

INVITATION FOR BIDS

SPOOK HILL F.R.S.,  
FLOODWAY &  
LANDSCAPE TREATMENT

BUCKHORN-MESA WATERSHED  
ARIZONA

Property of  
Flood Control District of Maricopa County, Arizona  
11/15/88  
24701 N. 24th St.  
Phoenix, AZ 85028



FLOOD CONTROL DISTRICT  
OF  
MARICOPA COUNTY, ARIZONA

CONTENTS

INVITATION NO. FCD 77-24

INVITATION FOR BIDS

INSTRUCTIONS TO BIDDERS, FORM SCS-AS-39

SPECIAL INSTRUCTIONS TO BIDDERS

NOTICE TO PROSPECTIVE FEDERALLY ASSISTED CONSTRUCTION CONTRACTORS,  
FORM SCS-AS-819

BID FORM (CONSTRUCTION CONTRACT), FORM SCS-AS-51

BID FORM (CONSTRUCTION CONTRACT), CONTINUED

EMPLOYMENT OF THE HANDICAPPED, FORM AD-655

BID SCHEDULE

GENERAL PROVISIONS, FORM SCS-AS-43

SPECIAL PROVISIONS

AFFIRMATIVE ACTION REQUIREMENTS ARIZONA "HOMETOWN" PLAN

EQUAL OPPORTUNITY CLAUSE, FORM SCS-AS-85

CERTIFICATION OF NONSEGREGATED FACILITIES, FORM SCS-AS-818

INSTRUCTION TO CONTRACTORS, FORM AD-425a

BID BOND, FORM SCS-AS-158

SPECIFICATIONS

<u>Number</u>	<u>Title</u>
CONSTRUCTION	
2	Clearing & Grubbing
3	Structure Removal
8	Mobilization
11	Removal of Water
21	Excavation

(See Over)

## CONSTRUCTION - Continued

<u>Number</u>	<u>Title</u>
23	Earth Fill
24	Drain Fill
26	Salvaging & Spreading Topsoil
31	Concrete
34	Steel Reinforcement
44	Asbestos-Cement Pipe Conduits and Drains
51	Corrugated Metal Pipe Conduits
61	Loose Rock Riprap
71	Water Control Gates
81	Metal Fabrication and Installation
82	Cleaning and Painting Metalwork
91	Chain Link Fence
92	Farm Field Fences
200	Grouted Rock Riprap
202	Plastic Pipe Conduits
203	Installing Valves
400	Salvaging, Heeling-In, Transplanting
401	Pumps, Motors and Controls
402	Wiring
403	Planting Container Stock
404	Seeding
406	Pavement Replacement

## MATERIAL

302	Plastic Pressure Pipe
-----	-----------------------

INVITATIONS FOR BIDS

SPOOK HILL FRS

Mesa, Maricopa County,  
Arizona

Invitation No. FCD 77-24  
Date: Nov. 1, 1977  
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, DECEMBER 1, 1977, IN THE OFFICE OF THE FLOOD CONTROL DISTRICT, MARICOPA COUNTY HIGHWAY DEPARTMENT BUILDING, 3335 WEST DURANGO STREET, PHOENIX, ARIZONA 85009 AND AT THAT TIME PUBLICLY OPENED.

PROSPECTIVE BIDDERS MAY ASSEMBLE AT THE MESA PROJECT OFFICE, SUITE F, FALCON PLAZA, 7127 E. APACHE TRAIL, MESA, ARIZONA ON TUESDAY, NOVEMBER 15 and 22, 1977, FOR A GROUP SHOWING OF THE WORK SITE. THE GROUP WILL LEAVE MESA, ARIZONA AT 9:30 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 HERBERT P. DONALD, CONTRACTING OFFICER FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, 3335 WEST DURANGO STREET, PHOENIX, ARIZONA 85009 (PHONE 262-1501).

BID SECURITY IN AN AMOUNT OF NOT LESS THAN TWENTY PERCENT (20%) OF THE TOTAL BID PRICE, MUST BE SUBMITTED WITH EACH BID EXCEEDING \$25,000. SECURITY MAY BE IN THE FORM OF A BID BOND, CASHIERS 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 BOND 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. IF A BID EXCEEDS \$25,000, 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. PROVIDED HOWEVER, IF THE AMOUNT OF THE BID EXCEEDS \$100,000, THE PAYMENT BOND SHALL BE NOT LESS THAN ONE HUNDRED PERCENT (100%) OF THE ORIGINAL AMOUNT OF THE CONTRACT.

DESCRIPTION OF WORK: CONSTRUCTION OF ONE FLOODWATER RETARDING STRUCTURE, FLOODWAY, FENCING AND LANDSCAPING INVOLVING THE ESTIMATED QUANTITIES SHOWN IN THE ATTACHED BID SCHEDULE.

THE WORK SHALL BE COMMENCED WITHIN TWENTY (20) CALENDAR DAYS AND BE COMPLETED WITHIN SIX HUNDRED AND NINE (609) 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 THIS RESULTANT CONTRACT.

SPECIAL INSTRUCTION TO BIDDERS

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 Friday. 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.

Traffic and Road Construction

The Contractor will be responsible for maintaining the flow of traffic on all roads in the construction site according to the Maricopa County traffic regulations. The Contractor will be guided by the following Maricopa County Highway Department road closures and traffic requirements:

- (a) Usery Pass Road will be kept open to traffic until Brown, McKellips and McDowell Road ramps are completed and open to traffic.
- (b) The road ramps will be constructed one at a time, leaving three (3) roads open to traffic at all times.
- (c) Road closures will not exceed forty-five (45) calendar days.

## 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 ordinance.

## 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.

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.

BID FORM  
(CONSTRUCTION CONTRACT)

NAME AND LOCATION OF PROJECT  SPOOK HILL FLOODWATER RETARDING STRUCTURE  Mesa, Maricopa County, Arizona	INVITATION NO. <u>FCD 77-24</u>  Date <u>11-1-77</u>
---	--

TO: Flood Control District of Maricopa County  
3335 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 Construction of the Spook Hill Floodwater Retarding Structure, including diversion, floodway and landscaping.

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

Total Price Bid:

dollars

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-AS-41, 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 609 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.

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:

Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

IFB# FCD 77-24  
Opening 12-1-77 - 2:00 p.m

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

BID FORM (CONSTRUCTION CONTRACT), - (Continued)

3. AFFIRMATIVE ACTION PROGRAM

The bidder (or offeror) represents 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.

THE FOLLOWING MUST BE CERTIFIED, IF APPLICABLE:

4. CLEAN AIR AND WATER CERTIFICATION

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

The bidder or offeror certifies as follows:

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

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

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

(Over)

## CLEAN AIR AND WATER CLAUSE

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

A. The Grantee, Cooperator or Contractor agrees as follows:

(1) To comply with all the requirements of Section 114 of the Clean Air Act (42 USC 1857, et. seq.) , as amended by Public Act (33 USC 1251, as amended by Public Law 92-500), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in Section 114 and Section 308 of the Air Act and the Water Act, respectively, and all regulations and guidelines issued thereunder before the award of this grant, agreement, or contract.

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

(3) To use his best efforts to comply with clean air standards and clean water standards at the facilities in which the grant, agreement or contract is being performed.

(4) To insert the substance of the provisions of this clause in any nonexempt subgrant, subagreement or subcontract, including this subparagraph (4).

## DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA

(This clause is applicable to all contracts and purchase orders of \$10,000 or more.)

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

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

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

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

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

cation copies of the reports submitted until the expiration of one year after final payment under the contract, during which time these reports and related documentation shall be made available, upon request, for examination by any authorized representatives of the contracting officer or of the Secretary of Labor. Documentation would include personnel records respecting job openings, recruitment and placement.

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

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

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

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

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

(3) "Openings which the contractor proposes to fill from within his own organization" means employment openings for which no consideration will be given to persons

outside the contractor's organization (including any affiliates, subsidiaries, and the parent companies) and includes any openings which the contractor proposes to fill from regularly established "recall" lists.

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

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

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

(k) The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, provided by or through the contracting officer. Such

notice shall state the contractor's obligation under the law to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era for employment, and the rights of applicants and employees.

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

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

UNITED STATES DEPARTMENT OF AGRICULTURE

EMPLOYMENT OF THE HANDICAPPED

(The following clause is applicable to all contracts or purchase orders of \$2,500 or more, as required by the regulations of the Secretary of Labor.)

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

(b) The contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Rehabilitation Act of 1973, as amended.

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

(d) The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, Office of Federal Contract Compliance Programs, Department of Labor, provided by or through the contracting officer. Such notices shall state the contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped employees and applicants for employment, and the rights of applicants and employees.

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

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

BID SCHEDULE NO. 1 BUCKHORN-MESA WPP, ARIZONA - SPOOK HILL FRS

ITEM No.	WORK OR MATERIAL	SPEC. NO.	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1.	Clearing, Grubbing & Chipping	2	205	Acres	\$ _____	\$ _____
2.	Clearing and Grubbing	2	6	Acres	\$ _____	\$ _____
3.	Pavement Removal	3	21,700	Sq.Yd.	\$ _____	\$ _____
4.	Mobilization	8	1	Job	XXXXXXXXXX	\$ _____
5.	Foundation Excavation, Common	21	321,720	C.Y.	\$ _____	\$ _____
6.	Channel Excavation, Common	21	181,690	C.Y.	\$ _____	\$ _____
7.	Structure Excavation, Common	21	3,900	C.Y.	\$ _____	\$ _____
8.	Structure Backfill	23	1,306	C.Y.	\$ _____	\$ _____
9.	Earth Fill	23	1,222,700	C.Y.	\$ _____	\$ _____
10.	Drain Fill	24	1,380	C.Y.	\$ _____	\$ _____
11.	Salvaging and Spreading Topsoil - 12-inch thickness	26	249,300	S.Y.	\$ _____	\$ _____
12.	Salvaging & Spreading Topsoil - 6-inch thickness	26	294,400	S.Y.	\$ _____	\$ _____
13.	Reinforced Concrete Class 4000X	31	1,266	C.Y.	\$ _____	\$ _____
14.	Cement	31	1,893	Bbls.	\$ _____	\$ _____
15.	Steel Reinforcement	34	193,750	Lbs.	\$ _____	\$ _____
16.	6-Inch Diameter Drain Systems	44	1	Job	XXXXXXXXXX	\$ _____
17.	24-Inch x 24-Inch Slide Gate	71	1	Job	XXXXXXXXXX	\$ _____
18.	Metalwork	81	1	Job	XXXXXXXXXX	\$ _____
19.	Identification Signs	81	1	Job	XXXXXXXXXX	\$ _____
20.	6-Foot Chain Link Fence	91	813	Lin.Ft.	\$ _____	\$ _____
21.	4-Strand Barbed Wire Fence	92	28,335	Lin.Ft.	\$ _____	\$ _____
22.	Grouted Rock Riprap	200	1,525	C.Y.	\$ _____	\$ _____

BID SCHEDULE NO. 2 BUCKHORN-MESA WPP, ARIZONA, SPOOK HILL FLOODWAY

ITEM NO.	WORK OR MATERIAL	SPEC. NO.	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Clearing and Grubbing	2	40.9	Ac.	\$ _____	\$ _____
2	Channel Excavation, Unclassified	21	467,400	C.Y.	\$ _____	\$ _____
3	Structure Excavation Unclassified	21	1967	C.Y.	\$ _____	\$ _____
4	Structure Backfill	23	1830	C.Y.	\$ _____	\$ _____
5	Embankment Earth Fill	23	50,700	C.Y.	\$ _____	\$ _____
6	24-inch Diameter Corrugated Metal Pipe	51	484	Ft.	\$ _____	\$ _____
7	30-inch Diameter Corrugated Metal Pipe	51	476	Ft.	\$ _____	\$ _____
8	Special Fittings	51	1	Job	XXXXXXXXXX	\$ _____
9	Loose Rock Riprap	61	12,734	C.Y.	\$ _____	\$ _____
10	Fencing	92	19,375	Ft.	\$ _____	\$ _____
11	Grouted Rock Riprap	200	433	C.Y.	\$ _____	\$ _____

BID SCHEDULE No. 3, SPOOK HILL FRS AND FLOODWAY - LANDSCAPE TREATMENT

ITEM NO.	WORK OR MATERIAL	SPEC. NO.	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1.	4-inch Diameter PVC Main Pipe	202	22,900	L.F.	\$ _____	\$ _____
2.	17-Head Irrigation System	202	67	each	\$ _____	\$ _____
3.	11-Head Irrigation System	202	2	each	\$ _____	\$ _____
4.	3/4-inch, 200 psi, PVC, Lateral Pipe	202	9,350	L.F.	\$ _____	\$ _____
5.	1-inch, 200 psi, PVC, Lateral Pipe	202	1,750	L.F.	\$ _____	\$ _____
6.	1-1/4 inch, 200 psi, PVC, Lateral Pipe	202	3,000	L.F.	\$ _____	\$ _____
7.	.580 inch PE Emitter Lateral Pipe	202	73,300	L.F.	\$ _____	\$ _____
8.	Emitter, PE Riser and Fitting	202	2,337	each	\$ _____	\$ _____
9.	Valve Boxes	202	121	each	\$ _____	\$ _____
10.	Electric Remote Control Valve, 4-inch diameter	203	2	each	\$ _____	\$ _____
11.	Butterfly Valve, 4-inch diameter, gear operated	203	2	each	\$ _____	\$ _____
12.	Check Valve, 4-inch diameter	203	2	each	\$ _____	\$ _____
13.	Backflow Preventer Valve, 4-inch diameter	203	2	each	\$ _____	\$ _____
14.	2" Solenoid Valve and Regulator	203	67	each	\$ _____	\$ _____
15.	1-1/2 inch Solenoid Valve and Regulator	203	2	each	\$ _____	\$ _____
16.	3/4-inch Solenoid Valve and Y-Screen	203	13	each	\$ _____	\$ _____
17.	3/4-inch Regulating Valve	203	41	each	\$ _____	\$ _____
18.	Salvaging and Transplanting of Saguaro Cacti	400	76	each	\$ _____	\$ _____
19.	Salvaging and Transplanting of Barrel Cacti	400	58	each	\$ _____	\$ _____

BID SCHEDULE No. 3, SPOOK HILL FRS AND FLOODWAY - LANDSCAPE TREATMENT

ITEM NO.	WORK OR MATERIAL	SPEC. NO.	QUANTITY	UNIT	UNIT PRICE	AMOUNT
20.	Salvaging and Transplanting of Ocotillo Shrubs	400	25	each	\$ _____	\$ _____
21.	Pump Station	401	2	each	\$ _____	\$ _____
22.	Water Supply Connection	401	1	Job	XXXXXXXXXX	\$ _____
23.	23-Station Controller	401	3	each	\$ _____	\$ _____
24.	7-Station Controller	401	4	each	\$ _____	\$ _____
25.	Wiring Pump Station	402	1	Job	XXXXXXXXXX	\$ _____
26.	Wiring - Controller	402	1	Job	XXXXXXXXXX	\$ _____
27.	Five-Gallon Container Stock	403	2,337	each	\$ _____	\$ _____
28.	Seed Mix No. One	404	38.5	acre	\$ _____	\$ _____
29.	Seed Mix No. Two	404	15.1	acre	\$ _____	\$ _____
30.	Seed Mix No. Three	404	70.1	acre	\$ _____	\$ _____

BID SCHEDULE NO. 4, BUCKHORN-MESA WPP, ARIZONA - ROAD RAMPS

ITEM NO.	WORK OR MATERIAL	SPEC. NO.	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1.	Clearing and Grubbing	2	25	Acres	\$ _____	\$ _____
2.	Foundation Excavation, Common	21	28,500	C.Y.	\$ _____	\$ _____
3.	Channel Excavation, Common	21	99,000	C.Y.	\$ _____	\$ _____
4.	Structure Excavation, Common	21	2,200	C.Y.	\$ _____	\$ _____
5.	Structure Backfill	23	2,000	C.Y.	\$ _____	\$ _____
6.	Earth Fill	23	138,000	C.Y.	\$ _____	\$ _____
7.	108-inch Diameter CMP	51	532	Lin.Ft.	\$ _____	\$ _____
8.	Pavement Replacement	406	17,900	Sq.Yd.	\$ _____	\$ _____
9.	28-foot Double Drive Gates	92	2	each	\$ _____	\$ _____

PAGE  
4

# 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 Contracting 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 prepara-

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

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

(d) All material and work covered by progress payments made shall thereupon become the sole property of the 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) All work (which term includes but is not restricted to materials, workmanship, and manufacture and fabrication of components) shall be subject to inspection and test by the Contracting Local Organization at all reasonable times and at all places prior to acceptance. Any such inspection and test is for the sole benefit of the Contracting Local Organization and shall not relieve the Contractor of the responsibility of providing quality control measures to assure that the work strictly complies with the contract requirements. No inspection or test by the Contracting Local Organization shall be construed as constituting or implying acceptance. Inspection or test shall not relieve the Contractor of responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of the 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 the clause of this contract entitled "Termination for Default - Damages for Delay - Time Extensions."

(d) The Contractor shall furnish promptly, without additional charge, all facilities, labor, and material reason-

ably needed for performing such safe and convenient inspection 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 unnecessarily to delay the work. Special, full size, and performance tests shall be performed as described in this contract. The Contracting Local Organization reserves the right to charge to the Contractor any additional cost of inspection or test when material or workmanship is not ready at the time specified by the Contractor for inspection or test or when reinspection or retest is necessitated by prior rejection.

(e) Should it be considered necessary or advisable by the 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, or that portion of the work that the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except as regards latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Contracting Local Organization's rights under any warranty or guarantee.

#### **10. SUPERINTENDENCE BY CONTRACTOR**

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

#### **11. PERMITS AND RESPONSIBILITIES**

① 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 unacceptable 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, or if the contract price is increased to such an extent that the penal sum of any bond becomes inadequate in the opinion of the Contracting Officer, the Contractor shall promptly furnish

such additional security as may be required from time to time to protect the interests of the 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.

## 30. SHOP DRAWINGS

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

(b) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate his approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of

the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate his approval or disapproval of the shop drawings and if not approved as submitted shall indicate his reasons therefor. Any work done prior to such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (c) below.

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

## 31. TERMINATION FOR CONVENIENCE OF THE CONTRACTING LOCAL ORGANIZATION

The Contracting Officer, by written notice, may terminate this contract in whole or in part, when it is in the interest of the Contracting Local Organization. If this contract is so terminated, the Contractor shall be compensated for all necessary and reasonable direct costs of performing the work actually accomplished. In addition, the Contractor shall be paid 10 percent for overhead expenses based on said direct costs, and 5 percent for profit based on the total of direct costs and overhead costs. From this will be deducted any payments or reimbursements previously paid and salvage value of materials paid for by the Contracting Local Organization but not used. Provided however, no profit shall be paid if the Contractor would have incurred a loss had the entire contract been completed.

## 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 \$333.00 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:
  - (a) Delay in completion of the work due to unavailability of fuel from suppliers because of a general fuel shortage will be considered unforeseeable.
4. Minor Item 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.

Spook Hill FRS

Item No. 1 Clearing, Grubbing and Chipping  
Item No. 2 Clearing and Grubbing  
Item No. 4 Mobilization

Spook Hill Floodway

Item No. 2 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) The construction of the Floodwater Retarding Structure shall begin at Station 303+75± and progress towards Station 87+00±.
  - (b) Foundation excavation and earth fill types 1, 2, 3, 4, 5, and 6 shall be completed to final grade in reaches of not less than 500 feet unless otherwise authorized 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: All utilities that need to be relocated will be done by their respective owners. The Contractor shall notify the Engineer and the Blue Stake Center, 3033 North 3rd Street, Phoenix, Arizona 85012, telephone number 263-1100 in writing three (3) weeks in advance of beginning construction near the following utilities:
  - (a) The 2-inch gas main and 12-inch water main at Usery Pass Road, Station 154+57± baseline of dam.
  - (b) The 12-inch water main at Hermosa Vista Drive, Station 243+74± baseline of dam.
  - (c) The Mountain Bell buried cable between Station 246+75± 200' rt. and Station 248+50± 1t. baseline of dam.
  - (d) The Salt River Project powerline and Mountain Bell telephone line along McDowell Road, Station 273+81± baseline of dam.
  - (e) The power and telephone lines, Station 132+40± centerline of Floodway 90'± north of Thomas Road.
  - (f) Powerline, Station 136+90± centerline of floodway.
  - (g) Power and telephone lines, Station 184+45± centerline of floodway along the north side of Section 30.
  - (h) Telephone line between Station 15+00± and Station 27+72± along the south side of the sediment basin.

8. Protection and Restoration of Existing Improvements and Vegetation:  
The Contractor shall conduct his operations in such a manner as to avoid damage to adjacent property, existing improvements or facilities and existing vegetation.
9. Road ramps that are used for haul roads shall have a minimum cover of four (4) feet over the 108-inch diameter corrugated metal pipe.
10. Traffic and Road Construction: The Contractor will be responsible for maintaining the flow of traffic on all roads in the construction site according to the Maricopa County traffic regulations. The Contractor will be guided by the following Maricopa County Highway Department road closures and traffic requirements:
  - (a) Usery Pass Road will be kept open to traffic until Brown, McKellips and McDowell Road ramps are completed and open to traffic.
  - (b) The road ramps will be constructed one at a time, leaving three (3) roads open to traffic at all times.
  - (c) Road closures will not exceed forty-five (45) calendar days.
11. The removal of fences and the location of access and haul roads needed for the construction of the Floodway through Forest Service property must have their approval. Contact the Tonto National Forest, 102 South 28th Street, P.O. Box 13705, Phoenix, Arizona 85002, fifteen (15) days prior to the removal of any fences or the construction of these roads for approval.
12. No bid will be accepted nor contract awarded unless the Contractor is registered under the applicable provision of Arizona statutes with the Registrar of Contractors of the State of Arizona.
13. In no event will the five percent differential be allowed in evaluating bids as provided by Arizona revised statutes 34-241; the provisions of Arizona revised statutes 34-244 being applicable.
14. 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.
15. Preservation of Historical and Archaeological Data:
  - (a) Public Law 93-291, May 24, 1974, provides for the preservation of historical and archaeological data (including relics and specimens) which might otherwise be lost due to alterations of the terrain as a result of any Federal or Federally-assisted construction project.
  - (b) The Contractor agrees that should he or any of his employees in the performance of this contract discover evidence of possible historical or archaeological data he will notify the Contracting Officer immediately in writing, giving the location and nature of the findings.

- (c) Where appropriate by reason of a discovery, the Contracting Officer may order delays in performance and/or changes in the work. The contract completion date and contract price shall be adjusted in accordance with other applicable provisions of this contract.
- (d) The Contractor agrees to insert this clause in all subcontracts which involve the performance of work on the terrain of the site.

16. Landscape Treatment Requirements:

- (a) A landscape architect registered by the State of Arizona will be required to direct the landscape treatment portion of the contract.
- (b) The Contractor will acquaint and instruct the Flood Control District of Maricopa County in the operation and maintenance of the irrigation system.
- (c) Substitutions for the plants and seed specified will not be permitted.

Immediately upon the awarding of the contract, the Contractor shall make arrangements for the growing of or collection of materials required to complete the contract.

- (d) All specified testing shall be at the expense of and carried out by the Contractor.

17. Haul roads, equipment yard, office and other areas required for the performance of the contract shall be at approved locations.

18. Heavy equipment will not be allowed access in areas not cross-hatched and not subject to borrow or stockpiling operations unless approved by the Engineer.

19. 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, 7127 East Apache Trail, Suite F., Mesa, Arizona. It is the Contractor's responsibility to determine the correct shrinkage and bulking factors that he should use when calculating earth work production. Attached is a Standard List of Geological Abbreviations used on the geological sheets of the drawings.

ARIZONA STATE  
STANDARD LIST OF GEOLOGIC ABBREVIATIONS

\* National Standards

* ang.	-	angular	qtz.	-	quartz
aq.	-	aquifer	qtzite.	-	quartzite
* bld.	-	boulder	* rdd.	-	rounded
* calc.	-	calcareous	* S	-	sand
* cali.	-	caliche	ss	-	sandstone
* cav.	-	cavities	sh.	-	shale
* cmt.	-	cemented	S.L.	-	Shrinkage Limit
CL	-	centerline	* M	-	silt
* C	-	clay	Ms.	-	siltstone
* cse.	-	coarse	* sl/.	-	slightly
bl.	-	cobble	* sft.	-	soft
* cpt.	-	compact	* s/.	-	some
* con.	-	concretion	* slo.	-	slowly
cong.	-	conglomerate	Sta.	-	Station
* xln.	-	crystalline	* stf.	-	stiff
* dns.	-	dense	* T.B.	-	thin bedded
* dip.	-	dipping	TD	-	total depth
* D.	-	disturbed sample	t	-	tough
* d.s.	-	downstream	tr.	-	trace
* fn.	-	fine	* tuff.	-	tuffaceous
* frm.	-	firm	* U.	-	Undisturbed Sample
flg.	-	flagstone	* u.s.	-	upstream
* frac.	-	fractured	* var.	-	variable
* frg.	-	fragment	* v/.	-	very
* fri.	-	friable	vug.	-	vugular
grad.	-	graded	* w.l.	-	water level
* grn.	-	grain	* wea.	-	weathered
G	-	gravel	* W	-	well graded
* gyp.	-	gypseous	* w/.	-	with
* 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			

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.

CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to federally assisted construction contracts and related sub-contracts 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 (CONSTRUCTION)

FOR COMPLIANCE WITH EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS UNDER EXECUTIVE ORDER 11246 AND EXECUTIVE ORDER 11375 FOR FEDERAL PROCUREMENT OF CONSTRUCTION, 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 subcon-

tractors post a copy of the notice "Equal 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, sex, 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. 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 are contained in the applicable Federal EEO Bid Conditions for the geographical area where the work is to be performed. In the absence of Federal EEO Bid Conditions the contractor's obligations are limited to the applicable EEO clause found in the contract.

8. REPORTS. If you employ 50 or more persons, are non-exempt, and if your contract amounts to \$50,000 or more 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.

<b>BID BOND</b> (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)	
					<input type="checkbox"/> Individual <input type="checkbox"/> Partnership <input type="checkbox"/> Joint <input type="checkbox"/> Venture <input type="checkbox"/> 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. FCD 77-24
	Million(s)	Thousand(s)	Hundred(s)	Cents		
KNOW ALL MEN BY THESE PRESENTS, That we, the Principal and Surety(ies) hereto, are firmly bound to the <u>Flood Control District of Maricopa County</u> , hereinafter called the Contracting <u>(Name of Contracting Local Organization)</u> 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.						
<b>Principal</b>						
Signature(s)	1.		2.			
			(Seal)		(Seal)	
Name(s) & Title(s) (Typed)	1.		2.			

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

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 area will be measured to the nearest 0.1 acre. Payment for clearing and grubbing will be made for the total area within the designated limits at the contract unit 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.

(2-1)

SCS-WEST

3-1-74

3-1-74

(S-S)

SCS-WEST

(Method 2) For items of work for which specific unit prices are established in the contract, the length of the cleared and grubbed area will be measured to the nearest full station (100 feet) along the line designated on the drawings or in the specifications. Payment for clearing and grubbing will be made for the total length within the designated limits at the contract unit price. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to completion of the work.

(Method 3) 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:

<u>Measured Diameter</u>	<u>Size Designation</u>
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 4) 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, Grubbing, and Chipping

- (1) This item shall consist of clearing, grubbing and chipping within the limits of the dam, principal spillway inlet channel, reservoir borrow areas, Salt-Gila Aqueduct borrow areas, construction corridors, and topsoil stockpile areas as shown on the drawings and staked in the field.
- (2) Trees, snags, logs, stumps and shrubs shall be chipped or shredded and spread within the following limits prior to salvaging topsoil:
  - (a) The base area of the dam
  - (b) The principal spillway inlet channel and reservoir borrow areas.
  - (c) The topsoil stockpile areas
  - (d) The Salt-Gila Aqueduct borrow area as shown on the drawings
- (3) If waste materials are disposed of by burying, they shall be covered by a minimum of 18 inches of soil. After disposal, the waste areas shall be smoothed and graded to blend into the surrounding terrain.
- (4) Measurement and payment will be by Method 1.

b. Bid Item 2, Clearing and Grubbing

- (1) This item shall consist of clearing and grubbing within the limits of the waste areas in the reservoir and as shown on the drawings and staked in the field.
- (2) If waste materials are disposed of by burying, they shall be covered by a minimum of 18 inches of soil. After disposal, the waste areas shall be smoothed and graded to blend into the surrounding terrain.
- (3) Measurement and payment will be by Method 1.

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 clearing and grubbing the following areas as shown on the drawings and staked in the field.
  - (a) Between Station 103+38± and Station 207+75± on the centerline of the floodway.
  - (b) Between Station 10+48.78 and Station 28+30± on the centerline of the sediment basin dike.
  - (c) Between Station 0+00 and Station 7+50± on the centerline of the sediment basin dike extension.
  - (d) The diversion dikes at weir inlet No. 23.
- (2) If waste materials are disposed of by burying, they shall be covered by a minimum of 18 inches of soil. After disposal, the waste areas shall be smoothed and graded to blend into the surrounding terrain.
- (3) If materials removed from the cleared and grubbed area 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.

6. 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, Clearing and Grubbing

- (1) This item shall consist of clearing and grubbing within the limits of the planting O&M road as shown on the drawings and staked in the field.
- (2) The roadway shall be a nominal width of ten (10) feet.
- (3) If waste materials are disposed of by burying, they shall be covered by a minimum of 18 inches of soil. After disposal, the waste areas shall be smoothed and graded to blend into the surrounding terrain.
- (4) No separate payment will be made for clearing and grubbing. Compensation for clearing and grubbing will be included in the payment for Bid Item 27, Five-Gallon Container Stock.

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 clearing and grubbing within the following limits:
  - (a) Channel excavation limits in the reservoir at McKellips Road as shown on the drawings and staked in the field.
  - (b) Channel excavation limits in the reservoir at McDowell Road as shown on the drawings and staked in the field.
  - (c) Base area of Brown Road ramp between the left toe and 40' lt. of centerline and between the right toe and 40' right of centerline.
  - (d) Base area of McKellips Road ramp between the left toe and 30' lt. of centerline and between the right toe and 40' rt. of centerline.
  - (e) Base area of McDowell Road ramp between the left toe and 20' lt. of centerline and between the right toe and 20' rt. of centerline.
- (2) If waste materials are disposed of by burying, they shall be covered by a minimum of 18 inches of soil. After disposal, the waste areas shall be smoothed and graded to drain and blend into the surrounding terrain.
- (3) 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.

(3-1)

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. Bid Item 3, Pavement Removal

- (1) This item shall consist of the removal and disposal of the existing asphalt pavement at the following locations as shown on the drawings and staked in the field.
  - (a) Between Station 9+60± and Station 24+70± centerline Brown Road.
  - (b) Between Station 12+45± and Station 24+80± centerline Utery Pass Road.
  - (c) Between Station 9+90± and Station 29+20± centerline McKellips Road.
  - (d) Between Station 10+20± and Station 26+50± centerline McDowell Road.
- (2) In Section 2, Marking, Method 1 shall apply.
- (3) In Section 3, Removal, Method 1 shall apply.
- (4) If waste materials are disposed of by burying, they shall be buried in the waste areas designated by the Engineer. They shall be covered by a minimum of 18 inches of soil. After disposal, the waste areas shall be smoothed and graded to drain and to blend into the surrounding terrain.
- (5) Measurement and payment will be by Method 1.

b. Subsidiary Item, Conduit Removal

- (1) This item shall consist of the removal and disposal of the following conduits as shown on the drawings and staked in the field.
  - (a) Existing 30" diameter reinforced concrete culvert pipe in McKellips Road and Station 13+15±, 31'±rt. and 31'± lt.
  - (b) Two (2) existing 30" diameter reinforced concrete culvert pipes in McKellips Road between Station 20+60± 33'±rt. and Station 20+80± 27'± lt.
  - (c) Existing 30" diameter reinforced concrete culvert pipe in McKellips Road between Station 24+63± 33'± rt. and Station 24+83± 27'± lt.

- (d) Existing 25" x 16" CM pipe-arch in McDowell Road between Station 14+97± 27' rt. and Station 15+27± 27' lt.
  - (e) Existing 36" x 22" CM pipe-arch in McDowell Road between Station 22+60± 28' rt. and Station 23+14± 28' lt.
  - (f) Existing two-(2) inch diameter City of Mesa water line between Station 150+45± 140'± rt. and Station 154+60± 175'± rt. baseline dam.
  - (g) Abandoned twelve-(12) inch diameter City of Mesa water main between Station 154+80± 175'± rt. and Station 155+05± 30'± lt. baseline dam.
  - (h) Abandoned six-(6) inch diameter City of Mesa water main between Station 243+50± 230'± rt. and Station 244+50± 40'± rt. baseline dam.
- (2) In Section 2, Marking, Method 2 shall apply.
  - (3) In Section 3, Removal, Method 2 shall apply. The conduit and any appurtenances shall be completely removed from the site.
  - (4) In Section 4, Salvage, no salvage of materials is required. All materials resulting from this item shall become the property of the Contractor.
  - (5) In Section 5, Disposal of Refuse Materials, all materials resulting from this item shall be disposed of by the Contractor at sites of his own choosing away from the work site.
  - (6) No separate payment will be made for conduit removal. Compensation for this work will be included in the payment for Bid Item 3, Pavement Removal.

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, Fence Removal

- (1) This item shall consist of the removal and disposal of existing fences within the clearing and grubbing limits at the following locations:
  - (a) Between Station 183+85± - 70 feet left and Station 185+15± - 130 feet right - centerline floodway.
  - (b) Between Station 10+90± - 12 feet left and Station 11+10 - 12 feet right - centerline of sediment basin dike.
  - (c) Between Station 14+83± - 18 feet right and Station 15+20± - 20 feet left - centerline of sediment basin dike.
  - (d) Between Station 27+64± - 10 feet right and Station 27+79± - 12 feet left - centerline of sediment basin dike.
  - (e) Between Station 18+74± - 160 feet left and Station 19+12± - 160 feet left - centerline of sediment basin dike.
- (2) In Section 2, Marking, Method 2 shall apply.
- (3) In Section 3, Removal, Method 2 shall apply.
- (4) No separate payment will be made for this item. Compensation 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.

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 4, Mobilization

- (1) This item shall consist of the mobilization of the contractor's equipment and forces for the Floodwater Retarding Structure, Floodway, and the Floodwater Retarding Structure and Floodway Landscape Treatment.
- (2) There are no additional construction details.
- (3) Measurement and payment will be 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, casings, wellpoints, 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, Dewatering

- (1) This item shall consist of dewatering the work site, including the borrow areas, to the extent that construction operations can be performed under dry, stable conditions.
- (2) Dewatering operations shall include diverting surface water, if required, and removing subsurface waters.
- (3) No advance plan of dewatering will be required.
- (4) No separate payment will be made for dewatering. Compensation for dewatering will be included in the payment for excavation, Bid Items 5 through 7, and in payment for the other bid items as applicable.

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) No advance plan of dewatering 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 2, 3, 4, and 5 as appropriate.

## 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-scrappers 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 attachments.

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.

(21-6)

SCS-WEST

3-7-69

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 5, Foundation Excavation, Common

- (1) This item shall consist of all foundation excavation within the base area of the dam between Station 87+00± and Station 303+75±, including the cutoff trench as shown on the drawings and staked in the field.
- (2) Excavation shall consist of the removal and disposal of all materials resulting from:
  - (a) Stripping the foundation to a depth of approximately one (1) foot of topsoil, roots and chipped material placed during clearing, grubbing, and chipping operations, and stockpiling these materials for further use.
  - (b) Removal of the remaining unconsolidated materials to depths varying from zero (0) to six (6) feet below existing ground.
  - (c) Cutoff trench excavation to a minimum depth of one (1) foot into the caliche or siltstone materials.

Approximate depths are shown on the drawings. Final depths will be determined by the Engineer after examination of the materials encountered.

- (3) In Section 5, Use of Excavated Materials, Method 1 shall apply.
- (4) In Section 6, Disposal of Waste Materials, Method 1 shall apply. After waste operations are completed, the waste fill area shall be smoothed and dressed to blend with the surrounding terrain and not interfere with the natural drainage pattern.
- (5) Measurement and payment will be by Method 3.

b. Bid Item 6, Channel Excavation, Common

- (1) This item shall consist of all excavation required to construct the following items including excavation for rock riprap placement and emergency spillway outlet channel protection to the lines and grades shown on the drawings.
  - (a) The principal spillway inlet channel between Station 105+00± and Station 299+95±, including the dip crossings.
  - (b) The channel between Station 102+69± and Station 103+38 center-line principal spillway.
  - (c) The emergency spillway outlet channel between Station 10+34 and Station 13+45±.
- (2) Excavation shall consist of the removal and disposal of all materials resulting from the operations described in Item 12.b(1) above including stripping the principal spillway inlet channel to a depth of approximately one (1) foot of topsoil, roots and chipped material placed during the clearing, grubbing and chipping operations and stockpiling these materials for further use.
- (3) In Section 5, Use of Excavated Materials, Method 1 shall apply.
- (4) In Section 6, Disposal of Waste Materials, Method 1 shall apply. After waste operations are completed, the waste fill area shall be smoothed and dressed to blend with the surrounding terrain and not interfere with the natural drainage pattern.
- (5) Measurement and payment will be by Method 2.

c. Bid Item 7, Structure Excavation, Common

- (1) This item shall consist of all common excavation outside the limits of foundation excavation, common, required for the installation of the structures including the anchors for the emergency spillway as shown on Sheets 10, 20, and 44 of the drawings.
- (2) Holes for the anchors for the emergency spillway shall be excavated to the dimensions shown on the drawings.
- (3) In Section 5, Use of Excavated Materials, Method 1 shall apply.
- (4) In Section 6, Disposal of Waste Materials, Method 1 shall apply. After waste operations are completed, the waste fill area shall be smoothed and dressed to drain and blend with the surrounding terrain and not interfere with the natural drainage pattern.
- (5) Measurement and payment will be by Method 2.

d. Subsidiary Item, Borrow Excavation, Common

- (1) This item shall consist of all excavation required for obtaining fill materials not available from required excavations including channel excavation and structure excavation for the Spook Hill Floodway to complete the construction of the permanent works.
- (2) Excavation shall consist of the removal and disposal of the materials as required in 12.d(1) above including stripping portions of the borrow area to a depth of approximately one (1) foot of topsoil, roots and chipped material placed during the clearing, grubbing and chipping operation and stockpiling these materials for further use.
- (3) In Section 5, Use of Excavated Materials, Method 1 shall apply.
- (4) In Section 6, Disposal of Waste Materials, Method 1 shall apply. After waste operations are completed, the waste fill area shall be smoothed and dressed to drain and blend with the surrounding terrain and not interfere with the natural drainage pattern.
- (5) Completed excavation within the borrow area shall be within the lines and grades shown on the drawings. Borrow area segments shall be terminated at a slope of 10:1.
- (6) No separate payment will be made for borrow excavation. Compensation for borrow excavation will be included in the payment for earth fill, Bid Items 9, 11, and 12 as appropriate.

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 2, Channel Excavation, Unclassified

- (1) This item shall consist of all excavation required to construct:
  - (a) The floodway between Stations 101+12± and 207+70± centerline channel as shown on the drawings.
  - (b) The diversion dikes for weir inlet number 23 at Station 182+70 centerline channel as shown on the drawings.
  - (c) The sediment basin and dike between Station 10+48.78 and Station 28+30± as shown on the drawings.
  - (d) The sediment basin dike extension between Station 0+00 and Station 7+50 as shown on the drawings.
  - (e) The road ramps between Station 129+31.96 and Station 133+26.42, between Station 185+77 and Station 187+00, and between Station 185+85 and Station 187+00 centerline channel as shown on the drawings.
  - (f) The road ramps between Station 19+25 and Station 19+75 and between Station 27+46± 7' lt. and Station 28+10± 140'± lt. centerline sediment basin dike as shown on the drawings.
- (2) In Section 5, Use of Excavated Material, Method 1 shall apply. Suitable materials resulting from this excavation and not required for Bid Item 4, Structure Backfill and Bid Item 5, Embankment Earth Fill will be used in the construction of the floodwater retarding structure. When stockpiling is necessary the material shall be placed within the limits of the floodwater retarding structure Salt-Gila borrow area.
- (3) In Section 6, Disposal of Waste Material, Method 1 shall apply.
- (4) Measurement and payment will be by Method 1 for Items 12.a(1)(b), 12.a(1)(c), and 12.a(1)(d), dikes.
- (5) Measurement and payment will be by Method 2 for Items 12.a(1)(a), 12.a(1)(e), and 12.a(1)(f).

b. Bid Item 3, Structure Excavation, Unclassified

- (1) This item shall consist of all excavation for pipe inlets to the limits shown on the drawings.
- (2) In Section 5, Use of Excavated Material, 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.

12. 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, Excavation, Common

- (1) This item shall consist of all the excavation required to install the following items within the limits shown on the drawings and staked in the field.
  - (a) PVC main and lateral pipe
  - (b) Irrigation systems
  - (c) PE emitter lateral pipe
  - (d) Emitter PE riser and fittings
  - (e) Valve boxes
  - (f) Precast electrical manholes
- (2) Prior to beginning trench excavation, the contractor shall lay out the water distribution system for the approval of the engineer by providing necessary indicators at the locations of all pipe lines, valves, and related structures.

Trenches shall be excavated to a uniform grade which shall not cause undue deflection of pipe and shall be no wider than is necessary for proper installation of the pipe, fittings, and other required incidentals. The bottom of the trench shall be firm and free from large or sharp rocks.
- (3) In Section 5, Use of Excavated Materials, Method 1 shall apply.
- (4) In Section 6, Disposal of Waste Materials, Method 1 shall apply. After waste operations are completed, the waste fill area shall be smoothed and dressed to blend with the surrounding terrain and not interfere with the natural drainage pattern.
- (5) No separate payment will be made for excavation. Compensation for excavation will be included in the payment for PVC main and lateral pipe, irrigation systems, PE lateral pipe, emitter, PE riser and fittings, valve boxes and precast electrical manholes, Bid Items 1 through 9, and 21 as appropriate.

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 2, Foundation Excavation, Common

- (1) This item shall consist of all foundation excavation within the following limits as shown on the drawings and staked in the field.
  - (a) The base area of the Brown Road ramp between Station 9+60± and Station 24+70±.
  - (b) The base area of the McKellips Road ramp between Station 7+00± and Station 29+20±.
  - (c) The base area of the McDowell Road ramp between Station 10+20± and Station 26+50±.

- (2) Excavation shall consist of the removal and disposal of all materials from the base of the roads from 0 to 4.6 feet below existing ground.

Approximate depths are shown on the drawings. Final depths will be determined by the Engineer after examination of the materials encountered.

- (3) In Section 5, Use of Excavated Materials, Method 1 shall apply.
- (4) In Section 6, Disposal of Waste Materials, Method 1 shall apply. After waste operations are completed, the waste fill area shall be smoothed and dressed to drain and blend with the surrounding terrain and not interfere with the natural drainage pattern.
- (5) Measurement and payment will be by Method 3.

b. Bid Item 3, Channel Excavation, Common

- (1) This item shall consist of all excavation required to construct the channel excavation in the reservoir at McKellips and McDowell Roads, as shown on the drawings and staked in the field.
- (2) In Section 5, Use of Excavated Materials, Method 1 shall apply.
- (3) In Section 6, Disposal of Waste Materials, Method 1 shall apply. After waste operations are completed, the waste fill area shall be smoothed and dressed to drain and blend with the surrounding terrain and not interfere with the natural drainage pattern.
- (4) Measurement and payment will be by Method 2.

c. Bid Item 4, Structure Excavation, Common

- (1) This item shall consist of all common excavation outside the limits of foundation excavation, common, required for the installation of the 108-inch diameter CMP as shown on Sheets 15 through 19 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. After waste operations are completed, the waste fill area shall be smoothed and dressed to drain and blend with the surrounding terrain and not interfere with the natural drainage pattern.
- (4) Measurement and payment will be by Method 2.

## 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

(23-1)

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.

<u>Structure</u>	<u>Time Interval</u>
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 8, Structure Backfill

- (1) This item shall consist of placing and compacting structure backfill within the limits shown on Sheets 10, 20, 21, and 44 of the drawings.
- (2) Backfill material shall be Type 1 as described in Item 10.b.(2). The material shall contain a minimum of 15 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140.
- (3) In Section 6, Compaction, Class A shall apply. The fill matrix shall be compacted to at least 95 percent of the maximum density obtained in compaction tests of the fill materials performed by Method A, ASTM D 698 (Standard Proctor Test).
- (4) The maximum size of rock fragments incorporated in the fill shall be three (3) inches.
- (5) The maximum thickness of a layer before compaction shall be four (4) inches.
- (6) The moisture content of the material incorporated in the fill shall be maintained within the range of two (2) percentage points below to two (2) percentage points above the optimum moisture content.
- (7) Measurement and payment will be by Methods 1 and 6. Deduction in volume will be made for embedded conduit and appurtenances.

b. Bid Item 9, Earth Fill

- (1) This item shall consist of placing and compacting the earth fill required in the embankment, and the emergency spillway within the limits shown on the drawings.
- (2) Earth fill materials to be used for this item shall consist of six (6) main types, obtained from the required excavation and borrow areas of the Spook Hill FRS and the Spook Hill Floodway, as follows:

Type 1 shall consist of silty sand, silty gravelly sand, clayey gravelly sand and clayey sand lying generally between four (4) feet depth and the siltstone or caliche limits and intermittently between the existing ground line and four (4) feet depth between Station 87+00± and Station 230+00± baseline of the dam. The material shall contain a minimum of 15 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140, and have a plasticity index greater than five (5) as determined by laboratory procedures outlined in ASTM D 424.

Type 2 shall consist of silt, silty sand, gravelly silt, gravelly silty sand, sand, gravelly sand, clayey gravelly sand and clayey sand located as follows: Between Station 87+00± and Station 230+00± baseline of the dam intermittently between the existing ground line and 4 feet depth and occasionally between 4 feet depth and the caliche or siltstone limit. Between Station 230+00± and Station 303+75± baseline of the dam, generally between the existing ground line and the caliche limits. Between Station 103+38 and Station 190+50± centerline of the Floodway, between the existing ground line and the caliche or granite limits.

The material shall contain a minimum of 15 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140.

Type 3 shall consist of caliche and siltstone located as follows: Between Station 87+00± and Station 303+75± baseline of the dam lying generally from 1 foot to 8 feet below the existing ground line to the lower excavation limit.

Between Station 103+38 and Station 130+00± centerline of the floodway lying generally at the existing ground line to the granite limit.

Type 4 shall consist of sands and gravels and fractured granite located as follows:

Between Station 87+00± and Station 305+75± baseline of the dam lying occasionally between the existing ground line and the caliche or siltstone limits.

Between Station 103+38 and Station 130+00± centerline of the floodway lying generally below the caliche lower limit.

Between Station 130+00± and Station 207+75± centerline of the floodway lying generally below the existing ground line.

The material shall contain a maximum of 15 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140.

Type 5 shall consist of oversize Type 4 material and shall have Type 4 material placed on top of and to the sides when used in the fill.

Type 6 shall consist of Type 4 material containing a maximum of 5 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140.

- (3) The material shall be placed in the manner shown on sheet 13 of the drawings.

- (4) Compaction for earth fill types 1, 2 and 3 shall be Class A. The materials shall be compacted to 95% of maximum dry density as determined by laboratory procedures outlined in ASTM Designation D 698, Method A.

The maximum size of rock fragments incorporated in this portion of the fill shall be six (6) inches and the thickness of each layer of fill placed shall not be greater than nine (9) inches before compaction.

During the earth fill operations, the materials being placed shall be maintained within a moisture content range of 2 percentage points above to 2 percentage points below optimum.

- (5) Compaction for earth fill type 4 and 6 shall be Class C. Materials shall be compacted by one of the following methods.
- (a) Four (4) passes per layer of fill of a pneumatic-tired roller weighing at least 50 tons (Static Service Weight).
  - (b) Four (4) passes per layer of fill of a smooth-wheel vibrating roller at least 72 inches wide, weighing at least one ton (Static Service Weight) per foot of width and capable of exerting a dynamic impact of at least 20,000 pounds at the rate of at least 1200 times per minute.

The maximum size of rock fragments incorporated in this portion of the fill shall be nine (9) inches and the thickness of each layer of fill placed shall not be greater than eighteen (18) inches before compaction.

The moisture content of the material to be incorporated in this portion of the fill shall be compatible with the material and method of compaction to insure a dense fill that is well bonded with the preceding and subsequent layers.

- (6) Compaction for earth fill type 5 shall be Class C. Materials shall be compacted by four (4) passes per layer of fill of a pneumatic-tired roller weighing at least 50 tons (Static Service Weight).

The maximum size of rock fragments incorporated in this portion of the fill shall be eighteen (18) inches.

The moisture content of the material to be incorporated in this portion of the fill shall be compatible with the material to insure a dense fill that is well bonded with the preceding and subsequent layers.

- (7) Sectional construction will be permitted in accordance with Section 4.e. of this specification.
- (8) Measurement and payment will be by Method 2 and Method 6.

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 4, Structure Backfill

- (1) This item shall consist of placing and compacting backfill around pipe inlets as shown on the drawings.
- (2) Backfill material shall consist of suitable sands, silty sand, silts and clays obtainable from the required excavations. The material shall contain a minimum of 15 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140.
- (3) In Section 6, Compaction, Class A shall apply. The fill matrix shall be compacted to at least 95 percent of the maximum density obtained in compaction tests of the fill materials performed by Method A, ASTM D 698 (Standard Proctor Test).
- (4) The maximum size of rock fragments incorporated in the fill shall be three (3) inches.
- (5) The maximum thickness of a layer before compaction shall be six (6) inches.
- (6) The moisture content of the material incorporated in the fill shall be maintained within the range of two (2) percentage points below to two (2) percentage points above the optimum moisture content.
- (7) Measurement and payment will be by Methods 1 and 6. Deduction in volume will be made for embedded conduit and appurtenances.

b. Bid Item 5, Embankment Earth Fill

- (1) This item shall consist of placing and compacting earth fill to construct the following:
  - (a) The roads between Stations 105+00 and 207+70.
  - (b) The diversion dikes at Inlet No. 23 at Station 182+70.
  - (c) The sediment basin dike between Station 10+48.78 and Station 28+30±.
  - (d) The sediment basin dike extension between Station 0+00 and Station 7+50.

- (2) Fill material shall consist of suitable sands, silty sand, silts and clays obtainable from the required excavations. The material shall contain a minimum of 15 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140.
- (3) In Section 6, Compaction Class A shall apply. The fill matrix shall be compacted to at least 95 percent of the maximum density obtained in compaction tests of the fill materials performed by Method A, ASTM D 698 (Standard Proctor Test).
- (4) The maximum size of rock fragments incorporated in the fill shall be six (6) inches.
- (5) The maximum thickness of a layer before compaction shall be nine (9) inches.
- (6) The moisture content of the material incorporated in the fill shall be maintained within the range of two (2) percentage points below to two (2) percentage points above the optimum moisture content.
- (7) Measurement and payment will be by Methods 4 and 6.

10. 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, Backfill

- (1) This item shall consist of placing and compacting backfill around the following items within the limits shown on the drawings.
  - (a) PVC main and lateral pipe
  - (b) Irrigation Systems
  - (c) PE emitter lateral pipe
  - (d) Emitter, PE riser and fittings
  - (e) Valve boxes
  - (f) Precast electrical manholes
- (2) Backfill material shall consist of suitable sands, silts or topsoil obtained from the required excavations.
- (3) Section 6, Compaction, does not apply to this item. The material shall be compacted to a density equivalent to the density of the adjacent material.
- (4) The maximum size of rock fragments incorporated within the backfill to a depth of six (6) inches above the pipe shall be one (1) inch. The maximum size of rock fragments incorporated within the remainder of the backfill shall meet the requirements of the adjacent materials.
- (5) The maximum thickness of a layer before compaction shall be compatible with the compaction required.
- (6) The moisture content of the backfill materials shall be equivalent to the moisture content of the adjacent materials.
- (7) No separate payment will be made for compacted backfill. Compensation for compacted backfill will be included in the payment for PVC main and lateral pipe, irrigation systems, PE lateral pipe, emitter, PE riser and fittings, valve boxes and precast electrical manholes, Bid Items 1 through 9, and 21 as appropriate.

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 5, Structure Backfill

- (1) This item shall consist of placing and compacting structure backfill for the 108-inch diameter CMP within the limits shown on Sheet 15 through 19 of the drawings.
- (2) Backfill material shall be Type 2 as described in Item 10 b (2). The material shall contain a minimum of 15 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140.
- (3) In Section 6, Compaction, Class A shall apply. The fill matrix shall be compacted to at least 95 per cent of the maximum density obtained in compaction tests of the fill materials performed by Method A, ASTM D 698 (Standard Proctor Test).
- (4) The maximum size of rock fragments incorporated in the fill shall be three (3) inches.
- (5) The maximum thickness of a layer before compaction shall be four (4) inches.
- (6) The moisture content of the material incorporated in the fill shall be maintained within the range of two (2) percentage points below to two (2) percentage points above the optimum moisture content.
- (7) Measurement and payment will be by methods 1 and 6. Deduction in volume will be made for embedded conduit and appurtenances.

(b) Bid Item 6, Earth Fill

- (1) This item shall consist of placing and compacting the earth fill required in the road ramps at Brown, McKellips and McDowell Roads within the limits shown on the drawings.
- (2) Earth fill materials to be used for this item shall consist of three (3) main types, obtained from the required excavation and borrow areas of the Spook Hill FRS and the Spook Hill Floodway as follows:

Type 2 shall consist of silt, silty sand, gravelly silt, gravelly silty sand, sand, gravelly sand, clayey gravelly sand and clayey sand located as follows: Between Station 87+00± and Station 230+00± baseline of the dam intermittently between the existing ground line and four (4) feet depth and occasionally between four (4) feet depth and the caliche or siltstone limit. Between Station 230+00± and Station 303+75± baseline of the dam, generally between the existing ground line and the caliche limits. Between Station 103+38 and Station 190+50± centerline of the Floodway, between the existing ground line and the caliche or granite limits.

The material shall contain a minimum of 15 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140.

Type 3 shall consist of caliche and siltstone located as follows: Between Station 87+00± and Station 303+75± baseline of the dam lying generally from one (1) foot to eight (8) feet below the existing ground line to the lower excavation limit.

Between Station 103+38 and Station 130+00± centerline of the floodway lying generally at the existing ground line to the granite limit.

Type 4 shall consist of sands and gravels and fractured granite located as follows: Between Station 87+00± and Station 305+75± baseline of the dam lying occasionally between the existing ground line and the caliche or siltstone limits.

Between Station 103+38 and Station 130+00± centerline of the floodway lying generally below the caliche lower limit.

Between Station 130+00± and Station 207+75± centerline of the floodway lying generally below the existing ground line.

The material shall contain a maximum of 15 percent passing the #200 sieve when determined on a dry weight basis in accordance with ASTM D 1140.

- (3) The material shall be placed in the manner shown on Sheets 14 through 19 of the drawings, with Type 2 material routed to the outside slopes as directed by the Engineer.

- (4) Compaction for earth fill types 2 and 3 shall be Class A. The materials shall be compacted to 95% of maximum dry density as determined by laboratory procedures outlined in ASTM Designation D 698, Method A.

The maximum size of rock fragments incorporated in this portion of the fill shall be six (6) inches and the thickness of each layer of fill placed shall not be greater than nine (9) inches before compaction.

During the earth fill operations, the materials being placed shall be maintained within a moisture content range of two (2) percentage points above to two (2) percentage points below optimum.

- (5) Compaction for earth fill type 4 shall be Class C. Materials shall be compacted by one of the following methods.
- (a) Four (4) passes per layer of fill of a pneumatic-tired roller weighing at least 50 tons (Static Service Weight).
  - (b) Four (4) passes per layer of fill of a smooth-wheel vibrating roller at least 72 inches wide, weighing at least one (1) ton (Static Service Weight) per foot of width and capable of exerting a dynamic impact of at least 20,000 pounds at the rate of at least 1200 times per minute.

The maximum size of rock fragments incorporated in this portion of the fill shall be nine (9) inches and the thickness of each layer of fill placed shall not be greater than eighteen (18) inches before compaction.

The moisture content of the material to be incorporated in this portion of the fill shall be compatible with the material and method of compaction to insure a dense fill that is well bonded with the preceding and subsequent layers.

- (6) Sectional construction will be permitted in accordance with Section 4.e. of this specification.
- (7) Measurement and payment will be by Method 2 and Method 6.

## CONSTRUCTION SPECIFICATION

### 24. DRAIN FILL

#### 1. SCOPE

The work shall consist of furnishing, placing and compacting drain fill required in the construction of structure drains and filters.

#### 2. MATERIALS

(Method 1) Drain fill materials shall conform to the requirements of Material Specification 521. At least 30 days prior to delivery of the materials to the site the Contractor shall inform the Contracting Officer in writing of the source from which he intends to obtain them. The Contractor shall provide the Engineer free access to the source for the purpose of obtaining samples for testing.

(Method 2) Drain fill materials shall be sand, gravel or crushed stone or mixtures thereof obtained from the specified sources. They shall be selected as necessary to avoid the inclusion of organic matter, clay balls, excessive fine particles or other substances that would interfere with their free-draining properties.

#### 3. BASE PREPARATION

Foundation surfaces and trenches shall be clean and free of organic matter, loose soil, foreign substances, and standing water when the drain fill is placed. Earth surfaces upon or against which drain fill will be placed shall not be scarified.

#### 4. PLACEMENT

Drain fill shall not be placed until the subgrade has been inspected and approved by the Engineer. Drain fill shall not be placed over or around pipe or drain tile until the installation of the pipe or tile has been inspected and approved.

Drain fill shall be placed uniformly in layers not more than 12 inches deep before compaction. When compaction is accomplished by manually controlled equipment, the layers shall be not more than 8 inches deep. The material shall be placed in a manner to avoid segregation of particle sizes and to insure the continuity and integrity of all zones. No foreign materials shall be allowed to become intermixed with or otherwise contaminate the drain fill.

(24-1)

Traffic shall not be allowed to cross over drains at random. Equipment crossovers shall be maintained, and the number and location of such crossovers shall be established and approved prior to the beginning of drain fill placement. Each crossover shall be cleaned of all contaminating materials and shall be inspected and approved by the Engineer before additional drain fill is placed.

Any damage to the foundation surface or to the sides or bottoms of trenches occurring during placement of drain fill shall be repaired before drain fill placement is continued.

The upper surface of drain fill constructed concurrently with adjacent zones of earth fill shall be maintained at an elevation at least one foot above the upper surface of the adjacent fill.

Drain fill over or around pipe or drain tile shall be placed in a manner to avoid any displacement of the pipe or tile in line or grade.

5. CONTROL OF MOISTURE

The moisture content of drain fill materials shall be controlled as specified in Section 9. When the addition of water is required, it shall be applied in such a way as to avoid excessive wetting of adjacent earth fill. Except as specified in Section 9, control of the moisture content will not be required.

6. COMPACTION

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

Class A compaction. Each layer of drain fill shall be compacted to a relative density of not less than 70 percent as determined by ASTM Method D 2049-64T.

Class I compaction. Each layer of drain fill shall be compacted by at least 2 passes, over the entire surface, of a steel-drum vibrating roller weighing not less than 5 tons and exerting a vertical vibrating force of not less than 20,000 pounds at least 1200 times per minute, or by an approved equivalent method.

Class II compaction. Each layer of drain fill shall be compacted by one of the following methods or by an approved equivalent method:

(24-2)

- a. At least 2 passes, over the entire surface, of a pneumatic-tired roller exerting a pressure of not less than 75 pounds per square inch.
- b. At least 4 passes, over the entire surface, of the track of a crawler-type tractor weighing not less than 20 tons.
- c. Controlled movement of the hauling equipment so that the entire surface is traversed by not less than one tread track of the loaded equipment.

Class III compaction. No compaction will be required beyond that resulting from the placing and spreading operations.

When compaction other than Class III compaction is specified materials placed in trenches or other locations inaccessible to heavy equipment shall be compacted by means of manually controlled pneumatic or vibrating tampers or by approved equivalent methods.

7. TESTING

The Engineer will perform such tests as are required to verify that the drain fill materials and the drain fill in place 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

For items of work for which specific unit prices are established in the contract, the volume of drain fill within the neat lines shown on the drawings or limits established by the Engineer will be measured and computed to the nearest cubic yard. Where the Engineer directs placement of drain fill outside the neat lines to replace unsuitable foundation material, the volume of such drain fill will be included, but only to the extent that the unsuitable condition is not a result of the Contractor's operations.

Payment for drain fill will be made at the contract unit price for each type of drain fill, complete in place. Except as otherwise specified in Section 9, such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the performance of the work.

(24-3)

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.

(24-4)

SCS-WEST

2-21-73

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 10, Drain Fill

- (1) This item shall consist of furnishing and placing all the drain fill materials required adjacent to the 6-inch diameter drain systems as shown on the drawings.
- (2) In Section 2, Materials, Method 1 shall apply.
- (3) The required gradation of the drain fill shall be

<u>Sieve Size</u>	<u>Percent Passing (Dry weight basis)</u>
3 inches	100
3/4 inch	76-100
#4	52- 80
#16	28- 56
#40	8- 38
#200	0- 3

Size No. 67 blended with fine aggregates in accordance with ASTM C 33 meets these requirements.

- (4) In Section 6, Compaction, Class II shall apply. Drain fill within two (2) feet of concrete structures shall be compacted by manually controlled equipment approved by the Engineer.
- (5) The moisture content shall be maintained in a range to accomplish the specified compaction without bulking or dilatance.
- (6) Measurement and payment will be made in accordance with Section 8.

CONSTRUCTION SPECIFICATION

26. SALVAGING AND SPREADING TOPSOIL

1. SCOPE

The work shall consist of salvaging topsoil from borrow pits or required excavations and spreading it on the areas shown on the drawings to the specified depths.

2. QUALITY OF TOPSOIL

Topsoil shall consist of friable surface soil reasonably free of grass, roots, weeds, sticks, stones or other foreign materials.

3. EXCAVATION

After the site has been cleared and grubbed the topsoil shall be removed from the designated areas and shall be stockpiled at locations approved by the Engineer. Objectionable materials encountered during excavation shall be removed and buried at locations approved by the Engineer or otherwise removed from the construction site.

4. SPREADING

(Method 1) Spreading shall not be done when the ground or topsoil is frozen, excessively wet or otherwise in a condition detrimental to the work. Surfaces designated to be covered shall be lightly scarified just prior to the spreading operation.

After placement is completed the surface of the topsoil shall be finished to a reasonably smooth surface.

(Method 2) Spreading shall not be done when the ground or topsoil is frozen, excessively wet or otherwise in a condition detrimental to the work. Surfaces designated to be covered shall be lightly scarified just prior to the spreading operation. Where compacted fills are designated to be covered by topsoil, the topsoil shall be placed concurrently with the fill and shall be bonded to the compacted fill with the compacting equipment.

After placement is completed the surface of the topsoil shall be finished to a reasonably smooth surface.

5. MEASUREMENT AND PAYMENT

(Method 1) The total area of the surfaces covered by topsoil will be computed to the nearest square yard. Payment for salvaging and placing topsoil will be made at the contract unit price. Such payment will constitute full compensation for all materials, labor and equipment and all other items necessary and incidental to the completion of the work, including excavating, stockpiling, hauling, and spreading.

(Method 2) The total area of the surfaces covered by topsoil will be computed to the nearest square yard except that the areas of the surfaces of embankments, levees, dikes and other earth fills will not be included for payment. Payment for salvaging and placing topsoil will be made at the contract unit price. Such payment will constitute full payment for all materials, labor and equipment and all other items necessary and incidental to the completion of the work, including excavating, stockpiling, hauling, and spreading.

Payment for topsoil spread on the surfaces of embankments, levees, dikes and other earth fills will be considered as included in the payment for the item of earth fill under which the embankment, levee, dike or other earth fill is constructed.

(Method 3) For items of work for which specific unit prices are established in the contract, the volume of topsoil salvaged and spread will be measured by cross section surveys of the stockpile from which it is taken if it is stockpiled; otherwise, of the area from which it is borrowed; and will be computed to the nearest cubic yard by the method of average cross-sectional end areas. Payment for salvaging and spreading topsoil 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 performance of the work, including excavating, stockpiling, hauling, and spreading.

(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 11, Salvaging and Spreading Topsoil - 12-inch Thickness

- (1) This item shall consist of furnishing and installing a twelve-(12) inch average thickness of topsoil including salvaging, mixing, stockpiling, and spreading on the upstream and downstream slopes of the dam and the outside slopes of the emergency spillway banks as shown on the drawings and staked in the field.
- (2) Materials for the topsoil shall consist of silt, silty sand, and clayey sand blended with chipped or shredded material and shall be obtained from the upper one (1) foot of the required excavation in Bid Item 5, Foundation Excavation, Common; Bid Item 6, Channel Excavation, Common; Salt-Gila Aqueduct borrow areas; and reservoir borrow areas.
- (3) The material shall conform to the following requirements:
  - (a) The material shall contain not less than twenty (20) percent fines (material passing the No. 200 sieve) when tested in accordance with ASTM D 1140 on the portion of soil mass finer than a three-(3) inch square screen opening.
  - (b) The maximum size woody particle incorporated in the topsoil shall be six (6) inches.
  - (c) The maximum size of rock fragments incorporated in the topsoil shall be twelve (12) inches and the maximum content of rock two (2) inches and larger in the soil shall not exceed twenty (20) percent.
- (4) In Section 4, Spreading, Method 1 shall apply.
- (5) The material shall be placed at a natural moisture content.
- (6) No compaction shall be required for twelve-(12) inch thickness of topsoil.
- (7) Measurement and payment will be by Method 1.

b. Bid Item 12, Salvaging and Spreading Topsoil - 6-inch Thickness

- (1) This item shall consist of furnishing and installing a six-(6) inch average thickness of topsoil including salvaging, mixing, stockpiling, and spreading of topsoil in the following areas as shown on the drawings and staked in the field.
  - (a) Brown Road ramp slopes between Brown Road Centerline Station 13+00± and Station 24+00±.

- (b) McKellips Road ramp slopes between McKellips Road Centerline Station 13+50± and Station 27+50±.
  - (c) McDowell Road ramp slopes between McDowell Road Centerline Station 14+00± and Station 24+00±.
  - (d) The channel excavation in the reservoir between dam baseline Station 198+00± and Station 212+00±, also between dam baseline Station 265+00± and Station 280+00±.
  - (e) The abandoned Usery Pass Road right-of-way between dam baseline Station 153+00± and Station 155+00± 980'± rt. and 67± lt., and the abandoned Hermosa Vista Drive right-of-way between dam baseline Station 239+00 and Station 245+00, 1032'± rt. and 78'± lt.
  - (f) The dressed waste areas located in the reservoir adjacent to Station 110+00, Station 148+43, Station 180+00, Station 230+90, and Station 300+00 baseline of the dam.
  - (g) The North and South Pump Stations.
  - (h) The dressed reservoir borrow areas adjacent to the principal spillway inlet channel between dam baseline Station 105+00 and Station 115+00, Station 140+00 and Station 153+00, Station 156+00 and Station 195+00, Station 220+00 and Station 242+00, Station 246+00 and Station 260+00, and Station 280+00 and Station 290+00.
- (2) Materials for the topsoil shall consist of silt, silty sand, and clayey sand blended with chopped or shredded material and shall be obtained from the upper one (1) foot of the required excavation in Bid Item 5, Foundation Excavation, Common, Bid Item 6, Channel Excavation, Common, Salt-Gila Aqueduct borrow areas, and reservoir borrow areas.
- (3) The material shall conform to the following requirements:
- (a) The material shall contain not less than twenty (20) percent fines (material passing the No. 200 sieve) when tested in accordance with ASTM D 1140 on the portion of soil mass finer than a three-(3) inch square screen opening.
  - (b) The maximum size woody particle incorporated in the topsoil shall be six (6) inches.
  - (c) The maximum size of rock fragments incorporated in the topsoil shall be twelve (12) inches and the maximum content of rock two (2) inches and larger in the soil shall not exceed twenty (20) percent.

- (4) In Section 4, Spreading, Method 2 shall apply.
- (5) The material shall be placed at a natural moisture content.
- (6) Measurement and payment will be by Method 1.

## 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.

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

#### (Method 2)

Concrete shall be classified as follows:

<u>Class of Concrete</u>	<u>Maximum Net Water Content (gallons/bag)</u>	<u>Minimum Cement Content (bags/cu. yd.)</u>
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:

<u>Maximum Size Aggregate</u>	<u>Air Content (%)</u>
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

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, the source, character or grading of the aggregates, the type or brand of cement or admixture shall be changed without notice to the Engineer and establishment of a new job mix supported by evidence, as required for the initial job mix, but the proposed new materials and mix proportions will produce concrete of the quality, consistency, and strength specified. The use of calcium chloride or other accelerators or anti-freeze compounds will not be allowed.

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 the same as that required in the mix without the admixture. Concrete containing admixtures shall be tested and its performance in the use of calcium chloride or other accelerators or anti-freeze 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:

<u>Test</u>	<u>Method (ASTM Designation)</u>
Sampling	C 172 <sup>1</sup>
Slump Test	C 143 <sup>1</sup>

<u>Test</u>	<u>Method (ASTM Designation)</u>
Air Content	C 231 <sup>1</sup> or C 173 <sup>1</sup>
Compression Test Specimens	C 31 <sup>1</sup> or C 42
Compressive Strength	C 39 <sup>2</sup> or C 42
Unit Weight	C 138

<sup>1</sup>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.

<sup>2</sup>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.

Except at otherwise provided in Section 8, cement and aggregates shall be measured as follows:

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.

Volumetric batching and continuous mixing at the site. Unless otherwise specified, volumetric batching and continuous mixing at the construction site will be permitted if approved by the Contracting Officer. The batching and mixing equipment shall conform to the requirements of ASTM Specification C 685 and shall be demonstrated prior to placement of concrete, by tests with the job mix, to produce concrete meeting the specified proportioning and uniformity requirements. Concrete made by this method shall be produced, inspected, and certified in conformance with sections 6., 7., 8., 13., and 14. of ASTM Specification C 685.

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 to 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.

<u>Element</u>	<u>Time</u>
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

<u>Element</u>	<u>Time</u>
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
Concrete supporting 20 to 30 feet of wall in place above it <sup>1</sup>	3 days
Concrete supporting not more than 20 feet of wall in place above it <sup>1</sup>	24 hours

<sup>1</sup>Age of stripped concrete shall be at least 7 days before any load is applied other than the weight of the column or wall itself and the forms and scaffolds for succeeding lifts.

(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 305.
- 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

- (1) This item shall consist of furnishing, forming and placing all concrete required to construct the following:
  - (a) The principal spillway inlet, conduit, anti-seep collars, transition and outlet.
  - (b) The emergency spillway at Station 294+50 - Centerline dam, including the anchors.
  - (c) The emergency spillway outlet channel protection between Station 11+54 and Station 12+00± - Centerline emergency spillway.
- (2) Preformed expansion joint filler shall conform to Material Specification 535 and ASTM D 1752 and shall be either Type I or Type II.
- (3) Joint sealing compound shall be Type II, Class A conforming to Material Specification 536 and Federal Specification TT-S-227.
- (4) Waterstops shall be Class II, Type E, size designation 16.
- (5) In Section 3, Classes of Concrete, and Section 5, Design of the Concrete Mix, Method 2 shall apply. Concrete shall be Class 4000X.
- (6) Coarse aggregate shall be size No. 67 in accordance with ASTM C 33.
- (7) In Section 15, Construction Joints, Method 1 shall apply.
- (8) In Section 18, Removal of Forms, Method 1 shall apply.
- (9) All exposed surfaces of the emergency spillway and principal spillway except the inside of the conduit and transition shall be finished in the following manner:

Upon patching and painting all holes as directed in Section 19, the surface shall be promptly covered with polyethylene film, wet burlap or wet cotton mats. If polyethylene film is used, the film shall be held securely to the surface by means of weights, adhesive or other suitable means. Only white polyethylene film for covering will be acceptable.

When the mortar used in patching and pointing has set sufficiently, the surface shall be uncovered and thoroughly rubbed with either a float or a carborundum stone until the surface is covered with a

lather. Cork, wood or rubber floats shall be used only on surfaces sufficiently green to work up such lather, otherwise a carborundum stone shall be used. During the rubbing process, a thin grout composed of one (1) part cement and one (1) part of fine sand may be used to facilitate producing a satisfactory lather; however, this grout shall not be used in quantities sufficient to cause a plaster coating to be left on the finished surface. A portion of the required cement for grout shall be white as required to match the color of the surrounding concrete. Rubbing shall continue until irregularities are removed and there is no excess material. At the time a light dust appears, the surface shall be brushed or sacked. Brushing or sacking shall be carried in one direction so as to produce a uniform texture.

(10) Curing compound shall be Type I-D conforming to Material Specification 534 and ASTM C 309.

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

b. Bid Item 14, Cement

(1) This item shall consist of furnishing and handling all cement required to construct the concrete items in Bid Item 13.

(2) Cement shall be Type II or IIA.

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

c. Subsidiary Item, Concrete, Class 3000

(1) This item shall consist of furnishing, forming and placing all items required to construct the following:

(a) The identification sign post anchors

(b) The four-(4) strand barbed wire fence post anchors

(c) The six-(6) foot chain link fence post anchors

(d) Gate well assembly

(e) The walkway pedestal

(2) In Section 3, Classes of Concrete, and Section 5, Design of the Concrete Mix, Method 1 shall apply. Concrete shall be Class 3000.

(3) Coarse aggregate shall be size No. 67 in accordance with ASTM C 33.

- (4) Cement shall be Type II or IIA.
- (5) In Section 15, Construction Joints, Method 2 shall apply.
- (6) In Section 18, Removal of Forms, Method 1 shall apply.
- (7) No separate payment will be made for Class 3000 concrete. Compensation for this work will be included in the payment for Bid Item 18, Metalwork; Bid Item 19, Identification Sign; Bid Item 20, 6-foot Chain Link Fence; and Bid Item 21, 4-strand Barbed Wire Fence.

26. 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, Concrete Class 3000

- (1) This item shall consist of the furnishing and placement of concrete for fence post anchors, sag weights and pipe inlets as shown on the drawings.
- (2) In Section 3, Classes of Concrete, and Section 5, Design of Concrete Mix, Method 1 shall apply. Concrete shall be Class 3000.
- (3) Concrete coarse aggregate shall conform to the requirements of ASTM C 33, size number 67.
- (4) Cement shall be Type II or IIA.
- (5) In Section 15, Construction Joints, Method 1 shall apply.
- (6) In Section 18, Removal of Forms, Method 1 shall apply.
- (7) No separate payment will be made for this item. Compensation will be included in Bid Items 8, Special Fittings, and 10, Fencing.

26. 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, Concrete, Class 3000

- (1) This item shall consist of furnishing, forming and placing all items required to construct the following:
  - (a) The pads for the pumps and motors
  - (b) The footings for the automatic controllers
  - (c) The thrust blocks
- (2) In Section 3, Classes of Concrete, and Section 5, Design of the Concrete Mix, Method 1 shall apply. Concrete shall be Class 3000.
- (3) Coarse aggregate shall be size No. 67 in accordance with ASTM C 33.
- (4) Cement shall be Type II or IIA.
- (5) In Section 15, Construction Joints, Method 2 shall apply.
- (6) In Section 18, Removal of Forms, Method 1 shall apply.
- (7) No separate payment will be made for Class 3000 concrete. Compensation for this work will be included in the payment for Bid Item 1, 4-inch Diameter PVC Main Pipe; Bid Item 23, Station Controller; Bid Item 24, 2-Station Controller; and Bid Item 21, Pump Station, as appropriate.

26. 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, Concrete, Class 3000

- (1) This item shall consist of furnishing, forming, and placing all items required to construct the following:
  - (a) The 108-inch diameter CMP concrete headwalls
  - (b) The concrete for the anchor posts on the 28-foot double drive gates
- (2) In Section 3, Classes of Concrete, and Section 5, Design of the Concrete Mix, Method 1 shall apply. Concrete shall be Class 3000.
- (3) Coarse aggregate shall be size No. 67 in accordance with ASTM C 33.
- (4) Cement shall be Type II or IIa.
- (5) In Section 15, Construction Joints, Method 2 shall apply.
- (6) In Section 18, Removal of Forms, Method 1 shall apply.
- (7) No separate payment will be made for Class 3000 concrete. Compensation for this work will be included in the payment for Bid Item #7, 108-Inch Diameter Corrugated Metal Pipe, and Bid Item #9, 28-Foot Double Drive Gates, as appropriate.

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.

(34-1)

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 <sup>1</sup>

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

<sup>1</sup>Style designation is defined in ACI Standard 315 of the American Concrete Institute.

TABLE 34-3. SQUARE WELDED WIRE FABRIC<sup>1</sup>

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		

<sup>1</sup>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 installing all steel reinforcement required in the construction of reinforced concrete under this contract.
- (2) Measurement and payment will be by Method 1.

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, Steel Reinforcement

- (1) This item shall consist of furnishing and installing all steel reinforcement required in the construction of reinforced concrete pads for the pump stations.
- (2) No separate payment will be made for steel reinforcement. Compensation for this work will be included in the payment for Bid Item 21, Pump Station.

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, Steel Reinforcement

- (1) This item shall consist of furnishing and installing all the 66-00 welded wire fabric reinforcement required in the construction of the 108-inch diameter CMP concrete headwalls.
- (2) In Section 6, Splicing Welded Wire Fabric, Sections a.(2) and b.(3) will apply.
- (3) No separate payment will be made for welded wire fabric reinforcement. Compensation for this work will be included in the payment for Bid Item #7, 108-inch diameter CMP.

## CONSTRUCTION SPECIFICATION

### 44. ASBESTOS-CEMENT PIPE CONDUITS AND DRAINS

#### 1. SCOPE

The work shall consist of furnishing and installing asbestos-cement pipe and the necessary fittings as shown on the drawings.

#### 2. MATERIALS

Pipe, fittings, and gaskets shall conform to the requirements of Material Specification 545 for the kind of pipe specified.

#### 3. LAYING AND BEDDING

Pipe shall be laid to the line and grade shown on the drawings.

- a. Concrete Cradle or Bedding. Pipe to be cradled or bedded on concrete shall be set to the specified line and grade and temporarily supported on concrete blocks or wedges until the cradle or bedding concrete is placed.
- 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 the 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, except where unsealed joints are indicated, shall be sound and watertight at the pressures specified.

Pipe shall be installed and joined in accordance with the manufacturer's recommendations except as otherwise specified.

#### 5. PRESSURE TESTING

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

(44-1)

(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.

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 of pipe 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 of pipe. 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 pipe 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 of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe 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 7 of this specification.

(44-3)

SCS-WEST

3-7-69

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

a. Bid Item 16, 6-Inch Diameter Drain Systems

- (1) These items shall consist of furnishing and installing all the 6-inch diameter perforated and non-perforated asbestos-cement pipe, including fittings for the following systems as shown on the drawings.
  - (a) Emergency spillway headwall drain system
  - (b) Emergency spillway side wall drain systems
  - (c) Principal spillway inlet drain system
  - (d) Principal spillway outlet drain system
- (2) All pipe shall be asbestos cement pressure pipe conforming to Material Specification 545 and ASTM C 296; Type I or II, Class 200.
- (3) In Section 5, Pressure Testing, Method 1 shall apply.
- (4) Measurement and payment will be by Method 2.

## CONSTRUCTION SPECIFICATION

### 51. CORRUGATED METAL PIPE CONDUITS

#### 1. SCOPE

The work shall consist of furnishing and placing circular, arched or elliptical corrugated metal pipe and the necessary fittings.

#### 2. MATERIALS

Pipe and fittings shall conform to the requirements of Material Specification 551 or Material Specification 552, whichever is specified.

#### 3. LAYING AND BEDDING THE PIPE

Unless otherwise specified, the pipe shall be installed in accordance with the manufacturer's recommendations. The pipe shall be laid with the outside laps of circumferential joints pointing upstream and with longitudinal laps at the sides at about the vertical midheight of the pipe. Field welding of corrugated galvanized iron or steel pipe will not be permitted. Unless otherwise specified, the pipe sections shall be joined with standard coupling bands. The pipe shall be firmly and uniformly bedded throughout its entire length to the depth and in the manner specified on the drawings.

Perforated pipe shall be laid with the perforations down and oriented symmetrically about a vertical center line. Perforations shall be clear of any obstructions at the time the pipe is laid.

The pipe shall be loaded sufficiently during backfilling around the sides to prevent its being lifted from the bedding.

#### 4. STRUTTING

When required, struts or horizontal ties shall be installed in the manner specified on the drawings. Struts and ties shall remain in place until the backfill has been placed to a height of 5 feet above the top of the pipe, or has been completed if the finished height is less than 5 feet above the top of the pipe, at which time they shall be removed by the Contractor.

5. HANDLING THE PIPE

The Contractor shall furnish such equipment as is necessary to place the pipe without damaging the pipe or coatings. The pipe shall be transported and handled in such a manner as to prevent bruising, scaling or breaking of the spelter coating or bituminous coating.

6. REPAIR OF DAMAGED COATINGS

Any damage to the zinc coating shall be repaired by thoroughly wire brushing the damaged area, removing all loose and cracked coating, removing all dirt and greasy material with solvent, and painting with two coats of zinc dust-zinc oxide primer conforming to the requirements of Federal Specification TT-P-641, Type III, or zinc dust paint conforming to the requirements of Military Specification MIL-P-21035. If the coating is damaged in any individual area larger than 12 square inches, or if more than 0.2 percent of a total surface area of a length of pipe is damaged, the length will be rejected.

Breaks or scuffs in bituminous coatings that are less than 36 square inches in area shall be repaired by the application of two coats of hot asphaltic paint or a coating of cold-applied bituminous mastic. The repair coating shall be at least 0.05 inches thick after hardening and shall bond securely and permanently to the pipe. The material shall meet the physical requirements for bituminous coatings contained in the references cited in Material Specifications 551 and 552. Whenever individual breaks exceed 36 square inches in area or when the total area of breaks exceeds 0.5 percent of the total surface area of the pipe, the pipe will be rejected.

Bituminous coating damaged by welding of coated pipe or pipe fittings shall be repaired as specified in this section for breaks and scuffs in bituminous coatings.

7. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gage 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, class, size and gage of pipe will be made at the contract unit price for that type, class, size and gage of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and 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, class, size and gage of pipe will be determined as the sum of the nominal laying lengths of the pipe sections and fittings used. Payment for each type, class, size and gage of pipe will be made at the contract unit price for that type, class, size and gage of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work.

(Method 3) For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gage 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, class, size and gage of pipe will be made at the contract unit price for that type, class, size and gage of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work except items designated as "special fittings." Payment for special fittings will be made at the contract lump sum price for special fittings (CMP).

(Method 4) For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gage of pipe will be determined as the sum of the nominal laying lengths of the pipe sections and fittings used. Payment for each type, class, size and gage of pipe will be made at the contract unit price for that type, class, size and gage of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work except items designated as "special fittings." Payment for special fittings will be made at the contract lump sum price for special fittings (CMP).

(Method 5) For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gage 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, class, size and gage of pipe will be made at the contract unit price for that type, class, size and gage 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 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.

(Method 6) For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gage of pipe will be determined as the sum of the nominal laying lengths of the pipe sections used. Payment for each type, class, size and gage of pipe will be made at the contract price for that type, class, size and gage 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 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.

(Method 7) For items of work for which specific lump sum prices are established in the contract, payment for corrugated metal pipe structures will be made at the contract lump sum prices. Such payment will constitute full compensation for furnishing, fabricating, transporting, and installing the pipe, fittings, and appurtenances, and all other items necessary and incidental to completion of the work, including, except as otherwise specified, required excavation, dewatering, and backfilling.

(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 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 6. 24-Inch Diameter Corrugated Metal Pipe

- (1) This item shall consist of the furnishing and installing of the 24-inch diameter corrugated metal pipe for the pipe inlets as shown on the drawings and staked in the field.
- (2) In Section 2, Materials, Materials Specification 551 shall apply.
- (3) The pipe shall be 16 gage, Class I or II, Shape 1, Series A and have Coating A in accordance with Federal Specification WW-P-405.
- (4) Measurement and payment will be by Method 3.

b. Bid Item 7. 30-Inch Diameter Corrugated Metal Pipe

- (1) This item shall consist of the furnishing and installing of the 30-inch diameter corrugated metal pipe for the pipe inlets as shown on the drawings and staked in the field.
- (2) In Section 2, Materials, Materials Specification 551 shall apply.
- (3) The pipe shall be 16 gage, Class I or II, Shape 1, Series A and have Coating A in accordance with Federal Specification WW-P-405.
- (4) Measurement and payment will be by Method 3.

c. Bid Item 8. Special Fittings

- (1) This item shall consist of furnishing and installing the 30-inch, 36-inch, and 42-inch diameter corrugated metal pipe risers, including hand rails and Class 3000 concrete for the 12-inch and 3-inch slabs for the pipe inlets as shown on the drawings.
- (2) In Section 2, Materials, Materials Specification 551 shall apply.
- (3) The pipe shall be 16 gage, Class I or II, Shape 1, Series A and have Coating A in accordance with Federal Specification WW-P-405.
- (4) Measurement and payment will be by Method 3.

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 7, 108-Inch Diameter Corrugated Metal Pipe

- (1) This item shall consist of the furnishing and installing of the 108-inch diameter corrugated metal pipe for the principal spillway inlet channel at the following locations as shown on the drawings and staked in the field.
  - (a) Station 20+60 centerline Brown Road - 71 feet left to 71 feet right.
  - (b) Station 19+40 centerline McKellips Road - 102 feet left to 102 feet right.
  - (c) Station 19+75 centerline McDowell Road - 93 feet left to 93 feet right.
- (2) In Section 2, Materials, Materials Specification 551 shall apply.
- (3) The pipe shall be 14-gage, Class I or II, Shape 1, Series B and have Coating A in accordance with Federal Specification WW-P-405.
- (4) Measurement and payment will be by Method 3.

## 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 9 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 9 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 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

(61-3)

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.

(61-4)

SCS-WEST

3-1-74

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 9, Loose Rock Riprap

- (1) This item shall consist of the furnishing and placing of loose rock riprap including filter material as shown on the drawings and as staked in the field.
- (2) Materials for the loose rock riprap shall consist of sound granite obtained from the excavation required in Bid Item 2, Channel Excavation, Unclassified.
- (3) The rock shall be graded as follows:

<u>Particle Size (inch)</u>	<u>Percent Passing (by Dry Wt.)</u>
15	100
12	70-100
9	40- 80
6	10- 50
3	0- 5

- (4) Rock shall be either hand or equipment placed.
- (5) Filter beneath riprap shall be graded as follows:

<u>U.S. Sieve Size</u>	<u>Percent Passing (by Dry Wt.)</u>
3"	100
3/4"	76-100
#4	52- 80
#16	28- 56
#40	8- 38
#200	0- 3

Size No. 67 blended with fine aggregates in accordance with ASTM C 33 meets these requirements.

- (6) 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.

(71-2)

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 17, 24-Inch X 24-Inch Slide Gate

- (1) This item shall consist of furnishing and installing the 24" X 24" slide gate and appurtenances as shown on the drawings.
- (2) The slide gate assembly shall be defined as the self-contained gate, complete with frame, rising stem, stem guides, handwheel, lift nut, anchor bolts and all other miscellaneous hardware required to complete the installation.
- (3) The gate shall be spigot back type slide gate and shall conform to the requirements specified in Material Specification 571. The gate shall be Type MLS-2, Class 10-0.
- (4) The gate stem shall be one and one-half (1-1/2) inch diameter stainless steel.
- (5) In Section 11, Painting, painting of the gate will not be required.
- (6) 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:

<u>Material</u>	<u>Unit Weight</u> <u>Pounds per Cubic Foot</u>
Aluminum alloy	173.0
Bronze or copper alloy	536.0
Iron, malleable	470.0
Iron, wrought	487.0

(81-2)

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.

(81-3)

SCS-WEST

3-7-69

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 18, Metalwork

- (1) This item shall consist of supplying, fabricating and installing the following:
  - (a) Walkway for the principal spillway inlet complete with angles, channels, bars, grating, handrail, and anchor bolts.
  - (b) Gate well assembly for the principal spillway inlet complete with slotted corrugated pipe, bands and trash rack.
  - (c) Small animal guards.
- (2) The walkway bars, angles and channels and the trash racks shall be fabricated of structural steel conforming to the requirements of ASTM Specification A 36 to the sizes and dimensions shown on the drawings.
- (3) The walkway grating shall be welded rectangular steel grating, standard spacing type, as supplied by McMaster-Carr Supply Company, P.O. Box 54960, Los Angeles, California 90054 or equivalent. The bearing bars shall be 1½" deep X 3/16" thick and shall run across the width of the walkway.
- (4) The walkway handrail shall be fabricated of standard weight steel pipe conforming to the requirements of ASA B 36.10.
- (5) The slotted corrugated pipe and bands shall be fabricated from Type II carbon steel sheets conforming to the requirements of Federal Specification QQ-S-775. The nominal thickness of the material shall be No. 8 gage (0.1681 inch).
- (6) The walkway and gate well assembly shall be painted in the manner specified in Construction Specification 82.
- (7) The small animal guards shall be fabricated as shown on the drawings and shall be galvanized after fabrication.
- (8) Measurement and payment will be by Method 1.

b. Bid Item 19, Identification Signs

- (1) This item shall consist of the fabrication and installation of the identification signs as shown on the drawings and as directed by the Engineer.
- (2) Painting shall be in accordance with Construction Specification 82.
- (3) Measurement and payment will be by Method 3.

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. ATMOSPHERIC 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

- (1) This item shall consist of cleaning and painting the designated metal items in Bid Item 18 and the Identification Signs, Bid Item 19.
- (2) In Section 3, Surface Preparation, Method 2 shall apply.
- (3) In Section 4, Paint Systems, Paint System C shall apply for the walkway and gate well assembly in Bid Item 18 and Paint System B (except that Type 4 paint shall be used in place of Type 2 paint for the priming coat) shall apply for the Identification Signs, Bid Item 19. The two (2) top coats of paint on the identification signs 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 18, Metalwork; and Bid Item 19, Identification Signs.

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

- (1) This item shall consist of cleaning and painting the designated metal items in Bid Item 8, Special Fittings.
- (2) In Section 3, Surface Preparation, Method 2 shall apply.
- (3) In Section 4, Paint Systems, Paint System C shall apply for the pipe inlet handrails in Bid Item 8.
- (4) No separate payment will be made for cleaning and painting. Compensation for this work will be included in the payment for Bid Item 8, Special Fittings.

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

Chain-link fence fabric, fence posts, top rails, braces, gates and accessories shall conform to the requirements of Federal Specification RR-F-191. Types, classes, and materials shall be as follows except as otherwise specified.

Fabric: Type I, 2-inch mesh, 9-gage, minimum weight of zinc coating - 1.8 ounces per square foot.

Barbed Wire: Zinc-coated steel.

Posts: Type I, Class 1, zinc-coated.

Top Rails: Type II, Class 1, zinc-coated.

Braces: Zinc-coated steel.

Gates: Type I, zinc-coated steel.

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 embedded, 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 20, 6-Foot 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 emergency spillway and the inlet and the outlet of the principal spillway as shown on the drawings.
- (2) The chain link fencing shall be 9-gage, Type I, Grade A, having a two (2) inch mesh and a nominal height of six (6) 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 (4) point pattern composed of two (2) strands of 12 1/2-gage line wires with 14-gage barbs spaced on approximately five (5) inch centers.
- (3) The concrete for post anchors shall be Class 3000.
- (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:

(92-1)

- 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 or by suitable splice sleeves applied with a tool designed for the purpose. The Western Union splice shall have not less than 8 wraps of each end about the other. All wraps shall be tightly wound and closely spaced. Splices made with splice sleeves shall have a tensile strength not less than 80 percent of the strength of the wire.

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 21, 4-Strand Barbed Wire Fence

- (1) This item shall consist of furnishing and installing barb wire fences, including gates, post anchors, and appurtenances as shown on the drawings and staked in the field.
- (2) The barbed wire shall be Type I, with two (2) strands of 12 1/2-gage line wires with 14-gage barbs spaced on approximately five (5) inch centers in accordance with Material Specification 591 and Federal Specification RR-F-221/1.
- (3) Gates, corner, pull and end post assemblies shall be as shown on the drawings. Line posts shall be Type 1, Style 1, painted in accordance with Material Specification 591 and Federal Specification RR-F-221/3.
- (4) Chains shall be welded, case hardened straight link pattern of 5/16-inch stock diameter, 18 inches long. Padlocks shall have brass casing 1-3/4 inches wide, five (5) pin tumbler lock mechanisms, 5/16-inch diameter shackles, 15/16-inch clear and master keyed with one (1) key.
- (5) Concrete for post anchors shall be Class 3000.
- (6) Measurement and payment will be by Method 1.

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 10, Fencing

- (1) This item shall consist of furnishing and installing barb wire fences, including gates, post anchors, sag weights, chains and padlocks between Station 117+74 and 205+50 centerline floodway and the replacement of fencing removed at the following stations along the sediment basin dike alinement as shown on the drawings.
  - (a) Station 11+10± - centerline sediment basin dike.
  - (b) Station 15+00± - centerline sediment basin dike.
  - (c) Station 19+00± - centerline sediment basin dike.
  - (d) Station 27+80± - centerline sediment basin dike.
- (2) At centerline of floodway Station 184+20± the constructed fence shall end at an existing fence. Common posts (corner posts) shall be used at the junction of the fences as shown on the drawings.
- (3) Locked gate assemblies shall be installed at the following locations as shown on the drawings.

Station	Begin		Station	End	
	Distance	Offset		Distance	Offset
<u>Floodway</u>					
130+74±	37.5'±	both	130+74±	51.5'±	both
131+84±	37.5'±	both	131+84±	51.5'±	both
184+25±	90'±	left	184+35±	97'±	left
185+62±	103'±	right	185+74±	94'±	right
205+50±	35.7'±	both	205+50±	49.7'±	both
<u>Sediment Basin</u>					
18+86±	160'±	left	19+00±	160'±	left
27+65±	5'±	right	27+75±	5'±	left

- (4) A floodgate shall be installed beginning at Station 205+50± 35.7'± right and ending at Station 205+50± 35.7'± left of the centerline of the floodway.

- (5) The barbed wire shall be Type I, with two (2) strands of 12 1/2-gage line wires with 14-gage barbs spaced on approximately five (5) inch centers in accordance with Material Specification 591 and Federal Specification RR-F-221/1.
- (6) The woven wire fabric for the gates shall be Type I, Style 1, standard woven wire No. 11, Design No. 1047-6-11 in accordance with Material Specification 591 and Federal Specification RR-F-221/2.
- (7) Gates, corner, pull and end post assemblies shall be as shown on the drawings. Line posts shall be Type 1, Style 1, painted in accordance with Material Specification 591 and Federal Specification RR-F-221/3.
- (8) All other materials shall conform to Federal Specification RR-F-221/1, Section 1.2, Type I classification.
- (9) Measurement and payment will be by Method 1.

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 9, 28-Foot Double Drive Gates

- (1) This item shall consist of furnishing and installing the two (2) gates and appurtenances including concrete post anchors as shown on drawing Sheets 3, 14, and 41, and as staked in the field, as follows:
  - (a) Between Station 23+94± and Station 24+22± 40' lt. of centerline Brown Road.
  - (b) Between Station 23+94± 420'± lt. and Station 24+22± 416' ± lt. of centerline Brown Road.
- (2) Gates and end post assemblies shall be shown on Sheet 41 of the drawings.
- (3) The concrete for post anchors shall be Class 3000.
- (4) Measurement and payment will be by Method 2.

## CONSTRUCTION SPECIFICATION

### 200. GROUTED ROCK RIPRAP

#### 1. SCOPE

The work shall consist of furnishing, transporting and placing rock and concrete grout in the construction of grouted rock riprap sections.

#### 2. MATERIALS

Rock used in grouted rock riprap construction shall conform to the requirements of Material Specification 523. At least 30 days prior to delivery of rock, the Contractor shall designate in writing the source from which he intends to obtain the rock. The Contractor shall provide the Engineer free access to the source for the purpose of obtaining samples for testing. The size and grading of the rock shall be as specified in the construction details.

Drain materials, when specified, shall conform to the requirements of Material Specification 521.

Portland cement shall conform to the requirements of Material Specification 531 for the specified type. The temperature of the cement at the time it is introduced into the mixture shall not exceed 170° F.

Aggregates shall conform to the requirements of Material Specification 522.

Water shall be clean and free from injurious amounts of oils, acid, alkali, organic matter or other deleterious substances.

Air-entraining admixtures shall conform to the requirements of Material Specification 532.

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

Other admixtures, when required, shall be as specified in the construction details.

#### 3. SUBGRADE PREPARATION

Riprap or filter shall not be placed until the subgrade surfaces have been inspected and approved by the Engineer.

#### 4. FILTER LAYERS OR BEDDING

When filter layers or bedding beneath the riprap is specified, the drain material shall be spread uniformly on the prepared subgrade

surfaces to the depth shown on the drawings. Compaction of drain material will not be required but the surface of such layers shall be finished reasonably free of mounds, dips or windrows.

5. PLACING ROCK

The rock shall be placed on the surfaces and to the depths specified in such a manner as to avoid displacement of the underlying materials. The rock may be equipment or hand placed as necessary to produce a surface in which the tops of the individual rocks do not vary more than the specified deviation from the neat lines shown on the drawings. Double decking of thin, flat rocks to bring the surface up to the required grade will not be permitted.

6. AIR CONTENT AND CONSISTENCY

The air content (by volume) of the grout mixture at the time of placement shall be 5 to 7 percent.

The consistency of the grout mixture shall be so maintained that the grout may be readily placed without segregation of materials or excessive laitance. Unless otherwise specified, the slump shall be within the range of six (6) to ten (10) inches.

7. DESIGN OF THE GROUT MIX

The Contractor shall be responsible for proportioning the mix.

The grout shall consist of Portland cement, fine and coarse aggregate, water and an air-entraining agent. The cement content shall be 5 1/2 bags per cubic yard unless otherwise specified. The maximum nominal size of coarse aggregate shall be 3/4 inch.

Prior to placement of grout, the Contractor shall furnish the Engineer a statement of the mix proportions. After the job mix has been so stated, neither the source or character of the aggregates nor the type or brand of cement will be changed without prior approval by the Engineer

8. INSPECTING AND TESTING FRESH GROUT

The Engineer will inspect and test grout during the course of the work. Sampling of fresh grout will be done by the methods prescribed in ASTM Designation C 172. The volume of each batch will be determined by the methods prescribed in ASTM Designation C 138.

The Engineer shall have free entry to all parts of the Contractor's plant and equipment which concern mixing and placing the grout while work on the contract is being performed. Proper facilities shall be provided for the Engineer to inspect materials and processes used in

mixing and placing the grout as well as for securing samples of the grout mix. All tests and inspections shall be so conducted as not to interfere unnecessarily with the mixing and placing of the grout.

When ready-mixed grout is furnished, the Contractor shall furnish to the Engineer a statement of delivery ticket for each batch delivered to the job site. The ticket shall show the total weights in pounds of cement, water and fine and coarse aggregates, amount of air-entraining agent, time of loading and the revolution counter reading at the time of batching.

9. PLACING GROUT

The rock riprap shall be flushed with water to remove the fines from the rock prior to placing the grout. The rock shall be kept moist just ahead of the actual placing but the grout shall not be placed in standing or flowing water. Grout placed on inverts or other nearly level areas may be placed in one course. On slopes, the grout shall be placed in two (2) courses in successive lateral strips approximately ten (10) feet in width starting at the toe of the slope and progressing to the top. The grout shall be delivered to the place of final deposit by approved means and discharged directly on the surface of the rock, using a splash plate of metal or wood to prevent displacement of the rock directly under the discharge. The flow of grout shall be directed with brooms, spades or baffles to prevent it from flowing excessively along the same path and to assure that all intermittent spaces are filled. Sufficient barring shall be done to loosen tight pockets of rock and otherwise aid the penetration of grout so that all voids shall be filled and the grout fully penetrates the rock blanket. All brooming on slopes shall be uphill and after the grout has stiffened, the entire surface shall be rebroomed to eliminate runs and to fill voids caused by sloughing.

After completion of any strip or panel, no workman or other load shall be permitted on the grouted surface for a period of twenty-four (24) hours. The grouted surface shall be protected from injurious action by the sun; shall be protected from rain, flowing water and mechanical injury; and shall be cured in the manner specified for concrete in Construction Specification 31.

10. MEASUREMENT AND PAYMENT

(Method 1) For items of work for which specific unit prices are established in the contract, the volume of grouted rock riprap, including filter layers or bedding, will be determined from the specified thickness shown on the drawings and the area on which acceptable placement has been made. Payment for grouted rock riprap will be made at the contract unit price. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the grouted rock riprap and filter layers or bedding.

(Method 2) For items of work for which specific unit prices are established in the contract, the volume of riprap and the volume of filter layers or bedding will be determined from the specified thickness shown on the drawings and the area on which acceptable placement has been made. The volume of grout will be determined from the calculated batch volume and the number of mixed batches delivered to the site and acceptably placed in the work. Payment for riprap; filter or bedding material; and concrete grout will be made at the contract unit price for each item. Such payment will be considered full compensation for all labor, materials, 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 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 22, Grouted Rock Riprap

- (1) This item shall consist of the furnishing and placing of grouted rock riprap including filter material at the following locations as shown on the drawings and staked in the field:
  - (a) Between Station 9+65.50 and Station 10+00 centerline Emergency Spillway.
  - (b) Between Station 10+30 and Station 10+54 centerline Emergency Spillway.
  - (c) Between Station 101+51.09 and Station 101+82.53 centerline Principal Spillway.
  - (d) Between Station 102+69.03 and Station 103+38 centerline Principal Spillway.
- (2) Materials for the grouted rock riprap shall consist of sound granite obtained from channel excavation of the floodway between Station 130+00± and Station 207+70±.
- (3) Filter material shall meet the gradation of Bid Item 10, Drain Fill.
- (4) The rock shall be graded as follows:

<u>Particle Size (Inch)</u>	<u>Percent Passing (by Dry Wt.)</u>
18	100
12	75-95
9	40-80
6	0-20
3	0- 5

- (5) Rock shall be either hand or equipment placed.
- (6) Cement shall be Type II or IIA.
- (7) Measurement and payment will be by Method 1.

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 11, Grouted Rock Riprap

- (1) This item shall consist of the furnishing or placing of grouted rock riprap as shown on the drawings and staked in the field.
- (2) The rock riprap shall consist of materials meeting the requirements of Bid Item 9, Loose Rock Riprap.
- (3) Cement shall be Type II or IIA.
- (4) Measurement and payment will be by Method 1.

## 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 1, 4-inch Diameter PVC Main Pipe

- (1) This item shall consist of furnishing and installing four (4) inch diameter main pipe including staking, excavation, assembling, testing, and backfilling of the trenches as shown on the drawings and staked in the field.
- (2) Pipe shall be four (4) inch diameter, Class 200 polyvinyl chloride (PVC) with twin gasket joint. Pipe shall be in accordance with Material Specification 302, Plastic Pressure Pipe for ASTM D 1784 (Type 1, Grade 1, 2000 psi, design stress - type 1120) for PVC compounds, ASTM D 2241 (SDR 21), for the standard dimensional ratio of the pipe and the standards of the National Sanitation Foundation (NSF).

Schedule 40 PVC pipe shall conform to ASTM specification D 1785 (1120).

Pipe shall be continuously marked down the length with the manufacturer's name, specification designation, normal size, class pressure rating, PVC 1120, NSF logo and identification code.

- (3) Couplings and fittings shall be manufactured by the same manufacturer as the pipe. Couplings and fittings shall be push-on type with twin ring rubber gaskets conforming to ASTM D 3139.

Insertion depth of the pipe in the coupling shall be controlled by an internal PVC mechanical stop in the coupling which will allow for thermal expansion and contraction. Coupling method shall allow for half of the expansion and contraction of each pipe section to be taken up at each end of the pipe. Couplings shall permit five degrees ( $5^{\circ}$ ) deflection, two and one-half degrees ( $2\frac{1}{2}^{\circ}$ ) each side, of the pipe without any evidence of infiltration, exfiltration, cracking or breaking.

Couplings shall be Class 200 PVC conforming to the requirements of ASTM D 1784 (Type 1120).

Supply from main pipe shall be by heavy-duty tapped couplings. Tapped couplings shall be fabricated of Class 150, minimum asbestos-cement with tapped brass outlet.

