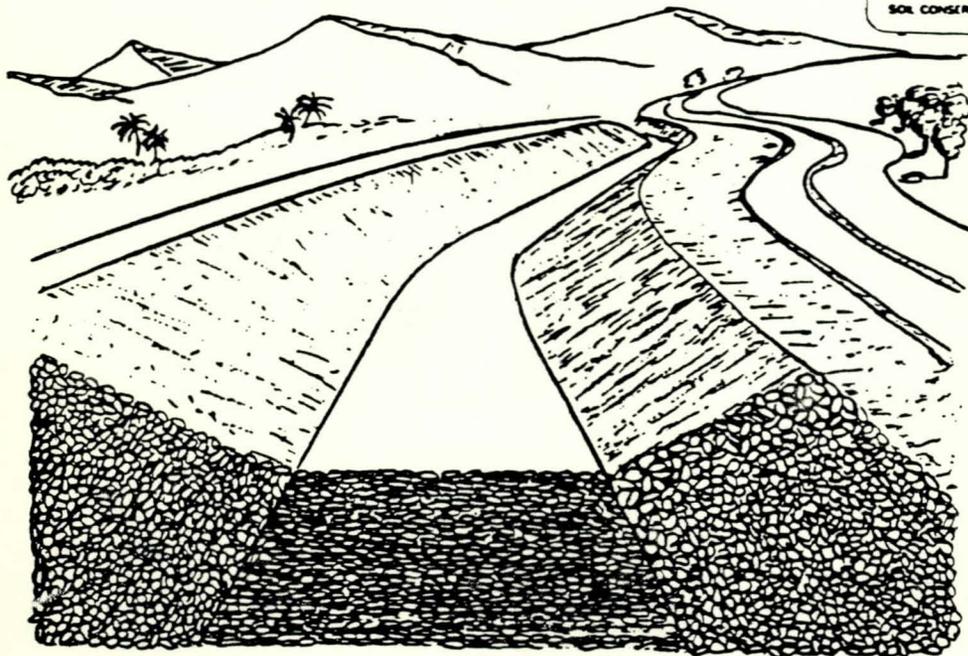
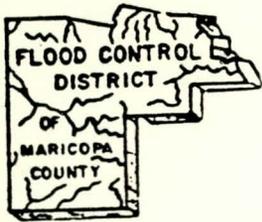


**SPECIFICATIONS
AND
CONTRACT**

FOR THE CONSTRUCTION OF

**EAST MARICOPA FLOODWAY
REACH 6**

*Property of
Flood Control District of MC Library
Please Return to
2601 W. Durango
Phoenix, AZ 85009*



**FOR
THE FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY
BY
THE SOIL CONSERVATION SERVICE
UNITED STATES DEPARTMENT
OF AGRICULTURE**

A121.505

PART I - THE SCHEDULE
SECTION A - SOLICITATION, OFFER AND AWARD
(Construction, Alteration or Repair)

OMB No. 0505-0005

Expiration Date: 05/31/88

1. SOLICITATION NO. SCS-2-AZ-88	2. TYPE OF SOLICITATION <input checked="" type="checkbox"/> SEALED BID (IFB) <input type="checkbox"/> NEGOTIATED (RFP)	3. DATE ISSUED July 1, 1988
------------------------------------	--	--------------------------------

IMPORTANT-The "Offer" section on pages 2 and 3 must be fully completed by offeror.

4. CONTRACT NO.	5. REQUISITION/PURCHASE REQUEST NO.	6. PROJECT NO.
-----------------	-------------------------------------	----------------

7. ISSUED BY (Hand-Carried/Carrier Address) USDA SOIL CONSERVATION SERVICE 201 E. INDIANOLA AVE., SUITE 200 PHOENIX, AZ 85012	8. ADDRESS OFFER TO (U.S. Mail Delivery) USDA SOIL CONSERVATION SERVICE 201 E. INDIANOLA AVE., SUITE 200 PHOENIX, AZ 85012
---	--

9. FOR INFORMATION CALL: A. NAME CAROL L. HARRIS	B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS) 602-241-5131
--	--

SOLICITATION

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

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS (Title, identifying no., date): EAST MARICOPA FLOODWAY REACH 6 EARTH FLOODWAY APPROX. 2.25 MILES LONG WITH VARIOUS INLET STRUCTURES

Price Range: Between \$1,000,000 and \$5,000,000

11. The Contractor shall begin performance within 20 calendar days and complete it within 178 calendar days after receiving <input type="checkbox"/> ward <input checked="" type="checkbox"/> notice to proceed. This performance period is <input checked="" type="checkbox"/> mandatory <input type="checkbox"/> negotiable. (*See Section ___)

EXCEPTION TO STANDARD FORM 1442
APPROVED BY GSA/OIRM 6/85

STANDARD FORM 1442 (Rev. 4-85)
FAR(48 CFR) 53.236-1(D)

SOLICITATION, OFFER AND AWARD
(Construction, Alteration or Repair)

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? (If "YES" indicate within how many calendar days after award in Item 12b.) [X] YES [] NO	12B. CALENDAR DAYS 10
---	------------------------------

13. ADDITIONAL SOLICITATION REQUIREMENTS:

- A. Sealed offers in original and 0 copies to perform the work required are due at the place specified in Item 8 by 2:00 p.m. (hour) local time AUGUST 23, 1988 (date).
If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.
- B. An offer guarantee [X] is, [] is not required.
- C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.
- D. Offers providing less than 60 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

OFFER (Must be fully completed by offeror)

14. NAME AND ADDRESS OF OFFEROR (Include ZIP Code)	15. TELEPHONE NO. (Include area code)
	16. REMITTANCE ADDRESS (Include only if different than Item 14)

CODE FACILITY CODE

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

AMOUNTS

SOLICITATION, OFFER AND AWARD
(Construction, Alteration or Repair)

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

19. ACKNOWLEDGMENT OF AMENDMENTS

(The offeror acknowledges receipt of amendments to the solicitation - give number and date of each)

AMENDMENT NO.									
DATE									

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)

20B. SIGNATURE

20C. OFFER DATE

AWARD (To be completed by Government)

21. ITEMS ACCEPTED:

22. AMOUNT

23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN ITEM (4 copies unless otherwise specified)

25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO:
[] 10 USC 2304(c) ()
[] 41 USC 253(c) ()

26. ADMINISTERED BY CODE

27. PAYMENT WILL BE MADE BY

EXCEPTION TO STANDARD FROM 1442
APPROVED BY GSA/OIRM 6/85

SOLICITATION, OFFER AND AWARD
(Construction, Alteration or Repair)

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

28. NEGOTIATED AGREEMENT (Contractor is required to sign this document and return _____ copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications incorporated by reference in or attached to this contract.

29. AWARD (Contractor is not required to sign this document.) Your offer on this solicitation is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30. NAME AND TITLE OF CONTRACTOR
OR PERSON AUTHORIZED TO SIGN
(Type or print)

31A. NAME OF CONTRACTING OFFICER
(Type or print)

30B. SIGNATURE

30C. DATE

31B. UNITED STATES
OF AMERICA

31C. AWARD
DATE

BY _____

EXCEPTION TO STANDARD FORM 1442
APPROVED BY GSA/OIRM 6/85

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	[For this Solicitation, there are NO provisions in this Section].	65

SECTION B - SUPPLIES OR SERVICES AND PRICE/COSTS

In order to be considered responsive, a bidder must bid on all items in the quantities stated in the Schedule.

EAST MARICOPA FLOODWAY REACH 6

ITEM NO.	WORK OR MATERIAL	SPEC. NO.	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Clearing and Grubbing	2	57	Acres	\$ _____	\$ _____
2	Mobilization	8	1	L.S.	\$ XXX	\$ _____
3	Water	10	34,000	M.G.	\$ _____	\$ _____
4	Channel Excavation, Common	21	299,500	Cu. Yd.	\$ _____	\$ _____
5	Structure Excavation, Common	21	24,866	Cu. Yd.	\$ _____	\$ _____
6	Trench Excavation	21	618	Cu. Yd.	\$ _____	\$ _____
7	Earthfill	23	37,600	Cu. Yd.	\$ _____	\$ _____
8	Structure Backfill	23	291	Cu. Yd.	\$ _____	\$ _____
9	Drainfill	23	164	Cu. Yd.	\$ _____	\$ _____
10	Concrete Channel Lining	31	155	Cu. Yd.	\$ _____	\$ _____
11	Concrete Structures	31	217	Cu. Yd.	\$ _____	\$ _____
12	Cement	31	7,940	Bbls.	\$ _____	\$ _____
13	Concrete for Minor Structures	31	15	Cu. Yd.	\$ _____	\$ _____
14	Steel Reinforcement	34	52,850	Lbs.	\$ _____	\$ _____
15	54" Conc. Culvert Pipe	42	108	L.F.	\$ _____	\$ _____
16	Collector Channel	51	46	Each	\$ _____	\$ _____
17	Metal Fabrication	81	1	L.S.	\$ XXX	\$ _____
18	Identification Plaque	93	2	Each	\$ _____	\$ _____
19	Drain Pipes	207	1,695	L.F.	\$ _____	\$ _____
20	Surveys	7	1	L.S.	\$ _____	\$ _____
21	Soil Cement	206	11,655	Cu. Yd.	\$ _____	\$ _____
22	Contractor Inspection	94	1	L.S.	\$ XXX	\$ _____
TOTAL					\$ _____	_____

AWARD RESTRICTION (AUGUST 1987, SCS, AMB)
One award for the aggregate of all items will
be made under this solicitation.

SECTION C - DESCRIPTION/SPECIFICATION
/WORK STATEMENT

C.1 STATEMENT OF WORK/SPECIFICATIONS
(USDA 452.210-71) (FEB 1988)

The Contractor shall furnish the necessary personnel, material, equipment, services and facilities (except as otherwise specified), to perform the Statement of Work/Specifications referenced in Section J.

C.2 ATTACHMENTS TO STATEMENT OF WORK/SPECIFICATIONS
(USDA 452.210-72) (FEB 1988)

The attachments to the Statement of Work/Specifications listed in Section J are hereby made part of this solicitation and any resultant contract.

