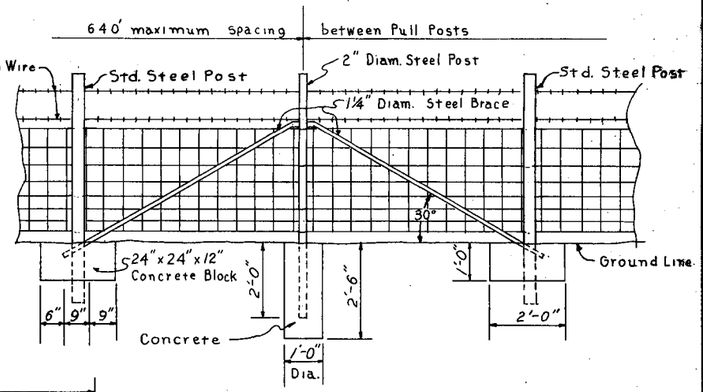
	Date	
Designed G.W.	1/73	Approved by
Drawn LMC	8/73	Title
Traced		Title
Checked JLS, RJM, HWF	11/73	Sheet No. 31 of 38 — Drawing No. 7-E-22659

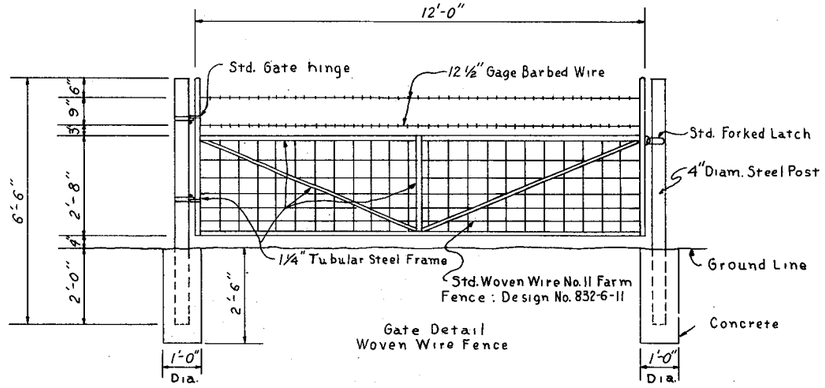


Chain Link Fence Detail

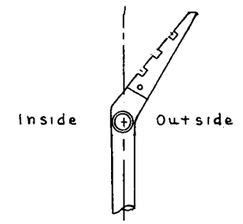


Woven Wire Fence Detail

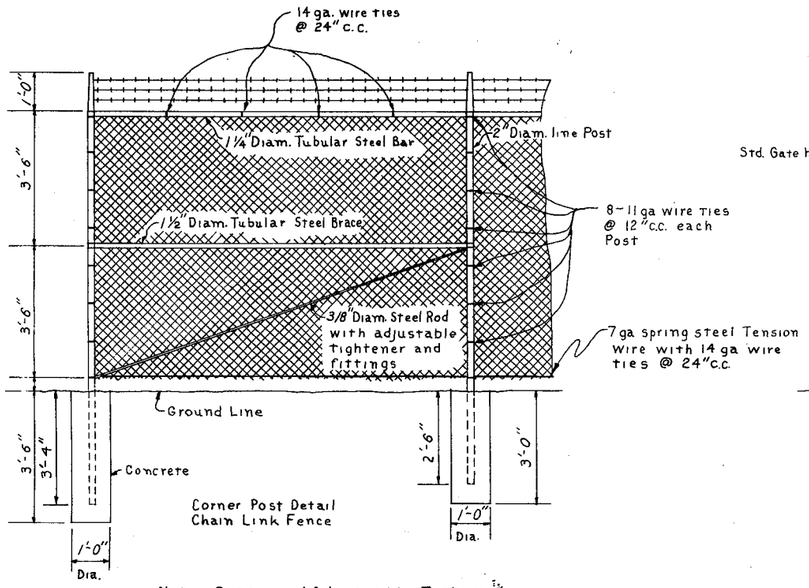




Gate Detail
Woven Wire Fence

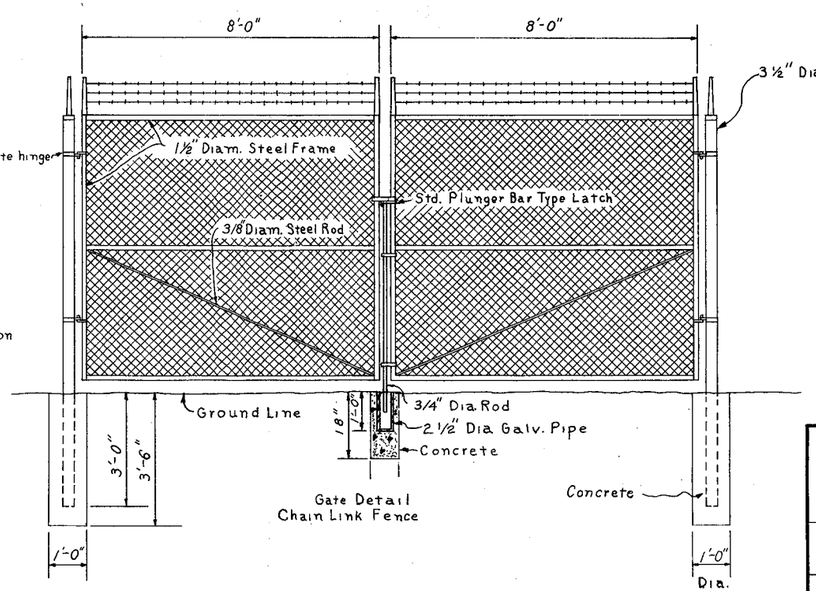


Detail A
Not to Scale

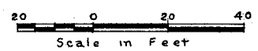


Corner Post Detail
Chain Link Fence

Note: Brace and Adjustable Tightener To Join Post in both directions Adjustable Tighteners Shall be Turnbuckle or equivalent, having 6" min. take up.



Gate Detail
Chain Link Fence



Note: All Materials Not Painted Shall Have A Galvanized or Equivalent Protective Coating.