No solvent-weld or laminated rubber ring couplings shall be used as a method to join lengths of pipe.

- (4) Lubrication shall be water soluble, non-toxic, non-supporting of bacteria growth, have no deteriorating effect on the PVC or rubber gaskets, and shall be supplied by the pipe manufacturer.
  - (5) Plastic to metal shall consist of Schedule 80 PVC, threaded male adaptors in conformance with ASTM specification D 2464.
  - (6) Installation procedures shall be as recommended by the manufacturer including cleaning ring and spigot, installing the gasket, applying lubricant, field cutting, field beveling, reference guiding, assembling and lowering into trench.
  - (7) Where plastic to metal connectors are required, the metal connections shall be worked first. A high corrosion preventative quality non-hardening compound or tape compatible with the plastic fittings shall be used and the joint shall be hand-tightened with final tightening not to exceed one turn with a strap wrench.
  - (8) In Section 5, Pressure Testing, Method 2 shall apply. Test pressure shall be one-hundred and fifty (150) pounds per square inch.
  - (9) In Construction Specification 402, Wiring, Section 18, c., Subsidiary Item, Wiring, solenoid valve control shall apply.
  - (10) In Section 6, Measurement, Method 2 shall apply.
- b. Bid Item 2, 17-Head Irrigation System.

Bid Item 3, 11-Head Irrigation System.

- (1) This item shall consist of furnishing and installing poly vinyl chloride (PVC) lateral pipe, risers, and irrigation heads including staking excavation, assembly, testing, backfilling and adjustment as shown on the drawings and staked in the field.
- (2) Pipe shall consist of Class 200 PVC pipe conforming to ASTM Specification D-1784 (Type 1, Grade 1, 2000 psi design stress type 1120) for PVC compounds and ASTM Specification D 2241 (SR 21) for the standard ration of the pipe, and the standards of the National Sanitation Foundation (NSF).

Pipe shall be continuously marked down the length with the manufacturer's name, normal pipe size, class pressure rating, PVC 1120, NSF logo, and identification code.

Buckhorn-Mesa WPP, Arizona  
Spook Hill FRS & Floodway  
Landscape Treatment

(202-5)

6/77

- (3) Couplings and fittings shall consist of Schedule 40 PVC conforming to the requirements of ASTM Specification D 2466 for plastic to plastic connections.

Couplings and fittings for plastic to metal connections shall consist of threaded, plastic fittings. Fittings shall conform to ASTM Specification D 2464 for Schedule 80 PVC, threaded pipe fittings. Unless otherwise specified, all such fittings shall be threaded, male, plastic adaptors.

Couplings shall be marked with the manufacturer's name, normal pipe size, schedule or class pressure rating.

- (4) Cements, solvents, thinners, primers, and joint compounds shall be compatible with and of the kind recognized by the industry as proper for use with the plastic pipe and fittings used. Solvent cement shall be in accordance with ASTM Specification D 2564.
- (5) Steel nipples and couplings shall be standard weight, threaded, galvanized steel in accordance with Material Specification 553, Steel Pipe and Fittings, ASTM Specification A 120, and Federal Specification WW-P-521 for types and kinds shown on the drawings.
- (6) Riser staking material shall consist of new redwood and include one-half ( $\frac{1}{2}$ ) inch wide, stainless steel, worm gear tightened, hose clamps as shown on the drawings.
- (7) Part circle sprinkler head for use on fixed riser shall be capable of covering a forty (40) foot radius at fifty (50) pounds per square inch (psi) pressure with a discharge rate of four and three hundredths (4.03) gallons per minute (gpm) ranging to 38 feet radius at 35 psi with a discharge rate of 3.36 gpm. Rotation shall be accomplished by an oscillating impact arm. Model shall have a "precision jet" tube to prevent water splash outside of intended coverage area. All heads shall have the provision for distance control. The body and bearing shall be of non-corrosive metals.

Sprinkler heads shall be of the types and sizes shown on the plans. They shall be constructed of bronze, brass, stainless steel, cast iron or as shown on plans. They shall be fitted with proper nozzles to provide for proper coverage.

All heads of a particular type of function in the system shall be of the same manufacture and shall be marked with the

manufacturer's name and identification in such a position that they can be identified without being removed from the system.

- (8) Plastic pipe shall be cut with a hand saw or hack saw with the assistance of a squared-in sawing vise, or in a manner so as to ensure a square cut. Burrs at cut ends shall be removed prior to installation so that smooth unobstructed flow will be obtained. Slip joints on pipe fittings one and one-fourth ( $1\frac{1}{4}$ ) inch diameter and smaller shall be welded using cement-solvent and larger pipe shall also be primed. Primers and solvent-cements shall be applied as recommended by the manufacturer. After pipe and fitting are prepared, the pipe shall be inserted until completely seated, then twisted one-half ( $\frac{1}{2}$ ) turn.

Where plastic to metal connectors are required, the metal connections shall be worked first. A high corrosion preventative quality non-hardening compound or tape compatible with the plastic fittings shall be used and the joint shall be hand-tightened with final tightening not to exceed one turn with a strap wrench.

- (9) Expansion and contraction shall be compensated for by the contractor. In installing poly vinyl chloride pipe, approximately three (3) inches of slack shall be provided for each 100 feet of pipe by snaking pipe in the trench.
- (10) In Section 5, Pressure Testing, Method 2 shall apply. Test pressure shall be one-hundred (100) pounds per square inch.
- (11) All sprinkler lines shall be flushed before installing heads. All heads shall be set perpendicular to finish grade unless otherwise designated on plans. Heads shall be adjusted for distance and portion of circle coverage.
- (12) In Section 6, Measurement and Payment, neither Method 1 nor Method 2 apply. Irrigation systems shall be paid for at the unit price established in the bid schedule. Such payment shall constitute full compensation for all labor, materials, equipment, and other items necessary and incidental to the performance of the work including staking, excavation, assembly backfilling, testing, and adjustment.

c. Bid Item 4, 3/4-inch, 200 psi, PVC, Lateral Pipe.

Bid Item 5, 1-inch, 200 psi, PVC, Lateral Pipe.

Bid Item 6, 1-1/4-inch, 200 psi, PVC, Lateral Pipe.

- (1) This item shall consist of installing lateral pipe including staking, excavation, assembly, testing and backfill as shown on the drawings and staked in the field.

- (2) Pipe shall be Class 200 poly vinyl chloride in accordance with Material Specification 302, Plastic Pressure Pipe ASTM Specification D-1784 (Type 1, Grade 1, 2000 psi design stress - Type 1120) for PVC compounds, ASTM D 2241 for the standard rati<sup>o</sup>n of the pipe, and the standards of the National Sanitation Foundation (NSF).

Pipe shall be continuously marked down the length with the manufacturer's name, normal pipe size, class pressure rating, the NSF logo, and the identification code.

- (3) Couplings and fittings shall consist of Schedule 40 PVC conforming to the requirements of ASTM Specification D 2466 for plastic to plastic connections.

Couplings and fittings for plastic to metal connections shall consist of threaded, plastic fittings. Fittings shall conform to ASTM Specification D 2464 for Schedule 80 PVC, threaded pipe fittings. Unless otherwise specified, all such fittings shall be threaded, male, plastic adaptors.

Couplings and fittings shall be marked with the manufacturer's name, normal pipe size and class pressure rating.

- (4) Cements, solvents, thinners, primers, and joint compounds shall be compatible with and of the kind recognized by the industry as proper for use with the plastic pipe and fittings used. Solvent cement shall be in accordance with ASTM Specification D 2564.

- (5) Plastic pipe shall be cut with a hand saw or hack saw with the assistance of a squared-in vise, or in a manner so as to ensure a square cut. Burrs at cut ends shall be removed prior to installation so that smooth unobstructed flow will be obtained. Slip joints on pipe and fittings one and one-fourth ( $1\frac{1}{4}$ ) inch diameter and smaller shall be welded using cement-solvent and larger pipe shall also be primed. Primers and solvent-cements shall be applied as recommended by the manufacturer. After pipe and fitting are prepared, the pipe shall be inserted until completely seated, then twisted one-half ( $\frac{1}{2}$ ) turn.

Where plastic to metal connectors are required, the metal connections shall be worked first. A high corrosion preventative quality non-hardening compound or tape compatible with the plastic fittings shall be used and the joint shall be hand-tightened with final tightening not to exceed one turn with a strap wrench.

- (6) Expansion and contraction shall be compensated for by the contractor. In installing poly vinyl chloride pipe, approximately three (3) inches of slack shall be provided for each 100 feet of pipe by snaking pipe in the trench.
- (7) In Section 5, Pressure Testing, Method 2 shall apply. Test pressure shall be one-hundred (100) pounds per square inch.
- (8) Measurement and payment shall be in accordance with Section 6, Method 2.

d. Bid Item 7, .580 inch PE Emitter Lateral Pipe.

- (1) This item shall consist of furnishing and installing polyethylene, emitter, lateral pipe including staking, excavation, assembly, testing and backfill.
- (2) Pipe shall be fifty-eight one-hundredths (.580) inch inside diameter by seven-hundred and four thousandths (.704) inch outside diameter polyethylene (PE) pipe in conformance with Material Specification 302, Plastic Pressure Pipe, ASTM Specification D 2239 (SDR-PR).
- (3) Fittings and couplings shall be compatible with pipe used. Couplings shall be compression socket-type, polyethylene (PE) fittings as shown on the drawings. PE to polyvinyl chloride or PE to metal connections shall consist of threaded, male PE adaptors.
- (4) Installation procedure shall be as recommended by the manufacturer. In no case shall the pipe be subject to reverse curvature. To prevent kinking, the pipe shall be cut into one-hundred (100) maximum lengths and spliced with a coupling or tee fitting for a riser. Kinks in pipe shall be cut out and the pipe spliced with a coupling.
- (5) Expansion and contraction shall be compensated for by the contractor. Pipe shall be snaked in trench to provide approximately three (3) inches of slack for each one-hundred (100) feet of pipe.
- (6) Capped lateral pipe shall protrude six (6) inches above finish grade to facilitate flushing.
- (7) Polyethylene pipe shall be sleeved with three-fourths (3/4) inch diameter, 200 psi, poly vinyl chloride pipe as shown on the drawings.
- (8) In Section 5, Pressure Testing, Method 2 shall apply. Test pressure shall be twenty-five (25) pounds per square inch when tested with Bid Item 8, Emitter, PE Riser and Fitting.

(9) In Section 6, Measurement and Payment, Method 2 shall apply.

e. Bid Item 8, Emitter, PE Riser and Fitting.

- (1) This item shall consist of furnishing and installing emitter excavation, assembly, testing, and backfill as shown on the drawings and staked in the field.
- (2) Riser pipe shall be three-hundred and seventy-five thousandths (.375) inch inside diameter polyethylene (PE) pipe in accordance with ASTM Specification D 2239 (SDR-PR).

Riser length shall not exceed six (6) feet.

- (3) Fittings shall be compatible with pipe used. Fittings shall be compression socket-type, PE fittings as shown on the drawings.
- (4) Emitter irrigation heads shall be as specified on the drawings. All emitters shall be of the same manufacturer. Emitter shall effectively function with a minimum of thirty (30) mesh filtration without clogging and shall have automatic, self-flushing capability.

Emitters shall be marked with the manufacturer's name.

- (5) Polyethylene lateral pipe shall be carefully installed so as to avoid stressing or kinking of the pipe. Kinked riser pipe shall be removed and replaced.

Riser pipe shall be routed within twelve (12) inches of the center of the plant to be irrigated and the final, emitter-adaptor fitting height shall be between one (1) and two (2) inches above finish grade.

Risers shall be flushed before installation of emitters.

- (6) After flushing the lines, emitter heads shall be installed as shown on the drawings.
- (7) In Section 5, Pressure Testing, Method 2 shall apply. Test pressure shall be twenty-five (25) pounds per square inch.
- (8) In Section 6, Measurement and Payment, neither Method 1 or Method 2 shall apply.

Emitters complete with risers and fittings will be compensated for at a unit price established in the bid schedule. Such payment shall constitute full compensation for all labor, materials, equipment, and other items necessary and incidental to the performance of the work including excavation, riser installation, emitter installation, testing, and backfill.

f. Bid Item 9, Valve Boxes.

- (1) This item shall consist of furnishing and installing valve boxes complete with cover including excavation and backfill as shown on the drawings and staked in the field.
- (2) Valve boxes shall be approximately eighteen (18) inches wide by twenty-four (24) inches long by twelve (12) inches deep. Each lid and box shall be of molded polyethylene plastic. Lid shall be latching type. Boxes shall be manufactured by Ametek or Roby.
- (3) Setting of box shall be centered on fixtures being housed. The top of the box shall be one-half ( $\frac{1}{2}$ ) inch above finish grade.
- (4) A three (3) inch deep layer of gravel shall be evenly distributed in the bottom of each valve box.

The required gradation of the gravel shall be

<u>Sieve Size</u>	<u>Percent Passing (Dry Weight Basis)</u>
1 inch	100
3/4 inch	90-100
1/8 inch	20- 55
#4	0- 10
#8	0- 5

Size No. 67 in accordance with ASTM C 33 meets these requirements.

- (5) In Section 6, Measurement and Payment, neither Method 1 nor Method 2 shall apply.

Valve boxes shall be paid for at a unit price established in the bid schedule. Such payment shall constitute full compensation for all labor, materials, equipment, and other items necessary and incidental to the performance of the work including excavation, installation, and backfill.

## CONSTRUCTION SPECIFICATION

### 203. INSTALLING VALVES

#### 1. SCOPE

The work shall consist of furnishing and installing valves including stems, stem guides, wrenches and other appurtenances as specified or shown on the drawings.

#### 2. MATERIALS

The valves shall conform to the requirements specified in Section 7 or as shown on the drawings.

#### 3. INSTALLING VALVES

Valves shall be installed according to the manufacturer's recommendations in such a way as to prevent leakage at the maximum operating pressure specified. Valves and pipes shall be carefully aligned to prevent damage to threads or flanges during installation.

Anchor bolts and other embedded appurtenances shall be secured in true position in the forms and held in alignment during the placement of concrete.

#### 4. INSTALLING STEM, STEM GUIDES AND FLOOR BOXES OR STANDS

Stem extension, stem guides and floor boxes or stands shall be carefully aligned so that the stem shall be installed in correct alignment with relation to the valve stem.

#### 5. OPERATIONAL TESTS

After the valves and appurtenances 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 valves and appurtenances by operating the system several times throughout its full range of operation. He shall make any changes and adjustments as are necessary to insure satisfactory operation of the valve system. Handwheel stops shall be set after adjustments are completed.

#### 6. MEASUREMENT AND PAYMENT

Method 1 - Payment for furnishing and installing each type, size and class of valve will be made at the contract unit price for that type, size and class of valve. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to completion of the work, including anchor bolts, flange bolts and flange gaskets.

Method 2 - Payment for furnishing and installing each type, size and class of valve assembly will be made at the contract unit price for that type, size and class of valve assembly. Such payment will constitute full compensation for furnishing and installing the assemblies complete in place in the outlets as shown on the drawings.

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 items 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 10, Electric Remote Control Valve, 4-Inch Diameter

- (1) This item shall consist of furnishing and installing the electric remote control valves as shown on the drawings and staked in the field.
- (2) The four (4) inch diameter electric remote control valve shall be slow opening and closing with flow control assembly functionally equal to a Rainbird Globe Pattern Electric Remote Control Valve, Model EGV-400. The coil voltage shall be as shown on sheets 32 and 33 of the drawings.
- (3) Flanges shall meet the requirements of Federal Specification WW-P-521F, Type 1, 125 pounds per square inch (psi) pressure rating and shall be compatible for attaching to the steel pipe fittings and flanges furnished for the rest of the system.
- (4) Measurement and payment shall be in accordance with Section 6, Method 1.

b. Bid Item 11, Butterfly Valve, 4-inch Diameter, Gear Operator

- (1) This item shall consist of furnishing and installing the gate valves as shown on the drawings and staked in the field.
- (2) The valves shall be functionally equal to a four (4) inch diameter weatherproof Keystone number 239-061.
- (3) Flanges shall meet the requirements of Federal Specification WW-P-521F, Type 1, 150 pounds per square inch (psi) pressure rating and shall be compatible for attaching to the steel pipe, fittings and flanges furnished for the rest of the system.
- (4) Measurement and Payment will be in accordance with Section 6, Method 1.

c. Bid Item 12, Check Valve, 4-inch Diameter

- (1) This item shall consist of furnishing and installing the check valves as shown on the drawings and staked in the field.
- (2) The check valves shall be functionally equal to a four (4) inch diameter Mission Duo-Check Valve, Style B, series 250.

- (3) Flanges shall meet the requirements of Federal Specification WW-P-521F, Type 1, 150 pounds per square inch (psi) pressure rating and shall be compatible for attaching to the steel pipe fittings and flanges furnished for the rest of the system.
- (4) Measurement and payment shall be in accordance with Section 6, Method 1.

d. Bid Item 13, Backflow Preventor Valve, 4-inch Diameter

- (1) This item shall consist of furnishing and installing the backflow preventer valve assemblies as shown on the drawings and staked in the field.
- (2) Backflow preventer shall be a four (4) inch diameter double check vented, reduced pressure backflow preventer assembly provided from manufacturer assembled with two gate valves and flanged four (4) inch Y-strainer. Assembly shall be capable of withstanding 150 pounds per square inch pressure.
- (3) Flanges shall meet the requirements of Federal Specification WW-P-521F, Type 1, 150 pounds per square inch (psi) pressure rating and shall be compatible for attaching to the steel pipe fittings and flanges furnished for the rest of the system.
- (4) Measurement and payment shall be in accordance with Section 6, Method 1.

e. Bid Item 14, Solenoid and Pressure Regulating Valve, 2-inch Diameter

Bid Item 15, Solenoid and Pressure Regulating Valve, 1½-inch Diameter

Bid Item 16, Solenoid Valve and Y-Strainer, ¾-inch Diameter

Bid Item 17, Regulating Valve, ¾-inch Diameter

- (1) The item shall consist of furnishing and installing irrigation solenoid valves with pressure regulating valves including plastic fittings between tapped, main pipe coupling and valves as shown on the drawings and staked in the field.
- (2) Solenoid valves shall be functionally equal to a Rainbird Series EF valve sized as per drawings. Pressure regulating valves shall be functionally equal to a Watts series U5 with gauge for 2-inch and 1½-inch sizes. Watts series IR 56 G or equal shall be used for ¾ inch size. Y-strainers shall be Watts number 77 with 30-mesh minimum screen or equal.

- (3) Fittings and nipples shall be threaded Schedule 80, polyvinyl chloride plastic in accordance with Material Specification 302, Plastic Pressure Pipe and ASTM D 2464.
- (4) The 2-inch and 1½-inch pressure regulating valves shall be adjusted to 50 pounds per square inch.
- (5) The 3/4 inch pressure regulating valves shall be adjusted to 25 pounds per square inch.
- (6) Measurement and payment shall be in accordance with Section 6, Method 2.

CONSTRUCTION SPECIFICATION

400. SALVAGING, HEELING-IN, TRANSPLANTING

1. SCOPE

The work shall consist of salvaging existing plant material including marking, excavating, heeling-in, transplanting, and maintaining plant material as shown on the drawings and staked in the field.

2. MATERIALS

Plant materials to be salvaged are as follows:

<u>Botanical Name</u>	<u>Common Name</u>	<u>Minimum Size in Feet Tall</u>
Cereus giganteus	Saguaro Cactus	Ten (10)
Ferocactus	Barrel Cactus	Three (3)
Fouquieria splendens	Ocotillo	Six (6)

Dusting Sulfur The dusting sulfur shall be a standard commercial agricultural dusting sulfur.

Burlap Burlap shall be in strip or bag form. The material shall be free of oils, solvents, heavily caked mud or other substances which the presence would be harmful to the exposed and unsupported plant root systems.

Wire Wire shall be eight (8) gauge, galvanized, annealed steel wire.

Rubber Hose Rubber hose shall be three-fourths (3/4) inch diameter, two-ply garden hose.

Pipe Stake Pipe used for staking shall conform to Materials Specifications 553, ASTM Specification A120 for galvanized pipe and shall be one (1) inch in diameter.

Water Water used in irrigation shall be kept free of oil, acids, alkali, salt and other substances harmful to plant growth.

3. MARKING

Plant materials to be salvaged shall be approved by the Engineer. Such material shall be marked with waterproof ribbon ties to the trunk. Ribbon shall be located at the highest possible elevation between two (2) feet and five (5) feet above the existing grade. The knot made in fastening the ribbon shall be located on the north side of the trunk and used to position the plant when heeling-in and transplanting.

Buckhorn-Mesa WPP, Arizona  
Spook Hill FRS & Floodway  
Landscape Treatment

(400-1)

6/77

#### 4. SUPPORT AND PROTECTION

Prior to excavation of a plant, a suitable support cradle equipped with padding and canvas or nylon straps shall be so placed against the plant that it will not be scarred, scraped or otherwise damaged during excavation, healing-in, and transplanting.

#### 5. EXCAVATION

Excavation of plant material shall be such that the radish-shaped, tap root growing directly beneath the trunk of plant material shall be retained, as well as approximately one (1) inch of main lateral root per one (1) foot of plant height measured from the base of the plant to its top. As soon as each plant is dug, all soil remaining on the roots shall be removed. Roots and the base of each plant will be carefully inspected for evidence of borers, rot, gall, nematodes, and broken or bruised roots. All broken or bruised roots shall be cut off with a clean, sharp knife, and the cuts liberally dusted with dusting sulfur. Nematode infested roots shall be cut off at the base of the plant. Cochineal and other scale infested plants shall be sprayed using an oil-based spray containing nicotine, malathion, or other approved agents. If, in the opinion of the Engineer, the plant cannot be saved, it shall be replaced and the rejected plant disposed in approved waste areas.

#### 6. HEELING-IN AND STORAGE

Plant material shall be stored in a fenced storage lot. Immediately after excavation procedures, the roots of the saguaro and barrel cactus shall be covered with burlap and the plants placed on their side so roots do not touch the ground for a one-week callousing period. Ocotillo roots shall be wrapped in burlap and kept wet from the time of removal to time of storage and planting.

After callousing, a trench shall be dug of sufficient width and depth to accommodate the full spread of the roots. Plants shall be supported at the original height relative to the grade while soil is carefully tamped around the roots. The top of the trench shall be three (3) feet wide with the surface of the trench being one-half (1/2) foot below surrounding grade to facilitate irrigation. The plant shall be oriented with the marking ribbon knot facing north. All plant material shall be supported in an upright position as required without injury to the plant.

#### 7. TRANSPLANTING

Beginning procedures shall apply as specified in Section 4, Support and Protection; Section 5, Excavation; and Section 6, Heeling-in and Storage with the following modifications. Materials shall be planted in pits

sufficient in size to accommodate the full spread of the roots. The plant shall be supported at the original height relative to the grade and the spoil soil carefully tamped around the roots. A one-half (1/2) foot deep by six (6) foot diameter well or crescent well on slopes shall be constructed around the trunk one month after the mound was constructed.

(Method 1) No support shall be required. A one-half (1/2) foot deep by six (6) foot in diameter well shall be constructed around the trunk of the plant.

(Method 2) For a one (1) month period, soil shall be mounded up around the trunk of the plant to divert water. A wire and hose tie shall be placed around the trunk of the plant at the upper third point. Three (3) wire guys shall be tied to the hose and wire tie and to three (3), two (2) foot long, pipe stakes to support the plant in an upright position.

#### 8. WATER APPLICATION

(Method 1) The plants shall be irrigated once when placed in trench or pit.

(Method 2) The plant shall be irrigated one (1) month after placement in trench or pit.

(Method 3) The plant shall be irrigated once when placed in pit or trench and subsequently at two (2) week intervals after placement. Subsequent irrigation shall be omitted during the period from October 1 to May 1.

#### 9. MAINTENANCE

The Contractor shall maintain all transplanted plant material until acceptance of the completed project is made by the Engineer. This maintenance shall include irrigation, staking, and other operations to insure the healthy growth of all plant material.

#### 10. MEASUREMENT AND PAYMENT

Transplanted plants will be compensated for at a specified unit price established in the bid schedule. Such payment will constitute full compensation for all labor, materials, equipment, and other items necessary and incidental to the performance of the work including marking, excavating, heeling-in, transplanting, irrigating and maintaining.

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 18, Salvaging and Transplanting of Saguaro Cacti

- (1) This item shall consist of furnishing and installing saguaro cacti including marking, excavating, stockpiling and transplanting as shown on the drawings and staked in the field. Saguaros shall be salvaged from the following areas in the following order.
  - (a) The Spook Hill dam, principal spillway inlet channel, floodway, and Salt-Gila Aqueduct borrow area.
  - (b) Soil stockpile areas.
  - (c) Reservoir areas as approved by the Engineer.
- (2) In Section 7, Transplanting, Method 2 shall apply.
- (3) In Section 8, Water Application, Method 2 shall apply.
- (4) Measurement and payment shall be in accordance with Section 10.

b. Bid Item 19, Salvaging and Transplanting of Barrel Cacti

- (1) This item shall consist of furnishing and installing barrel cacti including marking, excavating, stockpiling, and transplanting as shown on the drawings and staked in the field. Barrel cacti shall be salvaged from the following areas in the following order.
  - (a) The Spook Hill dam, principal spillway inlet channel, floodway, and Salt-Gila Aqueduct borrow area.
  - (b) Soil stockpile areas.
  - (c) Reservoir areas as approved by the Engineer.
- (2) In Section 7, Transplanting, Method 1 shall apply.
- (3) In Section 8, Water Application, Method 1 shall apply.
- (4) Measurement and Payment shall be in accordance with Section 10.

c. Bid Item 20, Salvaging and Transplanting of Ocotillo Shrubs

- (1) This item shall consist of furnishing and installing ocotillo shrubs including marking, excavating, stockpiling, and transplanting as shown on the drawings and staked in the field. Ocotillos shall be salvaged from the following areas in the following order.

- (a) The Spook Hill dam, principal spillway inlet channel, floodway, and Salt-Gila Aqueduct borrow area.
  - (b) Soil stockpile areas.
  - (c) Reservoir areas as approved by the Engineer.
- (2) In Section 7, Transplanting, Method 1 shall apply.
  - (3) In Section 8, Water Application, Method 3 shall apply.
  - (4) Measurement and Payment shall be in accordance with Section 10.

## CONSTRUCTION SPECIFICATION

### 401. PUMPS, MOTORS AND CONTROLS

#### 1. SCOPE

The work shall consist of furnishing and installing pumps, electric motors, controls, pipe, and appurtenances as shown on the drawings and staked in the field.

#### 2. PUMP SYSTEM

All pumps, electric motors, control equipment and appurtenant equipment included under pumps and motors shall be furnished by a single pump manufacturer. This shall not be construed to mean that the manufacturer selected must manufacture all equipment specified herein, but that he shall supply equipment of his own manufacture for the greater portion of the installation and shall be responsible for all equipment furnished.

The manufacturer shall be a firm regularly engaged in the manufacture of pumps with a franchised dealer in Arizona, to provide service and parts.

The equipment supplied shall be covered by the manufacturer's standard warranty or guarantee.

#### 3. PUMPS

Foundations - The Contractor shall construct suitable foundations of supports for all equipment installed by him. The pumps, supports and foundations must be adequately secured against any thrust which may occur. Any deviations from the drawings must be approved by the Engineer.

Base Plate - Pump units shall be provided with a heavy formed, structural steel base plate of sufficient size and rigidity to maintain the pump and motor in proper alinement and position. Base plate shall be prime coated. Anchor bolts shall be provided for transmitting the entire load due to discharge head pressure to the concrete base.

Bowl - The suction case and pump bowl shall be made of cast iron of a minimum tensile strength of thirty-five thousand pounds (35,000) and allow a two-hundred and fifty (250) pounds per square inch case working pressure. Casings shall be diagonally split, two stage, and self-venting. Casing rings shall be dowelled in place to prevent rotation, shall be of bronze material, and shall be renewable. Seals shall be of mechanical type.

Impeller - The pump impeller shall be bronze. It shall be secured to the shaft in such a manner that it can be readily removed. The impeller shall be mechanically balanced for minimum vibration and wear. The impeller shall be non-over loading at above design conditions or at a second design point of the specified design of discharge and head.

Shaft - The pump shaft shall be made of high grade steel designed with a high safety factor to easily withstand the torsional loads and other stresses to which it may be subjected. It shall be so designed that there will be no detrimental vibrational stresses. All of its surface shall be smoothly ground to accurate dimensions.

Shaft Sleeves - The shaft shall be protected by means of type three-hundred and sixteen (316) stainless steel shaft sleeves. They shall be so designed as to prevent leakage between the shaft itself and the shaft sleeves.

They shall be locked in place so that they cannot back off if the pump is accidentally rotated in reverse direction. Water slingers on the shaft shall be provided on the side next to the pump gland and prevent water from passing along the shaft and entering pump or motor bearings.

Bearings - Heavy duty ball or roller bearings with a high safety factor shall be provided. Bearings are to be mounted in a housing with oil lubrication and transparent, tempered glass oil reservoirs.

Couplings - Couplings shall be rubber in shear flexible type with coupling guards.

#### 4. MOTORS

The motors shall be continuous duty, squirrel cage induction type, with wire screens over all ventilating openings. The motors shall conform to the current American National Standards concerning rating, characteristics and tests unless otherwise specified. The motor shall also conform to the standards of the National Electrical Manufacturer's Association (NEMA) and the Underwriter's Laboratories (UL).

The horsepower rating of each motor shall be such that it will carry continuously the maximum possible load developed under all specified pumping conditions.

The motors shall be provided with suitable connections for lifting with slings or hooks.

Bearings - The bearings shall insure proper alinement of rotor and shaft to prevent leakage of lubricant. Bearings shall be ball bearings, self-cooled and sealed against loss of lubricant or entrance of dirt. The bearing housings shall be provided with adequate means for inserting new grease and flushing out old grease and a suitable grease gun shall be provided.

Insulation - The motors shall have Class B moisture sealed insulation.

Painting and Finish - The internal ferrous surface of the motor, including rotors, shall be finished with an applied protective covering of such composition as to effectively inhibit formation of rust and corrosion on the ferrous surfaces. The exterior of the motor shall be cleaned and given the manufacturer's standard color shop coating.

Motor Terminal Boxes and Leads - The motor shall be furnished with suitable terminal boxes of ample size to provide for making and housing the connections and with flexible leads of sufficient length to extend for a distance of not less than four inches beyond the face of the box. The size of the cable terminals and conduit terminal box holes shall be as approved by the Engineer. An approved type of solderless lug shall be furnished. The electrical connecting diagram shall be permanently mounted and shown on the motor nameplate or in the terminal box. The motor leads shall be numbered with attached metal clips.

5. STEEL PIPE, REDUCERS, AND FLANGES

The steel tee and steel pipe shall be fabricated from black pipe conforming to AWWA Standard C201. The flanges shall be Type 1, 150 psi and 300 psi, pressure rating conforming to Federal Specification WW-P-521F. After installation, the assemblies shall be field tested when the pipeline is pressure tested and shall be completely water tight at that pressure.

6. HIGH PRESSURE SHUT-OFF SWITCH

Shut-off switch shall be suitable for a break setting of one-hundred fifty (150) pounds per square inch. Switch shall have one-fourth (1/4) inch National Pipe Thread, male connection.

7. DISCHARGE PRESSURE GAUGE

Gauge shall have a minimum four (4) inch diameter, 0-300 pounds per square inch dial face, and phenolic case and turret style one-fourth (1/4) inch National Pipe Thread male bottom connection.

8. NEEDLE VALVE

Needle valves shall be one-fourth inch National Pipe Thread male connections and be supplied with plug cap.

9. CONTROLS

All electrical equipment shall conform to the standards of the National Electrical Manufacturer's Association (NEMA), the Underwriter's Laboratories, Inc. (UL), and the National Electric Code.

Power Supply - Make of controller shall be available in both one-hundred and seventeen (117) volt and two-hundred and twenty (220) volt.

Power Output - Output to each station shall be twenty-six and one-half (26.5) volt and one-hundred and seventy-five (175) ampere-volt maximum pump start circuit.

Control Program - Controllers shall be capable of times, automatic control of synchronized pump start and solenoid valve operation. Programming shall be for fourteen calendar day operation with individual omit and repeat switches for each station. Station operating periods shall be as noted on drawings.

10. WATER METERING

Water meters shall be in accordance with the City and by applicable codes.

11. INSTALLATION

All equipment shall be installed by skilled mechanics and in accordance with the instructions of the manufacturers and/or the standards of the Hydraulic Institute where applicable.

When setting pumps, motors and other items on steel bases, steel shims shall be used for final leveling and adjustment of the equipment. Shimming shall be adequate to provide sufficient bearing for the base of the equipment and to prevent undue deflection or distortion thereof.

The anchor bolts shall be as shown on the drawings or another anchor as approved by the Engineer. Anchor bolts shall be set accurately and shall be carefully held in suitable templates of approved design. If anchor bolts are installed after the concrete has set, all necessary drilling and grouting or caulking shall be done at the Contractor's expense and care shall be taken not to damage the structure or finish by cracking, chipping, or otherwise during the drilling and caulking.

The suction and discharge piping shall be carefully fitted and alined so that no stress will be transmitted to the pump case.

City water tap meter, and meter box shall be installed in accordance with city requirements and code.

12. TESTING

Testing of pumping equipment shall be during operation of the completed irrigation system.

13. MEASUREMENT AND PAYMENT

Items of work will be compensated for at a specific unit price established in the bid schedule. Such payment will constitute full compensation for all labor, materials, 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 14 of this specification.

Buckhorn-Mesa WPP, Arizona  
Spook Hill FRS & Floodway  
Landscape Treatment

(401-5)

6/77

14. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

a. Bid Item 21, Pump Station

- (1) This item shall consist of furnishing and installing pump equipment including precast electrical manholes complete with steel cover and frame, ladder and louvres, concrete pad bases, pumps, motors, steel pipe, needle valves, switches, and gauges as shown on the drawings and staked in the field.
- (2) Pump and motor shall be functionally equal to a two-stage Aurora series 431, size 1½ x 3 x 9, type AD with 15 horsepower TEFC motor, 230 volt - three phase - 60 Hertz capable of delivering 90 gallons per minute and 275 head-feet at 3500 revolutions per minute.

Pump shall be non-overloading at above design conditions or at a second design point of 135 gallons per minute at 205 head-feet.

Design operating pump efficiency shall be a minimum of 51 percent at load.

- (3) Precast electrical manholes shall be 9' - 6" x 7'-6" x 13'-0" precast electrical manholes as manufactured by Pre-Cast Manufacturing Company, P.O. Box 8186, Phoenix, Arizona 85066 or equivalent.

The 4' x 4' steel cover and frame shall be as manufactured by Pre-Cast Manufacturing Company or equivalent. The ladder shall be a 1'-6" wide ladder with ¾ inch diameter anti-slip rungs, @ 1'-0" c.c. 2" x 1/2" rails and top and bottom brackets as manufactured by Pre-Cast Manufacturing or equivalent.

The louvres shall be 1'-6" x 5'-6" stationary formed wall louvres Dorn Industries, Inc. 7336 L Shoeman Lane, Scottsdale, Arizona 85251 Model DF 140 or equivalent.

- (4) Needle valves shall be Marsh pattern number N5332 or equal.
- (5) Pressure gauge shall be recalibrator, Marsh number PG-73 series.
- (6) Measurement and payment will be made in accordance with Section 13.

Buckhorn-Mesa WPP, Arizona  
Spook Hill FRS & Floodway  
Landscape Treatment

(401-6)

6/77

b. Bid Item 22, Water Supply Connection

- (1) This item shall consist of connecting to the City of Mesa water supply including city tap, meter, and meter box as shown on the drawings, and staked in the field.
- (2) The connection shall consist of a city two (2) inch tap, meter, and meter box as installed by the city.
- (3) Measurement and Payment shall be in accordance with Section 13.

c. Bid Item 23, 23-Station Controller

Bid Item 24, 7-Station Controller

- (1) This item shall consist of furnishing and installing the controller including footing, pedestal, and metal enclosure as shown on the drawings and staked in the field.
- (2) The 23-Station controller shall be a Rainbird Number RC-23A controller, or equal.
- (3) The 7-Station controller shall be a Rainbird Number AG-7 controller or equal.
- (4) Measurement and Payment will be in accordance with Section 13.

CONSTRUCTION SPECIFICATION

402. WIRING

1. SCOPE

The work shall consist of furnishing and installing all wiring and electrical equipment for a complete and operable electrical system as shown on the drawings and staked in the field.

2. CODES

The wiring shall conform to the latest revision of the National Electrical Code, and all applicable local codes and ordinances.

3. DRAWINGS

The drawings are not intended to show in detail all features of the work. The Contractor shall take all measurements and do all cutting on the job site. The locations of conduit, boxes, switches, control panels and electrical outlets are approximate. Locations shall be checked by the Engineer.

4. MATERIALS

All equipment and materials shall be new, unused and manufactured in accordance with the following standards, where applicable.

Institute of Electrical and Electronics Engineers  
National Electrical Manufacturers Association (NEMA)  
Insulated Power Cable Engineers Association  
American National Standards Institute  
Underwriter's Laboratories, Inc. (UL)  
American Society for Testing and Materials  
Certified Ballast Manufacturers

The Contractor shall submit for approval a complete list of materials, fixtures and equipment to be used which shall show the catalog numbers, cuts, diagrams, shop drawings and technical ratings. Each type of material shall be of the same make and quality throughout the entire job. All equipment and materials, if of the type tested by the Underwriters Laboratories or Electrical Testing Laboratories shall bear their label.

Rigid Steel Conduit - Rigid steel conduit shall be galvanized inside and out and shall conform to Federal Specification WW-C-581. Electrical metallic tubing (EMT-thin-wall) shall not be used.

Rigid Plastic Conduit

Rigid plastic conduit shall be Schedule 40, poly vinyl chloride (PVC) conduit and fittings conforming with the requirements of Material Specification 302. PVC conduit shall be UL listed for 90° c cable.

Flexible Metal Conduit - Liquidtight flexible metal conduit shall be galvanized steel, flexible conduit with an outer PVC jacket. Fittings shall be UL listed for grounding.

Conduit Connectors - Conduit connections to sheet metal boxes or enclosures shall be made using Appleton "Uni-Seal" Hubs. Conduit terminations except those in cast conduit fittings or items that have a threaded hub shall be made with two locknuts and a bushing. All bushings shall be Buchanan Electrical Products Corporation, "Bush end" insulated metallic conduit bushings or equal.

Junction Boxes and Wireways - Cast or malleable type boxes with watertight threaded hubs and gasketed screw covers shall be used. Where specified on the drawings, rain-tight hinged cover wireways shall be furnished and installed. Underground junction boxes shall be Carlon Composolite or equal.

Wire - Wire and cable shall be soft drawn copper with insulation as indicated on the drawings.

All wire shall be 600-volt, copper marked in accordance with the National Electric Code. Wire No. 10 AWG and smaller, except control cable, shall be solid. Wire No. 8 AWG and larger shall be stranded. Control cable conductors shall be stranded.

Irrigation solenoid valve control wire shall be direct burial wire and shall be solid wire except larger than No. 8 AWG.

Connectors, Terminals, Taps, and Splices - Pigtail connections of No. 8 AWG wire and smaller shall be made with Scotchlock or approved equal, and insulator, or copper splice cap and insulator. All splice caps shall be indented with the proper size pressure tool. Pre-insulated connectors or porcelain or bakelite jacket types (wirenuts), with or without metal inserts shall not be used.

Underground splices of irrigation, solenoid valve, control wire shall be with Pen-tite or Rainbird snap-tite waterproof connectors or equal.

Wire and cable terminals and taps, shall be made using pressure type connectors or lugs approved for use with aluminum or copper wire. Terminations made to equipment and device terminals shall be made with compression type lugs, assembled with approved tools. Pressure connectors shall be manufactured by Burndy, T&B, or Buchanan or equal.

Grounding Material - Grounding rods shall be copper clad steel not less than 3/4 inch diameter and 8 feet long, driven full length into the earth without being bent or damaged.

Connectors and lugs shall be copper alloy, of the bolted type, for above ground connection. All connections made in the earth or concrete shall be Burndy Thermo-o-welded or Caldwelled.

Motor-starters and Associated Controls - Motors will be furnished and installed with the equipment to be driven in accordance with Bid Item 21.

Furnish motor starters and control devices as indicated on the drawings. Three-phase motor starters shall be magnetic type with 240-volt operating coil and three thermal overload elements.

Lighting - Lighting fixtures shall be as specified on the drawings. Furnish, install and connect all lighting fixtures complete with lamps, supports and accessories.

Lamps shall be Sylvania, General Electric Company or Westinghouse.

Disconnect Switches - Disconnecting devices shall be heavy-duty type rated for service entry duty. The enclosure shall be NEMA-1.

Fuses - Fuses in all fusible elements shall be as manufactured by Bushman Manufacturing Company or equal.

Fuses shall be dual element Fusetron unless otherwise noted on the drawings. Provide spare fuses for each fuse installed.

Electric Service Entrance - The service entrance shall include all necessary conduit and fittings as shown on the drawings. The entrance shall meet all code requirements. The meter socket shall meet all specifications of the power supplier.

Nameplates - Each motor starter, safety switch, pushbutton, etc. shall be positively identified by means of laminated phenolic nameplate having a black outer surface and a white inner core. Nameplate engraving shall be engraved into the white inner core. Nameplates shall be attached by means of screws. Adhesives will not be permitted.

5. SHIPMENT

Fixtures, wire and cable shall be delivered to the job site in standard coils or reels, enclosed in original cartons or packages, and suitably weather protected. Material damaged during handling, shipping, storage, etc. shall not be installed.

## 6. INSTALLATION OF CONDUIT

Unless noted otherwise on the drawings, conduit shall be rigid steel in all locations except as follows:

- a. Rigid PVC conduit for use with 90°C cable, shall be used for all underground wiring and wiring in concrete.
- b. Liquid-tight flexible metal conduit shall be used for connection to all equipment and devices subject to vibration, motion or frequent removal and where indicated on the drawings.

All conduits shall be installed in accordance with the National Electrical Code. All exposed conduit shall be run parallel to or perpendicular to the walls or beams. All vertical conduit runs shall be plumb.

Where changes in direction of run require a box or fitting, they shall be cast, threaded hubs with malleable or cast covers equipped with gaskets.

All conduit laid in concrete shall have a minimum of two (2) inches of concrete cover on all sides when the concrete is exposed to air and three (3) inches of concrete cover when adjacent to the earth.

Open conduit shall be sealed with conduit closures during course of construction to prevent entry of foreign material. All field cut threads shall be given a coat of red lead paint before assembly.

Conduit shall be properly secured in place with approved fasteners. Wooden plugs inserted in masonry or concrete shall not be used as a base to secure conduit supports.

All underground conduit shall be swabbed clean before installation of wire.

## 7. JUNCTION BOXES AND WIREWAYS

Junction and pull boxes shall be installed where necessary to pull wire, redirect conduit runs, or provide wire splices in underground conduit. The number of wires in a box shall be in strict accordance with National Electric Code. Underground boxes shall be buried six (6) inches below final grade and broken boxes shall not be installed.

## 8. WIRE INSTALLATION

Wire installation shall be shown on the wiring diagram. All connections shall be electrically and mechanically sound. Wires shall not be pulled into conduit until construction has advanced to a point where wires will not be damaged after they have been installed.

9. CONNECTOR INSTALLATION

Compression type lugs shall be assembled with approved tools.

Waterproof control wire connections shall be made in the four (4) step process as recommended by the manufacturer.

10. GROUNDING

All equipment, including pumps, motors, cabinets, piping and structural steel framework shall be grounded in accordance with the National Electric Code.

Ground conductors shall be sized as required by Code except where sizes are specifically designated on the plans.

Grounding wire shall have a minimum earth cover of 18 inches and 2 inches when embedded in concrete.

11. DISCONNECT SWITCHES INSTALLATION

Furnish and install disconnect switches as indicated on the drawings.

12. ELECTRIC SERVICE ENTRANCE

The underground electric service entrance conduit, metering provisions, wireway, and service switches shall be installed as indicated on the drawings.

13. WIRING DIAGRAM

A complete as-built wiring circuit drawing(s) with all points identified and encased shall be permanently affixed inside the control cabinet. The wiring diagram shall be a permanent black image on a dimensionally stable base film not less in size than eight (8) inches by eleven (11) inches. All terminals and wires in the control cabinet shall be labeled or tagged as shown on the wiring diagram.

14. TESTS

Upon completion of the electrical and control system installation, the equipment and controls shall be tested to demonstrate that the requirements of these specifications have been met. The Contractor shall furnish all instruments and personnel required for the tests. Tests shall be performed in the presence of the Engineer.

15. WARRANTY

Warranty: All workmanship and materials shall be guaranteed for one full year. Warranty records and information for equipment or fixtures shall be supplied to the Engineer before final acceptance.

16. UTILITY COMPANY SCHEDULES

The Electrical Contractor shall be responsible for coordination and scheduling of work by the serving Utility Company.

17. MEASUREMENT AND PAYMENT

The work will not be measured. Payment for furnishing and installing the wiring 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.

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 items of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 18 of this specification.

18. 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 25, Wiring - Pump Station

- (1) This item shall consist of furnishing and installing all electrical equipment at each pump station including equipment items numbers 1 through 9 on sheet number 33 of the drawings and staked in the field.
- (2) Measurement and Payment shall be in accordance with Section 17 of this specification.

b. Bid Item 26, Wiring Controller

- (1) This item shall consist of furnishing and installing all controller wiring including wire, boxes, and conduit as shown schematically in detail F on page 31 of the drawings, as shown on sheets 19 through 25 and as staked in the field.
- (2) Wiring shall include final connection at controllers and pump station.
- (3) Testing shall involve proper operation of the pump start system, controller timing circuit and controller output circuit.
- (4) Measurement and Payment shall be in accordance with Section 17 of this specification.

c. Subsidiary Item, Wiring, Valve Control

- (1) This item shall consist of furnishing and installing valve control wire including final connection with controllers.
- (2) Control wire shall be UL 14-gauge, direct burial, solid copper wire.
- (3) Wirings shall include final connection at controllers and valves.
- (4) Testing shall involve proper operation of each solenoid valve from manual, station switch on controller.
- (5) No separate payment will be made for valve control wiring. Compensation for valve control wiring will be included in the payment for 4-inch, PVC Main Pipe, Bid Item No. 1.

CONSTRUCTION SPECIFICATION

403. PLANTING CONTAINER STOCK

1. SCOPE

The work shall consist of furnishing and installing container stock including planting, guaranteeing, maintaining material and maintaining irrigation equipment as shown on the drawings and staked in the field. The words "Container Stock" as used herein shall mean nursery grown trees.

2. MATERIALS

Stock - The nomenclature for plant names shall be in accordance with the latest edition of "Standardized Plant Names," as prepared by the American Joint Committee on Horticultural Nomenclature.

All plants furnished by the Contractor shall conform to the applicable requirements set forth in the current issue of "American Standard for Nursery Stock" and current supplementary standards thereof, as approved by the American Standards Association, Inc., and sponsored by the American Association of Nurserymen, Inc., subject to certain variations in size and measurement if specified on the plans or in Section 9.

All stock furnished by the Contractor shall be true to type or name, as shown on the plans and at least one plant in each group of plants of the same species delivered to the project shall be tagged with a weatherproof label stating both the botanical and common name of the plants in that group.

All stock shall be in healthy condition with normal symmetrical form, well-developed foliage, branch and cane systems at the time of delivery to the project. Trees shall be self-supporting without the aid of a stake. Trees with thin or weak trunks not capable of supporting themselves when planted, will be rejected. They shall be free from disease, insect eggs or infestations, disfiguring knots, bark abrasions, broken tops, branches or canes, damaged roots, sun, wind, or frost injury or other objectionable features. Plants pruned from larger sizes to meet specified sizes will not be accepted.

Plants which are furnished in containers shall have been growing in the containers sufficient time for uniform root development throughout the plant's ball, but the roots shall show no evidence of having been restricted or deformed.

The presence of grass or weeds in the soil accompanying plants may be cause for rejection of the plants.

All stock shall comply with Federal and state laws requiring inspection for plant diseases and infestations.

All shipments or deliveries of plant material grown within the state will be inspected at the nursery or growing site by the authorized Federal and state authorities prior to delivery to the project.

Inspection certificates required by law shall accompany the invoice for each shipment of stock and certificates shall be delivered to the Engineer.

All rejected plant material shall be removed from the site immediately after rejection.

Fertilizer and Vitamins - Chemical fertilizer and vitamins shall be a standard commercial material containing the minimum analysis and in the physical form as specified. Chemical fertilizer shall be furnished in standard containers with the name, weight and guaranteed analysis of the contents clearly marked. When a mixed fertilizer is specified, such as a 5-10-5, the first number shall represent the minimum percent of soluble nitrogen required, the second number shall represent the minimum percent of available phosphoric acid required, and the third number shall represent the minimum percent of water soluble potash required.

Prepared Backfill - Prepared backfill shall be composed of three (3) parts of native soil to one (1) part of humus by volume, thoroughly mixed to insure uniformity. Five (5) gallon plant material will each require seven-tenths (.7) cubic feet of humus. Native soil shall be natural, fertile, friable soil which possesses the characteristics of representative productive soils in the vicinity, shall not be excessively acid or alkaline, nor contain toxic substances harmful to plant growth, shall be without admixture of subsoil, and be reasonably free of noxious weeds, clay lumps, clods, stones, roots, stumps and debris of any kind.

Humus - Humus shall be approved forest humus or peat moss, or other approved organic material free from sticks, stones, roots, or other objectionable material. Material shall pass through a one-half (1/2) inch sieve, have an acidity range from four (4) pH to seven and one-half (7.5) pH, and a minimum organic content of eighty-five (85) percent on a dry weight basis. The ash content, as determined by igniting a five-gram sample for twenty (20) hours at a temperature of 900 degrees F., shall not exceed twenty-five (25) percent by weight.

Humus shall not contain pine sawdust material.

Humus may be furnished in commercial bales, waterproof containers, or by uncontained truck yardage.

Poultry Netting - Netting shall be twenty (20) gauge wire, one (1) inch twisted wire mesh in three (3) foot wide rolls.

Water - Water used in planting shall be kept free from oil, acids, alkali, salt, and other substances harmful to plant growth.

3. STOCK STORAGE

Upon delivery to the site, all nursery stock shall be planted as soon as possible. Until planting, plants shall not be exposed to excessive sun or drying winds. Stock which is not satisfactory in the opinion of the Engineer shall be immediately removed from the site at the Contractor's expense and replaced with acceptable stock.

4. STAKING

Prior to the installation of an irrigation system, planting pit locations for trees shall be clearly identified by staking. Locations shall be in accordance with the plans and details.

5. EXCAVATION

Planting pits shall be excavated to a size twice as large as the rootball or larger.

Excavation for planting shall include the stripping and stockpiling of all acceptable topsoil encountered within the areas to be excavated.

Any rock or other underground obstructions shall be removed, if possible, to the depth necessary to permit proper planting, according to plans and specifications. If underground constructions, obstructions, or rock are encountered in the excavation of planting areas, other locations for the planting may be selected by the Contractor only upon approval of the Engineer. Prior to any work, the Contractor must be knowledgeable of the locations of all existing underground installations, and their protection is his responsibility. All damage will be corrected at the expense of the Contractor to the satisfaction of the Engineer.

6. PLANTING

The planting shall be performed during favorable weather conditions, during the season or seasons which are normal for such work, as determined by acceptable local practice.

Plants shall be removed from container after cutting can on two sides. Removal and setting shall be undertaken in a careful fashion so as not to break or otherwise disturb the root ball.

Unless otherwise specified, all plants shall be planted in pits and shall be set so that the finish grade level after settlement will be the same as that at which plants were grown. They shall be planted upright and faced to give the best appearance and relationship to adjacent plants or structures. All trees shall be set plumb and rigidly braced in position until the prepared backfill has been tamped solidly around the ball. After backfilling, the pit shall thoroughly be water settled and tamped to fill all voids.

Staking of trees shall be as described on drawings.

Rodent protection shall be as described on the drawings.

7. GUARANTEE

The Contractor shall guarantee all container stock to be in a vigorous, healthy condition for a period of sixty (60) days from the date of acceptance or replacement, and shall guarantee to replace any plant material which proves to be not true to name, regardless of the length of time it takes to make this determination. Monthly inspection shall be made by the Engineer during construction. Any plant material which, in his opinion, is dead or in unsalvageable condition shall be immediately replaced at the cost of the Contractor.

8. MAINTENANCE

The Contractor shall maintain all trees, shrubs, and ground covers until acceptance of the completed project is made by the Contracting Officer. This maintenance shall include watering, fertilizing, pumps, irrigation system, and general care to insure the healthy growth of all plant materials. Also included in this maintenance shall be the maintenance of furrows on the slopes. Breaks in furrows as a result of erosion shall be immediately repaired so as not to weaken other furrows. During construction, maintenance of damage due to vandalism or theft shall be the responsibility of the Contractor.

9. MEASUREMENT AND PAYMENT

Planted container stock will be compensated for at a unit price established in the bid schedule. Such payment shall constitute full payment for all labor, materials, equipment, and other items necessary and incidental to the performance of the work including staking, excavation, planting and maintaining.

Compensation for any item of work described in the contract but not listed on 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.

CONSTRUCTION SPECIFICATION

403. PLANTING CONTAINER STOCK

1. SCOPE

The work shall consist of furnishing and installing container stock including planting, guaranteeing, maintaining material and maintaining irrigation equipment as shown on the drawings and staked in the field. The words "Container Stock" as used herein shall mean nursery grown trees.

2. MATERIALS

Stock - The nomenclature for plant names shall be in accordance with the latest edition of "Standardized Plant Names," as prepared by the American Joint Committee on Horticultural Nomenclature.

All plants furnished by the Contractor shall conform to the applicable requirements set forth in the current issue of "American Standard for Nursery Stock" and current supplementary standards thereof, as approved by the American Standards Association, Inc., and sponsored by the American Association of Nurserymen, Inc., subject to certain variations in size and measurement if specified on the plans or in Section 9.

All stock furnished by the Contractor shall be true to type or name, as shown on the plans and at least one plant in each group of plants of the same species delivered to the project shall be tagged with a weatherproof label stating both the botanical and common name of the plants in that group.

All stock shall be in healthy condition with normal symmetrical form, well-developed foliage, branch and cane systems at the time of delivery to the project. Trees shall be self-supporting without the aid of a stake. Trees with thin or weak trunks not capable of supporting themselves when planted, will be rejected. They shall be free from disease, insect eggs or infestations, disfiguring knots, bark abrasions, broken tops, branches or canes, damaged roots, sun, wind, or frost injury or other objectionable features. Plants pruned from larger sizes to meet specified sizes will not be accepted.

Plants which are furnished in containers shall have been growing in the containers sufficient time for uniform root development throughout the plant's ball, but the roots shall show no evidence of having been restricted or deformed.

The presence of grass or weeds in the soil accompanying plants may be cause for rejection of the plants.

All stock shall comply with Federal and state laws requiring inspection for plant diseases and infestations.

All shipments or deliveries of plant material grown within the state will be inspected at the nursery or growing site by the authorized Federal and state authorities prior to delivery to the project.

Inspection certificates required by law shall accompany the invoice for each shipment of stock and certificates shall be delivered to the Engineer.

All rejected plant material shall be removed from the site immediately after rejection.

Fertilizer and Vitamins - Chemical fertilizer and vitamins shall be a standard commercial material containing the minimum analysis and in the physical form as specified. Chemical fertilizer shall be furnished in standard containers with the name, weight and guaranteed analysis of the contents clearly marked. When a mixed fertilizer is specified, such as a 5-10-5, the first number shall represent the minimum percent of soluble nitrogen required, the second number shall represent the minimum percent of available phosphoric acid required, and the third number shall represent the minimum percent of water soluble potash required.

Prepared Backfill - Prepared backfill shall be composed of three (3) parts of native soil to one (1) part of humus by volume, thoroughly mixed to insure uniformity. Five (5) gallon plant material will each require seven-tenths (.7) cubic feet of humus. Native soil shall be natural, fertile, friable soil which possesses the characteristics of representative productive soils in the vicinity, shall not be excessively acid or alkaline, nor contain toxic substances harmful to plant growth, shall be without admixture of subsoil, and be reasonably free of noxious weeds, clay lumps, clods, stones, roots, stumps and debris of any kind.

Humus - Humus shall be approved forest humus or peat moss, or other approved organic material free from sticks, stones, roots, or other objectionable material. Material shall pass through a one-half (1/2) inch sieve, have an acidity range from four (4) pH to seven and one-half (7.5) pH, and a minimum organic content of eighty-five (85) percent on a dry weight basis. The ash content, as determined by igniting a five-gram sample for twenty (20) hours at a temperature of 900 degrees F., shall not exceed twenty-five (25) percent by weight.

Humus shall not contain pine sawdust material.

Humus may be furnished in commercial bales, waterproof containers, or by uncontained truck yardage.

Poultry Netting - Netting shall be twenty (20) gauge wire, one (1) inch twisted wire mesh in three (3) foot wide rolls.

Water - Water used in planting shall be kept free from oil, acids, alkali, salt, and other substances harmful to plant growth.

3. STOCK STORAGE

Upon delivery to the site, all nursery stock shall be planted as soon as possible. Until planting, plants shall not be exposed to excessive sun or drying winds. Stock which is not satisfactory in the opinion of the Engineer shall be immediately removed from the site at the Contractor's expense and replaced with acceptable stock.

4. STAKING

Prior to the installation of an irrigation system, planting pit locations for trees shall be clearly identified by staking. Locations shall be in accordance with the plans and details.

5. EXCAVATION

Planting pits shall be excavated to a size twice as large as the rootball or larger.

Excavation for planting shall include the stripping and stockpiling of all acceptable topsoil encountered within the areas to be excavated.

Any rock or other underground obstructions shall be removed, if possible, to the depth necessary to permit proper planting, according to plans and specifications. If underground constructions, obstructions, or rock are encountered in the excavation of planting areas, other locations for the planting may be selected by the Contractor only upon approval of the Engineer. Prior to any work, the Contractor must be knowledgeable of the locations of all existing underground installations, and their protection is his responsibility. All damage will be corrected at the expense of the Contractor to the satisfaction of the Engineer.

6. PLANTING

The planting shall be performed during favorable weather conditions, during the season or seasons which are normal for such work, as determined by acceptable local practice.

Plants shall be removed from container after cutting can on two sides. Removal and setting shall be undertaken in a careful fashion so as not to break or otherwise disturb the root ball.

Unless otherwise specified, all plants shall be planted in pits and shall be set so that the finish grade level after settlement will be the same as that at which plants were grown. They shall be planted upright and faced to give the best appearance and relationship to adjacent plants or structures. All trees shall be set plumb and rigidly braced in position until the prepared backfill has been tamped solidly around the ball. After backfilling, the pit shall thoroughly be water settled and tamped to fill all voids.

Staking of trees shall be as described on drawings.

Rodent protection shall be as described on the drawings.

7. GUARANTEE

The Contractor shall guarantee all container stock to be in a vigorous, healthy condition for a period of sixty (60) days from the date of acceptance or replacement, and shall guarantee to replace any plant material which proves to be not true to name, regardless of the length of time it takes to make this determination. Monthly inspection shall be made by the Engineer during construction. Any plant material which, in his opinion, is dead or in unsalvageable condition shall be immediately replaced at the cost of the Contractor.

8. MAINTENANCE

The Contractor shall maintain all trees, shrubs, and ground covers until acceptance of the completed project is made by the Contracting Officer. This maintenance shall include watering, fertilizing, pumps, irrigation system, and general care to insure the healthy growth of all plant materials. Also included in this maintenance shall be the maintenance of furrows on the slopes. Breaks in furrows as a result of erosion shall be immediately repaired so as not to weaken other furrows. During construction, maintenance of damage due to vandalism or theft shall be the responsibility of the Contractor.

9. MEASUREMENT AND PAYMENT

Planted container stock will be compensated for at a unit price established in the bid schedule. Such payment shall constitute full payment for all labor, materials, equipment, and other items necessary and incidental to the performance of the work including staking, excavation, planting and maintaining.

Compensation for any item of work described in the contract but not listed on 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 27, Five-Gallon Container Stock

- (1) This item shall consist of planting trees including staking, excavating, planting and maintaining as shown on the drawings.
- (2) The stock to be installed shall be as described below:

<u>Quantity</u>	<u>Container Size</u>	<u>Botanical Name</u>	<u>Common Name</u>
107	5-gallon	Parkinsonia aculeata	Mexican paloverde
2,230	5-gallon	Cercidium microphyllum	littleleaf paloverde

All trees shall have a minimum trunk height of three (3) feet and a minimum foliage spread of two (2) feet, six (6) inches. Material shall have been nursery grown without supplemental staking support.

- (3) Section 6, Planting, shall apply with the following modification. During planting, two (2) Agriform 20-10-5 fertilizer tablets, as manufactured by Blue Chip Products, shall be incorporated in the prepared backfill for each plant.

Directly after planting, stock shall receive an application of Vitamin B-1 or other approved root stimulator as directed by the manufacturer.

- (4) Section 8, Maintenance shall apply with the following modification. All container stock shall receive applications in accordance with the manufacturer's recommendations of Vitamin B-1 at intervals of two (2) weeks throughout the maintenance period, before acceptance.
- (5) Measurement and Payment shall be in accordance with Section 9.

Buckhorn-Mesa WPP, Arizona  
Spook Hill FRS & Floodway  
Landscape Treatment

(403-5)

6/77

CONSTRUCTION SPECIFICATION

404. SEEDING

1. SCOPE

The work shall consist of furnishing and installing seed including planting, maintaining seed beds, and maintaining irrigation equipment as shown on the drawings and staked in the field.

2. MATERIALS

Seed - The seed mixtures shall be as follows:

Mix Number One:

<u>Botanical Name</u>	<u>Common Name</u>	<u>Percentage</u>
Atriplex lentiformis	quail bush	7.1
Atriplex semibaccata	Australian salt bush	7.1
Baccharis sarothroides	desert broom	7.1
Franseria deltoidea	triangle bursage	35.7
Larrea divaricata	creosote bush	12.5
Eragrostis lehmanniana	Lehmann lovegrass	12.5
Sporobolus cyptandrus	sand dropseed	12.5

Mix Number Two:

<u>Botanical Name</u>	<u>Common Name</u>	<u>Percentage</u>
Atriplex lentiformis	quail bush	7.1
Atriplex semibaccata	Australian salt bush	7.1
Baccharis sarothroides	desert broom	12.5
Franseria deltoidea	triangle bursage	12.5
Larrea divaricata	creosote bush	28.6
Eragrostis lehmanniana	Lehmann lovegrass	12.5
Sporobolus cyptandrus	sand dropseed	12.5

Mix Number Three:

<u>Botanical Name</u>	<u>Common Name</u>	<u>Percentage</u>
Prosopis juliflora	honey mesquite	2.5
Franseria deltoidea	triangle bursage	40.0
Larrea divaricata	creosote bush	17.5
Eragrostis lehmanniana	Lehmann lovegrass	20.0
Sporobolus cyptandrus	sand dropseed	20.0

Buckhorn-Mesa WPP, Arizona  
Spook Hill FRS & Floodway  
Landscape Treatment

(404-1)

6/77

The percentages given are by weight of the mix. Weights of mix shall be on an adjusted basis to one-hundred (100) percent pure, live seed (PLS) at the specified proportion. Noxious weed seed content shall be prohibited as listed on page ten (10), Arizona State Seed Law.

Triangle leaf bursage, desert broom, creosote bush, and mesquite seeds shall be collected within a radius of one-hundred (100) miles and an elevation within one-thousand (1,000) feet of the area to be planted.

Seed shall be premixed by the supplier and furnished in containers with the project name, seed mix number, and area of application clearly labeled on the container.

Fertilizer - Chemical fertilizer shall be a standard commercial fertilizer containing the minimum analysis and in the physical form as specified, such as a 5-10-5, the first number shall represent the minimum percent of soluble nitrogen required, the second number shall represent the minimum percent phosphoric acid required and the third number shall represent the minimum percent of soluble potash required.

Water - Water used in irrigation shall be kept free from oil, acids, alkali, salt and other substances harmful to plant growth.

### 3. SHIPMENT

Seed shall be furnished in sealed containers, labeled by the supplier and delivered to the job site prior to use for approval by the Engineer. Containers shall not be damaged and seed shall not show evidence of water damage, mildew, molds, or rot.

Chemical fertilizer shall be delivered in undamaged, moistureproof containers and shall be free from any evidence that fertilizer contains lumps or has caked.

### 4. SITE PREPARATION

(Method 1) No site preparation is required.

(Method 2) The area to be seeded shall be ripped to a minimum depth of five (5) inches, disced and harrowed to form a smooth, firm surface. Large soil clods, stones or foreign material brought to the surface by discing and which would interfere with the operation of the seeding equipment shall be removed and disposed of at areas designated by the Engineer.

### 5. SEED APPLICATION

Seeding operations in areas approved by the Engineer shall begin after the fifteenth (15th) of October and be completed before the fifteenth (15th) of November.

(Method 1) The seed shall be broadcasted with equipment as approved by the Engineer and performed as follows:

1. One-half of the seed shall be sown with the sower moving in one direction.
2. The other half of the seed shall be sown with the sower moving parallel to the first sowing in the opposite direction, and over the same area.

The broadcast method shall provide an even distribution of seed and shall not be applied during wind of speeds greater than five (5) miles per hour.

(Method 2) The areas shall be seeded by the drill method to a minimum depth of one-quarter ( $\frac{1}{4}$ ) inch and a maximum depth of one-half inch.

6. FERTILIZER APPLICATION

(Method 1) Fertilizing shall not be required.

(Method 2) Fertilizer shall be applied at a rate of two-hundred (200) pounds per acre of crystal form, 21-0-0 ammonium sulfate. Application method shall be approved by the Engineer and shall be scheduled between February 15 and March 15.

7. WATER APPLICATION

(Method 1) Watering shall not be required.

(Method 2) After seeding operations are completed, irrigate as soon as possible. For the first seven days, controller stations shall be scheduled for five (5) minute periods of operation with the repeat cycle space sufficiently apart so that water does not over fill the graded furrows.

The controller scheduling shall be set to maintain moisture in the top six (6) inches of soil, measured from the bottom of the furrows nearest the top of the dam, or as directed by the Engineer.

8. MAINTENANCE

(Method 1) Maintenance shall not be required.

(Method 2) The Contractor shall maintain all seeded areas until acceptance of the completed project is made by the Contracting Officer. This maintenance shall include irrigating, care of pumps, care of the irrigation system, and other operations to insure the healthy growth of all plant material germinated on the slopes. Also included shall be the maintenance of furrows constructed on the slopes. Breaks in furrows, resulting in erosion shall be immediately repaired so as to not weaken other furrows.

9. MEASUREMENT AND PAYMENT

The surface areas seeded will be measured to the nearest tenth (1/10) acre of the average slope. Payment for seeding will be made at the unit price established in the bid schedule and shall constitute full compensation for all labor, materials, equipment, and incidentals necessary to the completion of the work, including seed.

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.

Buckhorn-Mesa WPP, Arizona  
Spook Hill FRS & Floodway  
Landscape Treatment

(404-4)

6/77

CONSTRUCTION SPECIFICATION

404. SEEDING

1. SCOPE

The work shall consist of furnishing and installing seed including planting, maintaining seed beds, and maintaining irrigation equipment as shown on the drawings and staked in the field.

2. MATERIALS

Seed - The seed mixtures shall be as follows:

Mix Number One:

<u>Botanical Name</u>	<u>Common Name</u>	<u>Percentage</u>
Atriplex lentiformis	quail bush	7.1
Atriplex semibaccata	Australian salt bush	7.1
Baccharis sarothroides	desert broom	7.1
Franseria deltoidea	triangle bursage	35.7
Larrea divaricata	creosote bush	12.5
Eragrostis lehmanniana	Lehmann lovegrass	12.5
Sporobolus cyptandrus	sand dropseed	12.5

Mix Number Two:

<u>Botanical Name</u>	<u>Common Name</u>	<u>Percentage</u>
Atriplex lentiformis	quail bush	7.1
Atriplex semibaccata	Australian salt bush	7.1
Baccharis sarothroides	desert broom	12.5
Franseria deltoidea	triangle bursage	12.5
Larrea divaricata	creosote bush	28.6
Eragrostis lehmanniana	Lehmann lovegrass	12.5
Sporobolus cyptandrus	sand dropseed	12.5

Mix Number Three:

<u>Botanical Name</u>	<u>Common Name</u>	<u>Percentage</u>
Prosopis juliflora	honey mesquite	2.5
Franseria deltoidea	triangle bursage	40.0
Larrea divaricata	creosote bush	17.5
Eragrostis lehmanniana	Lehmann lovegrass	20.0
Sporobolus cyptandrus	sand dropseed	20.0

Buckhorn-Mesa WPP, Arizona  
Spook Hill FRS & Floodway  
Landscape Treatment

(404-1)

6/77

The percentages given are by weight of the mix. Weights of mix shall be on an adjusted basis to one-hundred (100) percent pure, live seed (PLS) at the specified proportion. Noxious weed seed content shall be prohibited as listed on page ten (10), Arizona State Seed Law.

Triangle leaf bursage, desert broom, creosote bush, and mesquite seeds shall be collected within a radius of one-hundred (100) miles and an elevation within one-thousand (1,000) feet of the area to be planted.

Seed shall be premixed by the supplier and furnished in containers with the project name, seed mix number, and area of application clearly labeled on the container.

Fertilizer - Chemical fertilizer shall be a standard commercial fertilizer containing the minimum analysis and in the physical form as specified, such as a 5-10-5, the first number shall represent the minimum percent of soluble nitrogen required, the second number shall represent the minimum percent phosphoric acid required and the third number shall represent the minimum percent of soluble potash required.

Water - Water used in irrigation shall be kept free from oil, acids, alkali, salt and other substances harmful to plant growth.

### 3. SHIPMENT

Seed shall be furnished in sealed containers, labeled by the supplier and delivered to the job site prior to use for approval by the Engineer. Containers shall not be damaged and seed shall not show evidence of water damage, mildew, molds, or rot.

Chemical fertilizer shall be delivered in undamaged, moistureproof containers and shall be free from any evidence that fertilizer contains lumps or has caked.

### 4. SITE PREPARATION

(Method 1) No site preparation is required.

(Method 2) The area to be seeded shall be ripped to a minimum depth of five (5) inches, disced and harrowed to form a smooth, firm surface. Large soil clods, stones or foreign material brought to the surface by discing and which would interfere with the operation of the seeding equipment shall be removed and disposed of at areas designated by the Engineer.

### 5. SEED APPLICATION

Seeding operations in areas approved by the Engineer shall begin after the fifteenth (15th) of October and be completed before the fifteenth (15th) of November.

(Method 1) The seed shall be broadcasted with equipment as approved by the Engineer and performed as follows:

1. One-half of the seed shall be sown with the sower moving in one direction.
2. The other half of the seed shall be sown with the sower moving parallel to the first sowing in the opposite direction, and over the same area.

The broadcast method shall provide an even distribution of seed and shall not be applied during wind of speeds greater than five (5) miles per hour.

(Method 2) The areas shall be seeded by the drill method to a minimum depth of one-quarter ( $\frac{1}{4}$ ) inch and a maximum depth of one-half inch.

6. FERTILIZER APPLICATION

(Method 1) Fertilizing shall not be required.

(Method 2) Fertilizer shall be applied at a rate of two-hundred (200) pounds per acre of crystal form, 21-0-0 ammonium sulfate. Application method shall be approved by the Engineer and shall be scheduled between February 15 and March 15.

7. WATER APPLICATION

(Method 1) Watering shall not be required.

(Method 2) After seeding operations are completed, irrigate as soon as possible. For the first seven days, controller stations shall be scheduled for five (5) minute periods of operation with the repeat cycle space sufficiently apart so that water does not over fill the graded furrows.

The controller scheduling shall be set to maintain moisture in the top six (6) inches of soil, measured from the bottom of the furrows nearest the top of the dam, or as directed by the Engineer.

8. MAINTENANCE

(Method 1) Maintenance shall not be required.

(Method 2) The Contractor shall maintain all seeded areas until acceptance of the completed project is made by the Contracting Officer. This maintenance shall include irrigating, care of pumps, care of the irrigation system, and other operations to insure the healthy growth of all plant material germinated on the slopes. Also included shall be the maintenance of furrows constructed on the slopes. Breaks in furrows, resulting in erosion shall be immediately repaired so as to not weaken other furrows.

9. MEASUREMENT AND PAYMENT

The surface areas seeded will be measured to the nearest tenth (1/10) acre of the average slope. Payment for seeding will be made at the unit price established in the bid schedule and shall constitute full compensation for all labor, materials, equipment, and incidentals necessary to the completion of the work, including seed.

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 28, Seed Mix No. One

- (1) This item shall consist of furnishing and installing seed including planting, watering, fertilizing, and maintaining furrows within the following limits as shown on the drawings and staked in the field.
  - (a) Between dam baseline Station 87+00 and Station 198+00.
  - (b) Between dam baseline Station 220+00 and Station 265+00.
  - (c) Between dam baseline Station 280+00 and Station 292+50.
  - (d) Between dam baseline Station 296+00 and Station 303+00.
- (2) Seed shall conform to the requirements of seed Mix Number One.
- (3) In Section 4, Site Preparation, Method 1 shall apply.
- (4) In Section 5, Seed Application, Method 1 shall apply.
- (5) Seed application rate shall be seven (7) pounds PLS per acre.
- (6) In Section 6, Fertilizer Application, Method 2 shall apply.
- (7) In Section 7, Water Application, Method 2 shall apply.
- (8) In Section 8, Maintenance, Method 2 shall apply.
- (9) Measurement and payment shall be in accordance with Section 9.

b. Bid Item 29, Seed Mix Number Two

- (1) This item shall consist of furnishing and installing seed including planting, watering, fertilizing, and maintaining furrows within the following limits as shown on the drawings and staked in the field.
  - (a) Between dam baseline Station 198+00 and Station 220+00.
  - (b) Between dam baseline Station 265+00 and Station 280+00.
- (2) Seed shall conform to the requirements of seed Mix Number Two.

- (3) In Section 4, Site Preparation, Method 1 shall apply.
- (4) In Section 5, Seed Application, Method 1 shall apply.
- (5) Seed application rate shall be seven (7) pounds PLS per acre.
- (6) In Section 6, Fertilizer Application, Method 2 shall apply.
- (7) In Section 7, Water Application, Method 2 shall apply.
- (8) In Section 8, Maintenance, Method 2 shall apply.
- (9) Measurement and payment shall be in accordance with Section 9.

c. Bid Item 30, Seed Mix Number Three

- (1) This item shall consist of furnishing and installing seed including cultivation and seeding in the following locations as shown on the drawings and staked in the field.
  - (a) McKellips Road ramp slopes between McKellips Road Centerline Station 13+50± and Station 27+50±.
  - (b) McDowell Road ramp slopes between McDowell Road Centerline Station 14+00± and Station 24+00±.
  - (c) Brown Road ramp slopes between Brown Road Centerline Station 13+00± and Station 24+00±.
  - (d) The topsoil stockpile areas between the dam and the principal spillway inlet channel at the following locations:

Between Dam baseline Station 96+00 and Station 120+00.  
Between Dam baseline Station 140+00 and Station 160+00.  
Between Dam baseline Station 167+00 and Station 195+00.  
Between Dam baseline Station 225+00 and Station 260+00.

- (e) The reservoir excavation areas between dam baseline Station 198+00 and Station 212+00, also between dam baseline Station 265+00 and Station 280+00.
  - (f) Construction corridors from the Salt-Gila Aqueduct borrow area to the principal spillway inlet channel at five hundred (500) foot intervals along the dam baseline stations.
  - (g) The abandoned homesite at dam baseline Station 248+00.
  - (h) The abandoned Usery Pass Road right-of-way between dam baseline Station 153+00 and Station 155+00, and the abandoned Hermosa Vista Drive right-of-way between dam baseline Station 239+00 and Station 245+00.
  - (i) The north and south pump stations.
  - (j) The waste areas located in the reservoir adjacent to Station 110+00, Station 148+43, Station 180+00, Station 230+90, and Station 300+00.
  - (k) The borrow areas located adjacent to the principal spillway inlet channel between dam baseline Station 105+00 and Station 115+00, Station 140+00 and Station 153+00, Station 156+00 and Station 195+00, Station 220+00 and Station 242+00, Station 246+00 and Station 260+00, and between Station 280+00 and Station 290+00.
- (2) Seed shall conform to the requirements of seed Mix Number Three.
- (3) In Section 4, Site Preparation, Method 1 shall apply.
- (4) In Section 5, Seed Application, Method 1 shall apply on slopes of steeper gradient of four-to-one (4:1) with the following modification. Planting will be accomplished by one (1) final compacting pass with tracklaying equipment.
- Method 2 shall apply to all other areas.
- (5) In Section 6, Fertilizer Application, Method 1 shall apply.
- (6) In Section 7, Water Application, Method 1 shall apply.
- (7) In Section 8, Maintenance, Method 1 shall apply.
- (8) Measurement and payment shall be in accordance with Section 9.

CONSTRUCTION SPECIFICATION

406. 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, including revisions, except as modified herein.

UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION  
Maricopa Association of Governments  
July 1, 1974                      Arizona

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:

Maricopa County Highway Department  
3335 West Durango Road  
Phoenix, Arizona 85009

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. UNTREATED BASE

The untreated base shall be installed in accordance with Section 310 of the referenced specifications. The base material shall be crushed aggregate in accordance with Section 702 and shall be placed in the following manner:

First Lift; A three-(3) inch layer of aggregate base  
Second Lift; A six-(6) inch layer of select material

6. ASPHALT CONCRETE PAVEMENT

The asphalt concrete pavement shall be installed in accordance with Section 321. Materials shall conform with the requirements of Section 710, except no mineral filler or blending sand will be required. Asphalt shall be AR 4000 and conform to the requirements of Section 711. The mineral aggregate shall meet the grading requirements within the range of specified tolerances for mix designation C-3/4.

7. PRESERVATIVE SEAL FOR ASPHALT CONCRETE

The preservative seal shall be installed in accordance with Section 334. The material shall conform to Section 718 and shall be applied at the rate of 0.07 of a gallon of diluted mixture per square yard.

8. 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.

CONSTRUCTION SPECIFICATION

406. 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, including revisions, except as modified herein.

UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION  
Maricopa Association of Governments  
July 1, 1974 Arizona

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:

Maricopa County Highway Department  
3335 West Durango Road  
Phoenix, Arizona 85009

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. UNTREATED BASE

The untreated base shall be installed in accordance with Section 310 of the referenced specifications. The base material shall be crushed aggregate in accordance with Section 702 and shall be placed in the following manner:

First Lift; A three (3) inch layer of aggregate base  
Second Lift; A six (6) inch layer of select material

6. ASPHALT CONCRETE PAVEMENT

The asphalt concrete pavement shall be installed in accordance with Section 321. Materials shall conform with the requirements of Section 710, except no mineral filler or blending sand will be required. Asphalt shall be AR 4000 and conform to the requirements of Section 711. The mineral aggregate shall meet the grading requirements within the range of specified tolerances for mix designation C-3/4.

7. PRESERVATIVE SEAL FOR ASPHALT CONCRETE

The preservative seal shall be installed in accordance with Section 334. The material shall conform to Section 718 and shall be applied at the rate of 0.07 of a gallon of diluted mixture per square yard.

8. 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.

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 24, Pavement Replacement

- (1) This item shall consist of the replacement of the existing asphalt concrete pavement including the untreated base and preservative seal within the following limits as shown on the drawings and staked in the field.

Between Station 9+93± and Station 23+55± centerline Brown Road.

Between Station 10+25± and Station 29+20± centerline McKellips Road.

Between Station 10+64± and Station 26+50± centerline McDowell Road.

- (2) Payment will be made in accordance with Section 8.

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 8, Pavement Replacement

- (1) This item shall consist of the replacement of the existing asphalt concrete pavement including the untreated base and preservative seal within the following limits as shown on the drawings and staked in the field.

Between Station 9+60± and Station 24+70± centerline Brown Road.

Between Station 9+90± and Station 29+20± centerline McKellips Road.

Between Station 10+20± and Station 26+50± centerline McDowell Road.

- (2) Payment will be made in accordance with Section 8.

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.

Aggregates of crushed limestone shall be thoroughly washed and screened. Coarse aggregates containing crushed limestone shall have not more than 3 percent, by weight, of particles finer than the No. 4 sieve. Crushed limestone shall not be used for fine aggregates except in combination with other materials such that not more than 5 percent of the portion finer than the 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.

(522-1)

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.

(522-2)

## 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 by ASTM Method C 88 for coarse aggregate modified as follows:

The test sample shall not be separated into fractions. It shall consist of 5000  $\pm$  300 grams of rock fragments, reasonably uniform in size and shape and weighing approximately 100 grams each, obtained by breaking the rock and selecting fragments of the required size.

After the sample has been dried, following completion of the final test cycle and washing to remove the sodium sulfate or magnesium sulfate, the loss of weight shall be determined by subtracting from the original weight of the sample the final weight of all fragments which have not broken into three or more pieces.

The report shall show the percentage loss of weight and the results of the qualitative examination.

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, when Type I portland cement is specified, Type IS portland blast-furnace slag cement or Type IP portland-pozzolan cement conforming to the requirements of ASTM Specification C 595 may be used unless prohibited in the specifications.

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.

(533-1)

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.

(534-1)

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.

(535-1)

SCS-WEST

3-7-69

## 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.

#### 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.

(536-1)

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 to prevent the entry of concrete or earth during the bedding, cradling or backfilling operations.

(536-2)

SCS-WEST

3-7-69

## 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.

(537-1)

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.

(537-2)

- (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  $145^{\circ} \pm 5^{\circ}\text{F}$ ;
  - (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;

(537-4)

- (5) Fresh medium shall be substituted 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 symmetrical 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

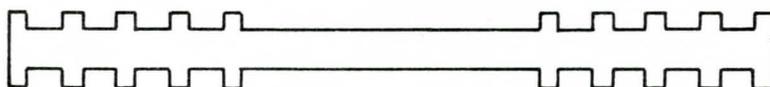
<u>Size Designation</u>	<u>Web Thickness (T) (Inches)</u>	<u>Width (W) (Inches)</u>
1	1/16	5 1/4
2	3/32	3 3/4
3	3/32	4
4	3/32	5 1/4
5	3/32	6
6	1/8	4
7	1/8	5 1/4
8	1/8	6
9	5/32	4
10	5/32	4 1/2
11	5/32	9
12	3/16	4
13	3/16	5
14	3/16	6
15	3/16	9
16	1/4	6
17	1/4	9
18	3/8	5
19	3/8	6
20	3/8	9
21	1/2	6
22	1/2	9
23	1/2	12

(537-6)

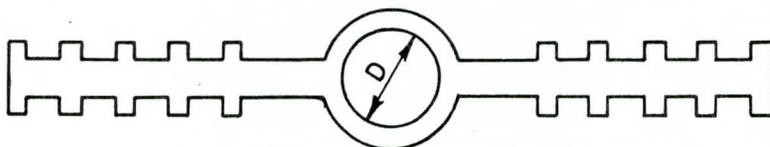
FIGURE 1

TYPES OF NON-METALLIC WATERSTOPS

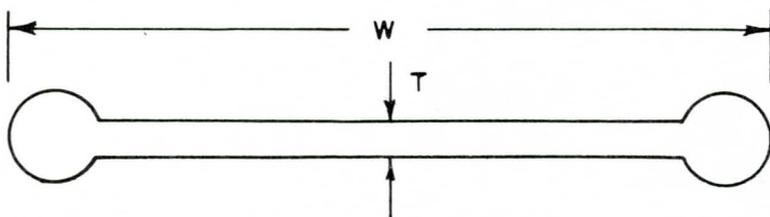
TYPE A



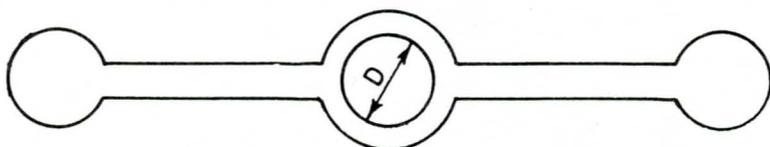
TYPE B



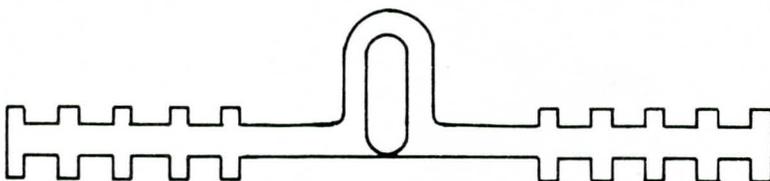
TYPE C



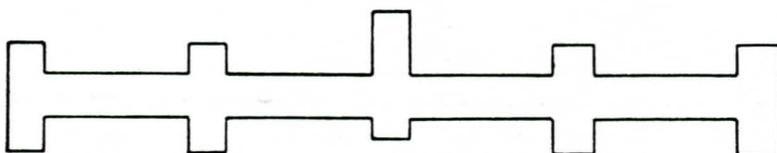
TYPE D



TYPE E



TYPE F



(537-7)

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

Zinc-coated (Galvanized) steel - ASTM Specification A 526

(538-1)

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 or Grade 60.

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.

(539-1)

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.

(539-2)

MATERIAL SPECIFICATION

545. ASBESTOS-CEMENT PIPE

1. SCOPE

This specification covers the quality of asbestos-cement pipe and fittings.

2. PRESSURE PIPE

Pressure pipe and couplings shall conform to the requirements of ASTM Specification C 296 for the specified class and type of pipe. Type I or Type II pipe shall be furnished unless otherwise specified.

Fittings other than couplings shall: (1) be cast iron or ductile iron pressure fittings compatible with the type of pipe furnished, (2) be of the all-bell, rubber-ring-connecting type with gasket retainer grooves cast or machined in the inner surfaces of the bells, and (3) otherwise conform to the requirements of AWWA Standard C110 (American National Standard A21.10). Gaskets shall conform to the requirements of ASTM Specification D 1869.

When perforated pressure pipe is specified, the number, size, location and spacing of perforations shall conform to the requirements of ASTM Specification C 508.

3. IRRIGATION PIPE

Irrigation pipe and couplings shall conform to the requirements of ASTM Specification C 296, except that lower strength will be allowed, as follows: The rated working pressure shall be not less than 75 pounds per square inch, the hydrostatic proof pressure shall be not less than 225 pounds per square inch, and the flexural proof loads and minimum crushing strengths shall be as tabulated below. Pipe and asbestos-cement fittings shall meet the chemical requirements for Type I or Type II pipe unless otherwise specified.

<u>Applied Flexural Proof Loads</u>		<u>Minimum Crushing Loads</u>	
<u>Nominal Size inches</u>	<u>Total Applied Load, lb.</u>	<u>Nominal Size inches</u>	<u>Crushing Strength per Lin. Ft., lb.</u>
4	1000	4	1900
6	2000	6	1400
8	3700	8	1650
		10	1900
		12	2200
		14	2600
		16	2750
		18	2900
		20	3100
		24	3500
		30	4100
		36	5000

#### 4. NONPRESSURE PIPE

Nonpressure pipe and couplings shall conform to the requirements of ASTM Specification C 428 or C 644 for the specified class and type of pipe. Type I or Type II pipe shall be furnished unless otherwise specified.

Fittings other than couplings shall meet the same physical and chemical requirements as the pipe and couplings.

When perforated nonpressure pipe is specified, the number, size, location and spacing of perforations shall conform to the requirements of ASTM Specification C 508.

#### 5. PERFORATED UNDERDRAIN PIPE

Perforated underdrain pipe, couplings and fittings shall conform to the requirements of ASTM Specification C 508, except that flexible couplings recommended by the pipe manufacturer will be allowed unless otherwise specified.

## MATERIAL SPECIFICATION

### 551. ZINC-COATED IRON OR STEEL CORRUGATED PIPE

#### 1. SCOPE

This specification covers the quality of zinc-coated iron or steel corrugated pipe and fittings.

#### 2. PIPE

Zinc-coated or steel corrugated pipe and fittings shall conform to the requirements of Interim Federal Specification **WW-P-405** for the specified classes and shapes of pipe, and to the following additional requirements:

- a. Unless otherwise specified, circumferential shop riveted seams shall have a maximum rivet spacing of 6 inches, except that 6 rivets will be sufficient for 12-inch diameter pipe;
- b. When close riveted pipe is specified: (1) the pipe shall be fabricated so that the rivet spacing in the circumferential seams shall not exceed 3 inches, except that 12 rivets will be sufficient to secure the circumferential seams in 12-inch pipe, and (2) in those portions of the longitudinal seams that will be covered by the coupling bands the rivets shall have finished flat heads or the rivets and holes shall be omitted and the seams shall be connected by welding to provide a minimum of obstruction to the seating of the coupling bands.
- c. Double riveting or double spot welding of pipe less than 42 inches in diameter may be required. When double riveting or double spot welding is specified, the riveting or welding shall be done in the manner specified for pipe 42 inches or greater in diameter.

#### 3. COATINGS

Coatings shall conform to the requirements of Interim Federal Specification **WW-P-405** for the specified types of coatings.

(551-1)

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:

<u>Kinds of Pipe</u>	<u>ASTM Specifications</u>
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
	<u>AWWA Standard</u>
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

571. SLIDE GATES (SLUICE GATES), METAL, LIGHT DUTY

1. SCOPE

This specification covers the quality of light 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 MLS-1 gates shall be cast iron with cast iron seat facings.

Type MLS-2 gates shall be fabricated metal gates.

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.

<u>Material</u>	<u>Specification</u> (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
Carbon steel sheets	A 569

<u>Material</u>	<u>Specification</u> (ASTM)
Carbon steel strip	A 569
Zinc-coated carbon steel sheets	A 526
Cast bronze	B 584

Galvanizing (zinc coating) shall conform to the requirements of Material Specification 582.

#### 4. CAST IRON GATES

The frame shall be cast iron and of the specified type. The front face shall be machined to receive the gate guides.

The gate slide shall be cast iron and shall be built to withstand the seating and unseating heads expressed by the gate class designation, as defined in Section 2 of this specification.

Grooves shall be cast on the vertical sides of the slide to match the guide angles.

The gate guides shall be galvanized structural steel and shall be built to withstand the total thrust of the gate slide due to water pressure and wedge action.

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. Adjusting bolts or screws shall be bronze or galvanized steel.

Seat facings shall be machined to a smooth finish to insure proper watertight contact.

#### 5. FABRICATED METAL GATES

Fabricated metal gates shall be built to withstand the seating head expressed by the gate class designation. Unless otherwise specified, the gates shall be galvanized steel with flat-back frames.

6. YOKE

When a self-contained gate is specified, the yoke shall be galvanized structural steel and of such design as to capably withstand the loads resulting from operation of the gate.

7. GATE STEM AND LIFT (OR HOIST)

The gate stem and lift (or hoist) shall be of the specified type, size and capacity, and 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 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 handwheel or on the lift housing to indicate the direction of opening.

Provision shall be made to prevent stem rotation at the connection with the gate slide.

Stop collars shall be provided to prevent over-travel in opening and closing the gate.

8. STEM GUIDES

Unless otherwise specified, stem guides shall be cast iron and adjustable in two directions.

9. FASTENERS

Unless otherwise specified, all anchor bolts and other fasteners shall be galvanized steel or bronze.

10. 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.

11. PAINTING

When specified, gates and accessories shall be painted by the designated systems.

12. CERTIFICATION

The material certification shall include the name of the manufacturer, the 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:

<u>Product</u>	<u>ASTM Specification</u>
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.

(581-1)

<u>Product</u>	<u>ASTM Specification</u>
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."

(581-2)

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

583. COAL TAR-EPOXY PAINT (FORMULA C-200)

1. SCOPE

This specification covers the quality of a coal tar polyamide epoxy paint suitable for use on structural steel or concrete. (Note: Coatings compounded from coal tar and epoxy resins are the subject of U.S. Patent No. 2,765,288 held by the U.S.S. Chemicals, a Division of United States Steel Corporation, Pittsburgh, Pennsylvania, 15230.)

2. COMPOSITION AND PROCESSING

- a. Composition. The paint shall be a two-component system containing the pitch, filler and catalyst in one component and the resin in another. The components shall contain the following types and proportions of ingredients:

(1) COMPONENT A

<u>Ingredient</u>	<u>% by Wt.</u>	<u>Gallons (absolute) in 38.5 lb. batch</u>
Coal Tar Pitch	35.0	1.28
Polyamide Resin	11.5	0.55
Magnesium Silicate	31.0	0.51
Xylene	18.7	1.00
Ethyl Alcohol (95%-denatured)	1.0	0.06
Gelling Agent	1.5	0.04
Catalyst	1.3	0.06
	<u>100.0</u>	<u>3.50 gallons</u>

(2) COMPONENT B

Epoxy Resin (100% nonvolatile)	9.7 pounds	1.0 gallon
-----------------------------------	------------	------------

- b. Processing. Magnesium silicate and gelling agent shall be thoroughly dispersed in Component A by means of grinding equipment capable of developing substantial shear values. Gellant shall be mixed with an equal weight of magnesium silicate and then dampened by stirring-in all of the alcohol;

(583-1)

the resultant mixture shall be added to and thoroughly dispersed into Component A. (The viscosity of Component A will be markedly influenced by the degree of dispersion of gellant and magnesium silicate.)

- c. Quality of Ingredients. Ingredient materials shall exhibit the following properties:

- (1) Coal Tar Pitch. Coal tar pitch shall have the following characteristics:

	<u>Minimum</u>	<u>Maximum</u>
B & R softening point, degree C (Method ASTM D 36)	70	75.0
Ash, percent by weight (Method ASTM D 3176)		0.5
Benzene insolubles, percent by weight (Method ASTM D 367)		18.0
Volatiles, percent by weight		
Under 250 degrees C		0.0
Under 300 degrees C		5.0

- (2) The Gellant. The gellant or thixotrophy-producing additive for coal tar-epoxy paint shall be an organic derivative of magnesium montmorillonite for use in low polarity hydrocarbons. It shall be a creamy white powder having a bulking value of  $15 \pm 0.2$  lbs. per gallon and water content of 3.0% maximum (Bentone 38, National Lead Company has these properties.)

- (3) The Catalyst. The catalyst shall be 3, 4, 6 Tri-(Dimethylamino methyl) phenol. (DMP-30 Rohm and Haas Company is such a chemical.)

- (4) Epoxy Resin. Epoxy resin shall be a diepoxide condensation product of bisphenol A and epichlorohydrin with terminal epoxide group with the following properties:

	<u>Minimum</u>	<u>Maximum</u>
Nonvolatile content	99	
Epoxide equivalent	180	200

(583-2)

	<u>Minimum</u>	<u>Maximum</u>
Color, Gardner		5
Viscosity, 25°C, Brookfield, Poises	100	160
Specific Gravity 25°C/25°C	1.15	1.18
 (5) <u>Polyamide Resin.</u> Polyamide resin shall be a condensation product of dimerized fatty acid and polyamines with the following characteristics:		
Amine Value	330-360	
Color, Gardner	12 maximum	
Specific Gravity 25°C/25°C	0.96-0.98	
Viscosity, Poises, 75°C, Brookfield	7-9	
Nonvolatile content, percent	97	
 (6) <u>Xylene.</u> Xylene shall conform to Federal Specification TT-X-916b, "Xylene (for use in organic coatings)."		
 (7) <u>Ethyl Alcohol.</u> Ethyl alcohol (95% denatured) shall conform to Federal Specification O-E-760b, and Amendment 2, "Ethyl Alcohol (Ethanol); Denatured Alcohol; and Proprietary Solvent," Grade III or IV.		
 (8) <u>Magnesium Silicate.</u> Magnesium silicate shall conform to Federal Specification TT-P-403, "Pigment, Magnesium Silicate, Dry," Medium Oil Absorption.		

### 3. PHYSICAL REQUIREMENTS

When tested by the methods described in Section 4:

a. Component A shall exhibit the following properties:

- |                                    |             |
|------------------------------------|-------------|
| (1) Viscosity, poises (Brookfield) | 160 maximum |
| (2) Nonvolatile residue, percent   | 78 minimum  |

(583-3)

b. The mixed paint shall exhibit the following properties:

- |                                  |           |
|----------------------------------|-----------|
| (1) Sag, 12 mil wet film         | None      |
| (2) Pot life at 77° ± 3°F, hours | 4 minimum |

c. The cured film shall exhibit the following properties:

- |   |                 |
|---|-----------------|
| (1) Penetration, 200 grams, 5 seconds, 77°F, hundredth centimeter units | 3 maximum       |
| (2) Odor after 48 hours curing  | Pass test       |
| (3) Flexibility on ½-inch mandrel                                       | Pass test       |
| (4) Adhesion  | No delamination |

#### 4. TEST METHODS

a. Viscosity of Component A. Fill a container having a diameter and a height of not less than 3 and 3-3/4 inches respectively to a depth of not less than 3 inches with a representative sample of Component A. Set up a Model RVT or RVF-100 Brookfield Synchro-Electric Viscometer with a No. 7 spindle and with guard removed. Bring the sample to a temperature of 25°C and stir vigorously for 2 minutes with a stiff spatula. Immediately after stirring, lower the viscometer until the spindle is immersed until ½ of the "neck" mark is covered. Run the viscometer at 100 r.p.m. for 1 minute and take a reading of the position of the pointer on the dial. If the dial reading is 40 or less, the viscosity shall be considered to be 160 Poises or less. If the reading is over 40, immediately start the motor and take additional readings at 1-minute intervals. If no readings of 40 or less are obtained out of 10 readings, taken at 1-minute intervals, the viscosity of the material shall be considered to be over 160 Poises.

b. Nonvolatile Content of Component A. Place a short length of stiff wire such as a partially-straightened paper clip into a small disposable aluminum dish of about 2 inches diameter and weigh to the nearest 0.1 milligram. As rapidly as possible, place between 2 and 3 grams of Component A into the dish and weigh immediately to the nearest 0.1 milligram. After weighing, spread the material over the bottom of the dish. Heat the dish, wire and contents in a well-ventilated

convection-type oven maintained at  $105^{\circ} \pm 2^{\circ}\text{C}$ , for 3 hours. After the material has been in the oven for a few minutes, and periodically thereafter, stir the material. Cool in a desiccator, weigh to the nearest 0.1 milligram and calculate the percentage nonvolatile.

- c. Sag Test of Coal Tar-Epoxy Paint. Prepare approximately one pint of the material by thoroughly mixing 100 ml. of Component B into 350 ml. of Component A. Determine its viscosity immediately after mixing, using the same procedure as for Component A above but employing a No. 6 spindle. If the material produces a scale reading of more than 80, at 100 r.p.m. after 5 readings taken at 1-minute intervals, reduce the viscosity by adding xylene in small increments until a reading not greater than 80 is obtained. Press a strip of 1-inch masking tape across the full width of a solvent cleaned 3" x 6" cold-rolled steel panel. The tape should be parallel to and centered on the shorter axis of the panel. Within 30 minutes after mixing, apply the material to the panel to a wet film thickness of at least 12 mils as determined by an Interchemical wet film thickness gage. The application may be made with a doctor blade having a gap of approximately 25 mils or by brush. Immediately after applying the material, carefully remove the masking tape and stand the panel in a vertical position with the bare strip horizontal. Examine the panel after four hours. Sagging or running of the coating into the bare area shall constitute failure of the material to pass the sag test.
- d. Penetration Test on Coal Tar-Epoxy Film. Select and solvent spray-clean two 3" x 6" steel panels in accordance with Method 2011 of Federal Test Method Standard 141. Draw down, in accordance with Method 2161, a coat of the paint mixed (including any thinning) for the sag test. Allow the film to dry 18 to 24 hours in a horizontal position at  $77^{\circ} \pm 3^{\circ}\text{F}$  and at a relative humidity of not over 60%. Apply a second coat over and at right angles to the first, using freshly mixed paint prepared identically to that used for the first coat. The draw-down applicator(s) shall be such as to provide a total dry-film thickness for the two coats of  $23 \pm 3$  mils and the coats shall be of approximately equal thickness. Allow the second coat to dry in a horizontal position for 120 hours at  $77^{\circ} \pm 3^{\circ}\text{F}$ . After 72 hours of curing, and daily thereafter, clamp the panel onto the table of a penetrometer (ASTM D5) so that the needle is over an area which is within the prescribed thickness range (as measured by Method 6181) and determine

(583-5)

the penetration, using a total load of 200 grams applied for 5 seconds at 77°F. The average of the 3 lowest out of 5 penetration readings, all taken within a 1 centimeter square, shall not exceed 3/100 of a centimeter after 120 hours of curing.

- e. Flexibility of Coal Tar-Epoxy Film. Sandblast 3 steel panels (similar to those used in the penetration test) at low pressure with clean, 30 to 50 mesh, non-metallic abrasive until a uniform, gray-white surface, with well developed anchor pattern, is achieved. (Note: It may be necessary to blast both sides of panel, in stages, to avoid warping.) Blow off dust with a clean air blast. Immediately after recoating of the penetration test panel, apply 10 to 12 mils (wet thickness as determined with an Interchemical gage) of the same material to the flexibility test panels in accordance with Method 2161, Federal Test Method Standard No. 141. Allow the film to cure in the horizontal position for 120 hours at 77° ± 3°F or for a period equal to that required to reach a penetration of 3/100 centimeter on the penetration test panel, whichever occurs first. With film side up, and in a time interval of approximately 1 second, bend each of the flexibility panels double over a 1/2-inch diameter mandrel. Cracks in any of the panels visible to the naked eye shall constitute failure except that edge cracks extending no further than 1/2 inch or small local fissures emanating from air bubbles, craters and similar imperfections shall be disregarded.
- f. Adhesion of Coal Tar-Epoxy Film. Test the adhesion of the coating on an unbroken area of the flexibility panel with a sharp knife after the panel has cured 120 hours. It shall strongly resist being removed from the metal. Also, test the intercoat adhesion of the film on a penetration panel after 120 hours curing, with a knife. Any delamination of the two coats shall constitute failure.
- g. Pot Life Test of Coal Tar-Epoxy Paint. Mix 100 ml. of Compound "B" into 350 ml. of Component "A" both of which have been brought to a temperature of 77° ± 3°F before mixing. Pour the material into a pint tin can, seal tightly and maintain at 77° ± 3°F. Examine the material in four hours from the time it was mixed. For its pot life to be considered satisfactory, the mixed material must still be in a fluid condition and when thinned with no more than 100 ml. of xylene shall be lump-free and brushable.

(583-6)

- h. Odor of Dried Coal Tar-Epoxy Film. Examine the paint film or one\*of the flexibility panels for odor after it has been cured for 48 hours. The film shall be free of any odor except for a faint odor of xylene.

5. PACKAGING

Three and one-half gallons of Component A shall be packaged in a standard 5-gallon container with a lug-type, removable lid. Component B shall be packaged to the full mark in a one-gallon, friction-lid container. In addition to other labelling requirements, each of the 5-gallon containers shall bear instructions for properly mixing the two components immediately prior to use.

(583-7)

## 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. Barbed wire and woven wire shall have zinc coating of at least 0.50 ounce per square foot of wire surface unless otherwise specified.

#### 4. STAYS, FASTENERS, AND TENSION WIRE

Stays and fasteners shall conform to the requirements of Federal Specification RR-F-221 unless otherwise specified. Tension wires shall have a tensile strength not less than 58,000 pounds per square inch. Stays, fasteners and tension wire shall have Class 3 zinc coating as specified in ASTM Specification A 641.