SECTION D - PACKAGING AND MARKING

[For this Solicitation, there are NO clauses in this Section]

SECTION E - INSPECTION AND ACCEPTANCE

E.1 Inspection of Construction (JUL 1986)

(a) Definition. "Work" includes, but is not limited to, materials, workmanship, and manufacture and fabrication of components. (b) The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. The Contractor shall maintain complete inspection records and make them available to the Government. All work shall be conducted under the general direction of the Contracting Officer and is subject to Government inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract. (c) Government inspections and tests are for the sole benefit of the Government and do not-- (1) Relieve the Contractor of responsibility for providing adequate quality control measures; (2) Relieve the Contractor of responsibility for damage to or loss of the material before acceptance; (3) Constitute or imply acceptance; or (4) Affect the continuing rights of the Government after acceptance of the completed work under paragraph (i) below. (d) The presence or absence of a Government inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specification without the Contracting Officer's written authorization. (e) The Contractor shall promptly furnish, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The Government may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. The Government shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract. (f) The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements, unless in the public interest the Government consents to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises. (g) If the Contractor does not promptly replace or correct rejected work, the Government may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor or (2) terminate for default the Contractor's right to proceed. (h) If, before acceptance of the entire work, the Government decides to examine already completed work by removing it or tearing it out, the Contractor, on request, shall promptly furnish all necessary facilities, labor, and material. If the work

is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray the expenses of the examination and of satisfactory reconstruction. However, if the work is found to meet contract requirements, the Contracting Officer shall make an equitable adjustment for the additional services involved in the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time. (i) Unless otherwise specified in the contract, the Government shall accept, as promptly as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the Government's rights under any warranty or guarantee.

SECTION F - DELIVERIES OR PERFORMANCE**F.1 COMMENCEMENT, PROSECUTION, AND COMPLETION
OF WORK (FAR 52.212-3) (APR 1984)**

The Contractor shall be required to (a) commence work under this contract within 20 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 178 days after receipt of notice to proceed. The time stated for completion shall include final cleanup of the premises.

The contractor will be restricted from working north of Brown Road until 146 calendar days after the notice to proceed is issued for the contract.

**F.2 LIQUIDATED DAMAGES--CONSTRUCTION
(FAR 52.212-5) (APR 1984)**

(a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, the Contractor shall pay to the Government as liquidated damages, the sum of \$495.00 for each day of delay.

(b) If the Government terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Government in completing the work.

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

**F.3 PERFORMANCE OF WORK BY THE CONTRACTOR
(FAR 52.236-1) (APR 1984)**

The Contractor shall perform on the site, and with its own organization, work equivalent to at least 20 percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

F.4 VARIATION IN ESTIMATED QUANTITY (FAR 52.212-11) (APR 1984)

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

F.5 SUSPENSION OF WORK (FAR 52.212-12) (APR 1984)

(a) The Contracting Officer may order the Contractor, in writing, to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of the Government. (b) If the performance of all or any part of the work, is for an unreasonable period of time, suspended, delayed, or interrupted, (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting Officer's failure to act within the time specified in this contract (or within a reasonable time if not specified), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by the 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 that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor, or for which an equitable adjustment is provided for or excluded under any other term or condition of this contract. (c) A claim under this clause shall not 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 the suspension, delay, or interruption, but not later than the date of final payment under the contract.

SECTION G - CONTRACT ADMINISTRATION DATAG.1 CONTRACTING OFFICER'S REPRESENTATIVE (USDA 452.204-72)
(JUL 1985)

A Contracting Officer's Representative (COR) will be designated after contract award. The contractor will be notified by letter of the name and duties of the COR.

G.2 DESIGNATED PAYMENT OFFICE (SCS, AMB, APRIL 1988)

The contact point described below coordinates the issuance of payments under this contract. If payment is not received within 40 days after submittal of invoice, contact the payment office designated below for information on when payment will be made.

Carol M. Kenney
(602) 241-5137

USDA, Soil Conservation Service, 201 E. Indianola Ave., Suite 200
Phoenix, AZ 85012

If questions arise on the amount paid, contact the contracting officer at the number or address shown on form SF-1442.

SECTION H - SPECIAL CONTRACT REQUIREMENTS

H.1 POST-AWARD CONFERENCE (USDA 452.215-77) (JUL 1985)

A post award conference with the successful offeror is required. It will be scheduled and held within 15 days after the date of contract award. The conference will be held at:

USDA, SOIL CONSERVATION SERVICE
201 E. INDIANOLA AVE., SUITE 200
PHOENIX, AZ 85012

H.2 NOTICE OF REQUIRED PERFORMANCE SECURITY
(USDA 452.228-71) (FEB 1988)

If a contract exceeds \$25,000, the successful offeror shall furnish security to guarantee faithful performance of the contract in the amount of 100 percent of the total contract price. Security may be in the form of a performance bond on Standard Form 25 (furnished on request), or in the form of a certified or cashier's check, bank draft, Post Office money order, or currency, or United States Government bonds or notes (at par value) deposited in accordance with Treasury Regulations. Money orders and checks shall be drawn payable to: USDA, SOIL CONSERVATION SERVICE.

H.3 NOTICE OF REQUIRED PAYMENT SECURITY
(USDA 452.228-72) (FEB 1988)

If a contract exceeds \$25,000, the successful offeror shall furnish security to guarantee payment to all persons supplying labor or materials in the performance of the contract. Such security may be in the form of a payment bond on Standard Form 25A (furnished on request) or in the form of a certified or cashier's check, bank draft, Post Office money order, or currency, or United States Government bonds or notes (at par value) deposited in accordance with Treasury Regulations. Money orders and checks shall be drawn payable to: USDA, SOIL CONSERVATION SERVICE. The penal sum of the payment bond shall equal:

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

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

(c) \$2-1/2 million, if the contract price is more than \$5 million.

H.4 DIFFERING SITE CONDITIONS (FAR 52.236-2) (APR 1984)

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of (1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

(b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

(c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.

(d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

H.5 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK (FAR 52.236-3) (APR 1984)

(a) The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Government, as well as from the drawings and specifications made a part of this

contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Government.

(b) The Government assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Government. Nor does the Government assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

H.6 PHYSICAL DATA (FAR 52.236-4) (APR 1984)

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

Other Physical Data

Geologic Report and Soil Mechanics Data are available at the address indicated in Block 7, page 1.

H.7 MATERIAL AND WORKMANSHIP (FAR 52.236-5) (APR 1984)

(a) All equipment, material, and articles incorporated into the work covered by this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract. References in the specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.

(b) The Contractor shall obtain the Contracting Officer's approval of the machinery and mechanical and other equipment to be incorporated into the work. When requesting approval, the Contractor shall furnish to the Contracting Officer the name of the

manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the machinery and mechanical and other equipment. When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work. When requesting approval, the Contractor shall provide full information concerning the material or articles. When directed to do so, the Contractor shall submit samples for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

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

H.8 SUPERINTENDENCE BY THE CONTRACTOR (FAR 52.236-6) (APR 1984)

At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the work a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.

H.9 PERMITS AND RESPONSIBILITIES (FAR 52.236-7) (APR 1984)

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, and municipal laws, codes, and regulations applicable to the performance of the work. The Contractor shall also be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence, and shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.

H.10 OTHER CONTRACTS (FAR 52.236-8) (APR 1984)

The Government may undertake or award other contracts for additional work at or near the site of the work under this contract.

The Contractor shall fully cooperate with the other contractors and with Government employees and shall carefully adapt scheduling and performing the work under this contract to accommodate the additional work, heeding any direction that may be provided by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by Government employees.

H.11 PROTECTION OF EXISTING VEGETATION,
STRUCTURES, EQUIPMENT, UTILITIES, AND
IMPROVEMENTS (FAR 52.236-9) (APR 1984)

(a) The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

(b) The Contractor shall protect from damage all existing improvements and utilities (1) at or near the work site and (2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

H.12 USE AND POSSESSION PRIOR TO COMPLETION
(FAR 52.236-11) (APR 1984)

(a) The Government shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the Government intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The Government's possession or use shall not be deemed an acceptance of any work under the contract.

(b) While the Government has such possession or use, the Contractor shall be relieved of the responsibility for the loss of

or damage to the work resulting from the Government's possession or use, notwithstanding the terms of the clause in this contract entitled "Permits and Responsibilities." If prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

H.13 CLEANING UP (FAR 52.236-12) (APR 1984)

The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. Before completing the work, the Contractor shall remove from the work and premises any rubbish, tools, scaffolding, equipment, and materials that are not the property of the Government. Upon completing the work, the Contractor shall leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer.

H.14 ACCIDENT PREVENTION (FAR 52.236-13) (APR 1984) ALTERNATE I (APR 1984)

(a) In performing this contract, the Contractor shall provide for protecting the lives and health of employees and other persons; preventing damage to property, materials, supplies, and equipment; and avoiding work interruptions. For these purposes, the Contractor shall--

(1) Provide appropriate safety barricades, signs, and signal lights;

(2) Comply with the standards issued by the Secretary of Labor at 29 CFR Part 1926 and 29 CFR Part 1910; and

(3) Ensure that any additional measures the Contracting Officer determines to be reasonably necessary for this purpose are taken.

(b) If this contract is with any Department of Defense agency or component, the Contractor shall comply with all pertinent provisions of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, dated April 1981.

(c) The Contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this contract resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment. The Contractor shall report this data in the manner prescribed by the Contracting Officer.

(d) The Contracting Officer shall notify the Contractor of any noncompliance with these requirements and of the corrective action required. This notice, when delivered to the Contractor or the

Contractor's representative at the site of the work, shall be deemed sufficient notice of the noncompliance and corrective action required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to take corrective action promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop order issued under these circumstances.

(e) The Contractor shall be responsible for its subcontractors' compliance with this clause.

(f) Before commencing the work, the Contractor shall--

(1) Submit a written proposal for implementing this clause; and

(2) Meet with representatives of the Contracting officer to discuss and develop a mutual understanding relative to administration of the overall safety program.

H.15 SCHEDULES FOR CONSTRUCTION CONTRACTS (FAR 52.236-15) (APR 1984)

(a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring materials, plant, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule.

(b) The Contractor shall enter the actual progress on the chart as directed by the Contracting Officer, and upon doing so shall immediately deliver three copies of the annotated schedule to the Contracting Officer. If, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary

to demonstrate how the approved rate of progress will be regained.

(c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of this contract.

H.16 QUANTITY SURVEYS (FAR 52.236-16) (APR 1984)
ALTERNATE I (APR 1984)

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

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

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

H.17 LAYOUT OF WORK
(FAR 52.236-17) (APR 1984)

The Contractor shall lay out its work from Government-established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the

Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

H.18 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION
(FAR 52.236-21) (APR 1984) ALTERNATE II (APR 1984)

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

(b) Wherever in the specifications or upon the drawings the words "directed," "required," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the "direction," "requirement," "order," "designation," or "prescription," of the Contracting Officer is intended and similarly the words "approved," "acceptable," "satisfactory," or words of like import shall mean "approved by," or "acceptable to," or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

(c) Where "as shown," "as indicated," "as detailed," or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place," that is "furnished and installed."