FENCE DETAILS
GUADALUPE FLOODWATER RETARDING STRUCTURE
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed L. BURTON	3-3-73	Approved by	
Drawn L. McCUIN	6-20-73	Title	
Traced		Title	
Checked U.S., PJM, HWF	11/73	Sheet No. 32 of 38	Drawing No. 7-E-22659

SCS-ENG-313-B Rev. 7-69

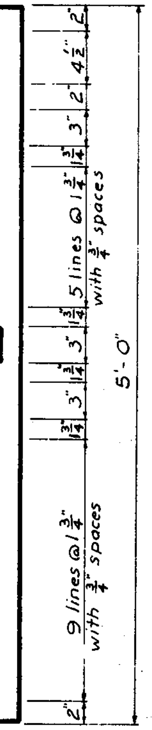
U.S. GOVERNMENT PRINTING OFFICE : 1970 O—366-750

GUADALUPE WATERSHED PROJECT
FLOODWATER RETARDING DAM

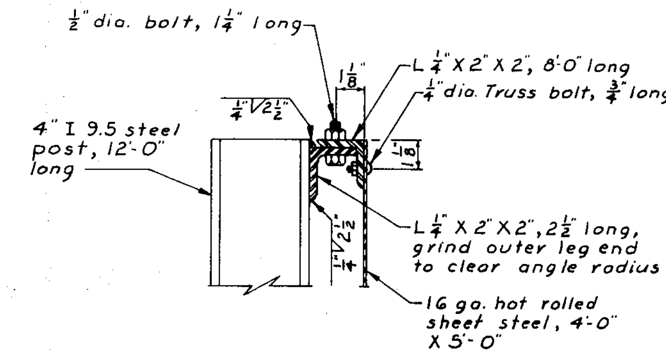
DRAINAGE AREA	1,197 ACRES
FLOOD WATER RETARDING STORAGE	273 ACRE FT.
WATER SURFACE AREA	28 ACRES
HEIGHT OF DAM	32 FEET
VOLUME OF FILL	175,000 CUBIC YD.

BUILT UNDER THE WATERSHED PROTECTION AND FLOOD PREVENTION ACT

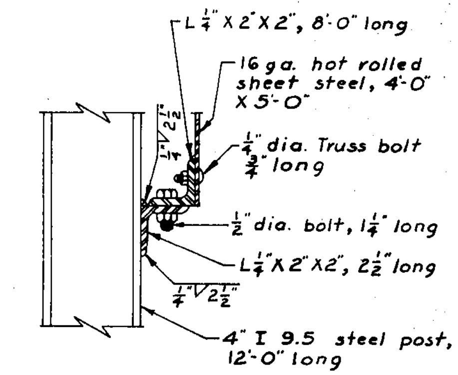
BY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
AND
EAST MARICOPA N.R.C.D.
WITH THE ASSISTANCE OF
SOIL CONSERVATION SERVICE
OF THE
U. S. DEPARTMENT OF AGRICULTURE
1974



LETTERING LAYOUT



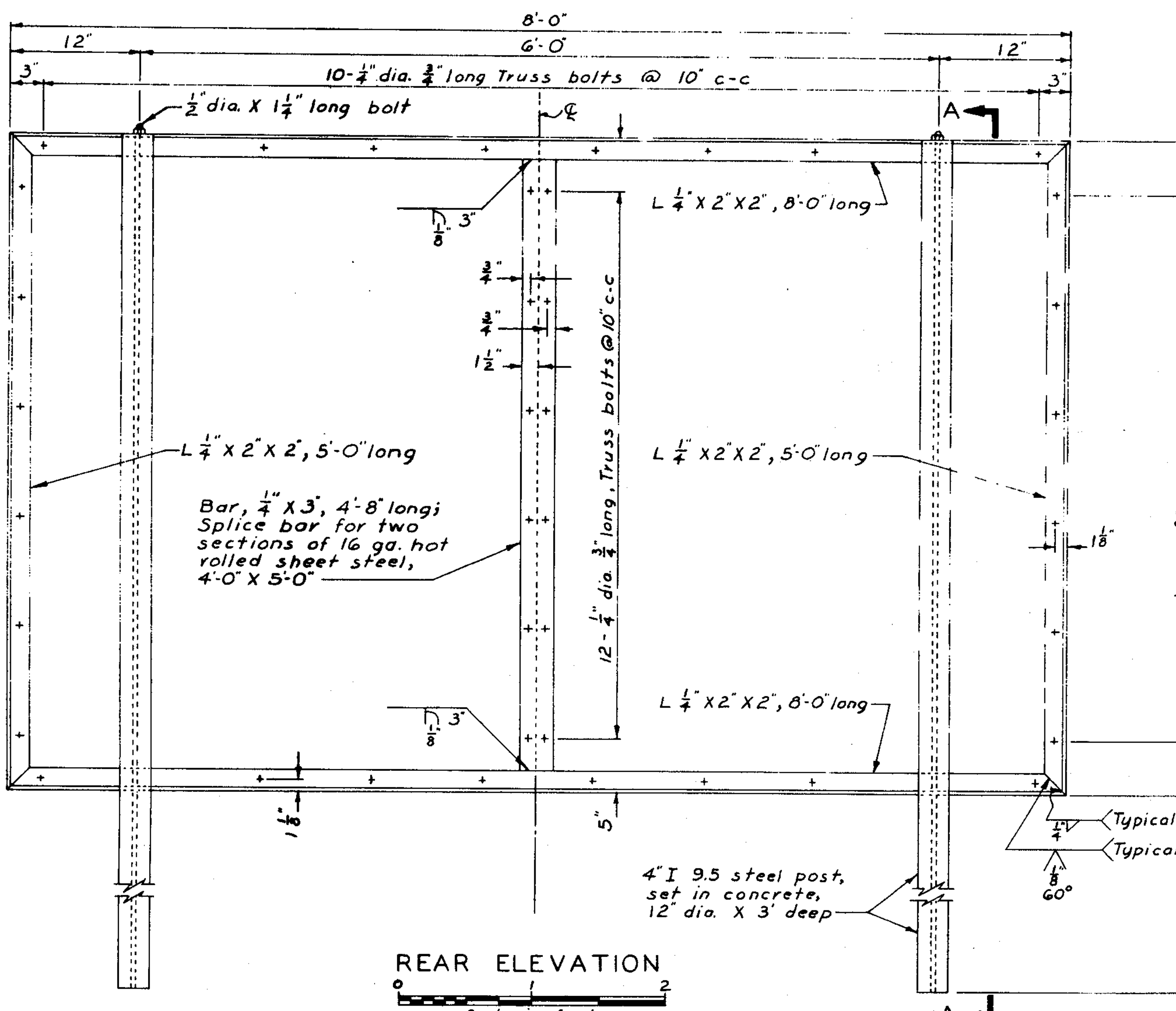
DETAIL "A"