#### 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

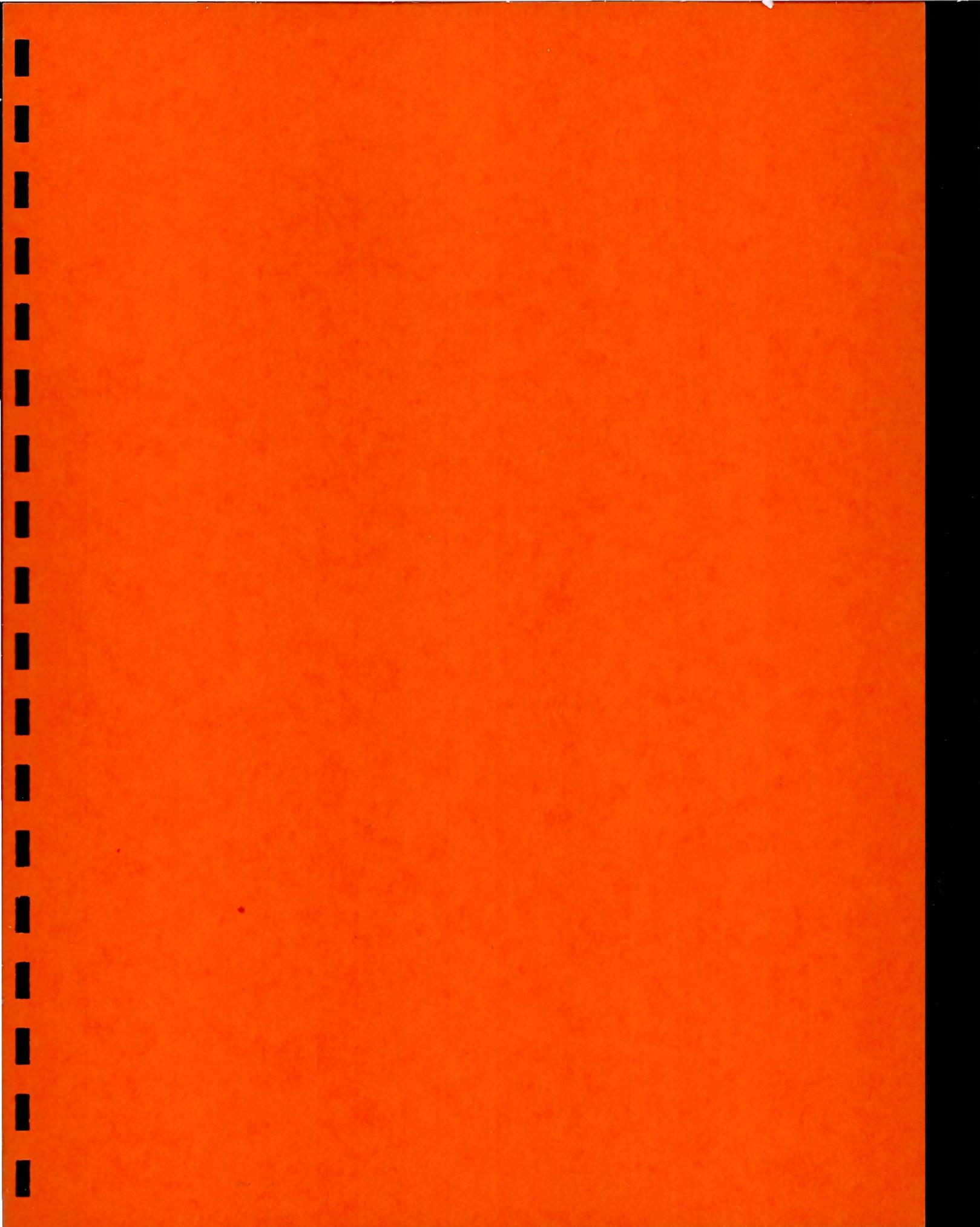
Wire gates shall be the type shown on the drawings, constructed in accordance with these specifications at the locations and to the dimensions shown on the drawings. The materials shall conform to the kinds, grades, and sizes specified for new fence, and shall include the necessary fittings and stays.

10. STAPLES

Staples used to fasten fence wire to wood posts shall be 9-gage galvanized wire with a minimum length of  $1\frac{1}{2}$  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, bolts, and other small hardware may be protected by electrodeposited zinc or cadmium coating.



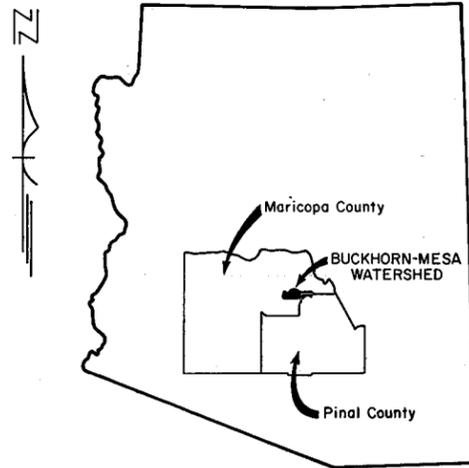
# BUCKHORN-MESA WATERSHED PROTECTION AND FLOOD PREVENTION PROJECT MARICOPA AND PINAL COUNTIES, ARIZONA

## PLANS FOR THE CONSTRUCTION OF SPOOK HILL FLOODWATER RETARDING STRUCTURE

PREPARED FOR THE  
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
BOARD OF SUPERVISORS OF PINAL COUNTY  
EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT

BY

SOIL CONSERVATION SERVICE  
U. S. DEPARTMENT OF AGRICULTURE



### INDEX OF DRAWINGS

DRWG. NO.	SHT. NO.	TITLE
7-E-23797	1.	INDEX OF DRAWINGS
	2.	LOCATION MAP
	3.	PLAN & PROFILE OF DAM Sta. 85+00 to Sta. 130+00
	4.	PLAN & PROFILE OF DAM Sta. 130+00 to Sta. 175+00
	5.	PLAN & PROFILE OF DAM Sta. 175+00 to Sta. 220+00
	6.	PLAN & PROFILE OF DAM Sta. 220+00 to Sta. 265+00
	7.	PLAN & PROFILE OF DAM Sta. 265+00 to Sta. 303+75±
	8.	PLAN OF SPILLWAYS
	9.	PLAN OF EMERGENCY SPILLWAY
	10.	PROFILE & CROSS SECTIONS OF EMERGENCY SPILLWAY
	11.	TYPICAL PLAN OF DAM & PRINCIPAL SPILLWAY INLET CHANNEL
	12.	CROSS SECTIONS OF DAM
	13.	CROSS SECTIONS OF DAM
	14.	PLAN-BROWN ROAD RAMP
	15.	PROFILE & CROSS SECTIONS-BROWN ROAD RAMP
	16.	PLAN-MCKELLIPS ROAD RAMP
	17.	PROFILE & CROSS SECTIONS-MCKELLIPS ROAD RAMP
	18.	PLAN-MCDOWELL ROAD RAMP
	19.	PROFILE & CROSS SECTIONS-MCDOWELL ROAD RAMP
	20.	PRINCIPAL SPILLWAY LAYOUT
	21.	PRINCIPAL SPILLWAY INLET LAYOUT
	22.	PRINCIPAL SPILLWAY INLET DETAILS
	23.	PRINCIPAL SPILLWAY INLET DETAILS
	24.	PRINCIPAL SPILLWAY INLET DETAILS
	25.	PRINCIPAL SPILLWAY CONDUIT & TRANSITION LAYOUT
	26.	PRINCIPAL SPILLWAY CONDUIT DETAILS
	27.	PRINCIPAL SPILLWAY TRANSITION DETAILS
	28.	PRINCIPAL SPILLWAY OUTLET LAYOUT
	29.	PRINCIPAL SPILLWAY OUTLET DETAILS
	30.	PRINCIPAL SPILLWAY OUTLET DETAILS
	31.	EMERGENCY SPILLWAY LAYOUT
	32.	EMERGENCY SPILLWAY LAYOUT
	33.	EMERGENCY SPILLWAY DETAILS-FOOTING & HEADWALL EXTENSION
	34.	EMERGENCY SPILLWAY DETAILS-SIDEWALL & WINGWALL
	35.	EMERGENCY SPILLWAY DETAILS-CROSS SECTIONS
	36.	EMERGENCY SPILLWAY DETAILS-INTERIOR BUTTRESS SECTION
	37.	EMERGENCY SPILLWAY DETAILS-EXTERIOR BUTTRESS SECTION
	38.	EMERGENCY SPILLWAY DETAILS-BLOCK SECTION
	39.	EMERGENCY SPILLWAY OUTLET CHANNEL PROTECTION DETAILS
	40.	IDENTIFICATION SIGN
	41.	FENCING DETAILS
	42.	FENCING DETAILS
	43.	UTILITY CROSSINGS
	44.	PAY LIMITS
	45.	LOG OF TEST PITS-BORROW AREAS

#### GENERAL NOTES

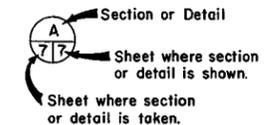
- Elevations are in feet above mean sea level U.S.G.S. datum.
- All stationing refers to centerline of construction and is the measured horizontal distance.
- All soil classification symbols shown are based on the unified soil classification system. Field identification was used except where indicated by an asterisk (\*). This denotes laboratory classification. Logs and descriptions are abridged. Complete drilling logs, laboratory reports and geology report are available for inspection at the project office.
- All bearings are referenced to True North.
- Blow count indicated is the results of standard penetration tests made with a split spoon sampler. Results are expressed as blows per foot.

#### STRUCTURAL NOTES

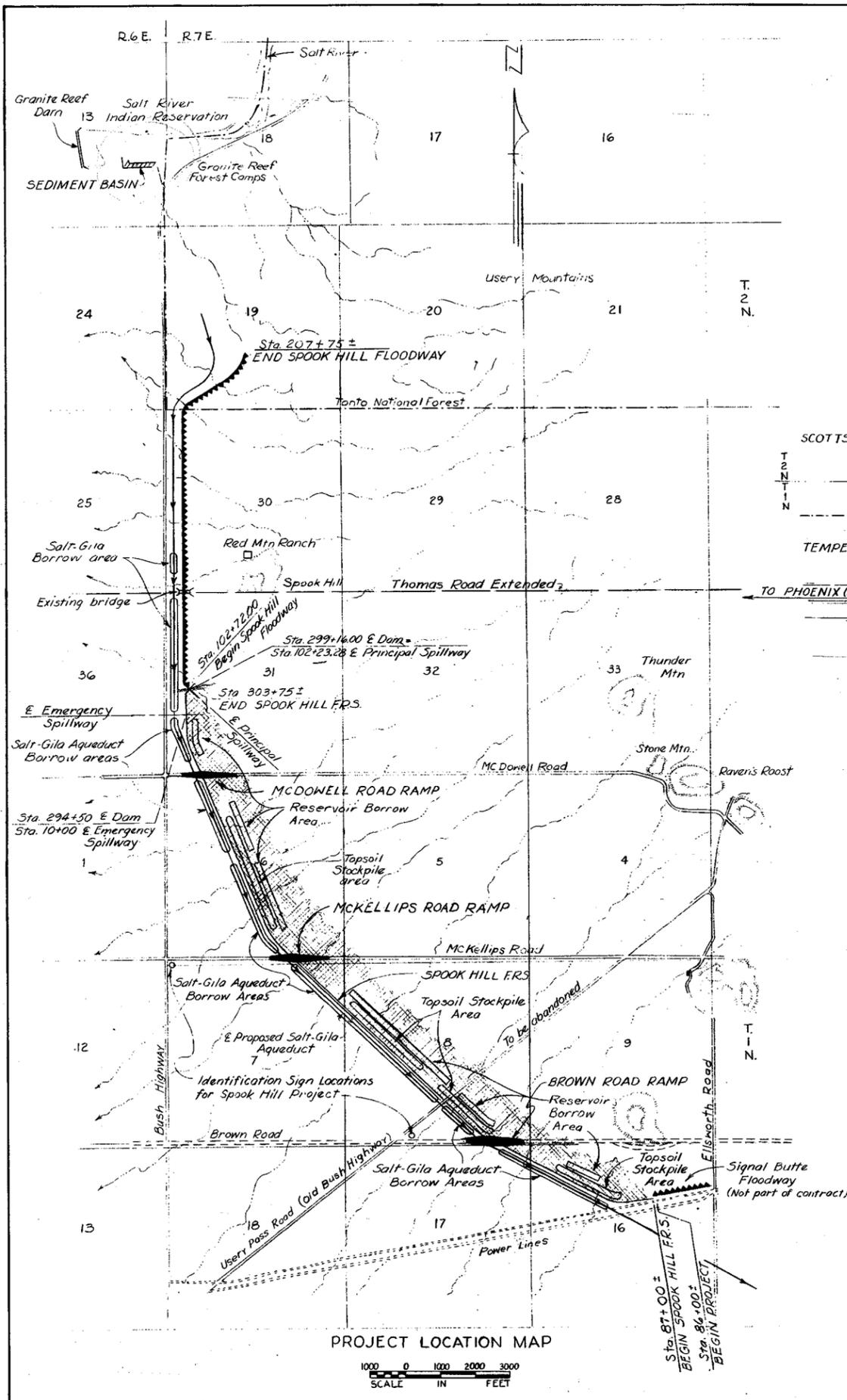
- Exposed concrete edges shall be chamfered one inch or rounded.
- Reinforcing bar spacing is center to center of bars. Bar cover is clear distance between surface of bar and face of concrete and shall be two inches for formed and top surfaces and three inches for surfaces placed against the earth unless otherwise shown.
- In sections with a single mat of reinforcing, the steel shall be positioned in the center of the section unless otherwise shown.
- Bar splices shall be lapped a minimum of 30 bar diameters of the smaller bar but not less than 12 inches, unless specifically shown otherwise.
- All exposed metal including anchor bolts, nuts, washers, etc. shall be galvanized unless otherwise noted.

#### LEGEND

- Floodwater retarding structure
- Floodway
- Road ramp crossings
- Salt Gila aqueduct
- Existing improved road
- Existing unimproved road
- Pipeline
- Existing trail
- Existing fence
- Test pit
- Test hole
- Power line
- Telephone line

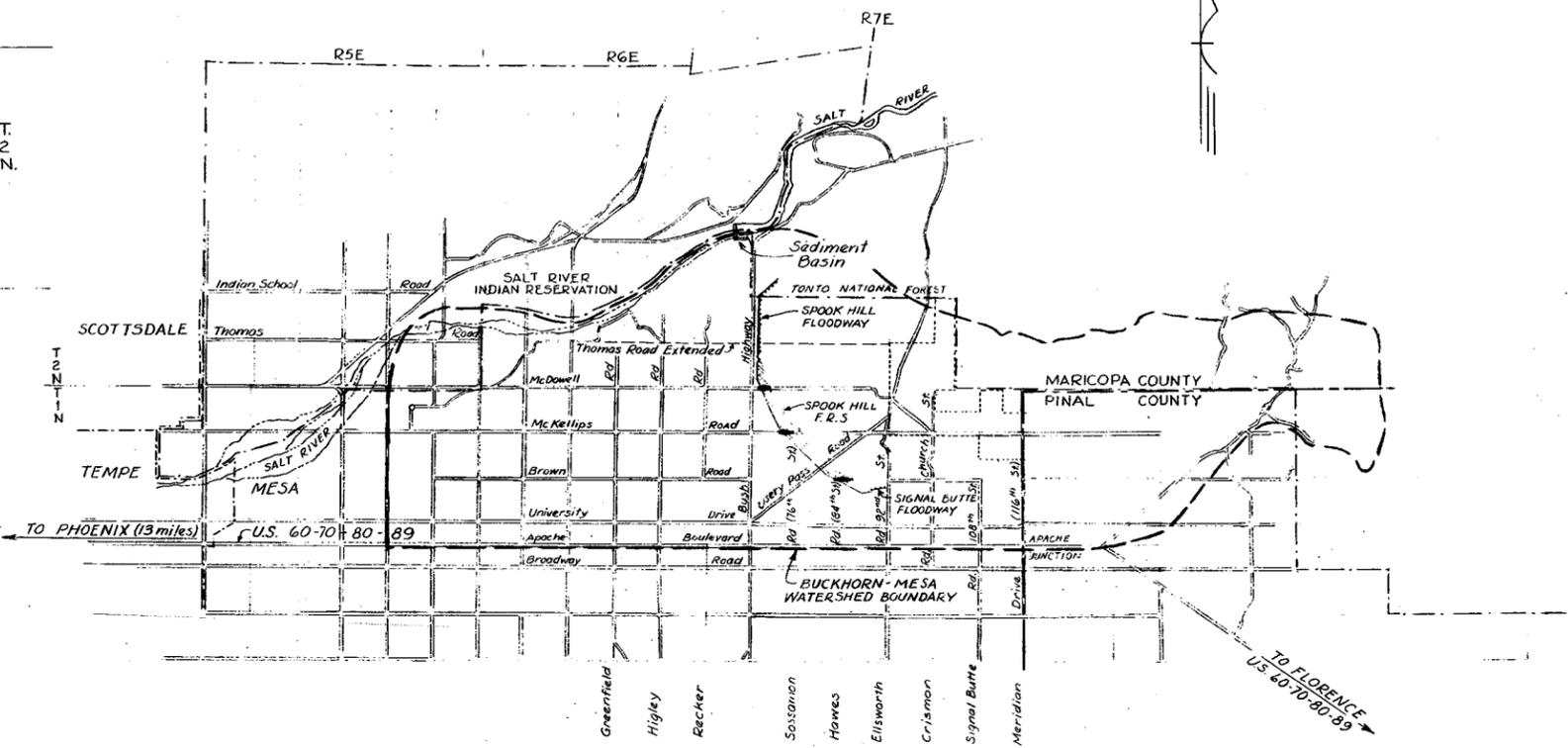


EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT  <b>APPROVED</b>  DATE <u>4-21-77</u> <i>Jim Miller</i> Chairman, Board of Supervisors	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  <b>APPROVED</b>  DATE <u>4/21/77</u> <i>[Signature]</i> Chief Engineer	REVISIONS  10/77 SHEET # 2,3,4,6,11,12,14,15,16,17,18,19 & 41
INDEX OF DRAWINGS <b>SPOOK HILL F.R.S.</b> BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE		
Designed: Soil Conservation Service Date 10-76 Approved by: <i>[Signature]</i> Title: Head, E. & W. E. Unit Drawn: Soil Conservation Service Date 10-76 Title: State Conservation Engineer Traced: E. F. S. A. Q. M. Date 11-76 Sheet No. 1 Checked: P. J. M. Date 12-76 Drawing No. <b>7-E-23797</b> of 45		



PROJECT LOCATION MAP

SCALE IN FEET  
0 1000 2000 3000



WATERSHED LOCATION MAP

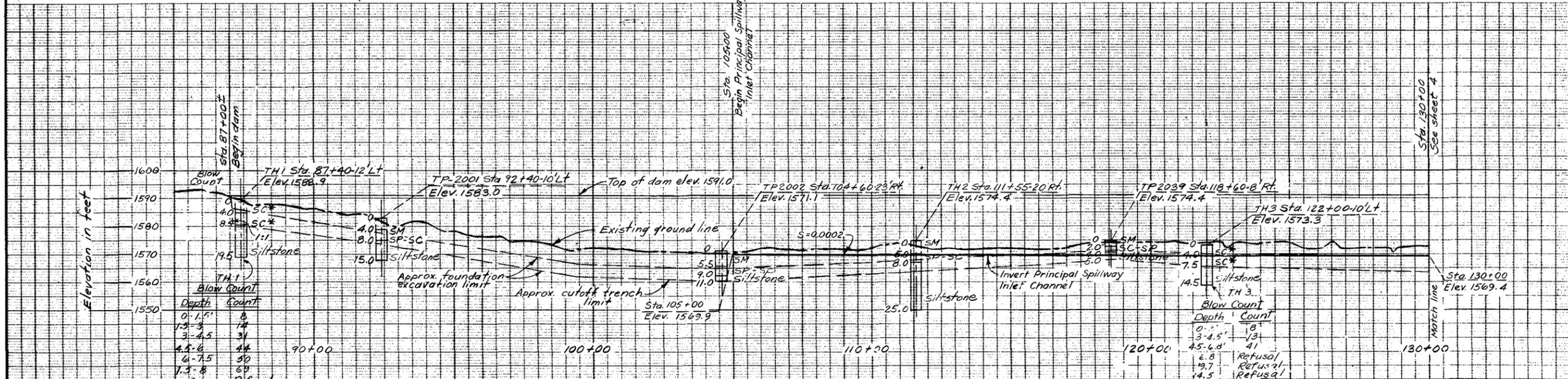
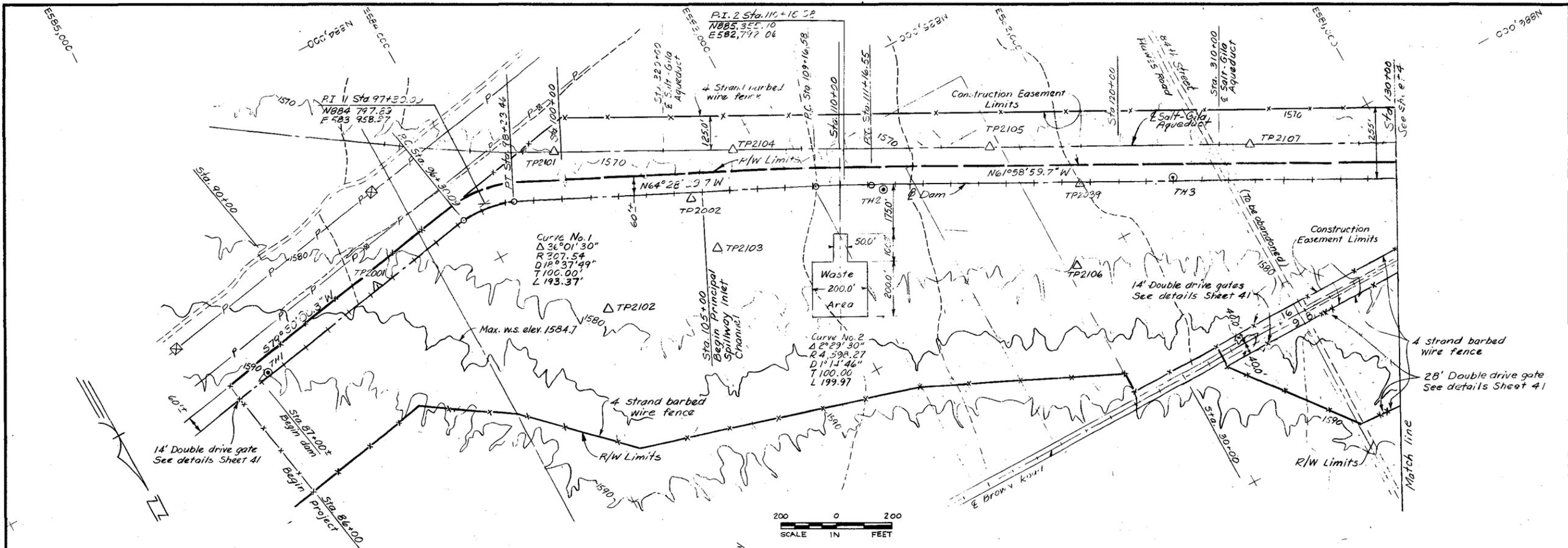
SCALE IN MILES  
0 1 2 3 4 5

LOCATION MAP  
SPOOK HILL F.R.S.  
BUCKHORN-MESA W.P.P.  
MARICOPA & PINAL COUNTIES, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

REVISIONS		Date	Approved by
10-77	Add Reservoir Borrow Areas	4-75	
Drawn	J.E.B.	4-75	
Traced	E.F.S.	6-76	
Checked	P.J.M.	7-76	

Sheet	No. 2	Drawing No.	7-E-23797
of	45		



Notes:

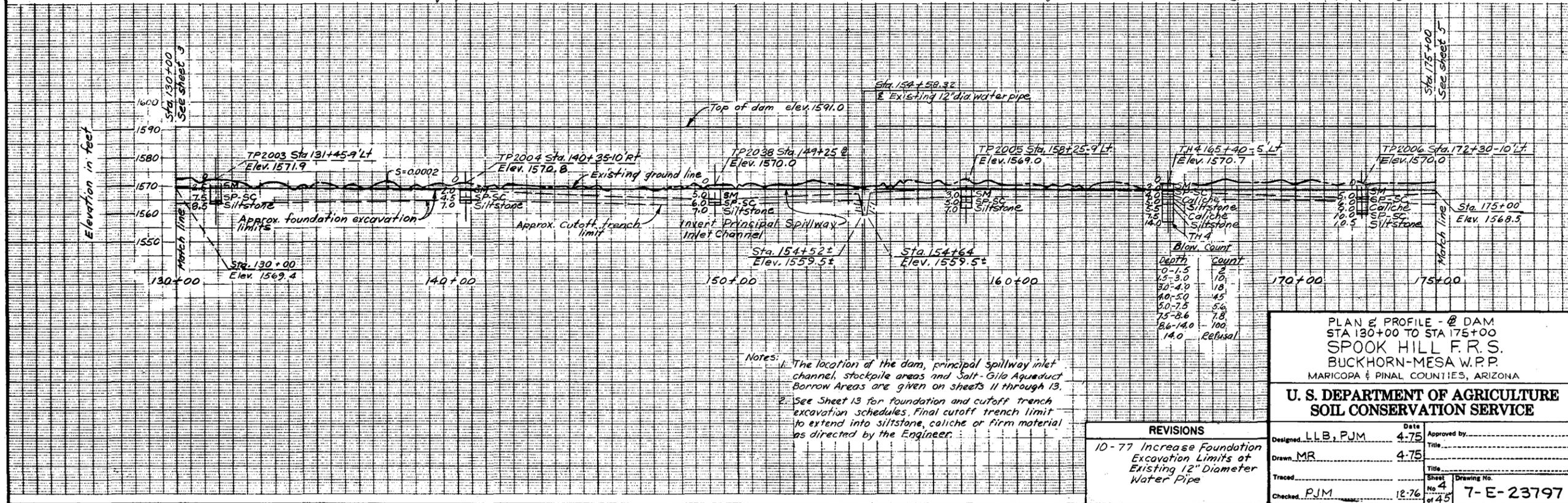
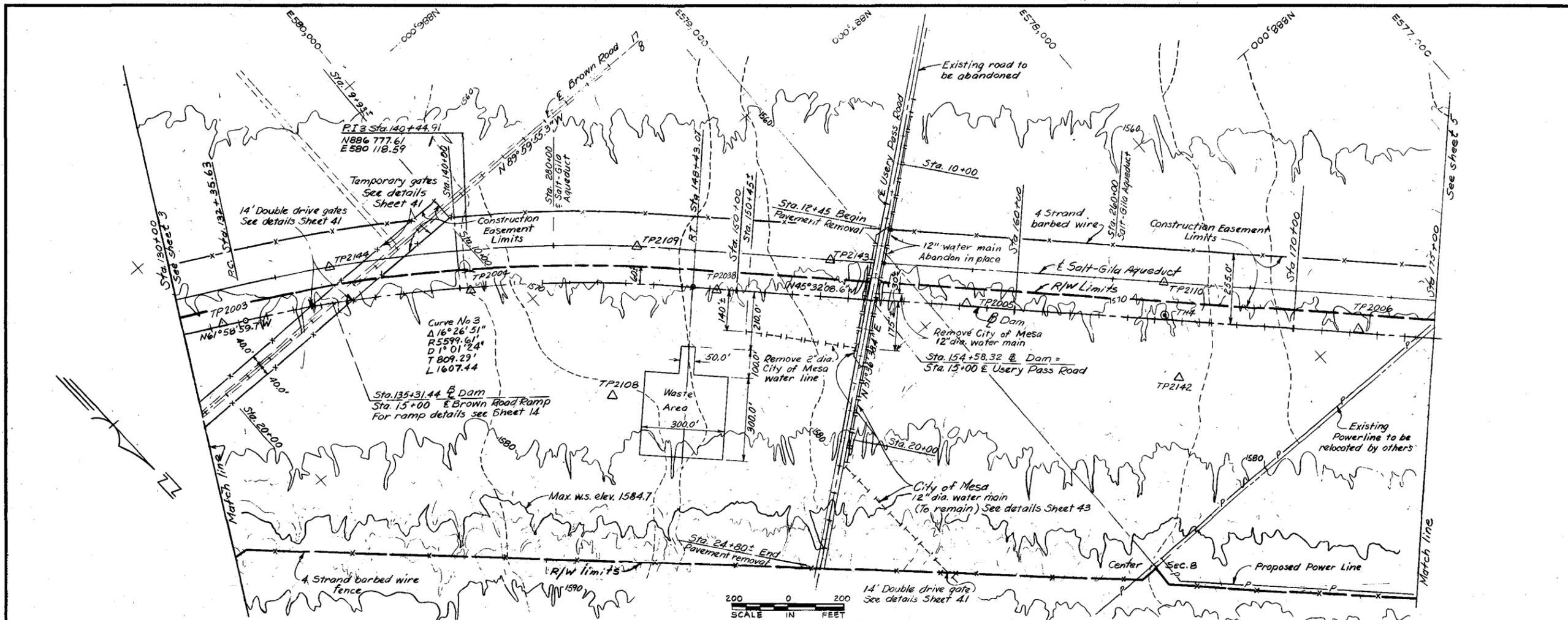
- The location of the dam, principal spillway inlet channel, stockpile areas and Salt-Gila Aqueduct Borrow Areas are given on Sheets 11 through 13.
- See Sheet 13 for foundation and cutoff trench excavation schedules. Final cutoff trench limit to extend into siltstone, caliche or firm material as directed by the Engineer.

PLAN & PROFILE - @ DAM  
 STA 85+00 TO STA 130+00  
 SPOOK HILL F.R.S.  
 BUCKHORN-MESA W.R.P.  
 MARICOPA & PINAL COUNTIES, ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

Designed: LLB, PJM	Date: 4-75	Approved by:
Drawn: MR	Title: 4-75	
Traced:	Title:	
Checked: PJM	Sheet No. 3 of 4.5	Drawing No. 7-E-23797

REVISIONS	
10-77 Add 2-28' Double drive gates North of Brown Road	



Notes:  
 1. The location of the dam, principal spillway inlet channel, stockpile areas and Salt-Gila Aqueduct Borrow Areas are given on sheets 11 through 13.  
 2. See Sheet 13 for foundation and cutoff trench excavation schedules. Final cutoff trench limit to extend into siltstone, caliche or firm material as directed by the Engineer.

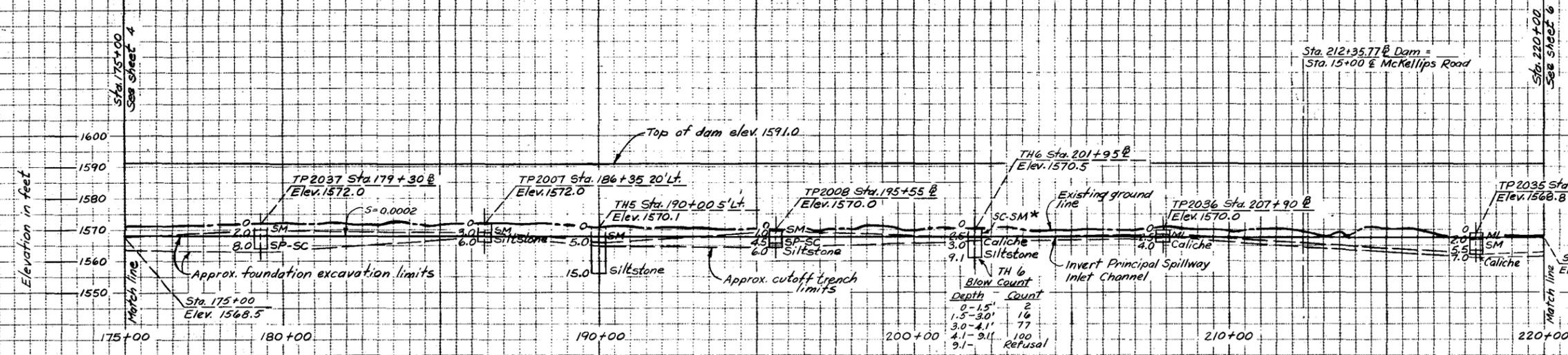
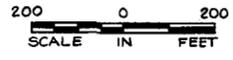
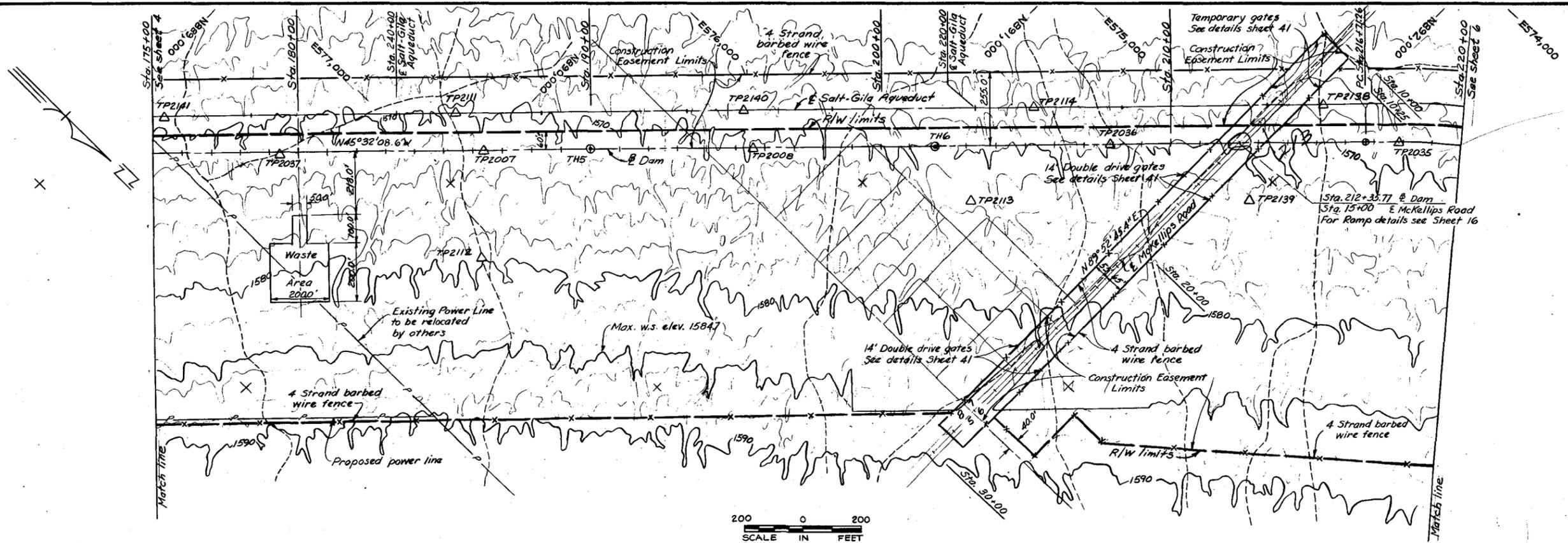
PLAN & PROFILE - @ DAM  
 STA 130+00 TO STA 175+00  
 SPOOK HILL F.R.S.  
 BUCKHORN-MESA W.P.P.  
 MARICOPA & PINAL COUNTIES, ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

REVISIONS		Date	Approved by
10-77 Increase Foundation Excavation Limits at Existing 12" Diameter Water Pipe	LLB, PJM	4-75	
	MR	4-75	
	PJM	12-76	

Designed: L.L.B., PJM  
 Drawn: MR  
 Traced: \_\_\_\_\_  
 Checked: PJM

Title: \_\_\_\_\_  
 Sheet No. 4 of 45  
 Drawing No. 7-E-23797

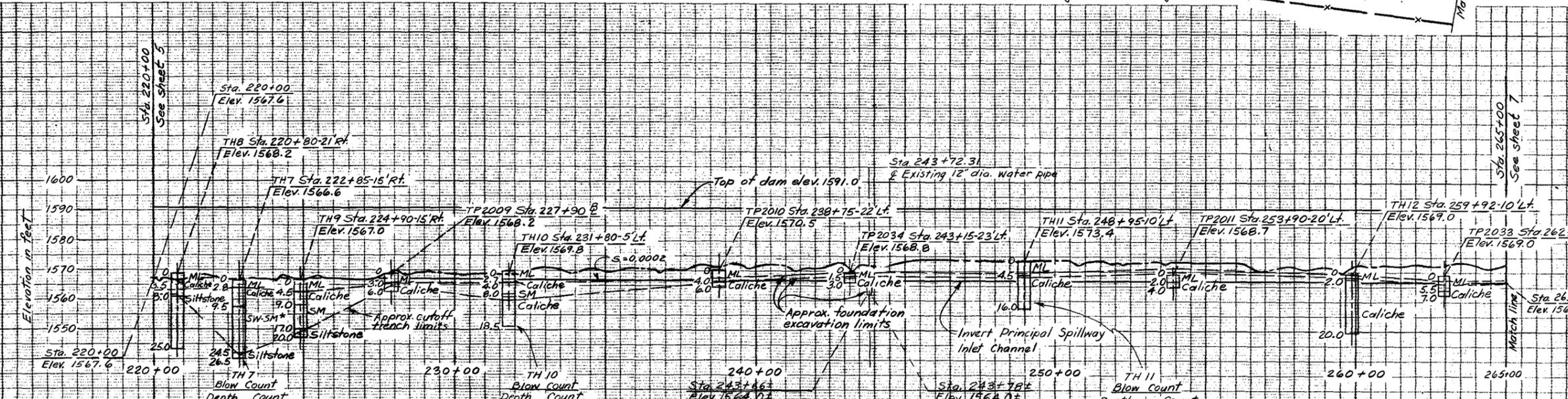
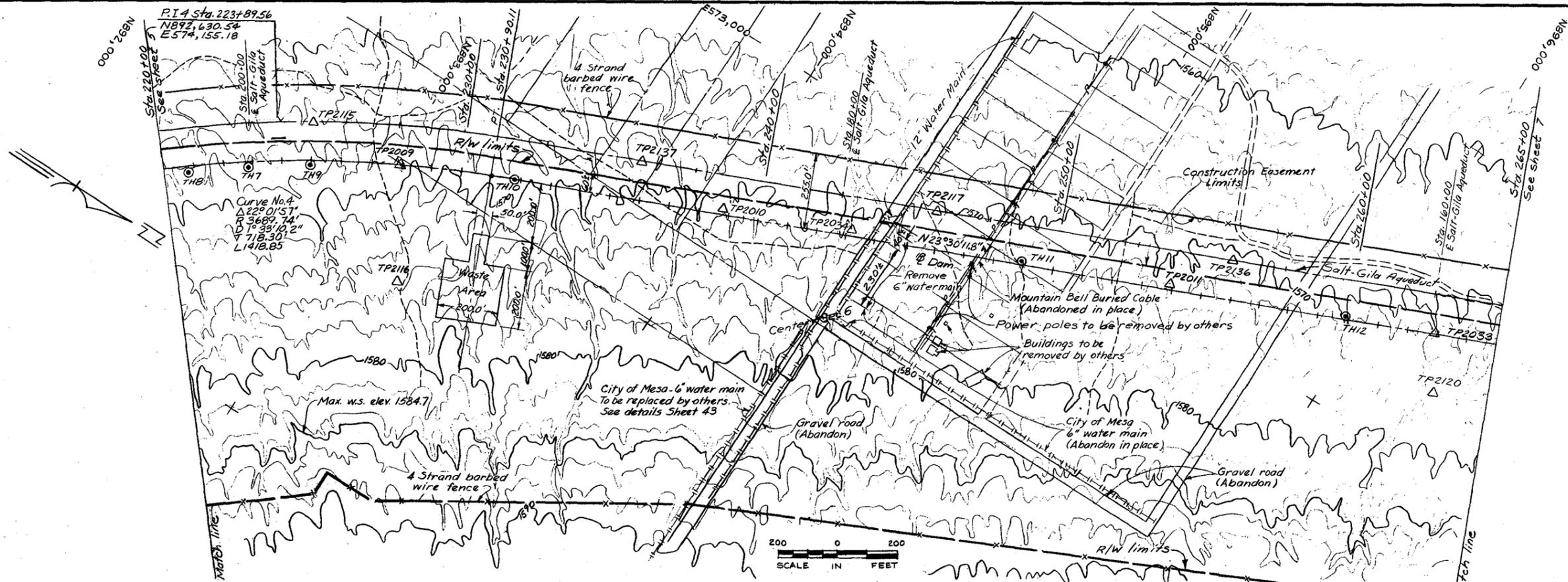


- Notes:
- The location of the dam, principal spillway inlet channel, stockpile areas and Salt-Gila Aqueduct Borrow Areas are given on Sheets 11 through 13.
  - See Sheet 13 for foundation and cutoff trench excavation schedules. Final cutoff trench limit to extend into siltstone, caliche or firm material as directed by the Engineer.

PLAN & PROFILE - @ DAM  
 STA 175+00 TO STA 220+00  
 SPOOK HILL F. R. S.  
 BUCKHORN-MESA W.P.P.  
 MARICOPA & PINAL COUNTIES, ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

Designed	LLB, PJM	Date	4-75
Drawn	MR	Approved by	4-75
Traced		Title	
Checked	PJM	Sheet No.	5 of 45
		Drawing No.	7-E-23797



TH7

Depth	Count
0-1.5	3
1.5-3.0	3
3.0-4.5	73
4.5-6.0	78
6.0-7.5	87
7.5-9.0	96
9.0-10.5	100
10.5-12.0	Refusal
12.0-13.5	Refusal
13.5-15.0	Refusal
15.0-16.5	Refusal
16.5-18.0	Refusal
18.0-19.5	Refusal
19.5-21.0	Refusal
21.0-22.5	Refusal
22.5-24.0	Refusal
24.0-25.5	Refusal
25.5-27.0	Refusal
27.0-28.5	Refusal
28.5-30.0	Refusal
30.0-31.5	Refusal
31.5-33.0	Refusal
33.0-34.5	Refusal
34.5-36.0	Refusal
36.0-37.5	Refusal
37.5-39.0	Refusal
39.0-40.5	Refusal
40.5-42.0	Refusal
42.0-43.5	Refusal
43.5-45.0	Refusal
45.0-46.5	Refusal
46.5-48.0	Refusal
48.0-49.5	Refusal
49.5-51.0	Refusal
51.0-52.5	Refusal
52.5-54.0	Refusal
54.0-55.5	Refusal
55.5-57.0	Refusal
57.0-58.5	Refusal
58.5-60.0	Refusal
60.0-61.5	Refusal
61.5-63.0	Refusal
63.0-64.5	Refusal
64.5-66.0	Refusal
66.0-67.5	Refusal
67.5-69.0	Refusal
69.0-70.5	Refusal
70.5-72.0	Refusal
72.0-73.5	Refusal
73.5-75.0	Refusal
75.0-76.5	Refusal
76.5-78.0	Refusal
78.0-79.5	Refusal
79.5-81.0	Refusal
81.0-82.5	Refusal
82.5-84.0	Refusal
84.0-85.5	Refusal
85.5-87.0	Refusal
87.0-88.5	Refusal
88.5-90.0	Refusal
90.0-91.5	Refusal
91.5-93.0	Refusal
93.0-94.5	Refusal
94.5-96.0	Refusal
96.0-97.5	Refusal
97.5-99.0	Refusal
99.0-100.5	Refusal

TH10

Depth	Count
0-1.5	3
1.5-3.0	19
3.0-4.5	25
4.5-6.0	8
6.0-7.5	63
7.5-9.0	89
9.0-10.5	Refusal
10.5-12.0	Refusal
12.0-13.5	Refusal
13.5-15.0	Refusal
15.0-16.5	Refusal
16.5-18.0	Refusal
18.0-19.5	Refusal
19.5-21.0	Refusal
21.0-22.5	Refusal
22.5-24.0	Refusal
24.0-25.5	Refusal
25.5-27.0	Refusal
27.0-28.5	Refusal
28.5-30.0	Refusal
30.0-31.5	Refusal
31.5-33.0	Refusal
33.0-34.5	Refusal
34.5-36.0	Refusal
36.0-37.5	Refusal
37.5-39.0	Refusal
39.0-40.5	Refusal
40.5-42.0	Refusal
42.0-43.5	Refusal
43.5-45.0	Refusal
45.0-46.5	Refusal
46.5-48.0	Refusal
48.0-49.5	Refusal
49.5-51.0	Refusal
51.0-52.5	Refusal
52.5-54.0	Refusal
54.0-55.5	Refusal
55.5-57.0	Refusal
57.0-58.5	Refusal
58.5-60.0	Refusal
60.0-61.5	Refusal
61.5-63.0	Refusal
63.0-64.5	Refusal
64.5-66.0	Refusal
66.0-67.5	Refusal
67.5-69.0	Refusal
69.0-70.5	Refusal
70.5-72.0	Refusal
72.0-73.5	Refusal
73.5-75.0	Refusal
75.0-76.5	Refusal
76.5-78.0	Refusal
78.0-79.5	Refusal
79.5-81.0	Refusal
81.0-82.5	Refusal
82.5-84.0	Refusal
84.0-85.5	Refusal
85.5-87.0	Refusal
87.0-88.5	Refusal
88.5-90.0	Refusal
90.0-91.5	Refusal
91.5-93.0	Refusal
93.0-94.5	Refusal
94.5-96.0	Refusal
96.0-97.5	Refusal
97.5-99.0	Refusal
99.0-100.5	Refusal

TH11

Depth	Count
0-1.5	3
1.5-3.0	12
3.0-4.5	27
4.5-6.0	67
6.0-7.5	Refusal
7.5-9.0	Refusal
9.0-10.5	Refusal
10.5-12.0	Refusal
12.0-13.5	Refusal
13.5-15.0	Refusal
15.0-16.5	Refusal
16.5-18.0	Refusal
18.0-19.5	Refusal
19.5-21.0	Refusal
21.0-22.5	Refusal
22.5-24.0	Refusal
24.0-25.5	Refusal
25.5-27.0	Refusal
27.0-28.5	Refusal
28.5-30.0	Refusal
30.0-31.5	Refusal
31.5-33.0	Refusal
33.0-34.5	Refusal
34.5-36.0	Refusal
36.0-37.5	Refusal
37.5-39.0	Refusal
39.0-40.5	Refusal
40.5-42.0	Refusal
42.0-43.5	Refusal
43.5-45.0	Refusal
45.0-46.5	Refusal
46.5-48.0	Refusal
48.0-49.5	Refusal
49.5-51.0	Refusal
51.0-52.5	Refusal
52.5-54.0	Refusal
54.0-55.5	Refusal
55.5-57.0	Refusal
57.0-58.5	Refusal
58.5-60.0	Refusal
60.0-61.5	Refusal
61.5-63.0	Refusal
63.0-64.5	Refusal
64.5-66.0	Refusal
66.0-67.5	Refusal
67.5-69.0	Refusal
69.0-70.5	Refusal
70.5-72.0	Refusal
72.0-73.5	Refusal
73.5-75.0	Refusal
75.0-76.5	Refusal
76.5-78.0	Refusal
78.0-79.5	Refusal
79.5-81.0	Refusal
81.0-82.5	Refusal
82.5-84.0	Refusal
84.0-85.5	Refusal
85.5-87.0	Refusal
87.0-88.5	Refusal
88.5-90.0	Refusal
90.0-91.5	Refusal
91.5-93.0	Refusal
93.0-94.5	Refusal
94.5-96.0	Refusal
96.0-97.5	Refusal
97.5-99.0	Refusal
99.0-100.5	Refusal

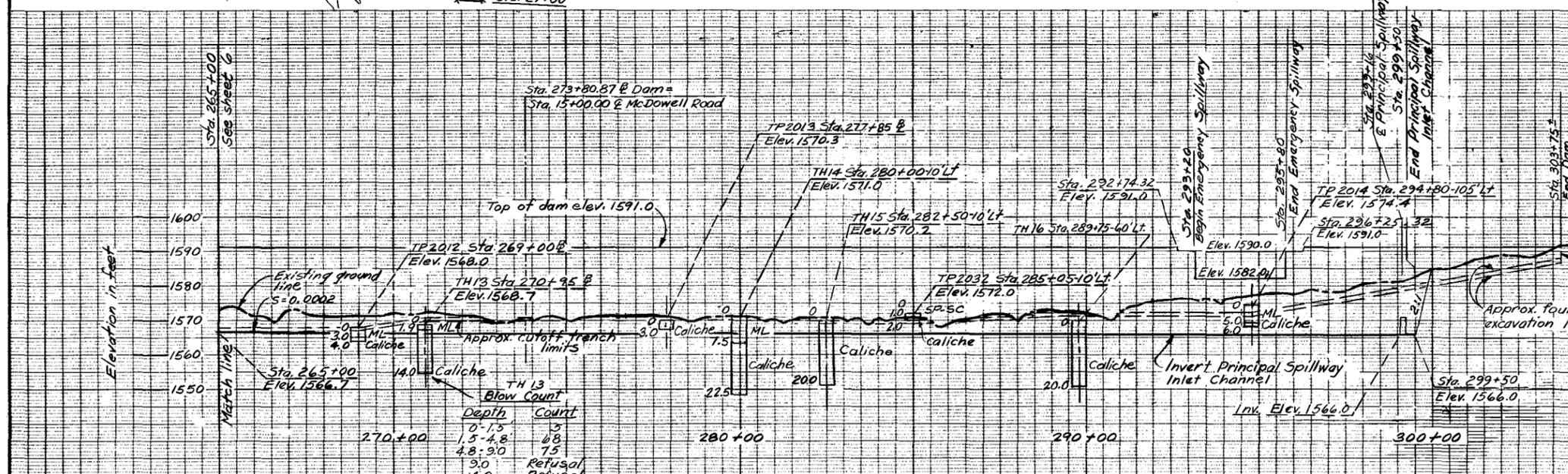
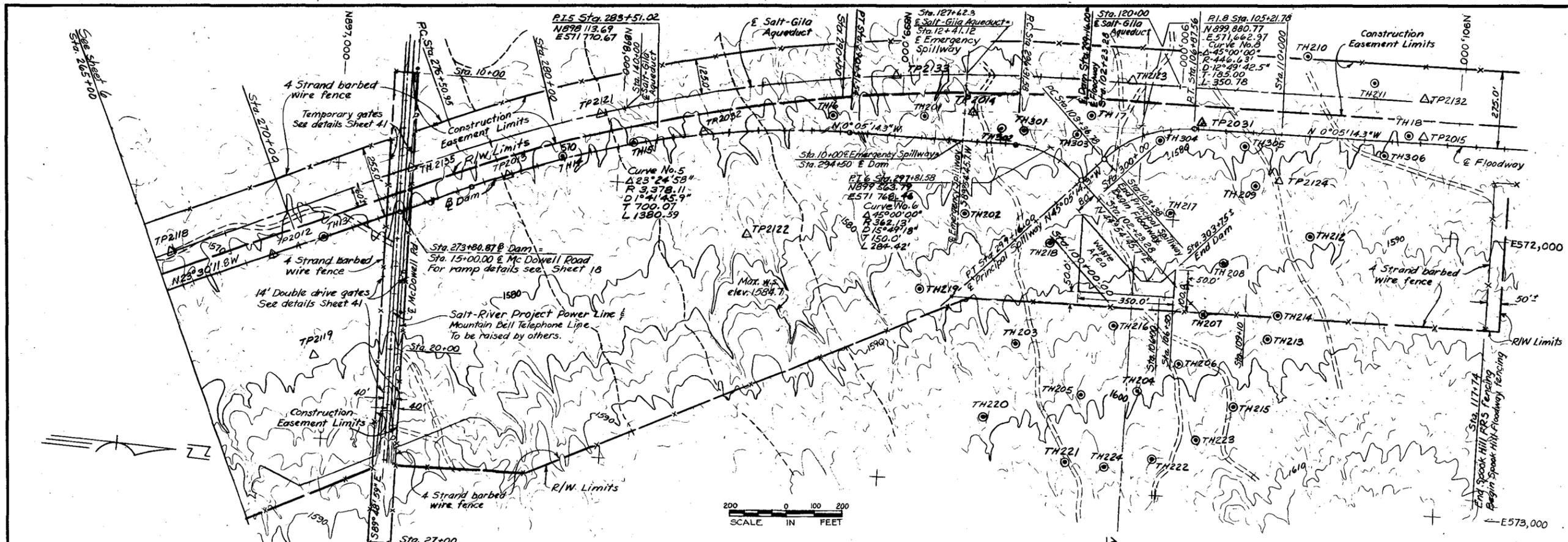
Note: 1. The location of the dam, principal spillway inlet channel, stockpile areas and Salt-Gila Aqueduct Borrow Areas are given on sheets 11 through 13.  
 2. See sheet 13 for foundation and cutoff trench excavation schedules. Final cutoff trench limit to extend into siltstone, caliche or firm material as directed by the Engineer.

PLAN & PROFILE - B DAM  
 STA 220+00 TO STA 265+00  
 SPOOK HILL F.R.S.  
 BUCKHORN-MESA W.P.P.  
 MARICOPA & PINAL COUNTIES, ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

REVISIONS  
 10-77 Increase Foundation Excavation Limits at existing 12" water main Change existing 6" water main to 12" water main

Designed L.L.B., P.J.M.	Date 6-75	Approved by
Drawn MR	6-75	Title
Traced		Title
Checked P.J.M.	12-76	Sheet No. 7-E-23797
		No. of 45



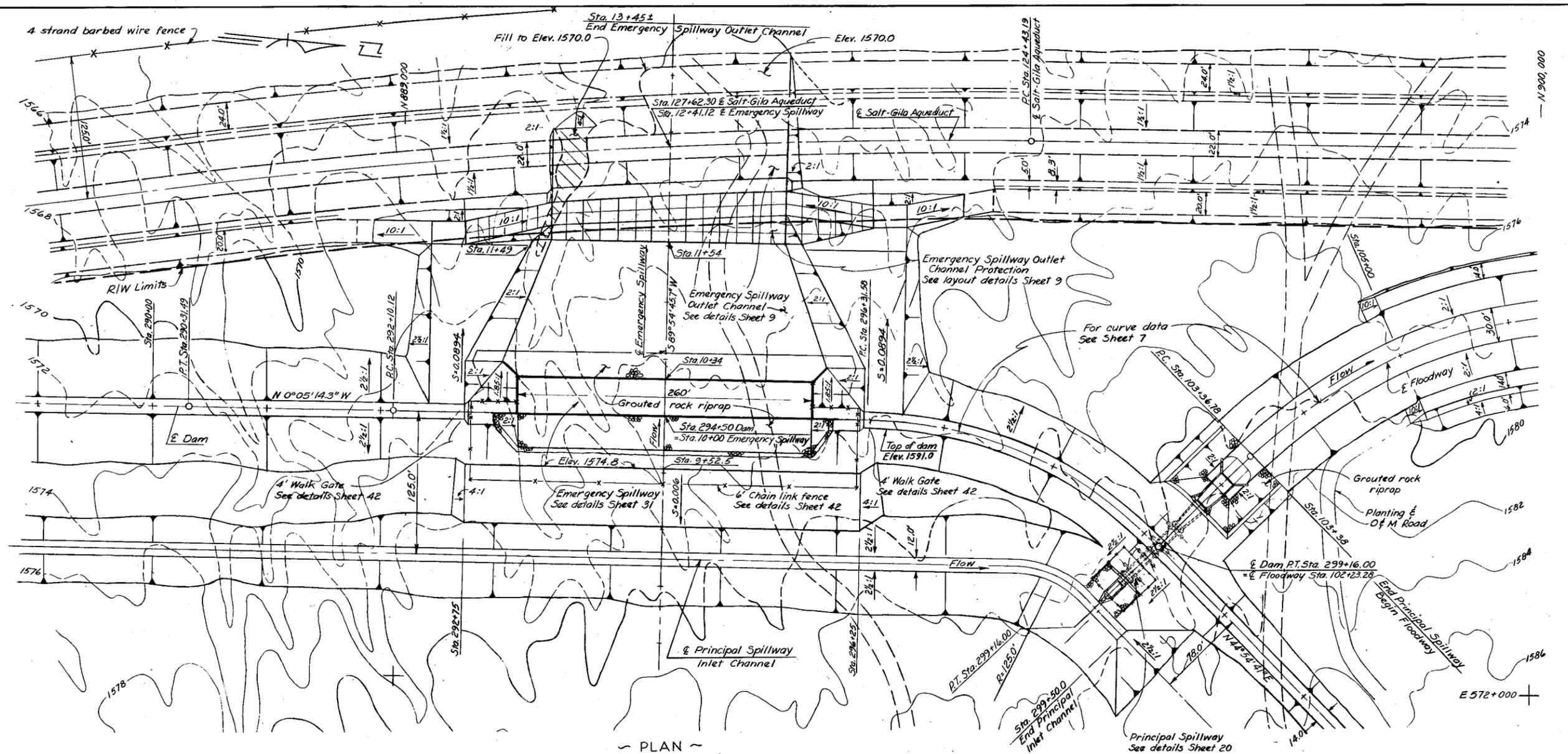
Notes:

- The location of the dam, Principal Spillway, Emergency Spillway, Emergency Spillway outlet channel, Principal Spillway inlet channel, stockpile areas and Salt-Gila Aqueduct Borrow Areas are given on Sheets 8 through 13.
- See Sheet 13 for foundation and cutoff trench excavation schedules. Final cutoff trench limit to extend into siltstone, caliche or firm material as directed by the Engineer.
- Logs of the following test holes are not included in the drawings. Complete drilling logs are available for inspection at the project office. TH 201-TH 224, TH 301-TH 303 & TH 304

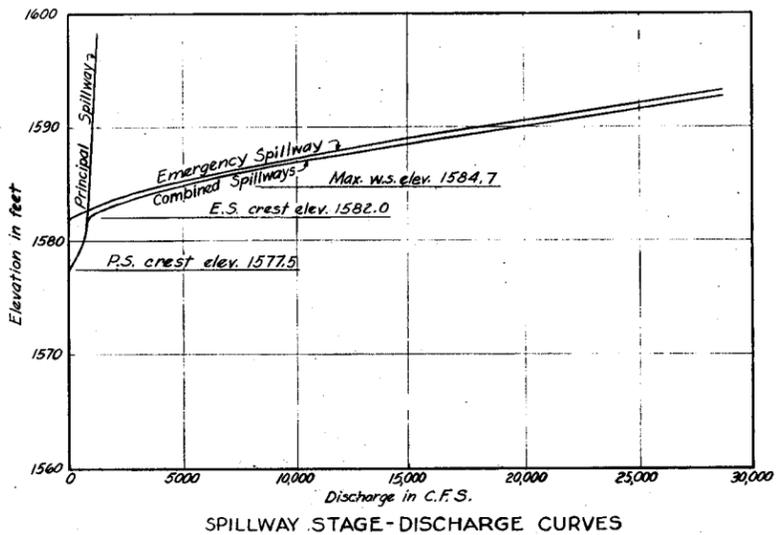
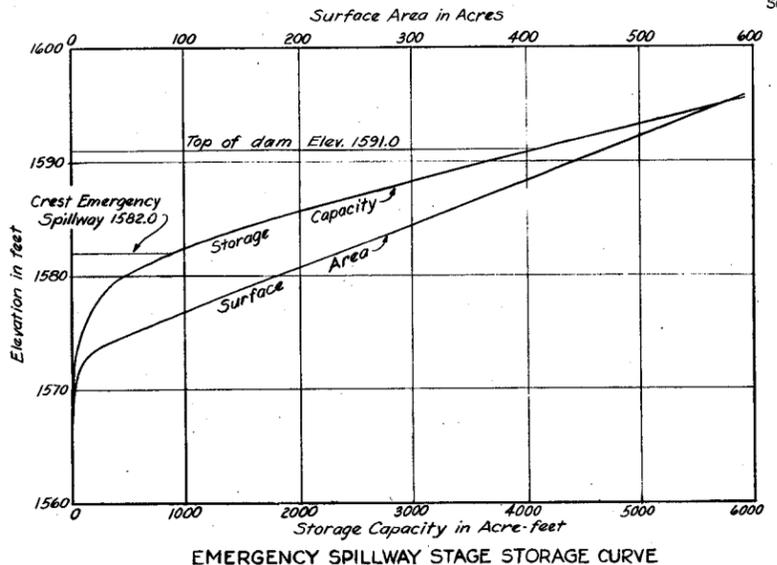
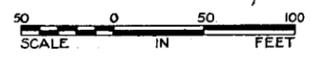
PLAN & PROFILE - @ DAM  
 STA 265+00 TO STA 303+50±  
 SPOOK HILL F.R.S.  
 BUCKHORN-MESA W.P.P.  
 MARICOPA & PINAL COUNTIES, ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

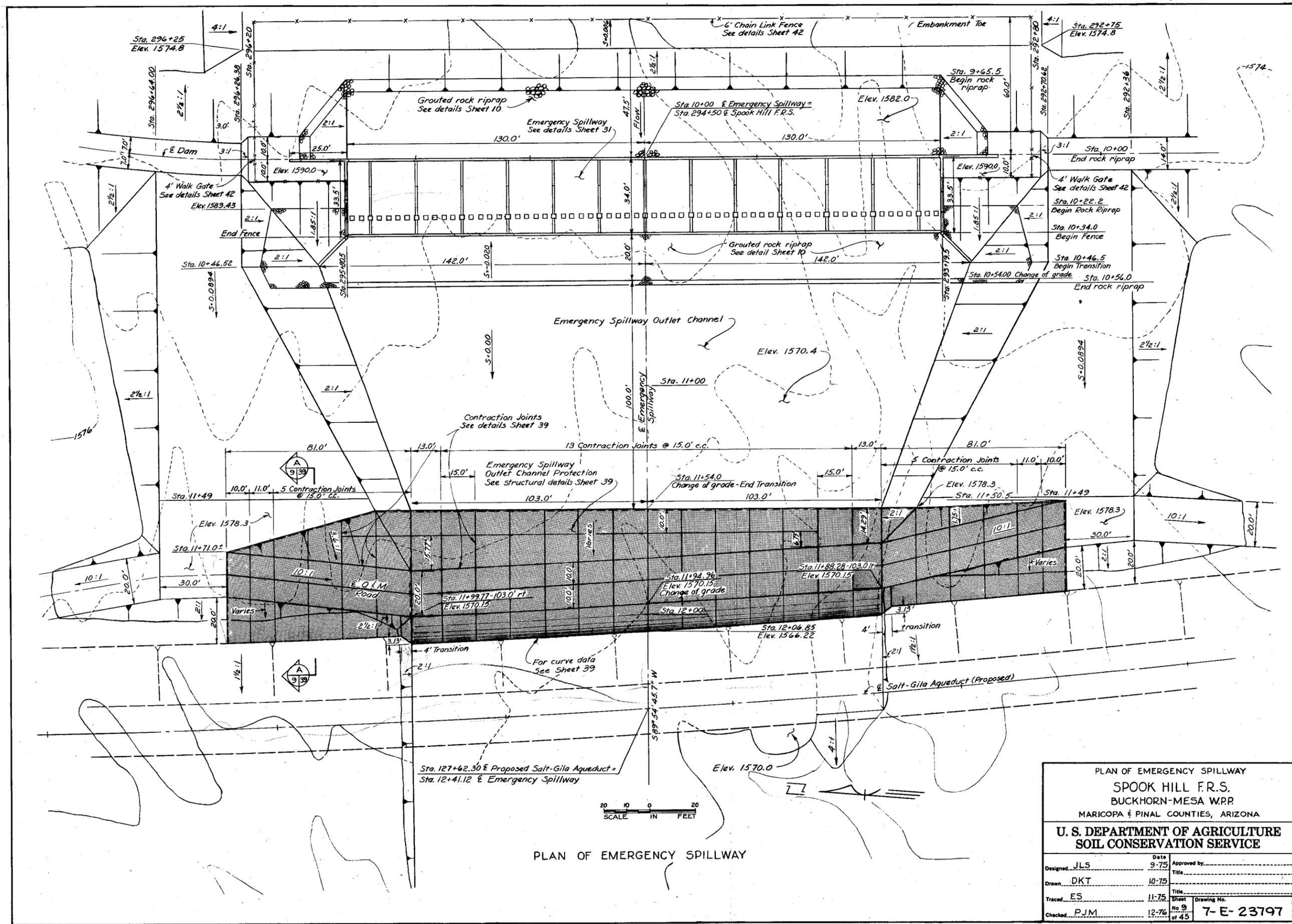
Designed	LLB, PJM	Date	4-75
Drawn	MR	Approved by	
Traced		Date	4-75
Checked	PJM	Sheet	No 7 of 45
		Drawing No.	7-E-23797



PLAN

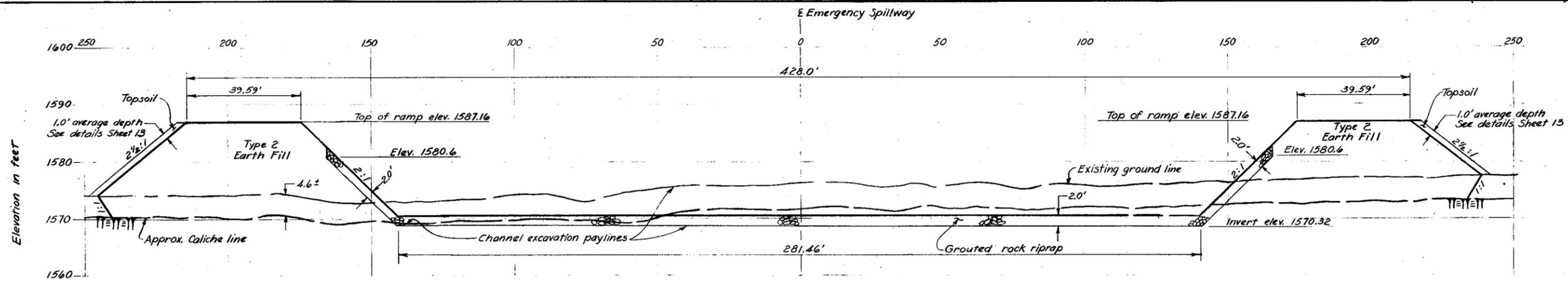


<b>PLAN OF SPILLWAYS</b> <b>SPOOK HILL F.R.S.</b> BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA <b>U. S. DEPARTMENT OF AGRICULTURE</b> <b>SOIL CONSERVATION SERVICE</b>			
Designed: JLS, PJM	Date: 8-75	Approved by: _____	
Drawn: _____	Title: _____	_____	
Traced: ES	9-75	Title: _____	_____
Checked: PJM	12-76	Sheet No. 8 of 45	Drawing No. 7-E-23797

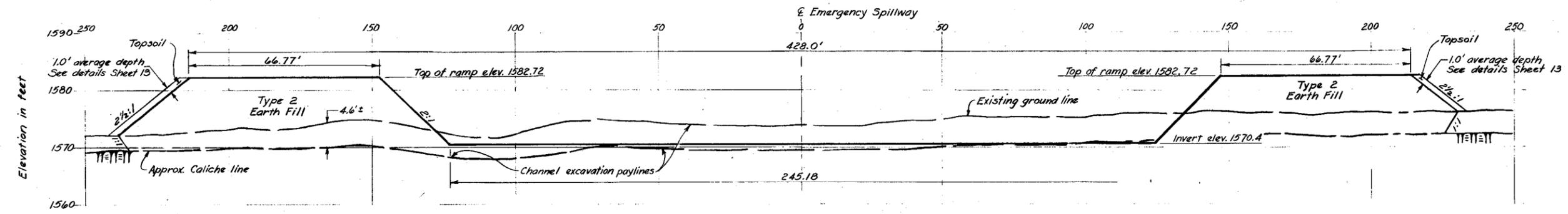


PLAN OF EMERGENCY SPILLWAY

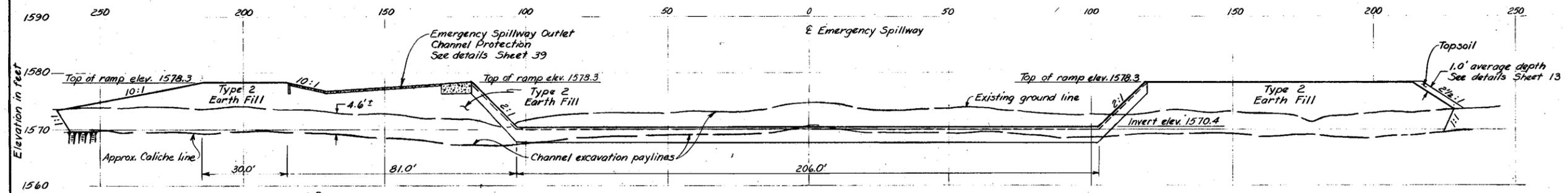
PLAN OF EMERGENCY SPILLWAY			
SPOOK HILL F.R.S.			
BUCKHORN-MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed: JLS	Date: 9-75	Approved by:	
Drawn: DKT	10-75	Title:	
Traced: ES	11-75	Title:	
Checked: PJM	12-76	Sheet No. 9 of 45	Drawing No. 7-E-23797



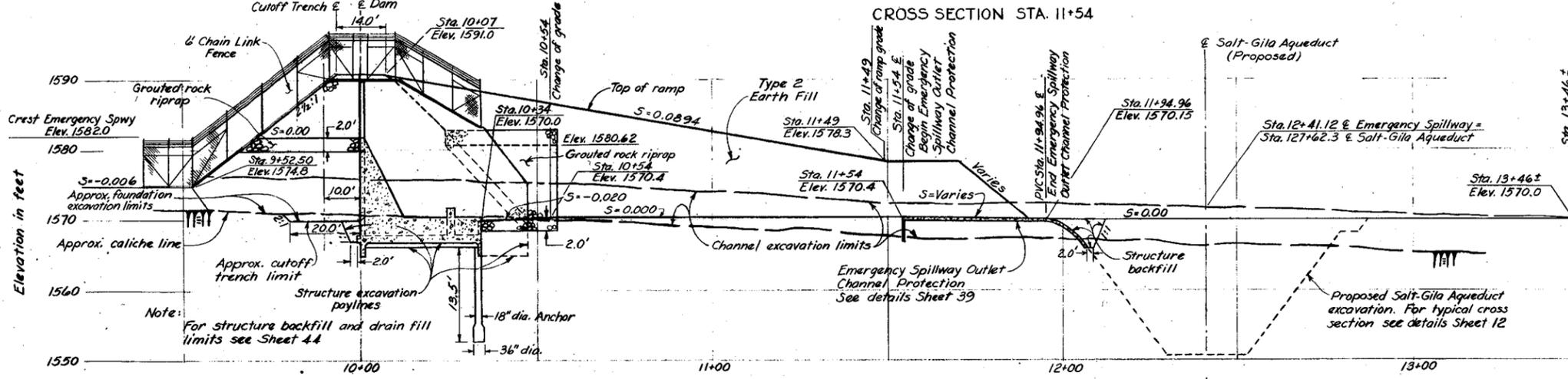
CROSS SECTION STA. 10+50



CROSS SECTION STA. 11+00

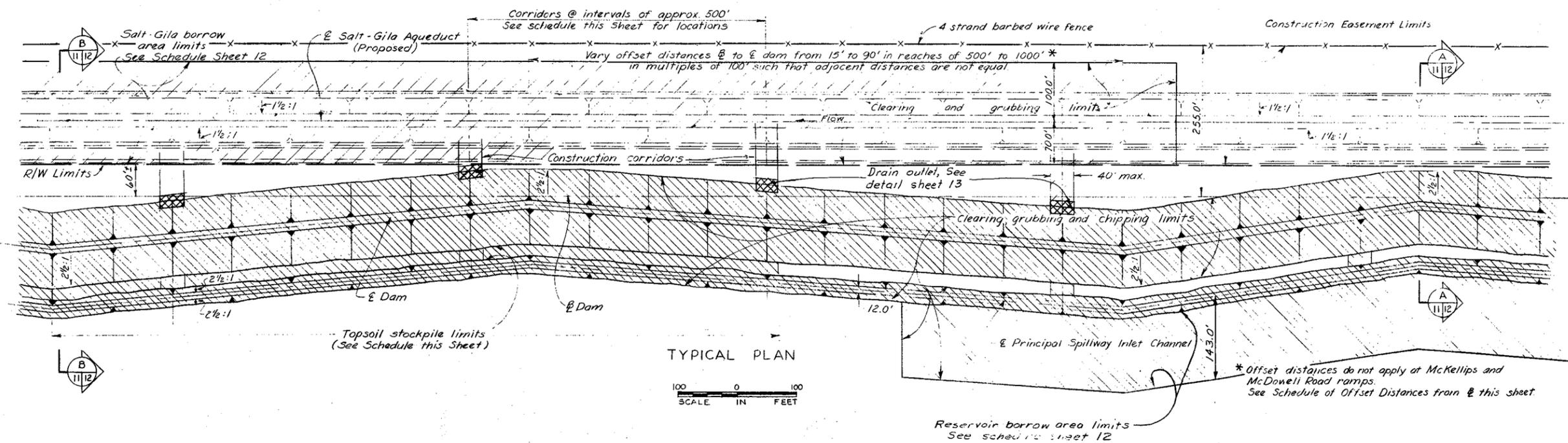


CROSS SECTION STA. 11+54



PROFILE OF EMERGENCY SPILLWAY

PROFILE & CROSS SECTIONS OF EMERGENCY SPILLWAY			
SPOOK HILL F.R.S. BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE</b>			
Designed	JLS PJM	Date	11-76
Drawn	EFS	Approved by	
Traced		Title	
Checked	PJM	Sheet	No 10 of 45
		Drawing No.	7-E-23797



SCHEDULE OF OFFSET DISTANCES FROM E

Station	Offset distance Rt of E to E Dam	Offset distance Rt of E to E Principal Spwy Inlet Channel	Station	Offset distance Rt of E to E Dam	Offset distances Rt of E to E Principal Spwy Inlet Channel
87+00±	0	-	208+00	-	184.69
96+30	0	-	209+59.91	15'	-
100+00	15'	-	209+92.59	-	380.09
105+00	90'	200'	211+58.54	216.53'	-
111+00	15'	130'	220+00	15'	240'
116+00	90'	200'	225+00	90'	200'
122+00	15'	130'	235+00	15'	130'
130+00	90'	192.52	244+00	90'	190'
130+88.78	-	359.38	249+00	15'	130'
140+00	15'	130'	255+00	90'	200'
149+00	90'	200'	264+00	15'	200'
157+00	15'	130'	266+54.38	-	200'
163+00	90'	270'	269+16.41	90'	-
173+00	15'	130'	272+81.63	-	475.16
178+00	90'	200'	273+64.38	286.51'	-
187+00	15'	200'	280+00	15'	125'
193+00	90'	200'	286+00	90'	200'
198+00	15'	130'	291+00	0	125'
204+00	90'	200'	299+25	0	78'
			303+75±	0	-

SCHEDULE OF TOPSOIL STOCKPILE AREAS

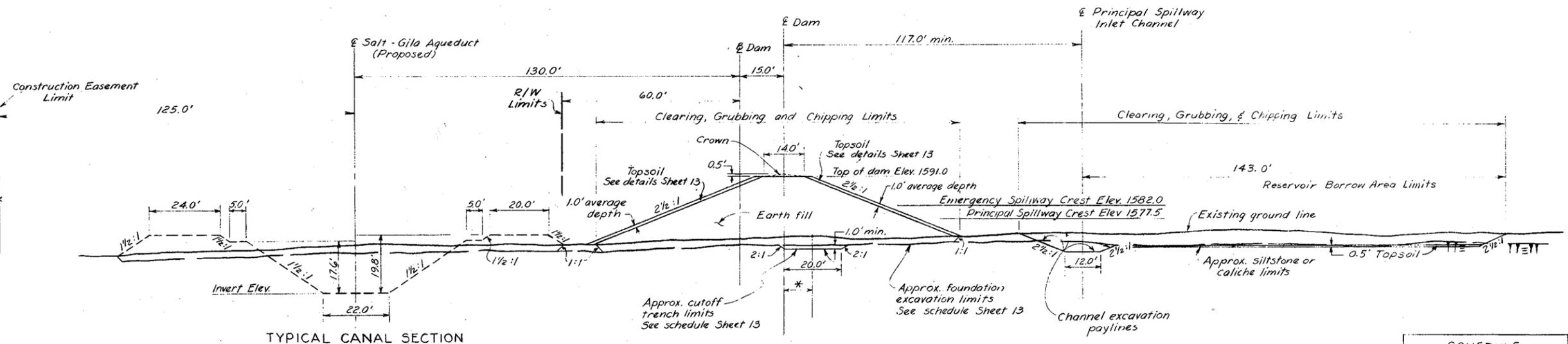
Station to	Station
96+00	120+00
140+00	160+00
167+00	195+00
225+00	260+00

SCHEDULE OF CONSTRUCTION CORRIDOR LOCATIONS

Station	Station	Station	Station
120+00	180+00	235+00	285+00
125+00	185+00	240+00	290+00
130+00	190+00	245+00	295+00
135+00	195+00	250+00	300+00
140+00	200+00	255+00	305+00
155+00	205+00	260+00	310+00
160+00	215+00	265+00	315+00
165+00	220+00	270+00	320+00
170+00	225+00	275+00	325+00
175+00	230+00	280+00	

TYPICAL PLAN OF DAM & PRINCIPAL SPILLWAY INLET CHANNEL.  
 SFOOK HILL F.R.S.  
 BUCKHORN-MESA W.R.P.  
 MARICOPA & PINAL COUNTIES, ARIZONA  
**U. S. DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**

REVISIONS		Date	Approved by
10-77	Add Reservoir Borrow Area Limits	4-76	
Designed	PJM	4-76	
Drawn	EFS		
Checked	PJM	12-76	



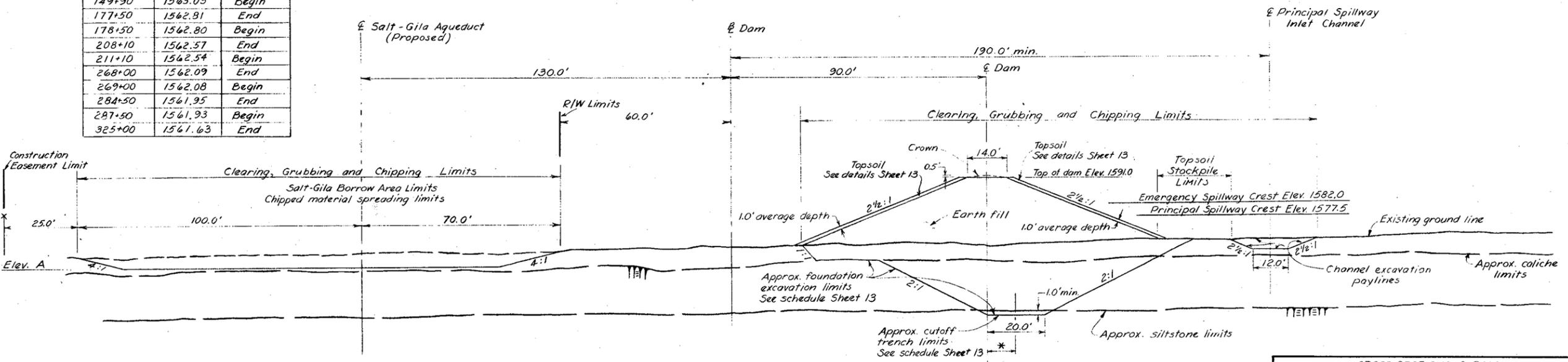
TYPICAL CANAL SECTION

SECTION A

Note: For cutoff trench and foundation excavation schedule see Sheet 13

SCHEDULE OF SALT GILA BORROW AREA LIMITS		
Salt-Gila Aqueduct Stations	Elevation A	Remarks
85+00	1563.55	Begin
94+00	1563.48	End
96+00	1563.46	Begin
124+62	1563.23	End
130+62	1563.19	Begin
146+90	1563.05	End
149+90	1563.03	Begin
177+50	1562.81	End
178+50	1562.80	Begin
208+10	1562.57	End
211+10	1562.54	Begin
268+00	1562.09	End
269+00	1562.08	Begin
284+50	1561.95	End
287+50	1561.93	Begin
325+00	1561.63	End

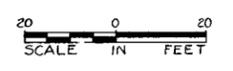
SCHEDULE OF RESERVOIR BORROW AREA LIMITS	
Begin	End
Sta. 105+00	Sta. 115+00
Sta. 140+00	Sta. 153+00
Sta. 156+00	Sta. 195+00
Sta. 220+00	Sta. 242+00
Sta. 246+00	Sta. 260+00
Sta. 280+00	Sta. 290+00



SECTION B

Note: Salt-Gila Aqueduct invert slope = 0.00008

\* See Schedule Sheet 13

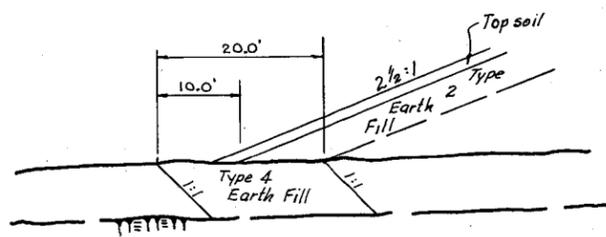


CROSS SECTIONS OF DAM  
 SPOOK HILL F.R.S.  
 BUCKHORN-MESA WPP  
 MARICOPA & PINAL COUNTIES, ARIZONA  
**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

REVISIONS		Date	Approved by
10-77	Add Reservoir Borrow Area	4-76	

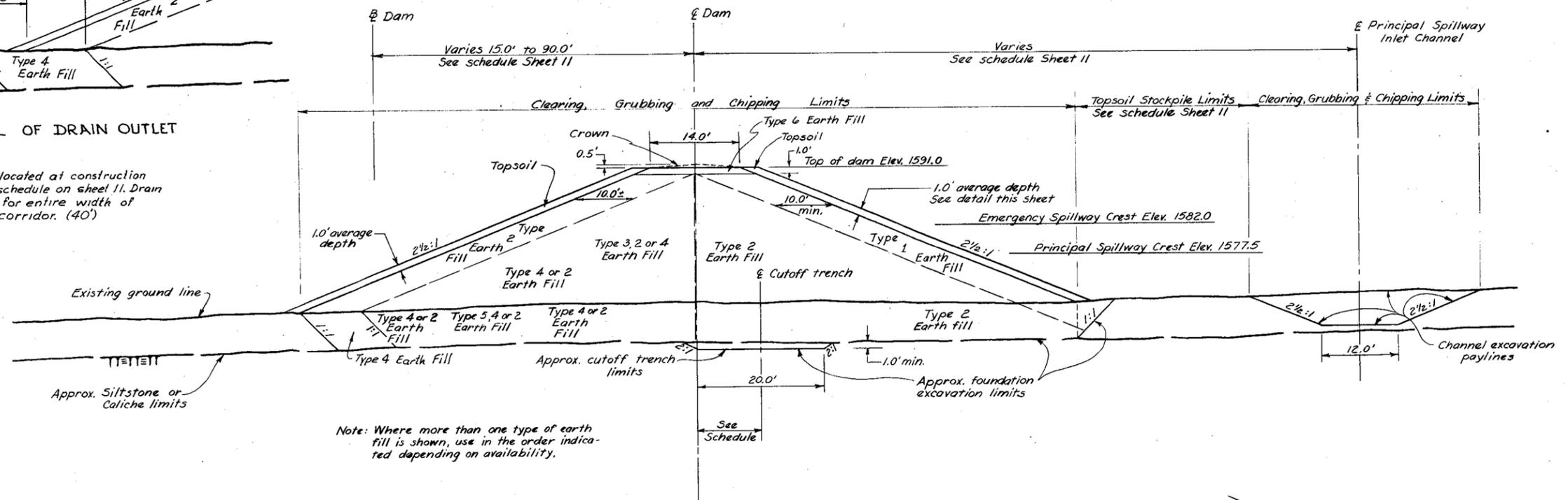
Designed	PJM LLB AC	Date	4-76
Drawn	EFS	Date	4-76
Checked	PJM	Date	4-76

Title: \_\_\_\_\_  
 Drawing No. \_\_\_\_\_  
 No. 12 of 45  
**7-E-23797**

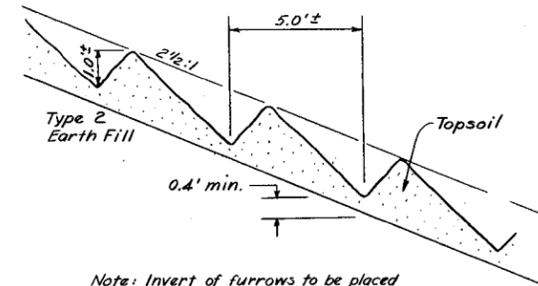


DETAIL OF DRAIN OUTLET

Note: Drain outlet located at construction corridors as schedule on sheet 11. Drain outlet will be for entire width of construction corridor. (40')



TYPICAL CROSS SECTION



Note: Invert of furrows to be placed at constant elevation.

TOP SOIL PLACEMENT DETAIL (Not to scale)

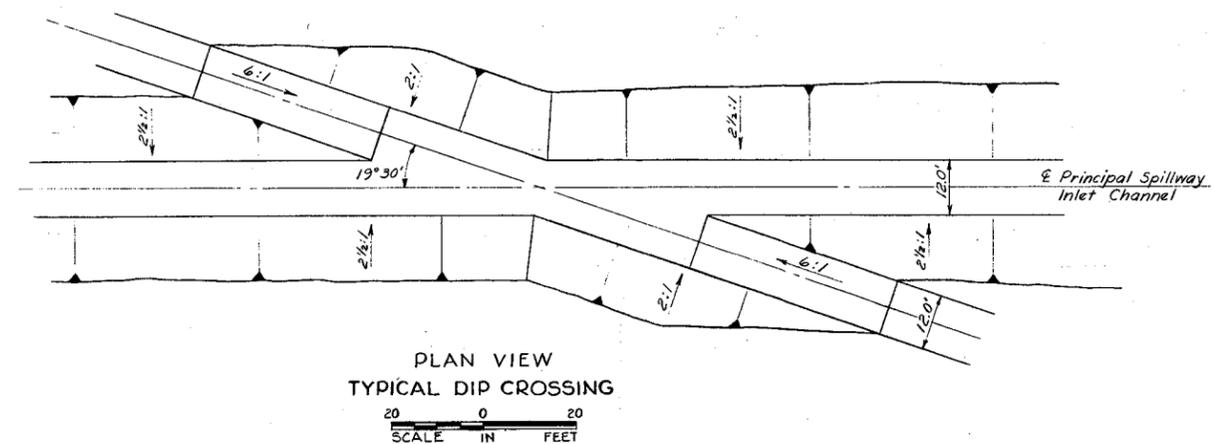
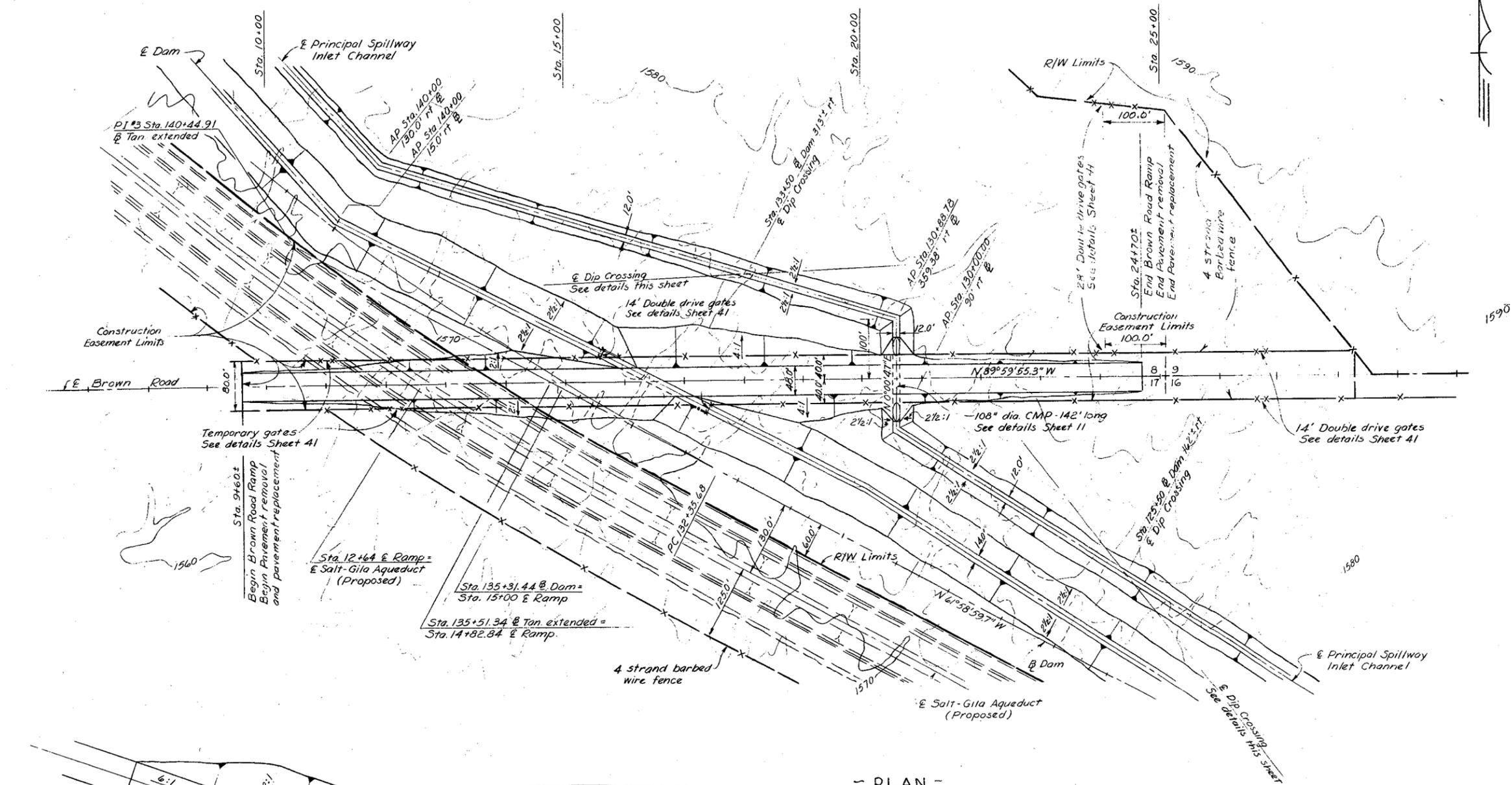
FOUNDATION AND CUTOFF TRENCH EXCAVATION SCHEDULE

Station	Foundation Excavation		Cutoff Trench Excavation		
	Approx. depth ft.	Approx. bottom width ft.	Approx. depth ft.	Offset distance $\epsilon$ to $\epsilon$ ft.	Bottom width ft.
87+00	0	-	0	0	-
87+10	4.0	12.5	9.5	0.4	20.0
98+30	4.0	92.5	9.5	10.0	20.0
104+60	5.5	108.5	10.0	10.0	20.0
118+60	2.0	92.0	5.0	10.0	20.0
122+00	4.0	90.0	8.5	10.0	20.0
131+45	2.5	104.0	8.5	10.0	20.0
140+35	2.0	112.0	5.5	10.0	20.0
149+25	5.0	111.5	7.0	10.0	20.0
158+25	3.0	103.5	6.0	10.0	20.0
165+40	3.0	111.0	5.0	10.0	20.0
172+30	5.0	109.0	7.0	10.0	20.0
179+30	2.0	102.0	9.0	10.0	20.0
184+35	3.0	101.0	4.0	10.0	20.0
190+00	6.0	106.5	6.0	10.0	20.0
195+55	1.0	115.5	5.5	10.0	20.0
201+95	2.5	114.0	3.5	10.0	20.0
207+70	2.5	111.5	3.5	10.0	20.0
217+85	2.0	122.0	6.5	10.0	20.0
220+80	3.5	133.0	4.5	10.0	20.0
222+85	2.8	131.2	25.5	10.0	20.0

FOUNDATION AND CUTOFF TRENCH EXCAVATION SCHEDULE

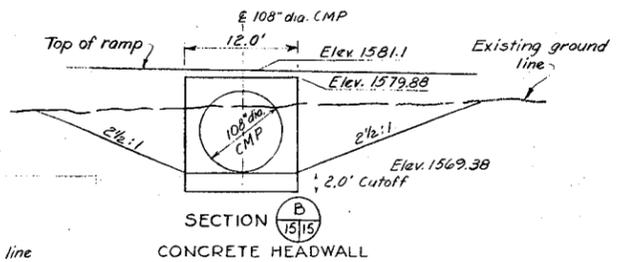
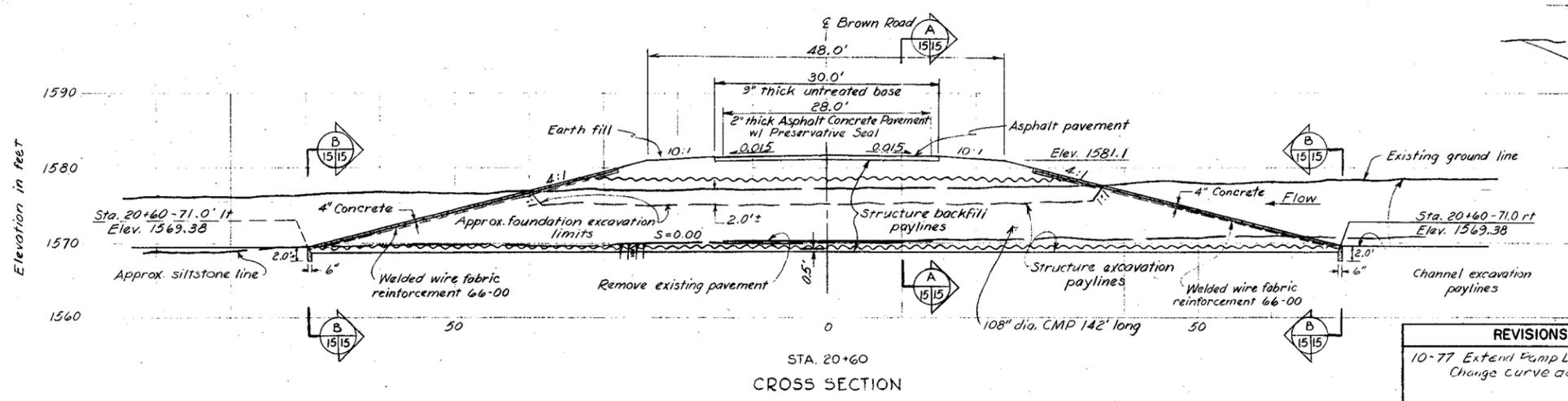
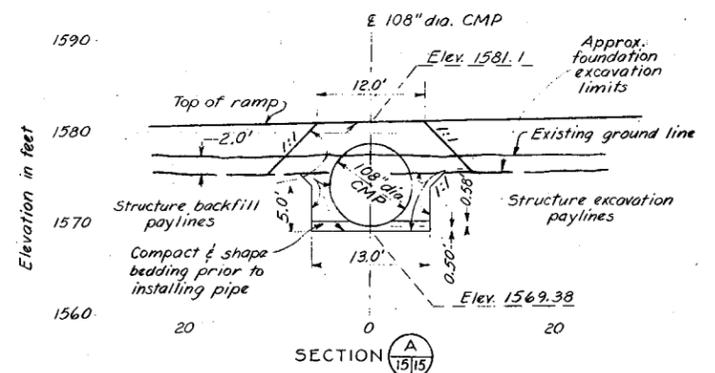
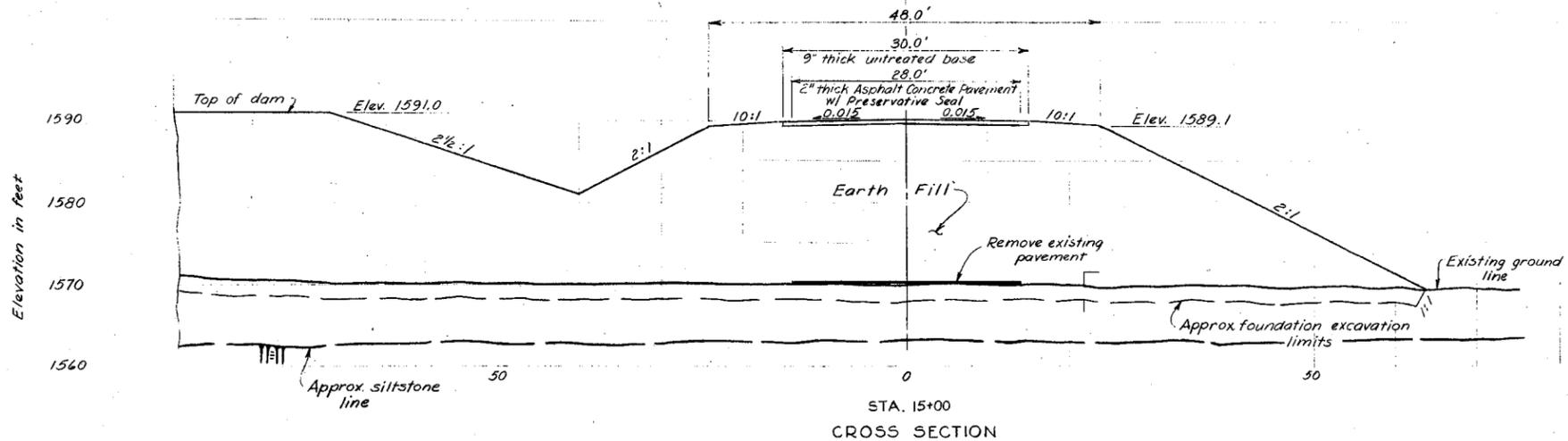
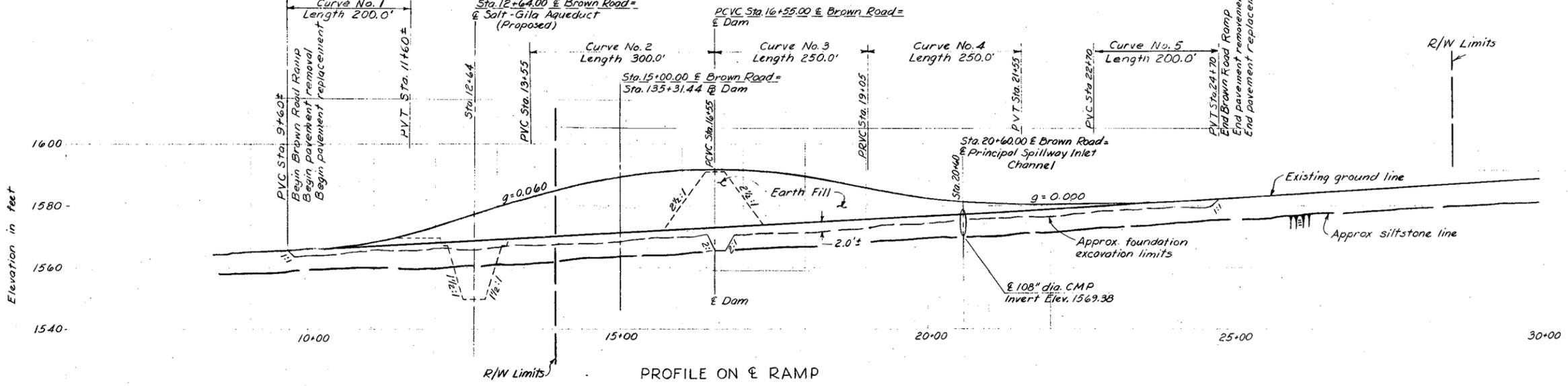
Station	Foundation Excavation		Cutoff Trench Excavation		
	Approx. depth ft.	Approx. bottom width ft.	Approx. depth ft.	Offset distance $\epsilon$ to $\epsilon$ ft.	Bottom width ft.
224+90	4.5	129.5	5.5	10.0	20.0
227+90	3.0	121.0	4.0	10.0	20.0
231+80	2.7	121.3	9.0	10.0	20.0
238+75	4.0	107.5	5.0	10.0	20.0
243+15	1.5	110.0	2.5	10.0	20.0
248+95	4.5	97.0	5.5	10.0	20.0
253+90	2.0	99.5	3.0	10.0	20.0
259+92	2.0	109.5	3.0	10.0	20.0
262+95	5.5	98.5	6.5	10.0	20.0
269+00	3.0	108.5	4.0	10.0	20.0
270+95	1.9	104.6	2.9	10.0	20.0
277+85	0	111.5	1.0	10.0	20.0
280+00	7.5	106.5	8.5	10.0	20.0
282+50	0	114.0	1.0	10.0	20.0
285+05	1.0	113.0	2.0	10.0	20.0
289+75	0	104.0	1.0	10.0	20.0
291+00	1.0	105.5	2.0	10.0	20.0
294+80	5.0	79.0	6.0	10.0	20.0
303+46±	3.0	13.5	4.0	0	20.0
303+50±	0	-	0	0	-

CROSS SECTION $\epsilon$ DAM			
SPOOK HILL FRS.			
BUCKHORN-MESA W.P.P.			
MARICOPA $\epsilon$ PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	PJM	Date	7-76
Drawn		Approved by	
Traced	ES	Date	8-76
Checked	PJM	Date	12-76
Title		Drawing No.	
Sheet No. 13		7-E-23797	
of 45			



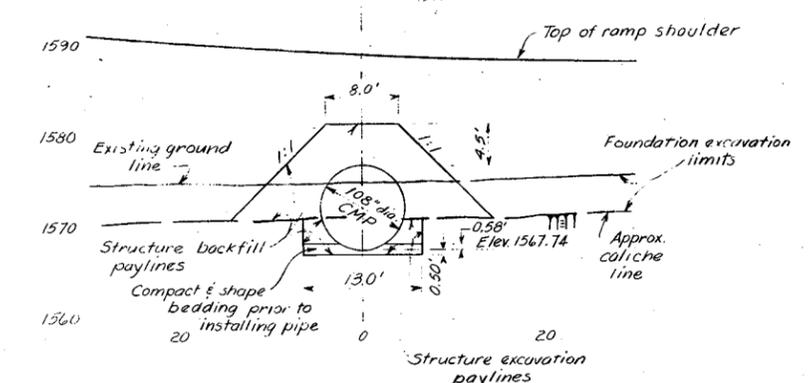
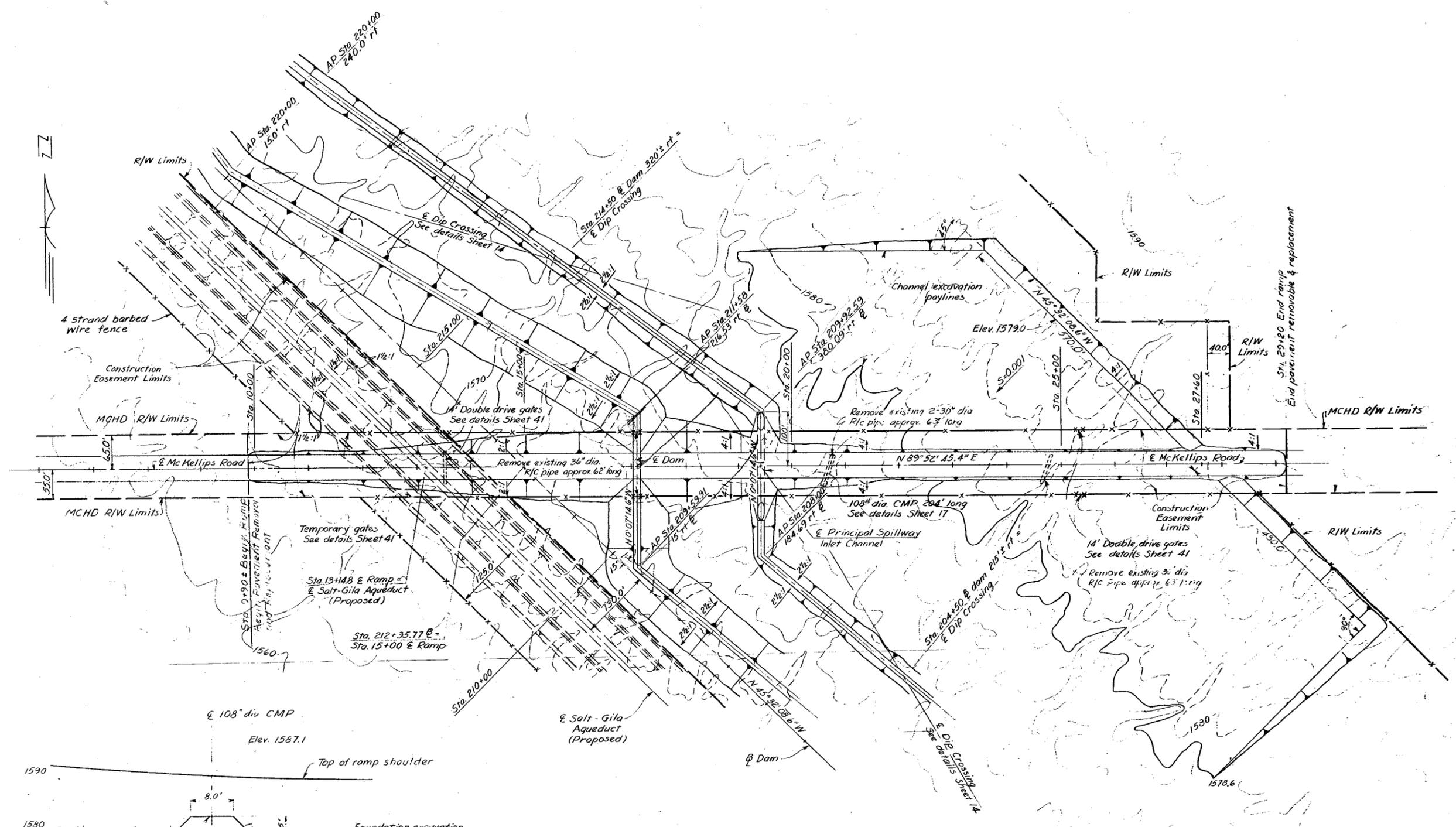
PLAN - BROWN ROAD RAMP		
SPOOK HILL F.R.S.		
BUCKHORN-MESA WPP		
MARICOPA & PINAL COUNTIES, ARIZONA		
U. S. DEPARTMENT OF AGRICULTURE		
SOIL CONSERVATION SERVICE		
<b>REVISIONS</b>		Date
10-77 Change Brown Road Ramp Limits		8-76
Add 2-28' Double Drive Gates		
Designed	AC	Approved by
Drawn		Title
Traced	ES	Date
Checked	PJM	12-76
Sheet No. 14 of 45		Drawing No.
		7-E-23797