(d) Shop drawings means drawings, submitted to the Government by the Contractor, subcontractor, any lower tier subcontractor pursuant to a construction contract, showing in detail (1) the proposed fabrication and assembly of structural elements and (2) the installation (i.e., form, fit, and attachment details) of materials of equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the contractor to explain in detail specific portions of the work required by the contract. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(e) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the Government's reasons therefor. Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) below.

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

(g) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the Contracting Officer and one set will be returned to the Contractor. Upon completing the work under this contract, the Contractor shall furnish 3 sets of prints of all shop drawings as finally approved. These drawings shall show changes and revisions made up to the time the equipment is completed and accepted.

(h) This clause shall be included in all subcontracts at any tier.

H.19 ARCHEOLOGICAL OR HISTORIC SITES (USDA 452.236-73) (FEB 1988)

If a previously unidentified archeological or historic site(s) is encountered, the Contractor shall discontinue work in the general area of the site(s) and notify the Contracting Officer immediately.

H.20 CONTROL OF EROSION, SEDIMENTATION AND POLLUTION (USDA 452.236-74) (FEB 1988)

Operations shall be scheduled and conducted to minimize erosion of soils and to prevent silting and muddying of streams, rivers, irrigation systems, and impoundments (lakes, reservoirs, etc.).

Pollutants such as fuels, lubricants, bitumens, raw sewage, and

other harmful materials shall not be discharged on to the ground, into or near rivers, streams, and impoundments or into natural or man-made channels. Wash water or waste from concrete or aggregate operations shall not be allowed to enter live streams prior to treatment by filtration, settling, or other means sufficient to reduce the sediment content to not more than that of the stream into which it is discharged.

Mechanized equipment shall not be operated in live streams without written approval by the Contracting Officer.

H.21 MAXIMUM WORKWEEK - CONSTRUCTION SCHEDULE (USDA 452.236-75) (FEB 1988)

Within 10 days after receipt of a written request from the Contracting Officer, the Contractor must submit the following information in writing for approval:

(a) A construction schedule as required by clause 52.236-15 "Schedules for Construction Contracts" and

(b) The hours and days of the week the Contractor proposes to carry out the work.

The maximum workweek that will be approved is 8 HRS/DAY Monday through Friday. The Contractor's proposed hours of work are to include daily starting and stopping times.

H.22 OPERATIONS, STORAGE AREAS, AND ACCESS

(a) The sponsors of this project have acquired adequate rights and interests in land to perform the work under this contract. Therefore, the Contractor is to confine all operations including storage of equipment, supplies, and materials to those land areas unless the Contractor, at his sole responsibility and expense, chooses to obtain the right to use adjacent land areas, roads, utilities, fences and other improvements not included on the provided land areas. (b) When ingress and egress are not defined on the drawings, the Contracting Officer will designate the ingress and egress routes. (c) Temporary buildings, such as storage sheds, shops, offices and utilities, may be erected only if approved by the Contracting Officer, or otherwise required by the contract. The temporary buildings and utilities will be erected or furnished by the Contractor at his expense and will remain the property of the Contractor; and upon completion of the work under this contract, the Contractor will remove such buildings and utilities at his expense. However, if the Contracting Officer consents, the buildings and utilities may be abandoned and need not be removed.

H.23 LABOR STANDARDS FOR CONSTRUCTION WORK--FACILITIES
CONTRACTS (FAR52.222-17) (FEB 1988)

(a) In the event that construction, alteration, or repair (including painting and decorating) of public buildings or public works is to be performed hereunder, the Contractor shall comply with the following listed clauses of the Federal Acquisition Regulation in performance of such work: (1) Contract Work Hours and Safety Standards Act-- Overtime Compensation at 52.222-4. (2) Davis-Bacon Act at 52.222-6. (3) Withholding of Funds at 52.222-7. (4) Payrolls and Basic Records at 52.222-8. (5) Apprentices and Trainees at 52.222-9. (6) Compliance With Copeland Act Requirements at 52.222-10. (7) Subcontracts (Labor Standards) at 52.222-11. (8) Contract Termination--Debarment at 52.222-12. (9) Compliance with Davis-Bacon and Related Act Regulations at 52.222-13. (10) Disputes Concerning Labor Standards at 52.222-14. (11) Certification of Eligibility at 52.222-15. (b) Upon determination by the Contracting Officer that the Davis-Bacon Act is applicable to any item of work to be performed hereunder, a determination of the prevailing wage rates shall be incorporated into the contract by modification. (c) No construction, alteration, or repair (including painting and decorating) of public buildings or public works shall be performed under this contract without incorporation of the wage determination unless the Contracting Officer authorizes the start of work because of unusual or emergency situations, in which case the wage determination shall be incorporated as soon as possible and made retroactive to the start of the work.

PART II - CONTRACT CLAUSESSECTION I - CONTRACT CLAUSESI.1 CLAUSES INCORPORATED BY REFERENCE
(FAR 52.252-2) (APR 1984)

This contract incorporates the following clauses by reference. These clauses have the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES

CLAUSE NUMBER	DATE	TITLE
52.202-1	APR 1984	DEFINITIONS ALTERNATE I (APR 1984)
52.203-1	APR 1984	OFFICIALS NOT TO BENEFIT
52.203-3	APR 1984	GRATUITIES
52.203-5	APR 1984	COVENANT AGAINST CONTINGENT FEES
52.214-26	APR 1985	AUDIT -- SEALED BIDDING
52.214-27	APR 1985	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA -- MODIFICATIONS -- SEALED BIDDING
52.214-28	APR 1985	SUBCONTRACTOR COST OR PRICING DATA -- MODIFICATIONS -- SEALED BIDDING
52.214-29	JAN 1986	ORDER OF PRECEDENCE -- SEALED BIDDING
52.219-6	APR 1984	NOTICE OF TOTAL SMALL BUSINESS SET-ASIDE
52.219-8	JUN 1985	UTILIZATION OF SMALL BUSINESS CONCERNS AND SMALL DISADVANTAGED BUSINESS CONCERNS
52.219-13	AUG 1986	UTILIZATION OF WOMEN-OWNED SMALL BUSINESSES
52.220-1	APR 1984	PREFERENCE FOR LABOR SURPLUS AREA CONCERNS
52.220-3	APR 1984	UTILIZATION OF LABOR SURPLUS AREA CONCERNS
52.222-3	APR 1984	CONVICT LABOR
52.222-26	APR 1984	EQUAL OPPORTUNITY
52.222-27	APR 1984	AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION

52.222-28	APR 1984	EQUAL OPPORTUNITY PREAWARD CLEARANCE OF SUBCONTRACTS
52.222-35	APR 1984	AFFIRMATIVE ACTION FOR SPECIAL DISABLED AND VIETNAM ERA VETERANS
52.222-36	APR 1984	AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS
52.223-2	APR 1984	CLEAN AIR AND WATER
52.225-5	APR 1984	BUY AMERICAN ACT -- CONSTRUCTION MATERIALS
52.227-1	APR 1984	AUTHORIZATION AND CONSENT
52.227-2	APR 1984	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT
52.227-4	APR 1984	PATENT INDEMNITY -- CONSTRUCTION CONTRACTS
52.228-1	APR 1984	BID GUARANTEE
52.228-2	APR 1984	ADDITIONAL BOND SECURITY
52.229-3	APR 1984	FEDERAL, STATE, AND LOCAL TAXES
52.229-5	APR 1984	TAXES -- CONTRACTS PERFORMED IN U.S. POSSESSIONS OR PUERTO RICO
52.232-17	APR 1984	INTEREST
52.232-23	JAN 1986	ASSIGNMENT OF CLAIMS
52.233-3	JUN 1985	PROTEST AFTER AWARD
52.244-1	JAN 1986	SUBCONTRACTS (FIXED- PRICE CONTRACTS)
52.248-3	APR 1984	VALUE ENGINEERING-CONSTRUCTION ALTERNATE I (APR 1984)
52.249-2	APR 1984	TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED PRICE) ALTERNATE I (APR 1984)
52.249-10	APR 1984	DEFAULT (FIXED-PRICE CONSTRUCTION) ALTERNATE II (APR 1984)

I.2 DAVIS-BACON ACT (40 U.S.C 276a--276a-7)
(FAR 52.222-6) (FEB 1988)

(a) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (d) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than

quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled "Apprentices and Trainees." Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (b) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(b) (1) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator of the Wage and Hour Division, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the

questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator for determination. The Administrator of the Wage and Hour Division, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (b)(2) or (b)(3) of this clause, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(c) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(d) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, that the Secretary of Labor has found, upon the written request of the Contractor, that applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(e) Paragraphs (a) through (d) of the clause shall apply to this contract to the extent that it is (1) a prime contract with the Government subject to the Davis-Bacon Act, or (2) a subcontract also subject to the Davis-Bacon Act under such prime contract.

I.3 APPRENTICES AND TRAINEES (FAR 52.222-9) (FEB 1988)

(a) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above shall be paid

not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(b) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination of the work actually

performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(c) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

I.4 PAYROLLS AND BASIC RECORDS (FAR 52.222-8)
(CONSTRUCTION) (FEB 1988)

(a) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under paragraph (d) of the clause entitled "Davis-Bacon Act" that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(b) (1) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Contracting Officer. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph (a) of this clause. The information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents, Government Printing Office. The Contractor is responsible for the submission of copies of payrolls

by all subcontractors.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this clause entitled "Payrolls and Basic Records" and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR Part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (b)(2) of this clause.

(4) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(c) The Contractor or subcontractor shall make the records required under paragraph (a) of this clause available for inspection, copying, or transcription by the Contracting Officer or the Department of Labor or their authorized representatives. The Contractor and subcontractors shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

I.5 COMPLIANCE WITH COPELAND ACT REQUIREMENT (FAR 52.222-10) (FEB 1988)

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

I.6 WITHHOLDING (FAR 52.222-7) (FEB 1988)

The Contracting Officer shall upon his/her own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Prime Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

I.7 SUBCONTRACTS (CONSTRUCTION)
(FAR 52.222-11) (FEB 1988)

The Contractor or subcontractor shall insert in any subcontracts the clauses entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act--Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Act Requirements," "Withholding," "Subcontracts," "Contract Termination Debarment," "Disputes Concerning Labor Standards," "Compliance with Davis-Bacon and Related Act Requirements," "Certification of Eligibility," and such other clauses as the Contracting Officer may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all the contract clauses cited above.