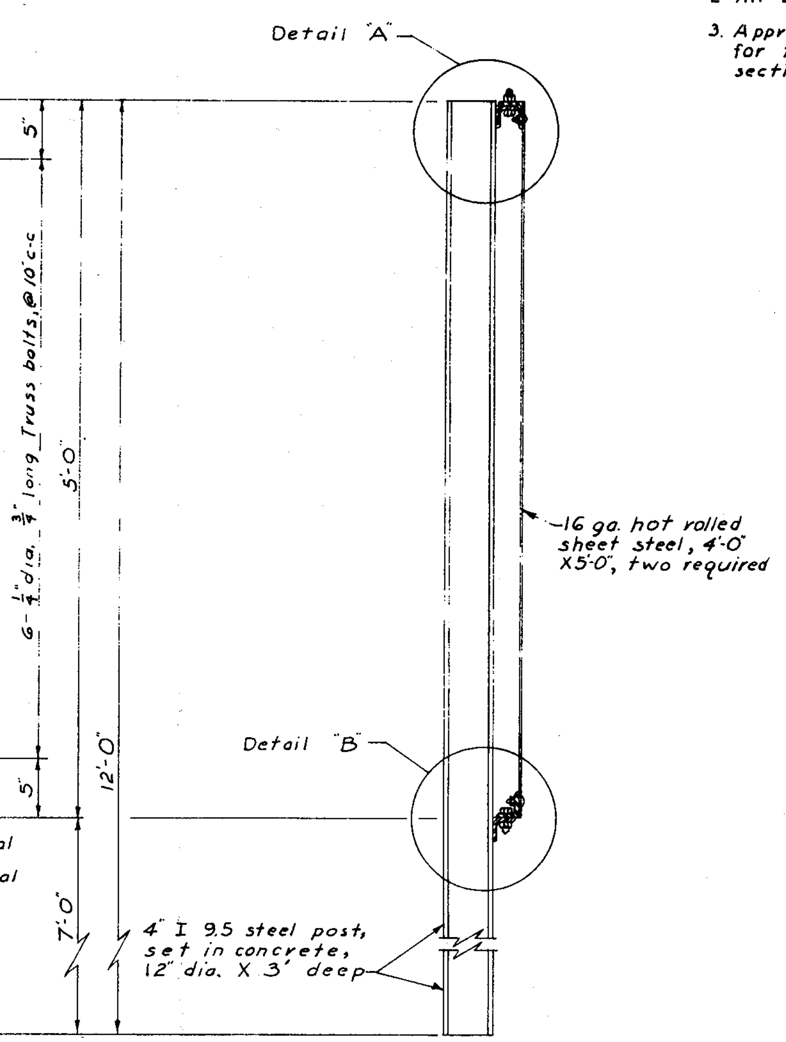
DETAIL "B"

Scale in feet

NOTES:
1. All bolts shall be installed with lock washers.
2. All bolts, nuts, and washers to be galvanized.
3. Approved spot or tack welding may be substituted for truss bolts in securing sign sheet steel sections to frame.