CURVE No. 1 L=200.0'			CURVE No. 2 L=300.0'			CURVE No. 3 L=250.0'			CURVE No. 4 L=250.0'			CURVE No. 5 L=200.0'		
Station	Elevation													
9+60	1544.7		13+55	1583.6		16+55	1592.6		19+05	1587.0		22+70	1581.4	
10+10	1565.6		14+30	1587.6		17+20	1592.2		19+70	1584.5		23+20	1581.5	
10+60	1567.0		15+05	1590.4		17+80	1591.2		20+30	1582.8		23+70	1581.8	
11+10	1569.2		15+80	1592.1		18+40	1589.5		20+90	1581.8		24+20	1582.2	
11+60	1571.8		16+55	1592.6		19+05	1587.0		21+55	1581.4		24+70	1582.9	



PROFILE & CROSS SECTIONS - BROWN ROAD RAMP			
SPOOK HILL F.R.S.			
BUCKHORN - MESA W.P.R.			
MARICODA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	AC PJM	Date	8-76
Drawn		Approved by	
Traced	ES	Sheet	8-76
Checked	PJM	No. 15	7-E-23797
		of 45	

REVISIONS	
10-77	Extend Pump Limits Change curve data



~ PLAN ~



PLAN - MC KELLIPS ROAD RAMP			
SPOOK HILL F.R.S. BUCKHORN-MESA WPP MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
<b>REVISIONS</b>		Date	Approved by
0-77 Extend Ramp Limits		8-76	
Designed	JLS AC		
Drawn			
Traced	EFS	8-76	
Checked	PJM	12-76	
		Sheet	Drawing No.
		No 16	7-E-23797
		of 45	

CURVE No.1 L=200.0'	
Station	Elevation
9+90	1563.1 ±
10+40	1564.0
10+90	1565.5
11+40	1567.6
11+90	1570.3

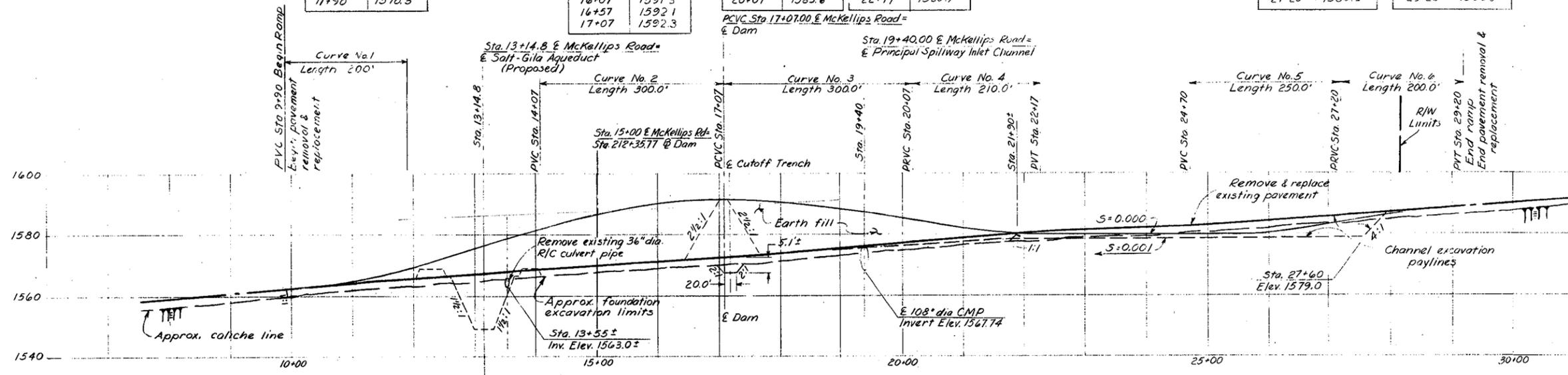
CURVE No.2 L=300.0'	
Station	Elevation
14+07	1583.3
14+57	1586.1
15+07	1588.3
15+57	1590.1
16+07	1591.3
16+57	1592.1
17+07	1592.3

CURVE No.3 L=300.0'	
Station	Elevation
17+07	1592.3
17+82	1591.9
18+57	1590.6
19+32	1588.6
20+07	1585.6

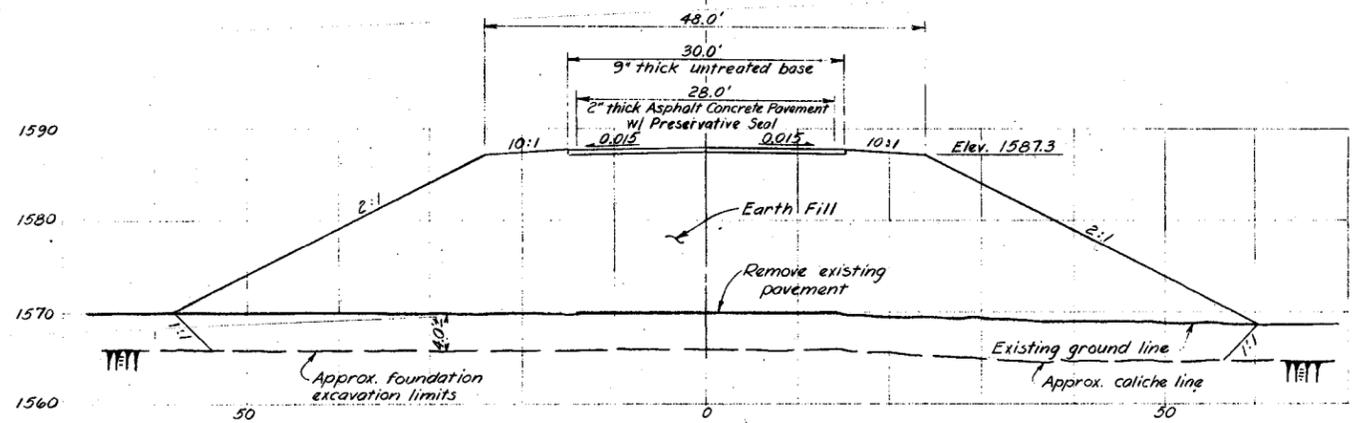
CURVE No.4 L=210.0'	
Station	Elevation
20+07	1585.6
20+57	1582.6
21+12	1582.0
21+67	1581.1
22+17	1580.9

CURVE No.5 L=250.0'	
Station	Elevation
24+70	1580.9
25+40	1581.2
25+95	1581.9
26+50	1583.1
27+20	1585.2

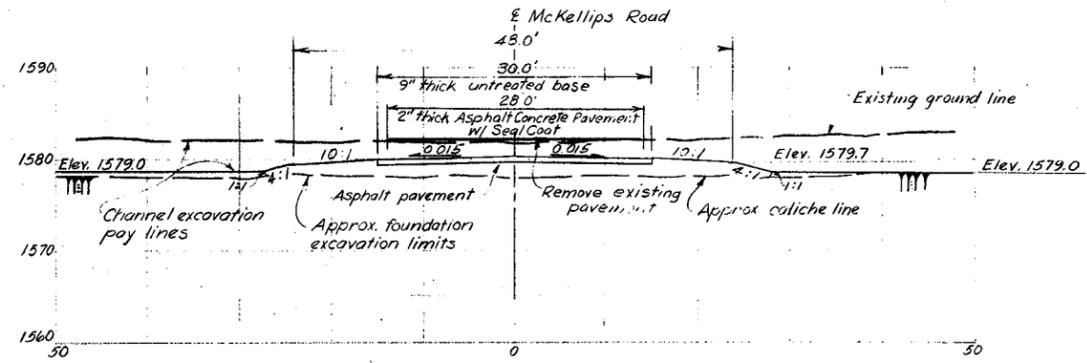
CURVE No.6 L=200.0'	
Station	Elevation
27+20	1584.1
27+70	1585.3
28+20	1586.4
28+70	1587.3
29+20	1588.0 ±



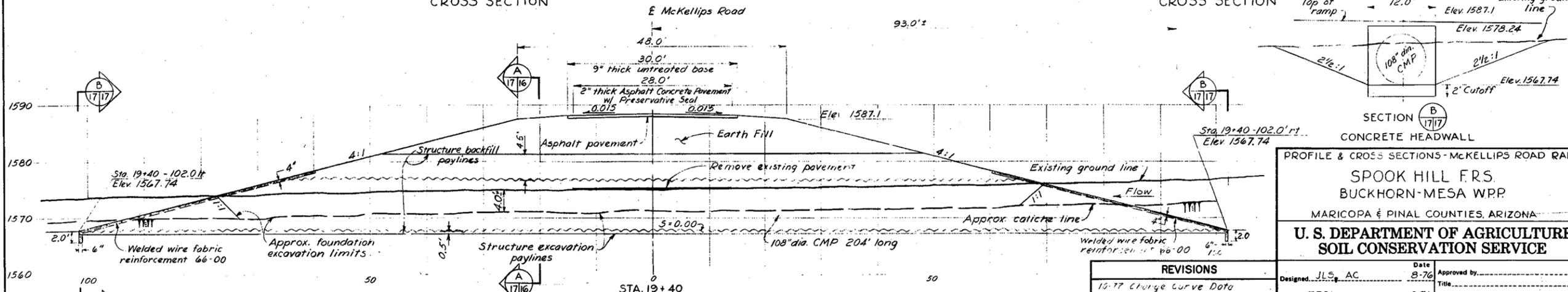
PROFILE ON E RAMP



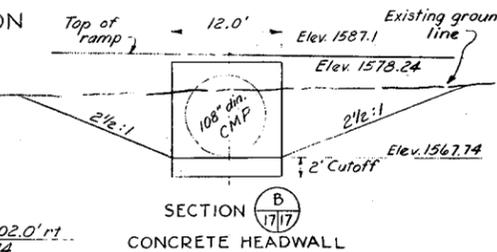
CROSS SECTION



CROSS SECTION



PROFILE ON E PRINCIPAL SPILLWAY INLET CHANNEL



SECTION B 17/17  
CONCRETE HEADWALL

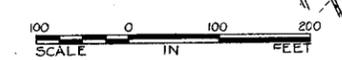
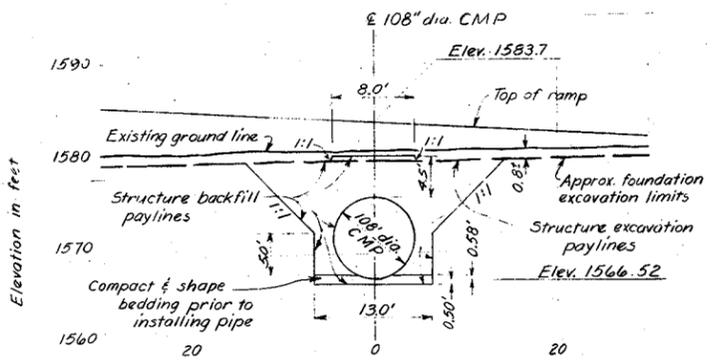
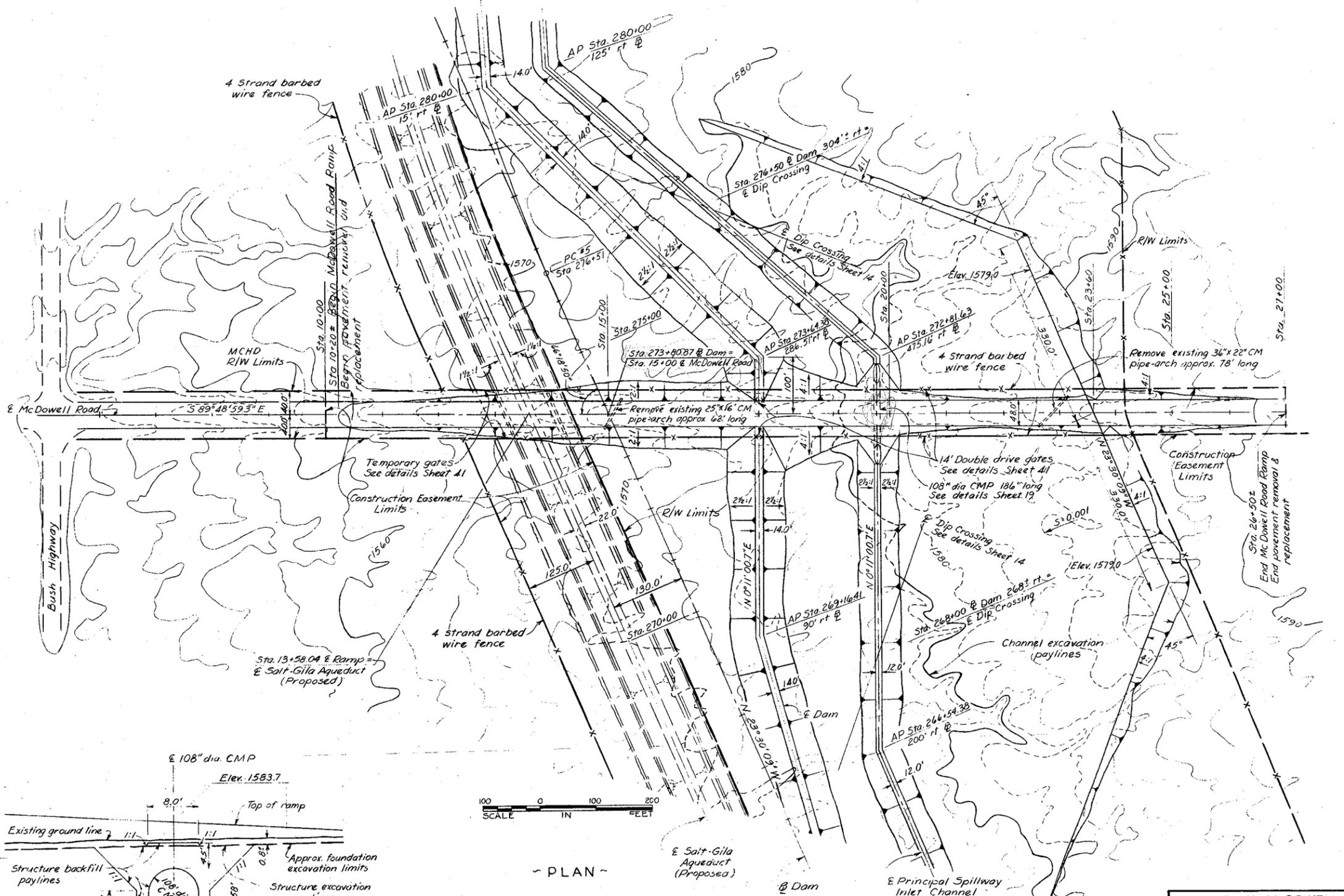
PROFILE & CROSS SECTIONS - MCKELLIPS ROAD RAMP

SPOOK HILL FRS.  
BUCKHORN-MESA WRP  
MARICOPA & PINAL COUNTIES, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

REVISIONS	
10-17 Change Curve Data	
Correct Structure Backfill Paylines	

Designed: JLS, AC	Date: 8-76	Approved by: _____
Drawn: EFS	Date: 8-76	Title: _____
Traced: _____	Date: _____	Title: _____
Checked: PJM	Date: 12-76	Sheet: No 17 of 45
		Drawing No: 7-E-23797



~ PLAN ~

PLAN - McDOWELL ROAD RAMP SPOOK HILL F.R.S. BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE          SOIL CONSERVATION SERVICE</b>			
<b>REVISIONS</b>		Date	Approved by
10-77 Extend Ramp Limits		8-76	
Designed	JLS, AC	8-76	Title
Drawn			
Traced	EFS	8-76	Title
Checked	PJM	12-76	Sheet No. 18 of 45
			Drawing No. 7-E-23797

CURVE No.1 L=140.0'		
Station	Elevation	
10+20	1561.3±	
10+70	1562.5	
11+20	1564.3	
11+70	1566.5	
12+20	1569.3	

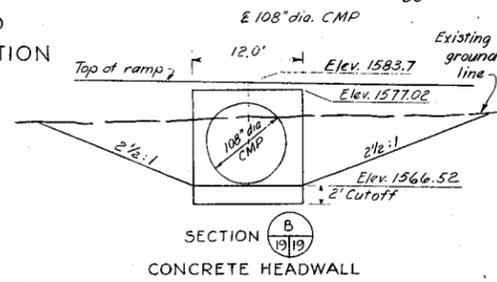
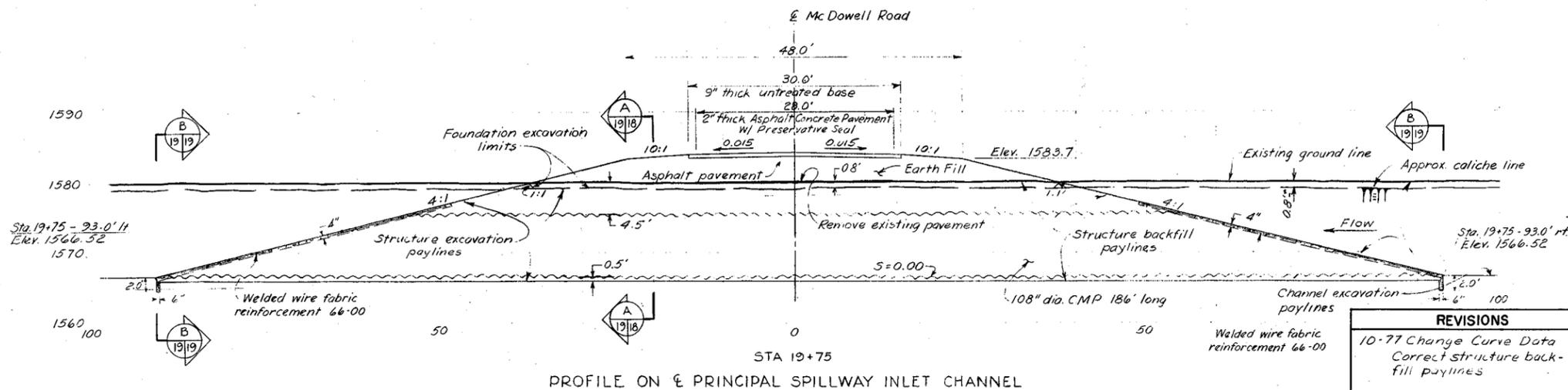
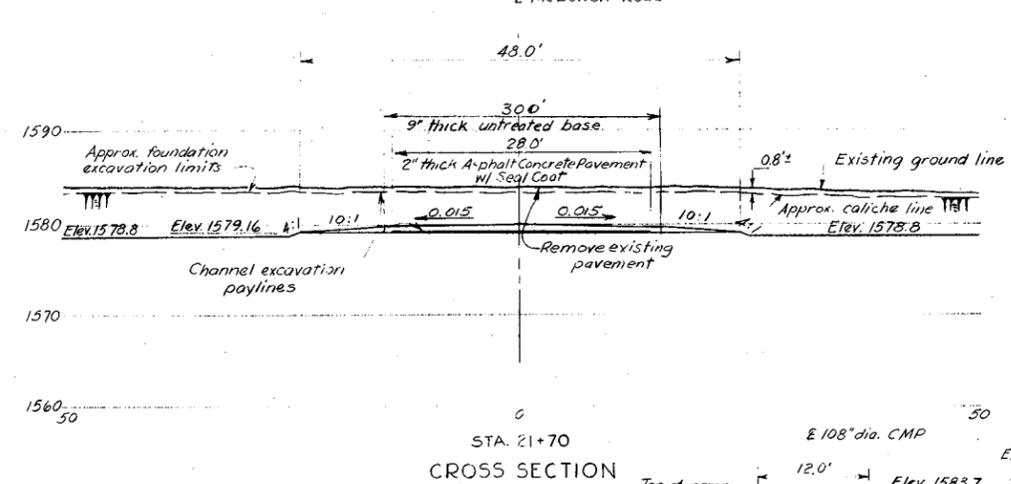
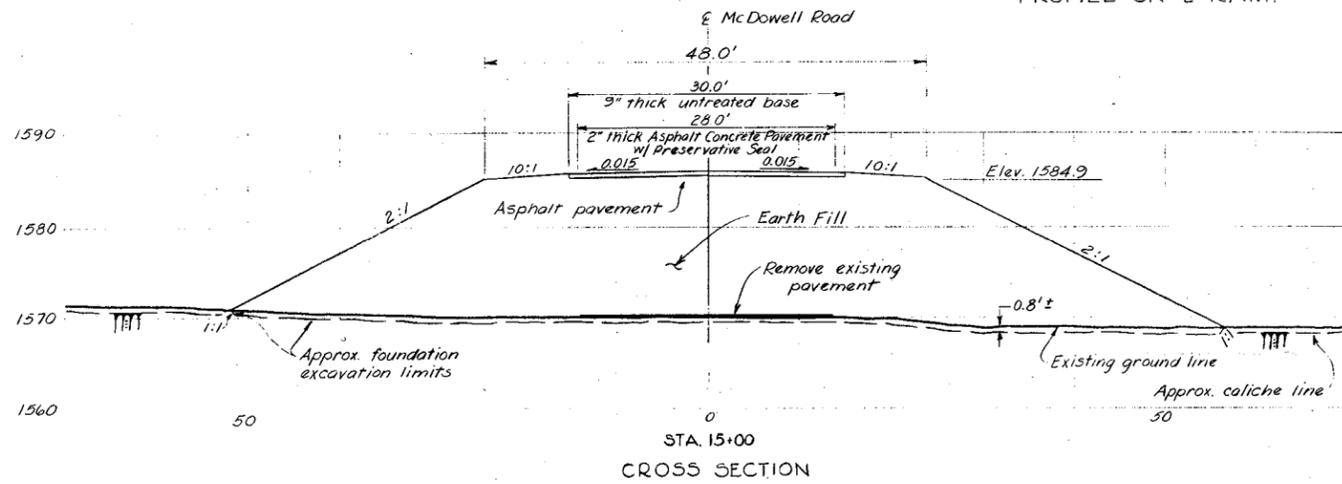
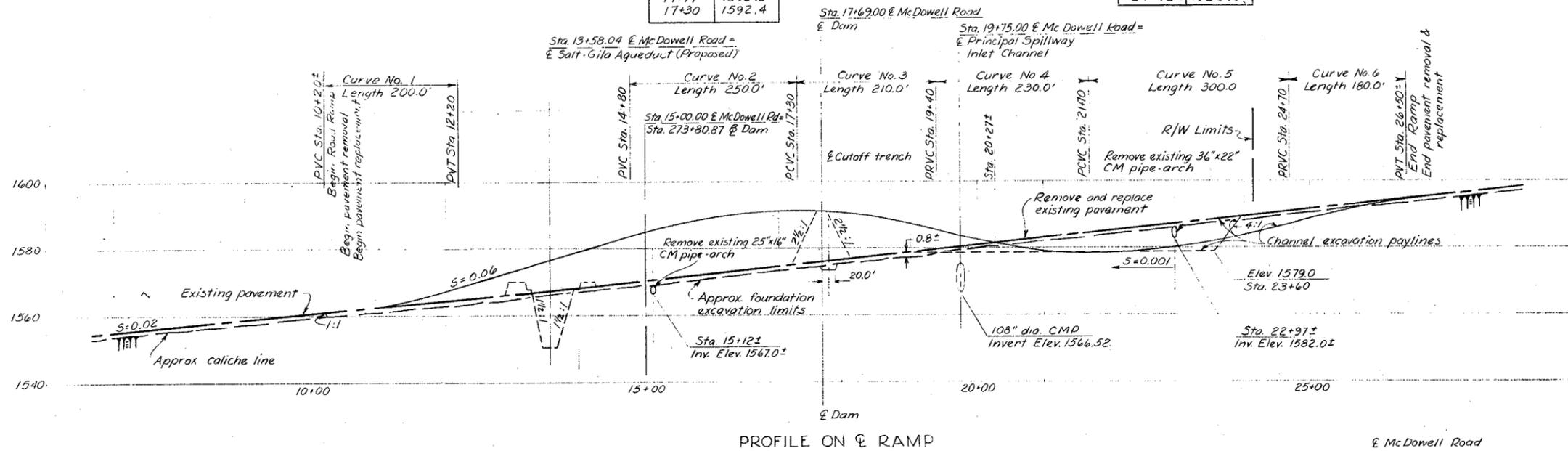
CURVE No.2 L=250.0'		
Station	Elevation	
14+80	1584.9	
15+17	1586.9	
15+67	1589.2	
16+05	1590.5	
16+17	1590.8	
16+67	1591.9	
17+17	1592.3	
17+30	1592.4	

CURVE No.3 L=210.0'		
Station	Elevation	
17+30	1592.4	
17+85	1592.0	
18+35	1590.9	
18+85	1589.2	
19+40	1586.6	

CURVE No.4 L=230.0'		
Station	Elevation	
19+40	1586.6	
19+40	1586.6	
20+00	1583.7	
20+55	1581.9	
21+10	1580.7	
21+70	1580.3	

CURVE No.5 L=300.0'		
Station	Elevation	
21+70	1580.3	
22+20	1580.3	
22+70	1580.7	
23+20	1581.7	
23+70	1582.8	
24+20	1584.2	
24+70	1586.0	

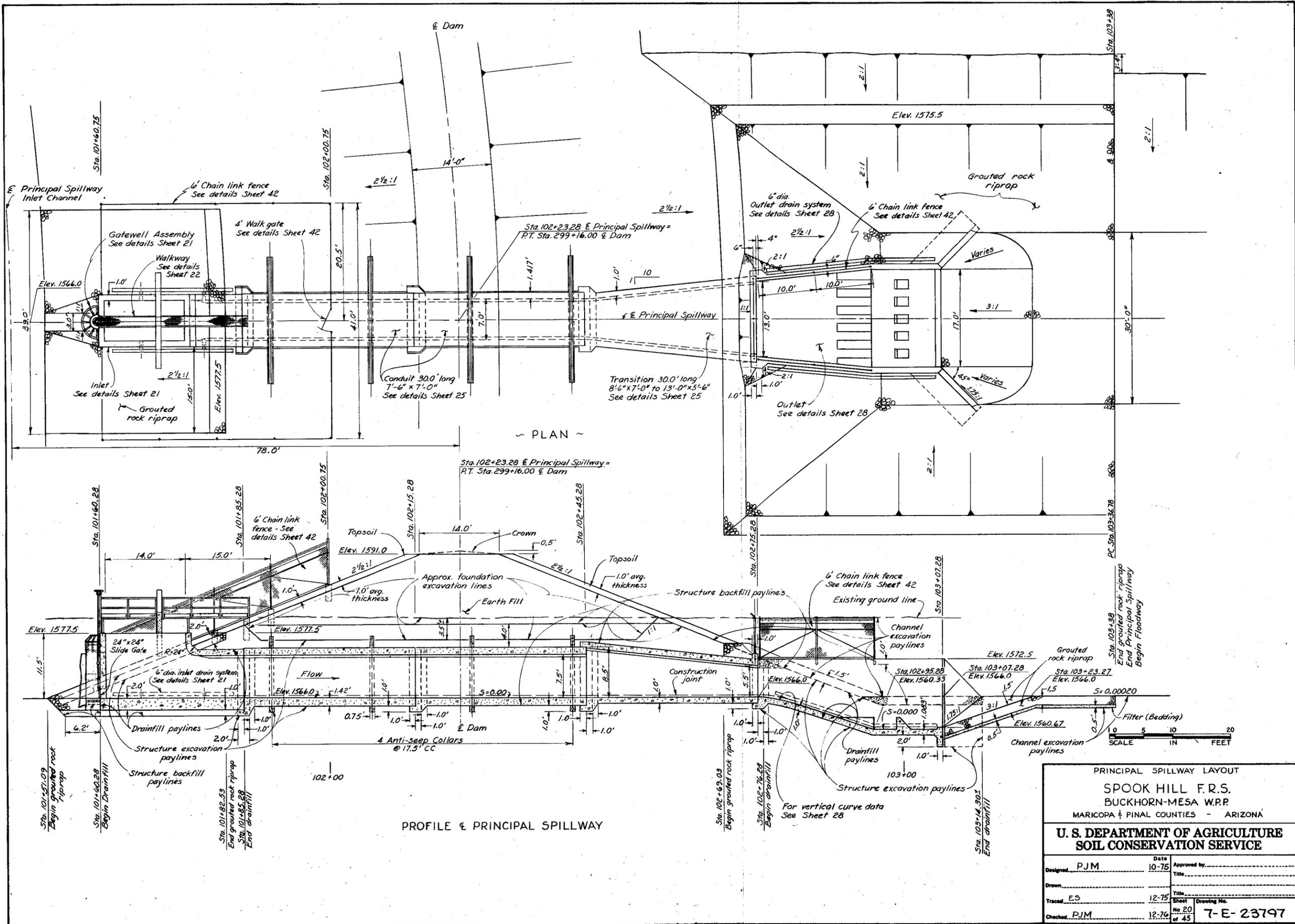
CURVE No.6 L=180.0'		
Station	Elevation	
24+70	1586.0	
25+15	1587.6	
25+60	1589.0	
26+05	1590.2	
26+50	1591.3±	



PROFILE & CROSS SECTIONS-McDOWELL ROAD RAMP  
 SPOOK HILL F.R.S.  
 BUCKHORN-MESA WRP  
 MARICOPA & PINAL COUNTIES, ARIZONA  
 U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

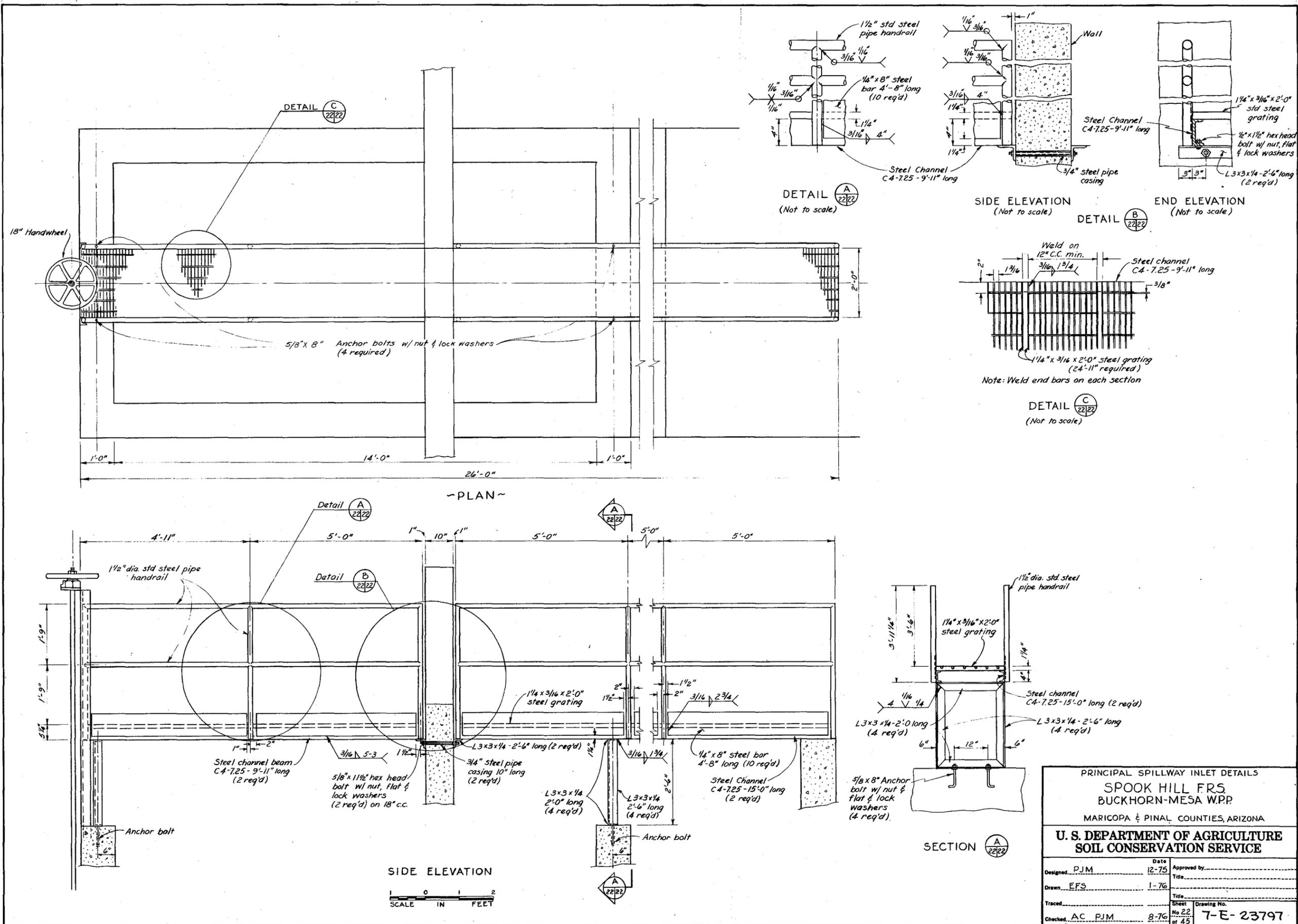
REVISIONS	
10-77 Change Curve Data	Correct structure back-fill paylines

Designed	JLS AC	Date	8-76	Approved by	
Drawn		Title			
Traced	EFS	Date	8-76	Title	
Checked	PJM	Date	8-76	Sheet	No. 19 of 45
				Drawing No.	7-E-23797

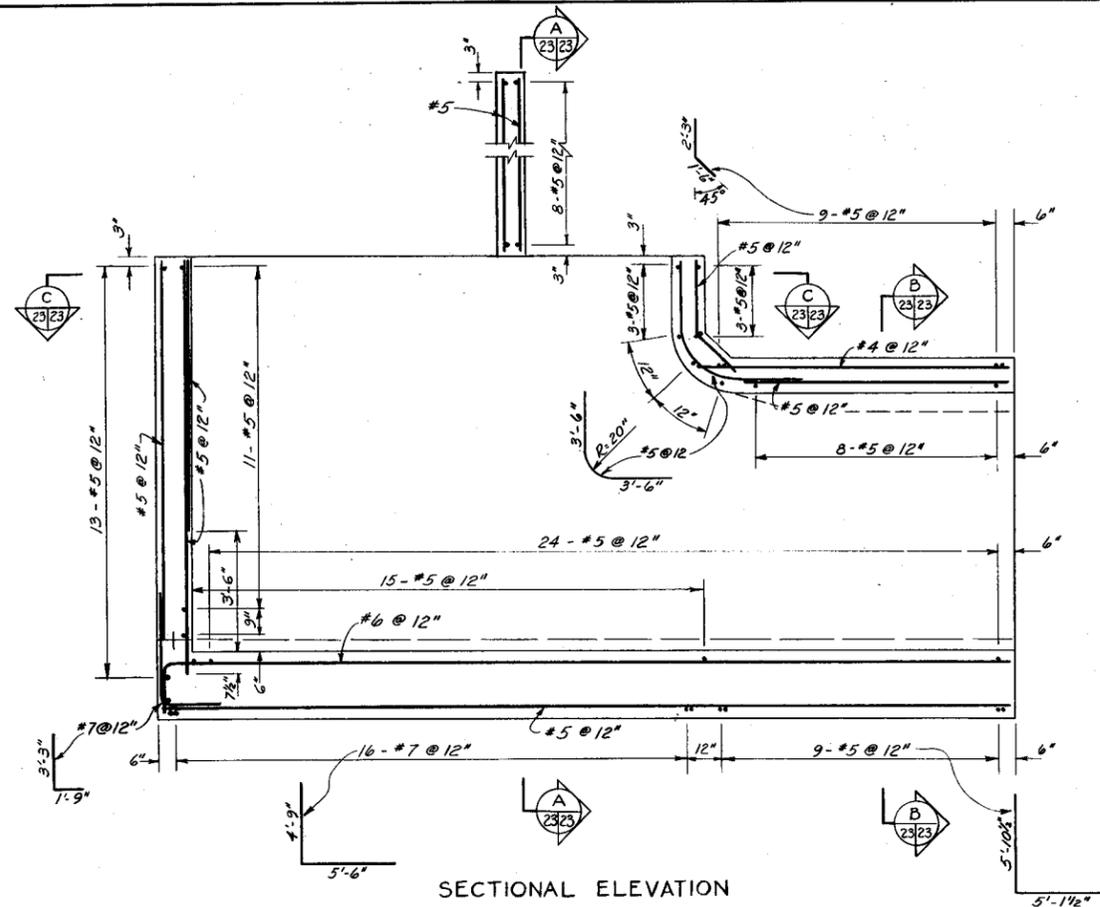


PRINCIPAL SPILLWAY LAYOUT SPOOK HILL F.R.S. BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES - ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE</b> <b>SOIL CONSERVATION SERVICE</b>			
Designed	PJM	Date	10-75
Drawn	ES	Approved by	
Traced	ES	Title	
Checked	PJM	Sheet	No. 20
		Drawing No.	7-E-23797

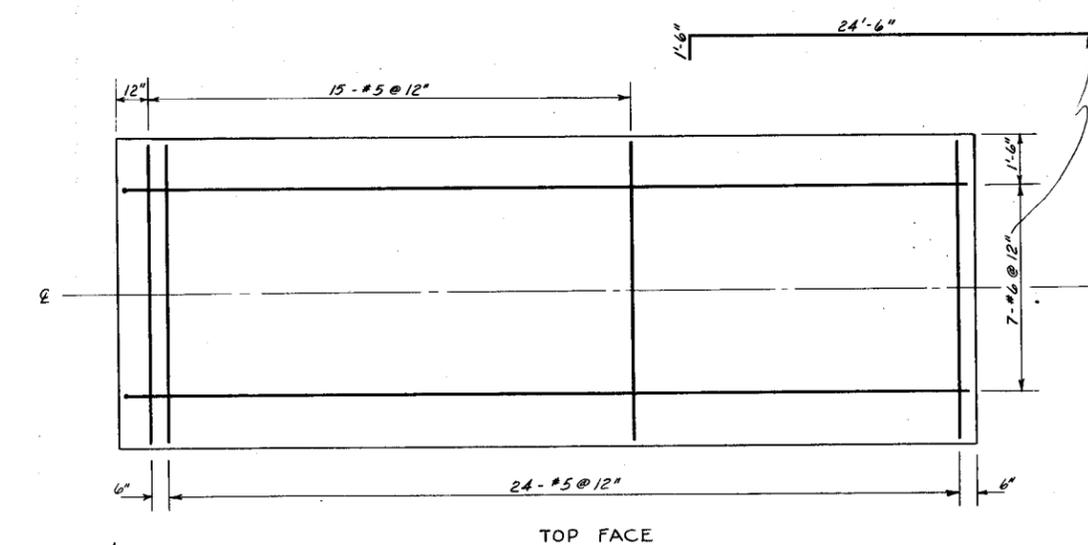




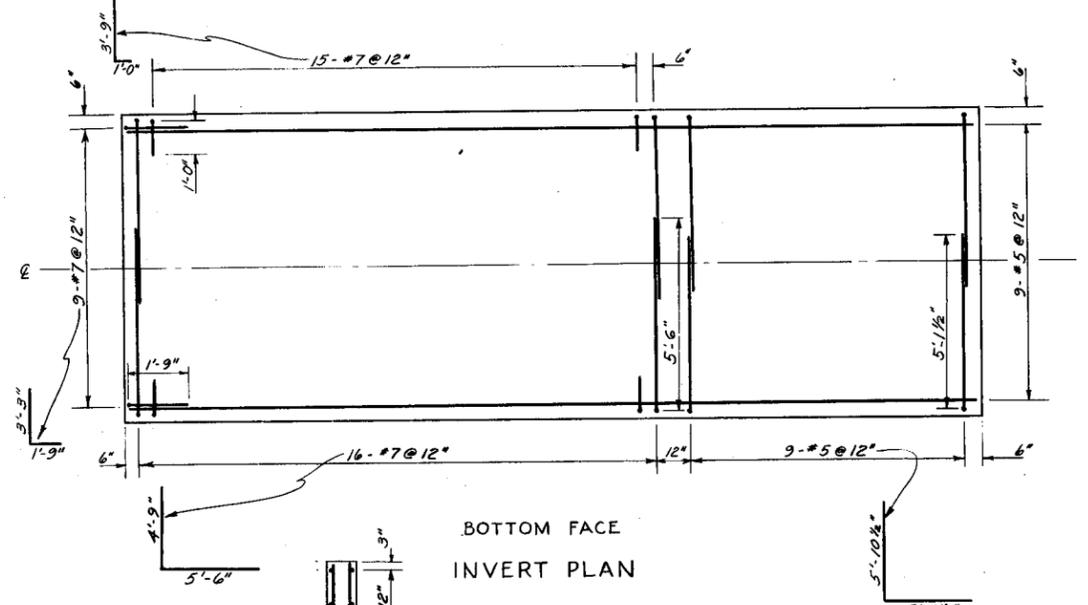
PRINCIPAL SPILLWAY INLET DETAILS			
SPOOK HILL FRS.			
BUCKHORN-MESA WPP			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	PJM	Date	12-75
Drawn	EFS	Approved by	
Traced		Title	
Checked	AC PJM	Sheet	No 22 of 45
		Drawing No.	7-E-23797



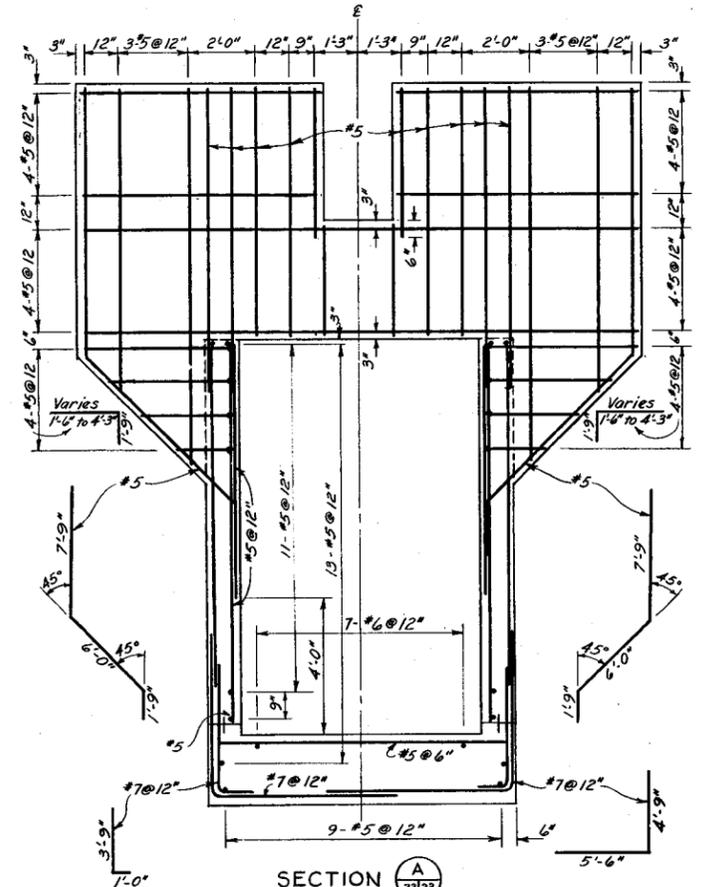
SECTIONAL ELEVATION



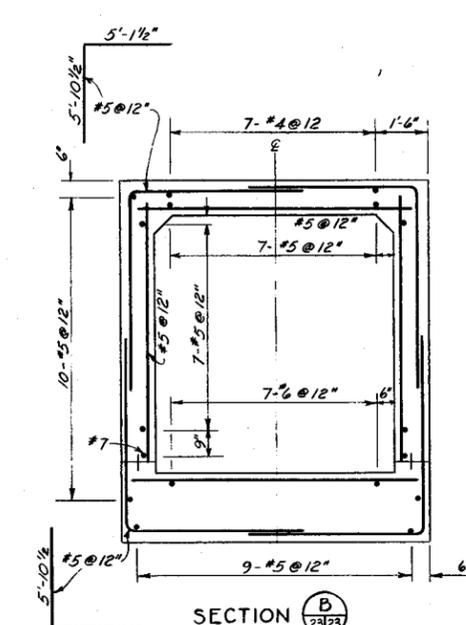
TOP FACE



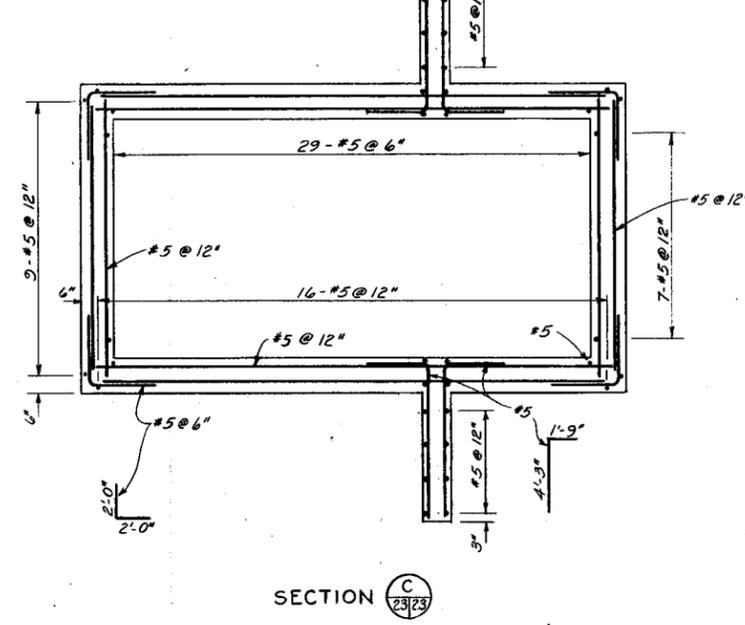
BOTTOM FACE  
INVERT PLAN



SECTION A



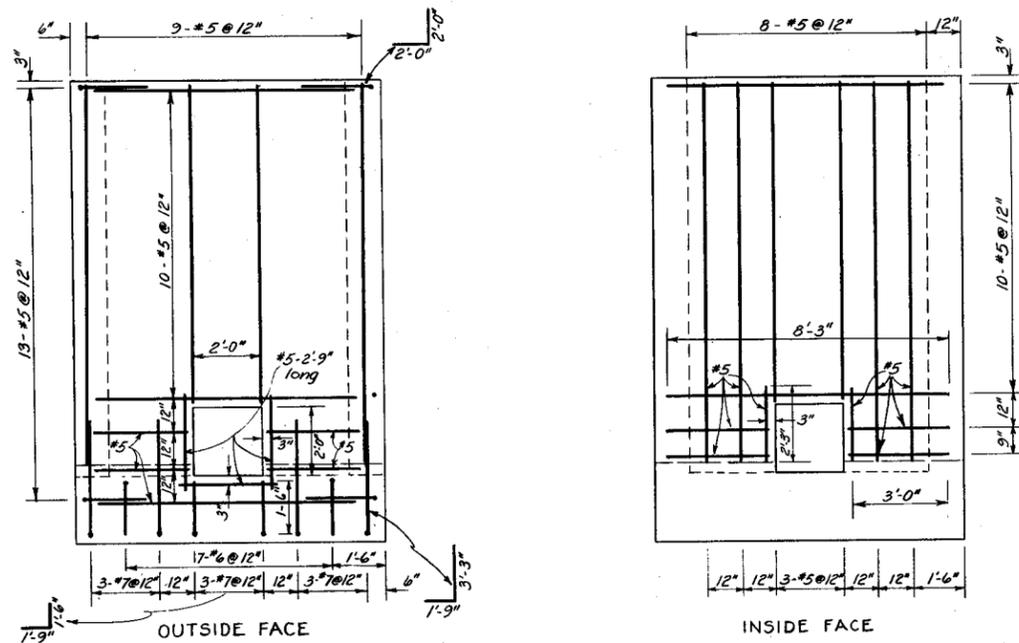
SECTION B



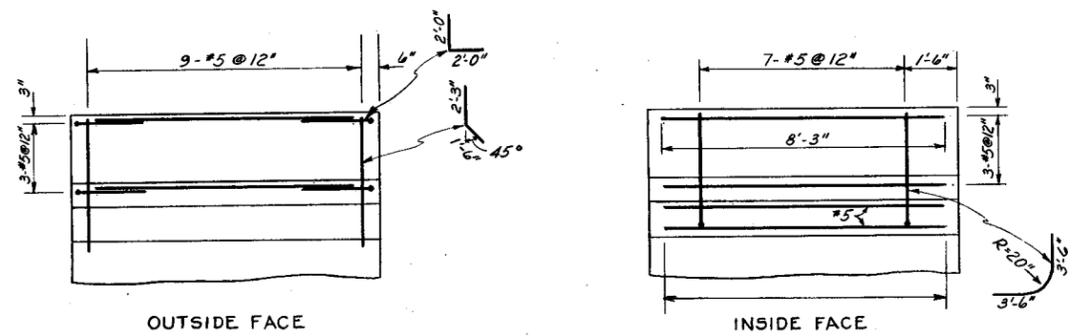
SECTION C



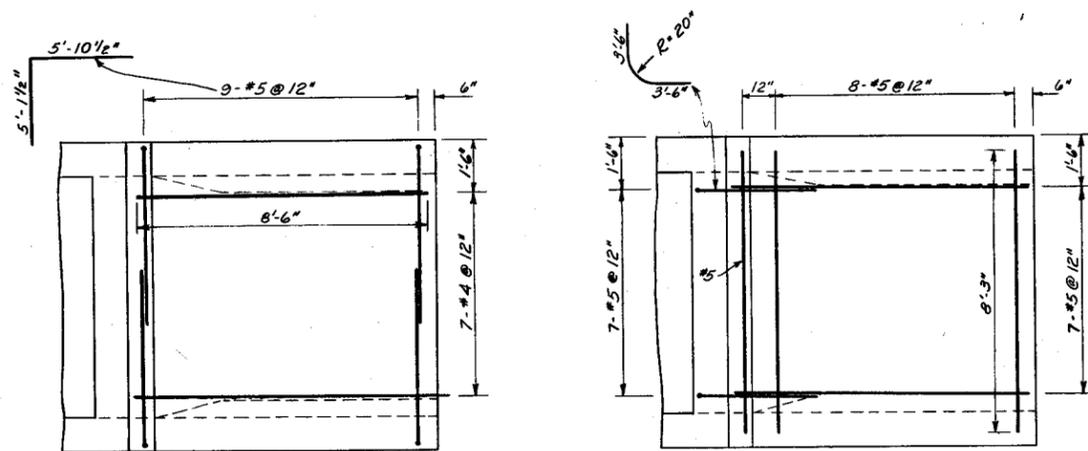
PRINCIPAL SPILLWAY INLET DETAILS			
SPOOK HILL F.R.S.			
BUCKHORN - MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	PJM	Date	12-75
Drawn	ES	Approved by	
Traced	ES	Sheet	3-76
Checked	AC PJM	No. 23 of 45	8-76
		Title	7-E-23797



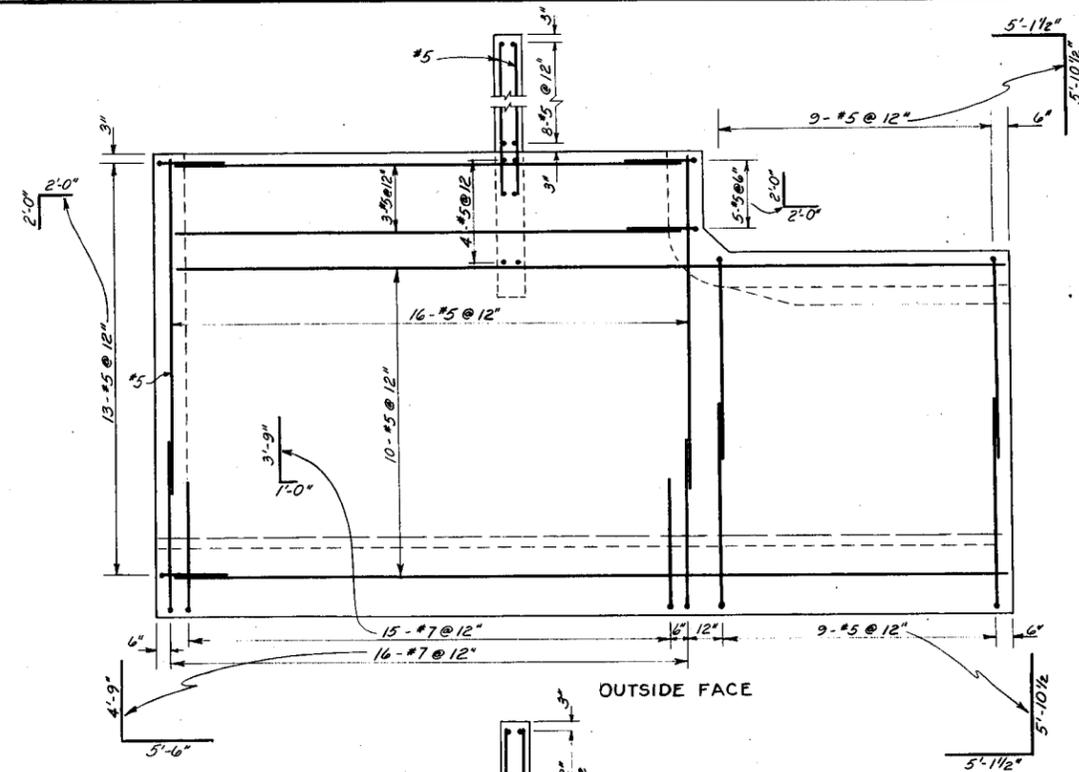
END ELEVATION  
(Looking downstream)



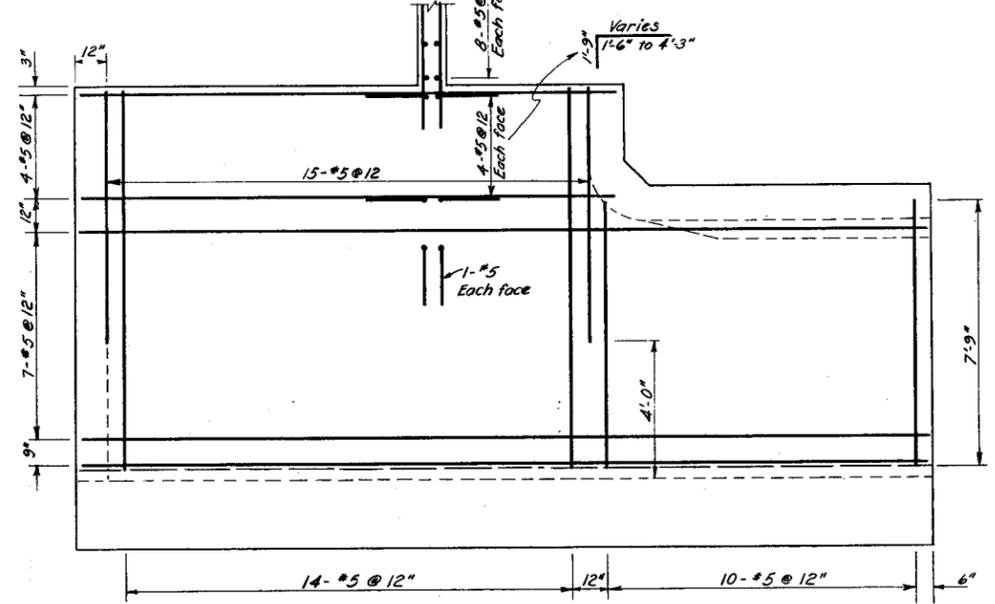
END ELEVATION  
(Looking upstream)



CROWN PLAN



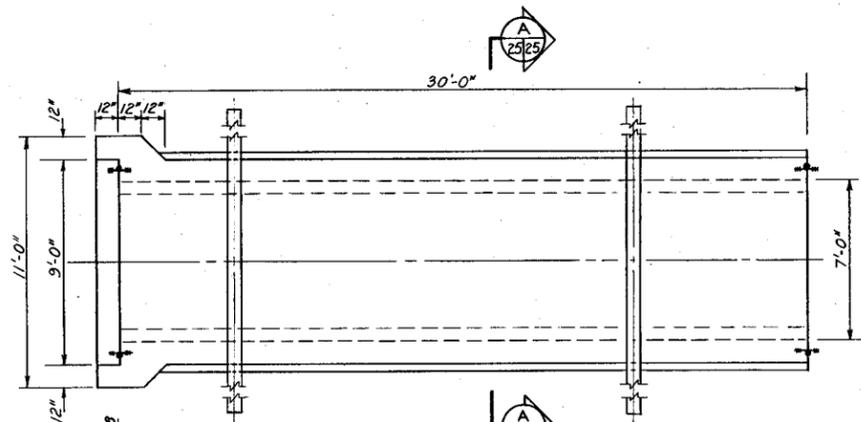
OUTSIDE FACE



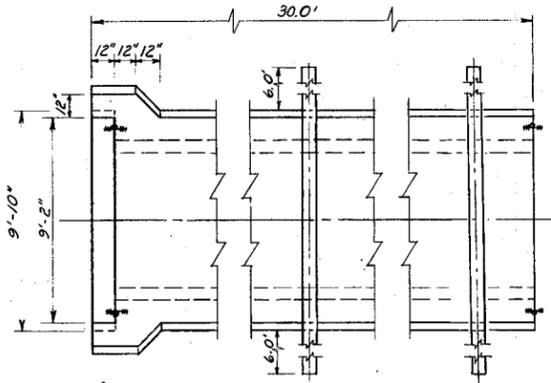
INSIDE FACE  
SIDEWALL ELEVATION



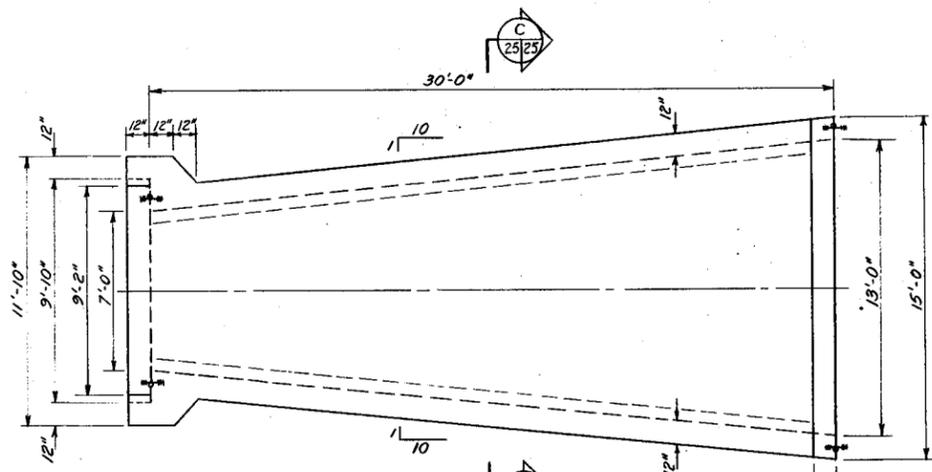
PRINCIPAL SPILLWAY INLET DETAILS			
SPOOK HILL F.R.S.			
BUCKHORN-MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	PJM	Date	12-75
Approved by		Title	
Drawn		Title	
Traced	ES	3-76	Sheet No. 24
Checked	AC PJM	8-76	of 45
			Drawing No. 7-E-23797



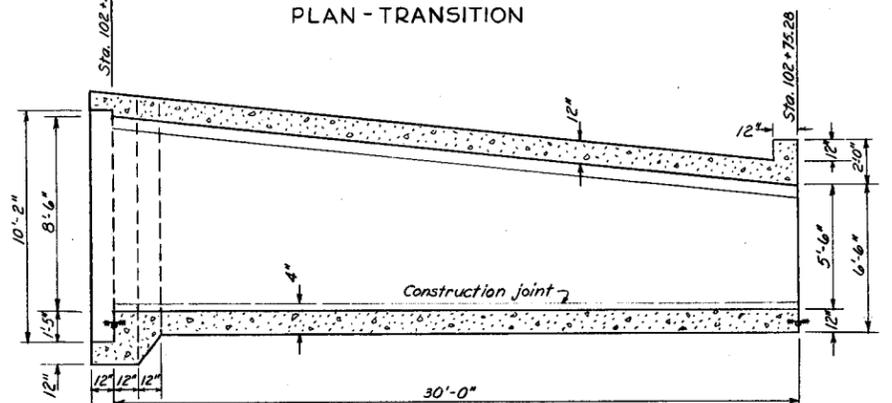
PLAN - CONDUIT



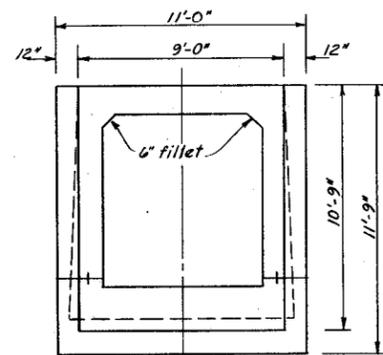
SECTIONAL ELEVATION - CONDUIT



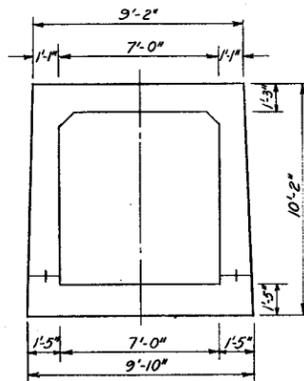
PLAN - TRANSITION



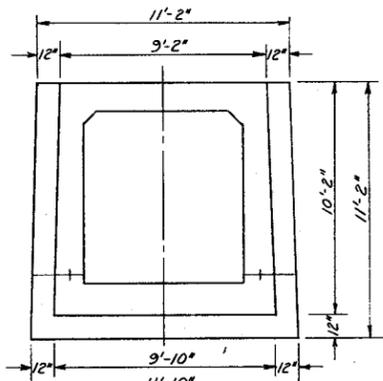
SECTIONAL ELEVATION - TRANSITION



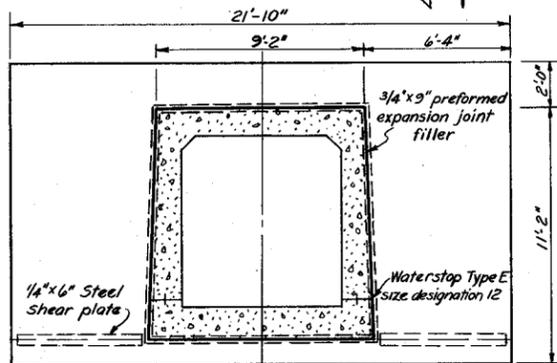
END ELEVATION  
STA. 101+85.28  
(Looking downstream)



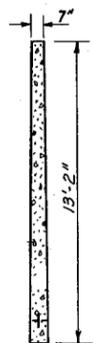
SECTION A



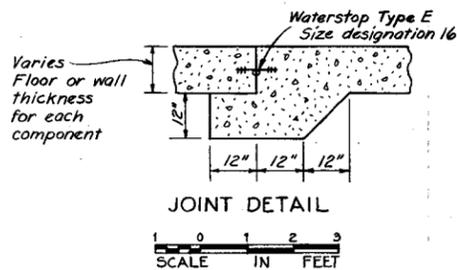
END ELEVATION  
STA. 102+15.28  
(Looking downstream)



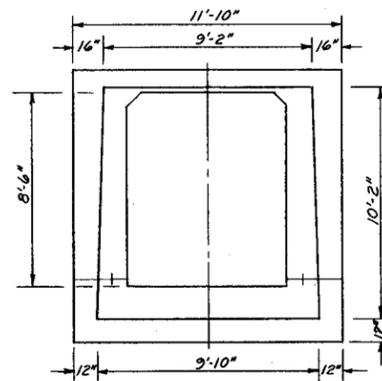
CROSS SECTION CONDUIT AT  
ANTI-SEEP COLLAR



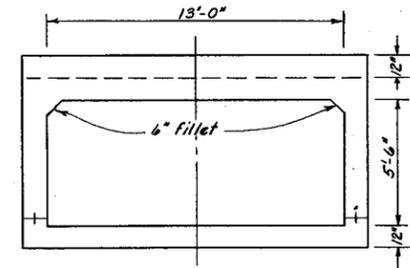
SECTION B



JOINT DETAIL



END ELEVATION  
STA. 102+45.28  
(Looking downstream)



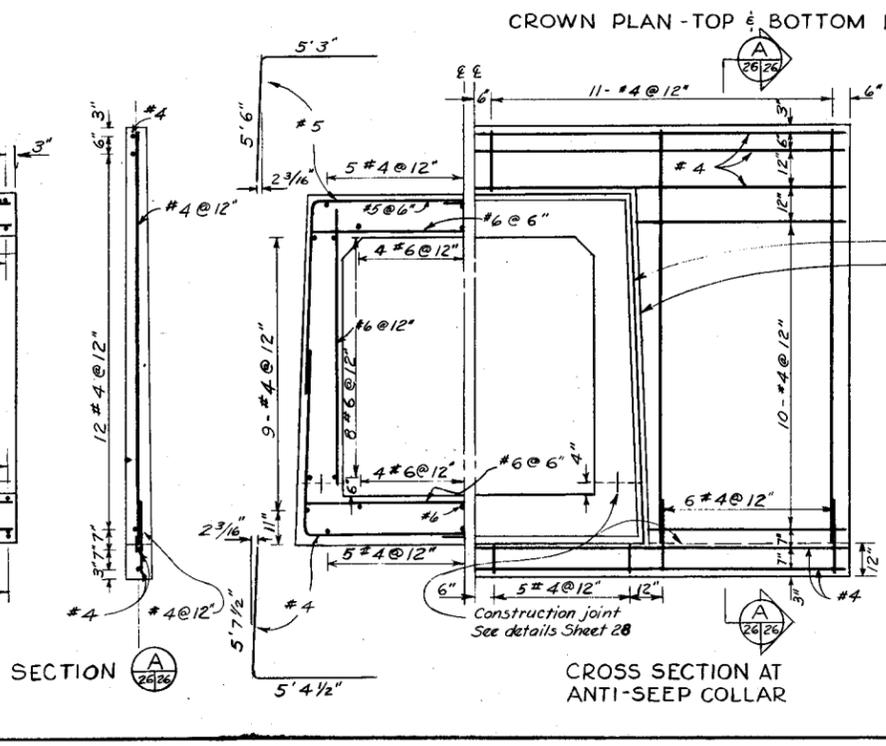
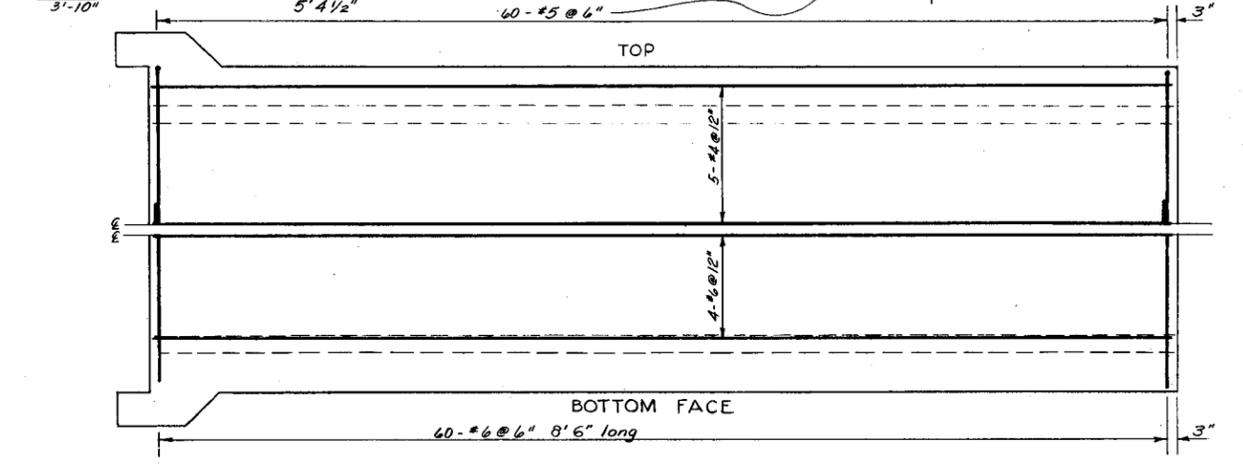
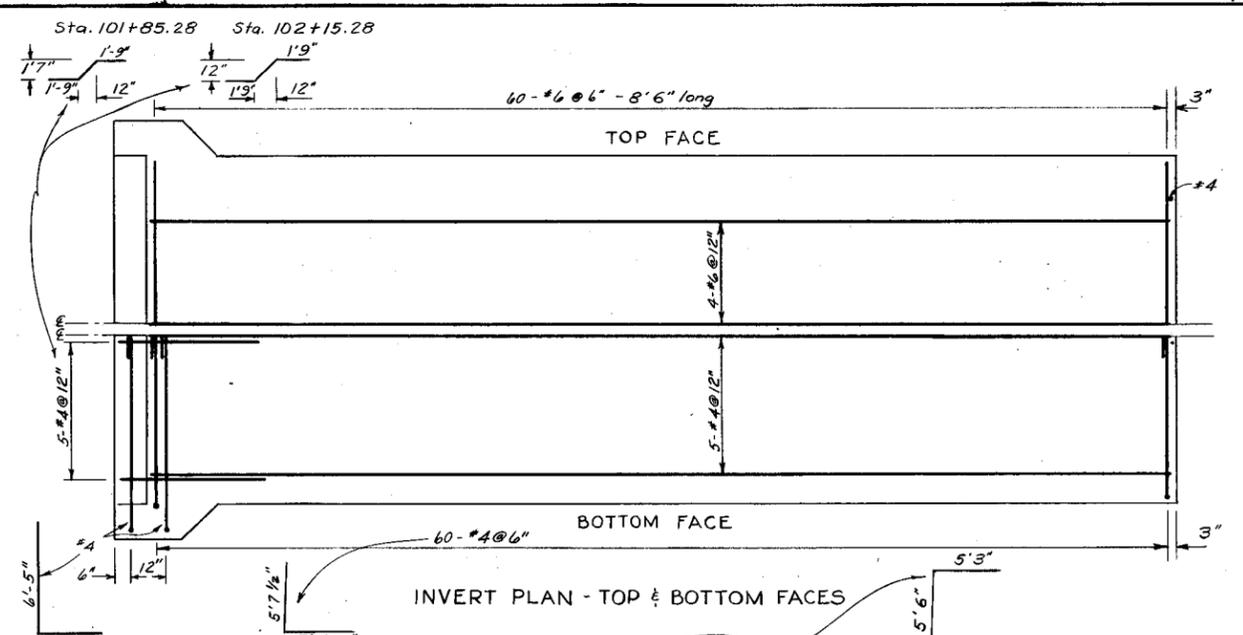
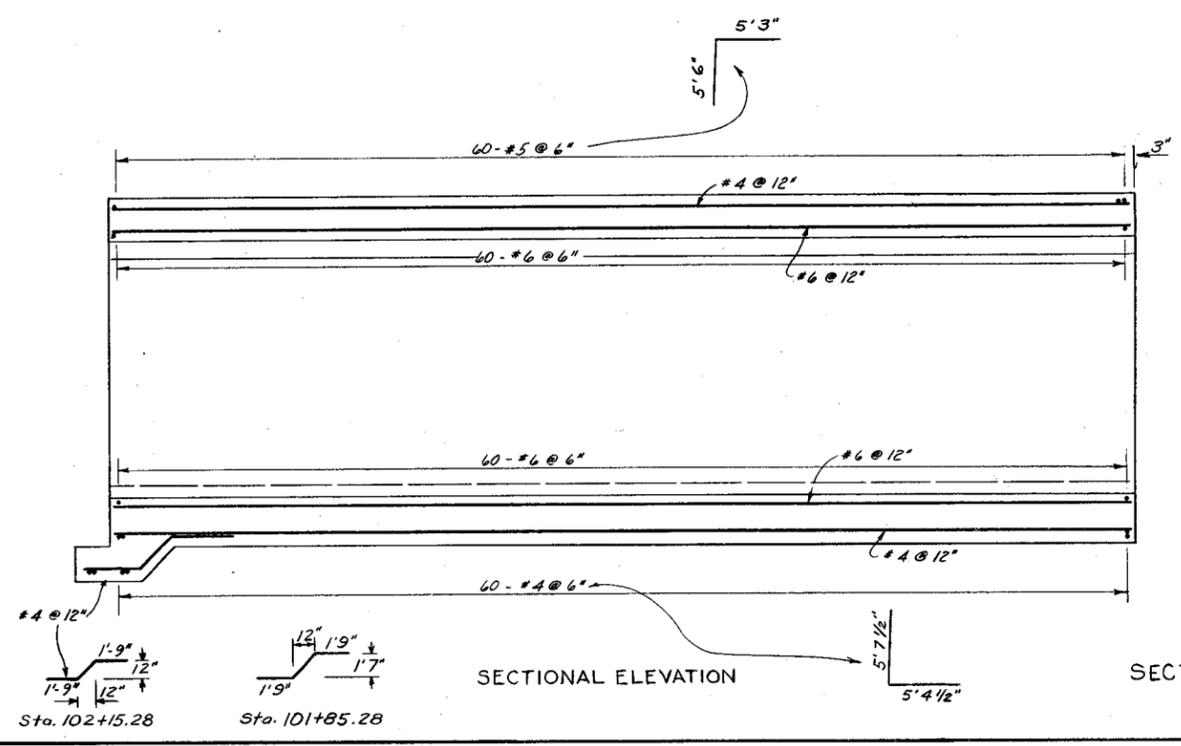
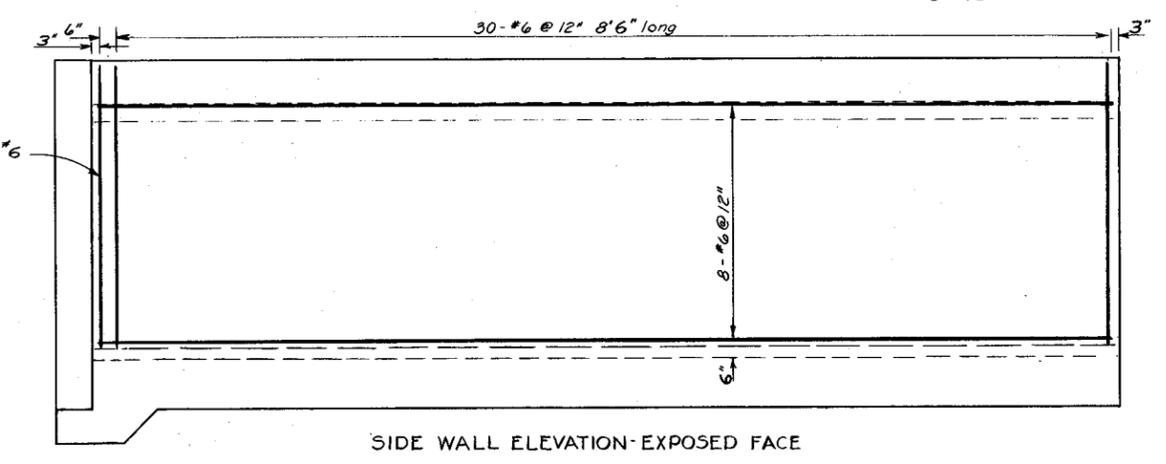
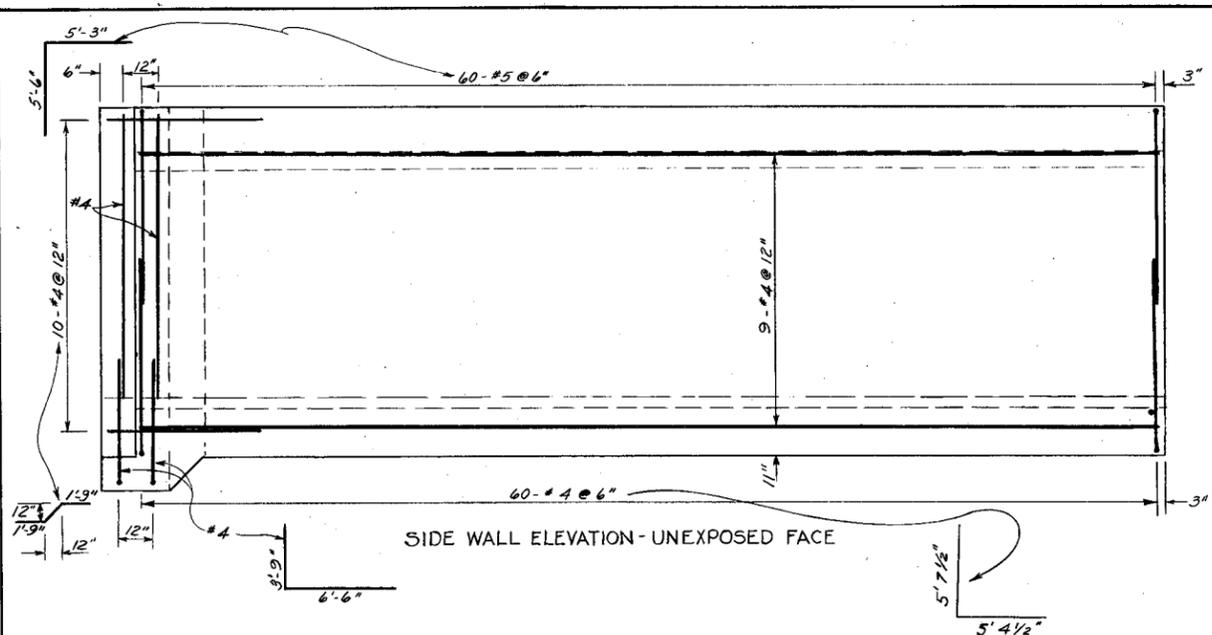
END ELEVATION  
STA. 102+75.28  
(Looking upstream)



PRINCIPAL SPILLWAY CONDUIT &  
TRANSITION LAYOUT  
SPOOK HILL F.R.S.  
BUCKHORN-MESA W.P.P.  
MARICOPA & PINAL COUNTIES, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

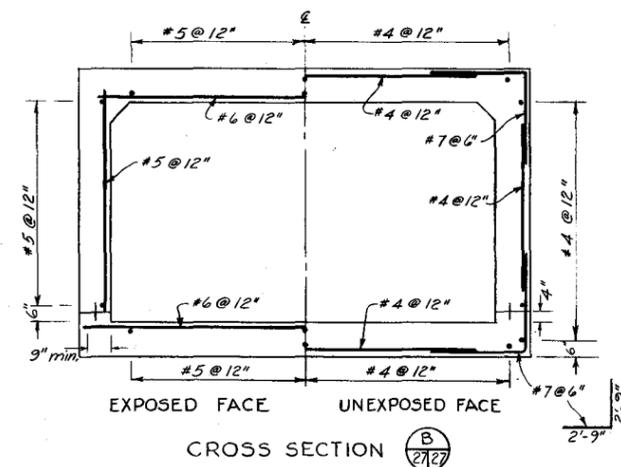
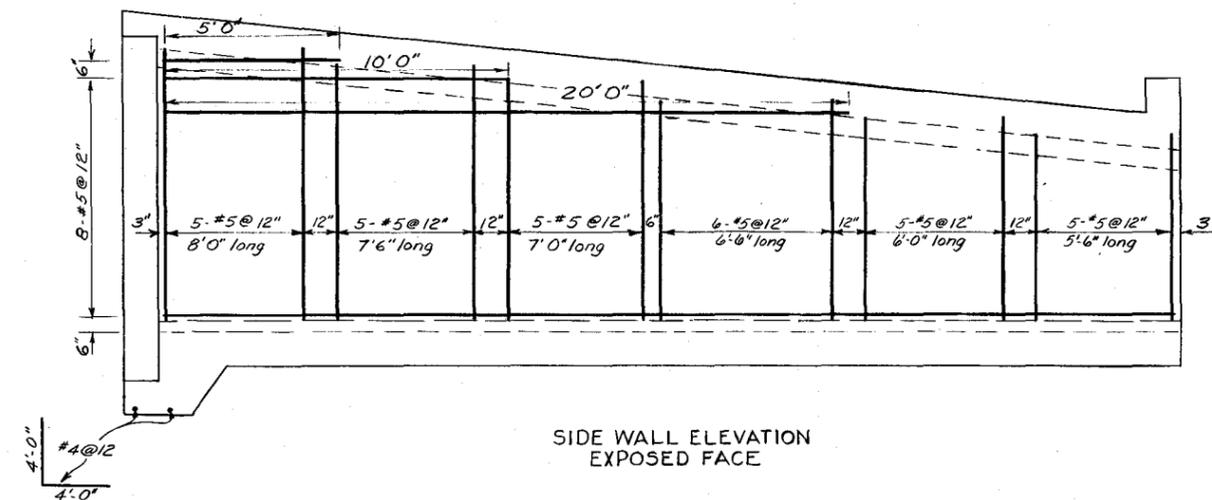
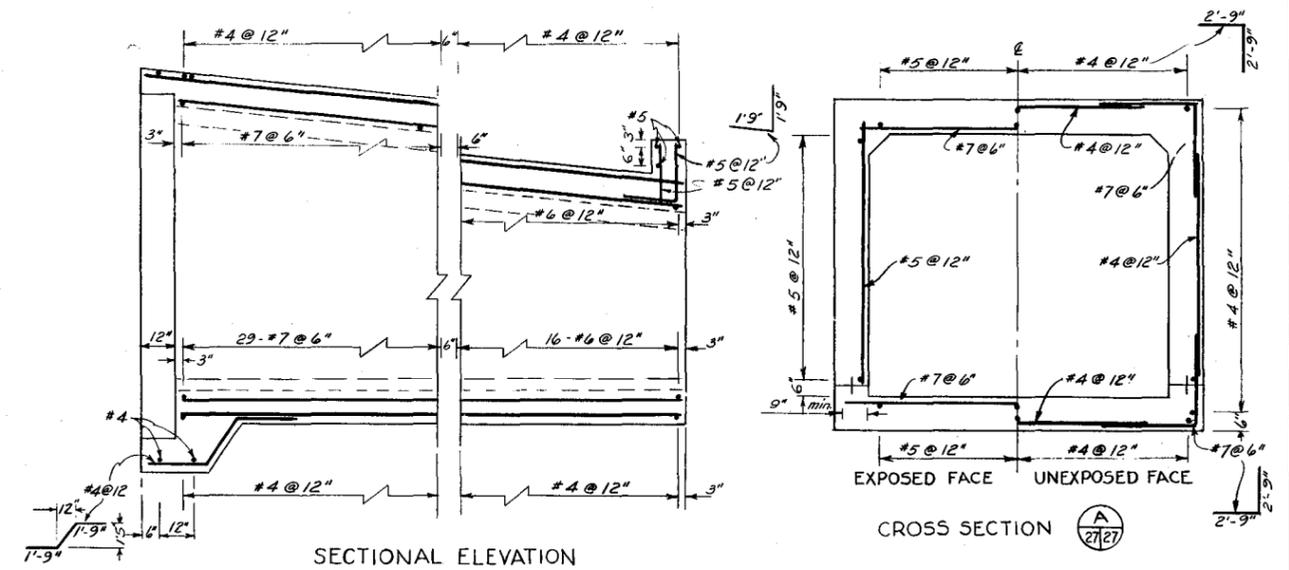
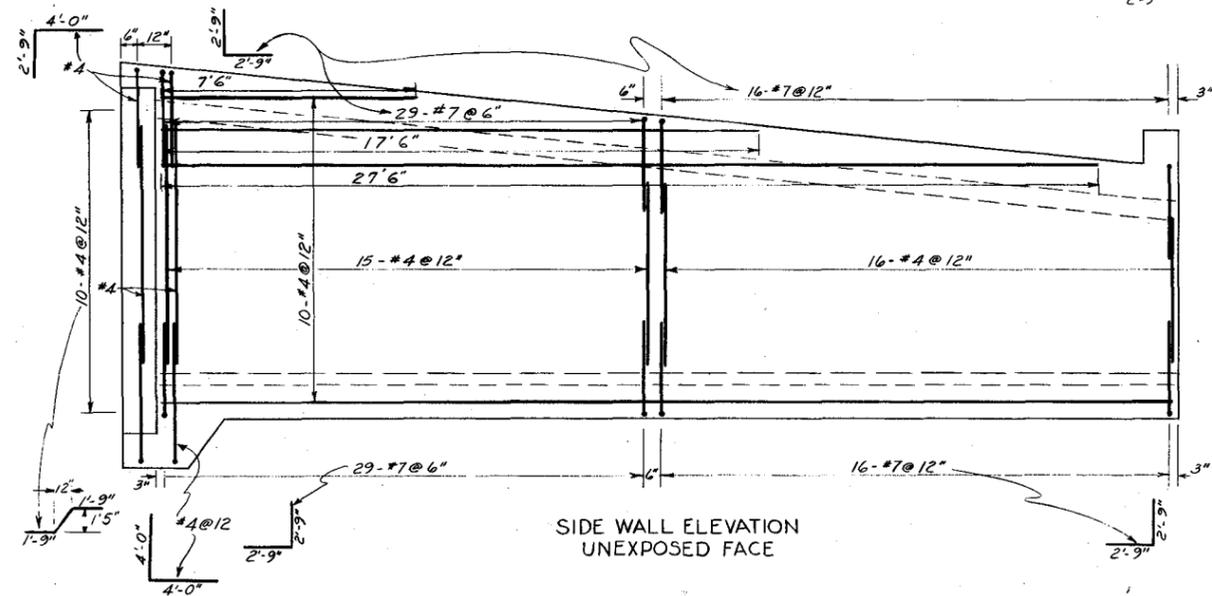
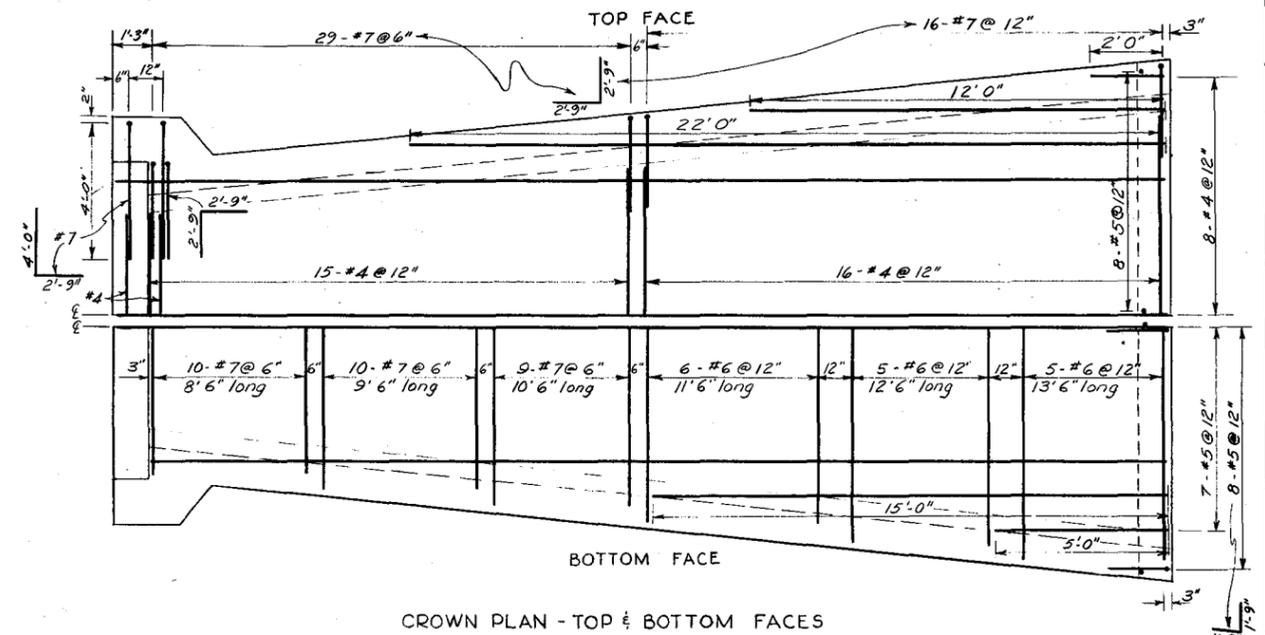
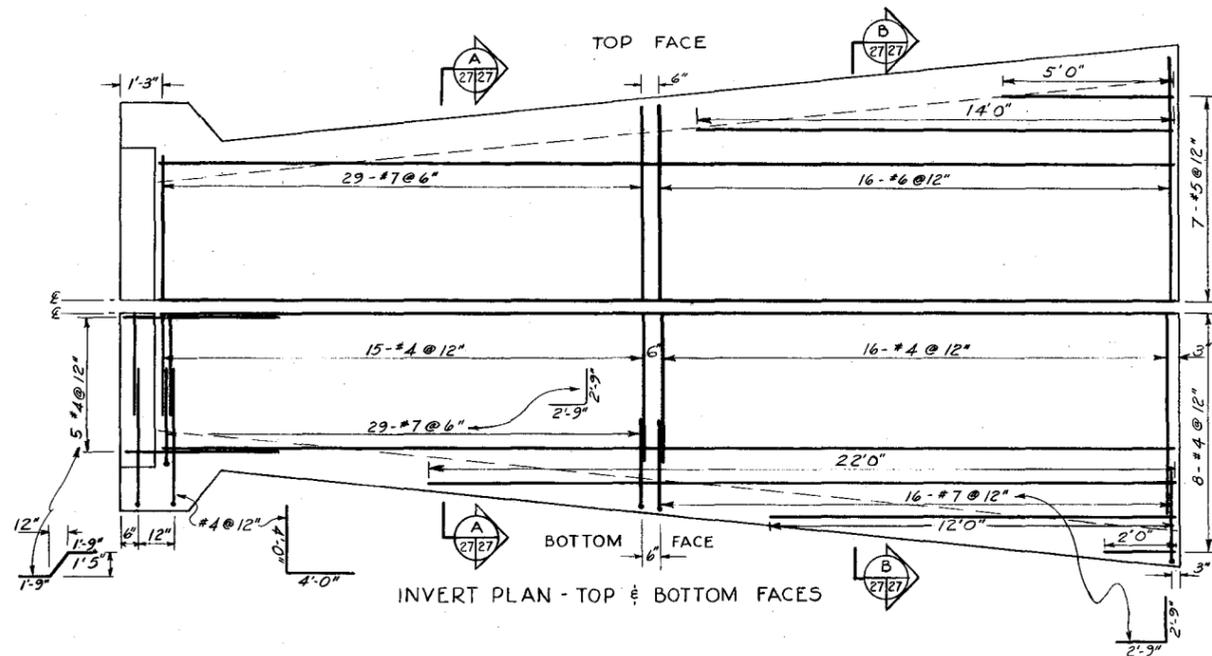
Designed	PJM	Date	Approved by
Drawn	ES	11-76	Title
Traced			Title
Checked	PJM	12-76	Sheet No. 25 of 45
			Drawing No. 7-E-23797



3/4" x 9" Preformed expansion joint filler  
Waterstop Type E size designation 12

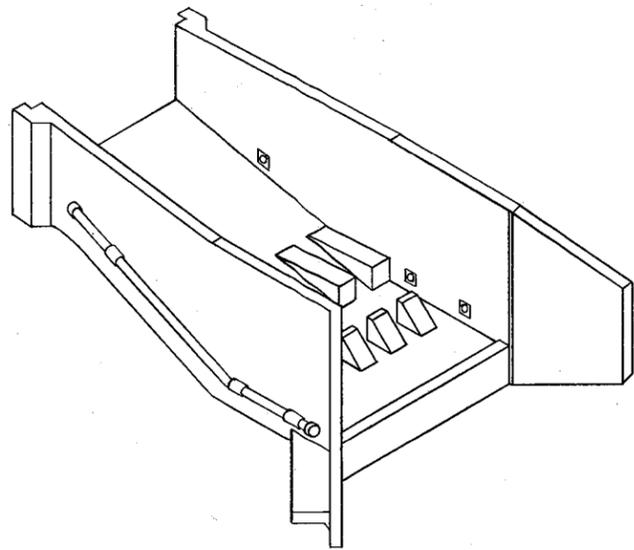


PRINCIPAL SPILLWAY CONDUIT DETAILS			
SPOOK HILL F.R.S.			
BUCKHORN-MESA WRP			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	PJM	Date	2-76
Drawn		Approved by	
Traced	ES	Title	
Checked	PJM	Sheet	No. 26 of 45
		Drawing No.	7-E-23797

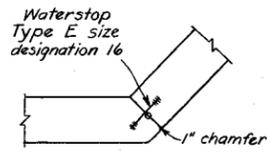


1 0 5  
SCALE IN FEET

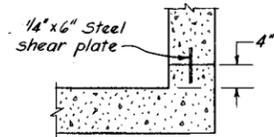
PRINCIPAL SPILLWAY TRANSITION DETAILS			
SPOOK HILL F.R.S.			
BUCKHORN - MESA W.R.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	PJM	Date	12-75
Drawn	ES	Approved by	
Traced		Title	
Checked	AC PJM	Sheet	No. 27 of 45
		Drawing No.	7-E-23797



ISOMETRIC VIEW

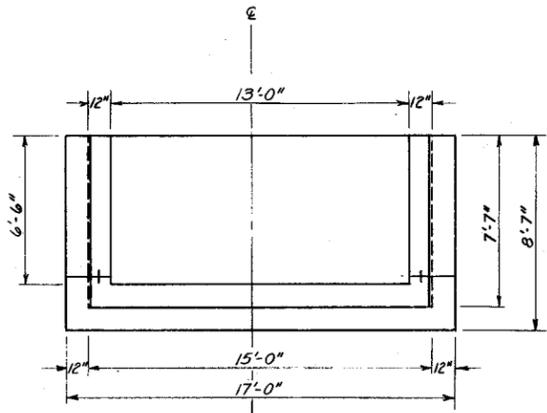


DETAIL A  
28/28

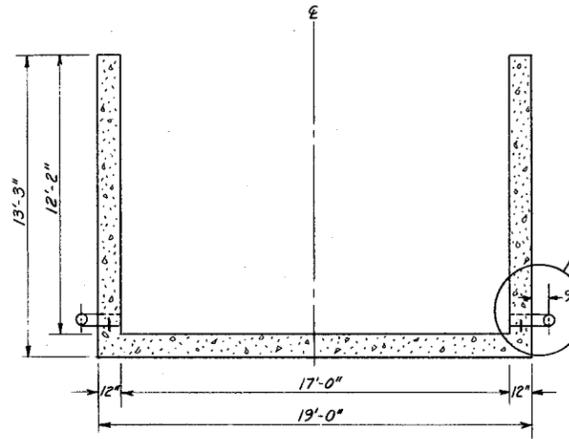


TYPICAL CONSTRUCTION JOINT DETAIL

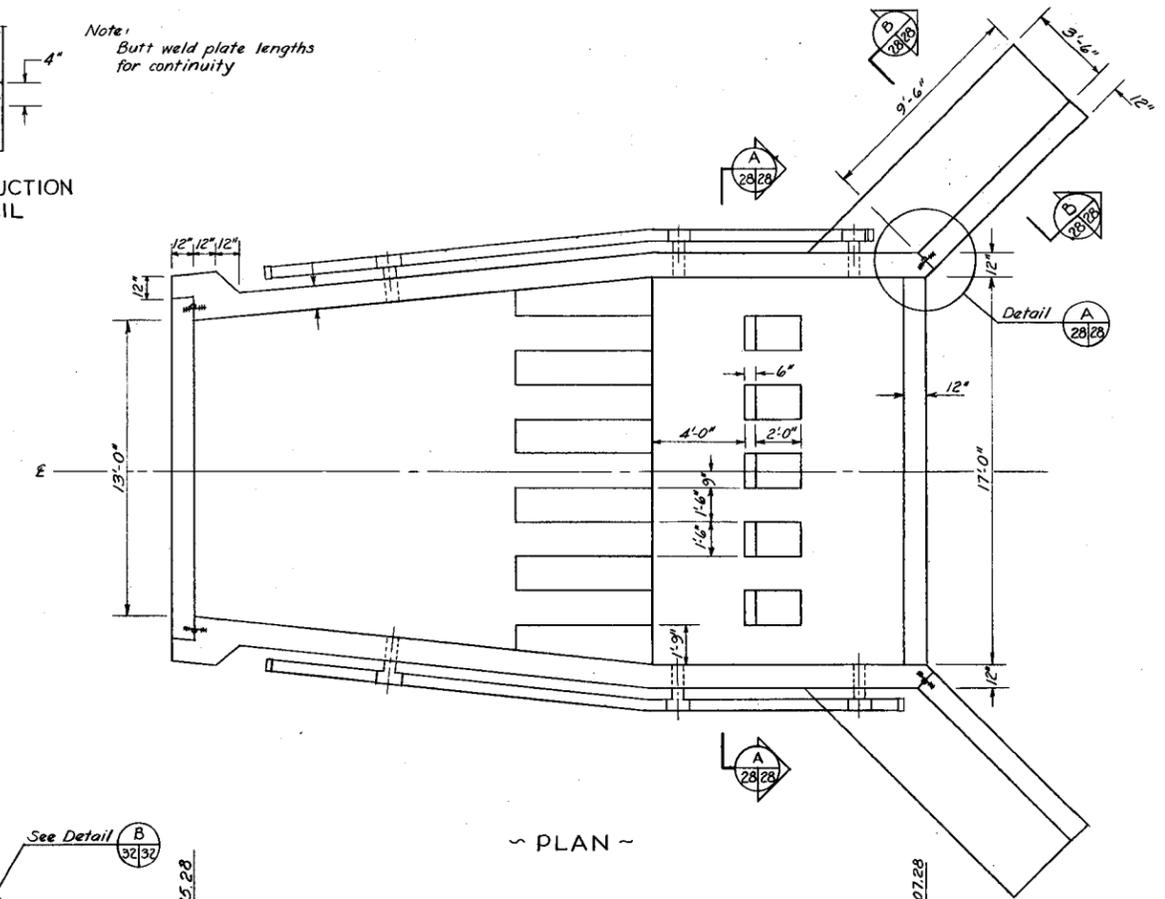
Note:  
Butt weld plate lengths  
for continuity



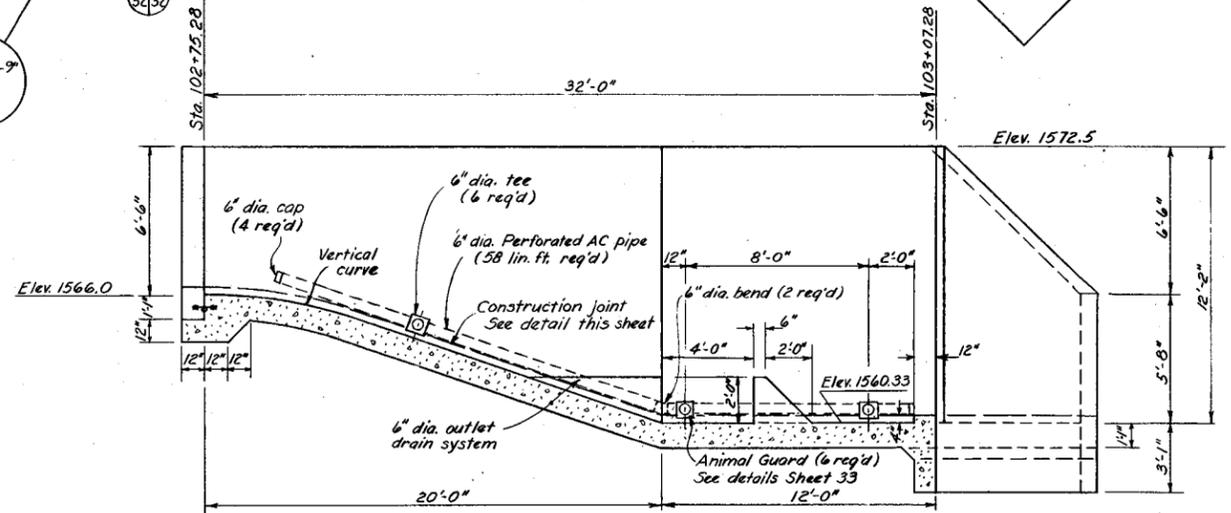
END ELEVATION  
(Looking downstream)



SECTION A  
28/28



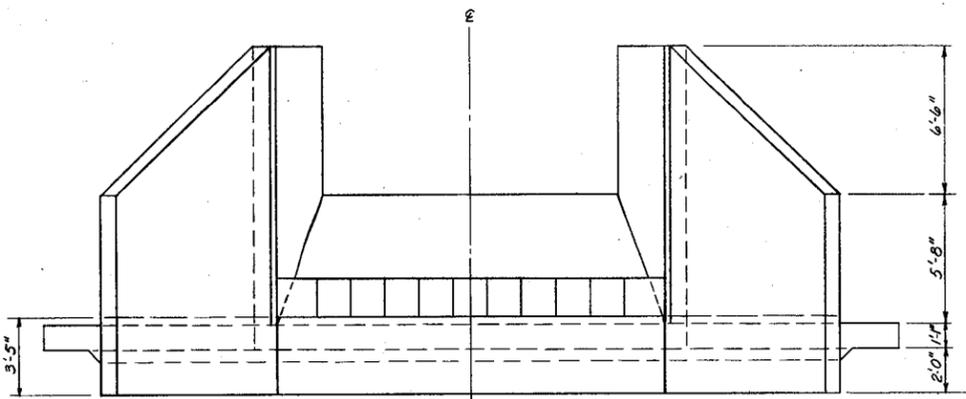
~ PLAN ~



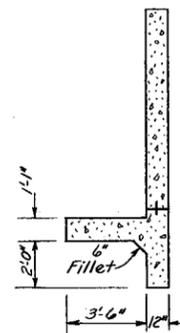
SECTIONAL ELEVATION

VERTICAL CURVE	
Station	Elevation
102+75.28	1566.00
102+76.28	1565.97
102+77.28	1565.89
102+78.28	1565.75
102+79.28	1565.56
102+80.28	1565.30
102+81.28	1565.00

1 0 5 10  
SCALE IN FEET



END ELEVATION  
(Looking upstream)