I.8 CONTRACT TERMINATION; DEBARMENT
(FAR 52.222-12) (FEB 1988)

A breach of the contract clauses entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act--Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Act Requirements," "Subcontracts," "Compliance with Davis-Bacon and Related Act Requirements," and "Certification of Eligibility," may be grounds for termination of the contract, and for debarment as a Contractor and a subcontractor as provided in 29 CFR 5.12.

I.9 DISPUTES CONCERNING LABOR STANDARDS
(FAR 52.222-14) (FEB 1988)

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

I.10 COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REQUIREMENTS (FAR 52.222-13) (FEB 1988)

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

I.11 CERTIFICATION OF ELIGIBILITY
(FAR 52.222-15) (FEB 1988)

(a) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

I.12 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT-- OVERTIME COMPENSATION (FAR 52.222-4) (MAR 1986)

(a) Overtime requirements. No Contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics (See Federal Acquisition Regulation (FAR) 22.300) shall require or permit any such laborers or mechanics in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than 1-1/2 times the basic rate of pay for all hours worked in excess of 40 hours in such workweek. (b) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the provisions set forth in paragraph (a) of this clause, the Contractor and any subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such

territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic employed in violation of the provisions set forth in paragraph (a) of this clause in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by provisions set forth in paragraph (a) of this clause.

(c) Withholding for unpaid wages and liquidated damages. The Contracting Officer shall upon his or her own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same Prime Contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same Prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the provisions set forth in paragraph (b) of this clause. (d)

Payrolls and basic records. (1) The Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of contract work and shall preserve them for a period of 3 years from the completion of the contract for all laborers and mechanics working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Nothing in this paragraph shall require the duplication of records required to be maintained for construction work by Department of Labor regulations at 29 CFR 5.5(a)(3) implementing the Davis-Bacon Act.

(2) The records to be maintained under paragraph (d)(1) of this clause shall be made available by the Contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Contracting Officer or the Department of Labor. The Contractor or subcontractor shall permit such representatives to interview employees during working hours on the job. (e) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the provisions set forth in paragraphs (a) through (e) of this clause and also a clause requiring the subcontractors to include these provisions in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the provisions set forth in paragraphs (a) through (e) of this clause.

I.13 BID GUARANTEE

(FAR 52.228-1) (APR 1984)

(a) 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. (b) The offeror (bidder) shall furnish a bid guarantee in the form of a firm commitment, such as a bid bond, postal money order, certified check, cashier's check, irrevocable letter of credit, or, under Treasury Department regulations, certain bonds or notes of the United States. The Contracting Officer will

return bid guarantees, other than bid bonds, (1) to unsuccessful bidders as soon as practicable after the opening of bids, and (2) to the successful bidder upon execution of contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted. (c) If the successful bidder, upon acceptance of its bid by the Government within the period specified for acceptance, fails to execute all contractual documents or give a bond(s) as required by the solicitation within the time specified, the Contracting Officer may terminate the contract for default. (d) Unless otherwise specified in the bid, the bidder will (1) allow 60 days for acceptance of its bid and (2) give bond within 10 days after receipt of the forms by the bidder. (e) In the event the contract is terminated for default, the bidder is liable for any cost of acquiring the work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

I.14 ADDITIONAL BOND SECURITY (FAR 52.228-2)(APR 1984)

The Contractor shall promptly furnish additional security required to protect the Government and persons supplying labor or materials under this contract if-- (a) Any surety upon any bond furnished with this contract becomes unacceptable to the Government; (b) Any surety fails to furnish reports on its financial condition as required by the Government; or (c) The contract price is increased so that the penal sum of any bond becomes inadequate in the opinion of the Contracting Officer.

I.15 INTEREST (FAR 52.232-17) (APR 1984)

(a) Notwithstanding any other clause of this contract, all amounts that become payable by the Contractor to the Government under this contract (net of any applicable tax credit under the Internal Revenue Code (26. U.S.C. 1481)) shall bear simple interest from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of the Treasury as provided in Section 12 of the Contract Disputes Act of 1978 (Public Law 95-563), which is applicable to the period in which the amount becomes due, as provided in paragraph (b) of this clause, and then at the rate applicable for each six-month period as fixed by the Secretary until the amount is paid. (b) Amounts shall be due at the earliest of the following dates: (1) The date fixed under this contract. (2) The date of the first written demand for payment consistent with this contract, including any demand resulting from a default termination. (3) The date the Government transmits to the Contractor a proposed supplemental agreement to confirm completed negotiations establishing the amount of debt. (4) If this contract provides for revision of prices, the date of written notice to the Contractor stating the amount of refund payable in connection with a pricing proposal or a negotiated pricing agreement not confirmed by contract modification. (c) The interest charge made under this clause may be reduced under the procedures prescribed in 32.614.2 of the Federal Acquisition

Regulation in effect on the date of this contract.

I.16 DISPUTES

(FAR 52.233-1) (APR 1984)

(a) This contract is subject to the Contract Disputes Act of 1978 (41 U.S.C. 601-613)(the Act). (b) Except as provided in the Act, all disputes arising under or relating to this contract shall be resolved under this clause. (c) "Claim," as used in this clause, means a written demand or a written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract. A claim arising under a contract, unlike a claim relating to that contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding \$50,000 is not a claim under the Act until certified as required by subparagraph (d)(2) below. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under the Act. The submission may be converted to a claim under the Act, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time. (d) (1) A claim by the Contractor shall be made in writing and submitted to the Contracting Officer for a written decision. A claim by the Government against the Contractor shall be subject to a written decision by the Contracting Officer. (2) For Contractor claims exceeding \$50,000, the Contractor shall submit with the claim a certification that-- (i) The claim is made in good faith; (ii) Supporting data are accurate and complete to the best of the Contractor's knowledge and belief; and (iii) The amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable. (3)(i) If the Contractor is an individual, the certification shall be executed by that individual. (ii) If the Contractor is not an individual, the certification shall be executed by-- (A) A senior company official in charge at the Contractor's plant or location involved; or (B) An officer or general partner of the Contractor having overall responsibility for the conduct of the Contractor's affairs. (e) For Contractor claims of \$50,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over \$50,000 the Contracting Officer must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made. (f) The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in the Act. (g) The Government shall pay interest on the amount found due and unpaid from (1) the date the Contracting Officer receives the claim (properly certified if required), or (2) the date payment otherwise would be due, if that date is later, until the date of payment. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Contracting Officer receives the claim and then at the rate applicable for each

6-month period as fixed by the Treasury Secretary during the pendency of the claim. (h) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under the contract, and comply with any decision of the Contracting Officer.

I.17 CHANGES
(FAR 52.243-4) (AUG 1987)

(a) The Contracting Officer may, at any time, without notice to the sureties, if any, by written order designated or indicated to be a change order, make changes in the work within the general scope of the contract, including changes-- (1) In the specifications (including drawings and designs); (2) In the method or manner of performance of the work; (3) In the Government-furnished facilities, equipment, materials, services, or site; or (4) Directing acceleration in the performance of the work. (b) Any other written or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; provided, that the Contractor gives the Contracting Officer written notice stating (1) the date, circumstances, and source of the order and (2) that the Contractor regards the order as a change order. (c) Except as provided in this clause, 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. (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 such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for an adjustment based on defective specifications, no adjustment for any change under paragraph (b) of this clause shall be made for any costs incurred more than 20 days before the Contractor gives written notice as required. In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications. (e) The Contractor must assert its right to an adjustment under this clause within 30 days after (1) receipt of a written change order under paragraph (a) of this clause or (2) the furnishing of a written notice under paragraph (b) of this clause, by submitting to the Contracting Officer a written statement describing the general nature and amount of the proposal, unless this period is extended by the Government. The statement of proposal for adjustment may be included in the notice under paragraph (b) above. (f) No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

I.18 LIMITATIONS ON SUBCONTRACTING
(FAR 52.219-14) (OCT 1987)

By submission of an offer and execution of a contract, the Offeror/Contractor agrees that in performance of the contract in the

case of a contract for-- (a) Services (except construction). At least 50 percent of the cost of contract performance incurred for personnel shall be expended for employees of the concern. (b) Supplies (other than procurement from a regular dealer in such supplies). The concern shall perform work for at least 50 percent of the cost of manufacturing the supplies, not including the cost of materials. least 15 percent of the cost of the contract, not including the cost of materials, with its own employees. (d) Construction by special trade contractors. The concern will perform at least 25 percent of the cost of the contract, not including the cost of materials, with its own employees.

I.19 EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS AND
VETERANS OF THE VIETNAM ERA(FAR 52.222-37)(JAN 1988)

(a) The contractor shall report at least annually, as required by the Secretary of Labor, on: (1) The number of special disabled veterans and the number of veterans of the Vietnam era in the workforce of the contractor by job category and hiring location; and (2) The total number of new employees hired during the period covered by the report, and of that total, the number of special disabled veterans, and the number of veterans of the Vietnam era. (b) The above items shall be reported by completing the form entitled "Federal Contractor Veterans' Employment Report VETS-100" (c) Reports shall be submitted no later than March 31 of each year beginning March 31, 1988. (d) The employment activity report required by paragraph (a)(2) of this clause shall reflect total hires during the most recent 12-month period as of the ending date selected for the employment profile report required by paragraph (a)(1) of this clause. Contractors may select an ending date: (1) As of the end of any pay period during the period January through March 1st of the year the report is due, or (2) as of December 31, if the contractor has previous written approval from the Equal Employment Opportunity Commission to do so for purposes of submitting the Employer Information Report EEO-1 (Standard Form 100). (e) The count of veterans reported according to paragraph (a) of this clause shall be based on voluntary disclosure. Each contractor subject to the reporting requirements at 38 U.S.C. 2012(d) shall invite all special disabled veterans and veterans of the Vietnam era who wish to benefit under the affirmative action program at 38 U.S.C. 2012 to identify themselves to the contractor. The invitation shall state that the information is voluntarily provided, that the information will be kept confidential, that disclosure or refusal to provide the information will not subject the applicant or employee to any adverse treatment and that the information will be used only in accordance with the regulations promulgated under 38 U.S.C. 2012. (f) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of \$10,000 or more unless exempted by rules, regulations, or orders of the Secretary.