REAR ELEVATION

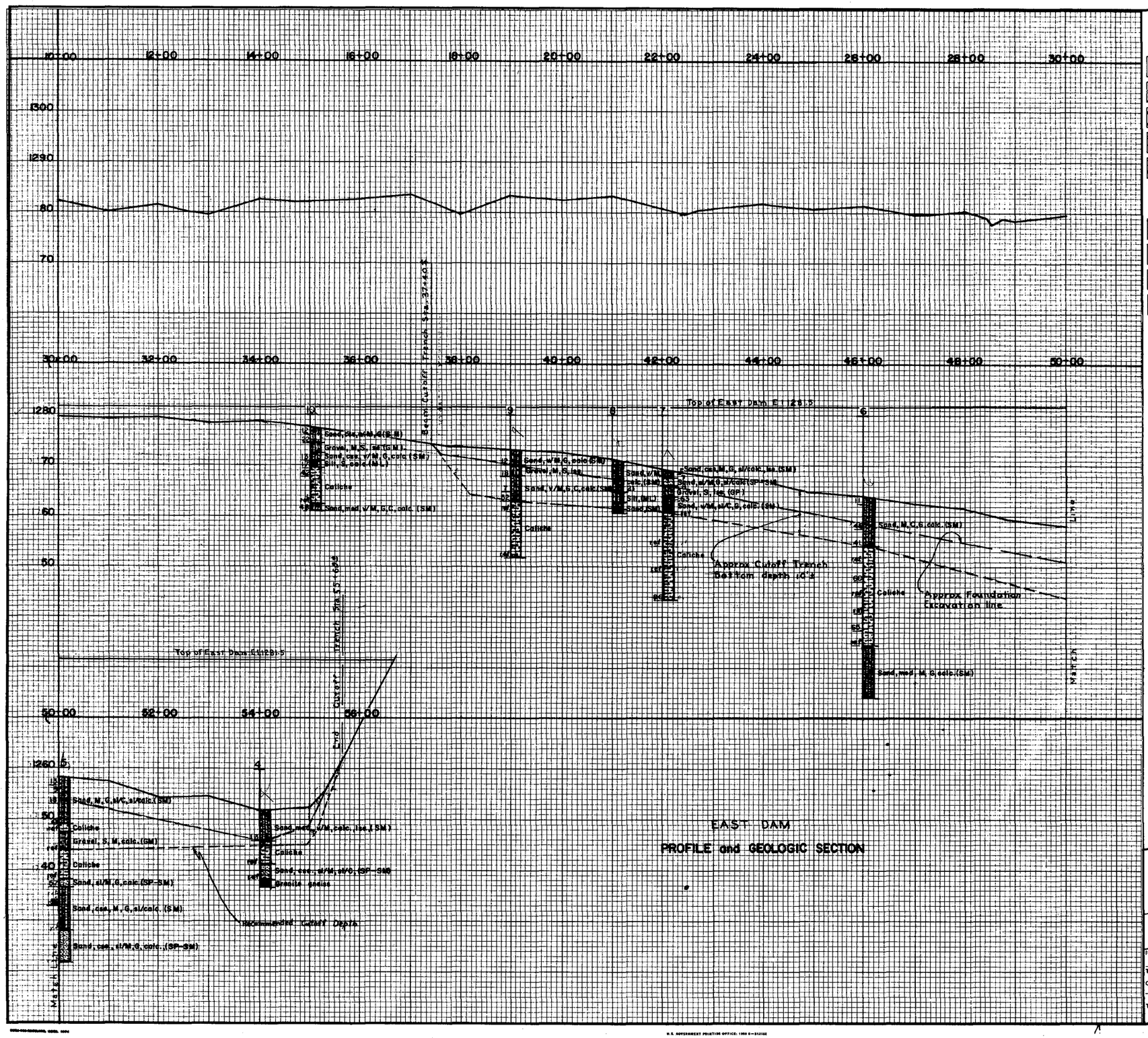


SECTION A-A

IDENTIFICATION SIGN
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed G. W.	1/72	Approved by
Drawn G. D. H. D.K.T.	2/72	Title
Traced		Title
Checked JLS PJM, HWF	11/73	Sheet No. 33 of 38 — Drawing No. 7-E-22659



EAST DAM

PROFILE and GEOLOGIC SECTION

LEGEND

SYMBOLS

UNCONSOLIDATED MATERIAL

gravel	sand	silt	clay	cobbles, boulders
gravel, sandy	sand, gravelly	silt, gravelly	clay, gravelly	peat
gravel, silty	sand, silty	silt, sandy	clay, sandy	gypsiferous *
gravel, clayey	sand, clayey	silt, clayey	clay, silty	calcareous *
gravel, sand, silt	sand, silt, clay	organic silt	organic clay	

* to be added to Standard Symbol when significant amounts of dispersed gypsum or calcified zones are present in the section.

CONSOLIDATED MATERIAL

Sedimentary Rocks

shale	sandstone	limestone	chalk	coal
calcareous shale	calcareous sandstone	cherty limestone	marl	gypsum
sandy shale	shaley sandstone	sandy limestone	chert	conglomerate
siltstone	breccia	dolomite		

Metamorphic Rocks

quartzite, slate, gneiss, schist, marble, soapstone talc serpentine

Igneous Rocks

intrusive, extrusive, pyroclastic

Undifferentiated

Other Symbols

- ○ hole logged only
- ● hole sampled
- dip and strike
- pit or trench

ABBREVIATIONS

aq	aquifer	fri	friable
cav.	cavities	lam	laminated
℄	centerline	mas	massive
con	concretions	TD	total depth
US	undisturbed samples	v.	very
DS	disturbed samples	w/	with
dip	dipping	wea	weathered
frac	fractured	WL	(date) groundwater level on a specified date

TEST HOLE NUMBERING SYSTEM

Centerline of dam	1 - 99
Borrow area	101 - 199
Emergency spillway	201 - 299
Centerline of outlet structure	301 - 399
Stream channel	401 - 499
Relief wells	501 - 599
	601 - 699
	701 - 799

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GW	Well graded gravels; gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-sand-silt mixtures
GC	Clayey gravels; gravel-sand-clay mixtures
SW	Well graded sands; sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sand
SC	Clayey sands; sand-clay mixtures
ML	Silts; silty, v. fine sands; sandy or clayey silts
CL	Clays of low to medium plasticity; silty, sandy or gravelly clays
CH	Inorganic clays of high plasticity; fat clays
MH	Elastic silts; micaceous or diatomaceous silts
OL	Organic silts and organic silty clays of low plasticity
OH	Organic clays of medium to high plasticity

PLAN AND PROFILES FOR GEOLOGIC INVESTIGATIONS

GUADALUPE FLOODWATER RETARDING STRUCTURE

GUADALUPE W. P. P.