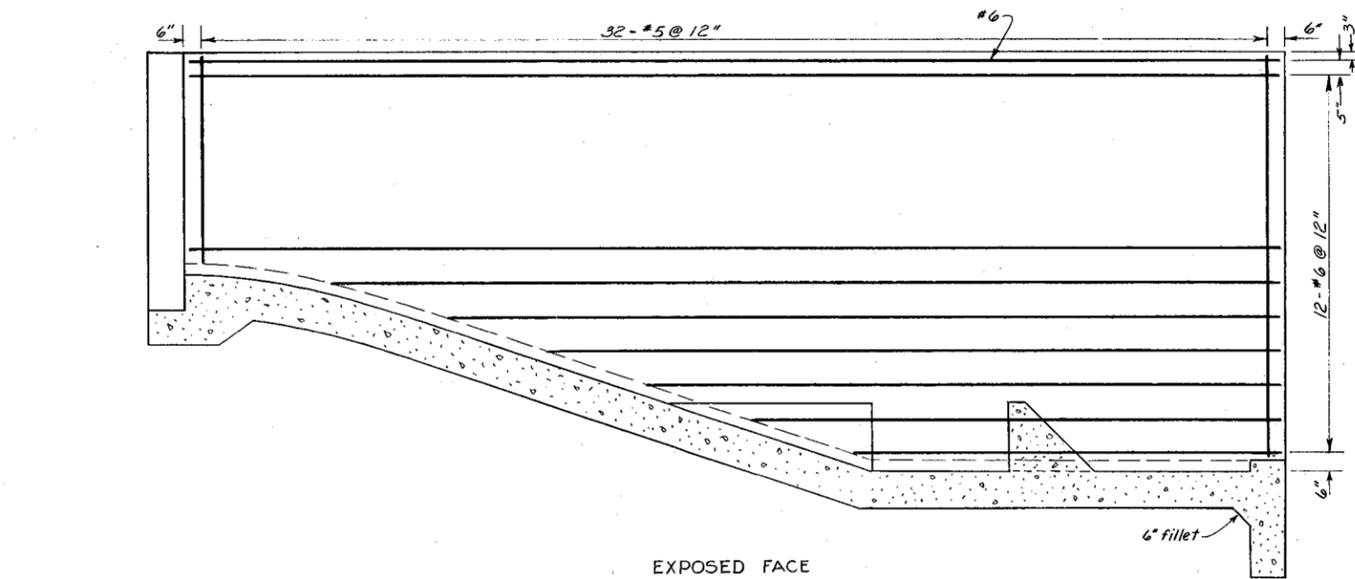
SECTION B  
28/28

PRINCIPAL SPILLWAY OUTLET LAYOUT  
SPOOK HILL F.R.S.  
BUCKHORN-MESA W.P.P.  
MARICOPA & PINAL COUNTIES, ARIZONA

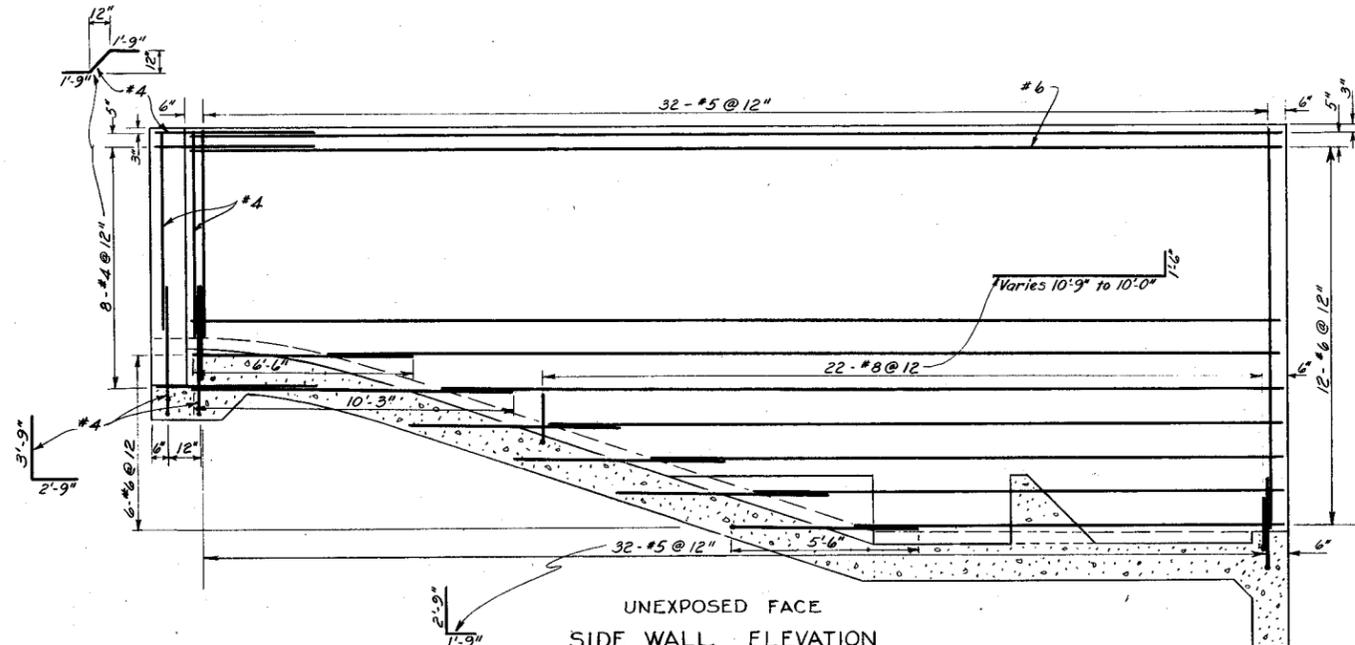
**U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

Designed: PJM	Date: 10-75	Approved by:
Drawn: EFS	Date: 11-75	Title:
Traced:	Sheet: No. 28 of 25	Drawing No.:
Checked: PJM	Date: 12-76	7-E-23797

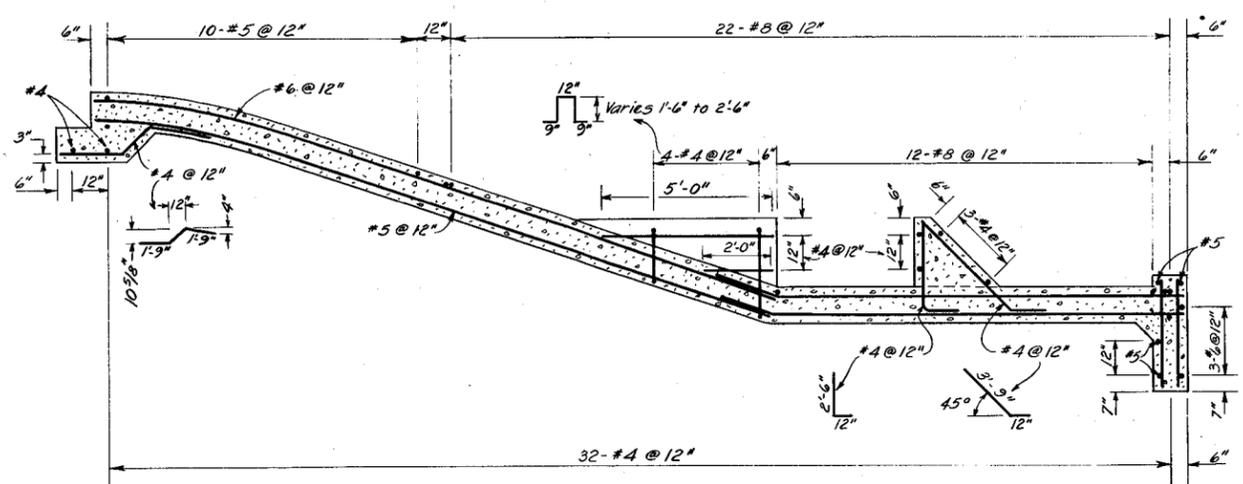




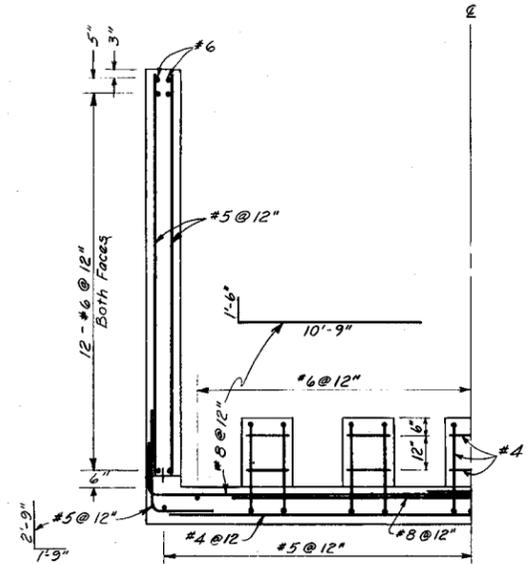
EXPOSED FACE



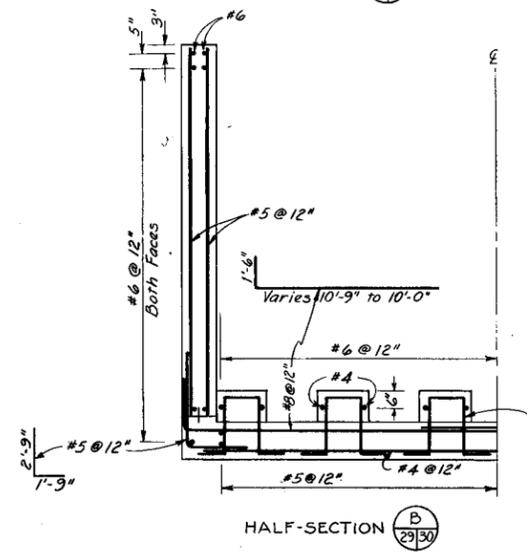
UNEXPOSED FACE  
SIDE WALL ELEVATION



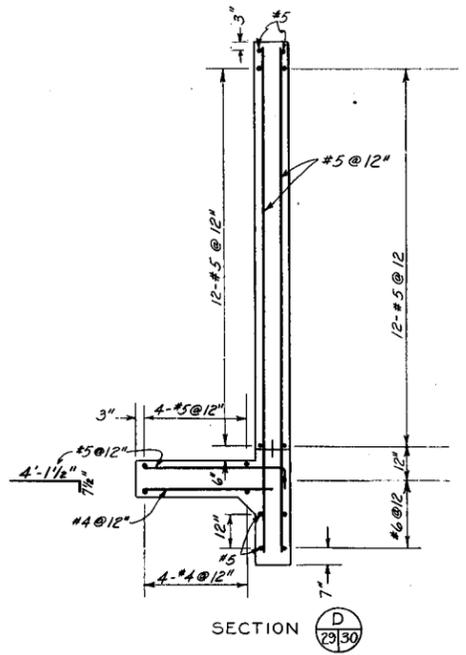
SECTIONAL ELEVATION



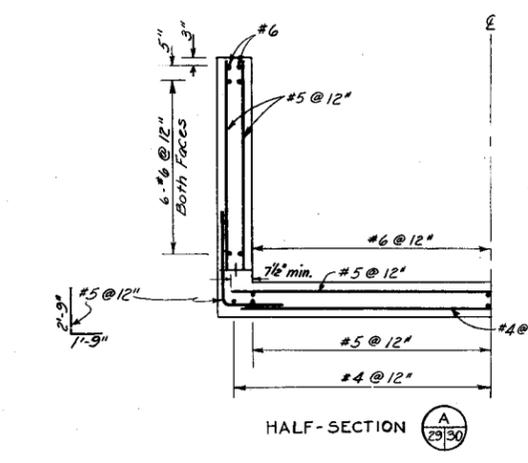
HALF-SECTION C  
29/30



HALF-SECTION B  
29/30



SECTION D  
29/30



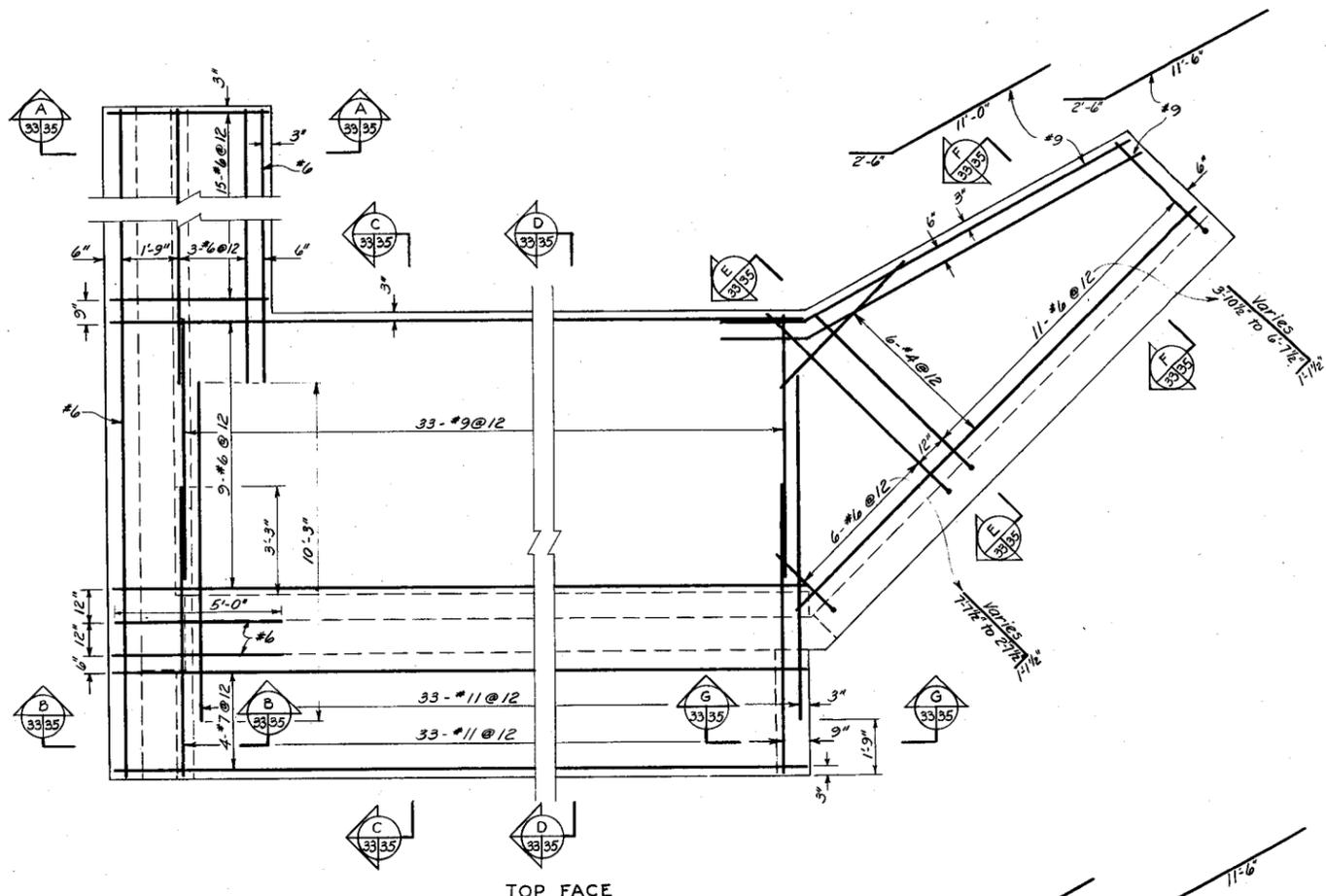
HALF-SECTION A  
29/30



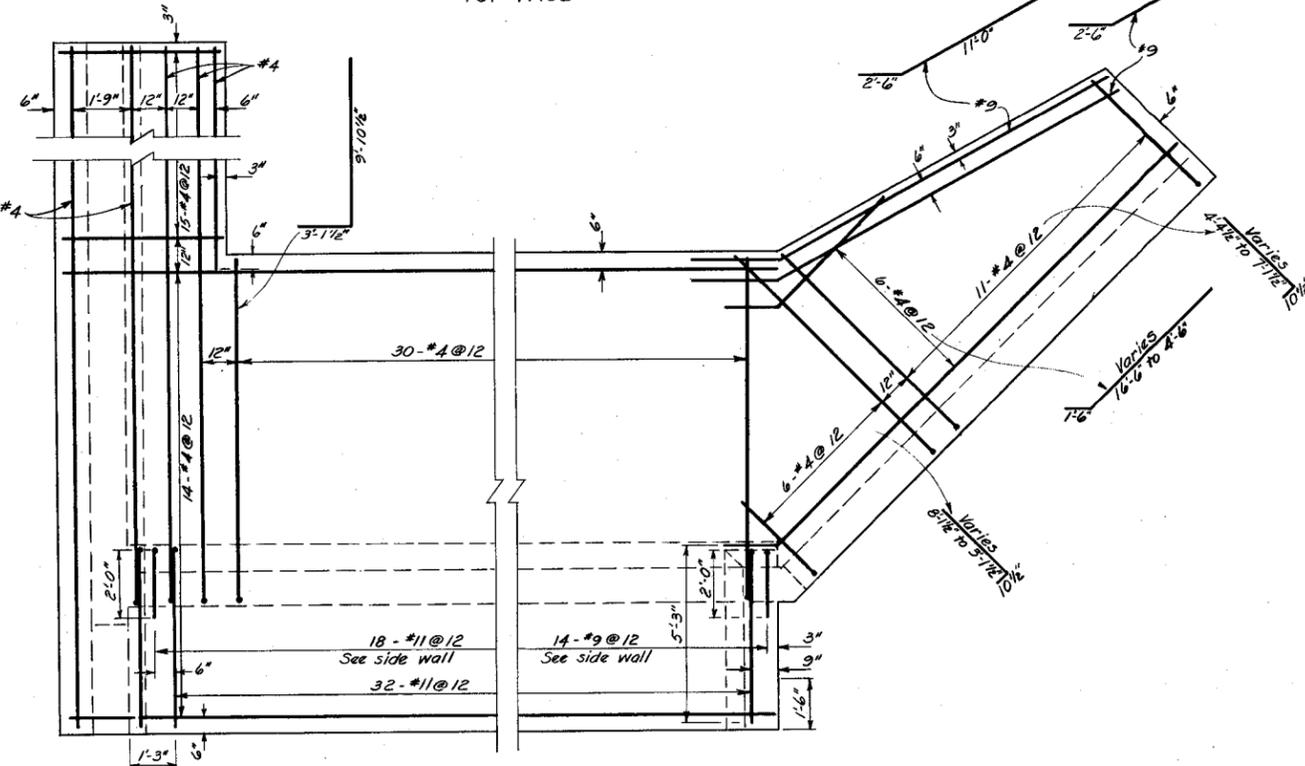
PRINCIPAL SPILLWAY OUTLET DETAILS			
SPOOK HILL F.R.S.			
BUCKHORN-MESA W.P.P.			
MARICOPA & PINAL COUNTIES ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	PJM	Date	10-75
Drawn	ES	Approved by	
Traced		Title	
Checked	PJM	Sheet	No. 30 of 45
		Drawing No.	7-E-23797



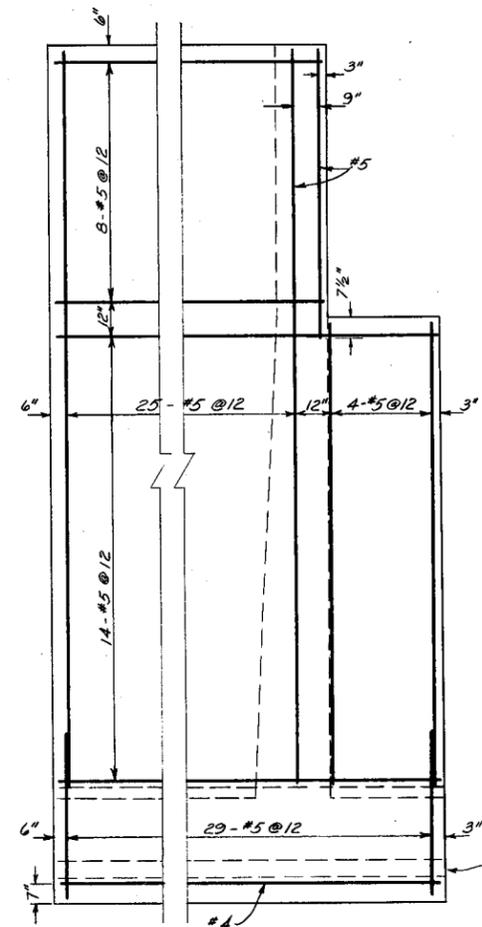




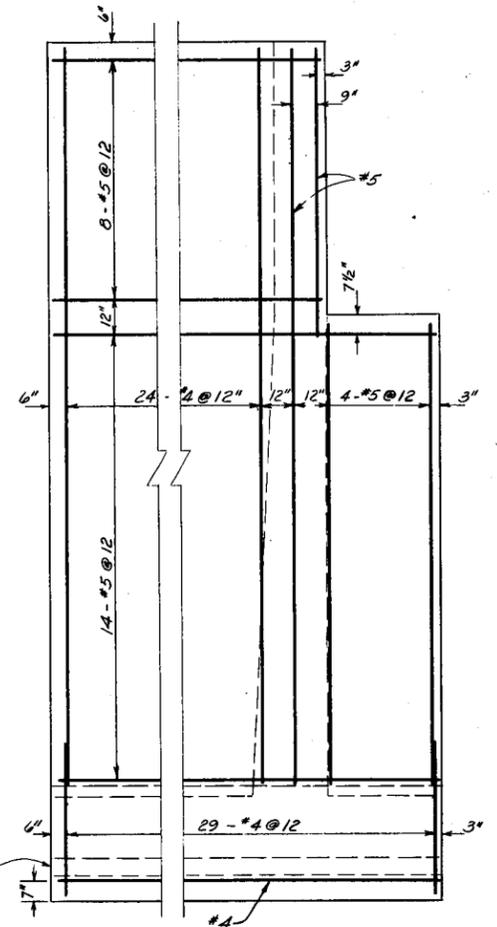
TOP FACE



BOTTOM FACE  
FOOTING

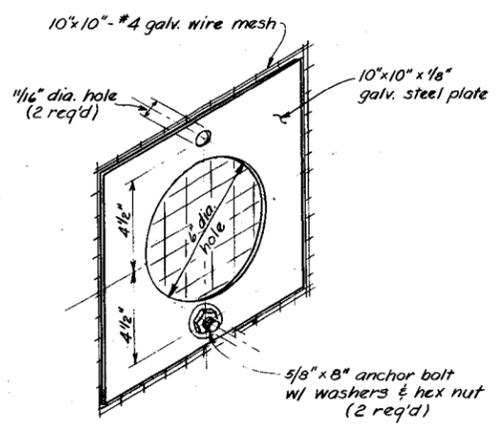


UPSTREAM FACE



DOWN STREAM FACE

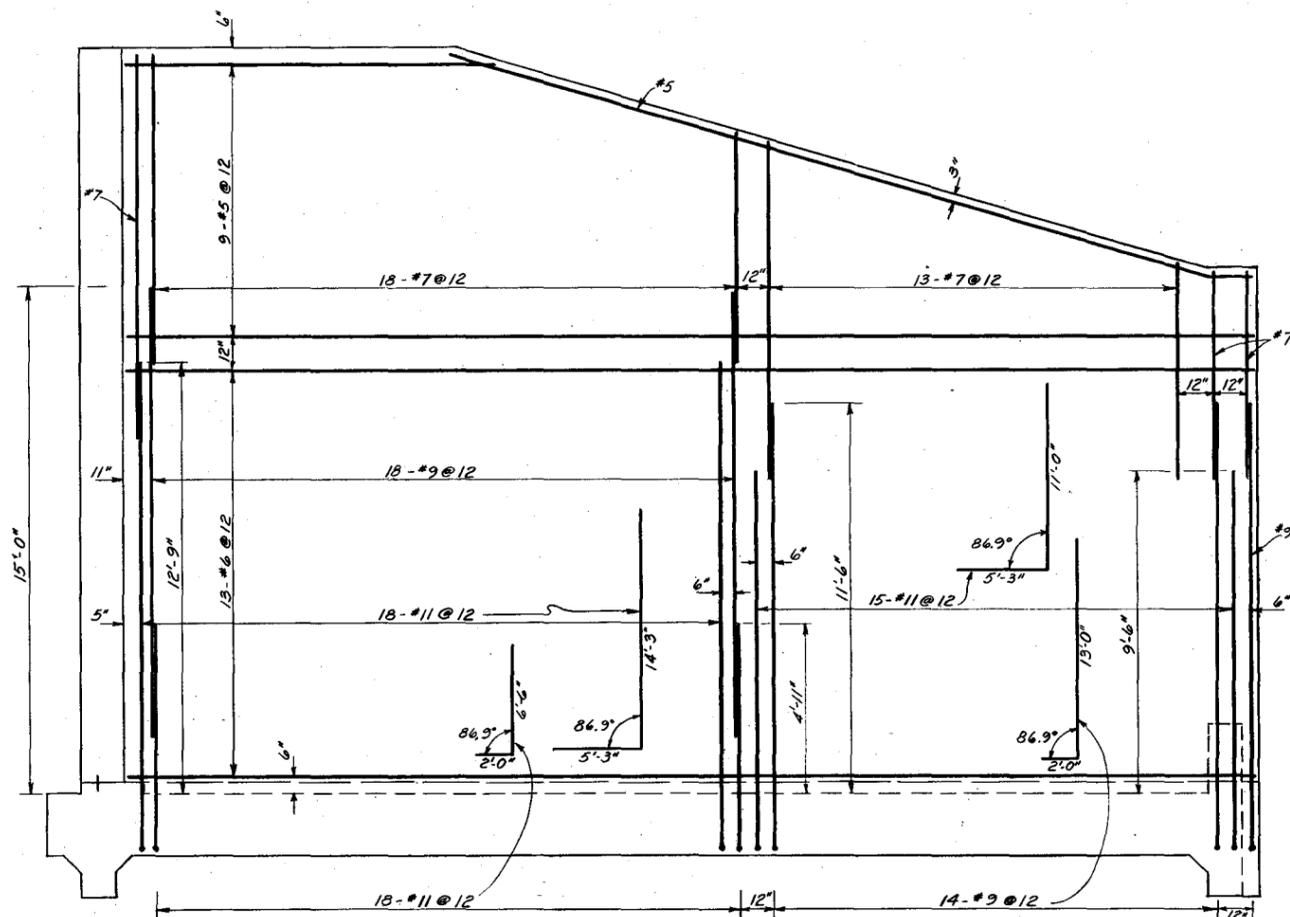
HEADWALL EXTENSION



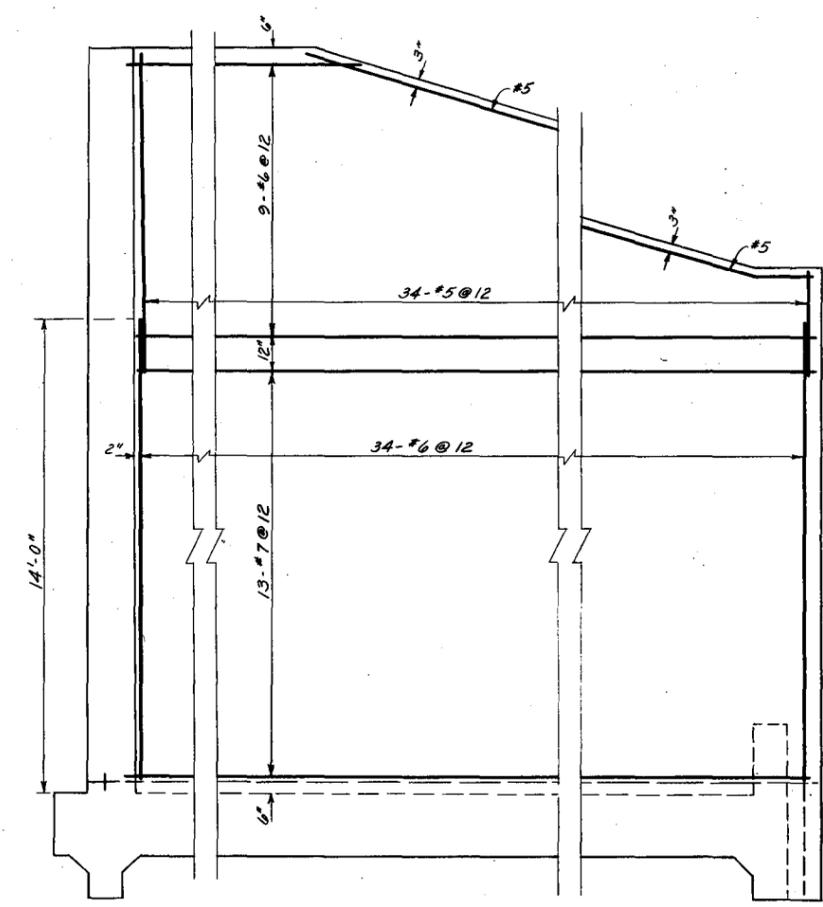
ANIMAL GUARD DETAILS  
(18 Req'd)  
(Not to scale)



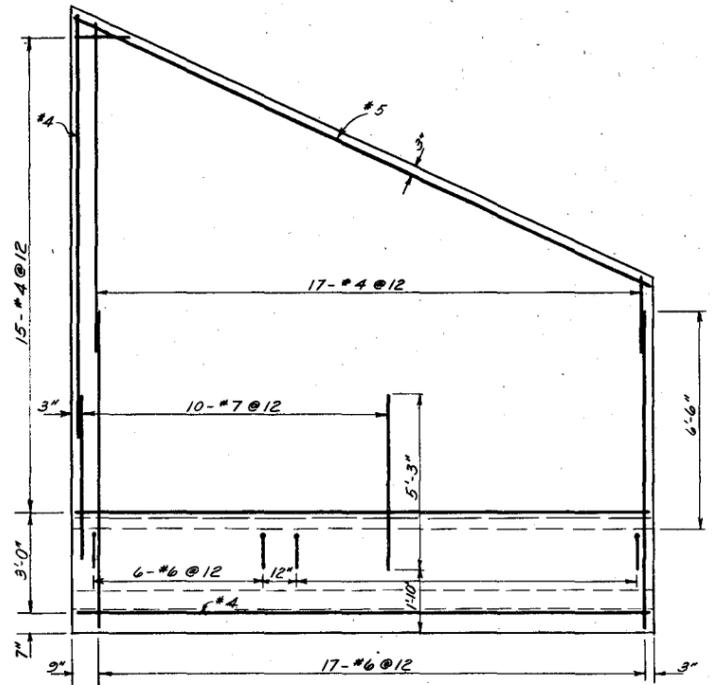
EMERGENCY SPILLWAY DETAILS FOOTING & HEADWALL EXTENSION			
SPOOK HILL F.R.S. BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	JLS PJM	Date	10-76
Drawn	EFS	Approved by	
Traced		Title	
Checked	PJM	Sheet	No. 33 of 45
		Drawing No.	7-E-23797



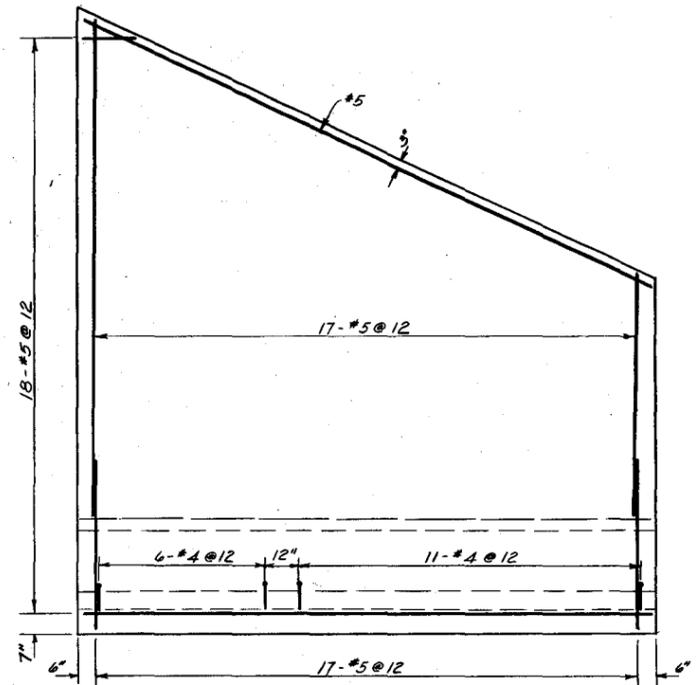
UNEXPOSED FACE



EXPOSED FACE



UPSTREAM FACE



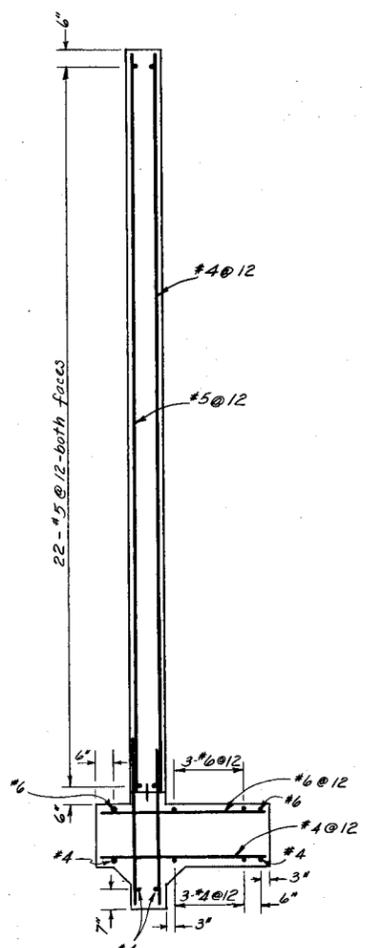
DOWN STREAM FACE

WINGWALL

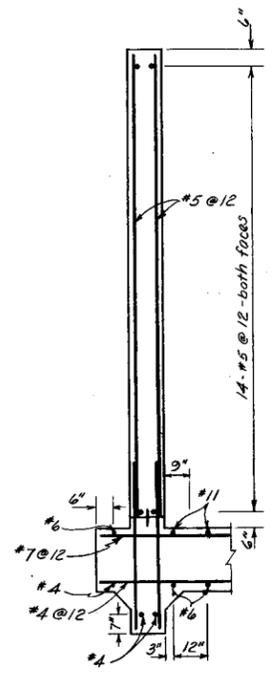
SIDE WALL



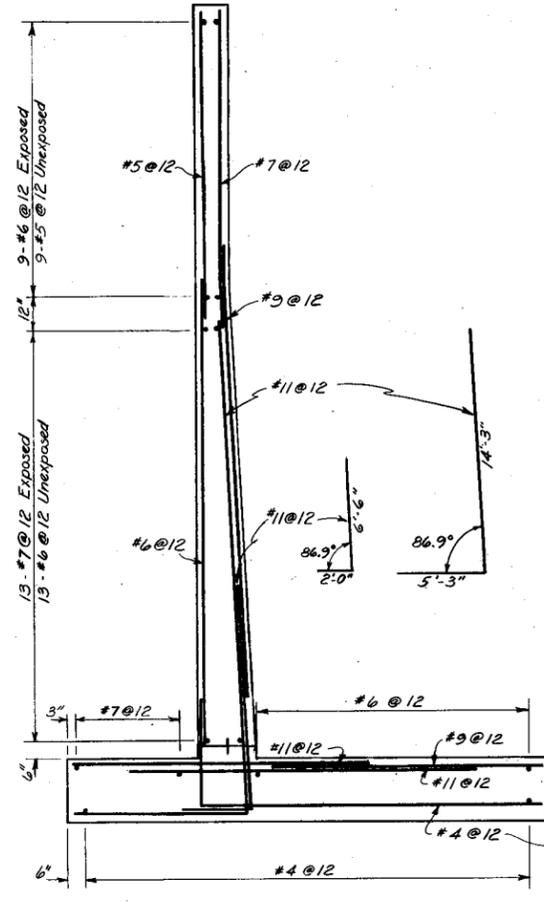
EMERGENCY SPILLWAY DETAILS SIDEWALL & WINGWALL SPOOK HILL FRS. BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	JLS PJM	Date	10-76
Drawn	EFS	Title	11-76
Traced		Sheet	No 34 of 45
Checked	PJM	Drawing No.	7-E-23797



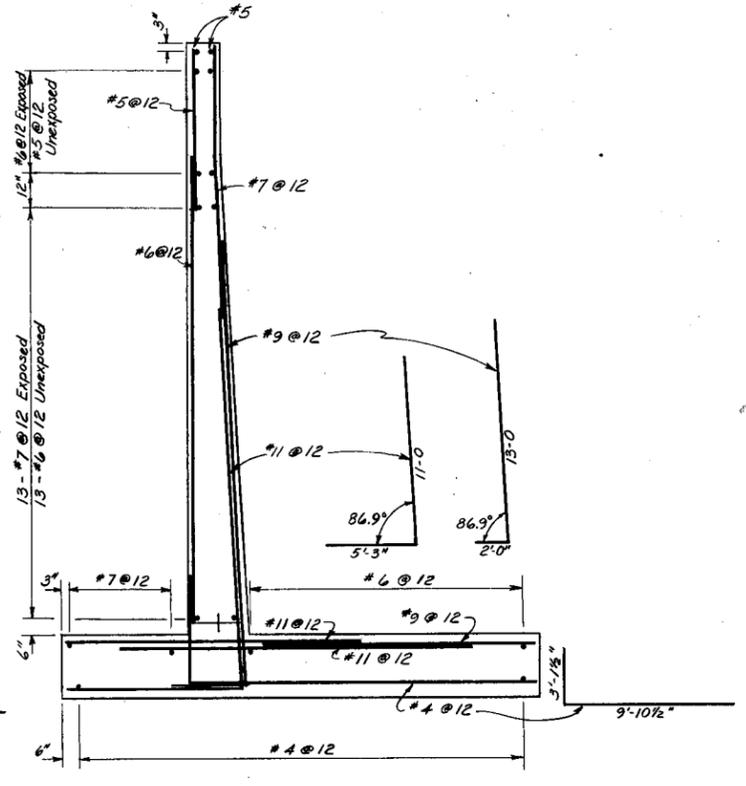
SECTION A  
33/35



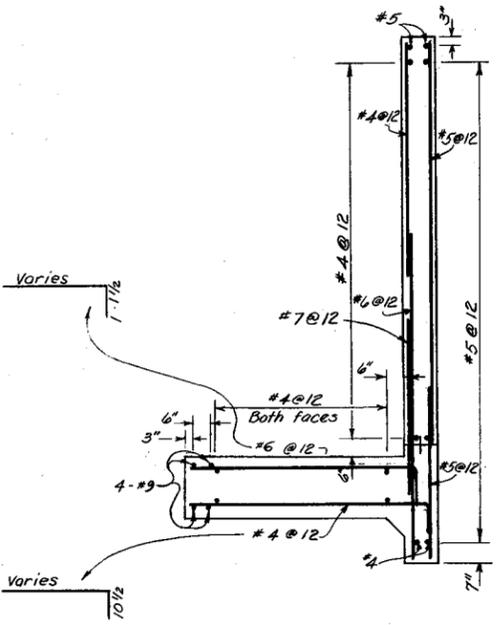
SECTION B  
33/35



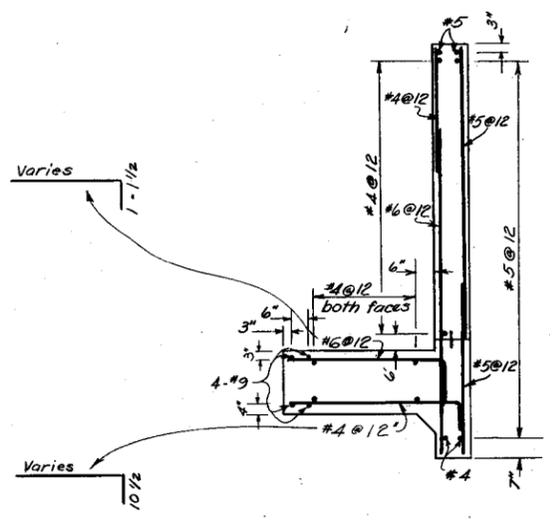
SECTION C  
33/35



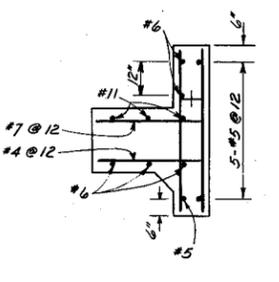
SECTION D  
33/35



SECTION E  
33/35



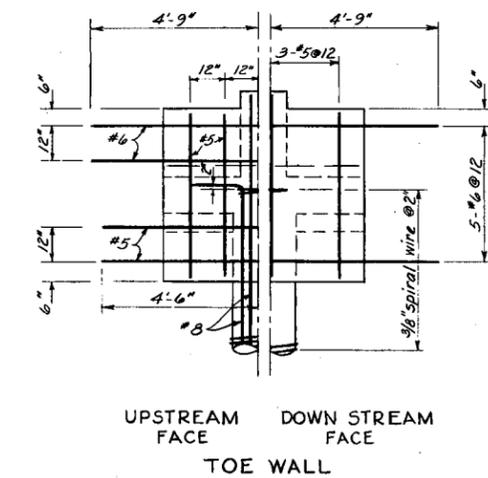
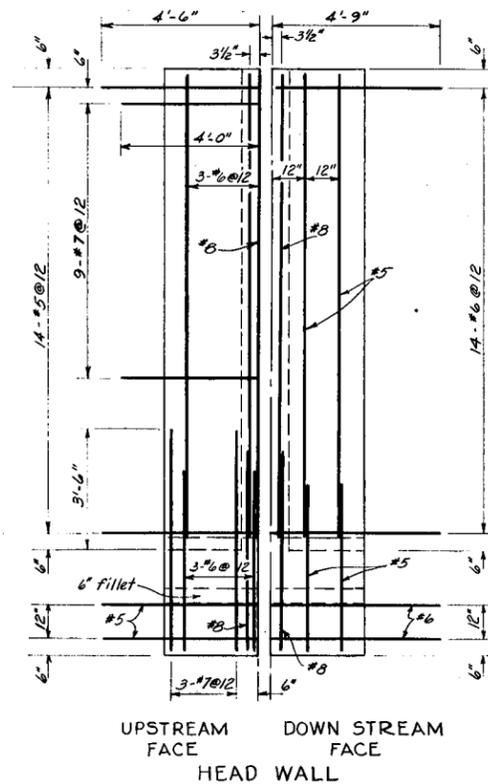
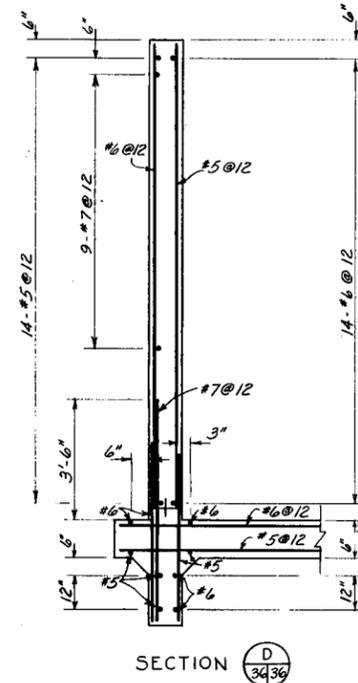
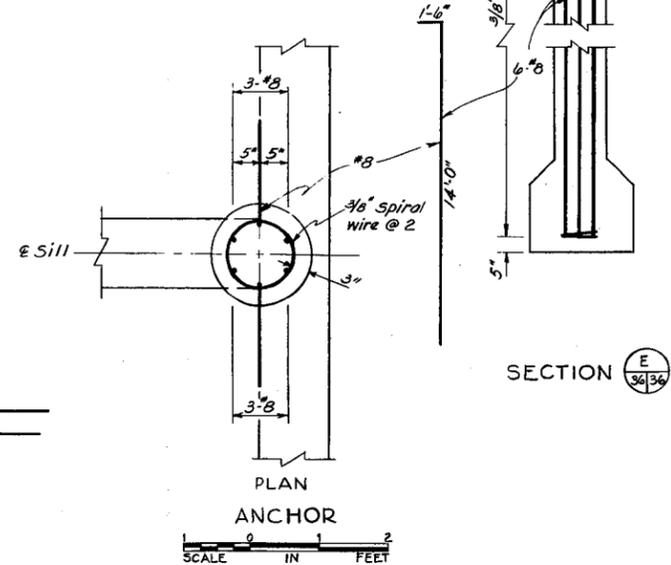
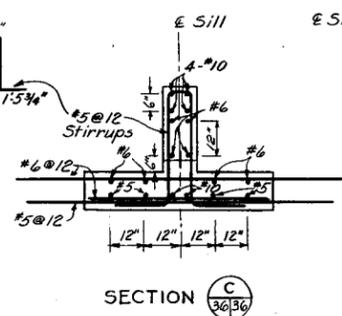
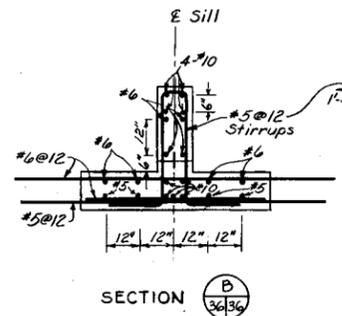
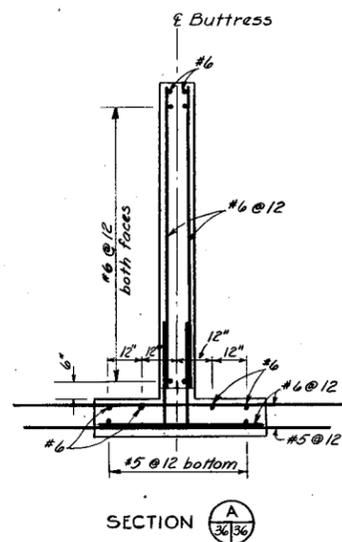
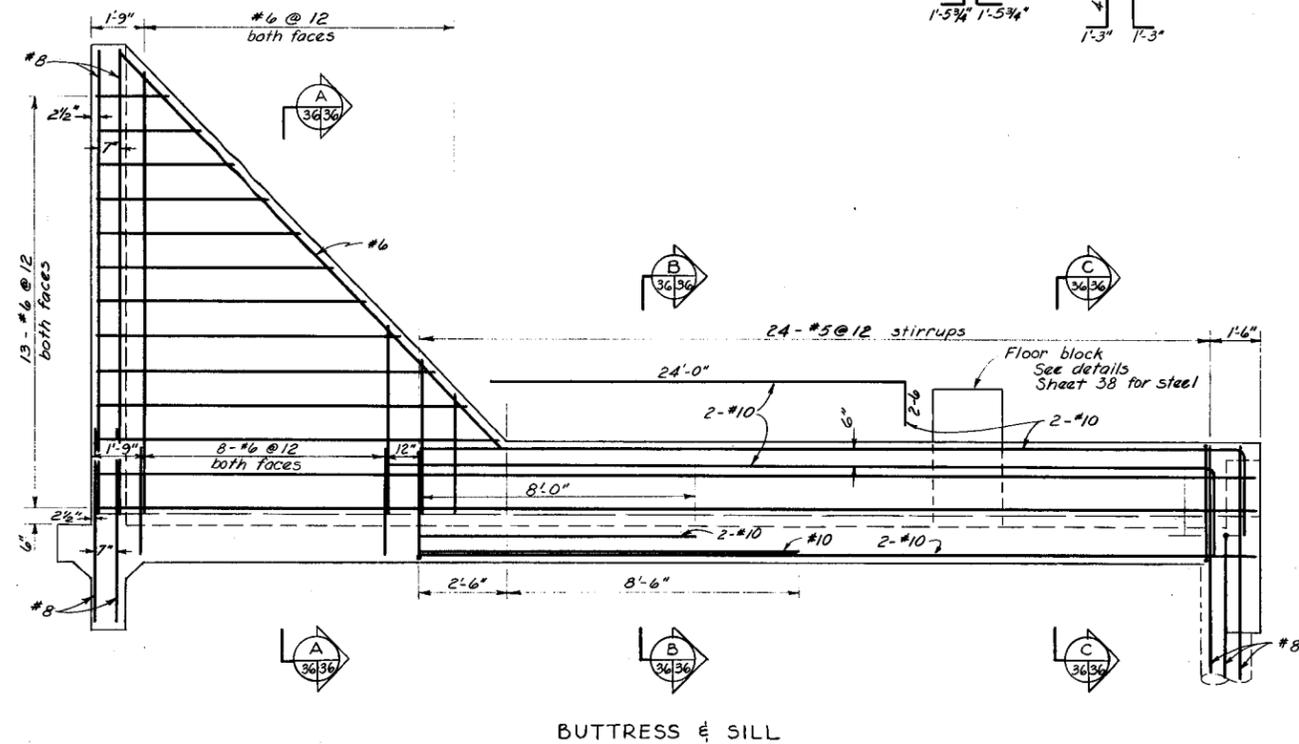
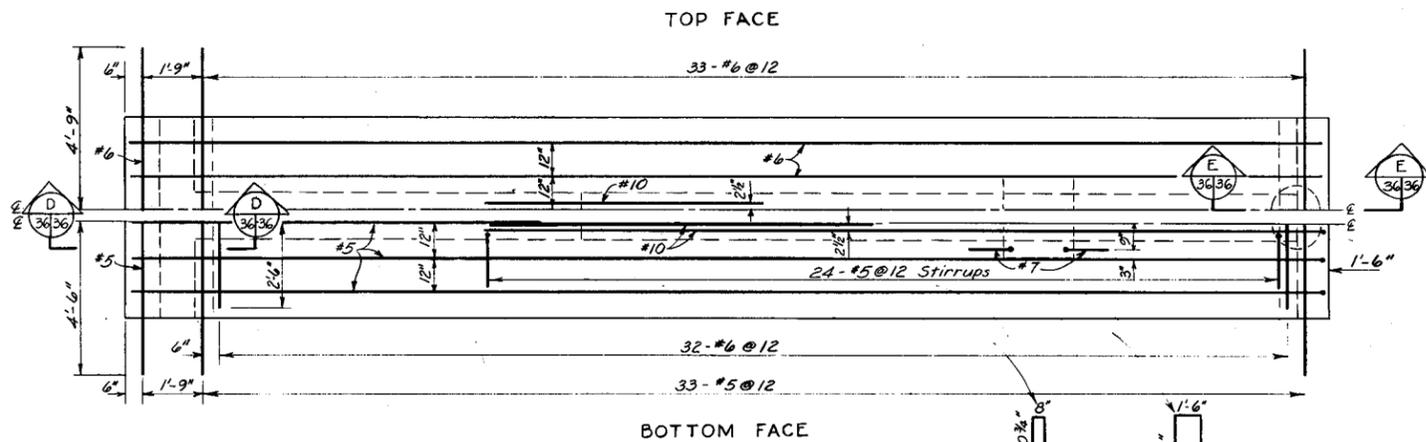
SECTION F  
33/35



SECTION G  
33/35



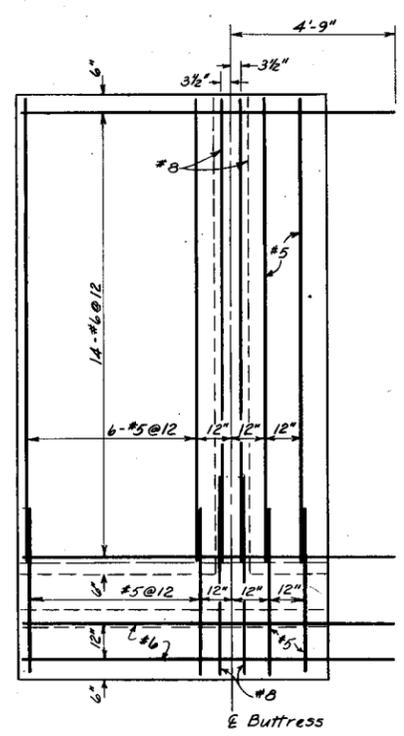
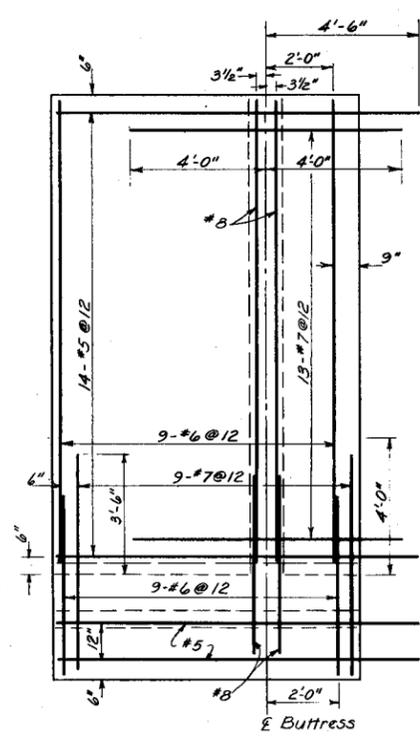
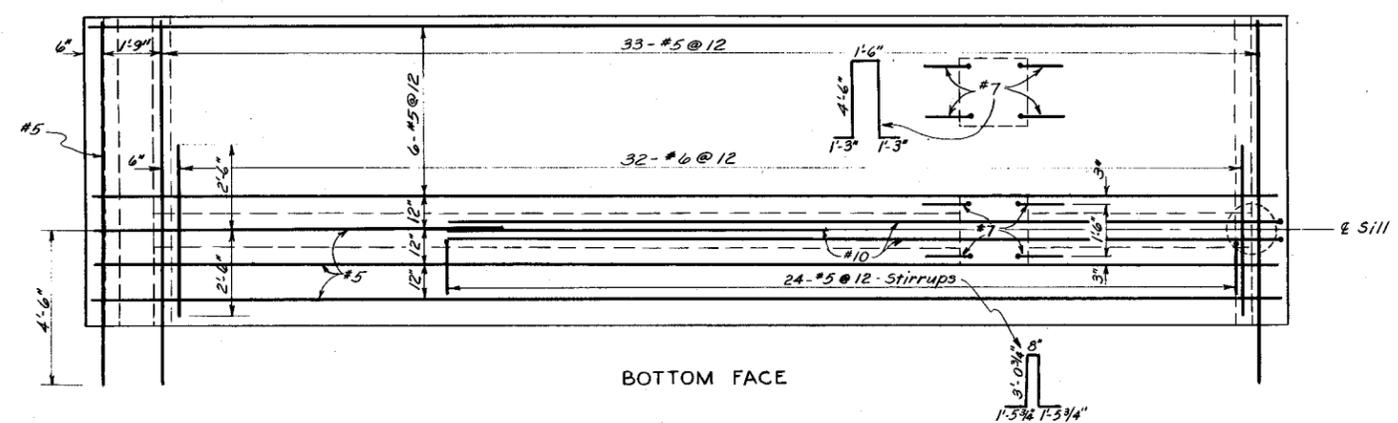
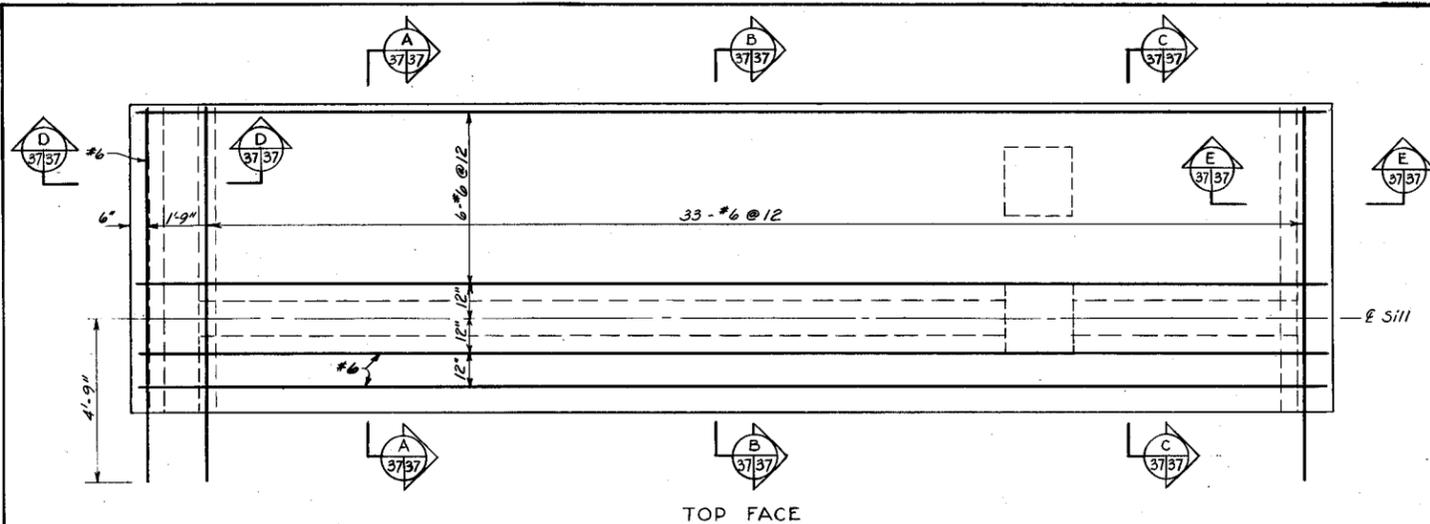
EMERGENCY SPILLWAY DETAILS CROSS SECTIONS SPOOK HILL F.R.S. BUCKHORN-MESA W.R.P. MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	JLS PJM	Date	10-76
Drawn	EFS	Date	11-76
Checked	PJM	Date	12-76
Title		Drawing No.	
7-E-23797		No. 35 of 45	



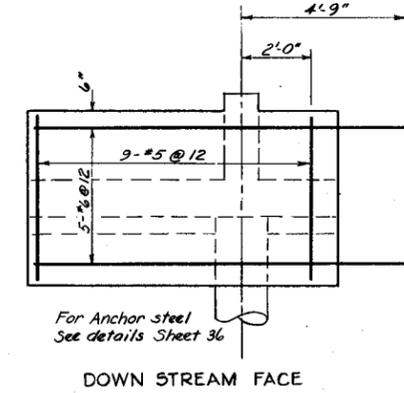
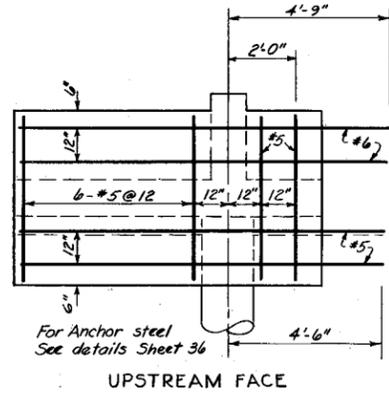
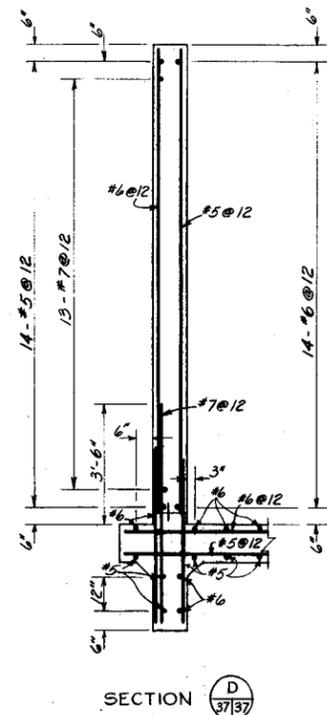
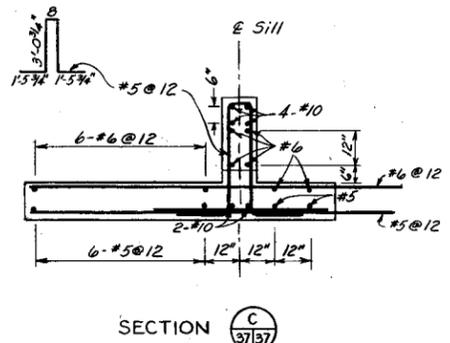
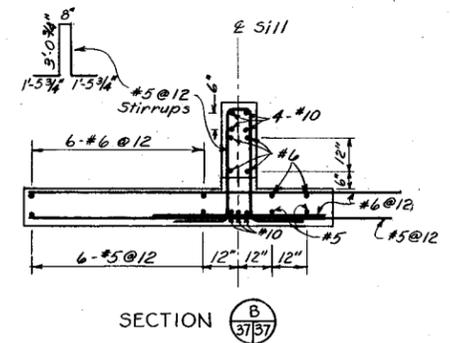
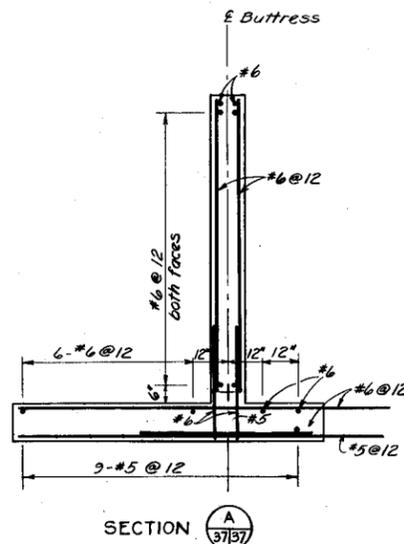
Note -  
Eleven (11) Interior buttress sections required.

1 0 5  
SCALE IN FEET

EMERGENCY SPILLWAY DETAILS INTERIOR BUTTRESS SECTION			
SPOOK HILL F.R.S. BUCKHORN-MESA W.R.P. MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	JLS PJM	Date	10-76
Drawn	EFS	Title	
Traced		Sheet	No. 36
Checked	PJM	Date	12-76
		Drawing No.	7-E-23797
		of 45	



HEAD WALL

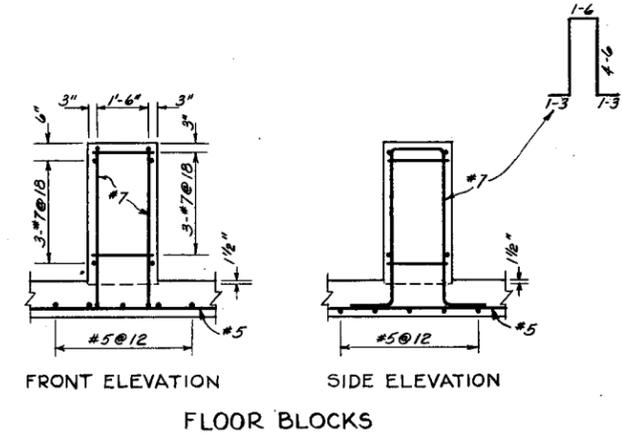
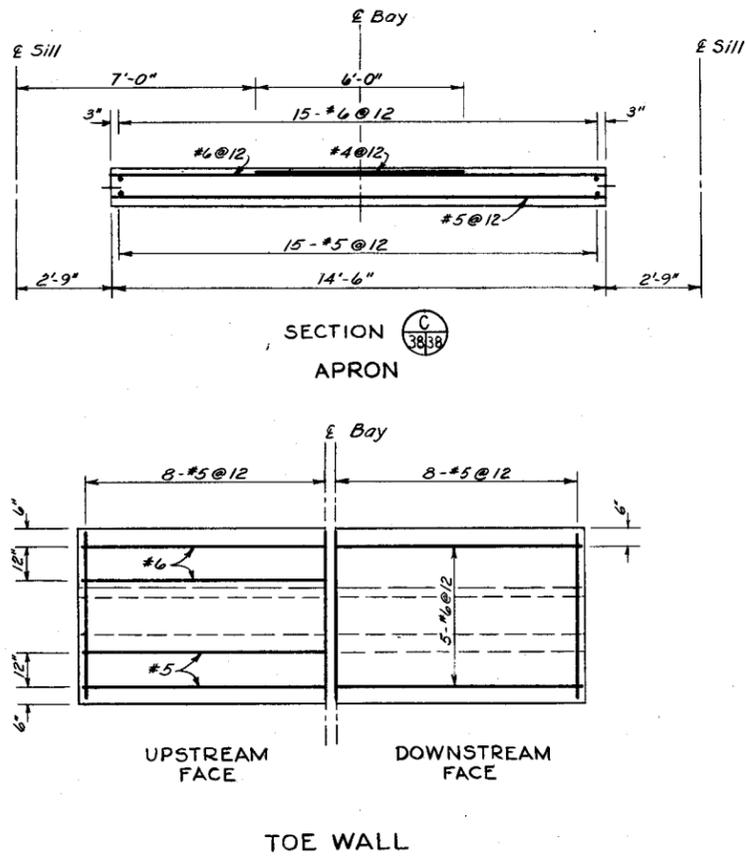
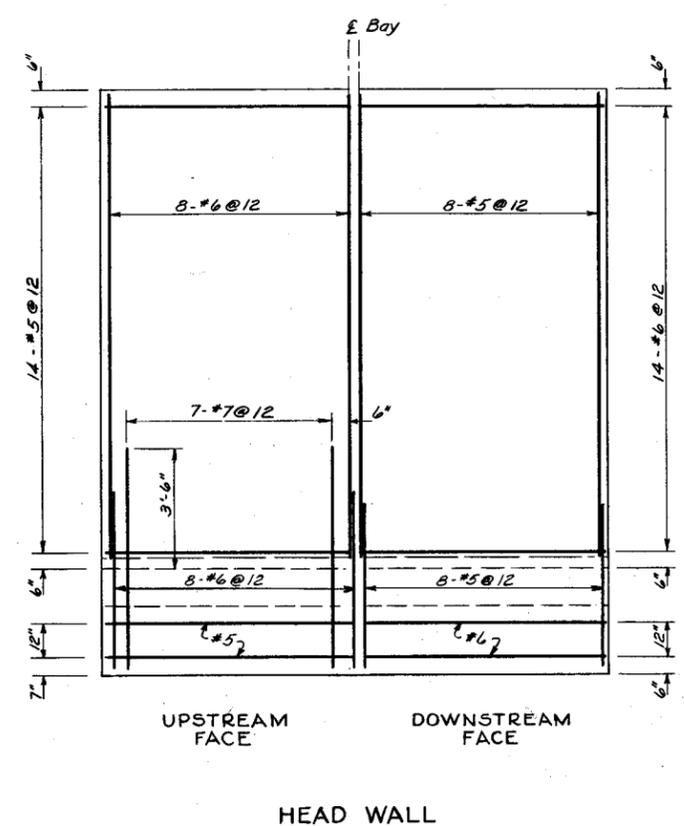
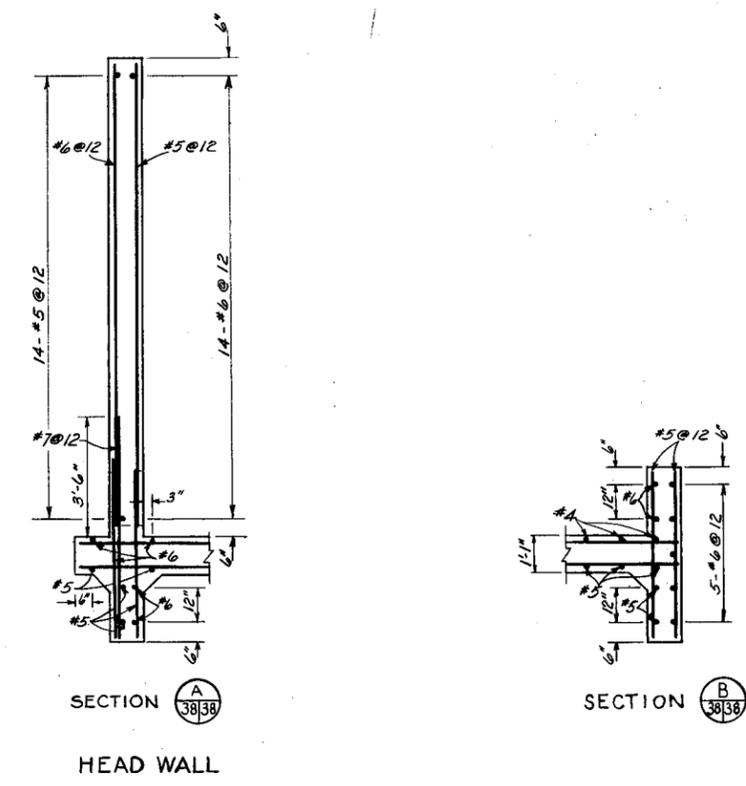
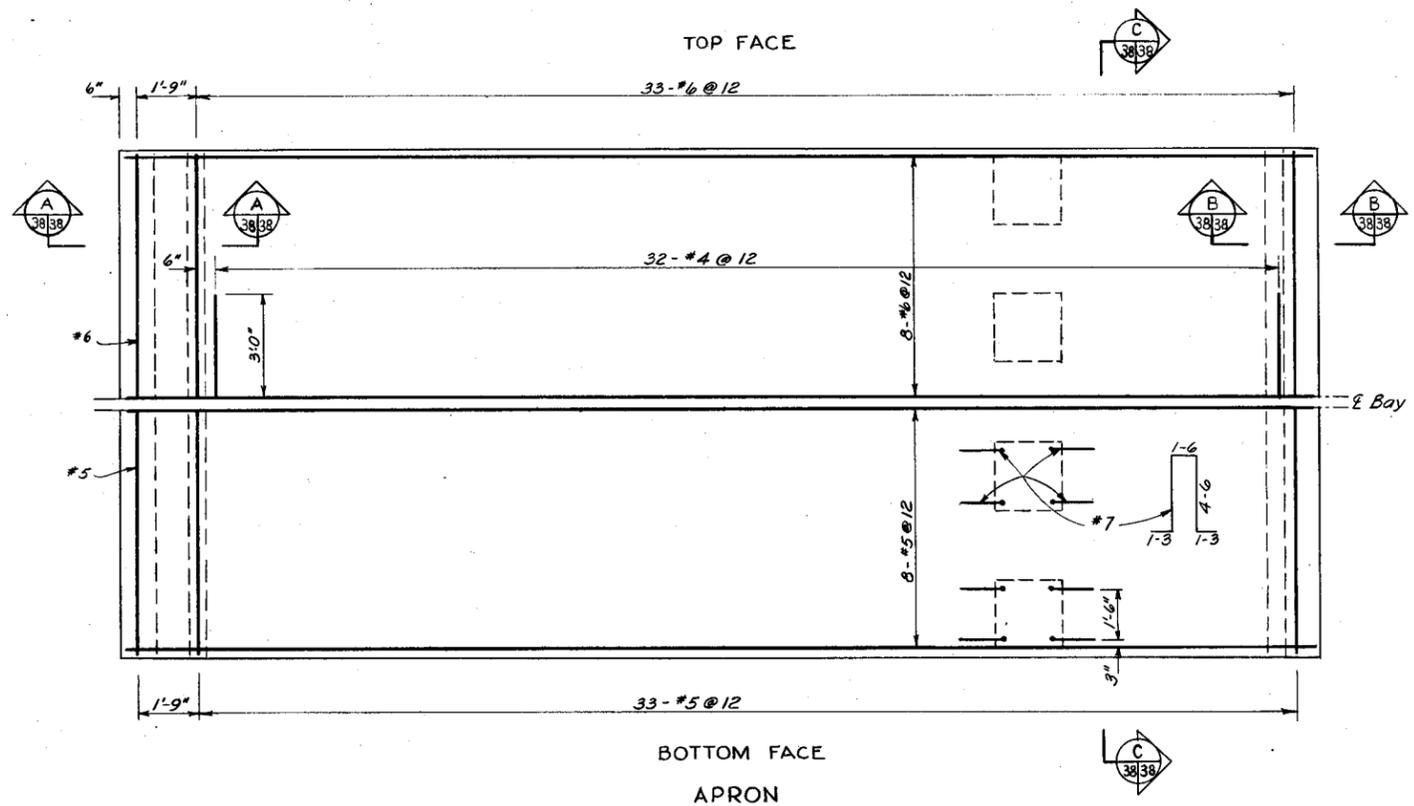


TOE WALL

Note: 1. For buttress and sill steel details see Sheet 36  
2. Two (2) exterior buttress sections required.



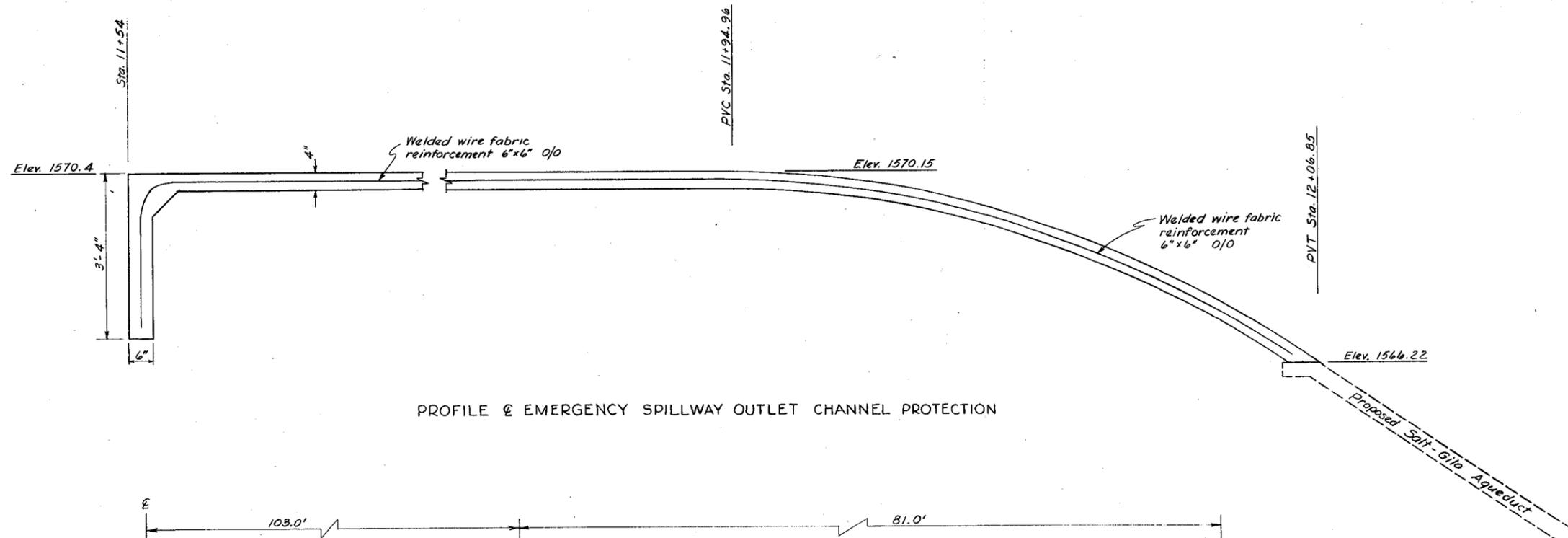
EMERGENCY SPILLWAY DETAILS EXTERIOR BUTTRESS SECTION SPOOK HILL F.R.S. BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE</b>			
Designed JLS PJM	Date 1-76	Approved by _____	Title _____
Drawn EFS	5-76	_____	_____
Traced _____	_____	_____	_____
Checked PJM	12-76	_____	_____
		Sheet No. 37 of 45	Drawing No. 7-E-23797



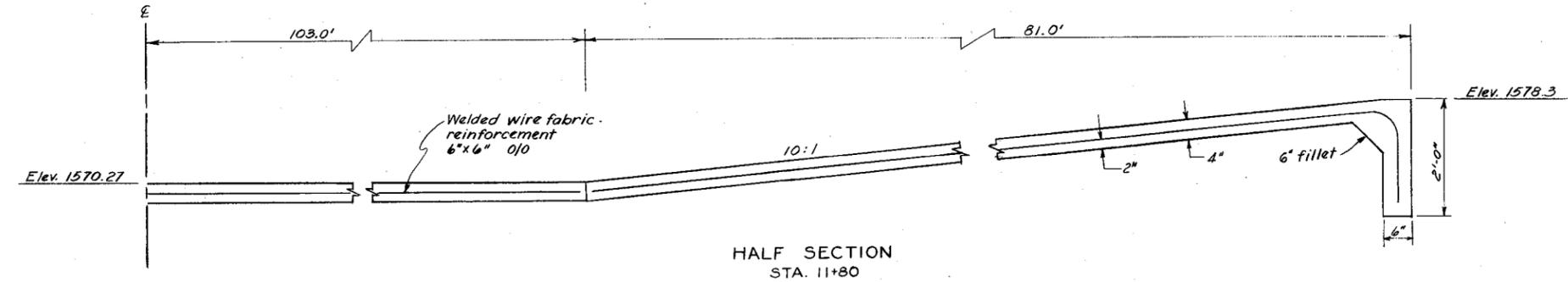
Note: Twelve (12) block sections required.



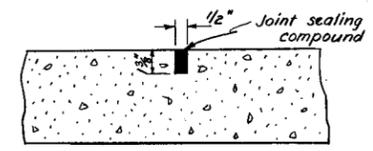
EMERGENCY SPILLWAY DETAILS BLOCK SECTION			
SPOOK HILL F.R.S. BUCKHORN-MESA W.R.P. MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	JLS PJM	Date	10-76
Drawn	EFS	Approved by	11-76
Traced		Title	
Checked	PJM	Sheet	No. 38
		of 45	Drawing No.
			7-E-23797



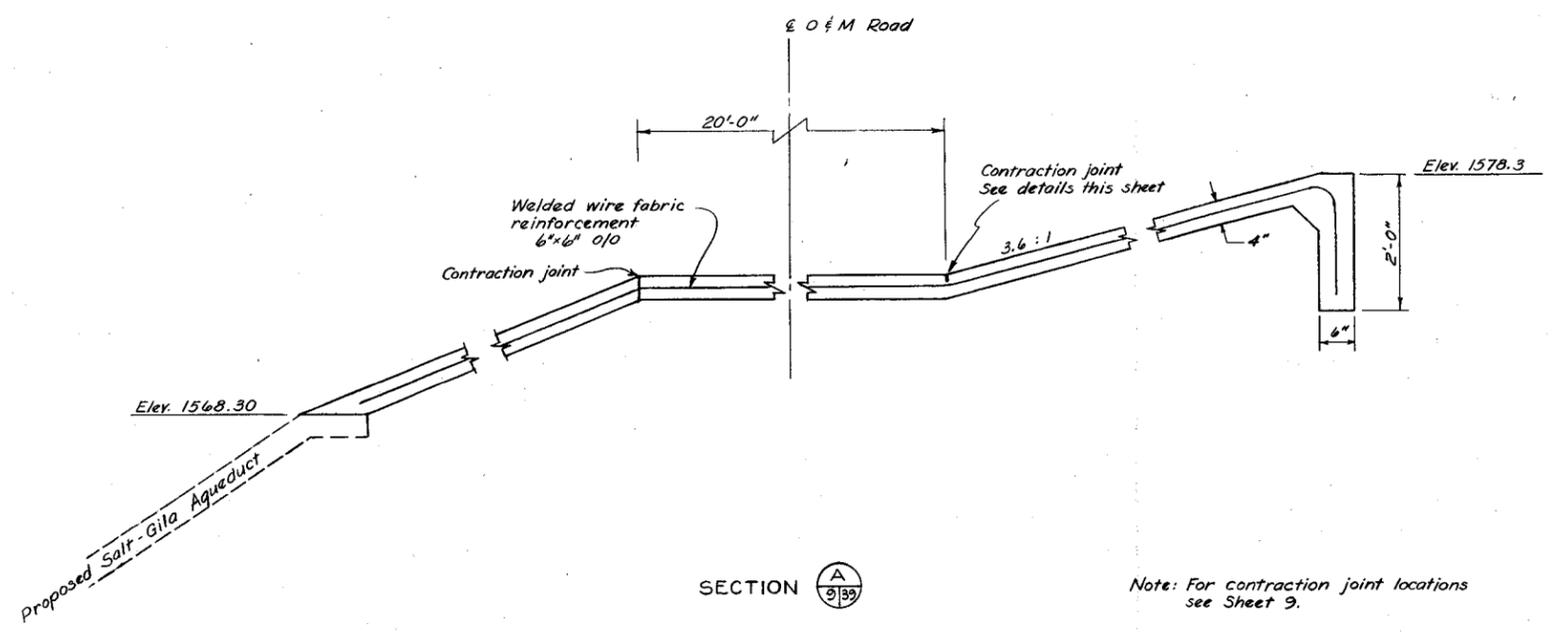
PROFILE & EMERGENCY SPILLWAY OUTLET CHANNEL PROTECTION



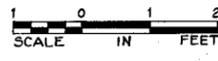
HALF SECTION  
STA. 11+80



CONTRACTION JOINT DETAILS  
(Not to scale)



SECTION A-A



Note: For contraction joint locations see Sheet 9.

EMERGENCY SPILLWAY OUTLET CHANNEL PROTECTION DETAILS			
SPOOK HILL F.R.S.			
BUCKHORN-MESA W.R.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	RJW	Date	10-76
Drawn	EFS	Approved by	
Traced		Title	
Checked	PJM	Sheet	No. 39 of 45
		Drawing No.	7-E-23797

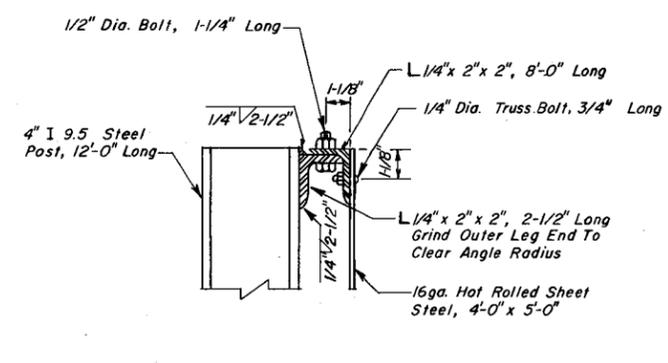
# BUCKHORN-MESA WATERSHED PROJECT

## SPOOK HILL FLOODWATER RETARDING DAM

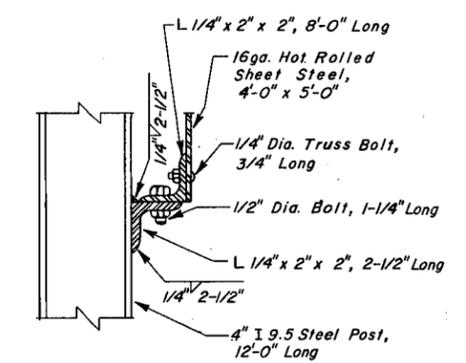
DRAINAGE AREA 8,700 ACRES  
 FLOOD WATER RETARDING STORAGE 1,070 ACRE FT.  
 WATER SURFACE AREA 232 ACRES  
 HEIGHT OF DAM 23 FEET  
 VOLUME OF FILL 1,500,000 CUBIC YD.

### 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  
 1977



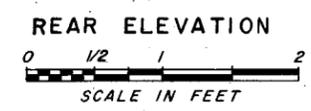
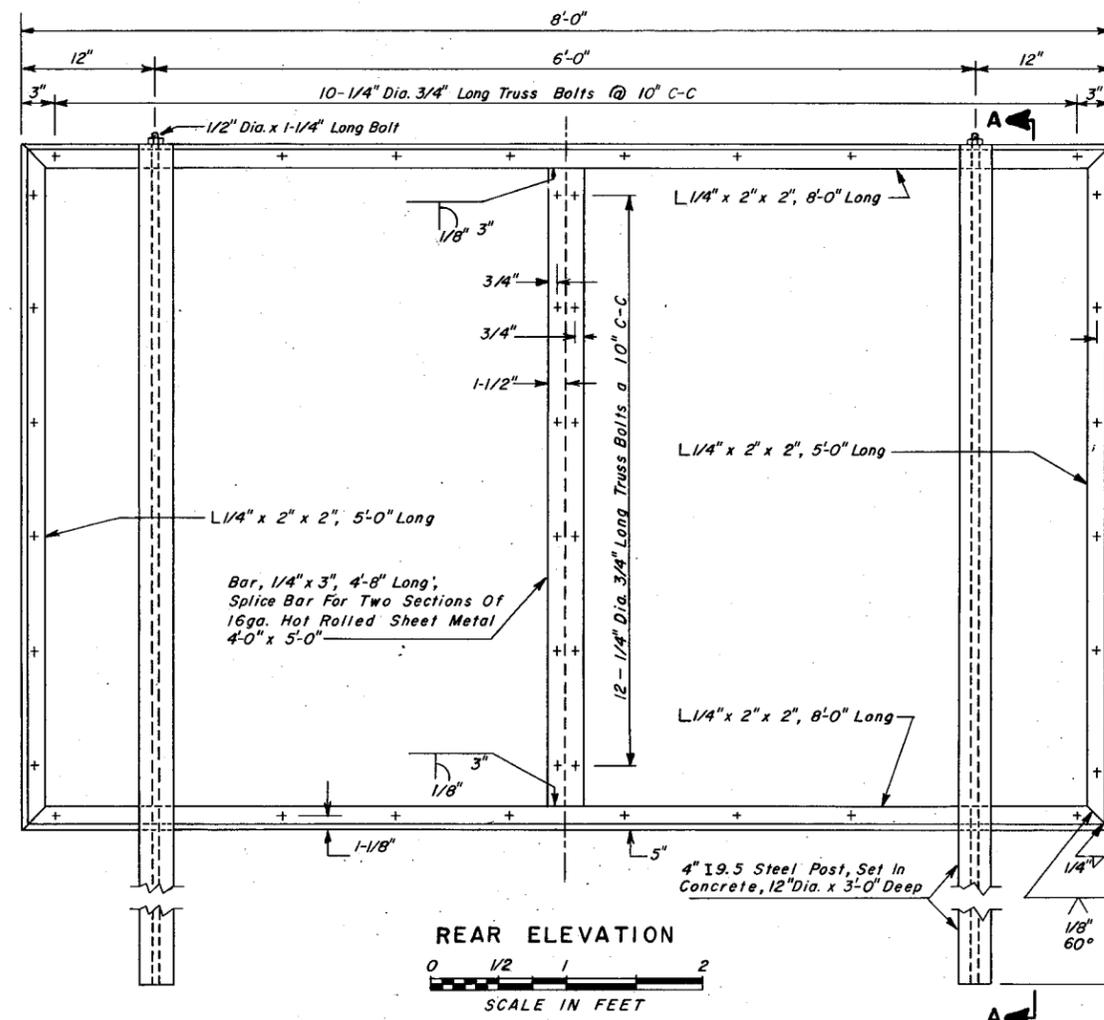
DETAIL "A"



DETAIL "B"



### LETTERING LAYOUT



Detail "A"

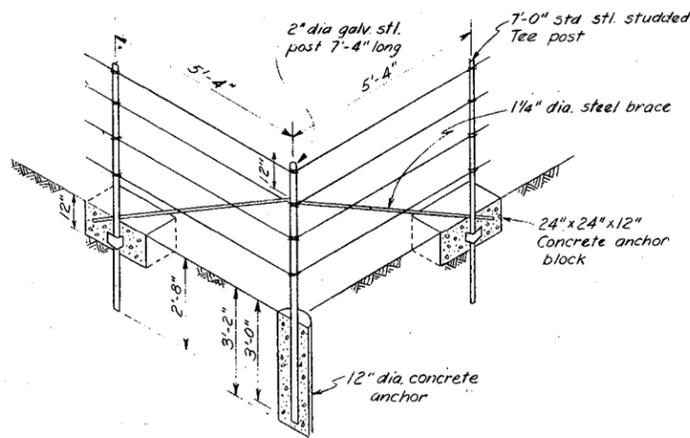
Detail "B"

SECTION A-A

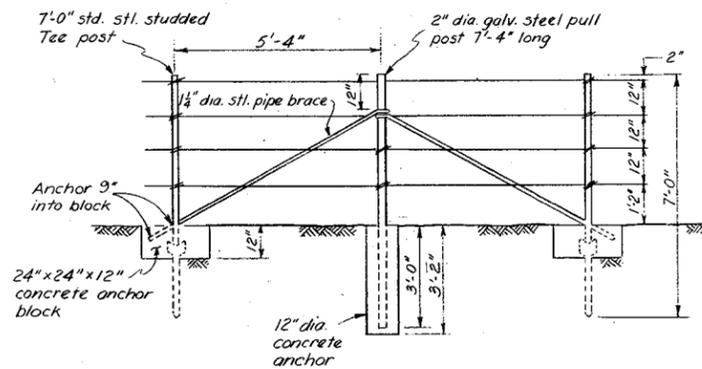
#### NOTE:

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 for truss bolts in securing sign sheet steel sections to frame
4. Frame and base coat for sign shall be painted in accordance with section 82.9 of the specifications
5. All parts shall be painted with base coat before assembly
6. Background of sign shall be painted with an approved white enamel
7. Letters shall be painted with an approved dark green enamel
8. Field location of the 2 signs required shown on sheet 2

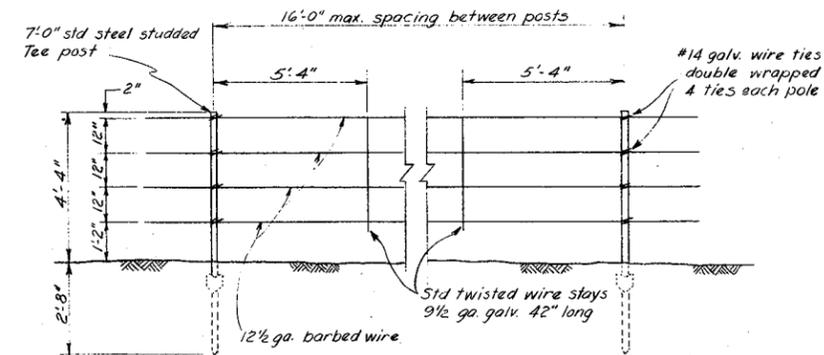
IDENTIFICATION SIGN			
<b>SPOOK HILL F.R.S.</b>			
BUCKHORN-MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE</b>			
<b>SOIL CONSERVATION SERVICE</b>			
Designed.....S.C.S.	Date.....1976	Approved by.....	Title.....
Drawn.....S.C.S.	Date.....1976	Traced.....A.D.M.	Title.....
Checked.....P.J.M.	Date.....12-76	Sheet No. 40 of 45	Drawing No. 7-E-23797



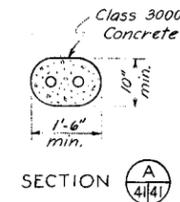
END OR CORNER POST ASSEMBLY



PULL POST OR CHANGE IN GRADE ASSEMBLY

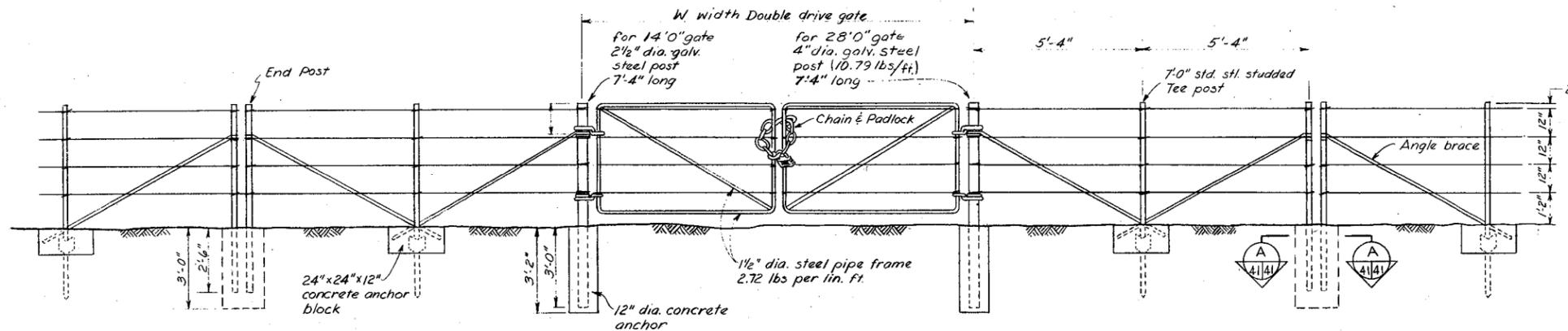


LINE POST ASSEMBLY



GATE SCHEDULE

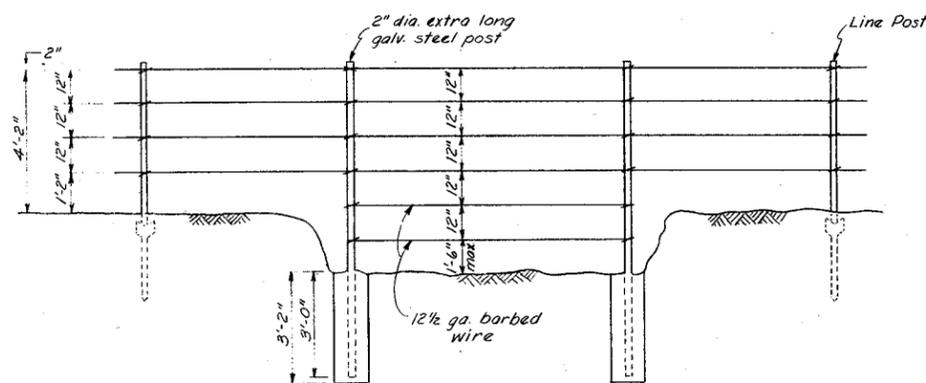
B DAM			
Station	Offset	Type	W
86+00	7' lt to 7' rt	Permanent	14.0'
158+23± to 158+37±	960' rt	Permanent	14.0'
E BROWN ROAD			
Station	Offset	Type	W
15+52± to 15+58±	40' lt to 526' lt	Permanent	14.0'
17+39± to 17+45±	526' rt to 40' rt	Permanent	14.0'
26+70± to 26+84±	40' rt	Permanent	14.0'
26+70± to 26+84±	40' lt	Permanent	14.0'
10+93± to 11+07±	40' lt	Temporary	14.0'
12+08± to 12+22±	40' rt	Temporary	14.0'
23+96± to 24+24±	40' lt	Permanent	28.0'
23+96± to 24+24±	459' lt	Permanent	28.0'



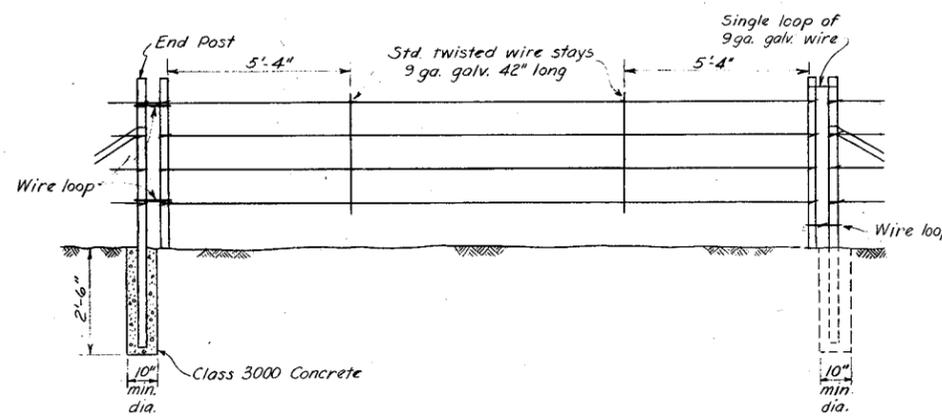
PERMANENT GATE AND POST ASSEMBLY  
(One gate required)

E MCKELLIPS ROAD			
Station	Offset	Type	W
17+00± to 17+14±	65' lt	Permanent	14.0'
17+00± to 17+14±	55' rt	Permanent	14.0'
25+28± to 25+42±	65' lt	Permanent	14.0'
25+28± to 25+42±	55' rt	Permanent	14.0'
11+60± to 11+74±	65' lt	Temporary	14.0'
12+81± to 12+95±	55' rt	Temporary	14.0'

E McDOWELL ROAD			
Station	Offset	Type	W
17+62± to 17+76±	40' lt	Permanent	14.0'
17+62± to 17+76±	40' rt	Permanent	14.0'
21+53± to 21+67±	40' lt	Permanent	14.0'
21+53± to 21+67±	40' rt	Permanent	14.0'
12+70± to 12+84±	40' lt	Temporary	14.0'
13+06± to 13+20±	40' rt	Temporary	14.0'



WASH OR DEPRESSION CROSSING ASSEMBLY

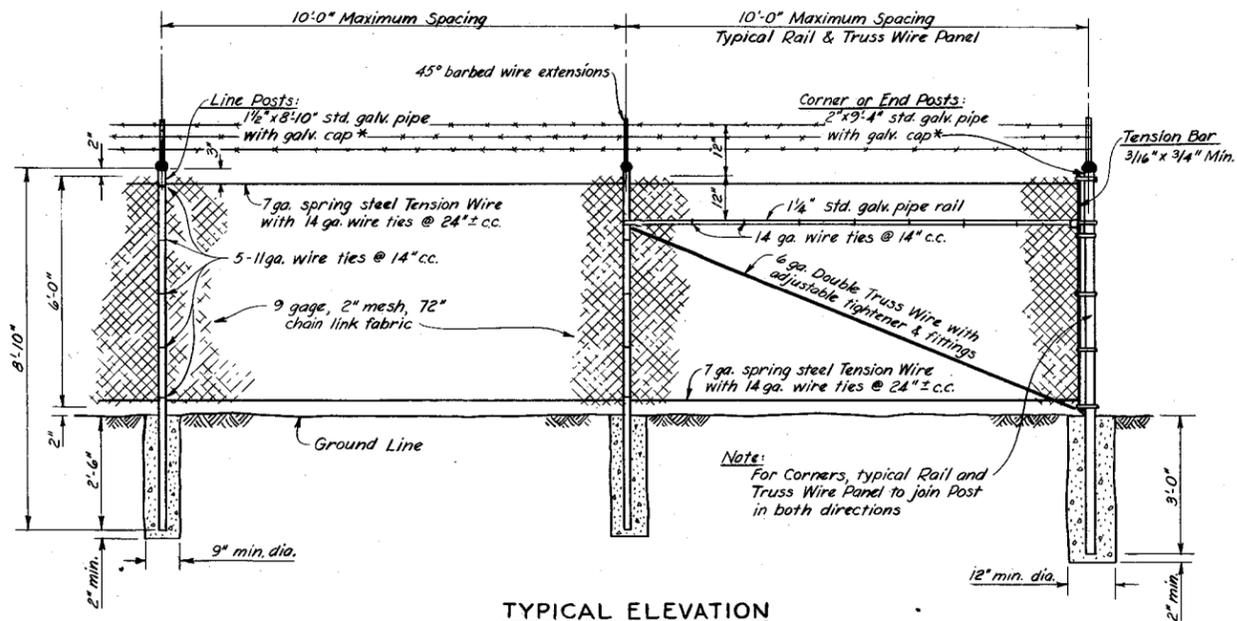


TEMPORARY GATE ASSEMBLY

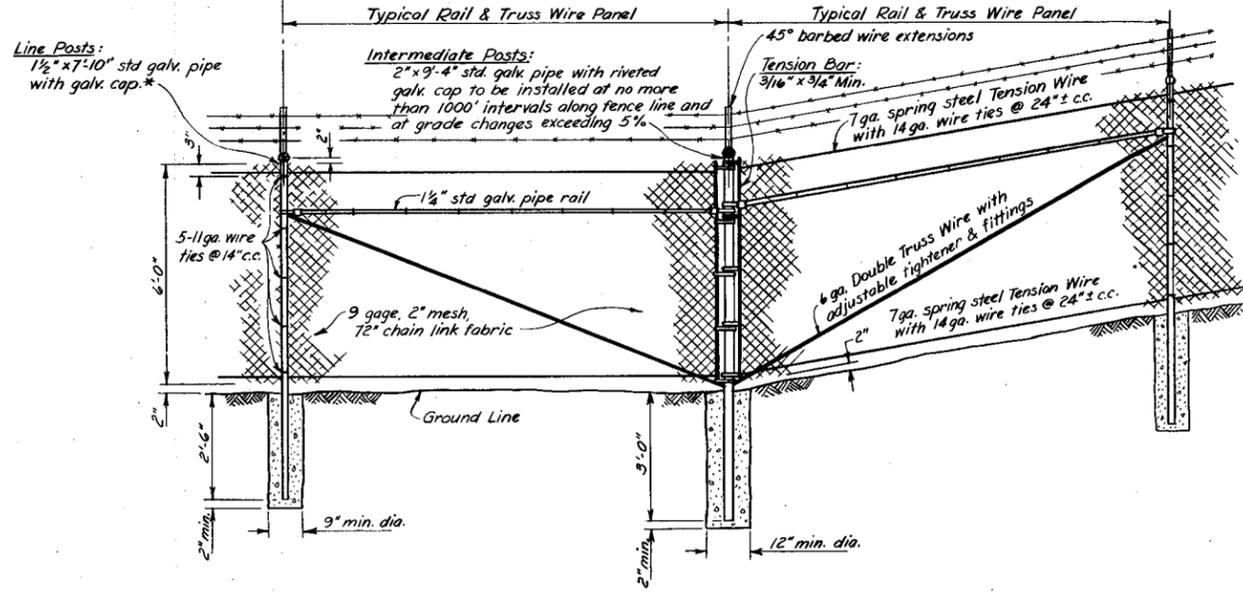
FENCING DETAILS  
(Not to scale)

FENCING DETAILS  
SPOOK HILL F.R.S.  
BUCKHORN - MESA W.P.P.  
MARICOPA & PINAL COUNTIES, ARIZONA  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

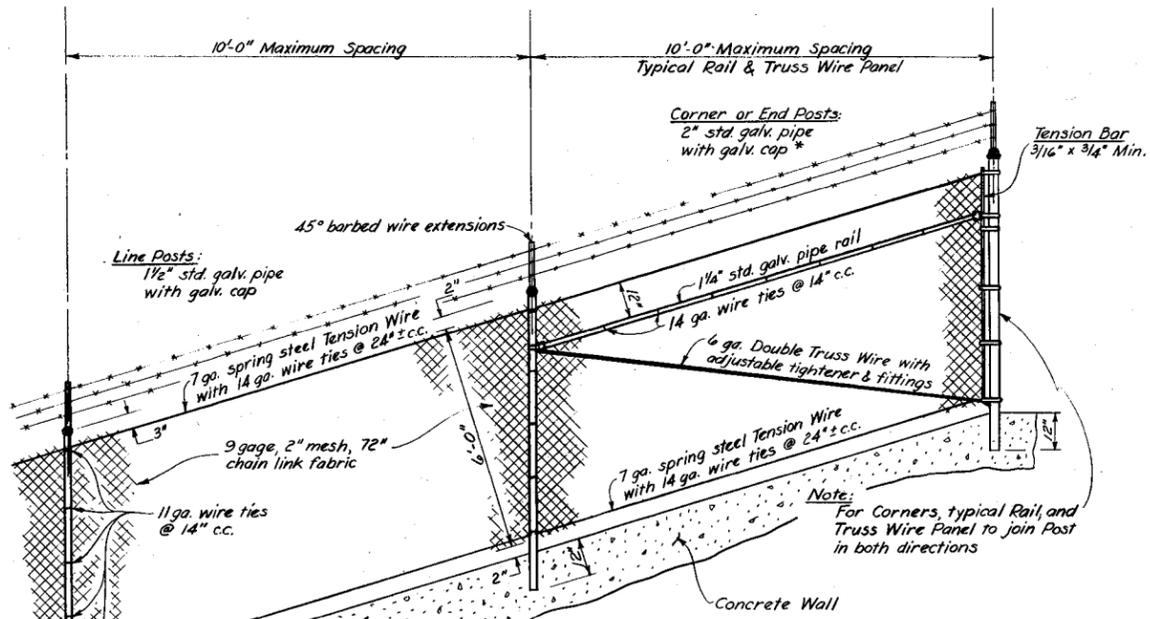
REVISIONS		Date	Approved by
10-77	Adj 25 ft. Double drive gates	6-76	
		6-76	
		6-76	
		7-76	



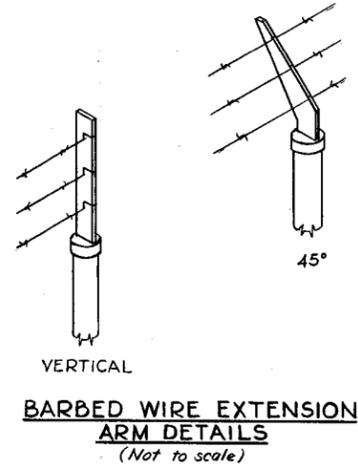
**TYPICAL ELEVATION  
TYPE I FENCE**  
(Not to scale)



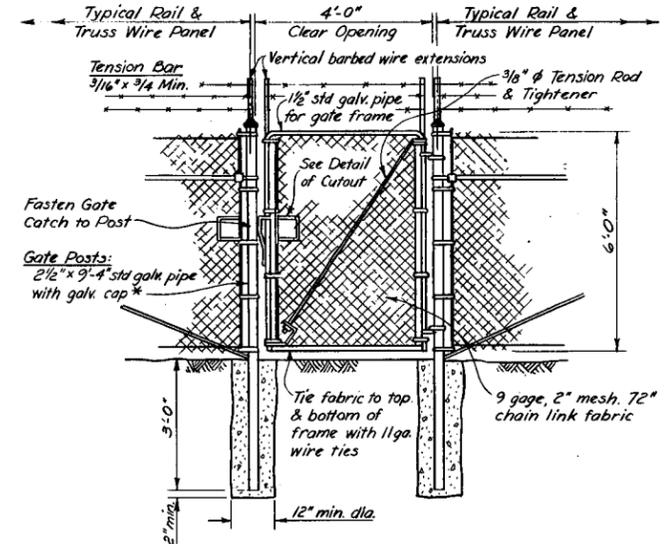
**INTERMEDIATE POST DETAIL  
TYPE I FENCE**  
(Not to scale)



**TYPICAL ELEVATION  
TYPE II FENCE**  
(Not to scale)



**BARBED WIRE EXTENSION  
ARM DETAILS**  
(Not to scale)

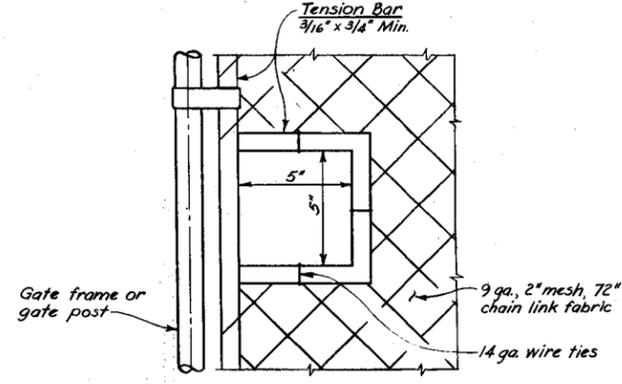


**TYPICAL WALK GATE**  
(Not to scale)

\* Secure galv. cap to post with 1/4 inch round head rivets

**WALK GATE LOCATIONS**

Station	Offset
292+80	E Dam
296+20	E Dam
299+16	22.53' Rn



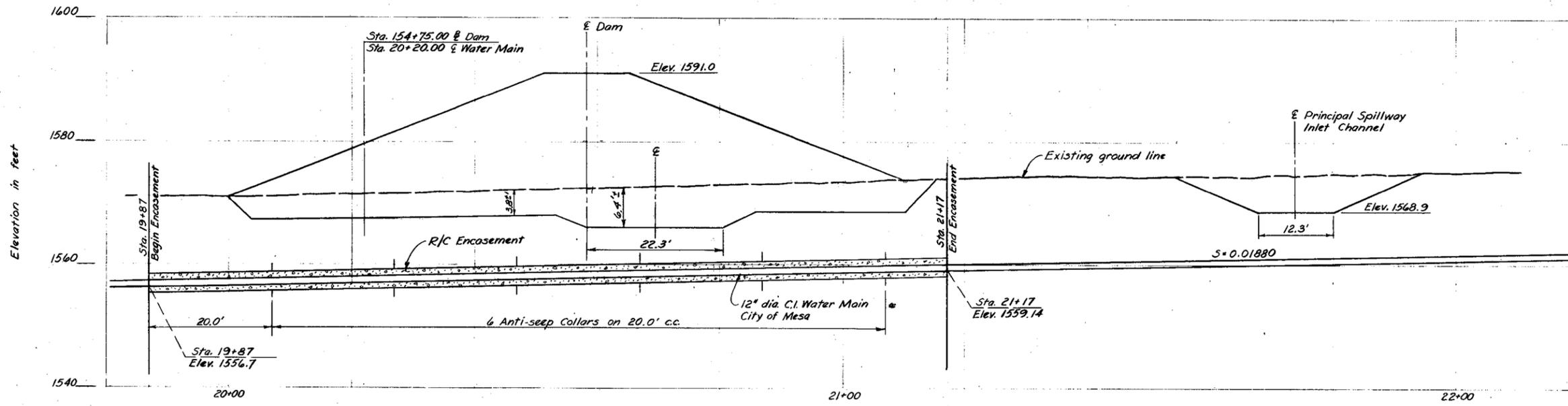
**DETAIL OF CUTOUT  
FOR CHAIN AND LOCK**  
(Not to scale)

FENCING DETAILS  
SPOOK HILL F.R.S.  
BUCKHORN-MESA W.P.P.  
MARICOPA COUNTY, ARIZONA

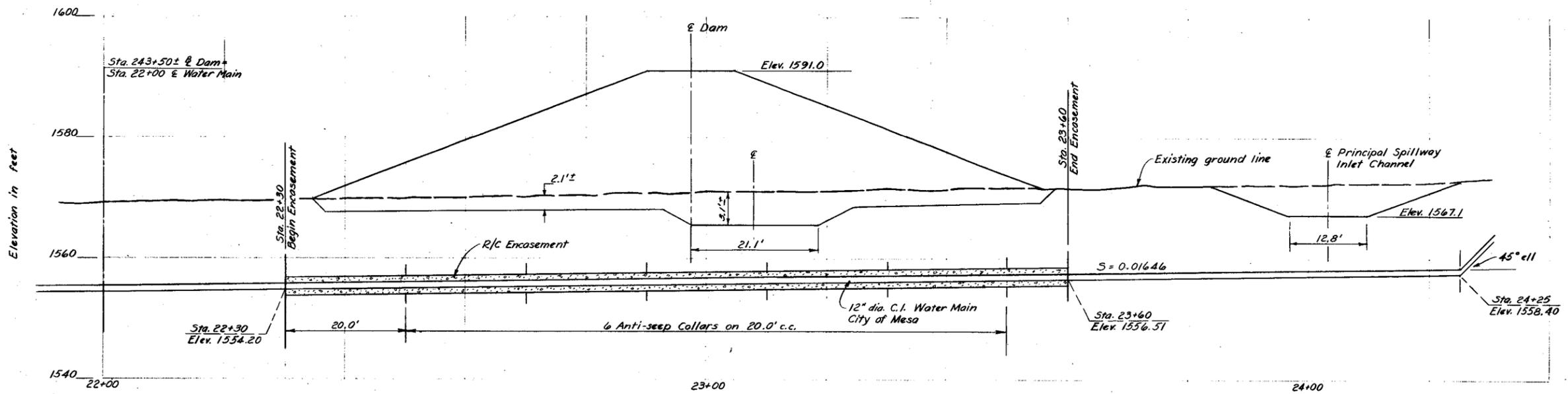
**U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

Designed	PJM	Date	3-77	Approved by	
Drawn	EFS		3-77	Title	
Traced				Sheet	No. 42
Checked	PJM		3-77	Drawing No.	7-E-23797

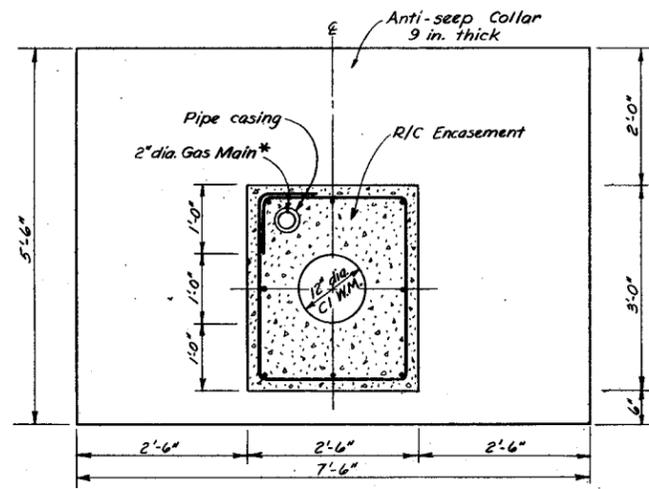
of 45



PROFILE ON 12" WATER MAIN IN USERY PASS RD.