I.20 PROMPT PAYMENT--ALTERNATE I
(FAR52.232-25) (FEB 1988)

Notwithstanding any other payment terms in this contract, the Government will make invoice payments and contract financing payments under the terms and conditions specified in this clause. Payment shall be considered as being made on the day a check is dated or an electronic funds transfer is made. Definitions of pertinent terms are set forth in 32.902. All days referred to in this clause are calendar days, unless otherwise specified. (a) Invoice Payments. (1) For purposes of this clause, "invoice payment" means a Government disbursement of monies to a Contractor under a contract or other authorization for work or services accepted by the Government, payments for partial deliveries that have been accepted by the Government, and progress payments based on contracting officer approval of the estimated amount and value of work or services performed. (2) The due date for making invoice payments shall be as described in this subparagraph (a)(2). (i) The due date for work or services completed by the Contractor shall be the later of the following two events: (A) The 30th day after the designated billing office has received a proper invoice from the Contractor. (B) The 30th day after Government acceptance of the work or services completed by the Contractor. On a final invoice where the payment amount is subject to contract settlement actions (e.g. release of claims), acceptance shall be deemed to have occurred on the effective date of the contract settlement. (ii) The due date for progress payments shall be the 30th day after Government approval of Contractor estimates of work or services accomplished. (3) An invoice is the Contractor's bill or written request for payment under the contract for work or services performed under the contract. An invoice shall be prepared and submitted to the designated billing office. A proper invoice must include the items listed in subdivisions (a)(3)(i) through (a)(3)(viii) of this clause. If the invoice does not comply with these requirements, then the Contractor will be notified of the defect within 15 days after receipt of the invoice at the designated billing office. Untimely notification will be taken into account in the computation of any interest penalty owed the Contractor in the manner described in paragraph (a)(5) of this clause: (i) Name and address of the Contractor. (ii) Invoice date. (iii) Contract number or other authorization for work or services performed (including order number and contract line item number). (iv) Description of work or services performed. (v) Delivery and payment terms (e.g. prompt payment discount terms). (vi) Name and address of Contractor official to whom payment is to be sent (must be the same as that in the contract or in a proper notice of assignment). (vii) Name (where practicable), title, phone number, and mailing address of person to be notified in event of a defective invoice. (viii) Any other information or documentation required by the contract. (4) An interest penalty shall be paid automatically by the designated payment office, without request from the Contractor, if payment is not made within 15 days after the due date and the following conditions are met, if applicable: (i) A proper invoice was received by the designated billing office. (ii) A receiving report or other Government documentation authorizing payment was processed

and there was no disagreement over quantity, quality, Contractor compliance with any contract term or condition, or requested progress payment amount. (iii) In the case of a final invoice for any balance of funds due the Contractor for work or services performed, the amount was not subject to further contract settlement actions between the Government and the Contractor. (5) The interest penalty shall be at the rate established by the Secretary of the Treasury under Section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611) that is in effect on the payment date, except where the interest penalty is prescribed by other governmental authority. This rate is referred to as the "Renegotiation Board Interest Rate," and it is published in the Federal Register semiannually on or about January 1 and July 1. The interest penalty shall accrue daily on the invoice payment amount approved by the Government and be compounded in 30-day increments inclusive from the first day after the due date through the payment date. That is, interest accrued at the end of any 30-day period will be added to the approved invoice payment amount and be subject to interest penalties if not paid in the succeeding 30-day period. If the designated billing office failed to notify the Contractor of a defective invoice within the periods prescribed in subparagraph (a)(3) of this clause, then the due date on the corrected invoice will be adjusted by subtracting the number of days taken beyond the prescribed notification of defects period. Any interest penalty owed the Contractor will be based on this adjusted due date. Adjustments will be made by the designated payment office for errors in calculating interest penalties, if requested by the Contractor. (i) For the sole purpose of computing an interest penalty that might be due the Contractor, Government acceptance or approval shall be deemed to have occurred constructively as shown in subdivisions (a)(5)(i)(A) and (B) of this clause. In the event that actual acceptance or approval occurs within the constructive acceptance or approval period, the determination of an interest penalty shall be based on the actual date of acceptance or approval. Constructive acceptance or constructive approval requirements do not apply if there is a disagreement over quantity, quality, Contractor compliance with a contract provision, or requested progress payment amounts. These requirements also do not compel Government officials to accept work or services, approve Contractor estimates, perform contract administration functions, or make payment prior to fulfilling their responsibilities. (A) For work or services completed by the Contractor, Government acceptance shall be deemed to have occurred constructively on the 10th working day after the Contractor has completed the work or services in accordance with the terms and conditions of the contract. (B) For progress payment, Government approval shall be deemed to have occurred on the 10th working day after Contractor estimates have been received by the designated billing office. (ii) The following periods of time will not be included in the determination of an interest penalty: (A) The period taken to notify the Contractor of defects in invoices submitted to the Government, but this may not exceed 15 days. (B) The period between the defects notice and resubmission of the corrected invoice by the Contractor. (iii) Interest penalties will not continue to accrue after the filing of a claim for such penalties under the clause at 52.233-1, Disputes, or for more than 1

year. Interest penalties of less than \$1.00 need not be paid. (iv) Interest penalties are not required on payment delays due to disagreement between the Government and contractor over the payment amount or other issues involving contract compliance, or on amounts temporarily withheld or retained in accordance with the terms of the contract. Claims involving disputes, and any interest that may be payable, will be resolved in accordance with the clause at 52.233-1, Disputes. (6) An interest penalty shall also be paid automatically by the designated payment office, without request from the Contractor, if an improperly taken discount for prompt payment was not corrected within 15 days after the expiration of the discount period. The interest penalty will be calculated on the amount of discount taken for the period through the date when the Contractor is paid. (b) Contract Financing Payments. (1) For purposes of this clause, if applicable, "contract financing payment" means a Government disbursement of monies to a Contractor under a contract clause or other authorization prior to acceptance of supplies or services by the Government, other than progress payments based on estimates of amount and value of work performed. Contract financing payments include advance payments. (2) If this contract provides for contract financing requests for payment shall be submitted to the designated billing office as specified in this contract or as directed by the Contracting Officer. Contract financing payments shall be made on the 30th day after receipt of a proper contract financing request by the designated billing office. In the event that an audit or other review of a specific financing request is required to ensure compliance with the terms and conditions of the contract, the designated payment office is not compelled to make payment by the due date specified. For advance payment, loans, or other arrangements that do not involve recurrent submissions of contract financing requests, payment shall be made in accordance with the corresponding contract terms or as directed by the Contracting Office. Contract financing payments shall not be assessed an interest penalty for payment delays.

OTHER INVOICING REQUIREMENTS UNDER PROMPT PAYMENT ALTERNATE I (SCS, AMB, APRIL 1988)

(a) In addition to the information required in clause 52.232-25 Alternate I, the contractor shall provide the following: (1) The original and one copy of each invoice are to be delivered to the contracting officer at the location shown in block 24 of form SF-1442. (2) One copy is to be submitted to the contracting officer's representative (COR) who will be identified prior to a work start. (3) The following must be attached to the original submitted to the contracting officer and to the copy submitted to the COR: (i) A copy of the payrolls and statements of compliance not previously submitted to cover the period of time for which the invoice is submitted. (ii) A copy of paid invoices for payment of materials and services when the contractor is requesting payment for materials onsite. These invoices must be identified by the bid item to which they apply. (iii) An itemized listing of costs incurred for lump sum bid items supported when applicable by paid invoices when the contractor is requesting progress payments on a lump sum item. (b) The data shown in 52.232-25(a)(3)(iv) and above shall be

lited by bid item number (CLIN) given in Section B of this contract and include the unit price and invoice total for that bid item.

I.21 ANTI-KICKBACK PROCEDURES
(FAR52.203-7) (FEB 1987)

(a) Definitions. "Kickback," as used in this clause, means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided, directly or indirectly, to any prime Contractor, prime Contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a subcontract relating to a prime contract. "Person," as used in this clause, means a corporation, partnership, business association of any kind, trust, joint stock company, or individual. "Prime contract," as used in this clause, means a contract or contractual action entered into by the United States for the purpose of obtaining supplies, materials, equipment, or services of any kind. "Subcontractor," as used in this clause, (1) means any person, other than the prime Contractor, who offers to furnish or furnishes any supplies, materials, equipment, or services of any kind under a prime contractor or a subcontract entered into in connection with such prime contract, and (2) includes any person who offers to furnish or furnishes general supplies to the prime Contractor or a higher tier subcontractor. "Subcontractor employee," as used in this clause means any officer, partner, employee, or agent of a subcontractor. (b) The Anti-Kickback Act of 1986 (41 U.S.C. 51-58) (the Act), prohibits any person from-- (1) Providing or attempting to provide or offering to provide any kickback; (2) Soliciting, accepting, or attempting to accept any kickback; or (3) Including, directly or indirectly, the amount of any kickback in the contract price charged by a prime Contractor to the United States or in the contract price charged by a subcontractor to a prime Contractor or higher tier subcontractor. (c)(1) The Contractor shall have in place and follow reasonable procedures designed to prevent and detect possible violations described in paragraph (b) of this clause in its own operations and direct business relationships. (2) When the Contractor has reasonable grounds to believe that a violation described in paragraph (b) of this clause may have occurred, the Contractor shall promptly report in writing the possible violation. Such reports shall be made to the inspector general of the contracting agency, the head of the contracting agency if the agency does not have an inspector general, or the Department of Justice. (3) The Contractor shall cooperate fully with any Federal agency investigating a possible violation described in paragraph (b) of this clause. (4) Regardless of the contract tier at which a kickback was provided, accepted, or charged under the contract in violation of paragraph (b) of this clause, the Contracting Officer may-- (i) Offset the amount of the kickback against any monies owed by the United States under this contract and/or (ii) direct that the Contractor withhold from sums owed the subcontractor, the amount of the kickback. The Contracting Officer may order that monies withheld under subdivision (c)(4)(ii) of this clause be paid over to the Government unless the Government has already offset those monies under subdivision (c)(4)(i) of this

clause. In the latter case, the Contractor shall notify the Contracting Officer when the monies are withheld. (5) The Contractor agrees to incorporate the substance of this clause, including this subparagraph (c)(5), in all subcontracts under this contract.