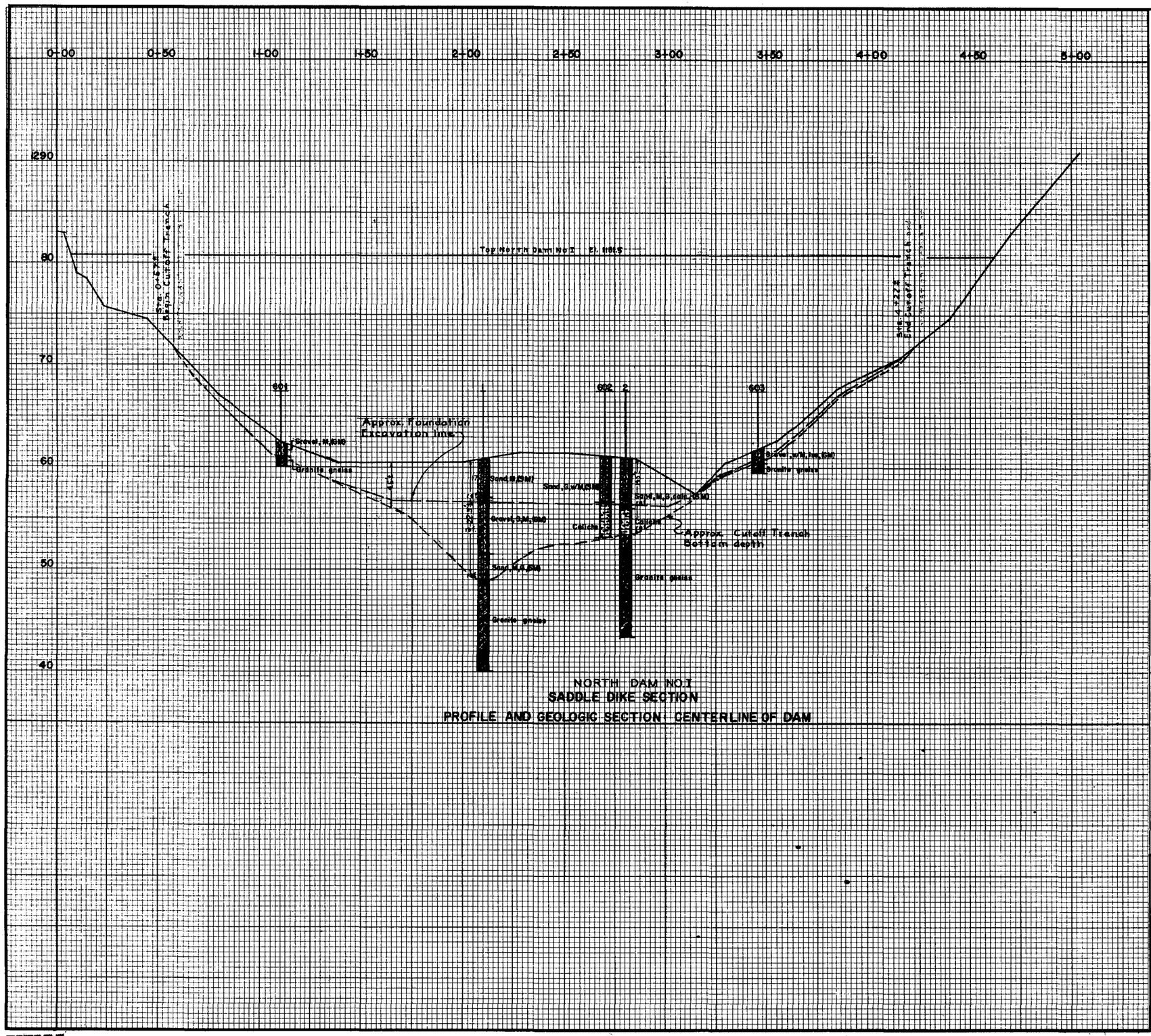
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Investigated by KEN KANESHIRO	Date 11-29-71	Approved by	
Title GEOLOGIST		Title	
Checked by J.S. PJM	11-72	Title	
Title		Sheet No. 34 of	Drawing No. 7-E-22659

ES 908 Sheet 4 of 4 SCS-SBD (6-59)

U.S. GOVERNMENT PRINTING OFFICE: 1960 O—542166



NORTH DAM NO.1
SADDLE DIKE SECTION
PROFILE AND GEOLOGIC SECTION: CENTERLINE OF DAM

LEGEND

SYMBOLS

UNCONSOLIDATED MATERIAL

gravel	sand	silt	clay	cobbles, boulders
gravel, sandy	sand, gravelly	silt, gravelly	clay, gravelly	peat
gravel, silty	sand, silty	silt, sandy	clay, sandy	gypsiferous *
gravel, clayey	sand, clayey	silt, clayey	clay, silty	calcareous *
gravel, sand, silt	sand, silt, clay	organic silt	organic clay	

* to be added to Standard Symbol when significant amounts of dispersed gypsum or calcified zones are present in the section.

CONSOLIDATED MATERIAL

Sedimentary Rocks

shale	sandstone	limestone	chalk	coal
calcareous shale	calcareous sandstone	cherty limestone	marl	gypsum
sandy shale	shaley sandstone	sandy limestone	chert	conglomerate
siltstone	breccia	dolomite		

Metamorphic Rocks

quartzite	slate
gneiss	schist
marble	soapstone talc serpentine

Igneous Rocks

intrusive	extrusive
pyroclastic	

Undifferentiated

Other Symbols

- ○ hole logged only
- ● hole sampled
- dip and strike
- pit or trench

ABBREVIATIONS

aq	aquifer	fri	friable
cav.	cavities	lam	laminated
℄	centerline	mas	massive
con	concretions	TD	total depth
US	undisturbed samples	v.	very
DS	disturbed samples	w/	with
dip	dipping	wea	weathered
frac	fractured	WL	(date) groundwater level on a specified date

TEST HOLE NUMBERING SYSTEM

Centerline of dam	1 - 99
Borrow area	101 - 199
Emergency spillway	201 - 299
Centerline of outlet structure	301 - 399
Stream channel	401 - 499
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	601 - 699
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UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