PROFILE ON 12" WATER MAIN IN HERMOSA VISTA DR.

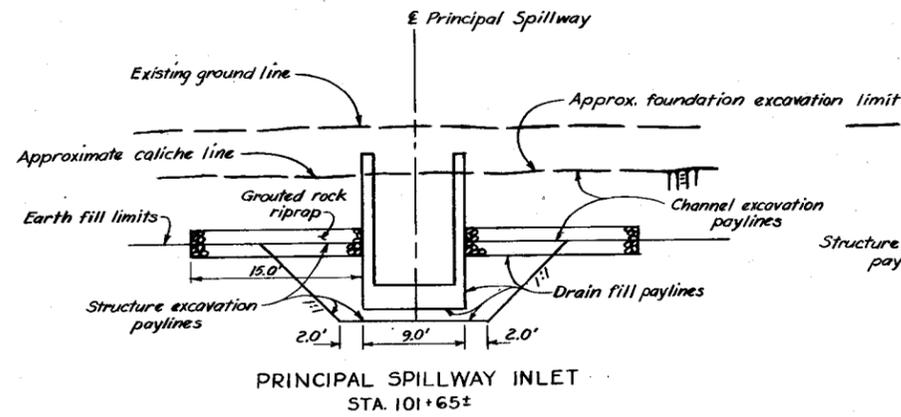


ANTI-SEEP COLLAR & ENCASEMENT DETAIL

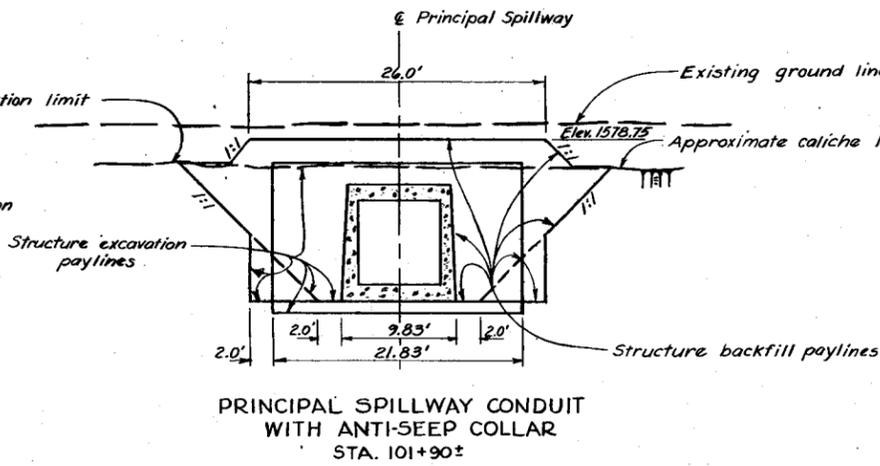
\*Usery Pass Rd only.

NOT PART OF THIS CONTRACT  
FOR INFORMATION ONLY

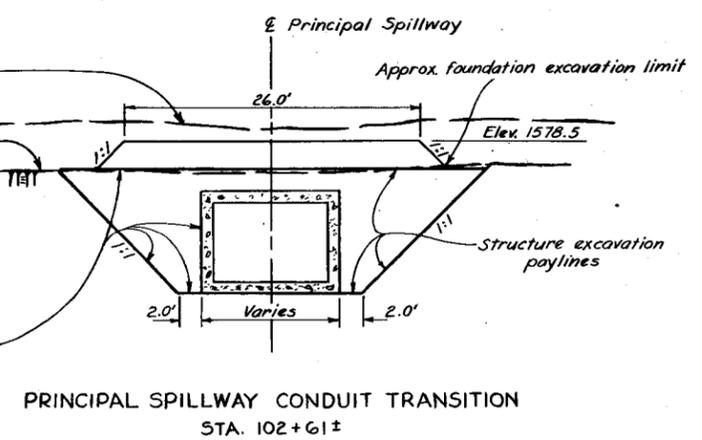
UTILITY CROSSINGS			
SPOOK HILL F.R.S. BUCKHORN-MESA W.R.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	PJM	Date	2-77
Drawn	JEB	Title	
Traced	BFS	Date	3-77
Checked	PJM	Date	3-77
		Sheet	No. 43
		of	45
		Drawing No.	7-E-23797



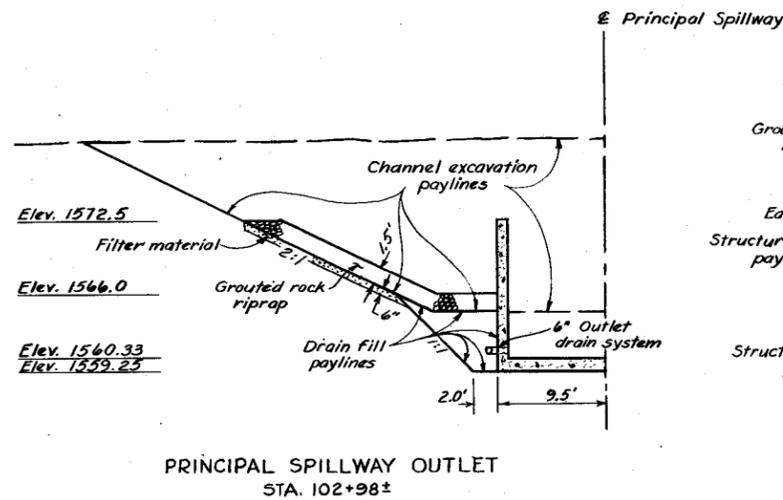
PRINCIPAL SPILLWAY INLET  
STA. 101+65±



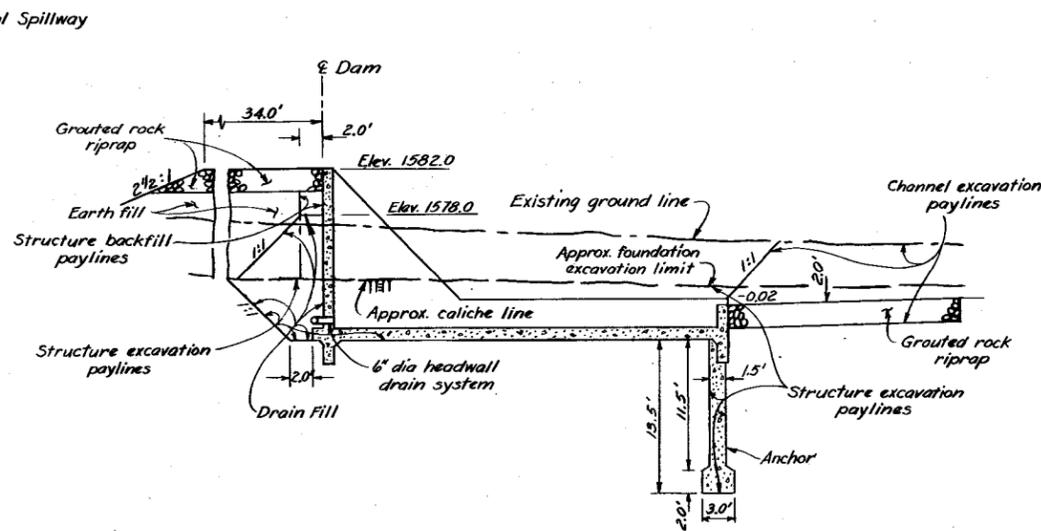
PRINCIPAL SPILLWAY CONDUIT  
WITH ANTI-SEEP COLLAR  
STA. 101+90±



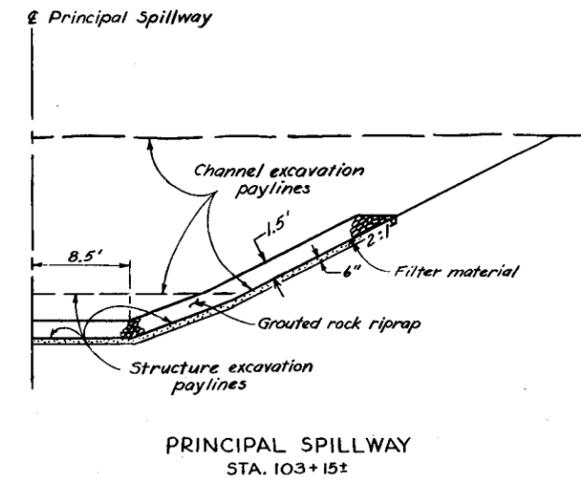
PRINCIPAL SPILLWAY CONDUIT TRANSITION  
STA. 102+61±



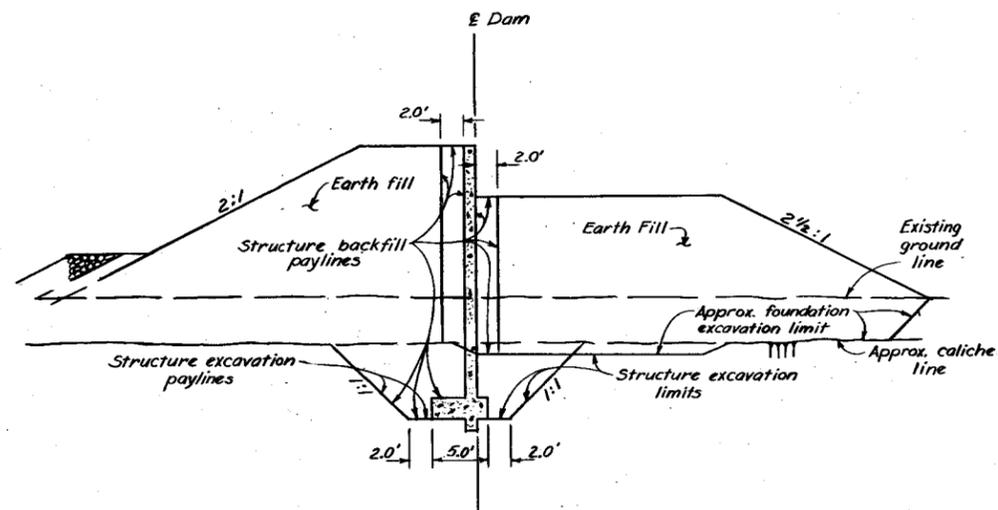
PRINCIPAL SPILLWAY OUTLET  
STA. 102+98±



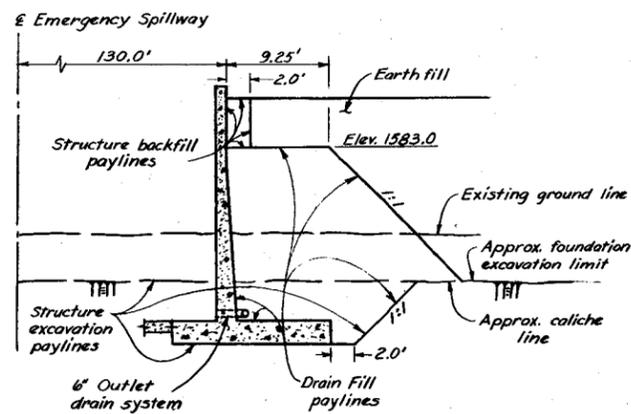
PROFILE & EMERGENCY SPILLWAY



PRINCIPAL SPILLWAY  
STA. 103+15±



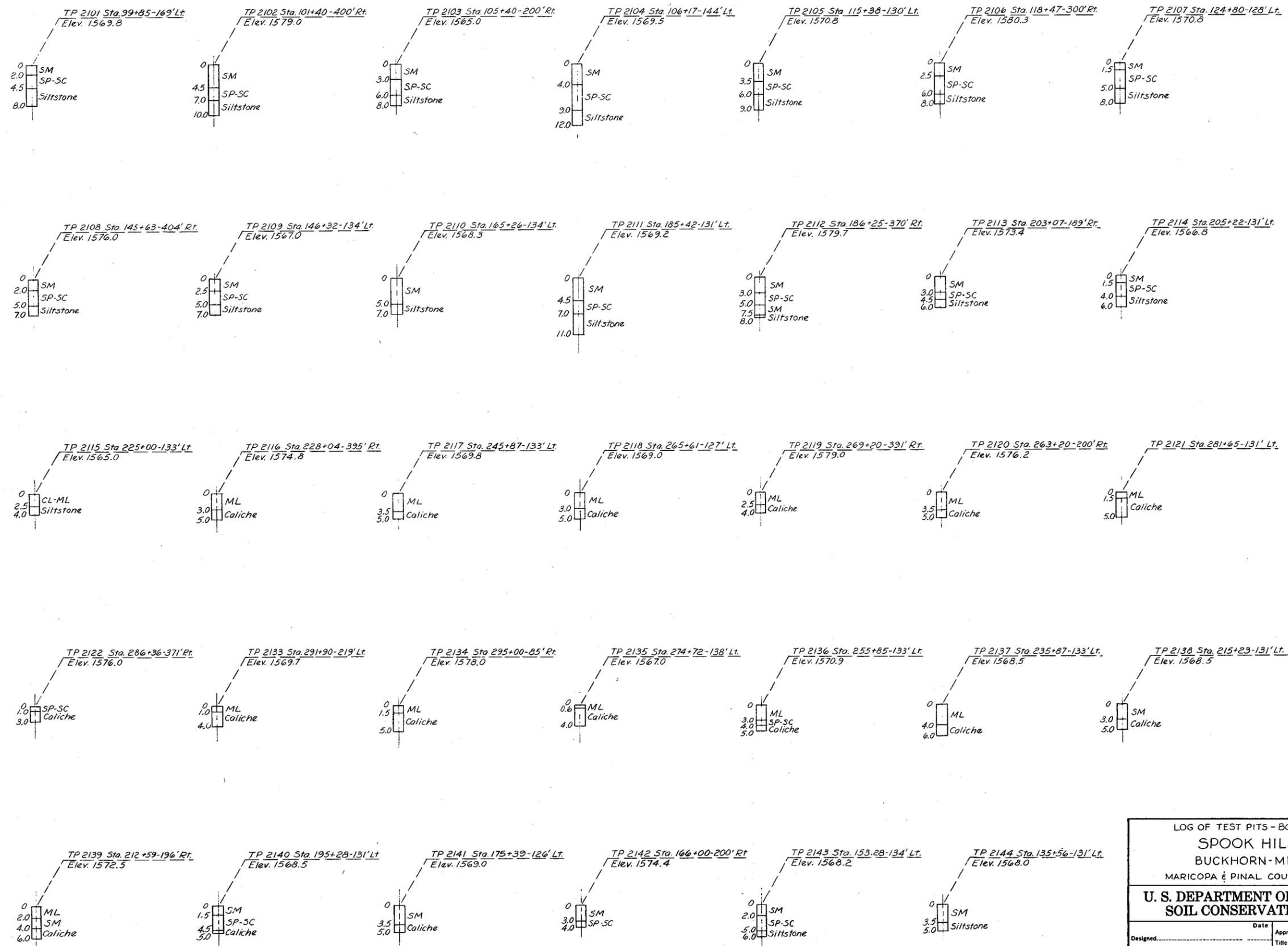
EMERGENCY SPILLWAY HEADWALL  
STA. 295+90± @ DAM =  
STA. 10+00 EMERGENCY SPILLWAY



EMERGENCY SPILLWAY SIDEWALL  
STA. 10+16± EMERGENCY SPILLWAY

1 0 5 10 20  
SCALE IN FEET

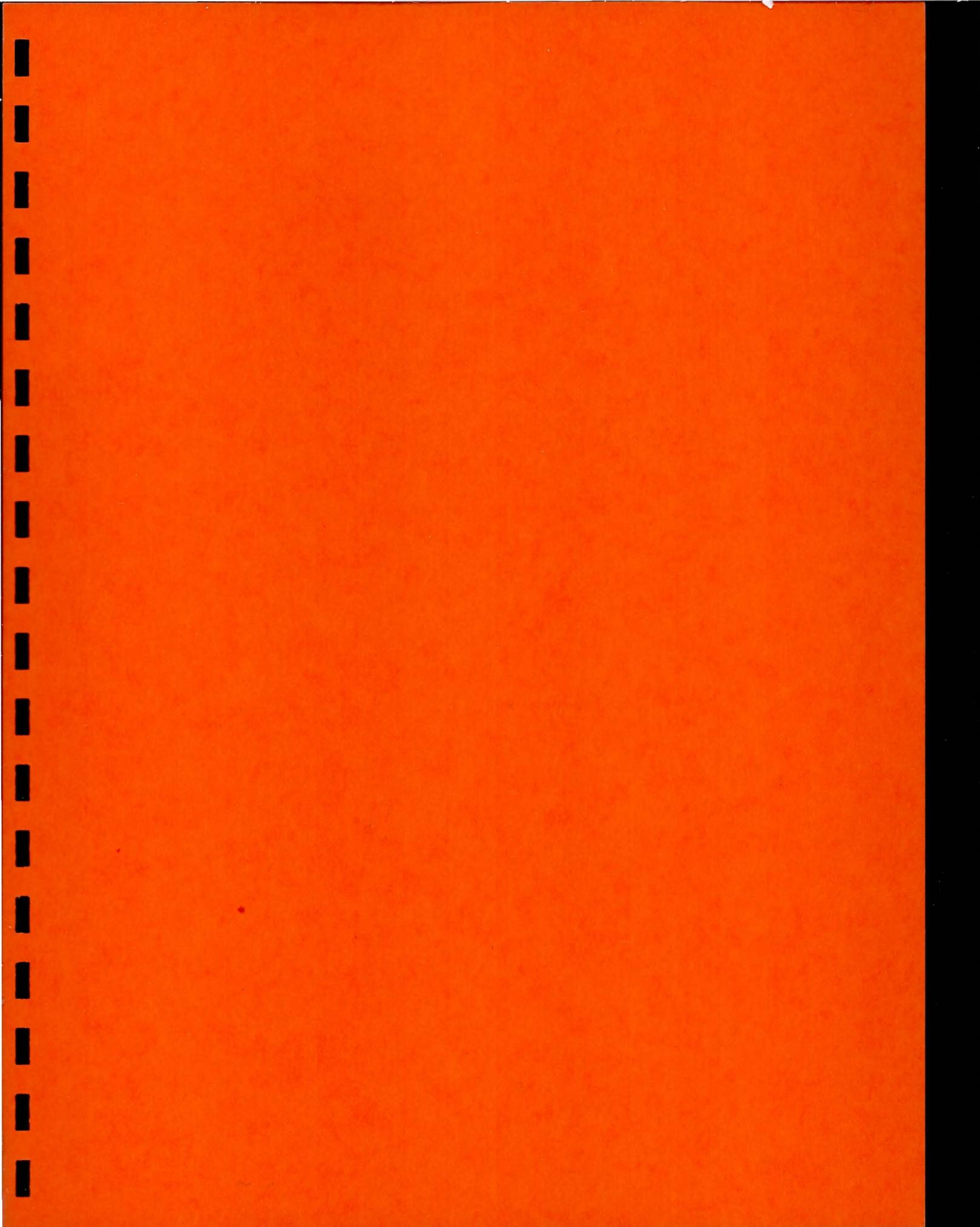
PAY LIMITS			
SPOOK HILL F.R.S. BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	PJM	Date	11-76
Drawn	JEB EFS	Approved by	
Traced		Title	
Checked	PJM	Sheet	No. 44 of 45
		Drawing No.	7-E-23797



LOG OF TEST PITS - BORROW AREAS  
 SPOOK HILL F.R.S.  
 BUCKHORN-MESA W.P.P.  
 MARICOPA & PINAL COUNTIES, ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

Designed.....	Date.....	Approved by.....	Title.....
Drawn: D.K.I.	6-75		
Traced: F.S.	7-75		
Checked: P.J.M.	12-76		
	Sheet No. 45 of 45	Drawing No.	<b>7-E-23797</b>



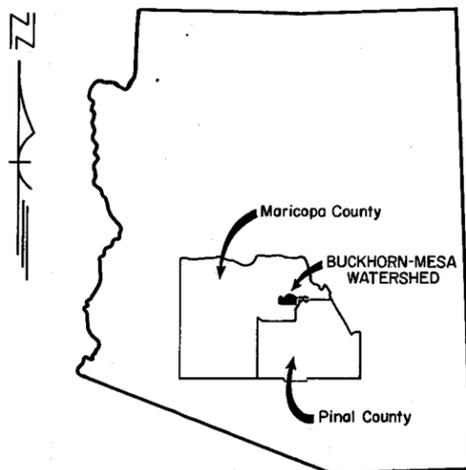
# BUCKHORN-MESA WATERSHED PROTECTION AND FLOOD PREVENTION PROJECT MARICOPA AND PINAL COUNTIES, ARIZONA

## PLANS FOR THE CONSTRUCTION OF SPOOK HILL FLOODWAY

PREPARED FOR THE  
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
BOARD OF SUPERVISORS OF PINAL COUNTY  
EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT

BY

SOIL CONSERVATION SERVICE  
U.S. DEPARTMENT OF AGRICULTURE



### INDEX OF DRAWINGS

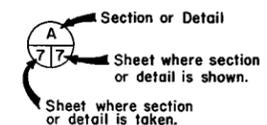
DRWG. NO.	SHT. NO.	TITLE
7-E-23796	1.	INDEX OF DRAWINGS
	2.	LOCATION MAP
	3.	PLAN & PROFILE- $\bar{C}$ FLOODWAY Sta. 95+00 to Sta. 145+00
	4.	PLAN & PROFILE- $\bar{C}$ FLOODWAY Sta. 145+00 to Sta. 190+00
	5.	PLAN & PROFILE- $\bar{C}$ FLOODWAY Sta. 190+00 to Sta. 210+00
	6.	CROSS SECTIONS OF FLOODWAY
	7.	CROSS SECTIONS OF FLOODWAY
	8.	CROSS SECTIONS OF FLOODWAY
	9.	CROSS SECTIONS OF FLOODWAY
	10.	CROSS SECTIONS OF FLOODWAY
	11.	PIPE INLET DETAILS
	12.	WEIR INLET DETAILS
	13.	MAINTENANCE ROAD RAMPS
	14.	WEIR INLET NO. 23 DIVERSION DIKES
	15.	SEDIMENT BASIN DETAILS
	16.	SEDIMENT BASIN & WEIR INLET NO. 24 DETAILS
	17.	FENCING DETAILS
	18.	LOG OF ADDITIONAL TEST HOLES & TEST PITS

### GENERAL NOTES

- Elevations are in feet above mean sea level U.S.G.S. datum.
- All stationing refers to centerline of construction and is the measured horizontal distance.
- All soil classification symbols shown are based on the unified soil classification system. Field identification was used except where indicated by an asterisk (\*). This denotes laboratory classification. Logs and descriptions are abridged. Complete drilling logs, laboratory reports and geology report are available for inspection at the project office.
- All bearings are referenced to True North.
- Blow count indicated is the results of standard penetration tests made with a split spoon sampler. Results are expressed as blows per foot.
- All floodway cross sections are shown looking in the direction of increasing stations.

### LEGEND

- $\Delta$  Test pit
- $\odot$  Test hole
- P — Power line
- T — Telephone line



### INDEX OF DRAWINGS

BUCKHORN-MESA W.P.P.

MARICOPA AND PINAL COUNTIES, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

EAST MARICOPA NATURAL RESOURCE  
CONSERVATION DISTRICT

**APPROVED**

DATE 4-21-77 *Jim Miller*  
Chairman - Board of Supervisors

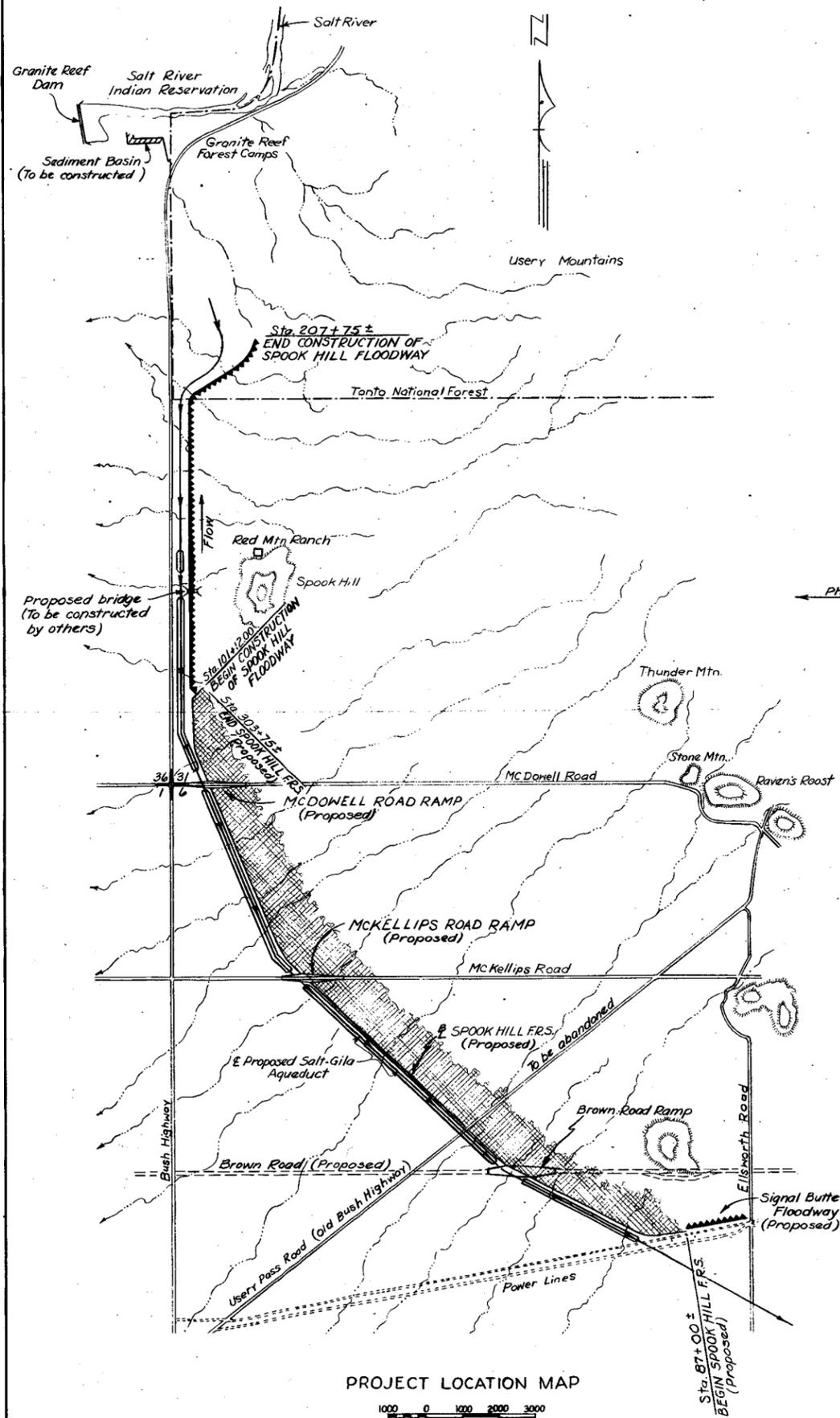
FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

**APPROVED**

DATE 4/19/77 *Robert [Signature]*  
Chief Engineer

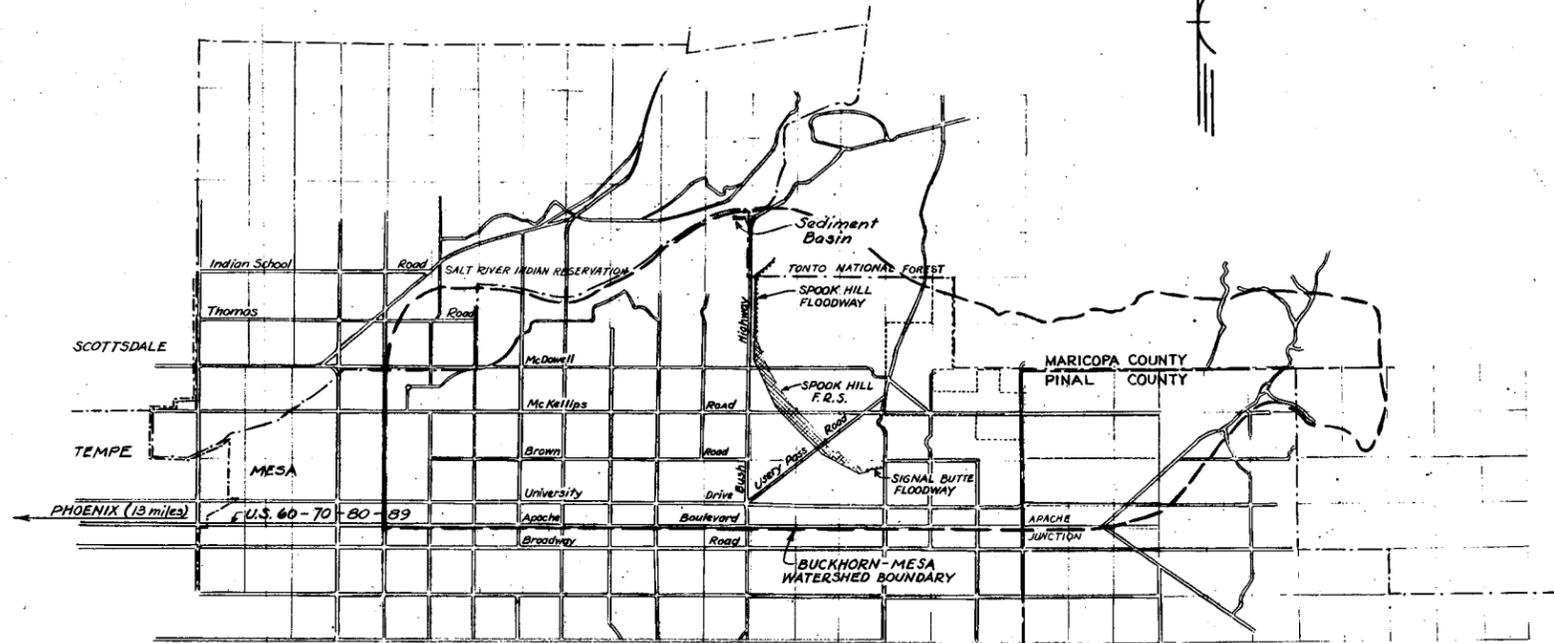
REVISIONS	

Designed Soil Conservation Service	Date 11-75	Approved by <i>[Signature]</i>
Drawn Soil Conservation Service	Date 11-75	Title Head, E.S.W.P. Unit
Traced E.F.S.	Date 12-75	Title State Conservation Engineer
Checked P.J.M., J.H.D.	Date 1-76	No. 1 of 18
Drawing No.		7-E-23796



PROJECT LOCATION MAP

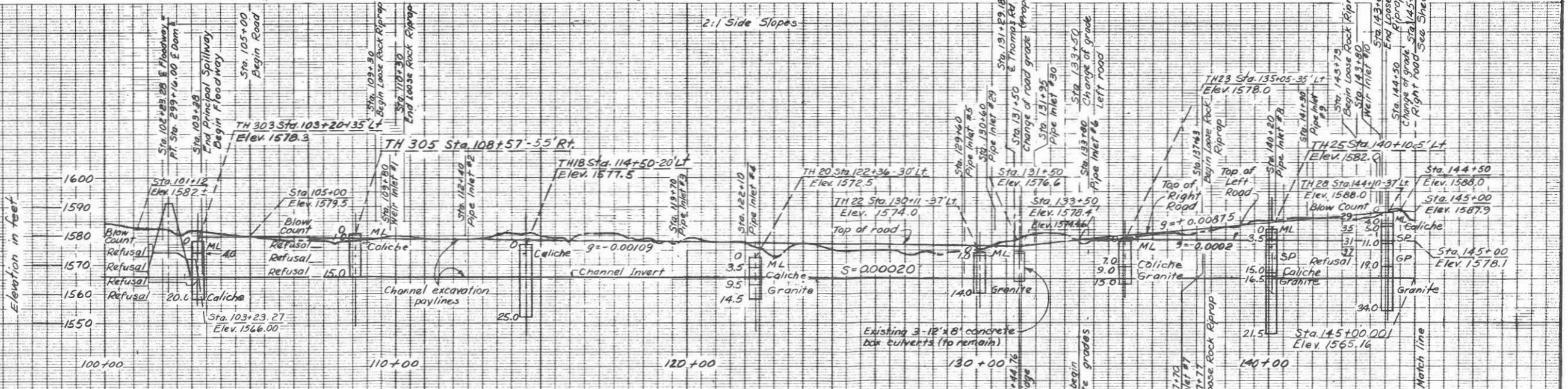
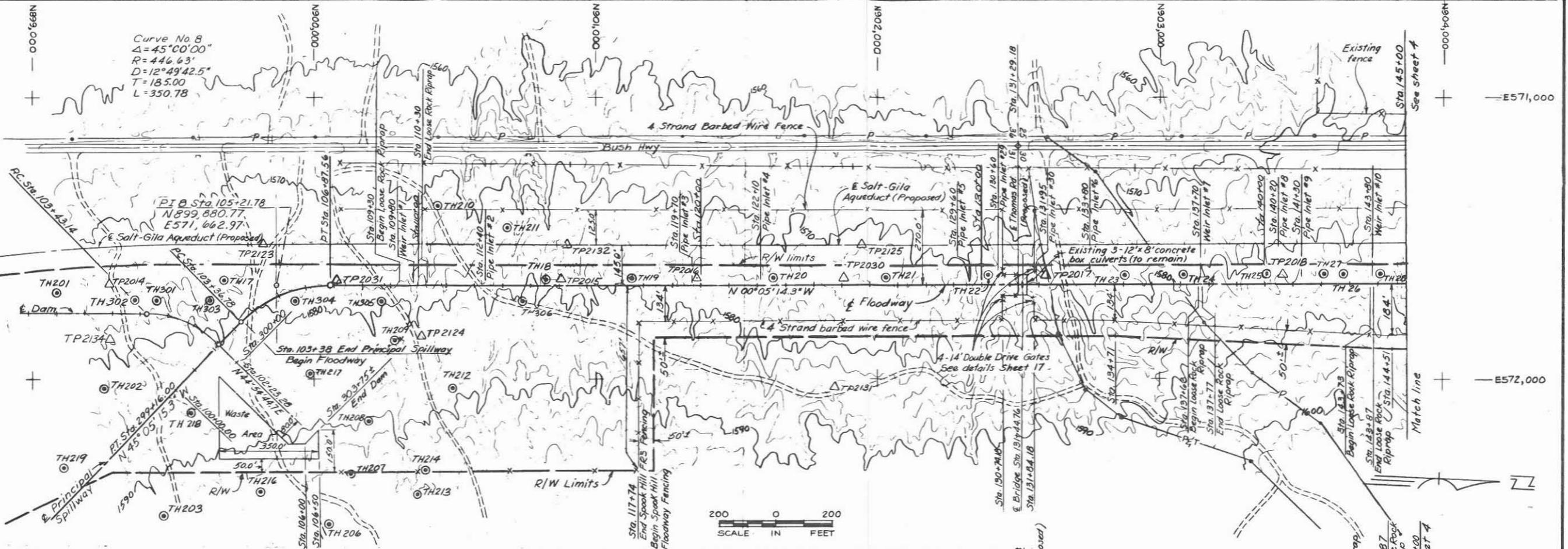
SCALE 0 1000 2000 3000  
IN FEET



WATERSHED LOCATION MAP

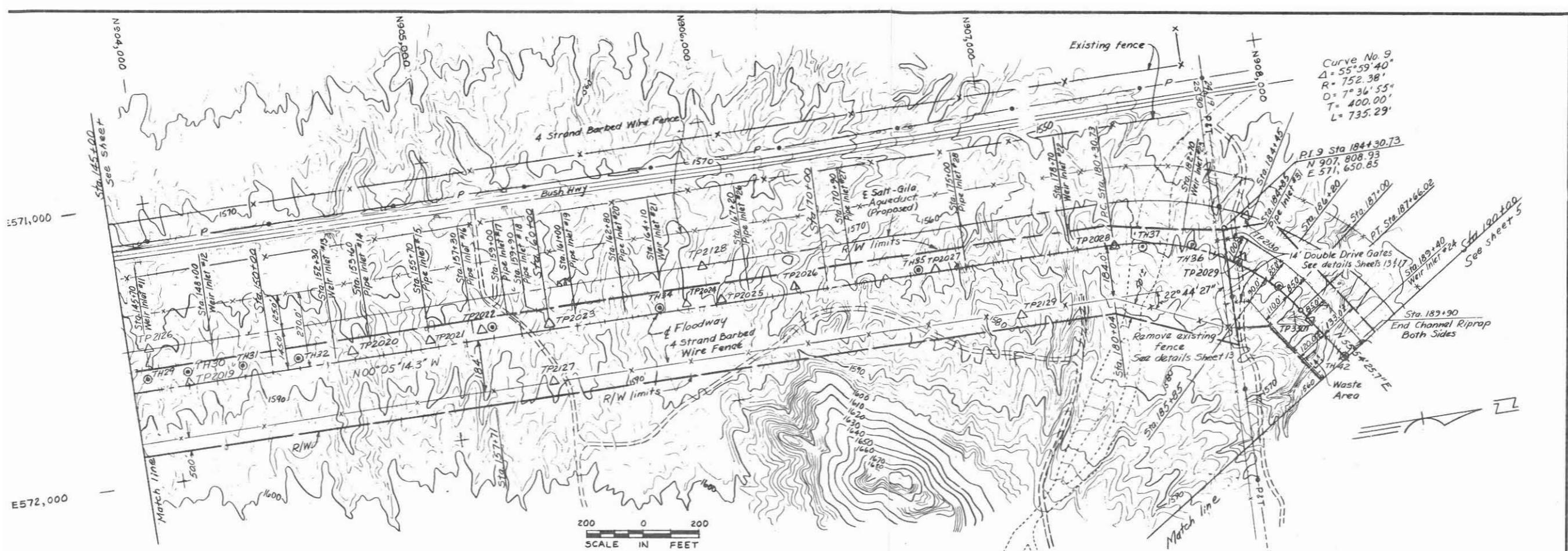
SCALE 0 2 4  
IN MILES

LOCATION MAP			
SPOOK HILL FLOODWAY			
BUCKHORN-MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	PJM, LLB, AC	Date	4-75
Drawn	J.E.B.	Approved by	.....
Traced	EFS	Title	.....
Checked	PJM	Date	7-76
		Sheet	No. 2
		of 18	
		Drawing No.	7-E-23796

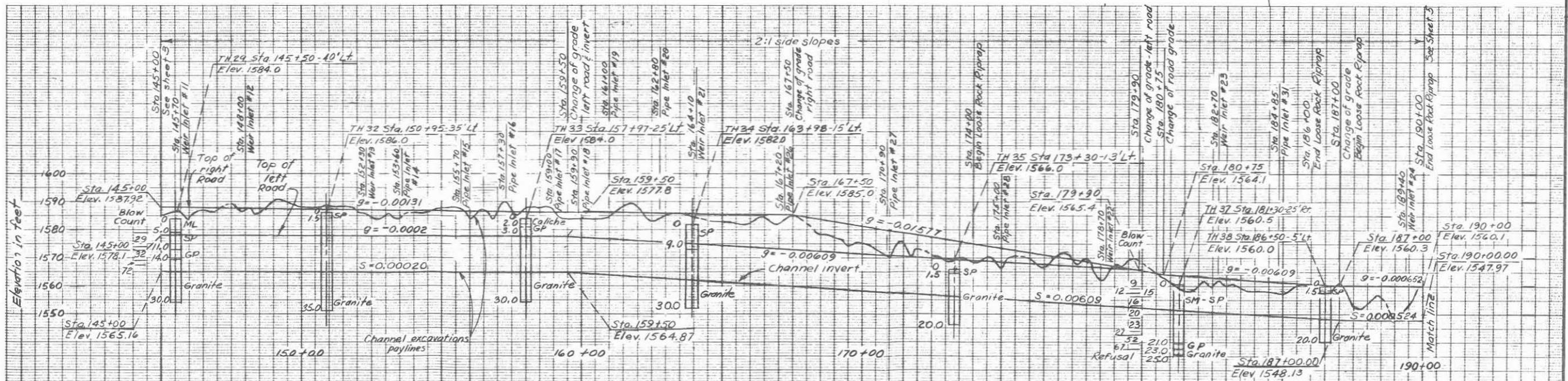


Note: For Weir Inlet, Pipe Inlet & Loose Rock Riprap Details see Sheets 11, 12, & 14.

<b>PLAN &amp; PROFILE - FLOODWAY</b> STA 95+00 TO STA 145+00 <b>SPOOK HILL FLOODWAY</b> BUCKHORN MESA W.P.P. MARICOPA & PINAL CO., ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE</b> <b>SOIL CONSERVATION SERVICE</b>			
Designed	LLB, PJM	Date	4-75
Drawn	MR	Date	4-75
Traced	EFS	Date	7-76
	PJM	Date	7-76
Approved by		Title	
Title		Sheet	
Drawing No.		No. 3	
7-F-23706			



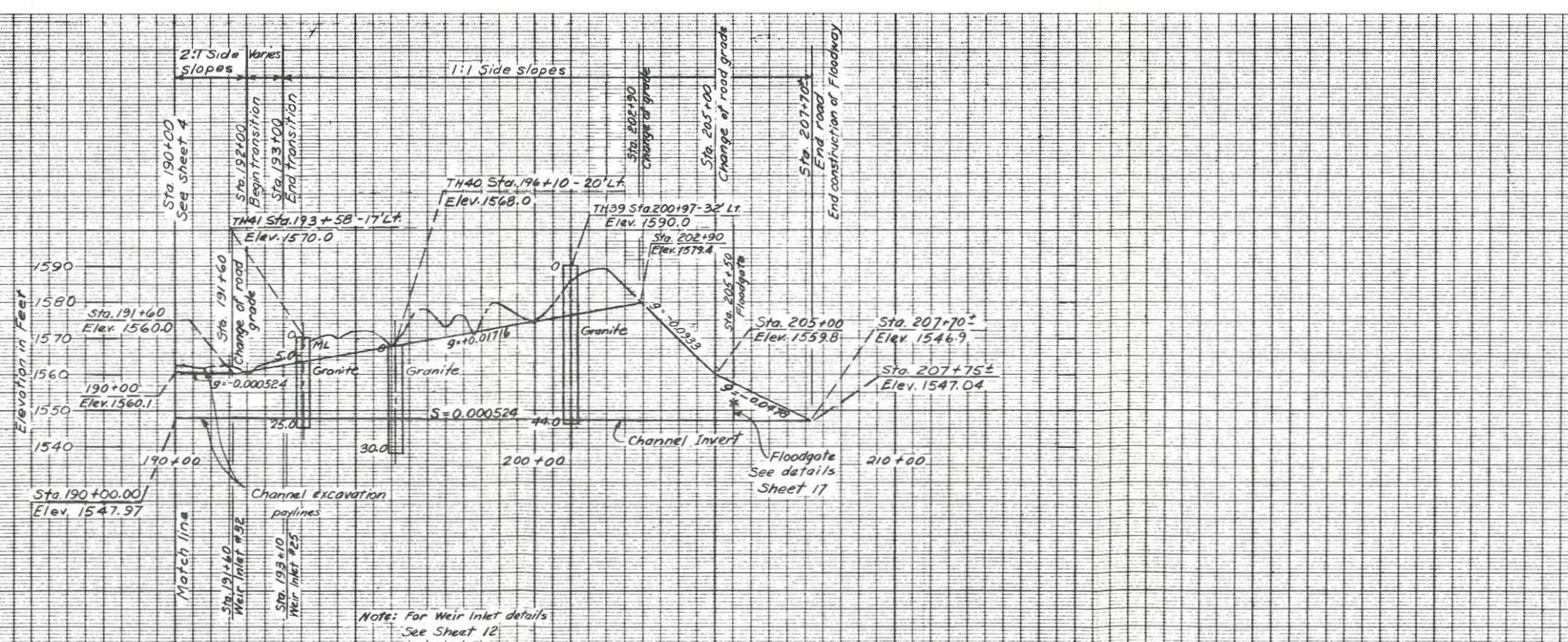
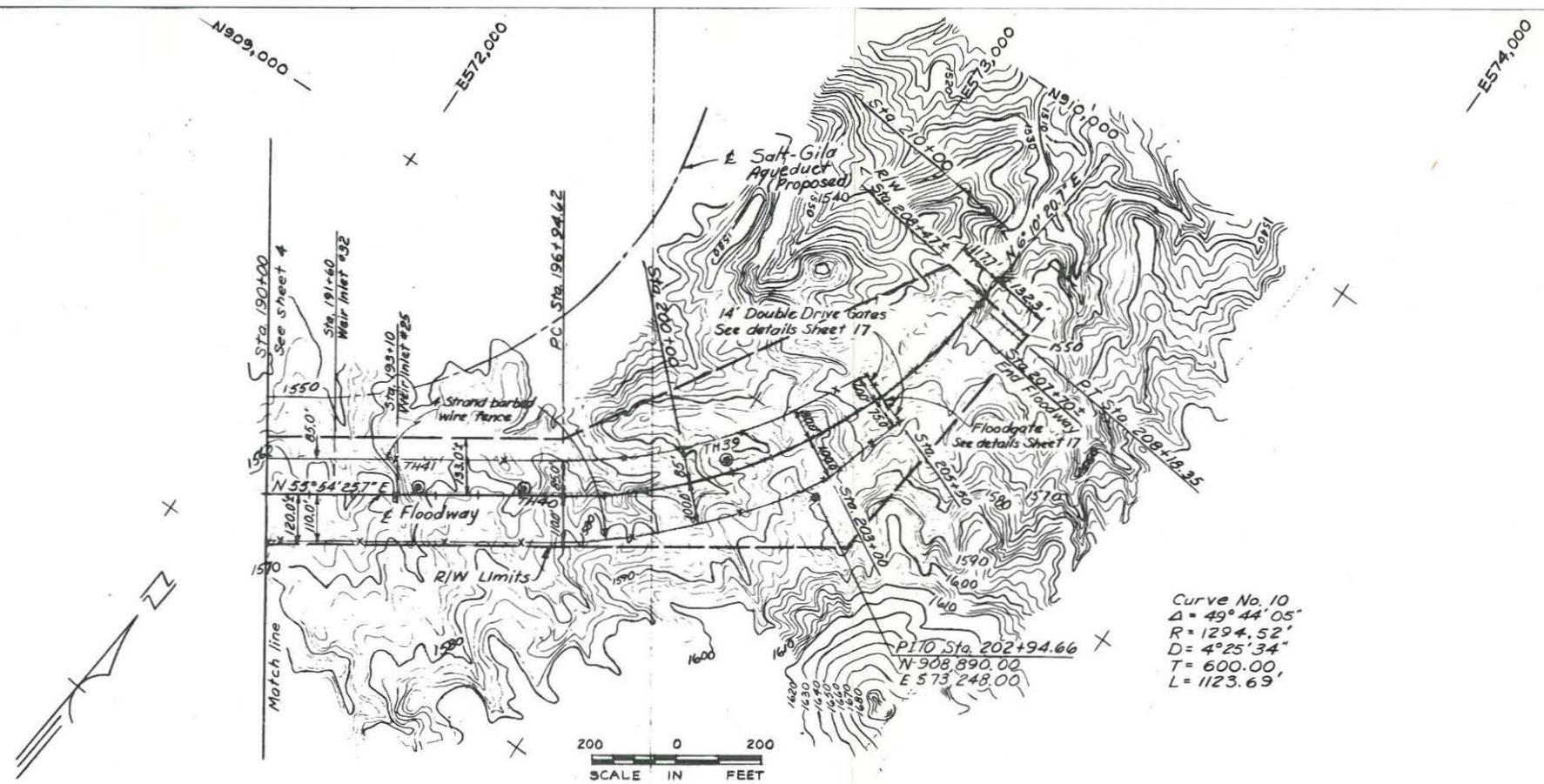
Curve No. 9  
 $\Delta = 55^\circ 59' 40''$   
 $R = 752.38'$   
 $D = 7^\circ 36' 55''$   
 $T = 400.00'$   
 $L = 735.29'$



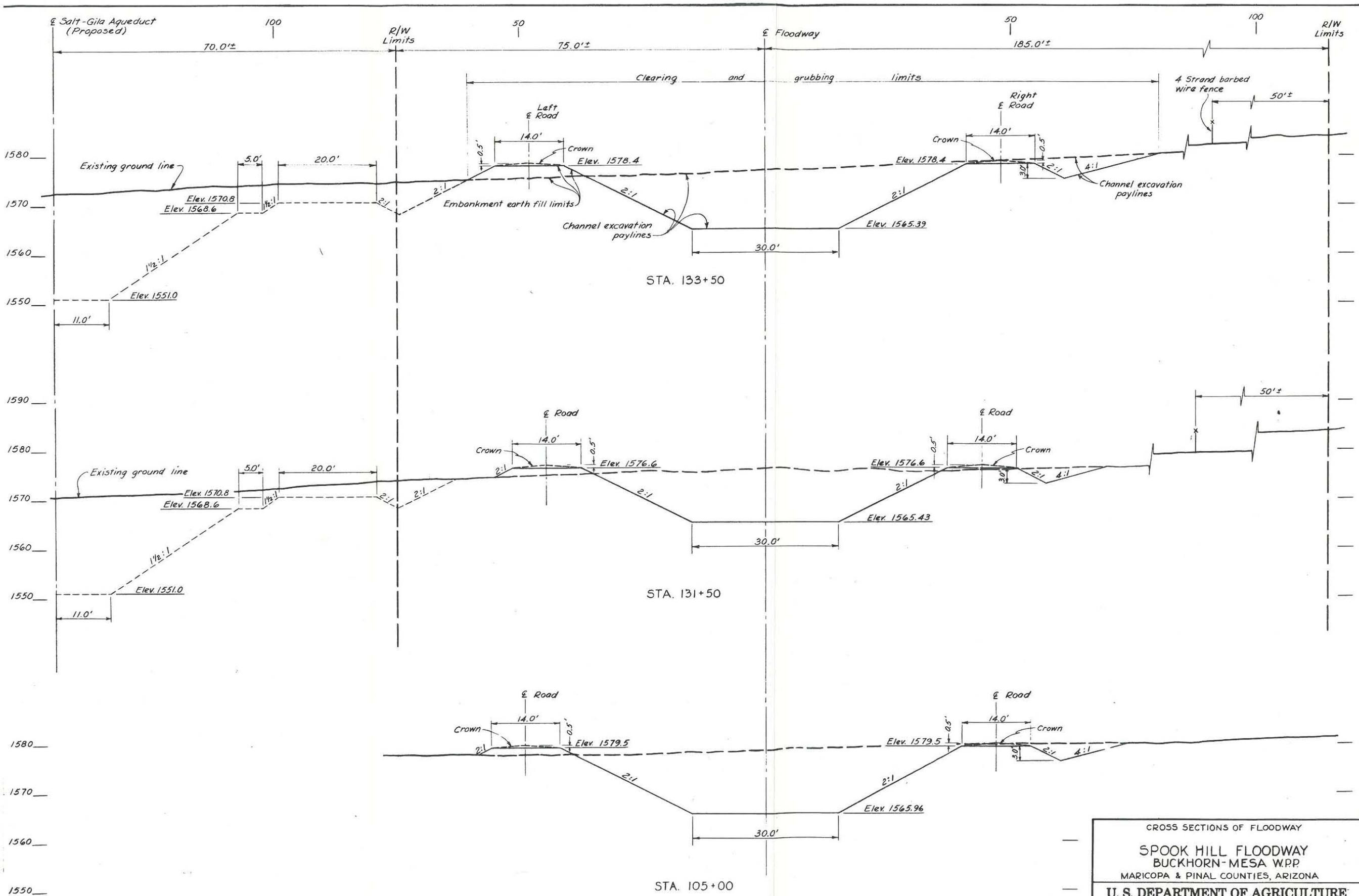
Note: For Weir Inlet, Pipe Inlet & Loose Rock Riprap details see Sheets 11, 12 & 14.

PLAN & PROFILE - E OF FLOODWAY  
 STA 145+00 TO STA 190+00  
 SPOOK HILL FLOODWAY  
 BUCKHORN MESA W.P.P.  
 MARICOPA & PINAL CO., ARIZONA  
**U. S. DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**

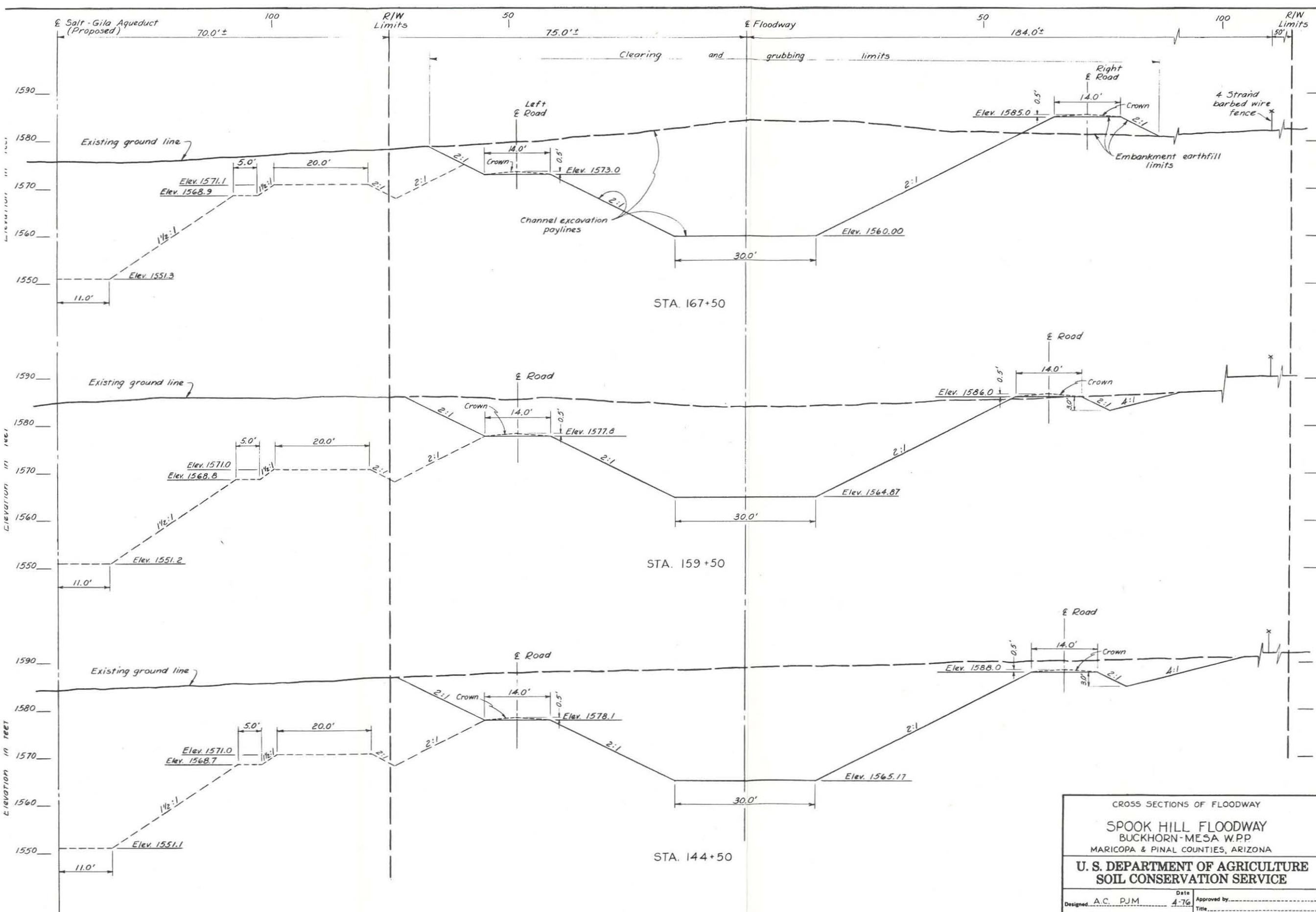
Designed	LLB, PJM	Date	4-75	Approved by	
Drawn	MR	Title	4-75		
Traced					
Checked	PJM	Sheet No.	7-76	Drawing No.	7-E-23796
		of 18			



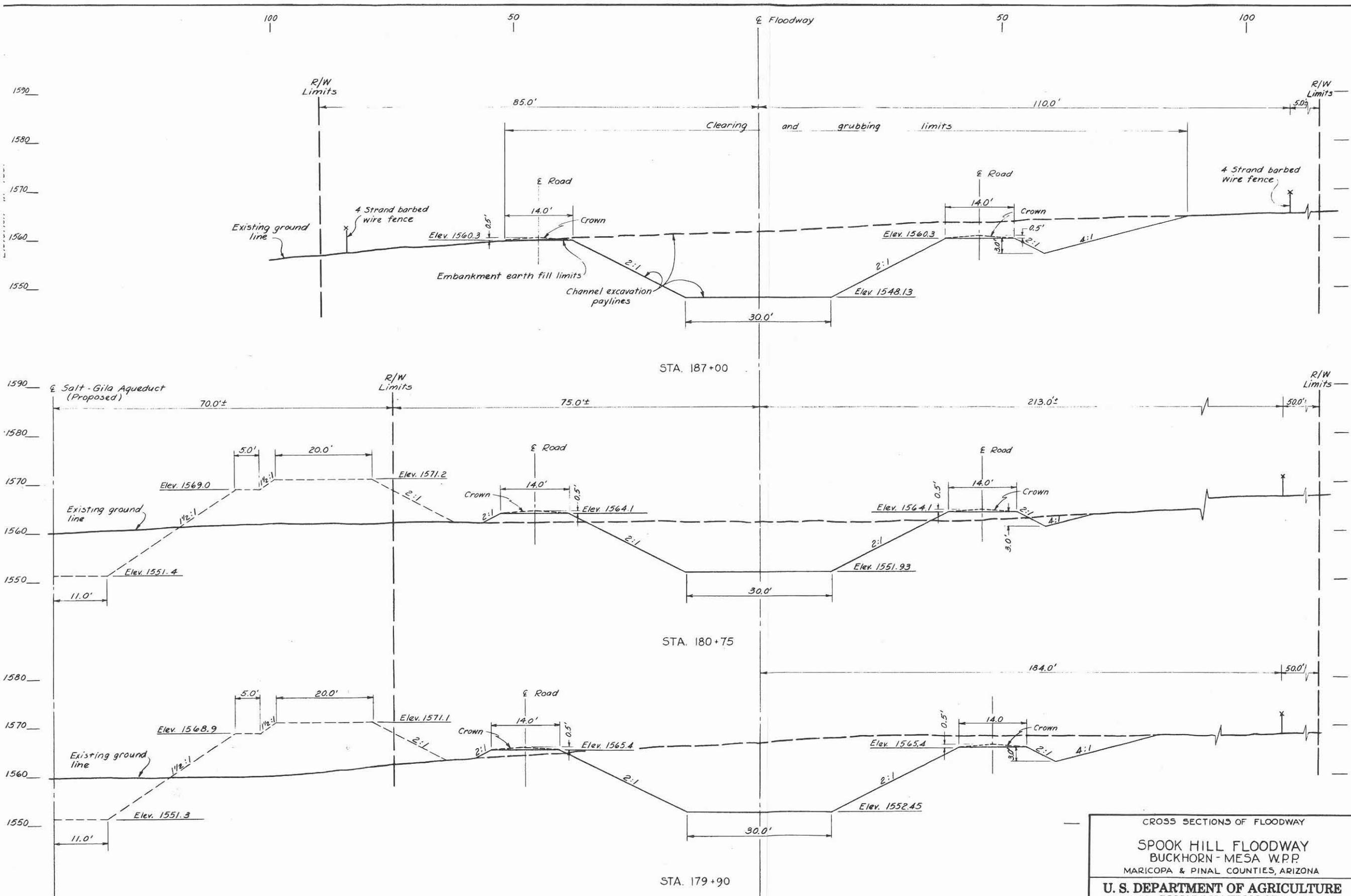
PLAN & PROFILE - E FLOODWAY STA 190+00 TO STA 210+00 SPOOK HILL FLOODWAY BUCKHORN-MESA W.P.P. MARICOPA & PINAL CO., ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE          SOIL CONSERVATION SERVICE</b>			
Designed	LLB, PJM	Date	4-75
Drawn	MR	Approved by	Title
Traced		Date	4-75
Checked	PJM	Sheet	No 5 of 18
		Drawing No.	7-E-23796



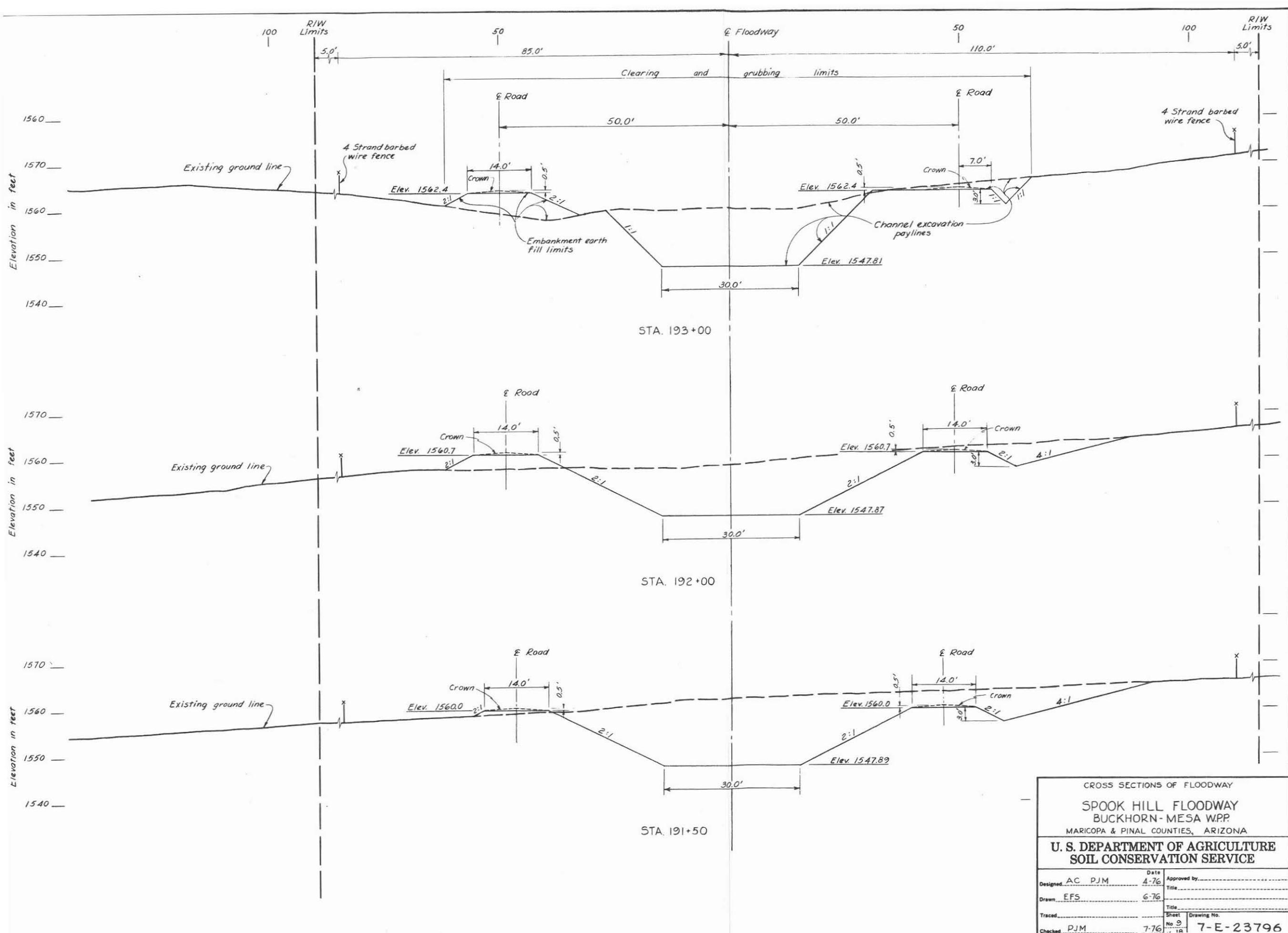
CROSS SECTIONS OF FLOODWAY			
<b>SPOOK HILL FLOODWAY</b> BUCKHORN-MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE</b> <b>SOIL CONSERVATION SERVICE</b>			
Designed	A.C. P.J.M.	Date	4-76
Drawn	J.E.B.	Date	5-76
Traced		Date	
Checked	P.J.M.	Date	7-76
		Approved by	
		Title	
		Drawing No.	
		Sheet	No. 6
		of	18
7-E-23796			



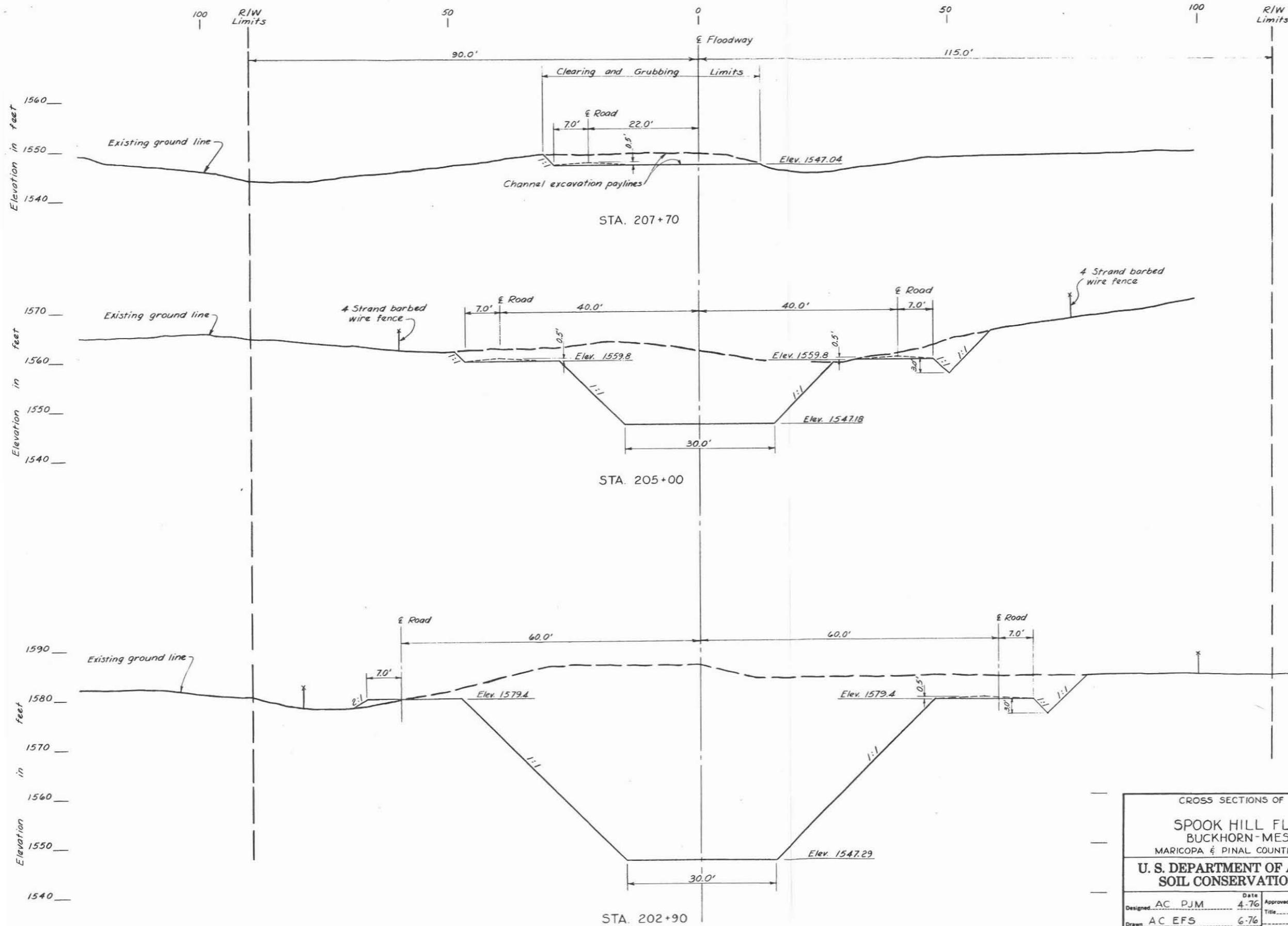
CROSS SECTIONS OF FLOODWAY			
SPOOK HILL FLOODWAY			
BUCKHORN-MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE</b>			
<b>SOIL CONSERVATION SERVICE</b>			
Designed	A.C. PJM	Date	4-76
Drawn	E.F.S.	Title	
Traced		Sheet	No. 7
Checked	PJM	Date	7-76
			Drawing No.
			No. 7 of 18
7-E-23796			



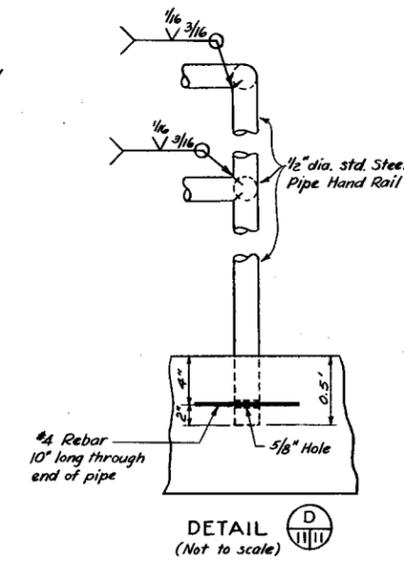
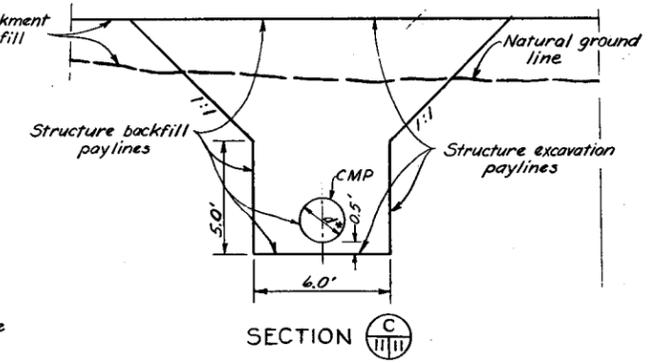
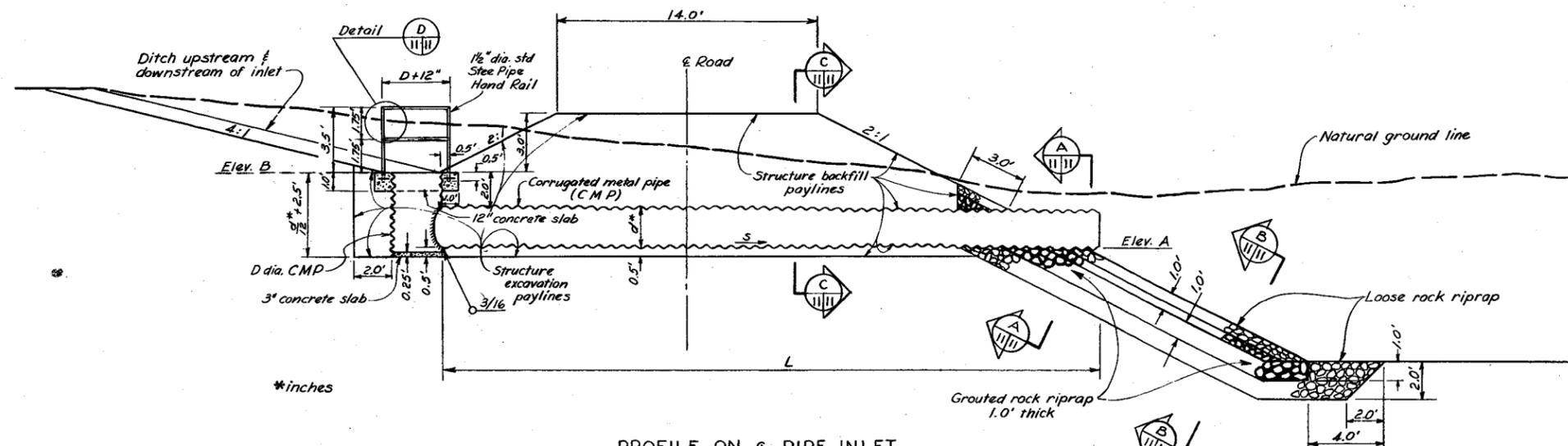
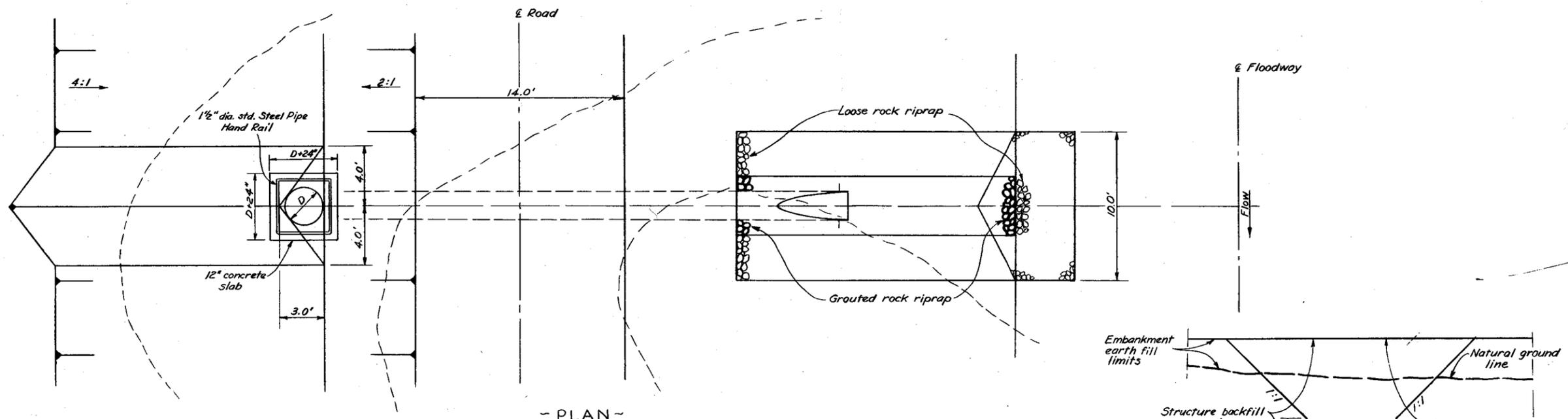
CROSS SECTIONS OF FLOODWAY			
SPOOK HILL FLOODWAY BUCKHORN - MESA W.P.P. MARICOPA & PINAL COUNTIES, ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE</b>			
Designed	AC PJM	Date	4-76
Drawn	EFS	Date	6-76
Traced		Date	
Checked	PJM	Date	7-76
		Approved by	.....
		Title	.....
		Title	.....
		Sheet	No. 6
		of 18	
		Drawing No.	7-E-23796



CROSS SECTIONS OF FLOODWAY			
SPOOK HILL FLOODWAY			
BUCKHORN - MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	AC PJM	Date	4-76
Drawn	EFS	Date	6-76
Traced		Date	
Checked	PJM	Date	7-76
Approved by		Title	
Sheet		Drawing No.	
No. 9		7-E-23796	

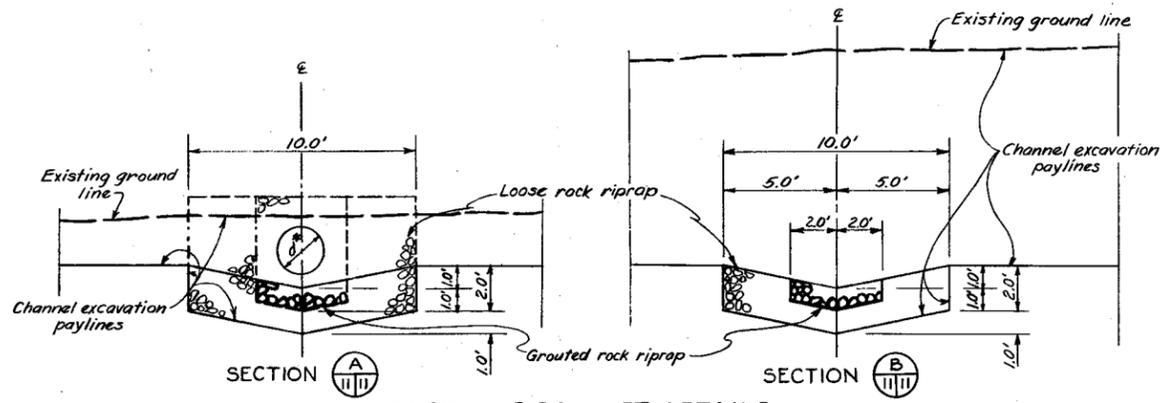


CROSS SECTIONS OF FLOODWAY			
SPOOK HILL FLOODWAY			
BUCKHORN-MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	AC PJM	Date	4-76
Drawn	AC EFS	Date	6-76
Traced		Sheet	No 10
Checked	PJM	Date	7-76
		Drawing No.	7-E-23796



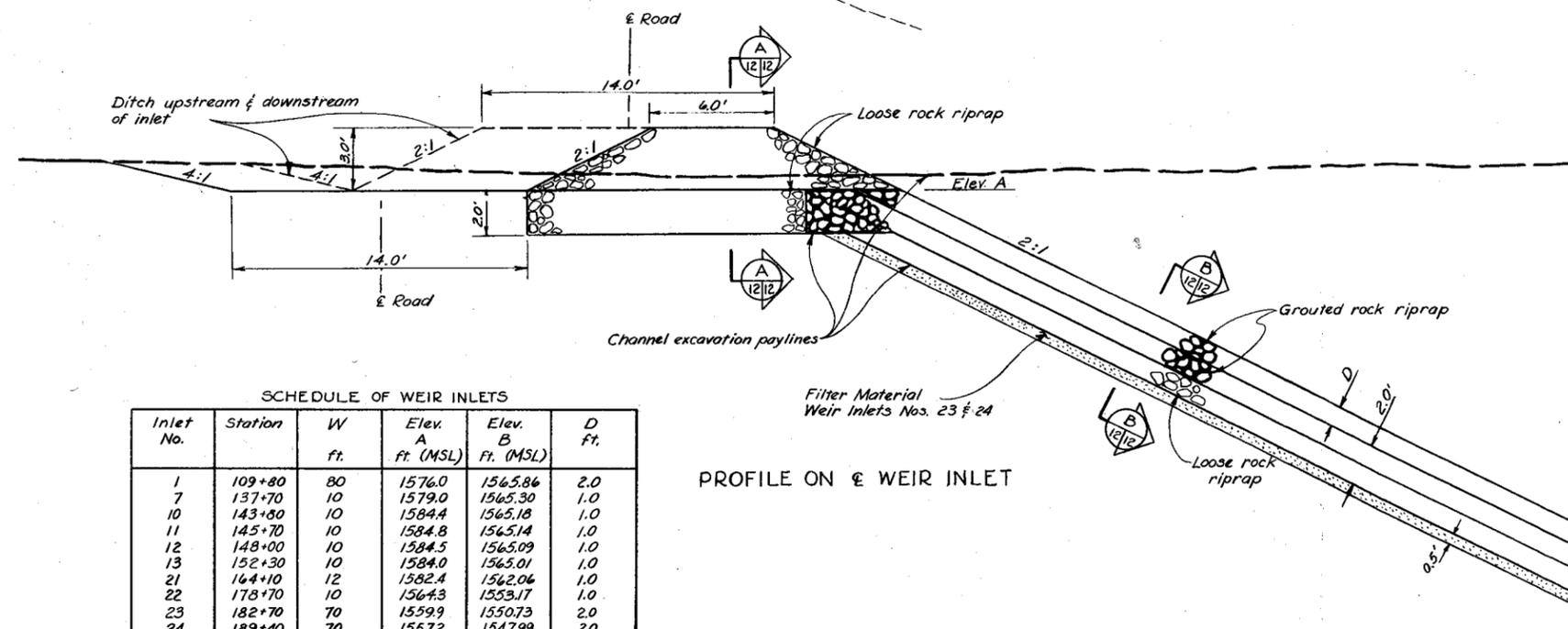
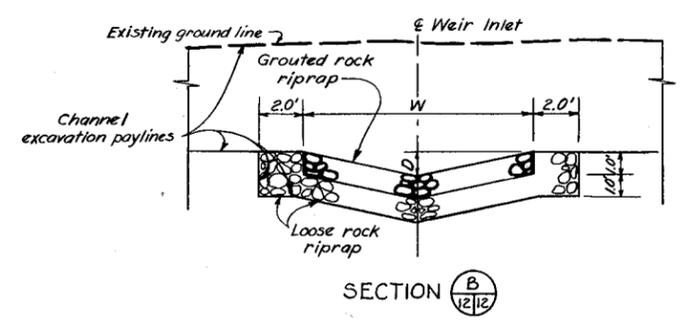
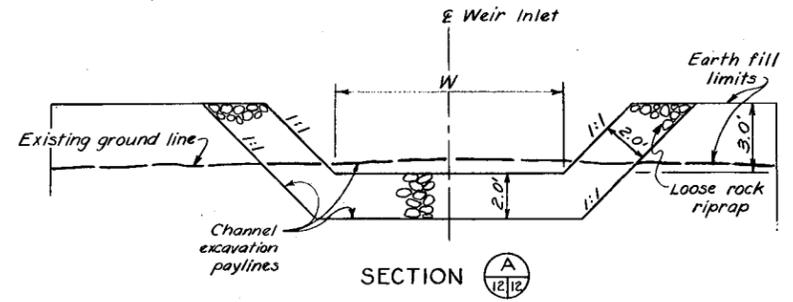
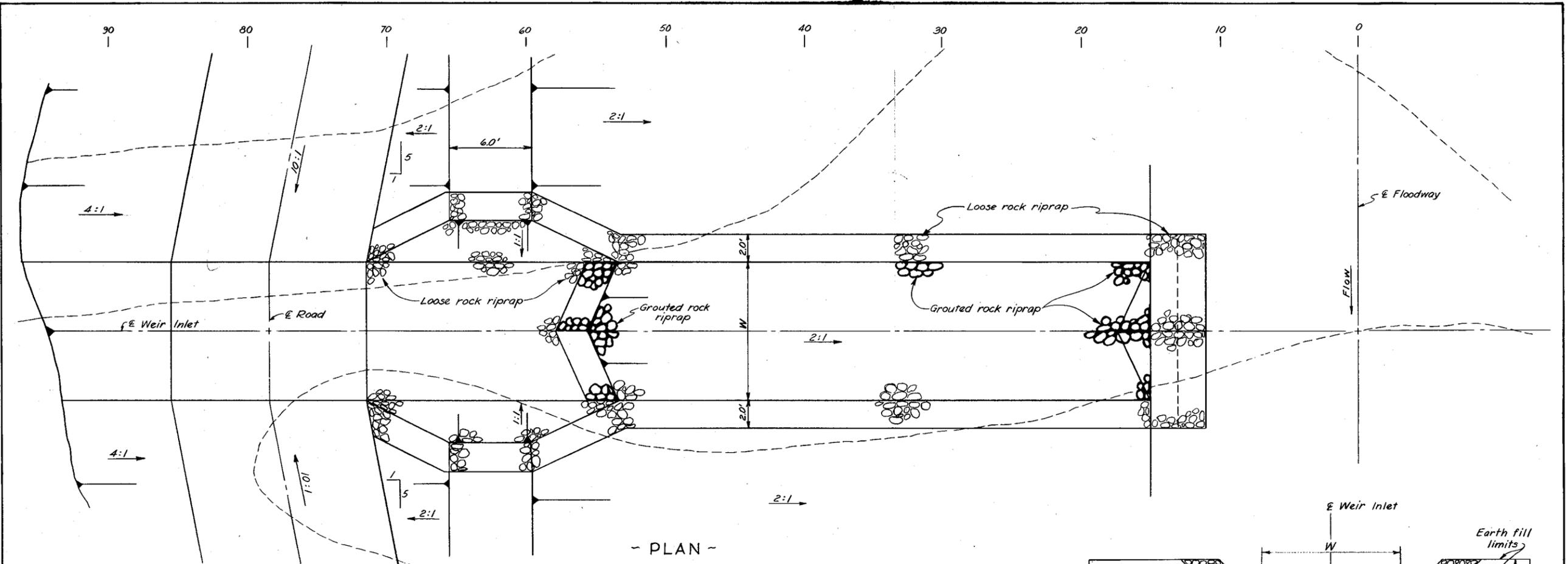
SCHEDULE OF PIPE INLETS

Inlet No.	Station	D in.	d* in.	Elev. A Ft. (MSL)	Elev. B Ft. (MSL)	L Ft.	S Ft./ft.
2	112+40	30	24	1571.65	1575.69	36	0.0011
3	119+70	30	24	1570.86	1574.90	36	0.0011
4	122+10	30	24	1570.60	1574.64	36	0.0011
5	129+60	30	30	1569.28	1573.82	36	0.0011
6	133+80	30	24	1571.58	1575.62	36	0.0011
8	140+20	36	30	1570.84	1581.22	48	0.1225
9	141+30	36	30	1570.75	1582.19	50	0.1388
14	153+60	36	30	1569.60	1583.80	56	0.1732
15	155+70	42	30	1569.29	1583.53	56	0.1739
16	157+30	36	30	1568.95	1583.32	56	0.1763
17	159+00	36	30	1568.23	1583.10	56	0.1852
18	159+90	30	24	1567.53	1582.98	58	0.1974
19	161+00	36	30	1566.86	1582.84	58	0.1979
20	162+80	36	30	1565.77	1582.61	60	0.2057
26	167+20	30	24	1563.19	1582.04	66	0.2250
27	170+90	30	24	1560.98	1576.64	60	0.1943
28	175+00	30	24	1558.88	1570.17	50	0.1458
29	130+60	30	24	1569.67	1573.70	34	0.0010
30	131+95	30	24	1569.96	1573.99	34	0.0010
31	184+85	30	24	1554.57	1558.61	38	0.0010



PIPE INLET DETAILS  
 SPOOK HILL FLOODWAY  
 BUCKHORN-MESA W.R.P.  
 MARICOPA & PINAL COUNTIES, ARIZONA  
 U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed	P.J.M.	Date	4-76	Approved by	
Drawn	P.J.M.	Title	4-76		
Traced	E.F.S.	Title	6-76		
Checked	P.J.M.	Sheet	7-76	No. 11	7-E-23796
		of 18			



SCHEDULE OF WEIR INLETS

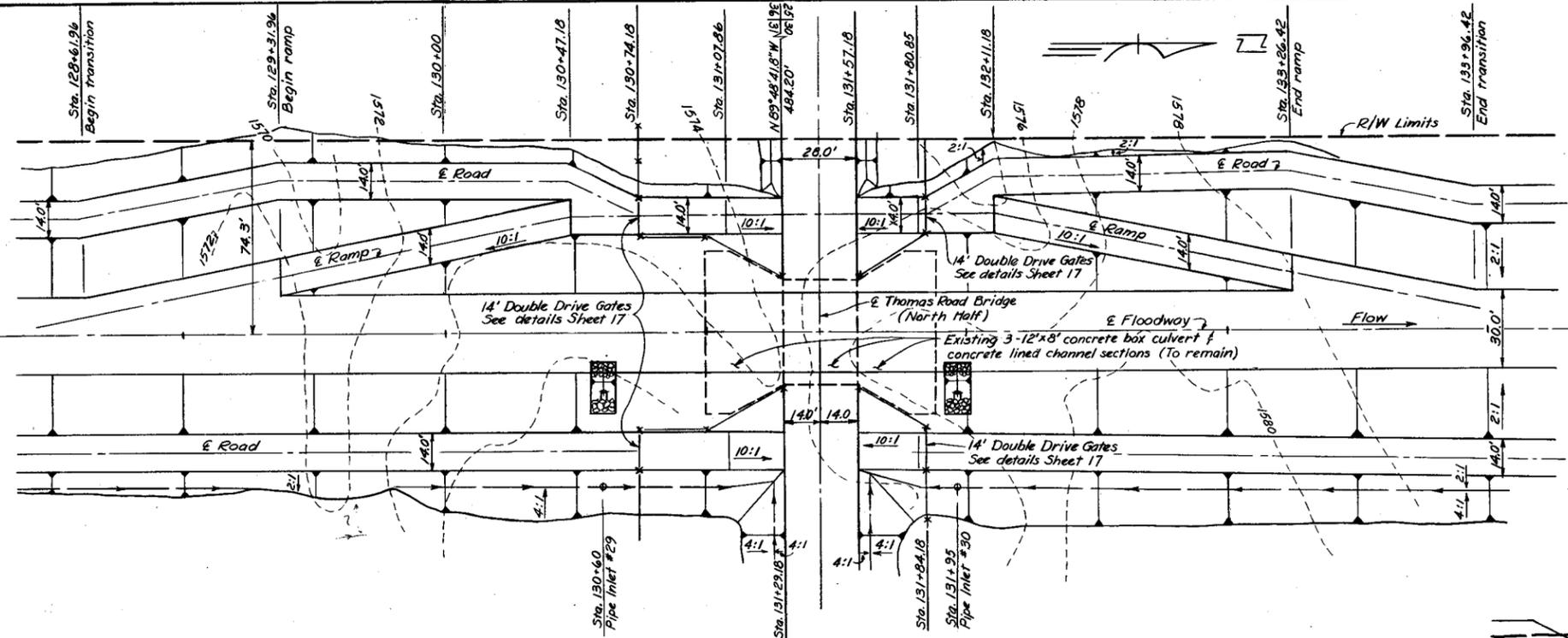
Inlet No.	Station	W ft.	Elev. A ft. (MSL)	Elev. B ft. (MSL)	D ft.
1	109+80	80	1576.0	1565.86	2.0
7	137+70	10	1579.0	1565.30	1.0
10	143+80	10	1584.4	1565.18	1.0
11	145+70	10	1584.8	1565.14	1.0
12	148+00	10	1584.5	1565.09	1.0
13	152+30	10	1584.0	1565.01	1.0
21	164+10	12	1582.4	1562.06	1.0
22	178+70	10	1564.3	1553.17	1.0
23	182+70	70	1559.9	1550.73	2.0
24	189+40	70	1557.2	1547.99	2.0
25	193+10	10	1559.7	1547.80	1.0
32	191+60	10	1557.1	1547.92	1.0

TYPICAL WEIR INLET DETAILS  
(Not to scale)

WEIR INLET DETAILS  
SPOOK HILL FLOODWAY  
BUCKHORN-MESA W.R.P.  
MARICOPA & PINAL COUNTIES, ARIZONA

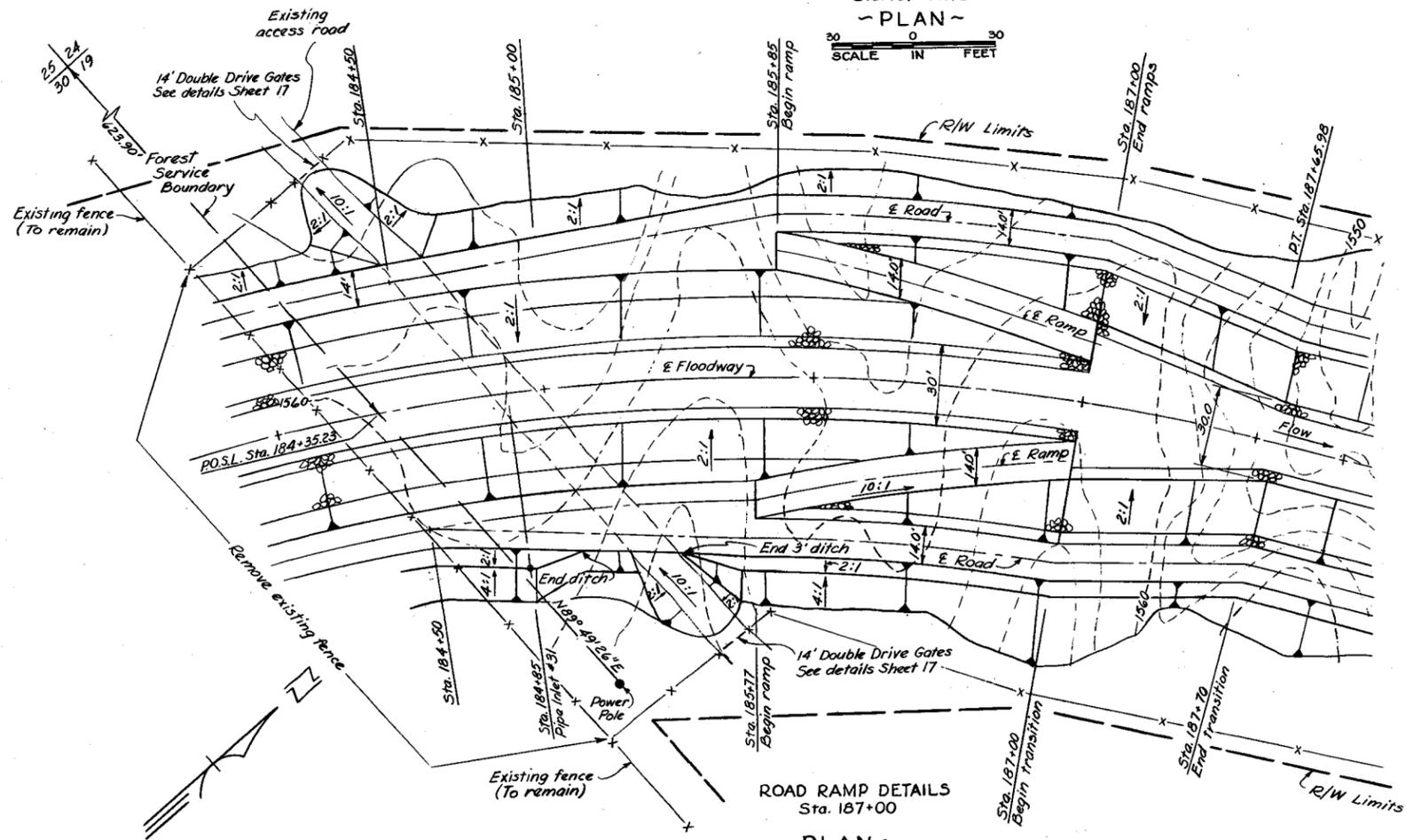
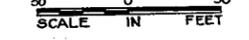
**U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

Designed	P.J.M.	Date	4-76	Approved by	
Drawn	P.J.M.	Title	5-76		
Traced	E.F.S.	Title	6-76		
Checked	P.J.M.	Sheet	No. 12	Drawing No.	7-E-23796
		of 18			



ROAD RAMP DETAILS  
Sta. 131+44.76

~ PLAN ~



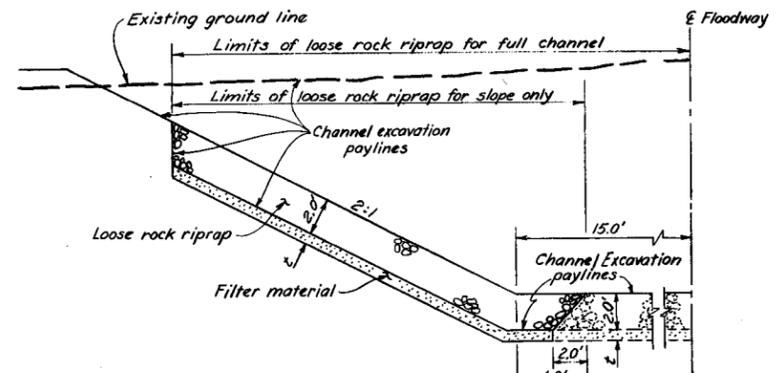
ROAD RAMP DETAILS  
Sta. 187+00

~ PLAN ~

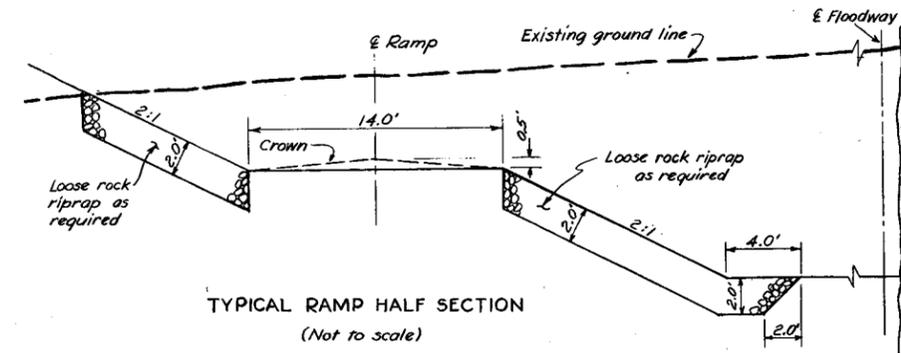


FLOODWAY CHANNEL  
LOOSE ROCK RIPRAP SCHEDULE

Station	Offset	Filter Material Thickness ft in.	Remarks
109+30	11'-30" left	0	Begin Riprap
110+30	11'-30" left	0	End Riprap
137+63	11'-30" left	0	Begin Riprap
137+77	11'-30" left	0	End Riprap
143+73	11'-30" left	0	Begin Riprap
143+87	11'-30" left	0	End Riprap
174+00	11'-32" left & right	0	Begin Riprap
180+50	32' left to 32' right	6	Begin full channel Riprap
182+70	32' left to 32' right	6	End full channel Riprap
185+77	11'-32" right	0	Begin right ramp
185+85	11'-32" left	0	Begin left ramp
185+96	11'-32" & 49' right	0	
186+04	11'-32" & 49' left	0	
187+00	11'-15" & 29'-50" left & right	6	End ramp - begin transition
187+70	11'-35" left & right	6	End transition
190+00	11'-35" left & right	6	End Riprap



TYPICAL FLOODWAY HALF SECTION  
LOOSE ROCK RIPRAP DETAILS  
(Not to scale)

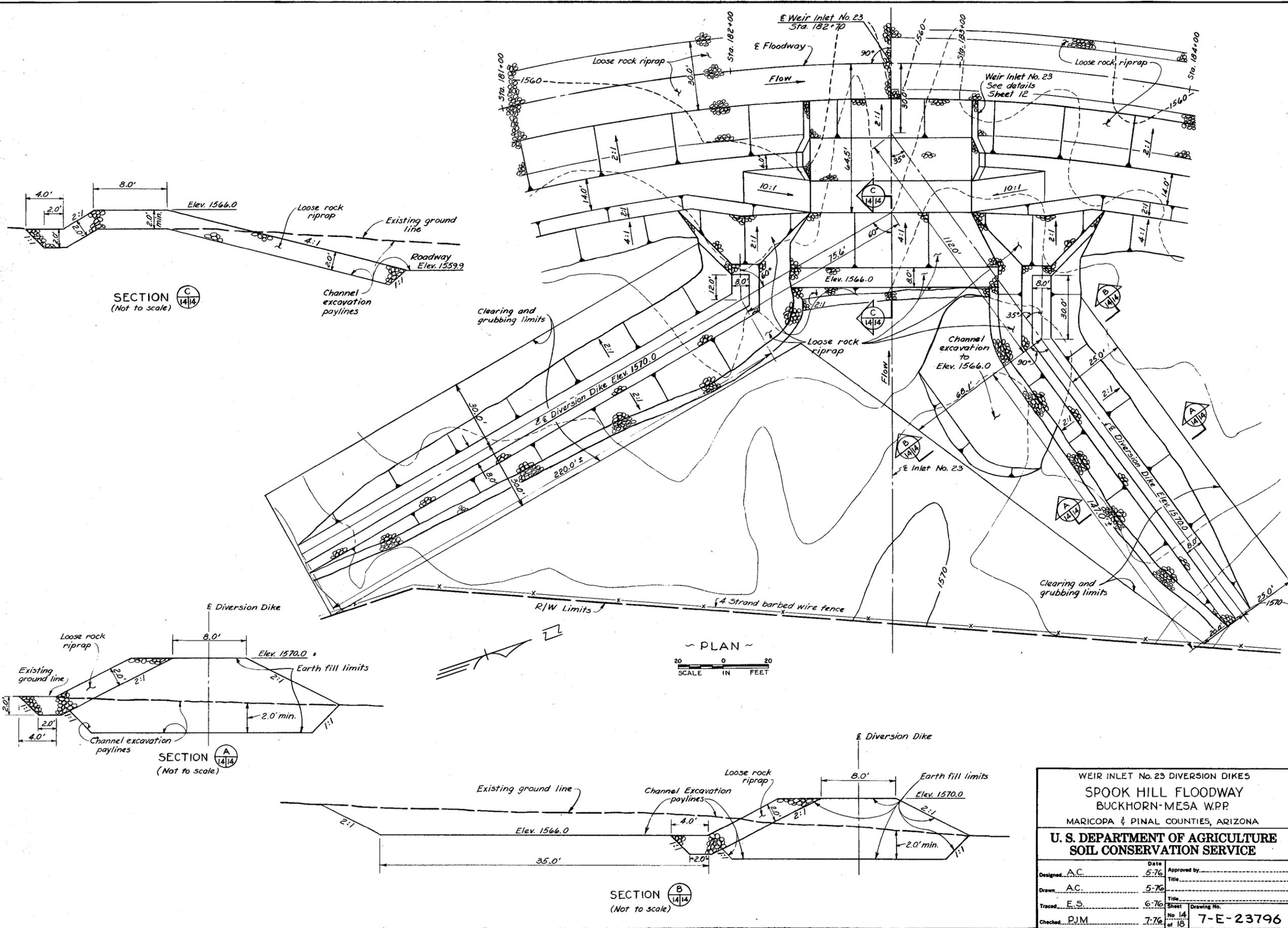


TYPICAL RAMP HALF SECTION  
(Not to scale)