I.22 PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS (FAR52.232-5)(AUG 1987)

(a) The Government shall pay the Contractor the contract price as provided in this contract. (b) The Government shall make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates of work accomplished which meets the standards of quality established under the contract as 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 may authorized material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site may also be taken into consideration if-- (1) Consideration is specifically authorized by this contract; and (2) The Contractor furnishes satisfactory evidence that it has acquired title to such material and that the material will be used to perform this contract. (c) If the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, the Contracting Officer shall authorize payment to be made in full. However, if satisfactory progress has not been made, the Contracting Officer may retain a maximum of 10 percent of the amount of the payment until satisfactory progress is achieved. When the work is substantially complete, the Contracting Officer may retain from previously withheld funds and future progress payments that amount the Contracting Officer considers adequate for protection of the Government and shall release to the Contractor all the remaining withheld funds. Also, on completion and acceptance of each separate building, public work, or other division of the contract, for which the price is stated separately in the contract, payment shall be made for the completed work without retention of a percentage. (d) All material and work covered by progress payments made shall, at the time of payment, become the sole property of the Government, but this shall not be construed as-- (1) 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 (2) Waiving the right of the Government to require the fulfillment of all of the terms of the contract. (e) In making these progress payments, the Government shall, upon request, reimburse the Contractor for the amount of premiums paid for performance and payment bonds (including coinsurance and reinsurance agreements, when applicable) after the Contractor has furnished evidence of full payment to the surety. The retainage provisions in paragraph (c) above shall not apply to that portion of progress payments attributable to bond premiums. (f) The Government shall pay the amount due the Contractor under this contract after-- (1) Completion

and acceptance of all work; (2) Presentation of a properly executed voucher; and (3) Presentation of release of all claims against the Government arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned under the Assignment of Claims Act of 1940 (31 U.S.C. 3727 and 41 U.S.C. 15). (g) Notwithstanding any provision of this contract, progress payments shall not exceed 80 percent on work accomplished on undefinitized contract actions. A "contract action" is any action resulting in a contract, as defined in FAR Support 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract modifications issued pursuant to the Changes clause, or funding and other administrative changes.

PART III - LIST OF DOCUMENTS, EXHIBITS
AND OTHER ATTACHMENTS

SECTION J -- LIST OF ATTACHMENTS

J.1 LIST OF ATTACHMENTS (USDA 452.252.70) (JUL 1985)

SCS SUPPLEMENT TO OSHA PARTS 1910 AND 1926
WAGE DECISION NO. AZ87-2 WITH MODIFICATIONS
STANDARD FORM 24, BID BOND
DRAWINGS NO. AZ-85015-CH (PAGES 1 THROUGH 25)

CONSTRUCTION SPECIFICATIONS

2. CLEARING AND GRUBBING (2 PAGES)
3. STRUCTURE REMOVAL (2 PAGES)
5. POLLUTION CONTROL (4 PAGES)
7. ENGINEERING CONSTRUCTION SURVEYS (4 PAGES)
8. MOBILIZATION (2 PAGES)
10. WATER FOR CONSTRUCTION (3 PAGES)
11. REMOVAL OF WATER (3 PAGES)
21. EXCAVATION (5 PAGES)
23. EARTHFILL (9 PAGES)
24. DRAINFILL (5 PAGES)
31. CONCRETE (37 PAGES)
34. STEEL REINFORCEMENT (6 PAGES)
42. CONCRETE PIPE CONDUITS AND DRAINS (6 PAGES)
51. CORRUGATED METAL PIPE CONDUITS (3 PAGES)
81. METAL FABRICATION AND INSTALLATION (4 PAGES)
82. CLEANING AND PAINTING METALWORK (6 PAGES)
93. IDENTIFICATION MARKERS OR PLAQUES (2 PAGES)
94. CONTRACTOR INSPECTION (6 PAGES)
206. SOIL-CEMENT (10 PAGES)
207. PLASTIC PIPE DRAINS (5 PAGES)

MATERIAL SPECIFICATIONS

306. ASPHALT LIQUID SLOW, MEDIUM AND RAPID CURING (2 PAGES)
521. AGGREGATES FOR DRAINFILL AND FILTER (1 PAGE)
522. AGGREGATE FOR PORTLAND CEMENT CONCRETE (2 PAGES)
531. PORTLAND CEMENT (1 PAGE)
532. AIR-ENTRAINING ADMIXTURES (FOR CONCRETE) (1 PAGE)
533. WATER-REDUCING AND SET-RETARDING ADMIXTURES FOR PORTLAND CEMENT CONCRETE (1 PAGE)
534. CURING COMPOUND (FOR CONCRETE) (1 PAGE)
535. PREFORMED EXPANSION JOINT FILLER (1 PAGE)
537. NON-METALLIC WATERSTOPS (6 PAGES)
539. STEEL REINFORCEMENT (FOR CONCRETE) (2 PAGES)
542. CONCRETE CULVERT PIPE (1 PAGE)
551. ZINC-COATED IRON OR STEEL CORRUGATED PIPE (1 PAGE)
581. METAL (2 PAGES)
582. GALVANIZING (1 PAGE)

PART IV - REPRESENTATIONS AND INSTRUCTIONS

SECTION K - REPRESENTATIONS, CERTIFICATIONS AND
OTHER STATEMENTS OF OFFERORS

K.1 CERTIFICATE OF INDEPENDENT PRICE
DETERMINATION (FAR 52.203-2) (APR 1985)

(a) The offeror certifies that--

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to (i) those prices, (ii) the intention to submit an offer, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory--

(1) Is the person in the offeror's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above

[Insert full name of person(s) in the offeror's organization responsible for determining the prices offered in the bid or proposal, and the title of his or her position in the offeror's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the offeror deletes or modifies subparagraph (a)(2) above, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

K.2 CONTINGENT FEE REPRESENTATION AND AGREEMENT (FAR 52.203-4) (APR 1984)

(a) Representation. The offeror represents that, except for full-time bona fide employees working solely for the offeror, the offeror--

[Note: The offeror must check the appropriate boxes. For interpretation of the representation, including the term "bona fide employee," see Subpart 3.4 of the Federal Acquisition Regulation.]

(1) [] has, [] has not employed or retained any person or company to solicit or obtain this contract; and

(2) [] has, [] has not paid or agreed to pay to any person or company employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(b) Agreement. The offeror agrees to provide information relating to the above Representation as requested by the Contracting Officer and, when subparagraph (a)(1) or (a)(2) is answered affirmatively, to promptly submit to the Contracting Officer--

(1) A completed Standard Form 119, Statement of Contingent or Other Fees, (SF 119); or

(2) A signed statement indicating that the SF 119 was previously submitted to the same contracting office, including the date and applicable solicitation or contract number, and representing that the prior SF 119 applies to this offer or quotation.

K.3 DATA UNIVERSAL NUMBERING SYSTEM (DUNS)
(USDA 452.204-70) (FEB 1988)

(a) The offeror is requested to insert the DUNS number applicable to the contractor's address shown on the solicitation form.

DUNS NO. _____

(b) If the production point (point of final assembly) is other than the location entered on the solicitation form, or if additional production points are involved, enter the DUNS number applicable to each production point in the space provided below.

ITEM NO.	MANUFACTURER	PRODUCTION POINT	DUNS NO.
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(c) If DUNS numbers have not been established for the contractor, or the production point(s) shown above, a number will be assigned upon request by Dun & Bradstreet, Allentown, Pennsylvania, phone (215) 776-4388, 89, 90 or 91.

K.4 PARENT COMPANY AND IDENTIFYING DATA
(FAR 52.214-8) (APR 1984)

(a) A "parent" company, for the purpose of this provision, is one that owns or controls the activities and basic business policies of the bidder. To own the bidding company means that the parent company must own more than 50 percent of the voting rights in that company. A company may control a bidder as a parent even though not meeting the requirement for such ownership if the parent company is able to formulate, determine, or veto basic policy decisions of the offeror through the use of dominant minority voting rights, use of proxy voting, or otherwise.

(b) The bidder [] is, [] is not owned or controlled by a parent company.

(c) If the bidder checked "is" in paragraph (b) above, it shall provide the following information:

Name and Main Office Address
of Parent Company
(Including Zip Code)

Parent Company's Employer's
Identification Number

(d) If the bidder checked "is not" in paragraph (b) above, it shall insert its own Employer's Identification Number on the following line

K.5 SMALL BUSINESS CONCERN REPRESENTATION
(FAR 52.219-1) (MAY 1986)

The offeror represents and certifies as part of its offer that it [] is, [] is not a small business concern and that [] all, [] not all end items to be furnished will be manufactured or produced by a small business concern in the United States, its territories or possessions, Puerto Rico, or the Trust Territory of the Pacific Islands. "Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the size standards in this solicitation.

K.6 SMALL DISADVANTAGED BUSINESS CONCERN
REPRESENTATION (FAR 52.219-2) (APR 1984)

(a) Representation. The offeror represents that it [] is, [] is not a small disadvantaged business concern.

(b) Definitions.

"Asian-Indian American," as used in this provision, means a United States citizen whose origins are in India, Pakistan, or Bangladesh.

"Asian-Pacific American," as used in this provision, means a United States citizen whose origins are in Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, the U.S. Trust Territory of the Pacific Islands, the Northern Mariana Islands, Laos, Cambodia, or Taiwan.

"Native Americans," as used in this provision, means American Indians, Eskimos, Aleuts, and native Hawaiians.

"Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria and size standards in 13 CFR 121.

"Small disadvantaged business concern," as used in this provision, means a small business concern that (1) is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged, or a publicly owned business having at least 51 percent of its stock owned by one or more socially and economically disadvantaged individuals and (2) has its management and daily business controlled by one or more such individuals.

(c) Qualified groups. The offeror shall presume that socially and

economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Asian-Indian Americans, and other individuals found to be qualified by the SBA under 13 CFR 124.1.

K.7 WOMEN-OWNED SMALL BUSINESS REPRESENTATION
(FAR 52.219-3) (APR 1984)

(a) Representation. The offeror represents that it [] is, [] is not a women-owned small business concern.

-(b) Definitions.

"Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominate in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria and size standards in 13 CFR 121.

"Women-owned," as used in this provision, means a small business that is at least 51 percent owned by a woman or women who are U.S. citizens and who also control and operate the business.

K.8 PREFERENCE FOR LABOR SURPLUS AREA CONCERNS
(FAR 52.220-1) (APR 1984)

(a) This acquisition is not a set aside for labor surplus area (LSA) concerns. However, the offeror's status as such a concern may affect (1) entitlement to award in case of tie offers or (2) offer evaluation in accordance with the Buy American Act clause of this solicitation. In order to determine whether the offeror is entitled to a preference under (1) or (2) above, the offeror must identify, below, the LSA in which the costs to be incurred on account of manufacturing or production (by the offeror or the first-tier subcontractors) amount to more than 50 percent of the contract price.

(b) Failure to identify the locations as specified above will preclude consideration of the offeror as an LSA concern. If the offeror is awarded a contract as an LSA concern and would not have otherwise qualified for award, the offeror shall perform the contract or cause the contract to be performed in accordance with the obligations of an LSA concern.

**K.9 CERTIFICATION OF NONSEGREGATED FACILITIES
(FAR 52.222-21) (APR 1984)**

(a) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that 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.

(b) By the submission of this offer, the offeror certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The offeror agrees that a breach of this certification is a violation of the Equal Opportunity clause in the contract.