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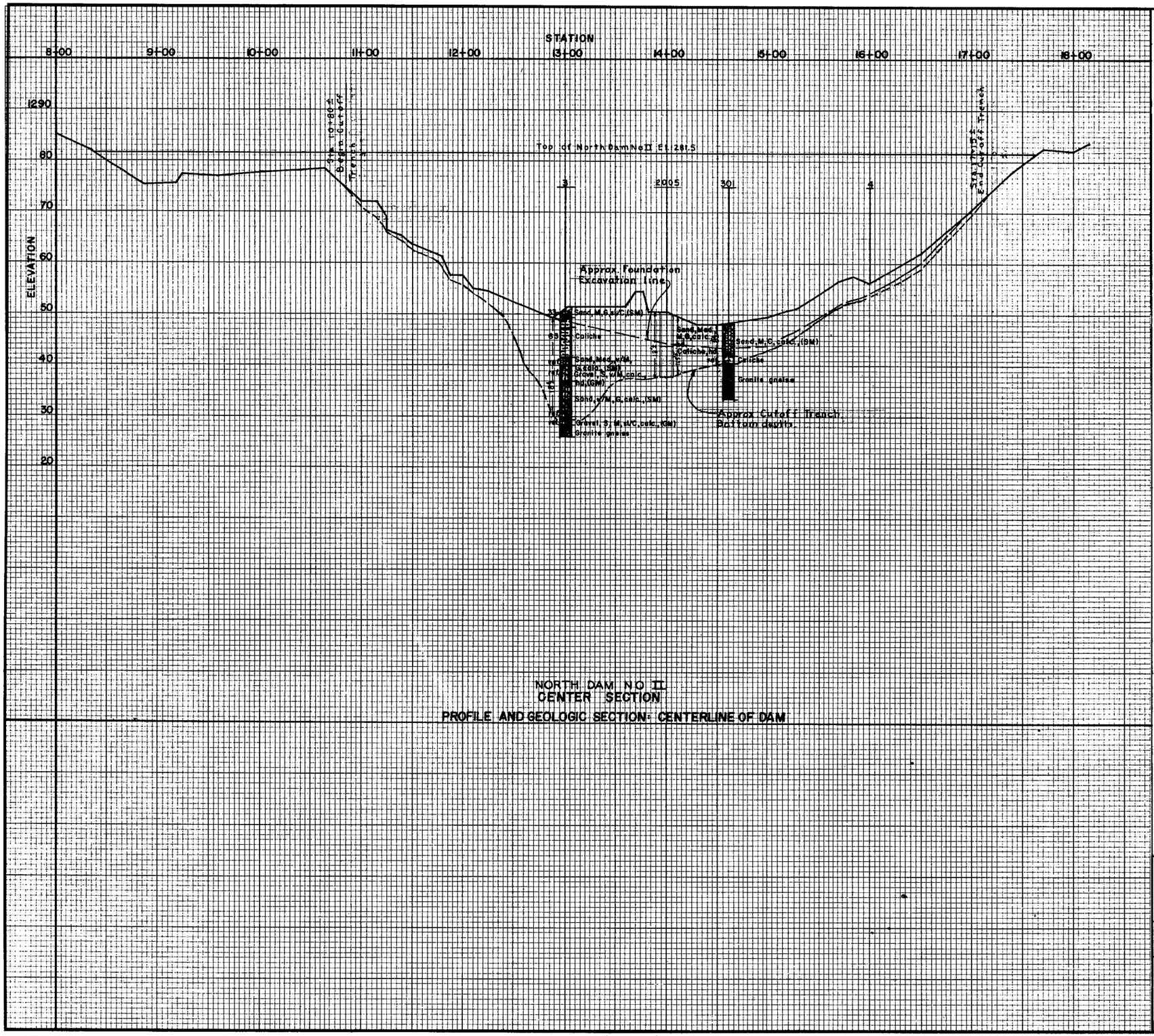
PLAN AND PROFILES FOR GEOLOGIC INVESTIGATIONS
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Investigated by KEN KANESHIRO II, Date 1-71	Approved by
Title GEOLOGIST	Title
Checked by J.L.S., P.J.M. 11-72	Title
Title	Sheet No. 35 of 38 — Drawing No. 7-E-2[illegible]59

ES 900 Sheet 4 of 4 925-350 (8-69)



NORTH DAM NO II
CENTER SECTION
PROFILE AND GEOLOGIC SECTION: CENTERLINE OF DAM

LEGEND

SYMBOLS
UNCONSOLIDATED MATERIAL

gravel	sand	silt	clay	cobbles, boulders
gravel, sandy	sand, gravelly	silt, gravelly	clay, gravelly	peat
gravel, silty	sand, silty	silt, sandy	clay, sandy	gypsiferous *
gravel, clayey	sand, clayey	silt, clayey	clay, silty	calcareous *
gravel, sand, silt	sand, silt, clay	organic silt	organic clay	

* to be added to Standard Symbol when significant amounts of dispersed gypsum or calcified zones are present in the section.

CONSOLIDATED MATERIAL
Sedimentary Rocks

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Undifferentiated

Other Symbols
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Borrow area	101 - 199
Emergency spillway	201 - 299
Centerline of outlet structure	301 - 399
Stream channel	401 - 499
Relief wells	501 - 599
	601 - 699
	701 - 799

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GW	Well graded gravels; gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-sand-silt mixtures
GC	Clayey gravels; gravel-sand-clay mixtures
SW	Well graded sands; sand-gravel mixtures
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SM	Silty sand
SC	Clayey sands; sand-clay mixtures
ML	Silts; silty, v. fine sands; sandy or clayey silts
CL	Clays of low to medium plasticity; silty, sandy or gravelly clays
CH	Inorganic clays of high plasticity; fat clays
MH	Elastic silts; micaceous or diatomaceous silts
OL	Organic silts and organic silty clays of low plasticity
OH	Organic clays of medium to high plasticity