MAINTENANCE ROAD RAMP  
SPOOK HILL FLOODWAY  
BUCKHORN-MESA W.P.P.  
MARICOPA & PINAL COUNTIES, ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

Designed	AC	Date	6-76	Approved by	
Drawn	AC	Date	6-76	Title	
Traced	ES	Date	7-76	Title	
Checked	PJM	Date	7-76	Sheet No. 13 of 18	Drawing No. 7-E-23796



SECTION C  
(Not to scale)

SECTION A  
(Not to scale)

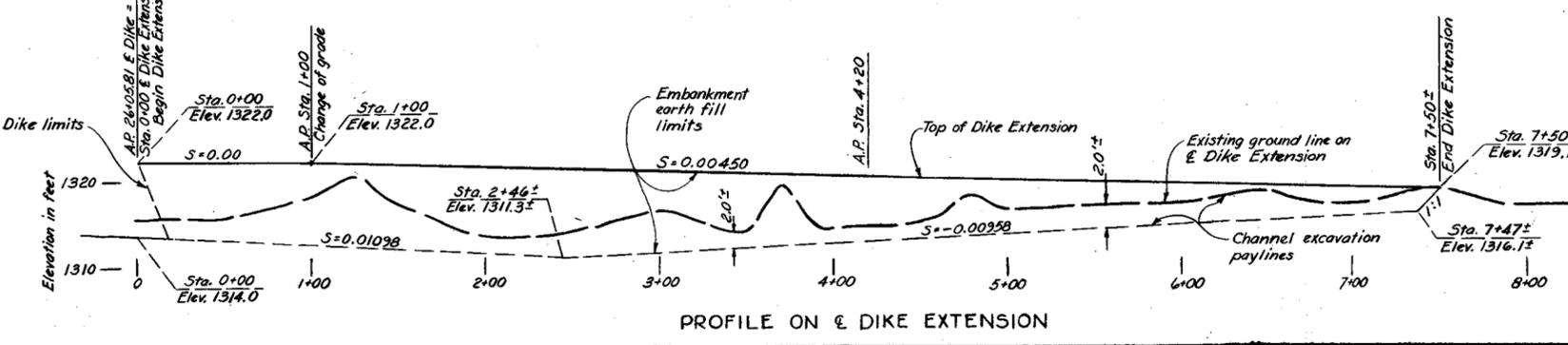
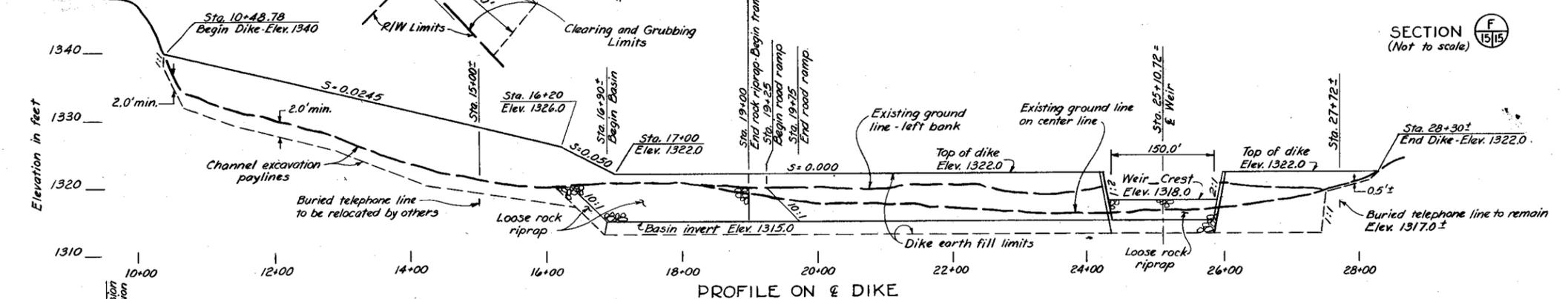
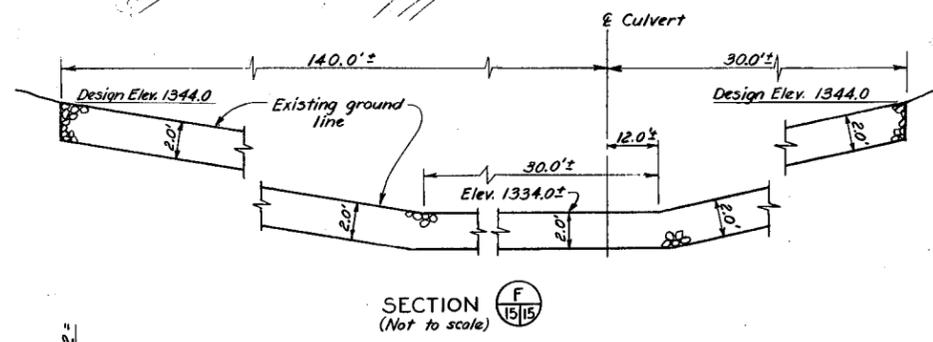
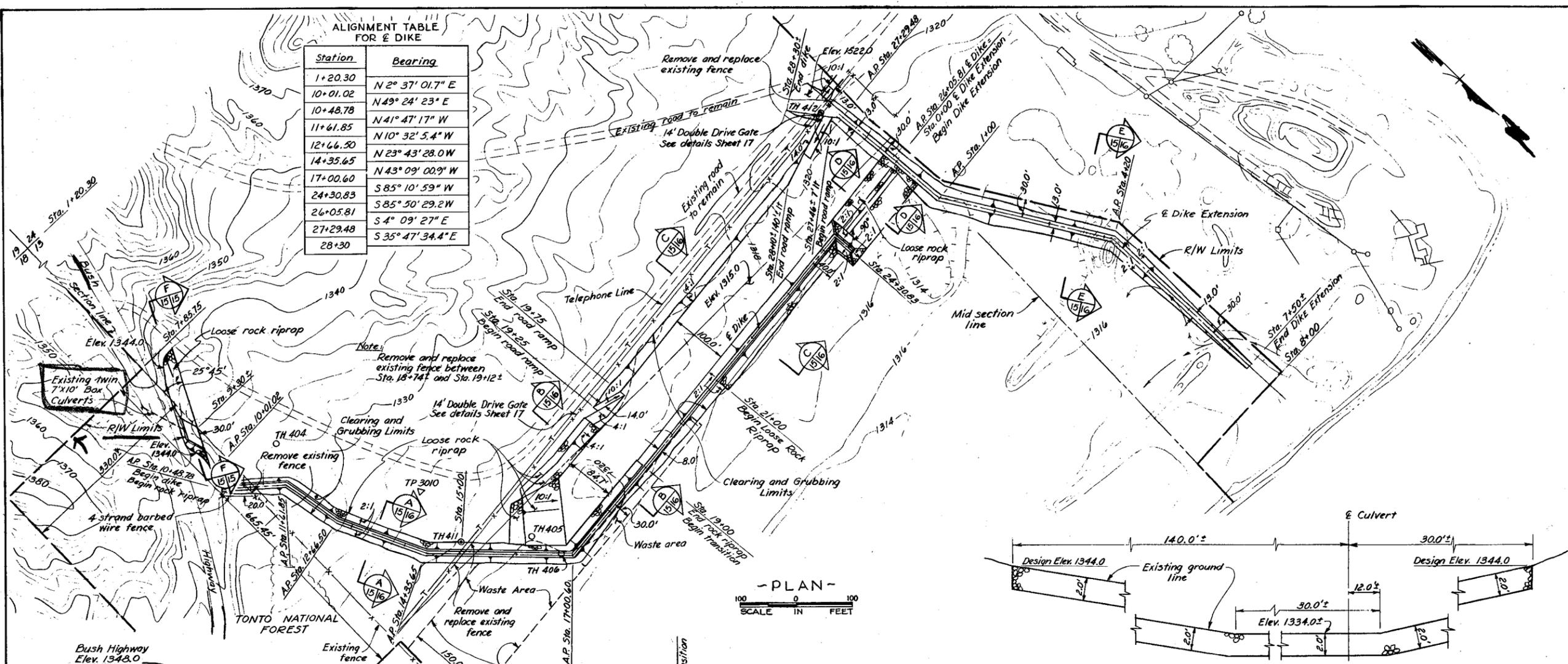
SECTION B  
(Not to scale)

PLAN  
SCALE IN FEET

WEIR INLET No. 23 DIVERSION DIKES			
SPOOK HILL FLOODWAY			
BUCKHORN-MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	A.C.	Date	5-76
Drawn	A.C.	Approved by	
Traced	E.S.	Title	
Checked	PJM	Sheet	14
		Drawing No.	7-E-23796
		of	18

ALIGNMENT TABLE FOR E DIKE

Station	Bearing
1+20.30	
10+01.02	N 2° 37' 01.7" E
10+48.78	N 49° 24' 23" E
11+61.85	N 41° 47' 17" W
12+66.50	N 10° 32' 5.4" W
14+35.65	N 23° 43' 28.0" W
17+00.60	N 43° 09' 00.9" W
24+30.83	S 85° 10' 59" W
26+05.81	S 85° 50' 29.2" W
27+29.48	S 4° 09' 27" E
28+30	S 35° 47' 34.4" E



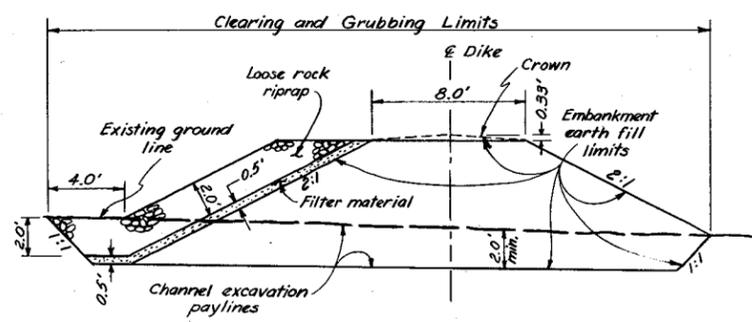
ALIGNMENT TABLE FOR E DIKE EXTENSION

Station	Bearing
0+00	
1+00	N 4° 09' 27" W
4+20	N 29° 49' 27" W
7+50±	N 0° 49' 27" W

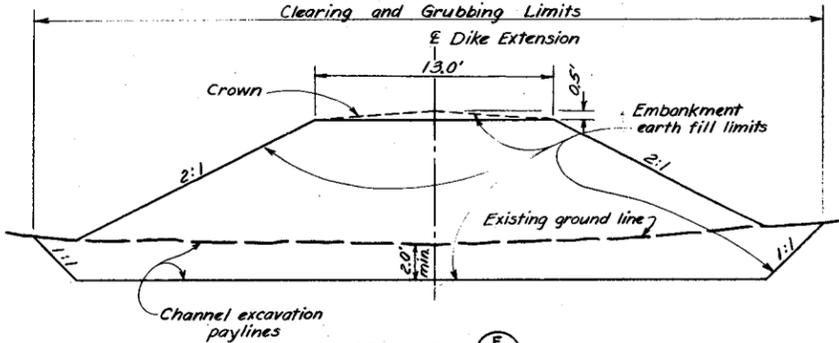
SEDIMENT BASIN DETAILS  
 SPOOK HILL FLOODWAY  
 BUCKHORN-MESA W.R.P.  
 MARICOPA & PINAL COUNTIES, ARIZONA  
**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

Designed	A.C.	Date	5-76
Drawn	A.C.	Approved by	
Traced	E.S.	Title	
Checked	PJM	2-77	

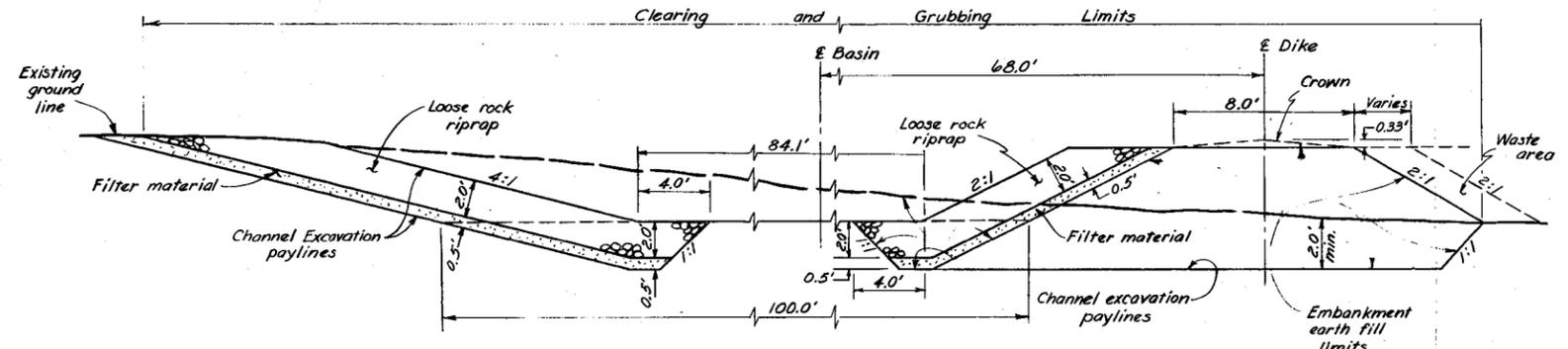
Drawing No. 7-E-23796  
 Sheet No. 15 of 18



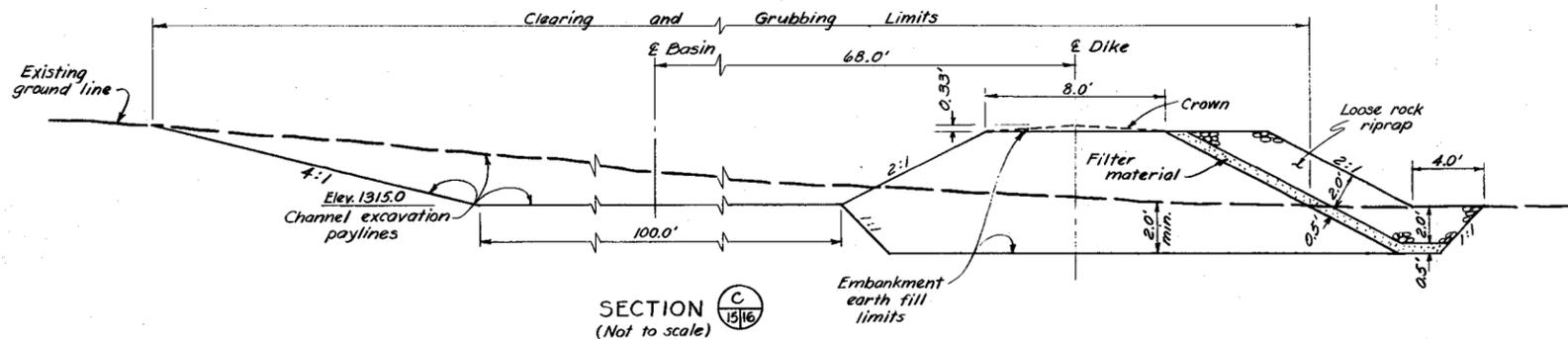
SECTION A  
(Not to scale)



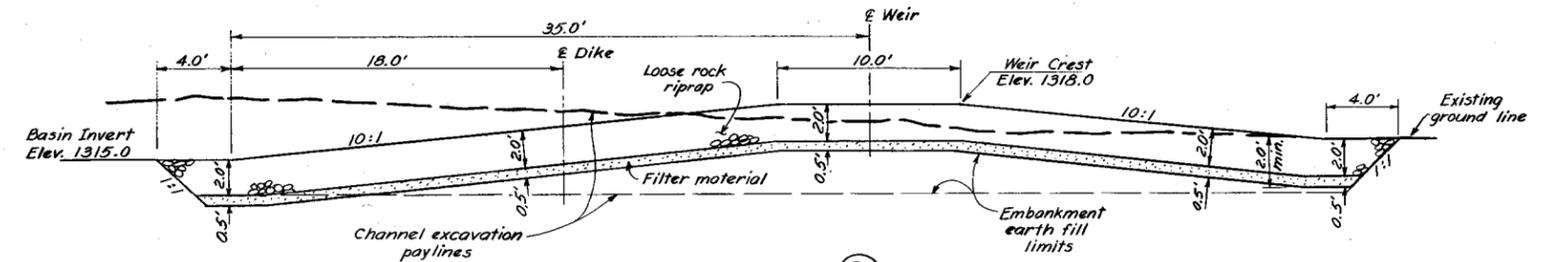
SECTION E  
(Not to scale)



SECTION B  
(Not to scale)

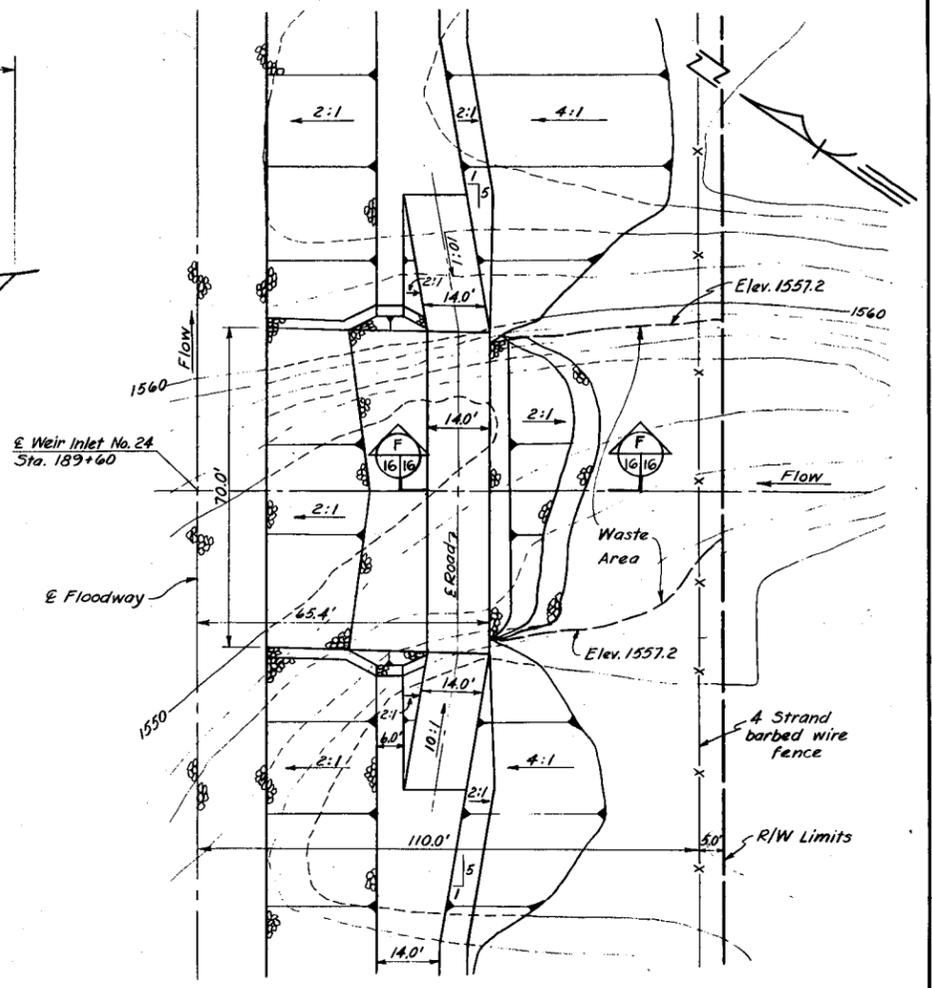


SECTION C  
(Not to scale)



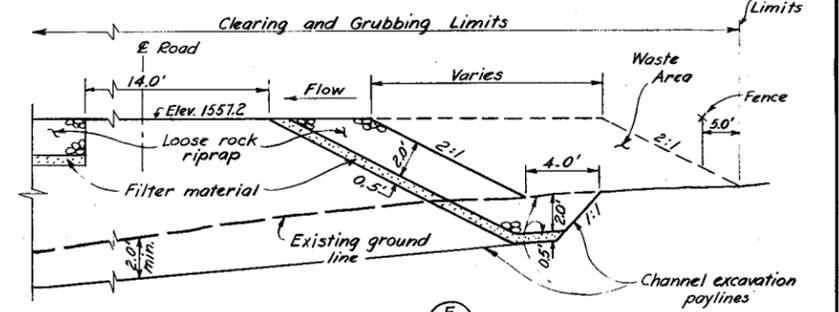
SECTION D  
(Not to scale)

SEDIMENT BASIN DETAILS



PLAN - WEIR INLET NO. 24

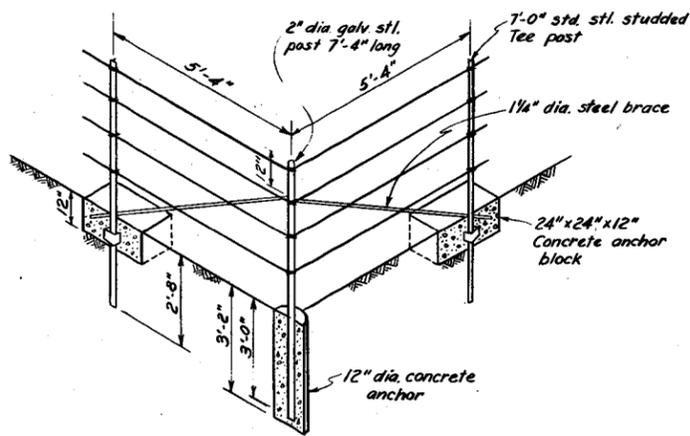
SCALE IN FEET



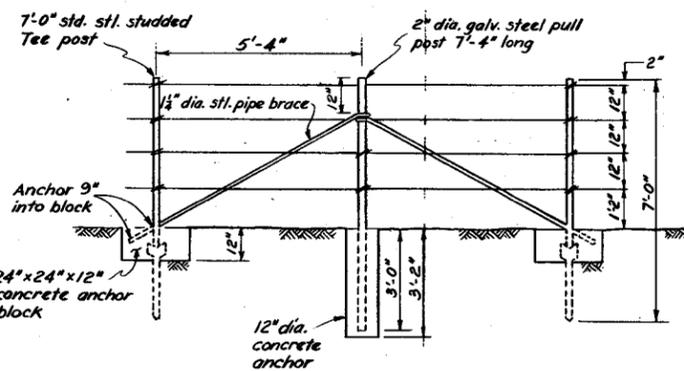
SECTION F  
(Not to scale)

WEIR INLET NO. 24 DETAILS

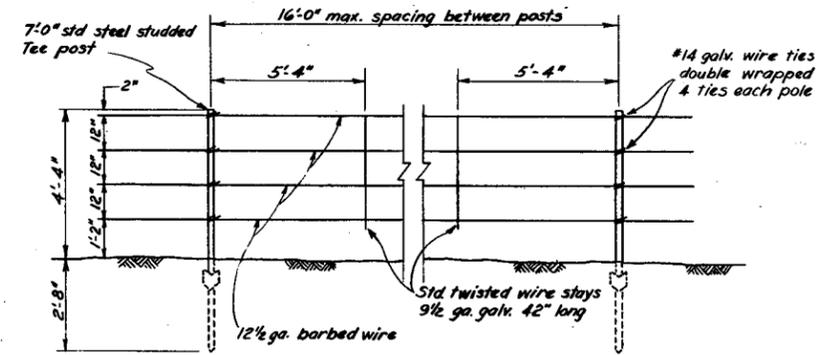
SEDIMENT BASIN & WEIR INLET No. 24 DETAILS			
SPOOK HILL FLOODWAY BUCKHORN-MESA W.R.P. MARICOPA & PINAL COUNTIES, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	TSJ PJM	Date	1-77
Drawn	AC TSJ	Approved by	
Traced	EFS	Title	
Checked	PJM	Sheet	No. 16 of 18
		Drawing No.	7-E-23796



END OR CORNER POST ASSEMBLY

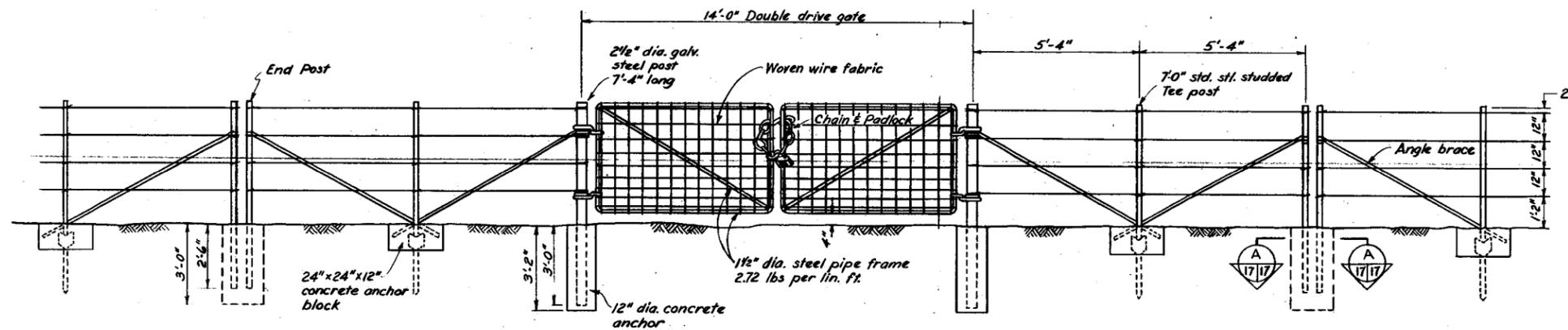


PULL POST OR CHANGE IN GRADE ASSEMBLY

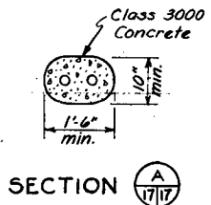


LINE POST ASSEMBLY

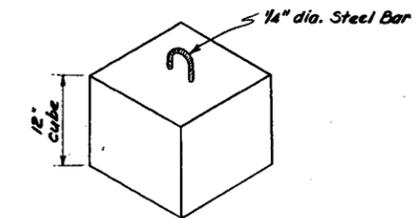
Note: For placement of line posts in granite, drill holes, to the depth required, of maximum diameter equal to or less than the greatest cross sectional dimension of the post. Remove flanges or other obstructions and drive post firmly in place.



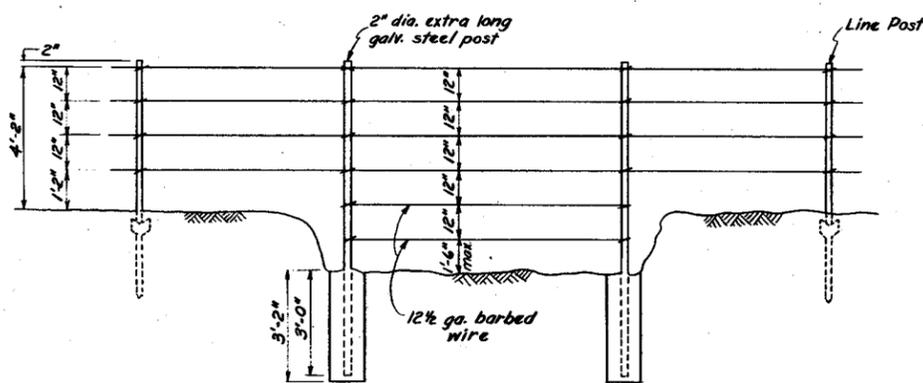
GATE AND POST ASSEMBLY



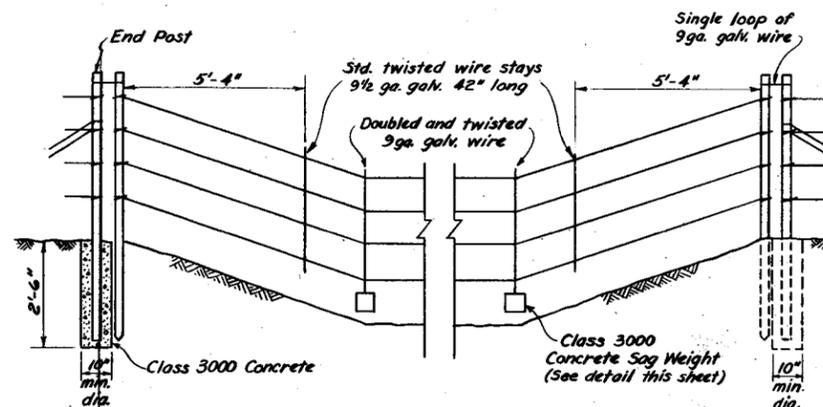
SECTION A



CONCRETE SAG WEIGHT DETAIL



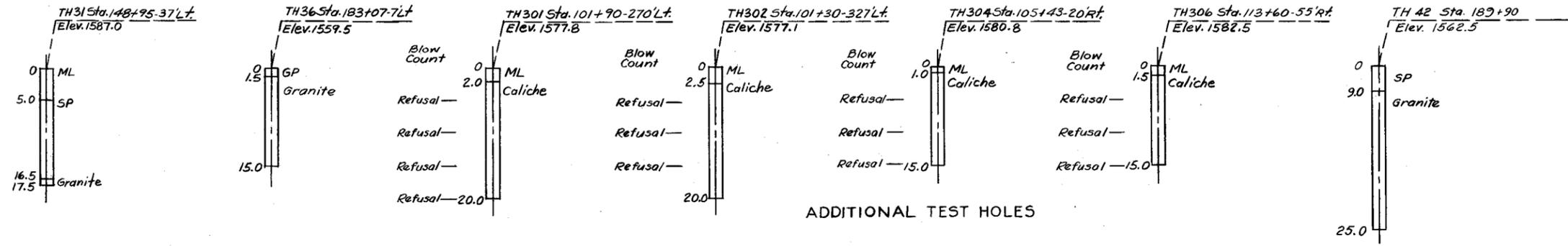
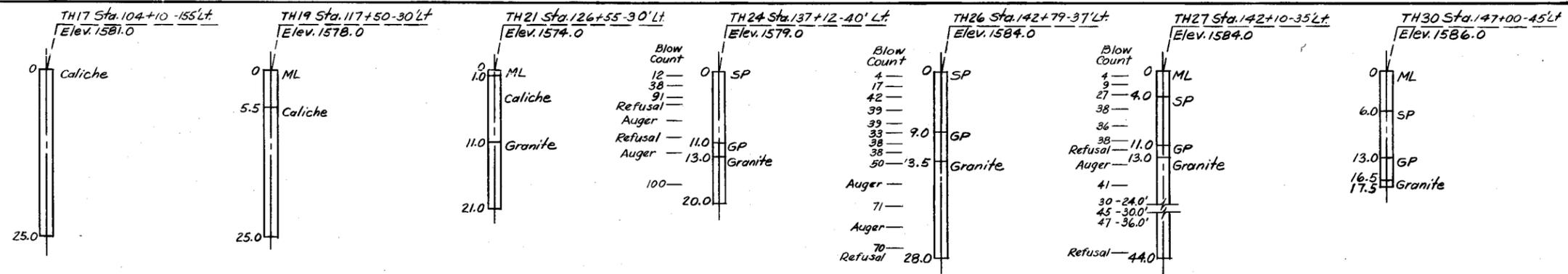
WASH OR DEPRESSION CROSSING ASSEMBLY



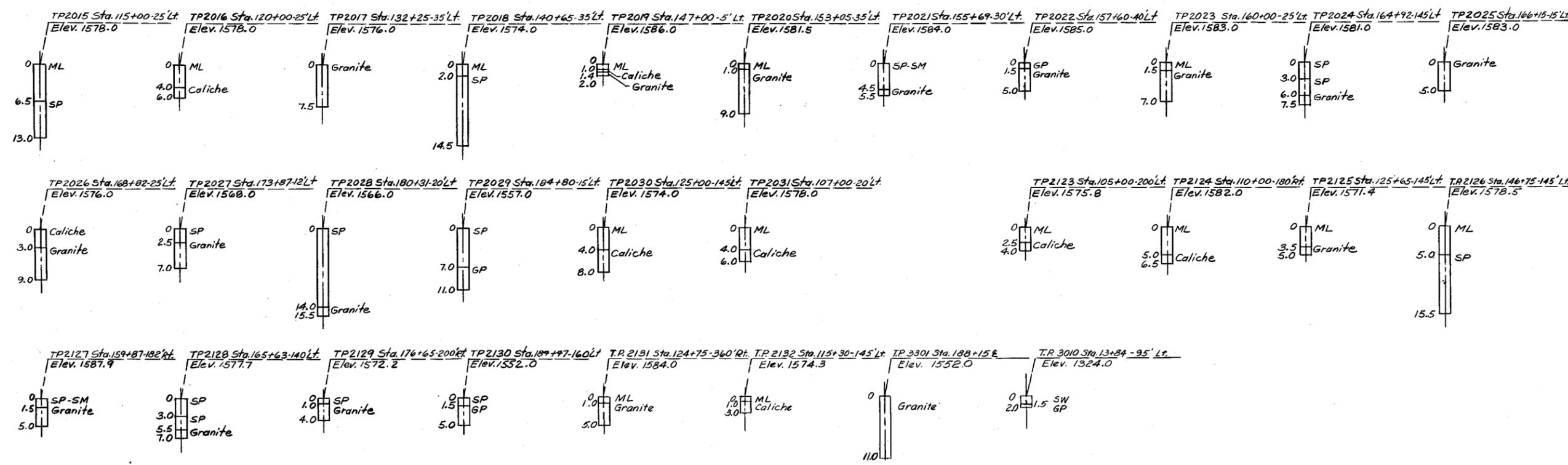
FLOOD GATE ASSEMBLY

FENCING DETAILS  
(Not to scale)

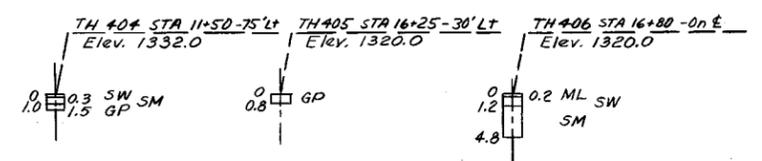
FENCING DETAILS			
<b>SPOOK HILL FLOODWAY</b>			
BUCKHORN - MESA W.P.P.			
MARICOPA & PINAL COUNTIES, ARIZONA			
<b>U. S. DEPARTMENT OF AGRICULTURE</b>			
<b>SOIL CONSERVATION SERVICE</b>			
Designed	A.C.	Date	6-76
Drawn	E.S.	Approved by	_____
Checked	P.J.M.	Title	_____
		Date	6-76
		Sheet	No 17
		of 18	
			Drawing No.
			7-E-23796



ADDITIONAL TEST HOLES

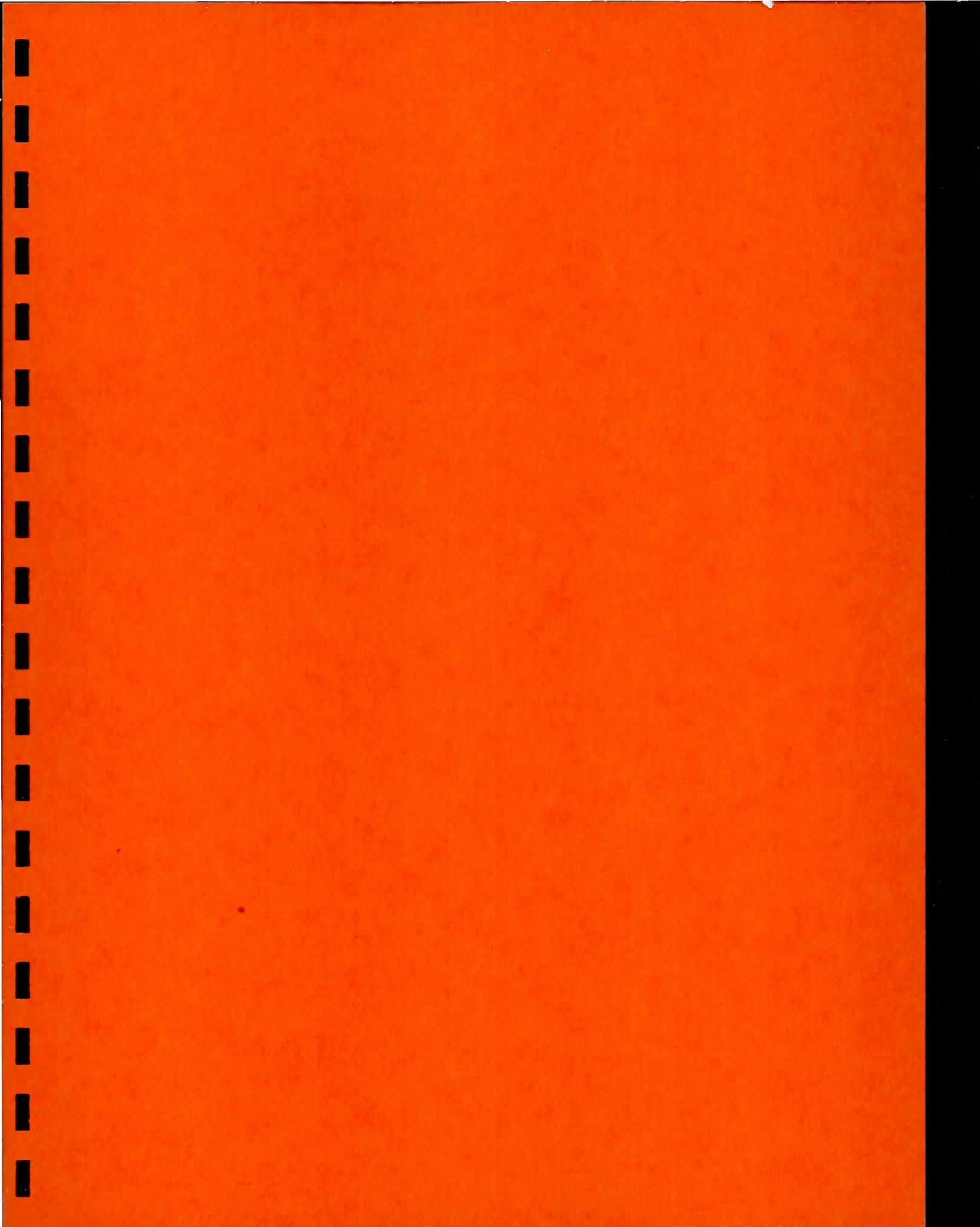


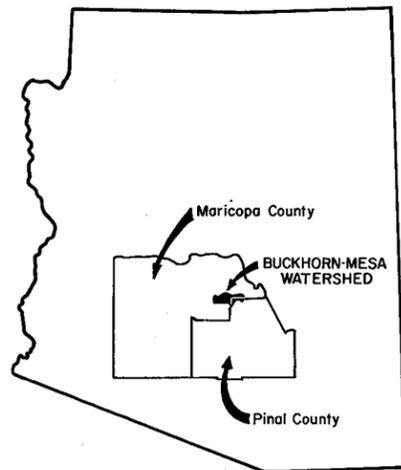
ADDITIONAL TEST PITS



ADDITIONAL TEST HOLES  
(Sediment Basin)

LOG OF ADDITIONAL TEST HOLES & TEST PITS			
SPOOK HILL FLOODWAY BUCKHORN MESA W.P.P. MARICOPA & PINAL COS., ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	PJM LLB	Date	4-75
Drawn	MR	Approved by	7-75
Traced		Title	
Checked	PJM	Sheet	No 18 of 18
		Drawing No.	7-E-23796





# BUCKHORN-MESA WATERSHED PROTECTION AND FLOOD PREVENTION PROJECT

MARICOPA AND PINAL COUNTIES, ARIZONA

PLANS FOR THE

## SPOOK HILL FLOODWATER RETARDING STRUCTURE

AND

## FLOODWAY LANDSCAPE TREATMENT

### INDEX OF DRAWINGS

DRWG. NO.	SHT. NO.	TITLE
7-E-23798	1.	INDEX OF DRAWINGS
	2.	PLANTING KEY MAP
	3.	PLANTING PLAN STA. 87+00 TO STA. 115+00 F.R.S.
	4.	PLANTING PLAN STA. 115+00 TO STA. 140+00 F.R.S.
	5.	PLANTING PLAN STA. 140+00 TO STA. 165+00 F.R.S.
	6.	PLANTING PLAN STA. 165+00 TO STA. 190+00 F.R.S.
	7.	PLANTING PLAN STA. 190+00 TO STA. 215+00 F.R.S.
	8.	PLANTING PLAN STA. 215+00 TO STA. 240+00 F.R.S.
	9.	PLANTING PLAN STA. 240+00 TO STA. 265+00 F.R.S.
	10.	PLANTING PLAN STA. 265+00 TO STA. 290+00 F.R.S.
	11.	PLANTING PLAN STA. 290+00 TO STA. 303+00 F.R.S. & STA. 101+12.00 TO STA. 120+00 FLOODWAY
	12.	PLANTING PLAN STA. 120+00 TO STA. 145+00 FLOODWAY
	13.	PLANTING PLAN STA. 145+00 TO STA. 170+00 FLOODWAY
	14.	PLANTING PLAN STA. 170+00 TO STA. 190+00 FLOODWAY
	15.	PLANTING PLAN STA. 190+00 TO STA. 210+00 FLOODWAY
	16.	PLANTING DETAILS
	17.	IRRIGATION KEY MAP
	18.	IRRIGATION PLAN STA. 87+00 TO STA. 115+00 F.R.S.
	19.	IRRIGATION PLAN STA. 115+00 TO STA. 140+00 F.R.S.
	20.	IRRIGATION PLAN STA. 140+00 TO STA. 165+00 F.R.S.
	21.	IRRIGATION PLAN STA. 165+00 TO STA. 190+00 F.R.S.
	22.	IRRIGATION PLAN STA. 190+00 TO STA. 215+00 F.R.S.
	23.	IRRIGATION PLAN STA. 215+00 TO STA. 240+00 F.R.S.
	24.	IRRIGATION PLAN STA. 240+00 TO STA. 265+00 F.R.S.
	25.	IRRIGATION PLAN STA. 265+00 TO STA. 290+00 F.R.S.
	26.	IRRIGATION PLAN STA. 290+00 TO STA. 303+00 F.R.S. & STA. 101+00 TO STA. 120+00 FLOODWAY
	27.	IRRIGATION PLAN STA. 120+00 TO STA. 145+00 FLOODWAY
	28.	IRRIGATION PLAN STA. 145+00 TO STA. 170+00 FLOODWAY
	29.	IRRIGATION PLAN STA. 170+00 TO STA. 190+00 FLOODWAY
	30.	IRRIGATION DETAILS
	31.	IRRIGATION & WIRING DETAILS
	32.	PUMP STATION DETAILS
	33.	WIRING DETAILS

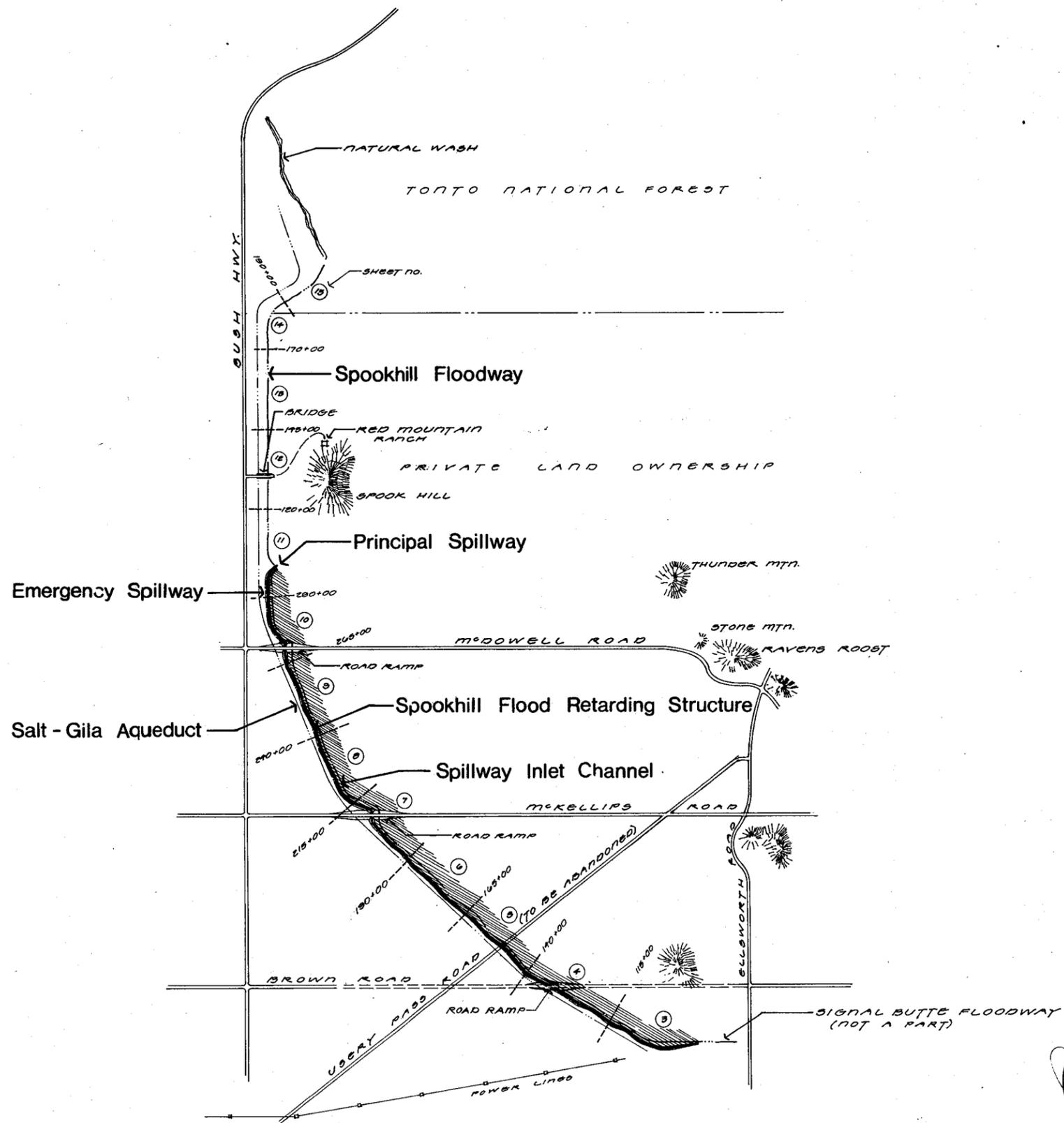
PREPARED FOR THE  
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
BOARD OF SUPERVISORS OF PINAL COUNTY  
EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT  
BY  
SOIL CONSERVATION SERVICE  
U.S. DEPARTMENT OF AGRICULTURE

EAST MARICOPA NATURAL RESOURCE  
CONSERVATION DISTRICT  
**APPROVED**  
DATE 4-21-77 *Jim Miller*  
Chairman - Board of Supervisors

FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY  
**APPROVED**  
DATE 4-21-77 *[Signature]*  
Chief Engineer

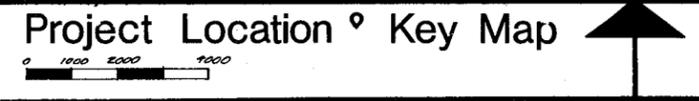
REVISIONS
10/77 SHEETS 3,5,6,7,8,9 & 10

INDEX OF DRAWINGS	
BUCKHORN-MESA W.P.P.	
MARICOPA AND PINAL COUNTIES, ARIZONA	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designer, A. Wayne Smith & Associates	Date 9-76
Drawn	Approved by <i>[Signature]</i>
Traced	Title, Head, E. & W. P. Unit
Checked, P. J. M. (111)	Title, State Conservation Engineer
3-77	Sheet No. 1
of 33	Drawing No. 7-E-23798



### Key to Symbols

- 107 5-GAL MEXICAN PALOVERDE (PARKINSONIA ACULEATA)
- 2230 5 GAL. LITTLELEAF PALOVERDES (CERCIDIUM MICROPHYLLUM)
- ▨ AREAS IN WHICH HEAVY OR LIGHT EQUIPMENT ACCESS IS LIMITED EXCEPT AS APPROVED BY THE ENGINEER
- ▼ EQUIPMENT SHALL CIRCULATE FROM THE SALT-GILA AQUEDUCT TO THE DAM AND STOCKPILES AT 500' INTERVALS ALONG THE RIGHT OF WAY. ACCESS CORRIDORS ARE REFERENCED WITH SYMBOLS.
- ▭ ABANDONED ROAD OR CONSTRUCTION CORRIDOR TO BE SCARIFIED AND RESEED WITH SHRUB MIX
- ▭ EXISTING VEGETATION TO BE SAVED
- ▭ AREAS TO BE SEEDED
- ▲ REFERENCE SYMBOL DENOTING THE CENTER OF TREE PLANTING MASSES ALONG THE ROADWAY, CHANNEL, TOE OF DAM, ETC.
- ▭ LEVEL GRADE OF ROADWAY
- x— FENCE (BY OTHERS)
- ▭ AREA USED FOR STOCKPILING TOPSOIL OR FOR BORROW PIT TO BE SEEDED TO LIMITS OF DISRUPTED AREA.
- TRANSPLANTED CACTI.



A. Wayne Smith & Associates Planning-Landscape Architecture  
 2120 South Rural Road Tempe, Arizona 85282

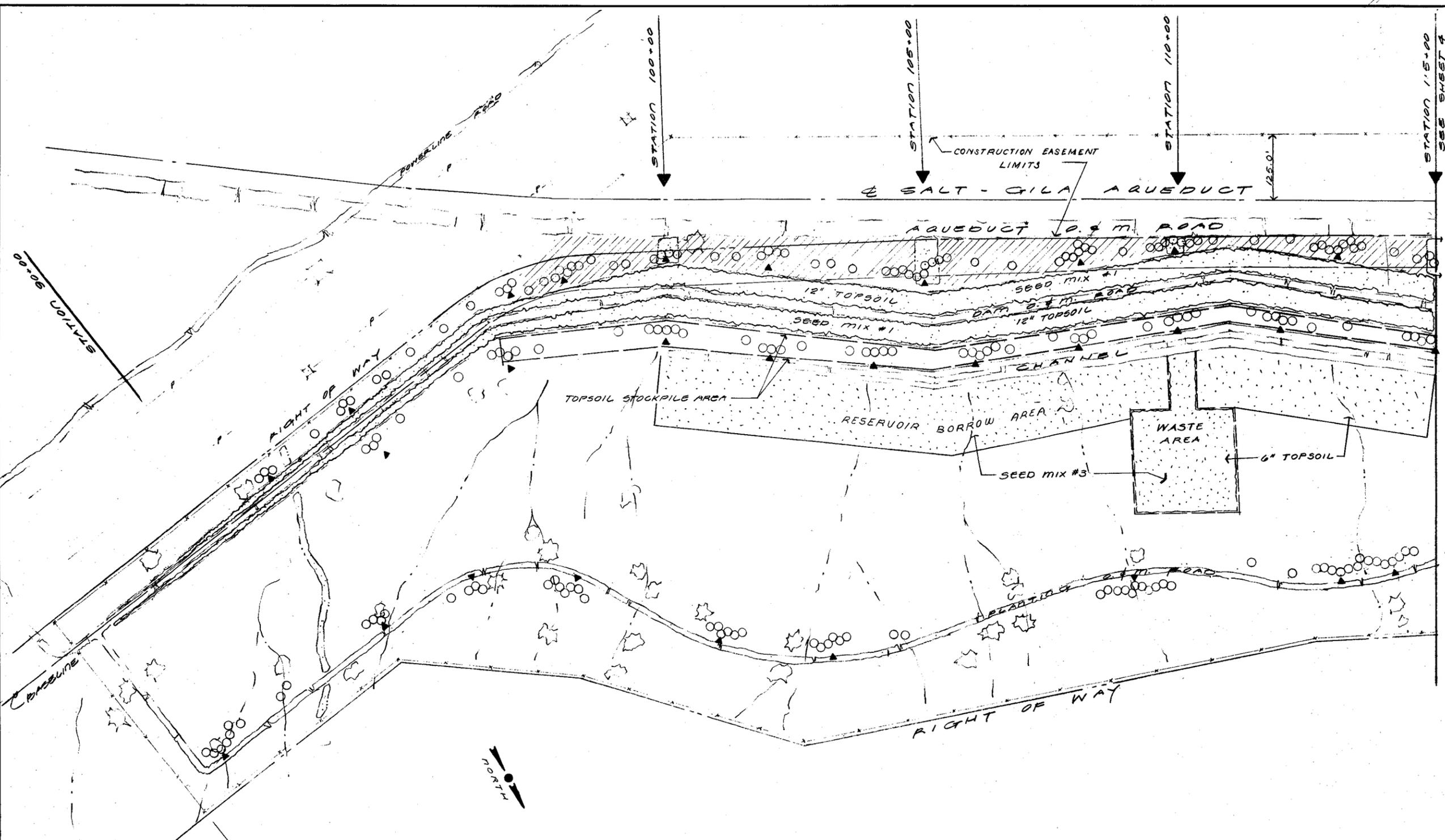


PLANTING KEY MAP  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W.F.P.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed MSU Title \_\_\_\_\_  
 Drawn MSU Title \_\_\_\_\_  
 Traced DC Title \_\_\_\_\_  
 Checked \_\_\_\_\_ Title \_\_\_\_\_

Sheet No. 2 of 33  
 Drawing No. 7-E-23798



STATION 00+00  
 STATION 05+00  
 STATION 100+00  
 STATION 105+00  
 STATION 110+00  
 STATION 115+00  
 SEE SHEET 4



SCALE IN FEET  
 100 50 0 100

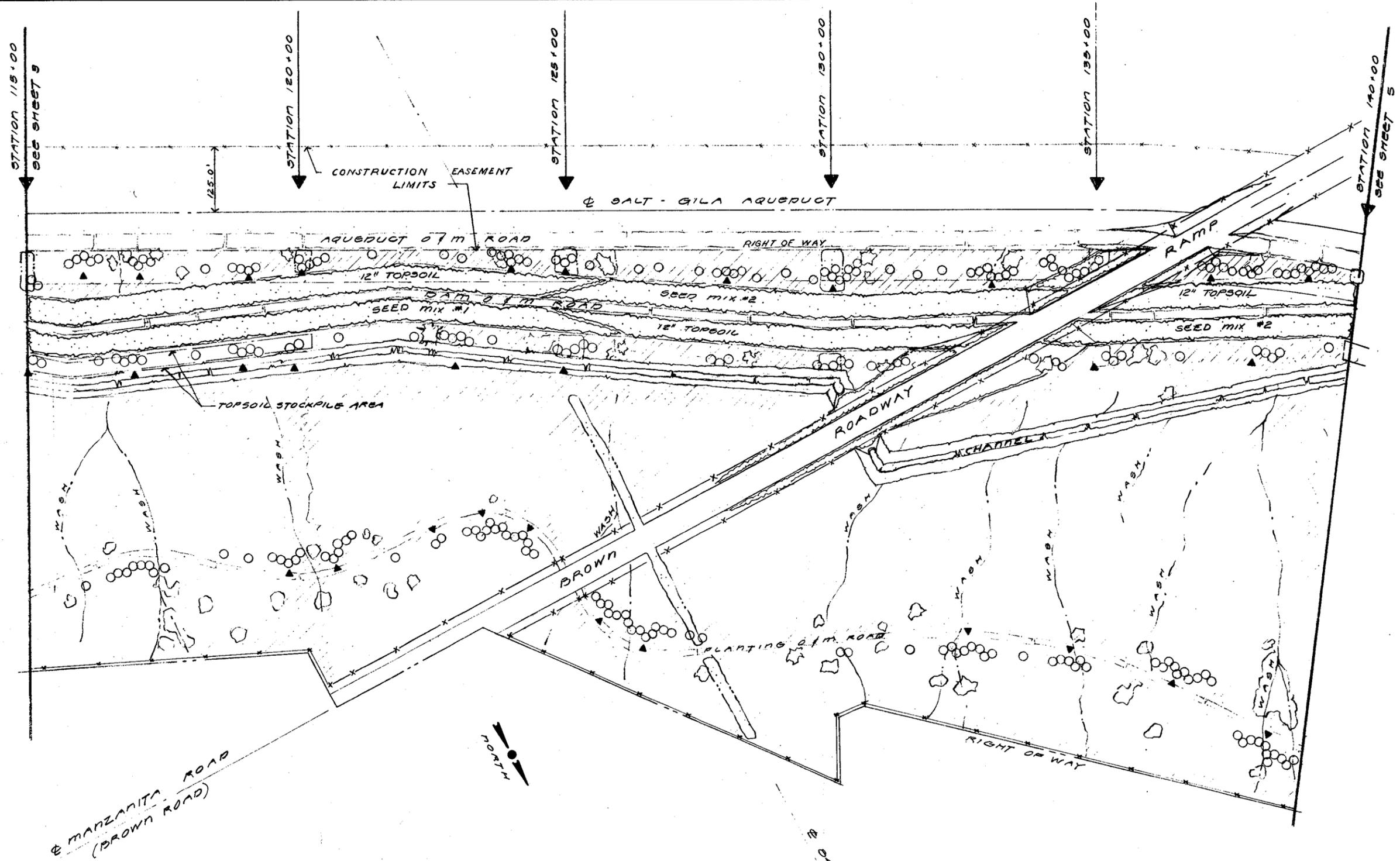
A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

REVISIONS  
 10-77 ADD RESERVOIR BORROW AREA

PLANTING PLAN  
 STA. 07+00 TO STA. 115+00  
 SPOOK HILL F.R.S.  
 BUCKHORN MESA W.F.P.  
 MARICOPA & PINAL CO, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed: msu	Date	Approved by:
Drawn: msu		Title:
Traced: DC		Title:
Checked:	Sheet No. 9 of 33	Drawing No. 7-E-23798



E MANZANITA ROAD  
(BROWN ROAD)



SCALE IN FEET  
100 50 0 100

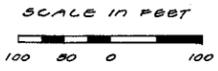
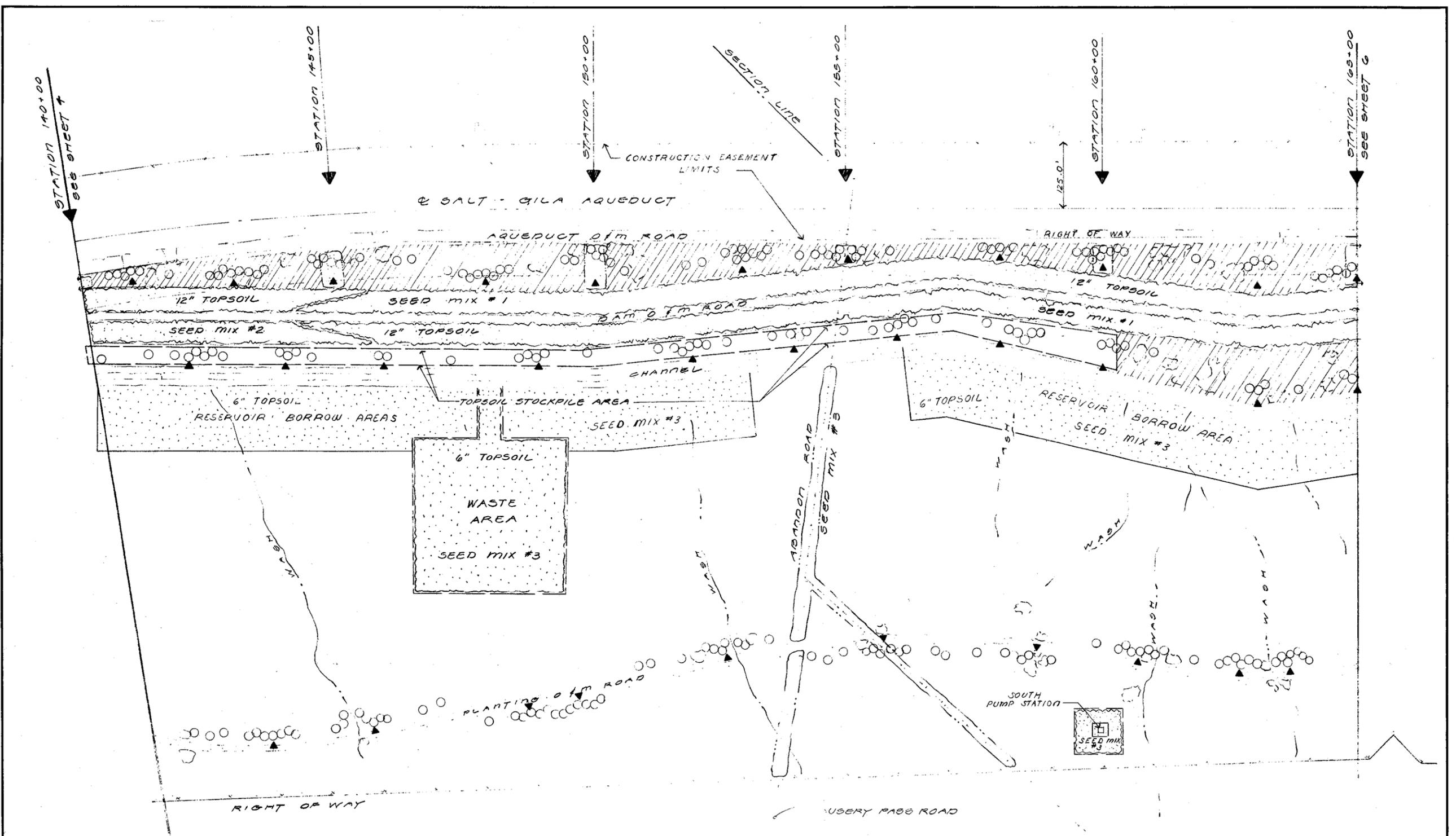
U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

REVISIONS	

PLANTING PLAN  
STA 115+00 TO STA 140+00  
SPOOK HILL F.R.S.  
BUCKHORN MESA WRP  
MARICOPA & PINAL CO ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

Designed: MSU	Date	Approved by:
Drawn: MSU		Title:
Traced: DC		Sheet No. 4
Checked:		Drawing No. 7-E-23798



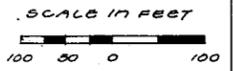
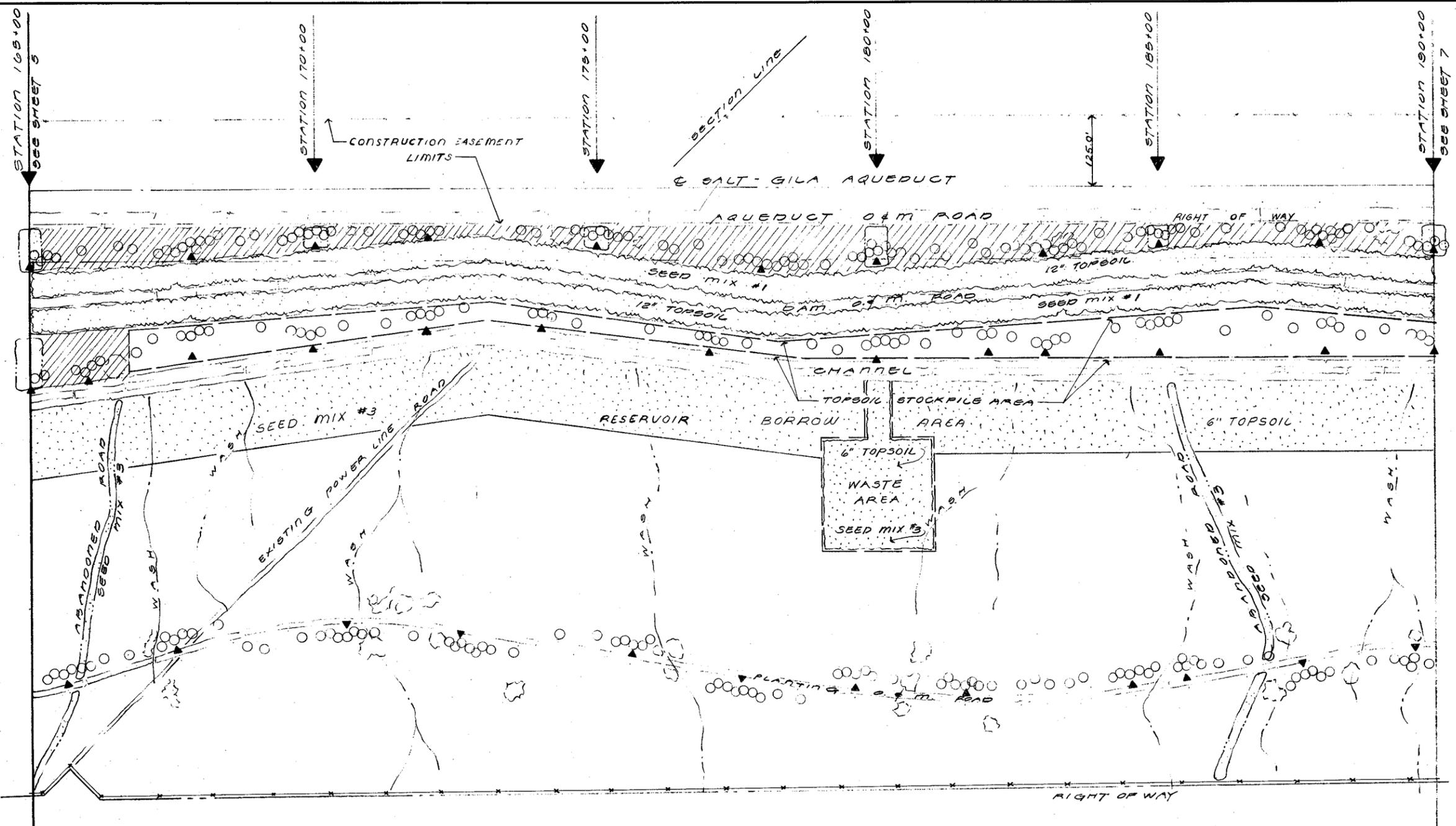
A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-0501

REVISIONS	
10-77	ADD RESERVOIR BORROW AREAS

PLANTING PLAN  
 STA 140+00 TO STA 165+00  
 SPOOK HILL F.R.S.  
 BUCKHORN MESA W.P.P.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed... MSU	Date	Approved by.....
Drawn... MSU		Title.....
Traced... DC		Title.....
Checked.....	Sheet No. 5	Drawing No. 7-E-23798



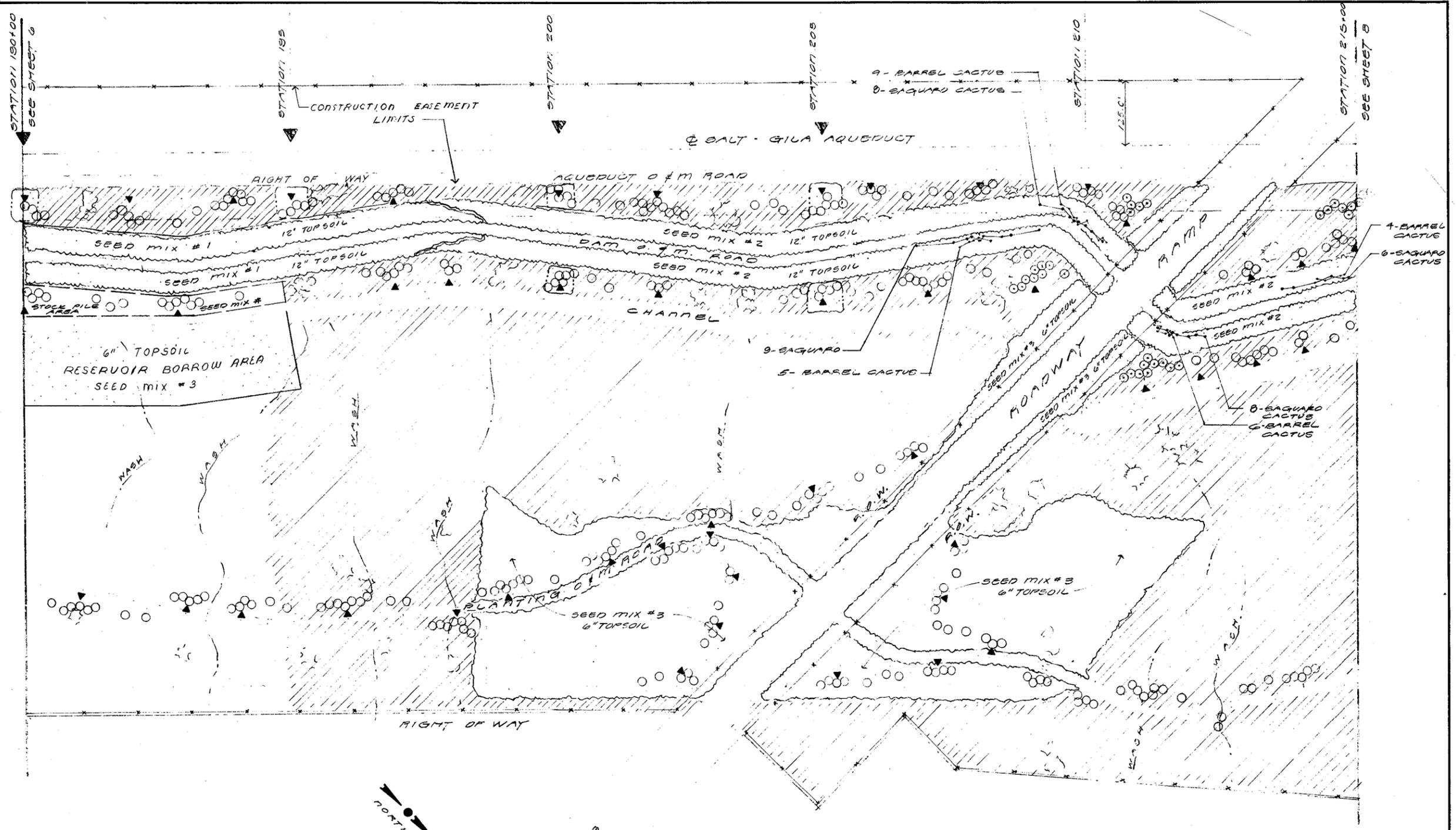
A. Wayne Smith & Associates Planners - Landscape Architects  
2120 South Rural Road Tempe, Arizona 85282 (602) 969-8501

REVISIONS  
10-77 ADD RESERVOIR BORROW AREA

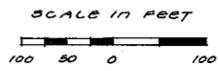
PLANTING PLAN  
STA 165+00 TO 190+00  
SPOOK HILL F.R.S.  
BUCKHORN MESA W.P.R.  
MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed: MSU	Date	Approved by:
Drawn: MSU		Title
Traced: DC		Title
Checked:	Sheet No. 6 of 33	Drawing No. 7-E-23798



*McKELLIPS*



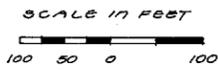
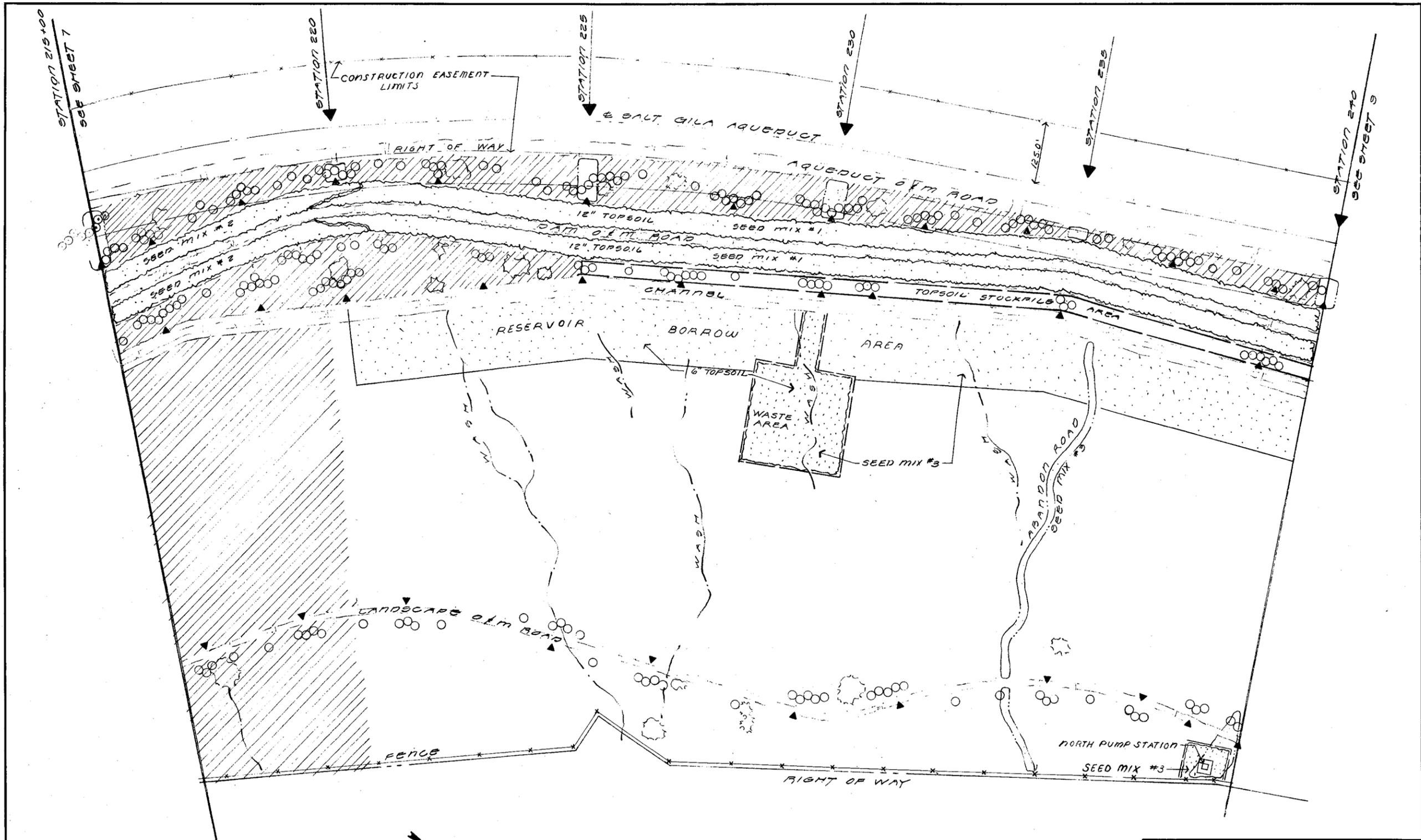
A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

REVISIONS  
 10-77 ADD RESERVOIR BORROW AREA

PLANTING PLAN  
 STA 180+00 TO STA 215+00  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W. R. R.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed..... MSU	Date.....	Approved by.....
Drawn..... MSU		Title.....
Traced..... PC		Title.....
Checked.....	Sheet No. 7	Drawing No. 7-E-23798
	of 3	



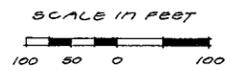
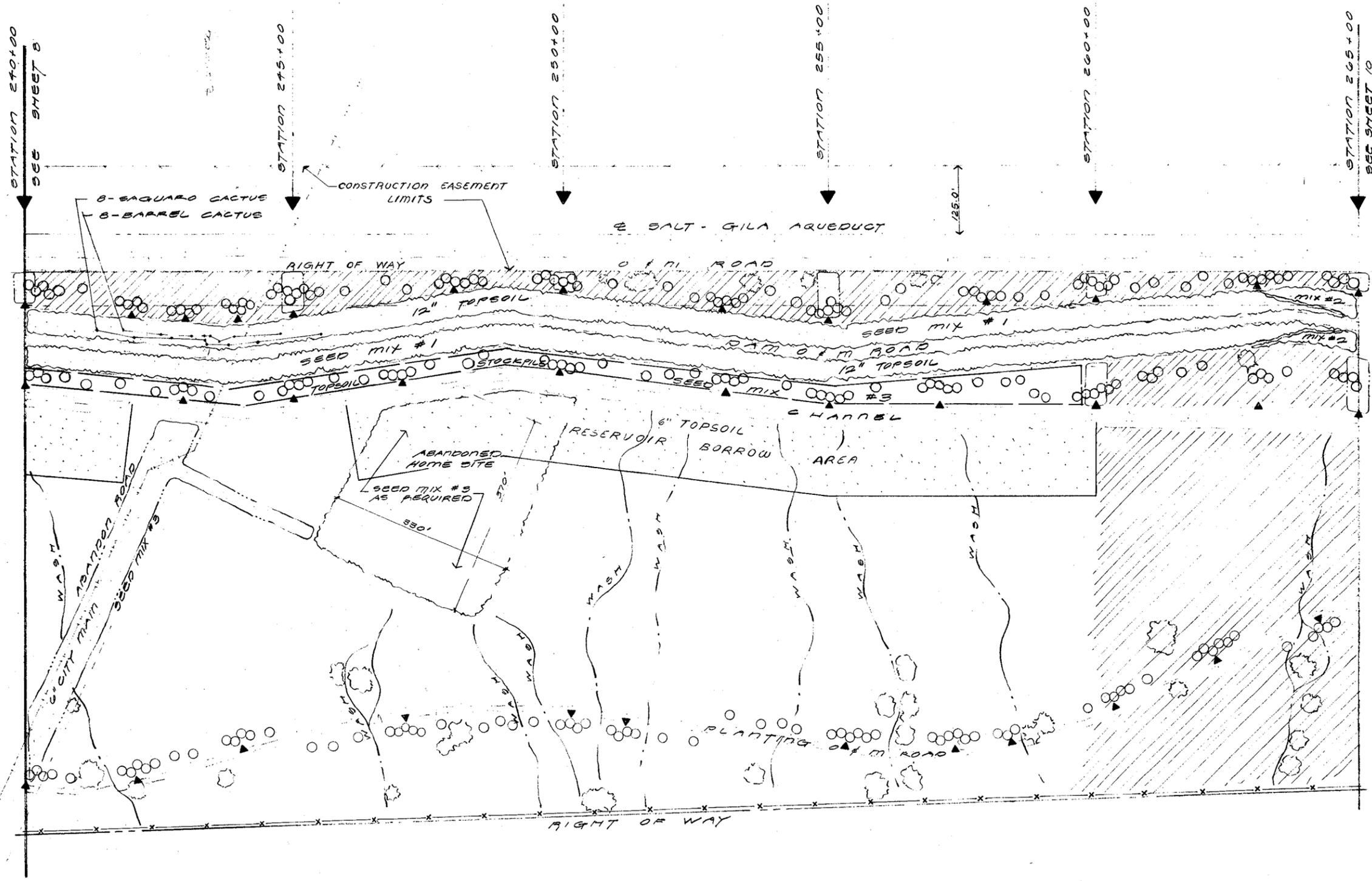
A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

REVISIONS  
 10-77 ADD RESERVOIR BORROW AREA

PLANTING PLAN  
 STA 215+00 TO 240+00  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W. P. P.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed: MSU	Date:	Approved by:
Drawn: MSU		Title:
Traced: DC		Title:
Checked:	Sheet No. 8	Drawing No. 7-E-23798
	of 33	



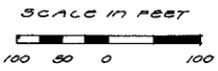
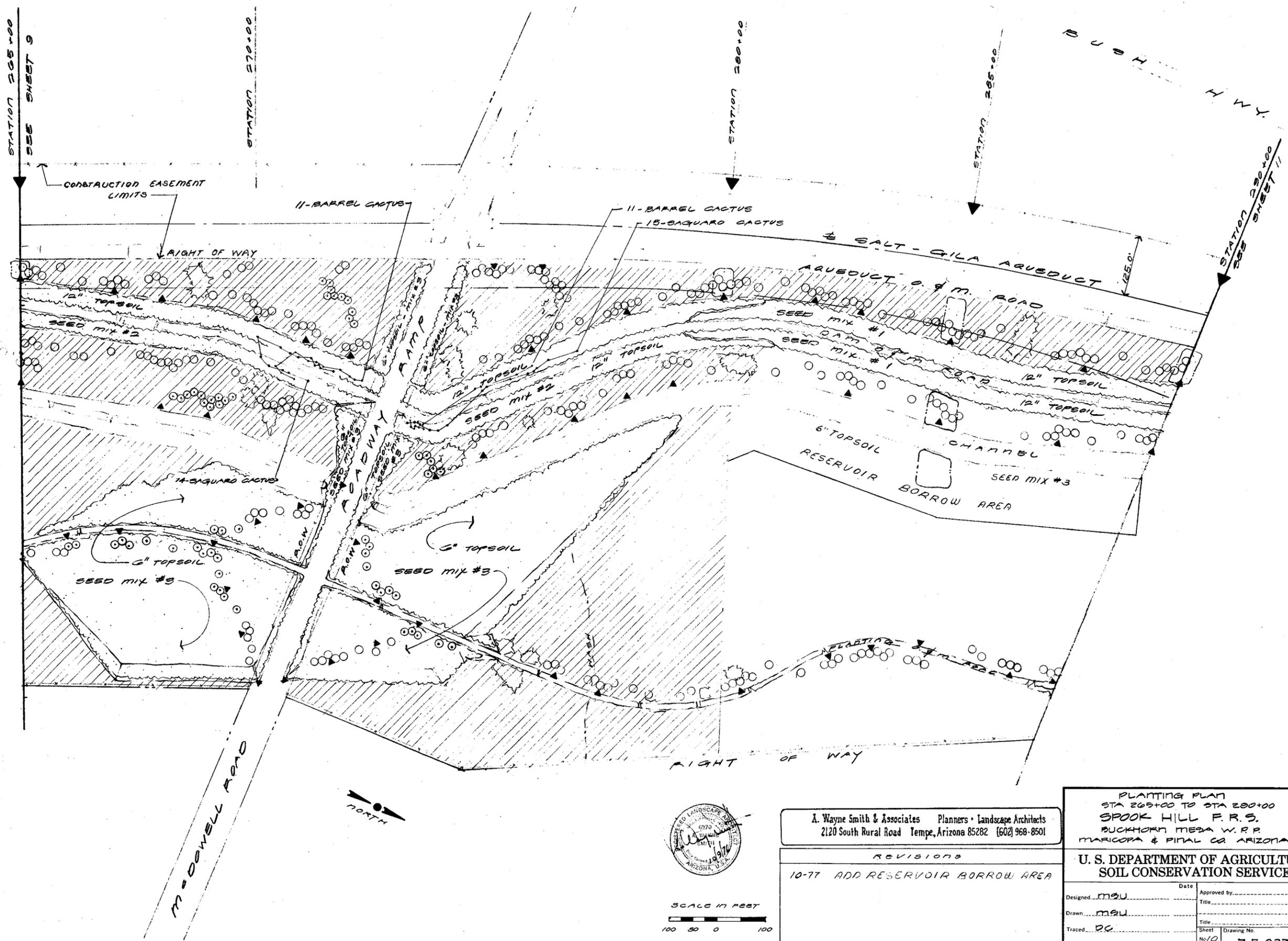
A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

REVISIONS  
 10-77 ADD RESERVOIR BORROW AREA

PLANTING PLAN  
 STA 240+00 TO STA 265+00  
 SPOOK HILL F.R.S.  
 BUCKHORN MESA W.F.P.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed... MSU	Date	Approved by
Drawn... MSU		Title
Traced... DC		Title
Checked	Sheet No. 3 of 3	Drawing No. 7-E-23798



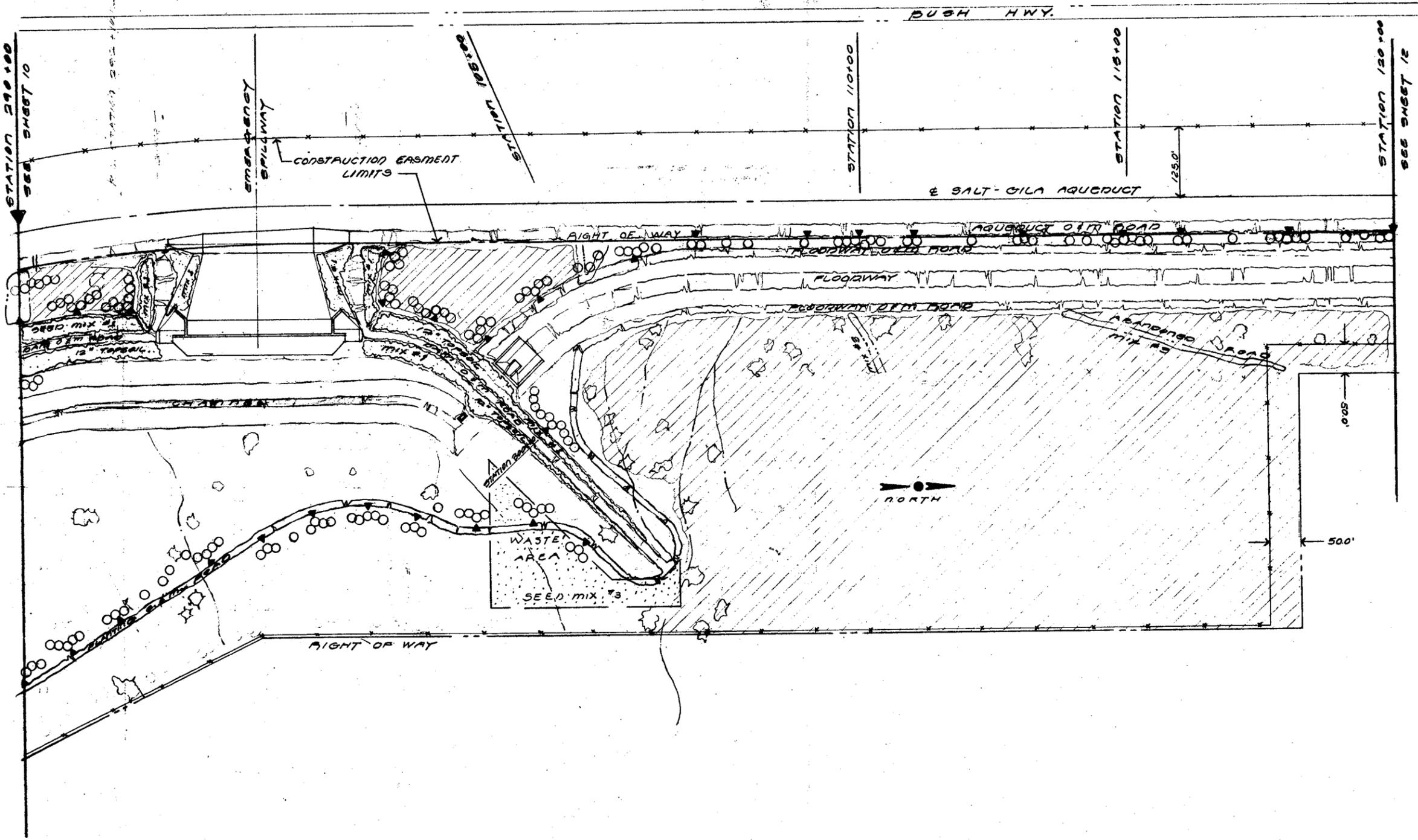
A. Wayne Smith & Associates Planners • Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

REVISIONS	
10-77	ADD RESERVOIR BORROW AREA

PLANTING PLAN  
 STA 265+00 TO STA 280+00  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W. P. P.  
 MARICOPA & PINAL CO. ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

Designed <u>MSU</u>	Date	Approved by _____
Drawn <u>MSU</u>		Title _____
Traced <u>DC</u>		Title _____
Checked _____	Sheet <u>10</u> of <u>33</u>	Drawing No. <u>7-E-23798</u>



SCALE 1" = 50'  
 100 50 0 100

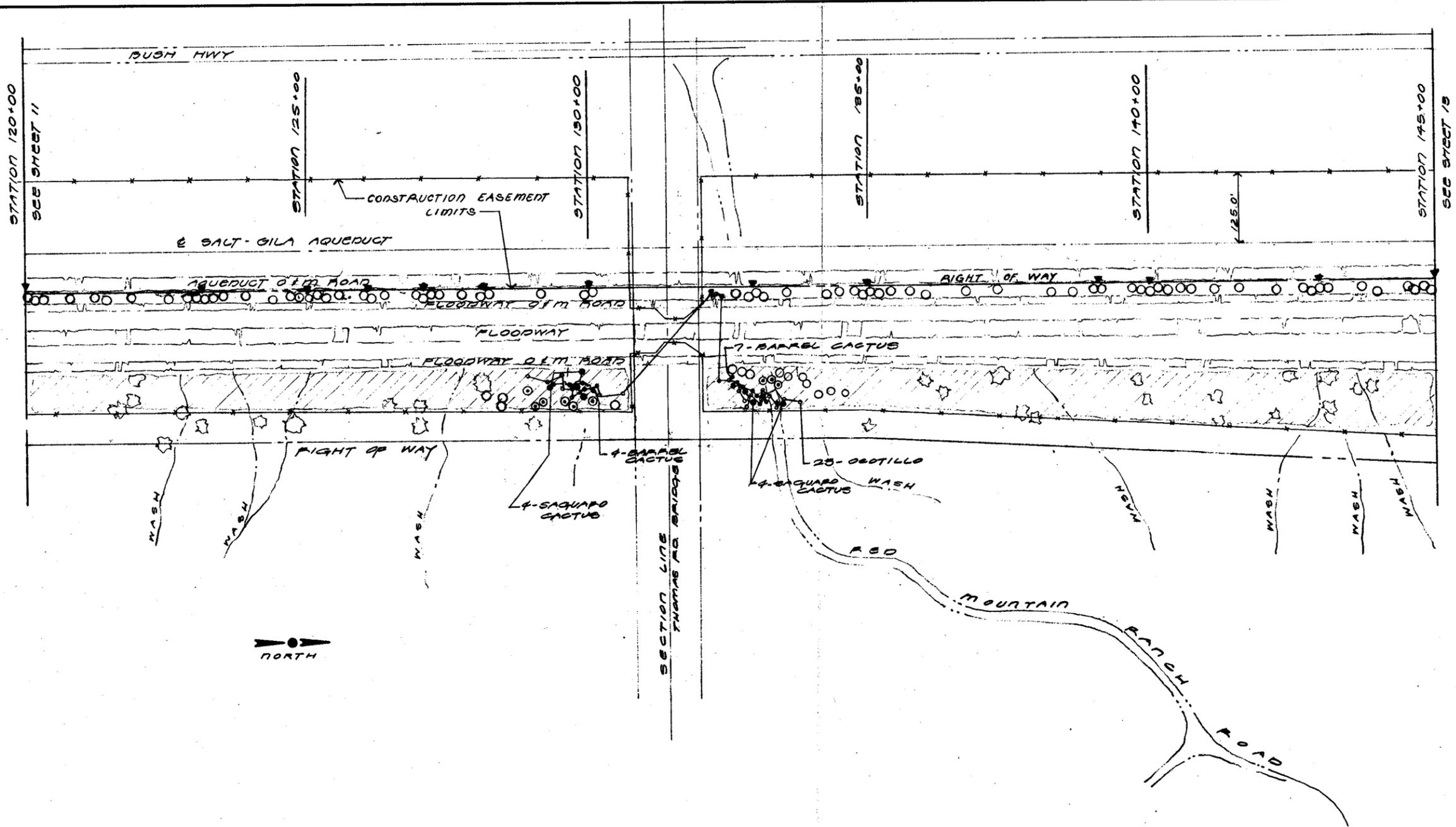
A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 969-8501

REVISIONS	

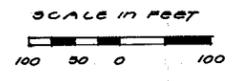
PLANTING PLAN  
 STA. 290+00 TO STA. 120+00  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W. P. R.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed <u>MSU</u>	Date	Approved by
Drawn <u>MSU</u>		Title
Traced <u>BC</u>		Title
Checked	Sheet No. <u>11</u>	Drawing No. <u>7-E-23798</u>
	of <u>33</u>	



SECTION LINE THOMAS RD BRIDGES



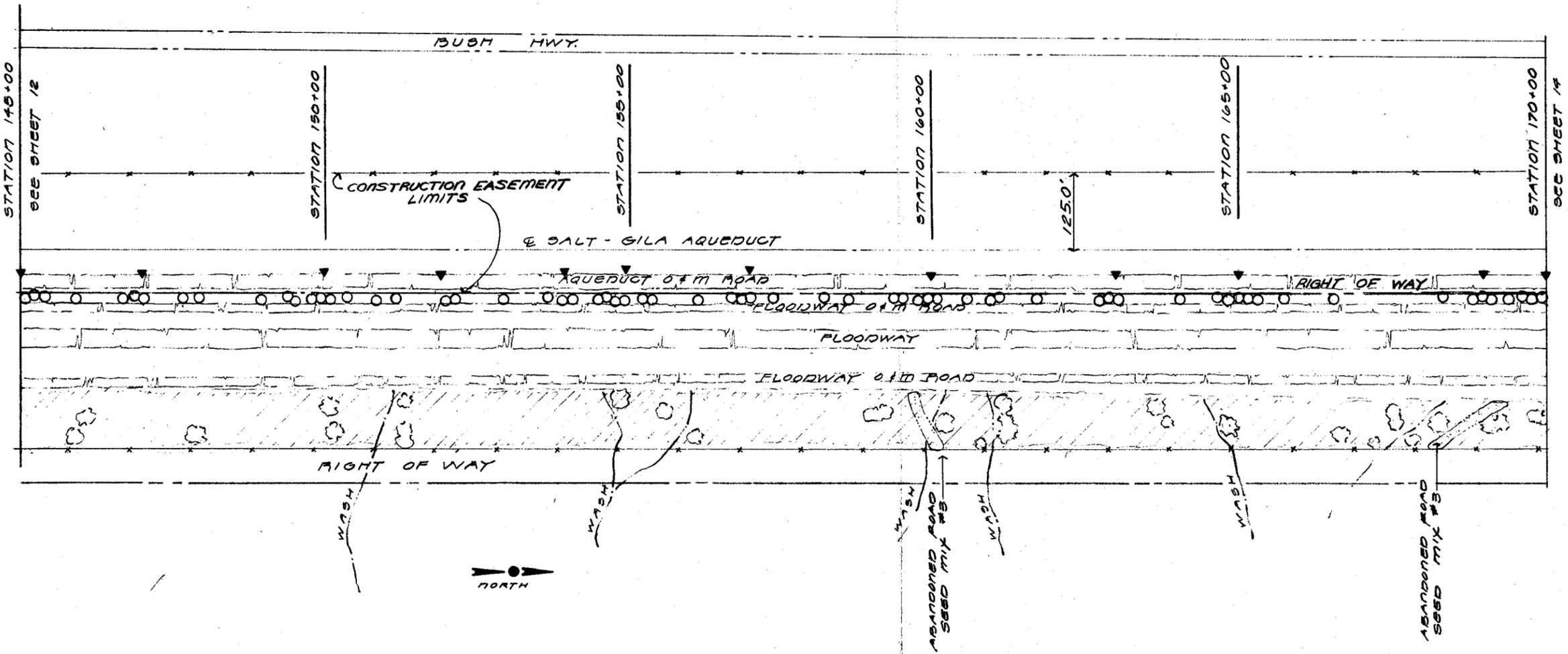
**A. Wayne Smith & Associates** Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

REVISIONS	

PLANTING PLAN  
 STA. 120+00 TO STA. 145+00  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W. P. R.  
 MARICOPA & PINAL CO. ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

Designed: <b>MSU</b>	Date	Approved by:
Drawn: <b>MSU</b>		Title
Traced: <b>PC</b>		Title
Checked:	Sheet No. <b>23</b>	Drawing No. <b>7-E-23798</b>



SCALE IN FEET  
 100 50 0 100

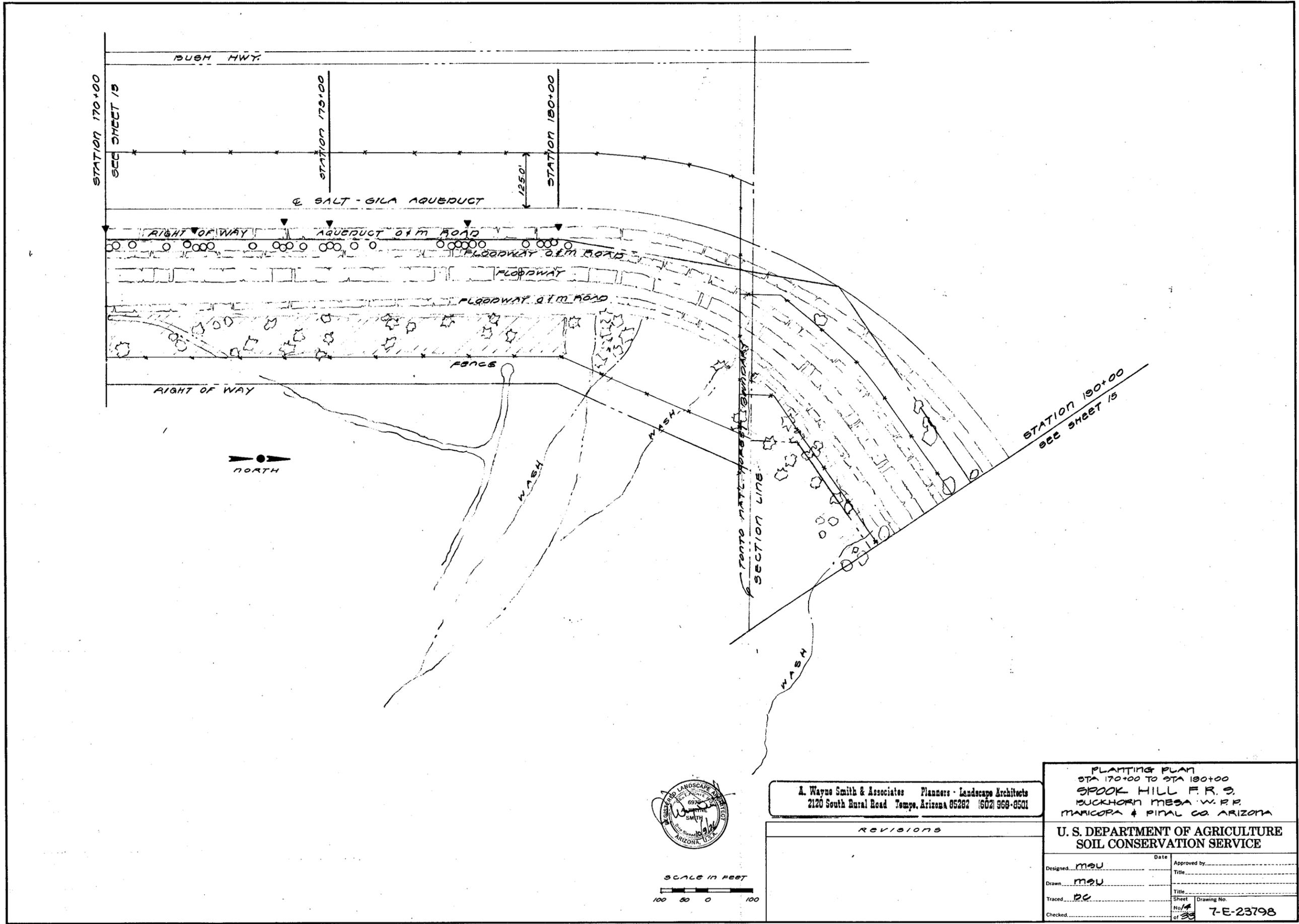
**A. Wayne Smith & Associates** Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 660-8501

REVISIONS	

PLANTING PLAN  
 STA 145+00 TO STA 170+00  
 SPOOK HILL F.R.S.  
 BUCKHORN MESA W.F.R.  
 MARICOPA & PINAL CO. ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

Designed: MSU	Date: _____	Approved by: _____
Drawn: MSU	Title: _____	
Traced: DC	Title: _____	
Checked: _____	Sheet No. 13	Drawing No. 7-E-23798
	of 20	



STATION 170+00  
SEE SHEET 15

STATION 175+00

STATION 180+00

STATION 180+00  
SEE SHEET 15



SCALE IN FEET  
100 50 0 100

**A. Wayne Smith & Associates** Planners - Landscape Architects  
2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

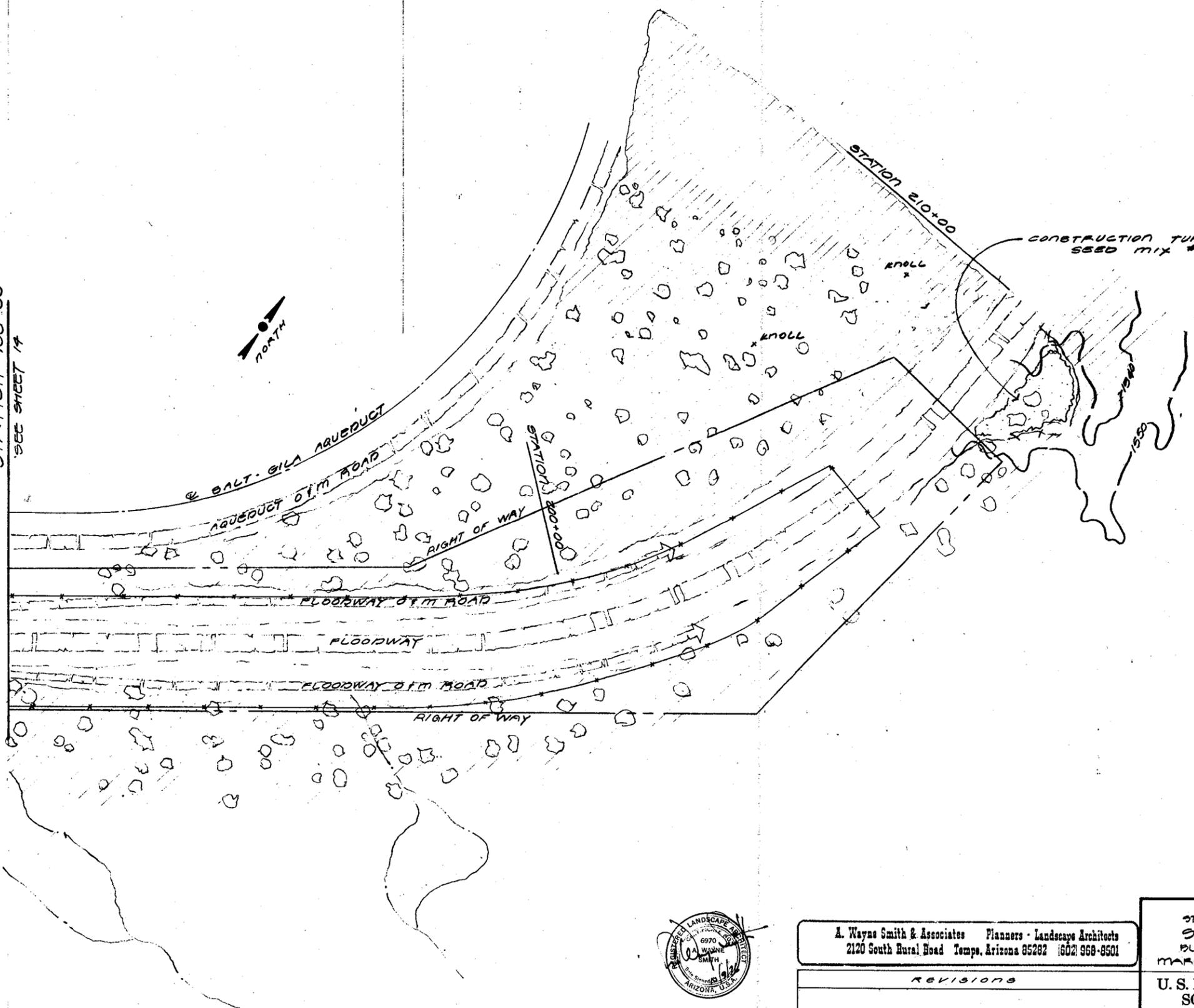
REVISIONS	

PLATTING PLAN  
STA 170+00 TO STA 180+00  
SPOOK HILL F. R. S.  
BUCKHORN MESA W. R. P.  
MARICOPA & PINAL CO. ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

Designed <b>MSU</b>	Date	Approved by
Drawn <b>MSU</b>		Title
Traced <b>DC</b>		Title
Checked		Drawing No.
		Sheet No. <b>7-E-23798</b>
		of <b>30</b>

STATION 190+00  
SEE SHEET 14



CONSTRUCTION TURN-AROUND AS PER'D.  
5550 MIX #3



SCALE IN FEET  
100 50 0 100

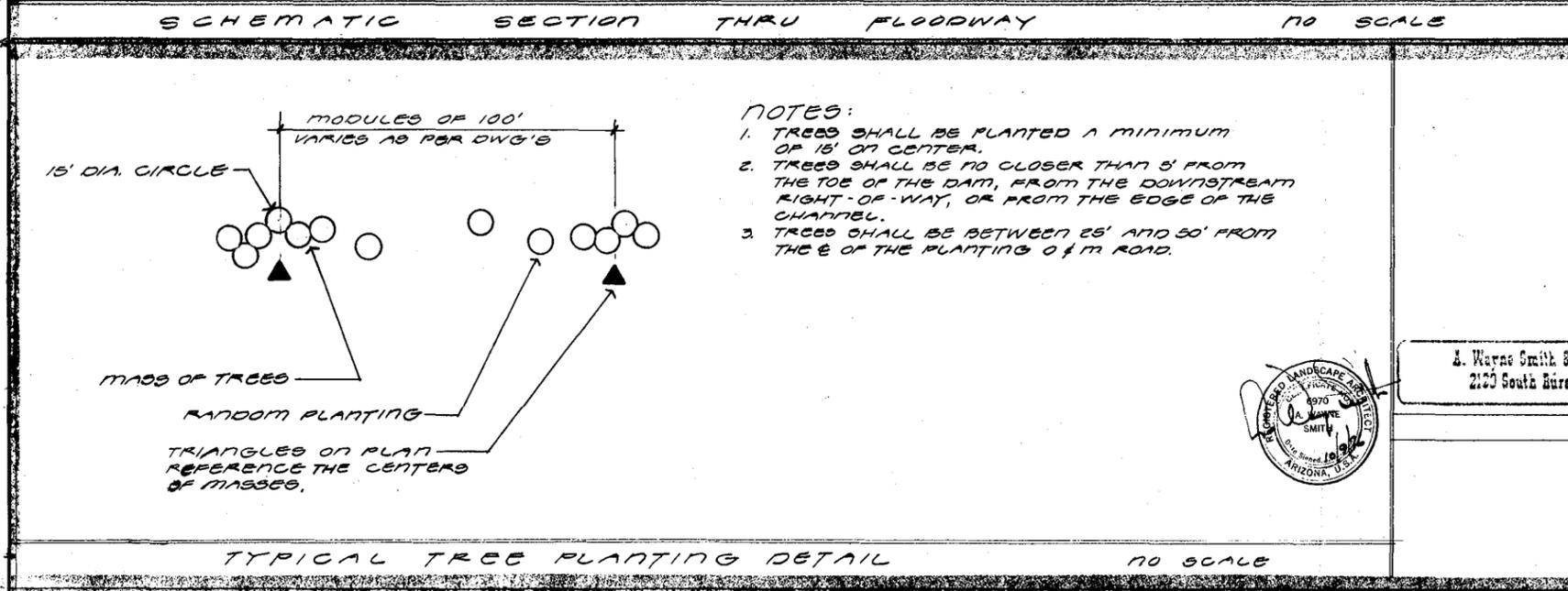
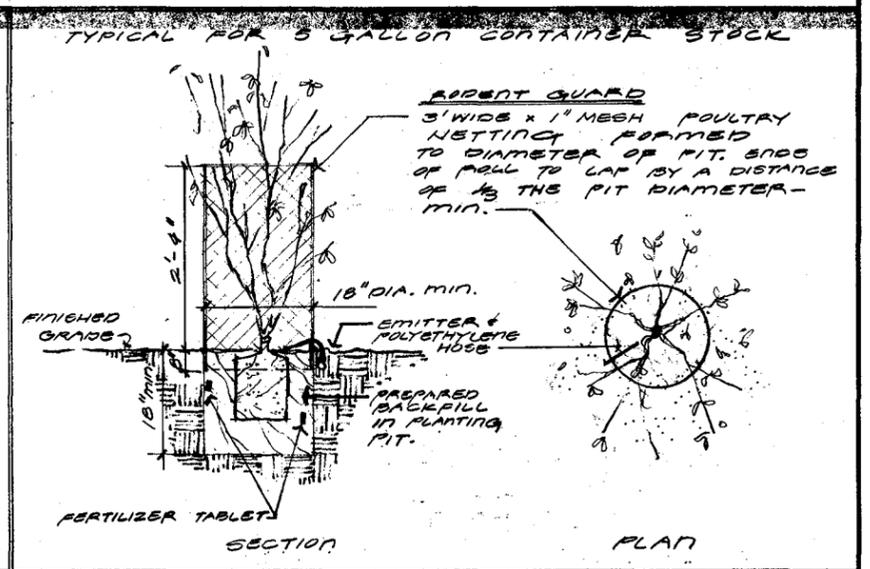
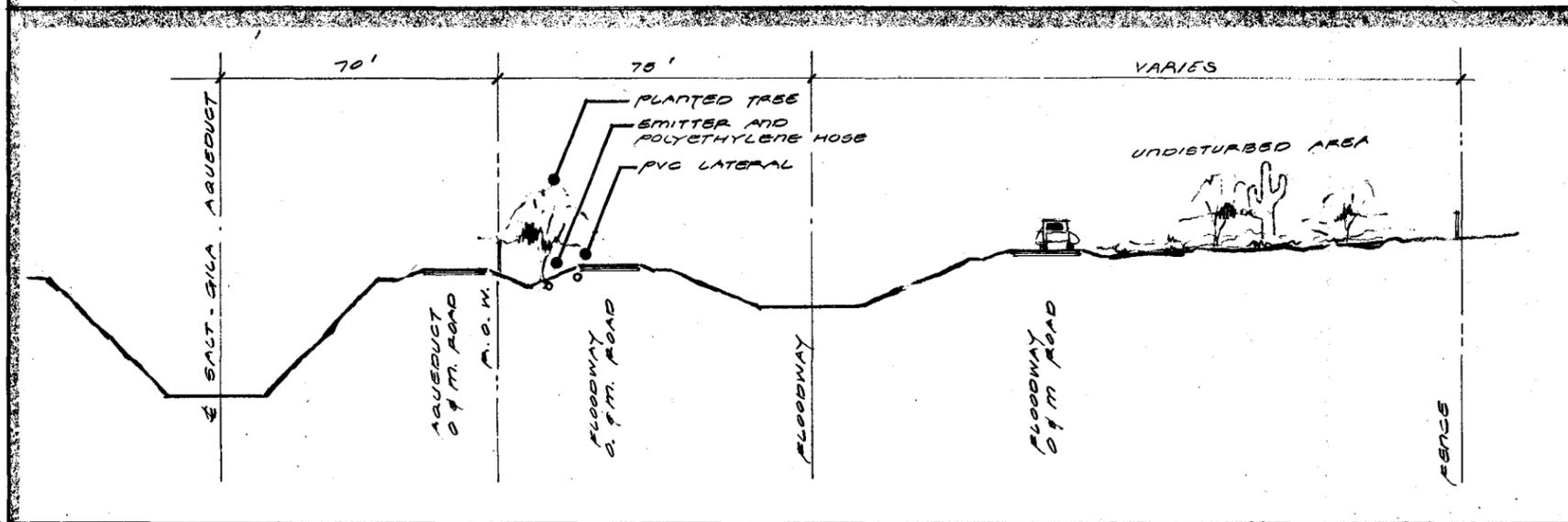
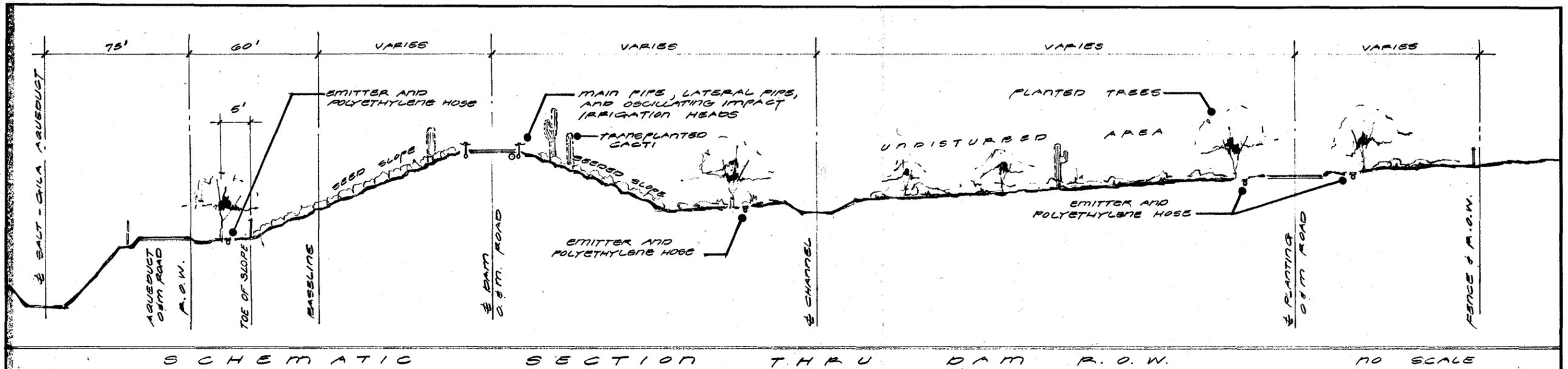
A. Wayne Smith & Associates Planners - Landscape Architects  
2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

REVISIONS	

PLANTING PLAN  
STA 190+00 TO STA 210+00  
SPOOK HILL F.R.S.  
BUCKHORN MESA W.P.R.  
MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed <u>MSU</u>	Date	Approved by
Drawn <u>MSU</u>		Title
Traced <u>DC</u>	Sheet	Title
Checked	No. <u>5</u>	Drawing No.
	of <u>53</u>	<b>7-E-23798</b>



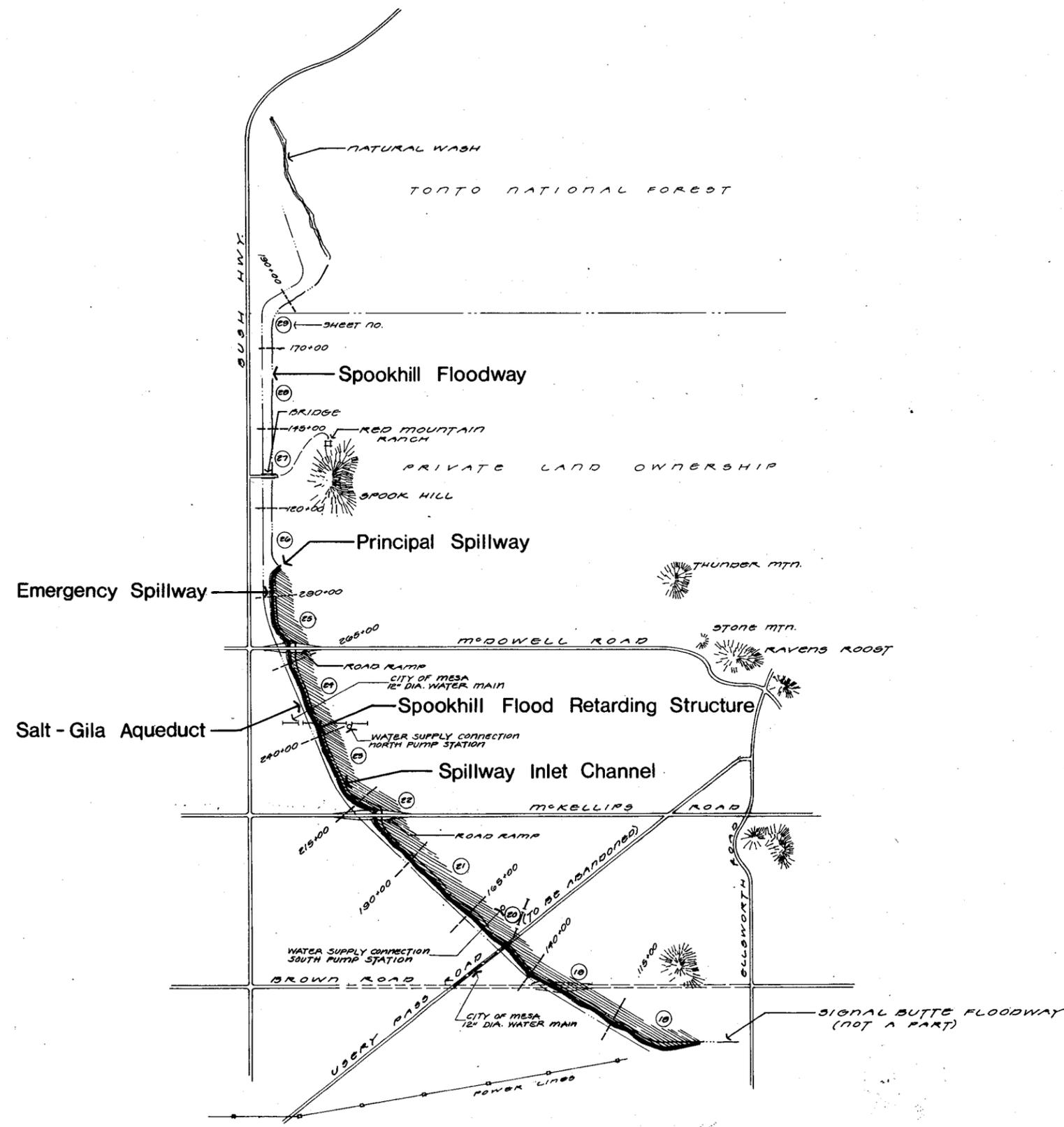
- NOTES:**
1. TREES SHALL BE PLANTED A MINIMUM OF 18' ON CENTER.
  2. TREES SHALL BE NO CLOSER THAN 5' FROM THE TOE OF THE DAM, FROM THE DOWNSTREAM RIGHT-OF-WAY, OR FROM THE EDGE OF THE CHANNEL.
  3. TREES SHALL BE BETWEEN 25' AND 30' FROM THE E OF THE PLANTING 0.5 M. ROAD.