(c) The offeror further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) it will--

(1) Obtain identical certifications from proposed subcontractors before the award of subcontracts under which the subcontractor will be subject to the Equal Opportunity clause;

(2) Retain the certifications in the files; and

(3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

**NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR
CERTIFICATIONS OF NONSEGREGATED FACILITIES**

A Certification of Nonsegregated Facilities must be submitted before the award of a subcontract under which the subcontractor will be subject to the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

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

**K.10 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS
(FAR 52.222-22) (APR 1984)**

The offeror represents that--

(a) It [] has, [] has not participated in a previous contract or subcontract subject either to the Equal Opportunity clause of this solicitation, the clause originally contained in Section 310 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114;

(b) It [] has, [] has not filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

K.11 CLEAN AIR AND WATER CERTIFICATION
(FAR 52.223-1) (APR 1984)

The Offeror certifies that--

(a) Any facility to be used in the performance of this proposed contract is [], is not [] listed on the Environmental Protection Agency List of Violating Facilities;

(b) The Offeror will immediately notify the Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the Offeror proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and

(c) The Offeror will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

K.12 SOCIAL SECURITY NUMBERS OF CONSULTANTS AND
CERTAIN SOLE PROPRIETORS AND PRIVACY ACT
STATEMENT (USDA 452.224-70) (FEB 1988)

(a) Section 6041 of Title 26 of the U.S. Code requires an executive agency to file Internal Revenue Service (IRS) Form 1099 with respect to individuals who receive payments from USDA under purchase orders or contracts. Section 6109 of Title 26 of the U.S. Code authorizes collection by an executive agency of the social security numbers of such individuals for the purpose of filing IRS Form 1099. Social security numbers obtained for this purpose will be used by USDA for the sole purpose of filing IRS Form 1099 in compliance with Section 6041 of Title 26 of the U.S. Code.

(b) If the offeror or quoter is an individual, consultant, or sole proprietor and has no Employer Identification Number, insert the offeror's or quoter's social security number on the following line.

**K.13 RESTRICTIONS ON FEDERAL PUBLIC WORKS PROJECTS
CERTIFICATION (FAR52.225-12) (APR 1988)**

(a) Definitions. The definitions pertaining to this provision are those that are set forth in the clause entitled, "Restrictions on Federal Public Works Projects." (b) Certification. Except as provided in paragraph (c) of this provision, by submission of its offer, the offeror certifies that is-- (1) Is not a Contractor of a foreign country included on the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR) (see paragraph (h) of this provision): (2) Has not or will not enter into any subcontract with a subcontractor of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR; and (3) Will not provide any product of a country included on the list of foreign countries that discriminate against U.S. firms published by the USTR. (c) Inability to certify. An offeror unable to certify in accordance with paragraph (b) of this provision shall submit with its offer a written explanation fully describing the reasons for its inability to make the certification. (d) Applicability of 18 U.S.C. 1001. The certification in paragraph (b) of this provision concerns a matter within the jurisdiction of any agency of the United States and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001. (e) Notice. The offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. (f) Restrictions on contract award. Unless a waiver to these restrictions is granted by the President of the United States or the Head of the Agency, no contract will be awarded to an offeror (1) who is owned or controlled by a citizen or national of a foreign country included on the list of foreign countries that discriminate against U.S. firms published by the USTR, (2) whose subcontractors are owned or controlled by citizen(s) or national(s) of a foreign country on such USTR list, or (3) who incorporates any product of a foreign country on such USTR list in the Federal public works project. (g) Recordkeeping. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (b) of this provision. The knowledge and information of an offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings. (h) USTR list. The USTR published an initial list in the Federal Register on December 30, 1987 (53 FR 49244), which identified one country, Japan. The USTR can add countries to the list, and delete countries from it in accordance with section 109(c) of Pub. L. 100-202.

K.14 RESTRICTIONS ON FEDERAL PUBLIC WORKS PROJECTS
(FAR52.225-13) (APR 1988)

(a) Definitions. "Component," as used in this clause, means those articles, materials, and supplies incorporated directly into the product. "Contractor or subcontractor of a foreign country." as used in this clause, means any Contractor or subcontractor that is a citizen or national of a foreign country, or is controlled directly or indirectly by citizens or nationals of a foreign country. A Contractor or subcontractor shall be considered to be a citizen or national of a foreign country, or controlled directly or indirectly by citizens or nationals of a foreign country-- (1) If 50 percent or more of the Contractor or subcontractor is owned by a citizen or a national of the foreign country; (2) If the title to 50 percent or more of the stock of the Contractor or subcontractor is held subject to trust or fiduciary obligations in favor of a citizen(s) or national(s) of the foreign country; (3) If 50 percent or more of the voting power in the Contractor or subcontractor is vested in or exercisable on behalf of a citizen(s) or national(s) of the foreign country; (4) In the case of a partnership, if any general partner is a citizen of the foreign country; (5) In the case of a corporation, if its president or other chief executive officer or the chairman of its board of directors is a citizen of the foreign country or the majority of any number of its directors necessary to constitute a quorum are citizens of the foreign country or the corporation is organized under the laws of the foreign country or any subdivision, territory, or possession thereof; or (6) In the case of a contractor or subcontractor who is a joint venture, if any participant is a citizen or national of a foreign country or meets any of the criteria in subparagraphs (a)(1) through (5) of this clause. "Products," as used in this clause, means construction materials; i.e., articles, materials, and supplies brought to the construction site for incorporation into the public works project. In determining the origin of a product, Federal agencies or recipients of Federal funds are to consider a product as produced in a foreign country if it has been assembled or manufactured in the foreign country, or if the cost of the components mined, produced, or manufactured in the foreign country exceed 50 percent of the cost of all its components. (b) Restrictions. The Contractor shall not (1) knowingly enter into any subcontract under this contract with a subcontractor of a foreign country included on the list of countries that discriminate against U.S. firms published by the United States Trade Representative (USTR) (see paragraph (c) of this clause, or (2) supply any product under this contract of a country included on the list of foreign countries that discriminate against U.S. firms published by the USTR. (c) USTR list. The USTR published an initial list in the Federal Register on December 30, 1987 (53 FR 49244), which identified one country, Japan. The USTR can add other countries to the list, and delete countries from it, in accordance with section 109(c) of Pub. L. 100-202. (d) Certification. The Contractor may rely upon the certification of a prospective subcontractor that it is not a subcontractor of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR and that products supplied by such subcontractor for use on the Federal public works project under this

contract are not products of a foreign country included on the list of foreign countries that discriminate against U.S. firms published by the USTR, unless the Contractor has knowledge that the certification is erroneous. (e) Subcontracts. The Contractor shall incorporate this clause, modified only to properly identify the parties, including this paragraph (e), in all subcontracts.

SECTION L - INSTRUCTIONS, CONDITIONS, AND NOTICES
TO OFFERORS

L.1 SOLICITATION PROVISIONS INCORPORATED BY
REFERENCE (FAR 52.252-1) (APR 1984)

This solicitation incorporates the following provisions by reference. These provisions have the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)
SOLICITATION PROVISIONS

PROVISION NUMBER	DATE	TITLE
52.214-1	APR 1985	SOLICITATION DEFINITIONS -- SEALED BIDDING
52.214-3	APR 1984	ACKNOWLEDGEMENT OF AMENDMENTS TO INVITATIONS FOR BIDS
52.214-4	APR 1984	FALSE STATEMENTS IN BIDS
52.214-5	APR 1984	SUBMISSION OF BIDS
52.214-6	APR 1984	EXPLANATION TO PROSPECTIVE BIDDERS
52.214-7	APR 1984	LATE SUBMISSIONS, MODIFICATIONS, AND WITHDRAWALS OF BIDS
52.214-17	APR 1984	AFFILIATED BIDDERS
52.214-18	APR 1984	PREPARATION OF BIDS -- CONSTRUCTION

L.2 INQUIRIES (USDA 452.204-71) (FEB 1988)

Inquiries and all correspondence concerning this solicitation document should be submitted in writing to the Contracting Officer. OFFERORS ARE INSTRUCTED SPECIFICALLY TO CONTACT ONLY THE CONTRACTING OFFICER ISSUING THE SOLICITATION ABOUT ANY ASPECT OF THIS REQUIREMENT PRIOR TO CONTRACT AWARD.

L.3 CONTRACT AWARD--SEALED BIDDING--CONSTRUCTION
(FAR 52.214-19) (FEB 1986)

(a) The Government will evaluate bids in response to this solicitation without discussions and will award a contract to the

responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the Government, considering only price and the price-related factors specified elsewhere in the solicitation.

(b) The Government may reject any or all bids, and waive informalities or minor irregularities in bids received.

(c) The Government may accept any item or combination of items, unless doing so is precluded by a restrictive limitation in the solicitation or the bid.

L.4 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION
TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY
(FAR 52.222-23) (APR 1984)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Trade	Percent of Contractor Aggregate Workforce %
ALL	16.8

Goals for female participation for each trade:

Trade	Percent of Contractor Aggregate Workforce %
ALL	6.9

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be used on (1) its implementation of the Equal Opportunity clause, (2) specific

affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Director, Office of Federal Contract Compliance Programs, within 10 working days following award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the--

- (1) Name, address, and telephone number of the subcontractor;
 - (i) Employer identification number of the subcontractor;
- (2) Estimated dollar amount of the subcontract;
- (3) Estimated starting and completion dates of the subcontract;
and
- (4) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is:
MARICOPA COUNTY, ARIZONA

L.5 SET-ASIDE/SIZE-STANDARD INFORMATION
(USDA 452.219-70) (FEB 1988)

This solicitation includes the following set-aside and/or size standard criteria:

- (a) Percent of the set-aside: 100%
- (b) Type of set-aside: Total, Small Business
- (c) Size standard or other criteria: No more than 17 million dollars average annual receipts for an offeror's preceding 3 fiscal years.
- (d) Standard Industrial Classification (SIC Code): 1629.

L.6 NOTICE OF REQUIRED BID GUARANTEE
(USDA 452.228-70) (FEB 1988)

If a contract exceeds \$25,000, each bidder must submit a bid guarantee in the amount of 20 percent of the total bid price, but in no event shall the penal sum exceed \$3 million. If a bid bond is submitted, it should be on Standard Form 24. Money orders, cashiers checks, or certified checks, if used, shall be drawn payable to: USDA, SOIL CONSERVATION SERVICE.

L.7 PRE-BID/PRE-PROPOSAL CONFERENCE AND SITE VISIT
(USDA 452.237-72) (FEB 1988)

The Government is planning a preproposal conference and site visit during which potential contractors may obtain a better understanding of the work required.

Offerors are strongly urged to visit this site during the conference to fully inform themselves about the location and conditions under which the work is to be performed.