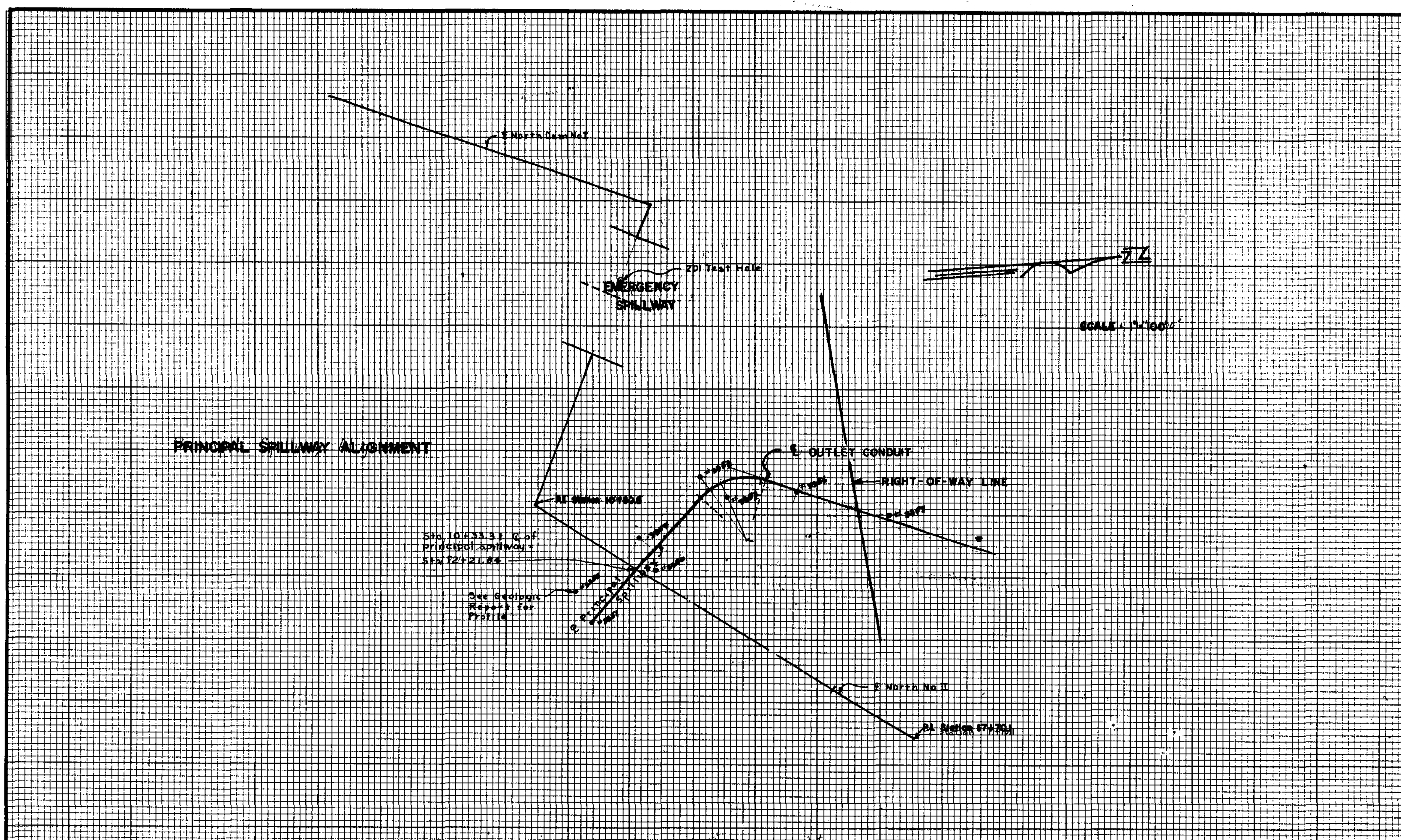
PLAN AND PROFILES FOR GEOLOGIC INVESTIGATIONS
GUADALUPE FLOODWATER RETARDING STRUCTURE
GUADALUPE W. P. P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Investigated by KEN KANESHIRO II, Date 1-71	Approved by
Title GEOLOGIST	Title
Checked by JLS, PJM 1-73	Title
Title	Sheet No. 36 of 38
	Drawing No. 7-E-22659

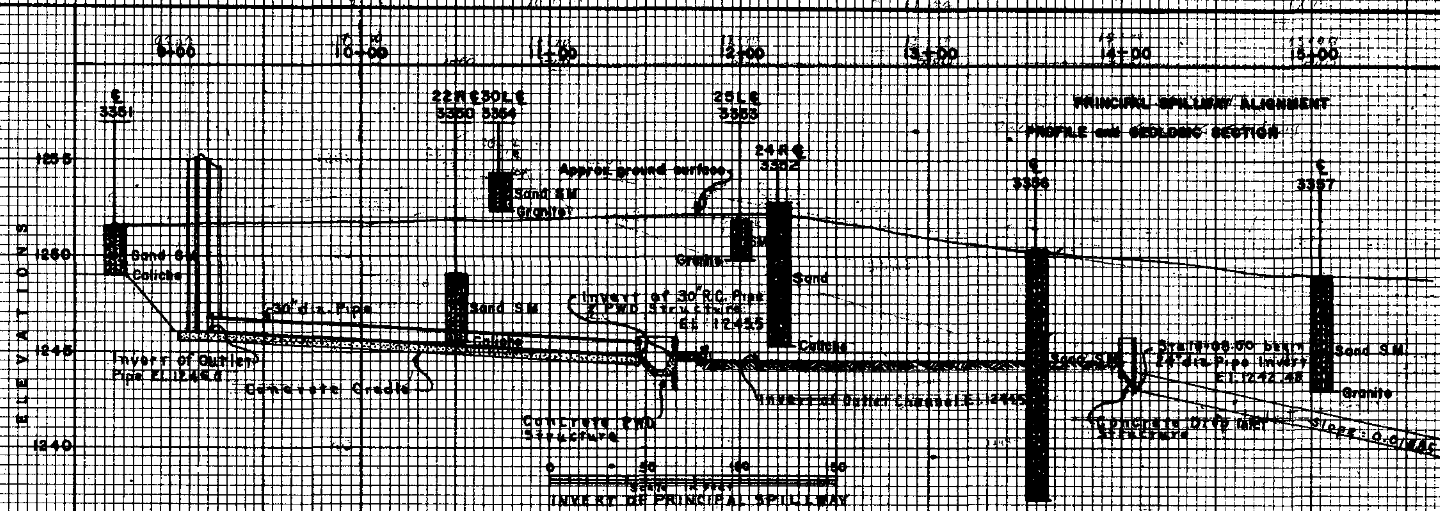
ES 900 Sheet 4 of 4 SCS-35D (6-59)

U.S. GOVERNMENT PRINTING OFFICE: 1960 O—611648



HOLE No.	Surface elevation ft	Depth to rock or caliche ft	Comments
3350	1249.1	3.5	Caliche
3351	1251.8	2.5	Caliche
3352	1262.7	7.5	Caliche
3353	1251.9	22.0	Granite
3354	1254.4	2.0	Granite
3355	1256.7	.5	Granite
3356	1260.3	—	SM to 15 ft.
3357	1249.0	6.0	Granite

ALIGNMENT DATA



LEGEND

SYMBOLS

UNCONSOLIDATED MATERIAL

gravel; sand; silt; clay; cobbles, boulders
gravel, sandy; sand, gravelly; silt, gravelly; clay, gravelly; peat
gravel, silty; sand, silty; silt, sandy; clay, sandy; gypsiferous *
gravel, clayey; sand, clayey; silt, clayey; clay, silty; calcareous *
gravel, sand, silt; sand, silt, clay; organic silt; organic clay

* to be added to Standard Symbol when significant amounts of dispersed gypsum or calcified zones are present in the section.