J. Wayne Smith & Associates Planners - Landscape Architects  
 2100 South Rural Road Tempe, Arizona 85282 602-669-6621

REVISIONS

PLANTING DETAILS			
SPOOK HILL F.R.S. BUCKHORN MESA W.B.R. MARICOPA & PINAL CO ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed: MSU	Date:	Approved by:	
Drawn: MSU		Title:	
Traced: DC	Sheet No. 16	Drawing No.	
Checked:	0133	7-E-23798	



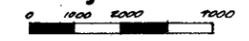
Key to Symbols

- ⊕ DETAIL OR SECTION
- ⊕ SHEET OF DETAIL
- ⊕ FIRST SHEET DETAIL APPEARS
- △ RAINBIRD - 23PJDA IMPACT HEAD
- ▲ RAINBIRD - 15111A POP-A-WAY
- ⊕ CONTROLLER BY LETTER
- ⊕ CONTROLLER STATION BY NUMBER
- ⊕ SPRINKLER ELECTRIC SOLENOID VALVE - SEE SPECIFIC DETAIL FOR SIZE OF VALVE & REGULATOR
- ⊕ EMITTER ELECTRIC SOLENOID VALVE AND Y-STRAINER - SEE DETAIL C, SHEET 30
- ⊕ EMITTER PRESSURE REGULATOR, GATE VALVE
- PVC MAIN PIPE CLASS 200 PSI (RUBBER RING)
- PVC LATERAL PIPE CLASS 200 PSI (SOLVENT WELD)
- .500" PE (POLYETHYLENE) PIPE SIZED AS NOTED
- 120 V POWER AND PUMP START CIRCUIT IN CONDUIT
- FENCE (BY OTHERS)
- RAINBIRD - EM BS EMITTER (ONE TO EACH CONTAINER STACK PLANT MATERIAL)
- RAINBIRD RC 23A (2-6 minute timing) OR AG 7 (1-24 hour timing) AS NOTED

- NOTES
1. SLIP FITTINGS TO BE SCH 40 (WELDED)
  2. THREADED FITTINGS TO BE SCH 80 & 80#
  3. ALL VALVE CONTROL WIRE TO BE #14 600V
  4. UL DIRECT BURIAL SOLID COPPER



Project Location & Key Map

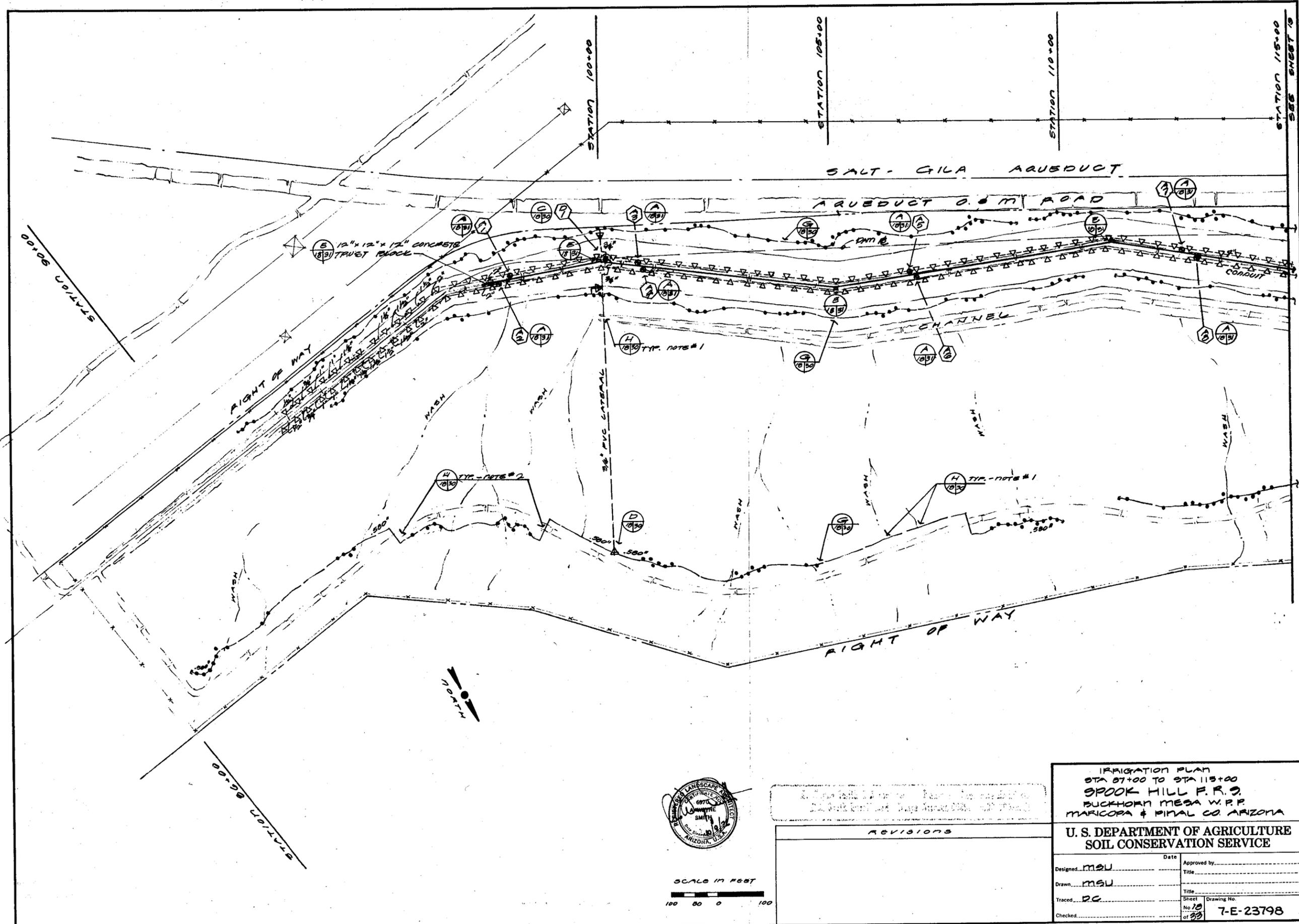


A. Wayne Smith & Associates Planning-Landscape Architecture  
 2120 South Rural Road Tempe, Arizona 85282

IRRIGATION KEY MAP  
 SPOOK HILL F.R.S.  
 BUCKHORN MESA W.R.P.  
 MARICOPA & PINAL CO ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed: MSU	Approved: _____
Drawn: MSU	Title: _____
Traced: DE	Date: _____
Checked: _____	Project No. 17-33
	7-E-23798



SCALE IN FEET  
 100 50 0 100

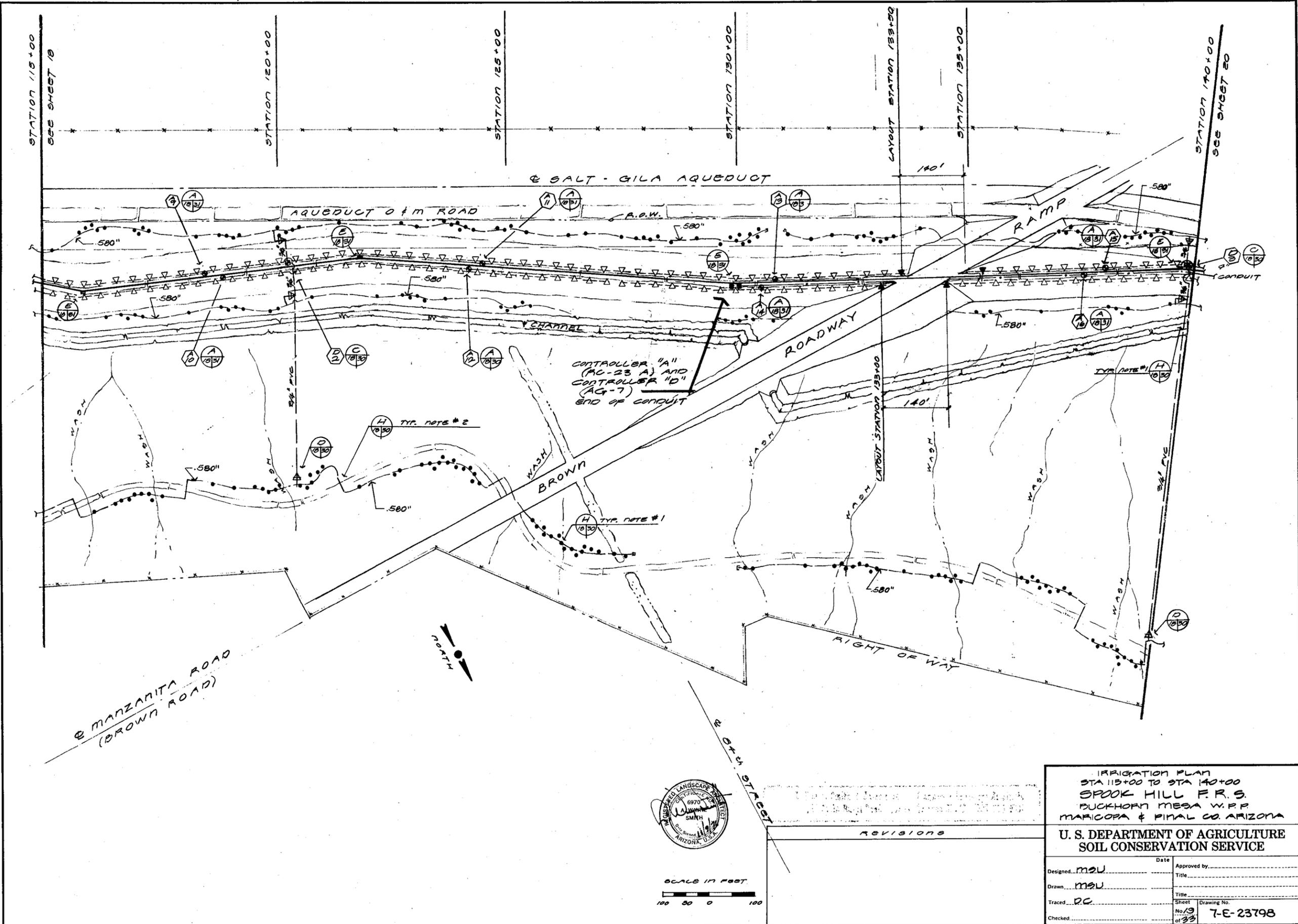
As shown on the plan, the location of the structure is subject to change without notice.

REVISIONS	

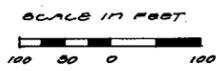
IRRIGATION PLAN  
 STA 97+00 TO STA 115+00  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W. R. P.  
 MARICOPA & PINAL CO ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed <u>MSU</u>	Date	Approved by
Drawn <u>MSU</u>		Title
Traced <u>DC</u>		Title
Checked	Sheet No. <u>18</u>	Drawing No. <u>7-E-23798</u>
	of <u>22</u>	



E MANZANITA ROAD  
(BROWN ROAD)

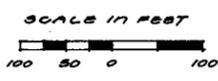
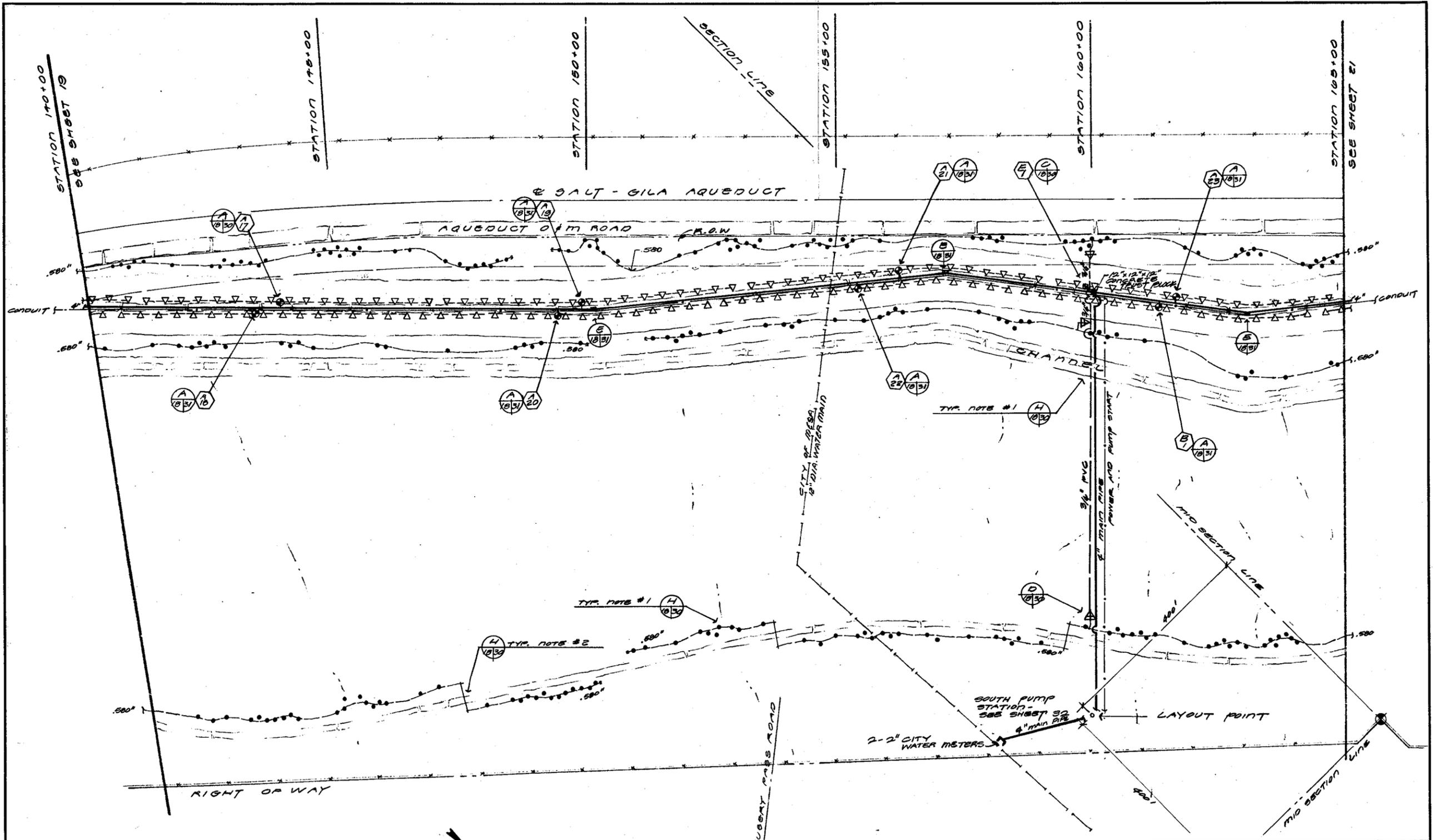


REVISIONS

IRRIGATION PLAN  
STA 115+00 TO STA 140+00  
SPOOK HILL F.R.S.  
BUCKHORN MESA W.P.P.  
MARICOPA & PINAL CO. ARIZONA

**U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

Designed <u>msu</u>	Date	Approved by
Drawn <u>msu</u>		Title
Traced <u>DC</u>		Title
Checked	Sheet No. <u>19</u>	Drawing No. <u>7-E-23798</u>
	of <u>33</u>	



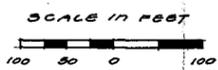
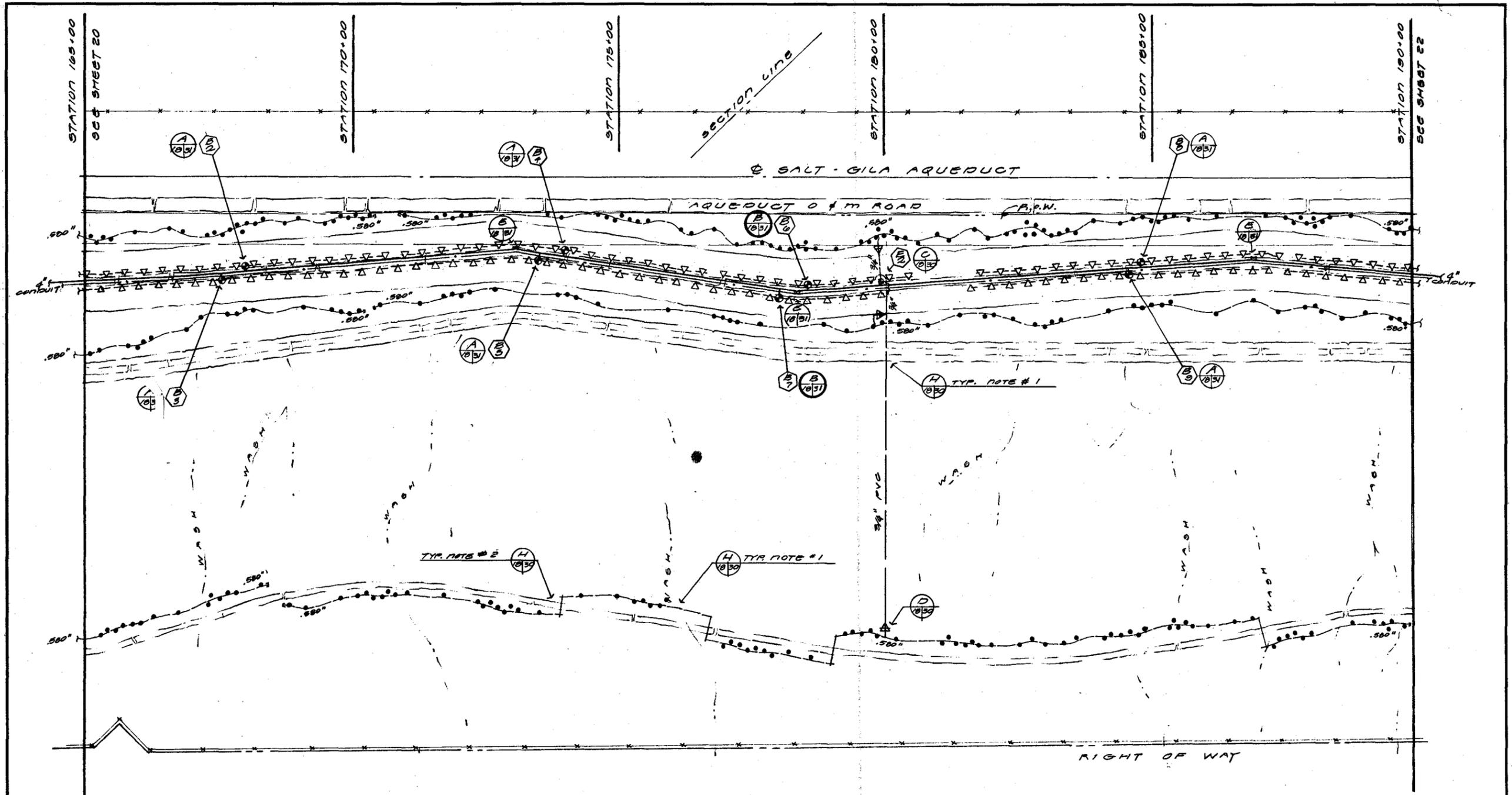
Approved by \_\_\_\_\_  
 Title \_\_\_\_\_  
 Date \_\_\_\_\_

REVISIONS	

IRRIGATION PLAN  
 STA 140+00 TO STA 165+00  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W. P. R.  
 MARICOPA & PINAL CO ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed <u>MSU</u>	Date _____	Approved by _____
Drawn <u>MSU</u>		Title _____
Traced <u>PC</u>	Sheet <u>No 20</u>	Drawing No. _____
Checked _____	of <u>33</u>	<b>7-E-23798</b>



A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

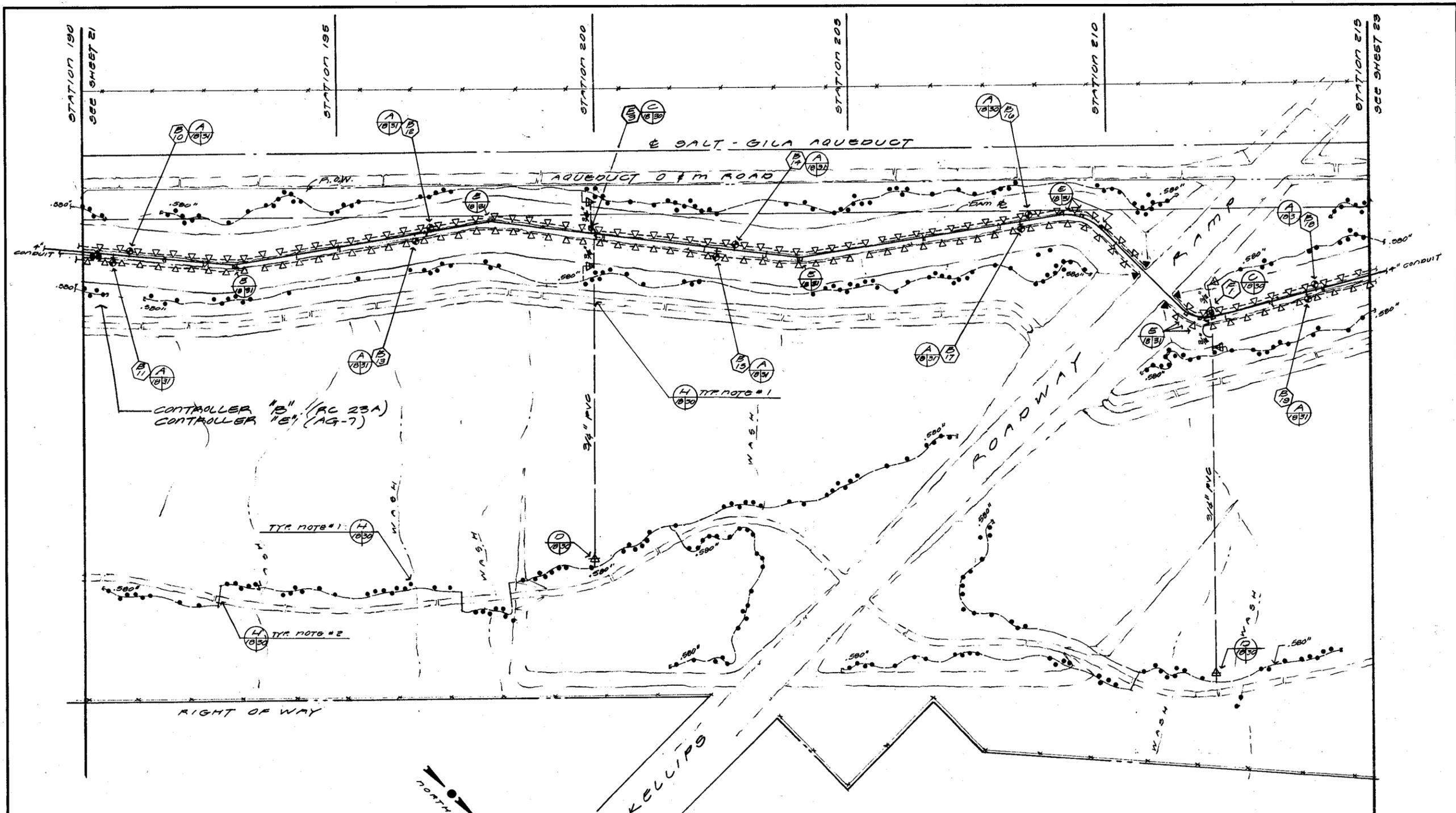
REVISIONS	

IRRIGATION PLAN  
 STA 165+00 TO STA 190+00  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W. P. P.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

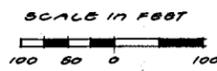
Designed: MSW	Approved: _____
Drawn: MSW	Title: _____
Traced: DC	Checked: _____
Checked: _____	Sheet No. 21 of 33

7-E-23798



A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-3501

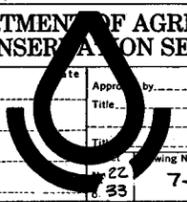
REVISIONS	

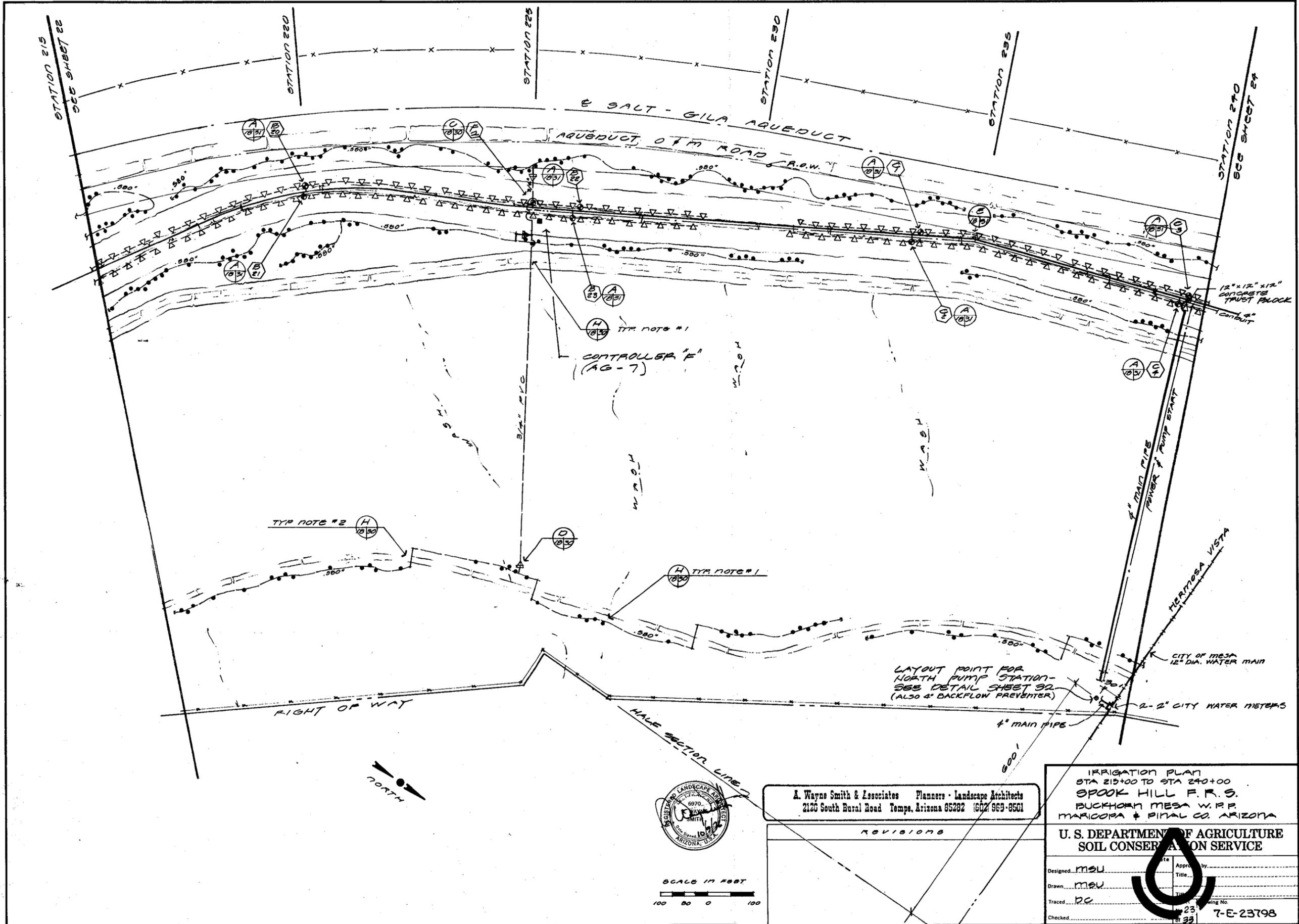


IRRIGATION PLAN  
 STA 180+00 TO STA 215+00  
**SPOOK HILL F.R.S.**  
 BUCKHORN MESA W. R.P.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed: MSU	Approved by: _____
Drawn: MSU	Title: _____
Traced: DC	Drawing No. _____
Checked: _____	Date: 7-22-83





TYP. NOTE #2

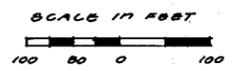
CONTROLLER 'F'  
(AG-7)

TYP. NOTE #1

LAYOUT POINT FOR  
NORTH PUMP STATION-  
SEE DETAIL SHEET 32  
(ALSO 4" BACKFLOW PREVENTER)

RIGHT OF WAY

HALF SECTION LINE



A. Wayne Smith & Associates Planners - Landscape Architects  
2120 South Rural Road Tempe, Arizona 85282 (602) 969-8501

REVISIONS	

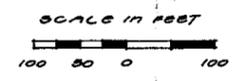
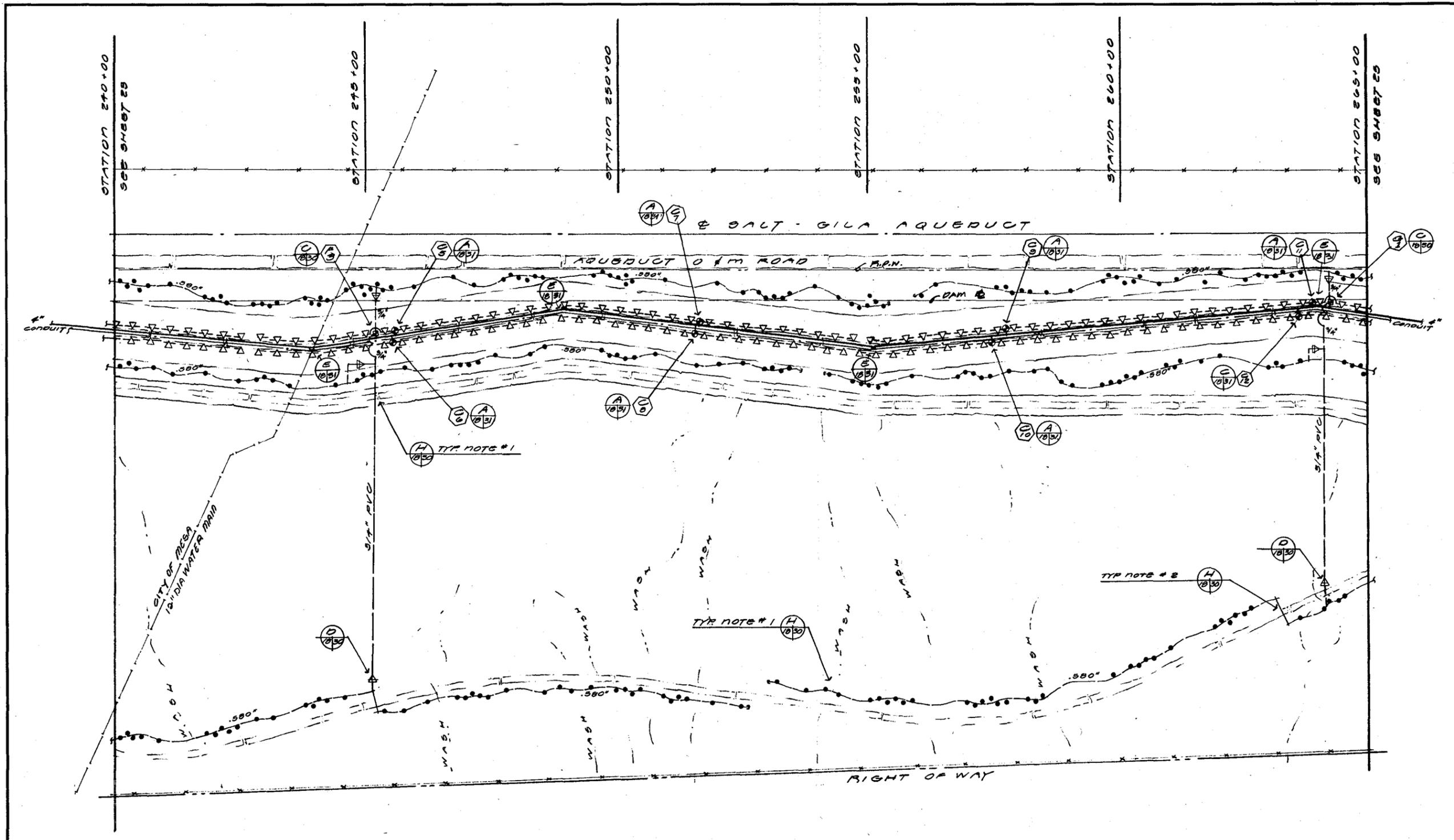
IRRIGATION PLAN  
STA 215+00 TO STA 240+00  
SPOOK HILL F. R. S.  
BUCKHORN MESA W. R. P.  
MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed by: MSU	Approved by:
Drawn by: MSU	Title:
Traced by: DC	Plotting No.:
Checked by:	7-E-23798



← CENTER OF SECTION G



A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 969-3501

REVISIONS	

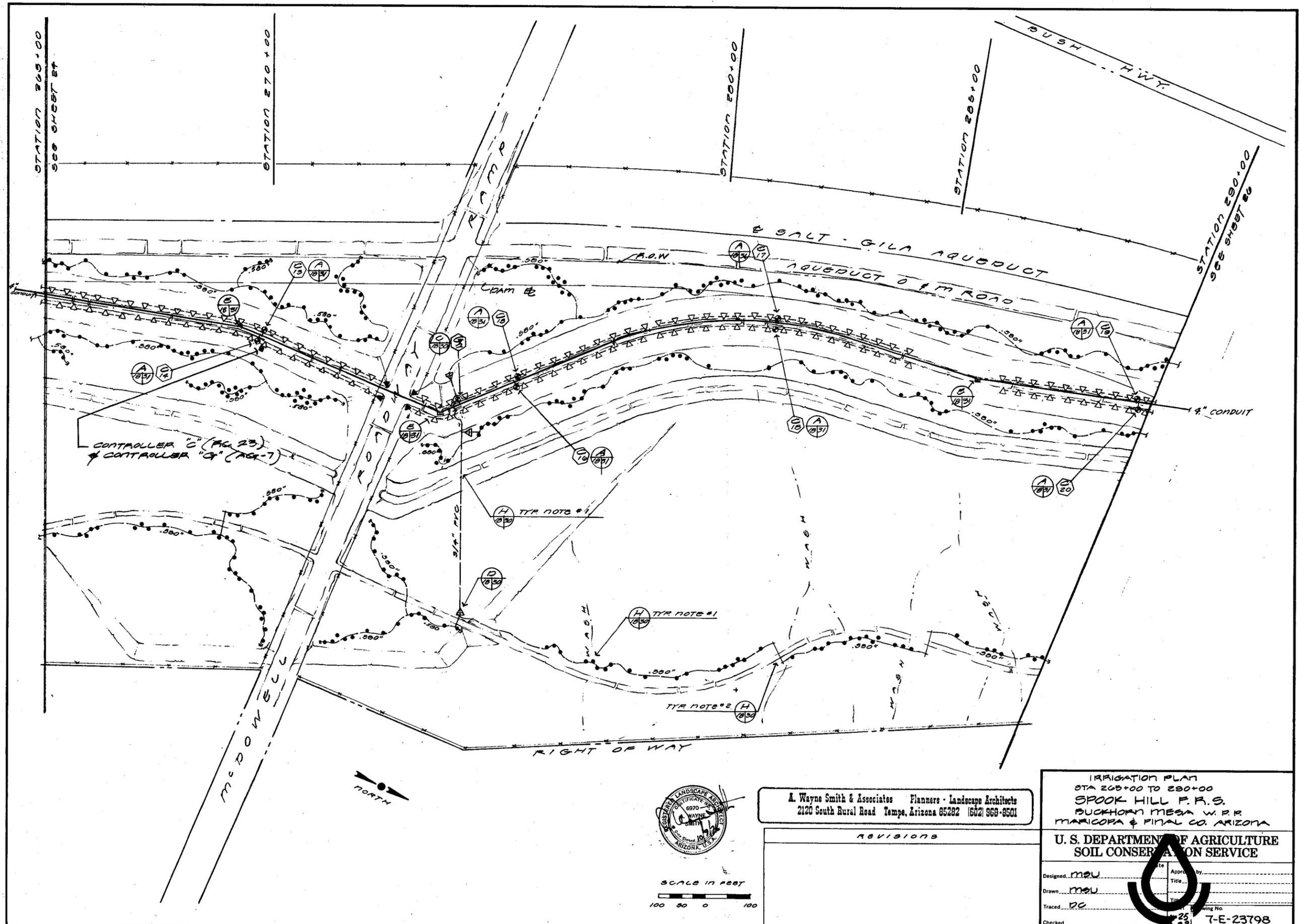
IRRIGATION PLAN  
 STA 240+00 TO STA 265+00  
 SPOOK HILL F.R.S.  
 DUCKHORN MESA W. P. R.  
 MARICOPA & PINAL CO ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed	msu	Approved	
Drawn	msu	Title	
Traced	pc		
Checked			



7-E-23798



A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

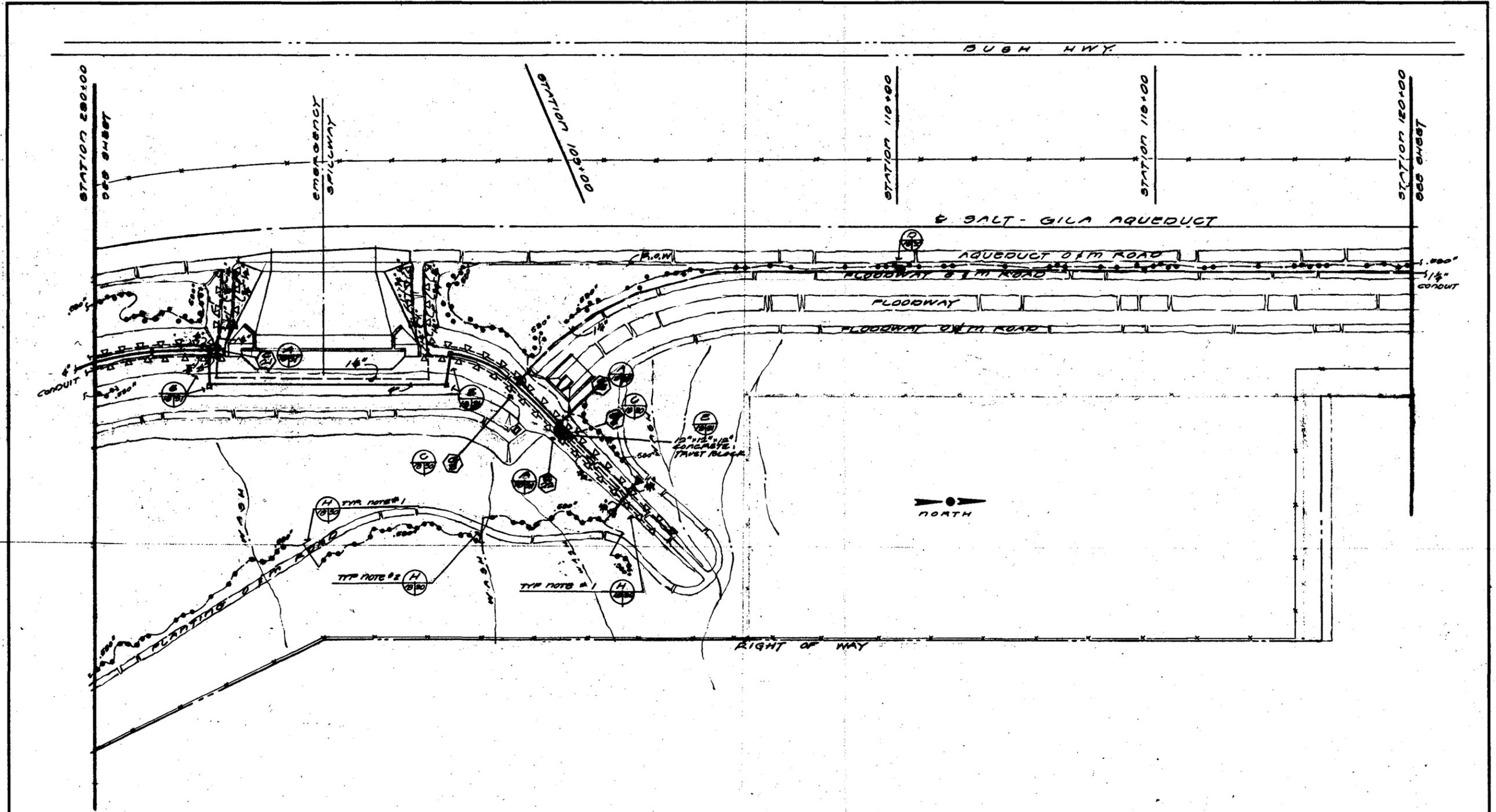
REVISIONS	

IRRIGATION PLAN  
 STA 265+00 TO 290+00  
 SPOCK HILL F.R.S.  
 BUCKHORN MESA W.P.R.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed: MSU	Approved: [Signature]
Drawn: MSU	Title: [Blank]
Traced: DC	Plotting No. [Blank]
Checked: [Blank]	Date: 10/25/53

7-E-23798



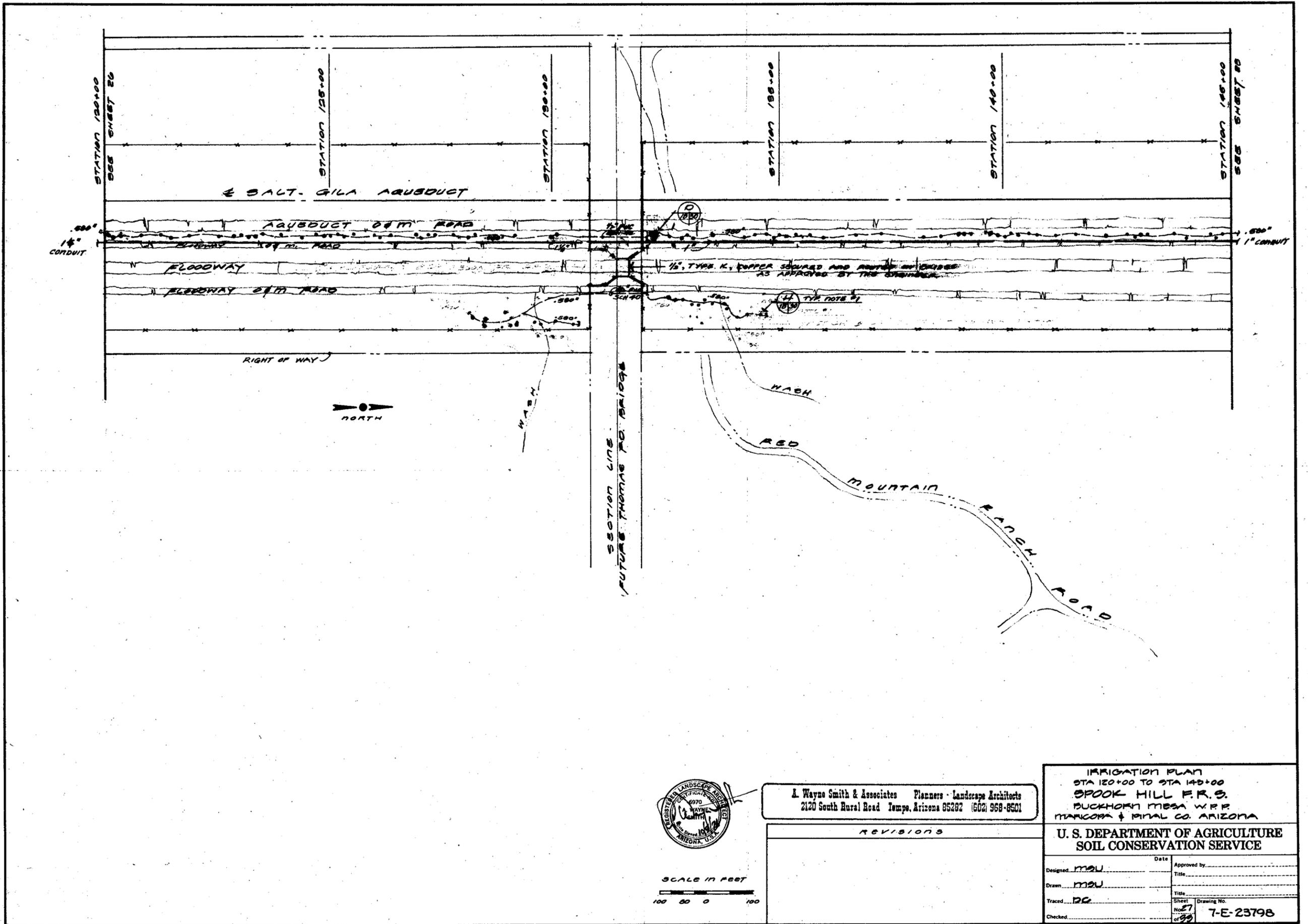
A. J. ... & Associates, Inc. Planning Engineers  
 250 South ... Street, Tempe, Arizona 85281 (602) 955-5511

REVISIONS	

IRRIGATION PLAN  
 STA 200+00 TO STA 120+00  
 BROOK HILL F. R. S.  
 BUCKHORN MESA W. P. P.  
 MARICOPA & PINAL CO. ARIZONA

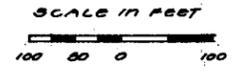
U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed by _____	Approved by _____
Drawn by _____	Title _____
Traced by _____	Drawing No. _____
Checked by _____	7-E-23798



A. Wayne Smith & Associates Planners - Landscape Architects  
2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

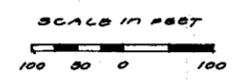
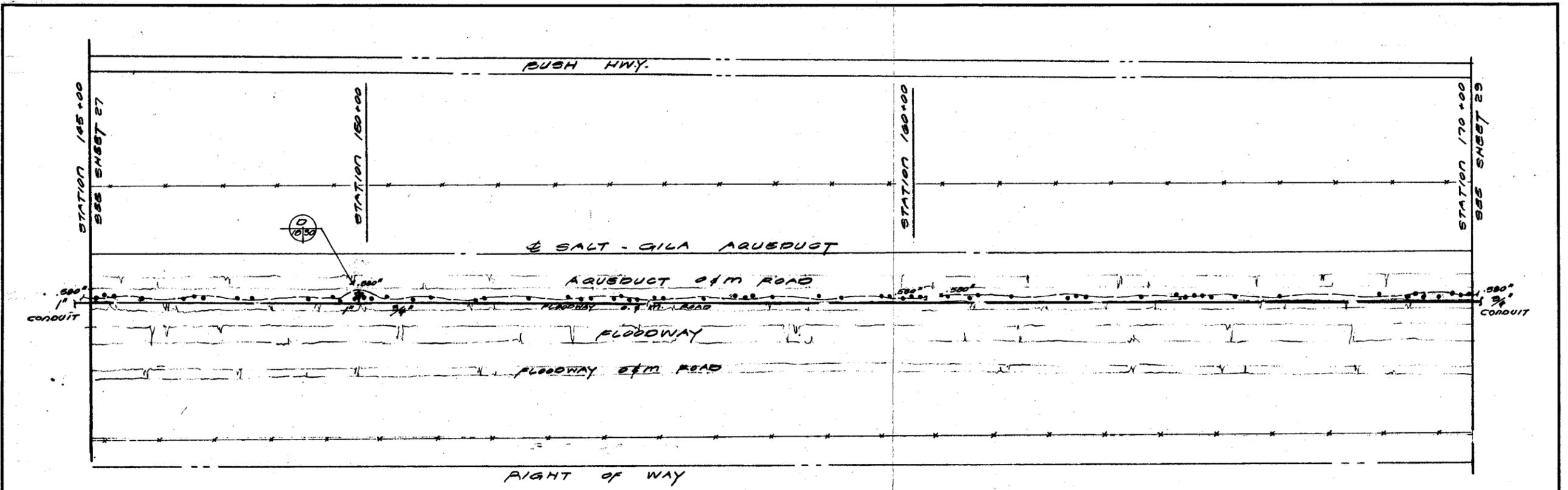
REVISIONS	



IRRIGATION PLAN  
STA 120+00 TO STA 145+00  
SPOOK HILL F.R.S.  
BUCKHORN MESA W.F.R.  
MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed <u>MSU</u>	Date	Approved by
Drawn <u>MSU</u>		Title
Traced <u>PC</u>		Title
Checked	Sheet No. <u>27</u> of <u>28</u>	Drawing No. <u>7-E-23798</u>



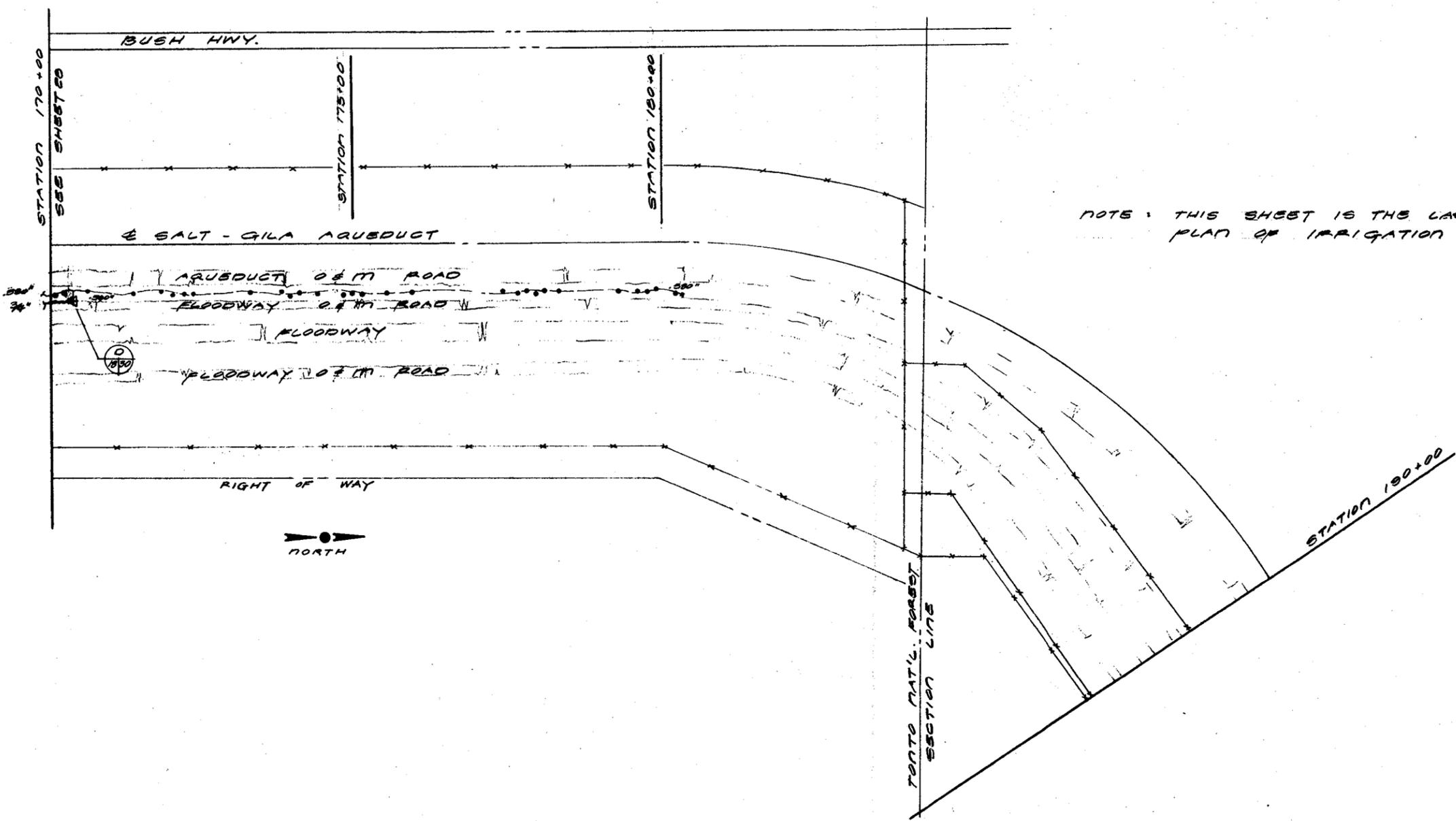
A. Wayne Smith & Associates Planners - Landscape Architects  
 2120 South Rural Road Tempe, Arizona 85282 (602) 968-8221

REVISIONS	

IRRIGATION PLAN  
 STA 145+00 TO STA 170+00  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W.F.R.  
 MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed: MSU	Date	Approved by:
Drawn: MSU		Title:
Traced: RC		Title:
Checked:	Sheet No. 28 of 28	Drawing No. 7-E-23798



NOTE: THIS SHEET IS THE LAST PLAN OF IRRIGATION



SCALE IN FEET  
100 50 0 100

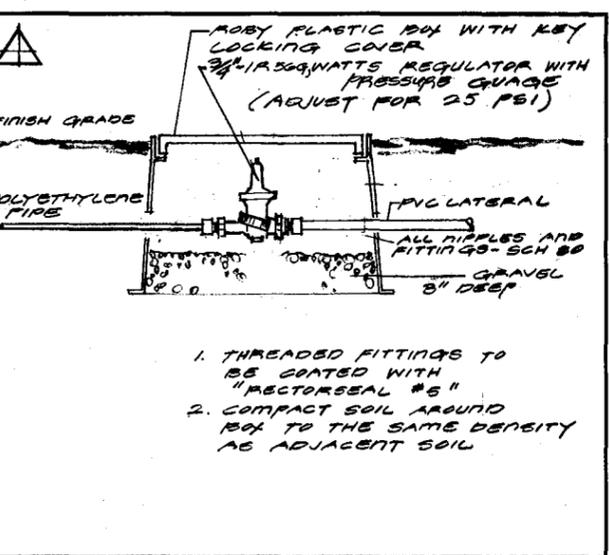
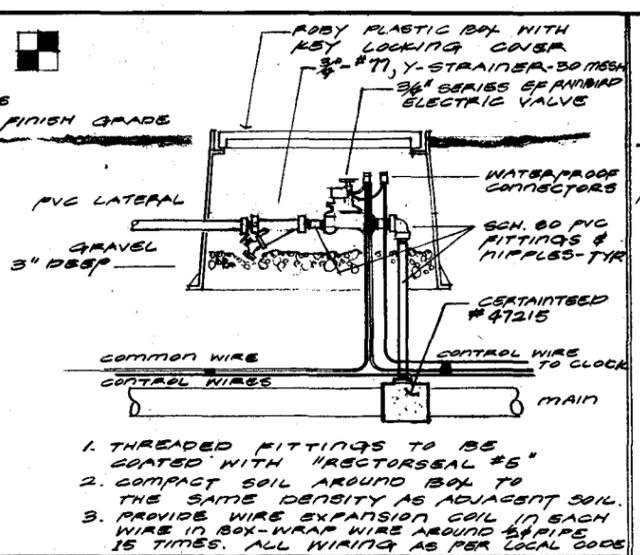
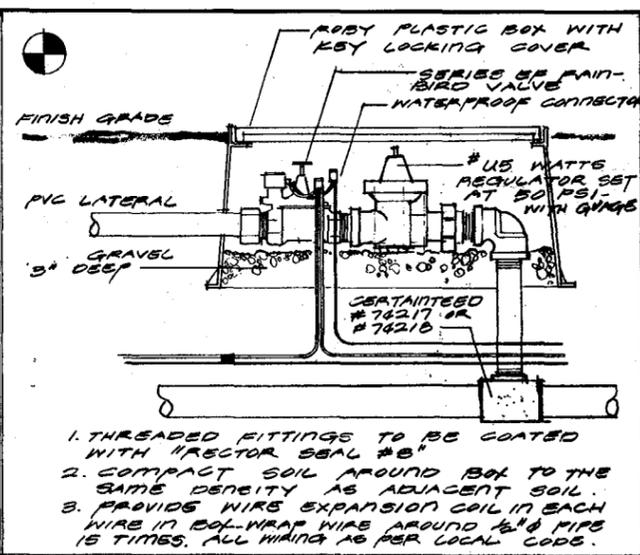
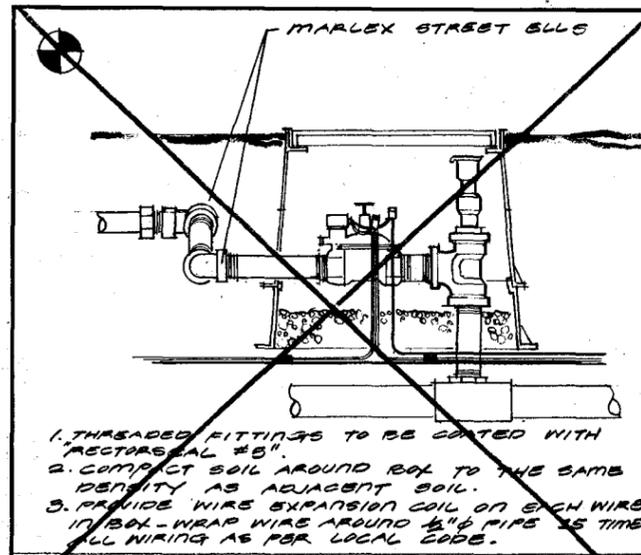
J. W. Watkins & Associates, Inc. 1000 North Central Expressway, Suite 100, Phoenix, Arizona 85028

REVISIONS	

IRRIGATION PLAN  
STA 170+00 TO STA 190+00  
SPOOK HILL F. R. S.  
BUCKHORN MESA W.P.R.  
MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

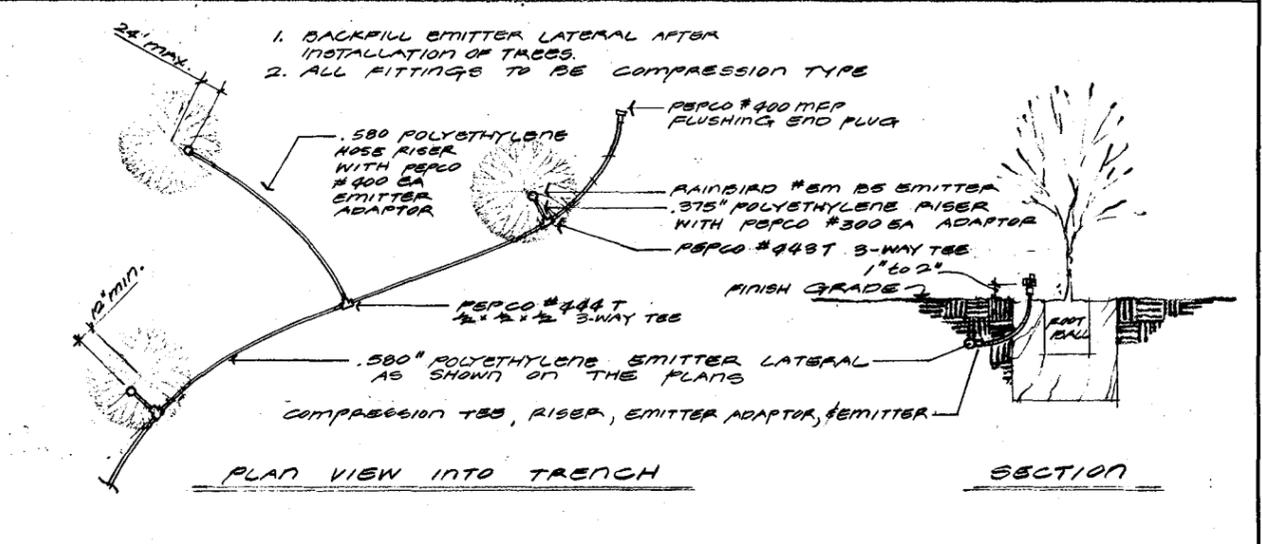
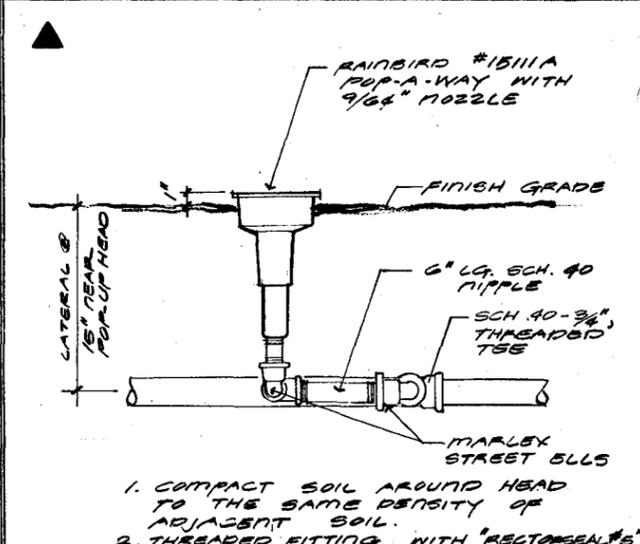
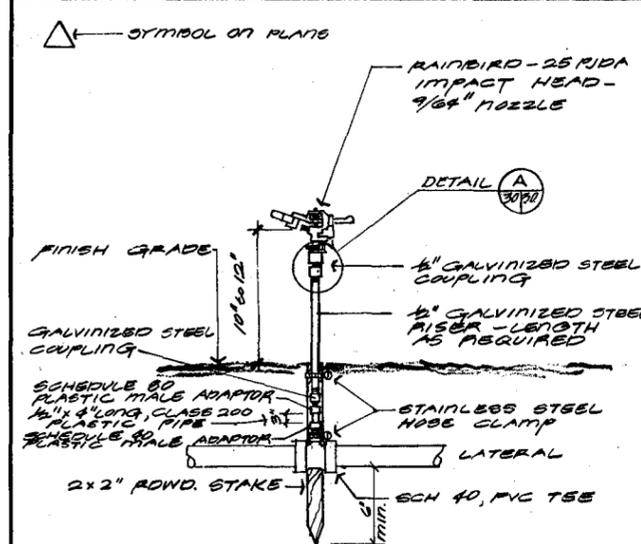
Designed <b>MSU</b>	Date	Approved by
Drawn <b>MSU</b>		Title
Traced <b>PC</b>		Title
Checked	Sheet No. <b>29</b>	Drawing No. <b>7-E-23798</b>
	of <b>30</b>	



(B) SPRINKLER VALVE N.T.S.

(C) EMITTER VALVE & FILTER - N.T.S.

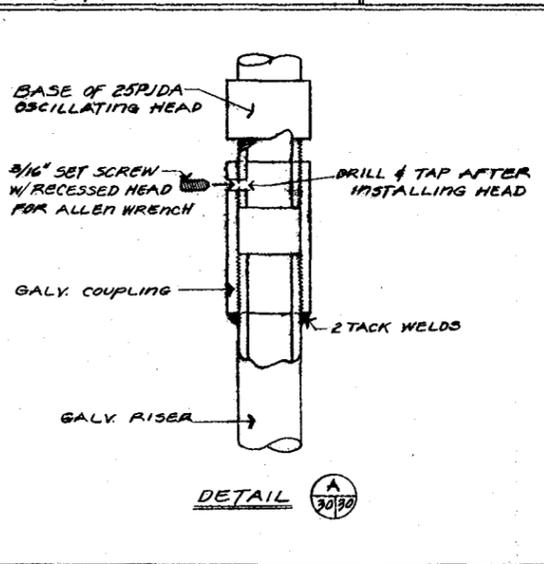
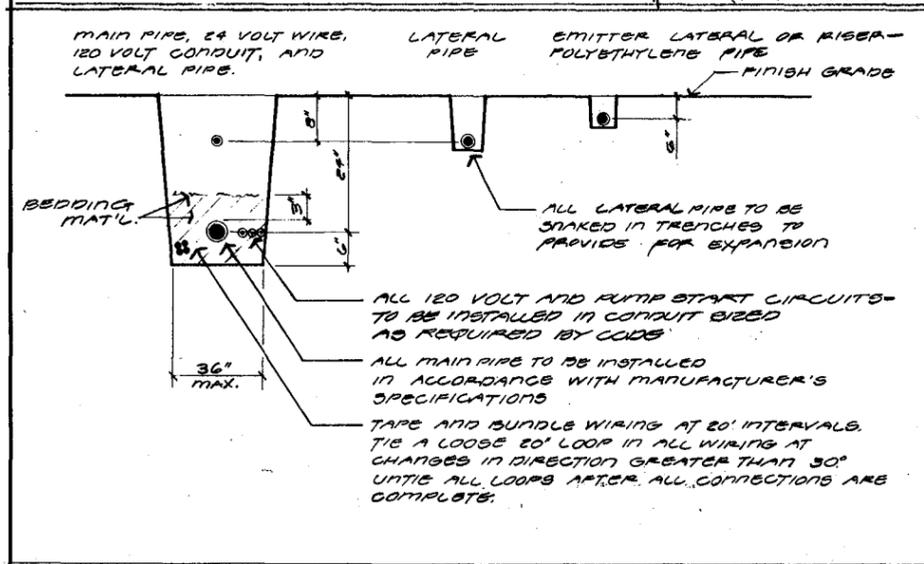
(D) PRESSURE REGULATOR - N.T.S.



(E) OSCILLATING HEAD N.T.S.

(F) SWING JOINT RISER N.T.S. (REQUIRED ON ALL POP-A-WAY HEADS)

(G) EMITTER AND EMITTER HOSE LAYOUT N.T.S.



NOTES:

- ALL PIPE & CONDUIT SHALL BE AT 24" BELOW FINAL GRADE WHEN BENEATH ASPHALT PAVEMENT, THE PRINCIPAL SPILLWAY CHANNEL, THE PLANTING OF M ROAD, AND WASHES.
- POLYETHYLENE PIPE SHALL BE SLEEVED WITH 30' OF 1" SCHEDULE 40 PVC PIPE WHEN CROSSING PLANTING OF M ROAD, AND 60' OF 1" SCHEDULE 40 PVC PIPE WHEN CROSSING BROWN ROAD.



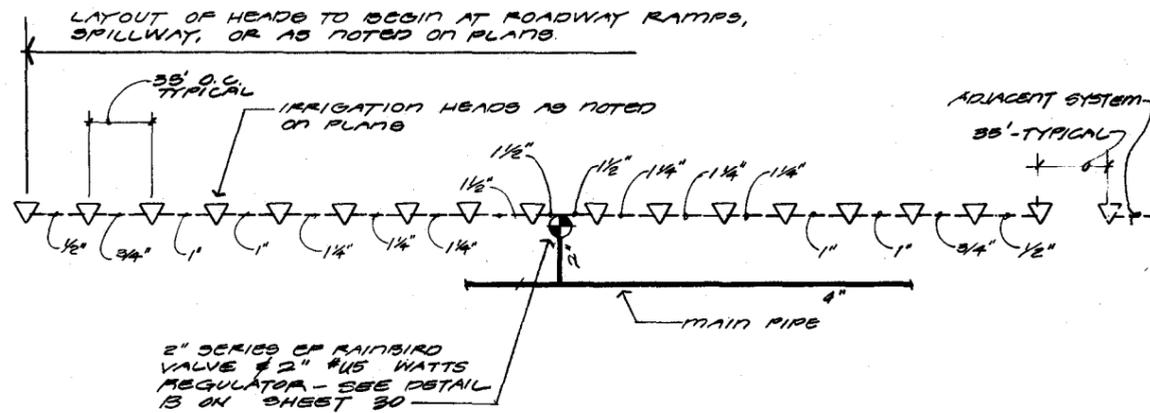
IRRIGATION DETAILS  
 SPOOK HILL F. R. S.  
 BUCKHORN MESA W. P. P.  
 MARICOPA & PIMA CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

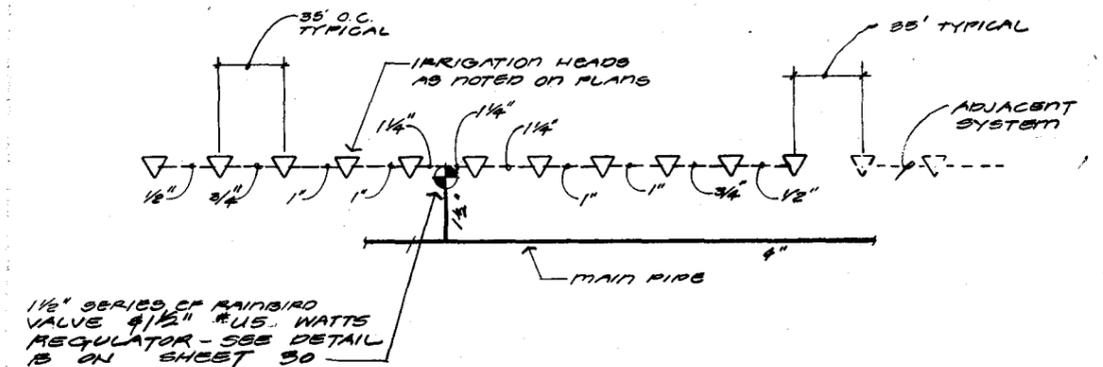
Designed: <u>msu</u>	Date: _____	Approved by: _____
Drawn: <u>msu</u>	Title: _____	_____
Traced: <u>pc</u>	Title: _____	_____
Checked: _____	Sheet No: <u>30</u>	Drawing No: <u>7-E-23798</u>

(H) TRENCHING

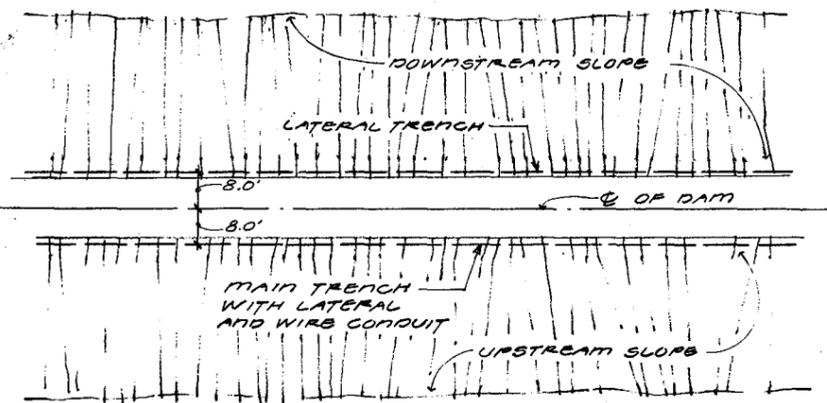
NOT TO SCALE



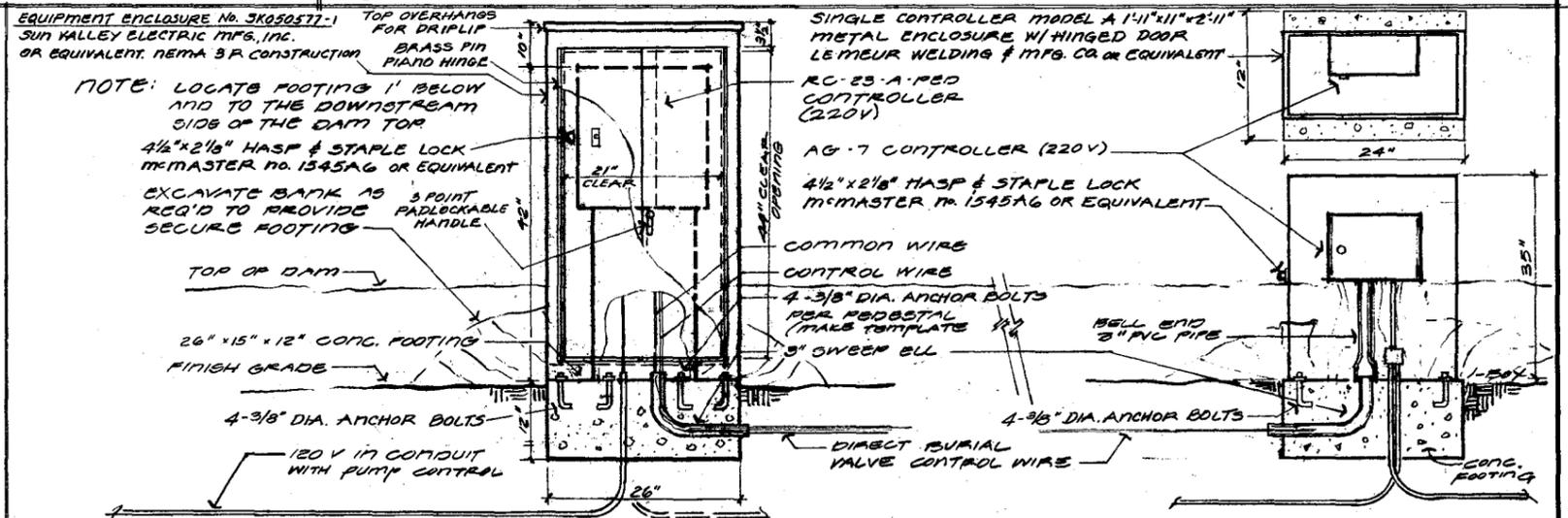
(A) SEVENTEEN HEAD IRRIGATION SYSTEM - NO SCALE



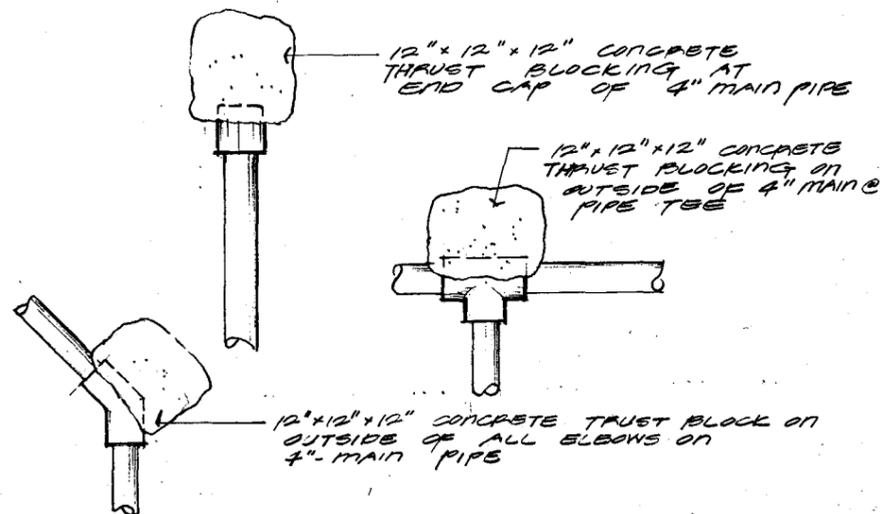
(B) ELEVEN HEAD IRRIGATION SYSTEM - NO SCALE



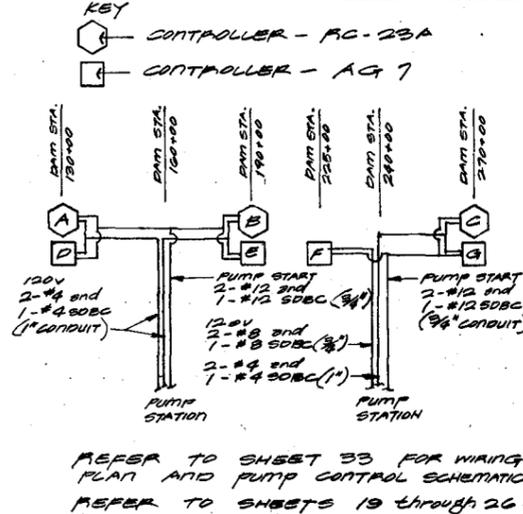
(C) TRENCHING ON DAM DETAIL NO SCALE



(D) AUTOMATIC CONTROLLERS NO SCALE



(E) THRUST BLOCKING NO SCALE



(F) CONDUIT & WIRE SCHEMATIC

A. Wayne Smith & Associates Planners - Landscape Architects  
2120 South Rural Road Tempe, Arizona 85282 (602) 968-8501

REVISIONS

IRRIGATION & WIRING DETAILS  
SPOOK HILL F.R.S.  
BUCKHORN MESA W.P.P.  
MARICOPA & PINAL CO. ARIZONA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed: MSU  
Drawn: MSU  
Traced: DC  
Checked: [Signature]

Approved: [Signature]  
Title: [Blank]  
Date: 3/31  
Drawing No. 7-E-23798



**PUMP SPECIFICATION**

**NORTH PUMP:**

90 gpm at 275 feet t.d.h. - 15 Hp TEFC Motor, 230V-3ph-60 Hz, 3500 rpm

**SOUTH PUMP:**

90 gpm at 275 feet t.d.h. 15 Hp TEFC Motor, 230 V-3ph-60 Hz 3500 rpm

Pumps shall be diagonally split case, two-stage, Aurora series 431, size 1 1/2 x 3 x 9, type AD, with enclosed bronze impeller. Pump and motor shall be mounted on a heavy formed steel base plate, prime coated.

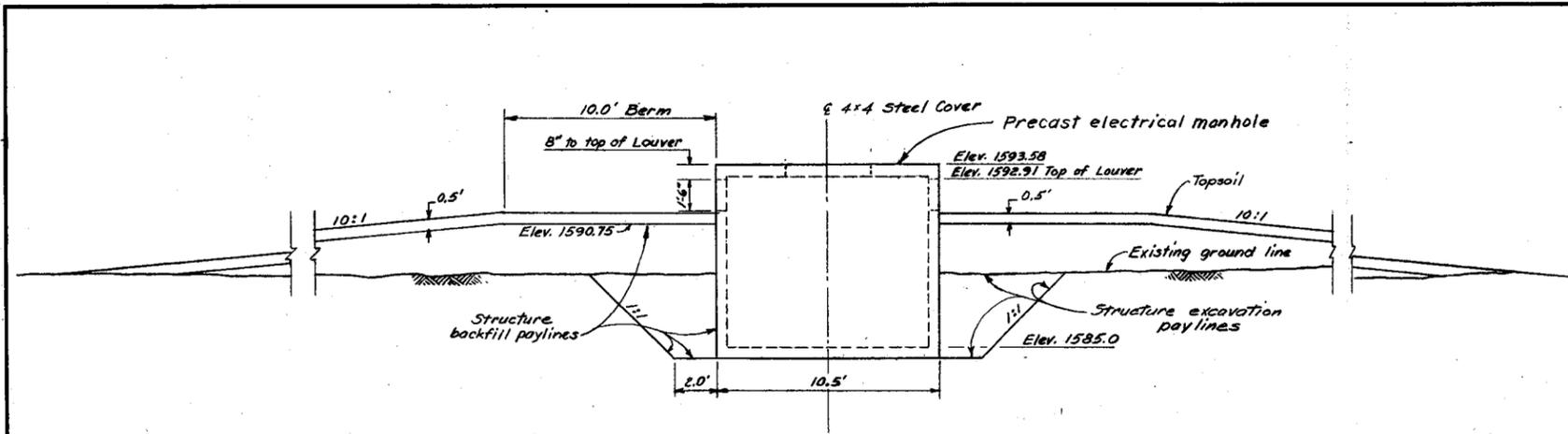
Pumps shall be equipped with mechanical Crane type 2l seals; 316 stainless steel shaft sleeves; renewable casing rings, made of bronze and dowelled in place to prevent rotation; heavy duty oil-lubricated bearings, with transparent, tempered glass oil reservoirs; water slingers on side next to pump gland; Lovejoy rubber-in-shear flexible couplings and coupling guards.

Pump casings shall diagonally split, self-venting, made of cast iron of a min. tensile strength of 35,000 lbs. and allow a 250 psi case working pressure.

Pumps shall be non-overloading at above design conditions or at a second design point of 135 gpm at 205 ft. head. Shutoff head shall be approx. 315 ft. Design operating pump efficiency shall be min. 51%.

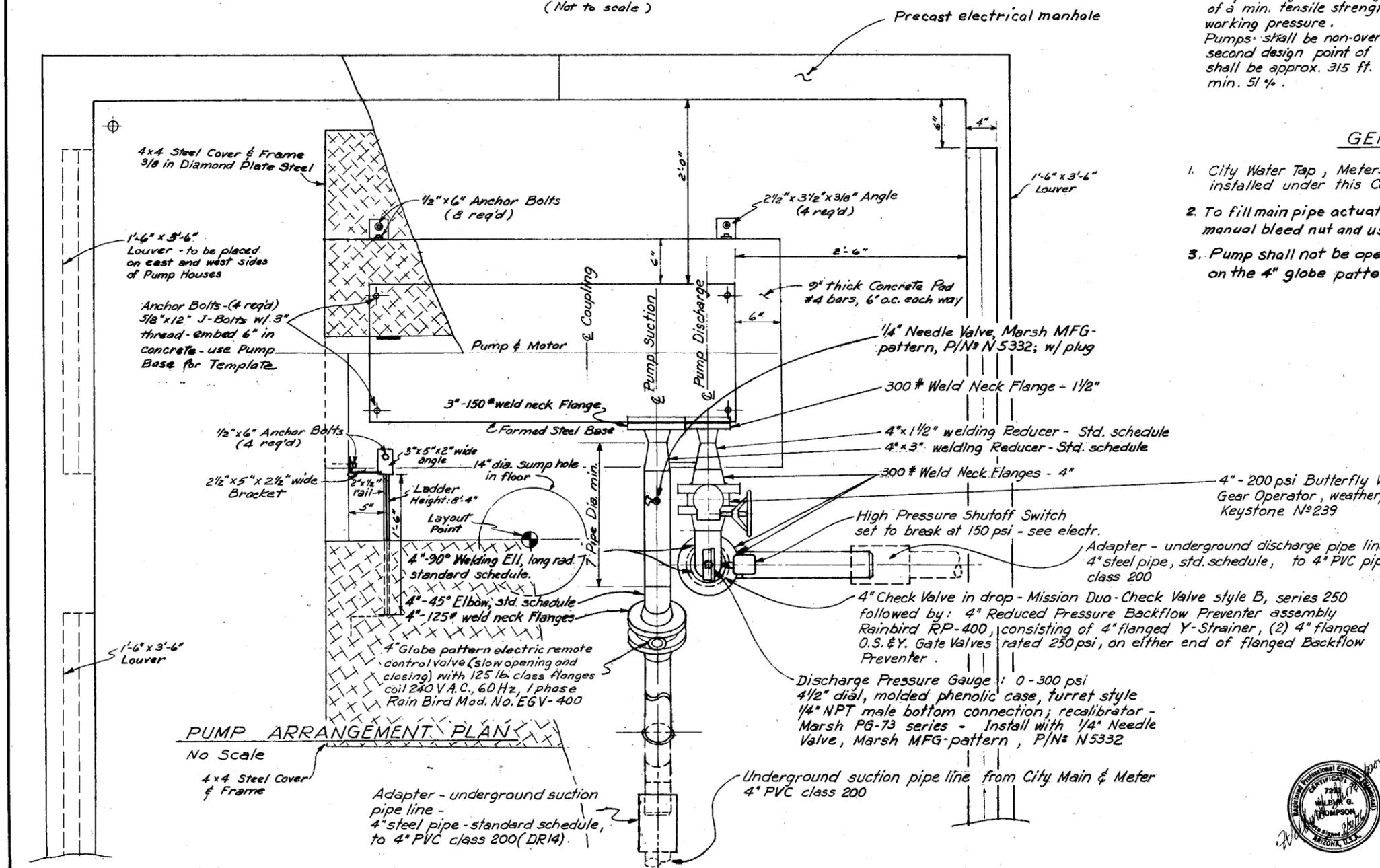
**GENERAL NOTE**

1. City Water Tap, Meters and Backflow Preventers shall be installed under this Contract as required by applicable Codes.
2. To fill main pipe actuate 4" globe pattern electric valve by manual bleed nut and use city water pressure only.
3. Pump shall not be operated when the manual flow control on the 4" globe pattern electric valve is in closed position



**SECTIONAL ELEVATION OF PUMP STATION**

(Not to scale)



**PUMP ARRANGEMENT PLAN**

No Scale

4x4 Steel Cover & Frame

Adapter - underground suction pipe line - 4" steel pipe - standard schedule, to 4" PVC class 200 (DR14).

**SVERDRUP & PARCEL AND ASSOCIATES, INC.**  
CONSULTING ENGINEERS  
TEMPE, ARIZ.

**PUMP STATION DETAILS**  
SPOOK HILL F.R.S.  
BUCKHORN MESA W.P.P.  
MARICOPA & PINAL CO. ARIZONA  
**U. S. DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**

Designed: C.H. Bruning 8-76  
Drawn: C.H. Bruning  
Checked: D.G. Hazzard 8-76  
Title: PUMP STATION DETAILS  
Drawing No. 32  
7E23798



**NOTES**

1. Conductor for installation in raceways shall be type THHN-THWN for #8 and smaller and type THW for #6 and larger.
2. Unistrut shall be as supplied by Precast Manufacturing Co. or equivalent

**EQUIPMENT LIST**

- ① Meter socket, 100A, 120/240V, 3 $\phi$ , 4W, Circle A-W Catalog NR. 117.
- ② Wireway, 6" x 6" x 3'-0", with hinged cover
- ③ Combination motor starter, fusible disconnect switch type, NEMA size 2 starter with 3-O.L. elements, 240V. coil, internal reset and NEMA 12 enclosure, Square D Class 8538, Type 5DA-2. Provide oil tight, key operated "Hand-Off-Auto" selector switch in door. Install 50A. Bussman Fuse-trons in fuse clips.
- ④ Load center, 120/240V, 1 $\phi$ , 3W, NEMA 1 enclosure, Bryant Catalog NR. 4-8 S.L. with 40A, 2P, main breaker and 4-20A, 1P, branch circuit breakers. All circuit breakers shall have 10,000 A.I.C.
- ⑤ Lighting fixtures, 2 keyless Porcelain sockets with 2-100A Lamps
- ⑥ Toggle switch, 15A, 1P.
- ⑦ Receptacle, duplex NEMA 5-15R with standard cover
- ⑧ Wireway, 6" x 6" x 18", with hinged cover.
- ⑨ Relay cabinet, NEMA 12 enclosure with Square D Class 8501, Type GDO-20, 230V.D.C. relay, full wave bridge rectifier, & 250V. fuse blocks

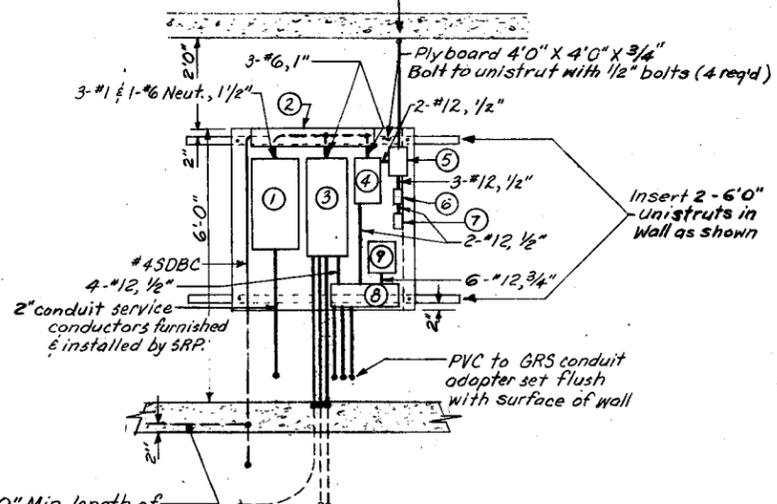
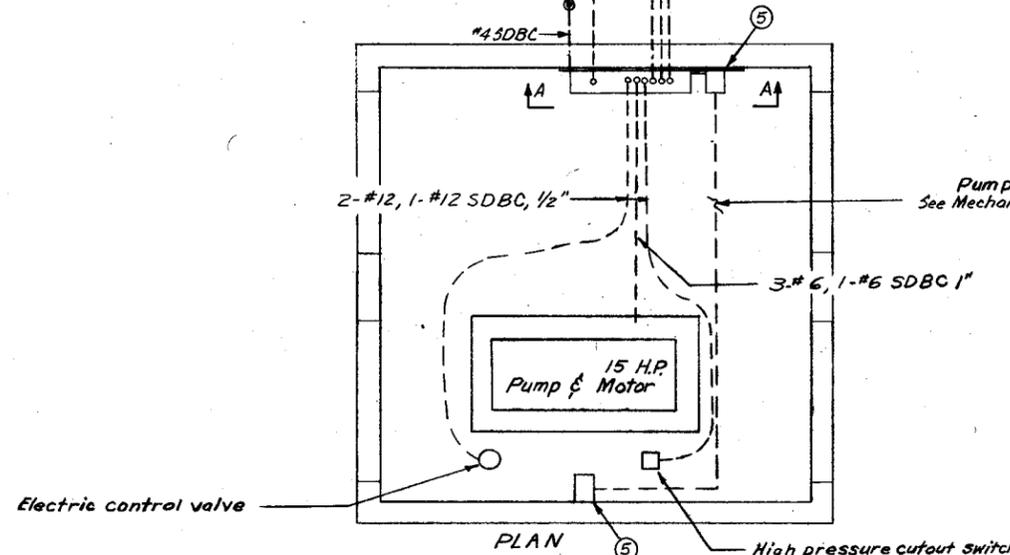
Dipole furnished and installed by S.R.P. Verify exact location in field

Stub conduit up 1'-0" above finished grade

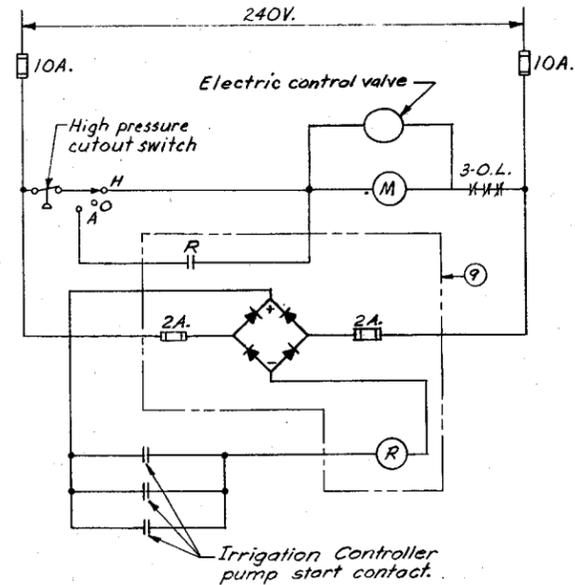
3/4" x 10'-0" ground rod

2-#12, 1-#12 SDBC, 3/4" (to irrigation controller pump start contacts)  
120V. power to irrigation controllers.

See sheets 17 thru 25 for conduit plans.  
See sheet 31 for schematic plan



Provide 20'-0" Min. length of #4 SDBC in slab per Section 250-81b of the 1971 Arizona Electrical code.



SVERDRUP & PARCEL AND ASSOCIATES, INC.  
CONSULTING ENGINEERS  
PHOENIX, ARIZ.

WIRING DETAILS  
SPOOK HILL F.A.S.  
BUCKHORN MESA W.F.P.  
MARICOPA & PINAL CO., ARIZONA  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE



Designed Steinbruegge	Approved by
Drawn Laughery	Title
Traced	Working No.
Checked THOMPSON	33 33

7-E-23798