CONSOLIDATED MATERIAL

Sedimentary Rocks

shale; sandstone; limestone; chalk; coal
calcareous shale; calcareous sandstone; cherty limestone; marl; gypsum
sandy shale; shaley sandstone; sandy limestone; chert; conglomerate
siltstone; breccia; dolomite

Metamorphic Rocks: quartzite; slate; gneiss; schist; marble; soapstone, talc, serpentine

Igneous Rocks: intrusive; extrusive; pyroclastic

Undifferentiated

Other Symbols

- hole logged only
- hole sampled
- dip and strike
- pit or trench

ABBREVIATIONS

aq	aquifer	fri	friable
cav.	cavities	lam	laminated
℄	centerline	mas	massive
con	concretions	TD	total depth
US	undisturbed samples	v.	very
DS	disturbed samples	w/	with
dip	dipping	wea	weathered
frac	fractured	WL	(date) groundwater level on a specified date

TEST HOLE NUMBERING SYSTEM

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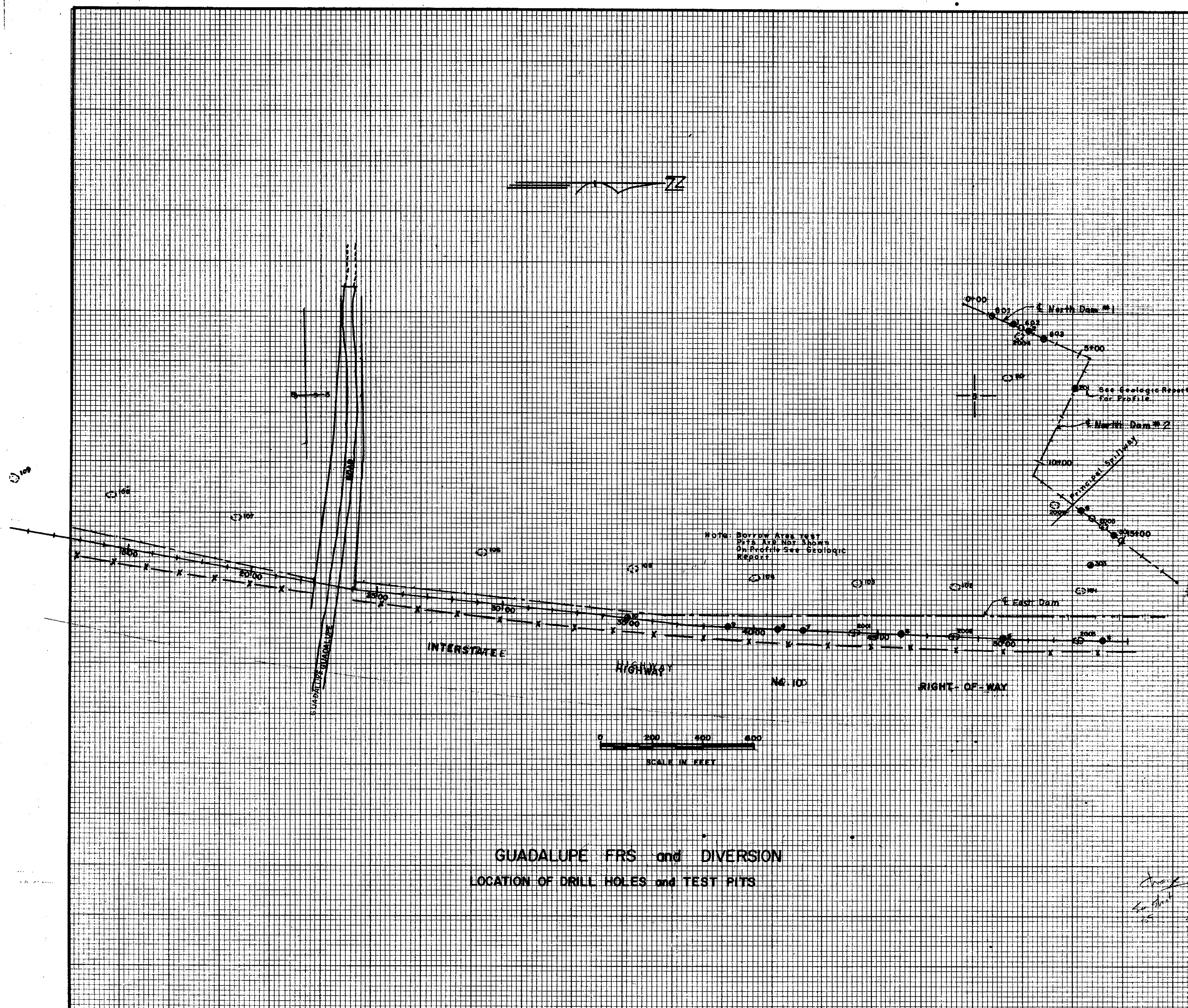
GUADALUPE FLOODWATER RETARDING STRUCTURE GUADALUPE W. P. P.

MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

Investigated by KK — Date 5/72
Title GEOLOGIST
Checked by J.S., PJM — 11-73
Title
Approved by
Title
Title
Sheet No 37 of 38
Drawing No. 7-E-22659

ES 900 Sheet 4 of 4 SCS-350 (6-59)



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GUADALUPE W. P. P.

MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Investigated by K.K. & D.C. Date 12-72
Title Geologist
Checked by JLS PUM 11/73
Title
Approved by
Title
Title
Sheet No 38 of 38
Drawing No. 7-E-22659