Offerors are encouraged to submit all questions in writing at least five (5) days prior to the conference. Questions will be considered at any time prior to, or during, the conference; however, offerors will be asked to confirm verbal questions in writing. Subsequent to the conference an amendment containing an abstract of the questions and answers, and a list of attendees, will be disseminated to all participants.

In order to facilitate conference preparations it is requested that the person named on the Standard Form 1442 of this solicitation be contacted and advised of the number of persons who will attend.

The Government assumes no responsibility for any expense incurred by an offeror prior to contract award.

Offerors are cautioned that, notwithstanding any remarks or clarifications given at the conference, all terms and conditions of the solicitation remain unchanged unless they are changed by amendment. If the answers to conference questions, or any solicitation amendment, create ambiguities it is the responsibility of the offeror to seek clarification prior to submitting an offer.

The conference will be held:

Date: July 28, 1988 and August 16, 1988

Time: 10:00 A.M. ON BOTH DATES

Location: Assemble at the bridge on Broadway Road, 1/2 mile
East of Higley Road, Mesa, Arizona.

L.8 SERVICE OF PROTEST (FAR 52.233-2) (JAN 1985)

Protests, as defined in Section 33.101 of the Federal Acquisition Regulation, shall be served on the Contracting Officer by obtaining written and dated acknowledgement of receipt from:

CAROL L. HARRIS

Hand-Carried Address:

USDA SOIL CONSERVATION SERVICE
201 E. INDIANOLA AVE., SUITE 200
PHOENIX, AZ 85012

Mailing Address:

USDA SOIL CONSERVATION SERVICE
201 E. INDIANOLA AVE., SUITE 200
PHOENIX, AZ 85012

SECTION M - EVALUATION FACTORS FOR AWARD

[For this Solicitation, there are NO provisions in this Section]

**SOIL CONSERVATION SERVICE
SUPPLEMENT TO OSHA PARTS 1910 AND 1926
CONSTRUCTION INDUSTRY STANDARDS AND INTERPRETATIONS**

The contractor shall comply with OSHA (Occupational Safety and Health Administration) Parts 1910 and 1926, Construction Industry Standards and Interpretations, and with this supplement.

Requests for variances or waivers from this supplement are to be made to the contracting officer in writing supported by evidence that every reasonable effort has been made to comply with the contractual requirements. A written request for a waiver or a variance shall include--

- (1) Specific reference to the provision or standard in question;
- (2) An explanation as to why the waiver is considered justified; and
- (3) The contractor's proposed alternative, including technical drawings, materials, or equipment specifications needed to enable the contracting officer to render a decision.

No waiver or variance will be approved if it endangers any person. The contractor shall not proceed under any requested revision of a provision until the contracting officer has given written approval. The contractor is to hold and save harmless the Soil Conservation Service or free from any claims or causes of action whatsoever resulting from the contractor or subcontractors proceeding under a waiver or approved variance.

Copies of OSHA Part 1910 and 1926, Construction Industry Standards and Interpretations, may be obtained from:

**Superintendent of Documents
U. S. Government Printing Office
Washington, D.C. 20402**

**SOIL CONSERVATION SERVICE
SUPPLEMENT TO OSHA PARTS 1910 AND 1926
CONSTRUCTION INDUSTRY STANDARDS AND INTERPRETATIONS**

GENERAL CONTRACTOR REQUIREMENTS

1.1 SAFETY PROGRAM. Each contractor is to demonstrate that he or she has facilities for conducting a safety program commensurate with the work under contract. The contractor is to submit in writing a proposed comprehensive safety program to the contracting officer for approval before the start of construction operations. The program is to specifically state what provisions the contractor proposes to take for the health and safety of all employees, including subcontractors and rental equipment operators. The program shall be site specific and provide details relevant to the work to be done, the hazards associated with the works, and the actions that will be necessary to minimize the identified hazards.

1.2 PRECONSTRUCTION SAFETY MEETING. Representatives for the contractor are to meet with the contracting officer (CO) or the CO's representative before the start of construction to discuss the safety program and the implementation of all health and safety standards pertinent to the work under this contract.

1.3 JOINT SAFETY POLICY COMMITTEE. The contractor or designated onsite representative is to participate in monthly meetings of a Joint Safety Policy Committee, composed of and contractor supervisory personnel. At these meetings the contractor's project manager and the contracting officer will review the effectiveness of the contractor's safety effort, resolve current health and safety problems, and coordinate safety activities for upcoming work.

1.4 SAFETY PERSONNEL. Each contractor is to designate a competent supervisory employee satisfactory to the contracting officer to administer the safety program.

1.5 SAFETY MEETINGS. A minimum of one "on-the-job" or "toolbox" safety meeting is to be conducted each week by all field supervisors or foremen and attended by mechanics and all construction personnel at jobsite. The contractor is to also conduct regularly scheduled supervisory safety meetings at least monthly for all levels of job supervision.

1.6 SAFETY INSPECTION. The contractor shall perform frequent and regular safety inspections of the jobsite, materials, and equipment, and shall correct deficiencies.

1.7 FIRST AID TRAINING. Every contractor foreman's work crew must include an employee who has a current first aid certificate from the Mine Safety and Health Administration, American Red Cross, or other state-approved organization.

1.8 REPORTS. Each contractor is to maintain an accurate record of all job-related deaths, diseases, or disabling injuries. The records shall be maintained in a manner approved by the contracting officer. A copy of all reports is to be provided to the contracting officer. All fatal or serious injuries are to be reported immediately to the contracting officer, and every assistance is to be given in the investigation of the incident, including submission of a comprehensive narrative report to the contracting officer. Other occurrences with serious accident potential, such as equipment failures, slides, and cave-ins, must also be reported immediately. The contractor is to assist and cooperate fully with the contracting officer in conducting accident investigations. The contracting officer is to be furnished all information and data pertinent to investigation of an accident.

FIRST AID AND MEDICAL FACILITIES

2.1 FIRST AID KITS. A 16-unit first aid kit approved by the American Red Cross is to be provided at accessible, well-identified, locations at the ratio of a least 1 kit for each 25 employees. The first aid kits are to be moistureproof and dusttight, and the contents of the kits are to be replenished as used or as they become ineffective or outdated.

2.2 EMERGENCY FIRST AID. At least one employee certified to administer emergency first aid must be available on each shift and duly designated by the contractor to care for injured employees. The names of the certified employees shall be posted at the jobsite.

2.3 COMMUNICATION AND TRANSPORTATION. Prior to the start of work, the contractor is to make necessary arrangements for prompt and dependable communications, transportation, and medical care for injured employees. At least one stretcher and two blankets shall be readily available for transporting injured employees.

2.4 FIRST AID AND MEDICAL REPORTS. The contractor is to maintain a record system for first aid and medical treatment on the jobsite. Such records are to be readily available to the contracting officer and are to include--

- (a) A daily treatment log listing chronologically all persons treated for occupational injuries and illnesses;
- (b) Cumulative record of injury for each individual;
- (c) Monthly statistical records of occupational injuries, classified by type and nature of injury; and
- (d) Required records for worker's compensation.

2.5 SIGNS AND DIRECTIONAL MARKINGS. Adequate identification and directional markers are to be provided to readily denote the location of all first aid stations.

2.6 EMERGENCY LISTING. A listing of telephone numbers and addresses of doctor, rescue squad, hospital, police, and fire departments is to be provided at all first aid locations.

PHYSICAL QUALIFICATION OF EMPLOYEES

3.1 GENERAL REQUIREMENTS. Persons employed throughout the contract are to be physically qualified to perform their assigned duties. Employees must not knowingly be permitted or required to work while their ability or alertness is impaired by fatigue, illness, or any other reason that may jeopardize themselves or others.

3.2 HOIST OPERATORS. Operators of cranes, cableways, and other hoisting equipment shall be examined annually by a physician and provided with a certification stating that they are physically qualified to safely operate hoisting equipment. The contractor is to submit a copy of each certification to the contracting officer.

3.3 MOTOR VEHICLE OPERATORS. Operators of motor vehicles engaged primarily in the transportation of personnel are to be 18 years of age or older and have a valid state operator's permit or license for the equipment being operated. The operators must have passed a physical examination administered by a licensed physician within the past year showing that they are physically qualified to operate vehicles safely.

PERSONAL PROTECTIVE EQUIPMENT

4.1 HARDHAT AREAS. The entire jobsite, with the exception of offices, shall be considered a hardhat area. All persons entering the area are, without exception, required to wear hardhats. The contractor shall provide hardhats for visitors entering hardhat areas.

4.1.1 LABELS. Hardhat shall bear a manufacturer's label indicating design compliance with the appropriate ANSI (American National Standards Institute) standard.

4.2 POSTING. Signs at least 3 by 4 feet worded as follows with red letters (minimum 6 inches high) and white background shall be erected at access points to designated hardhat areas:

CONSTRUCTION AREA - HARDHATS REQUIRED BEYOND THIS POINT

These signs are to be furnished and installed by the contractor at entries to shops, construction yards, and job access points.

MACHINERY AND MECHANIZED EQUIPMENT

5.1 SAFE CONDITION. Before any machinery or mechanized equipment is initially used on the job, it must be inspected and tested by qualified personnel and determined to be in safe operating condition and appropriate for the intended use. Operators shall inspect their equipment prior to the beginning of each shift. Any deficiencies or defects shall be corrected prior to using the equipment. Safety equipment, such as seatbelts, installed on machinery is to be used by equipment operators.

5.2 TAGGING AND LOCKING. The controls of power-driven equipment under repair are to be locked. An effective lockout and tagging procedure is to be established, prescribing specific responsibilities and safety procedures to be followed by the person or persons performing repair work.

5.3 HAUL ROADS FOR EQUIPMENT

5.3.1 ROAD MAINTENANCE. The contractor shall maintain all roadways, including haul roads and access roads, in a safe condition so as to eliminate or control dust and ice hazards. Wherever dust is a hazard, adequate dust-laying equipment shall be available at the jobsite and utilized to control the dust.

5.3.2 SINGLE-LANE HAUL ROADS. Single-lane haul roads with two-way traffic shall have adequate turnouts. Where turnouts are not practical, a traffic control system shall be provided to prevent accidents.

5.3.3 TWO-WAY HAUL ROADS. On two-way haul roads, arrangements are to be such that vehicles travel on the right side wherever possible. Signs and traffic control devices are to be employed to indicate clearly and variations from a right-hand traffic pattern. The road shall be wide enough to permit safe passage of opposing traffic, considering the type of hauling equipment used.

5.3.4 DESIGN AND CONSTRUCTION OF HAUL ROADS. Haul road design criteria and drawings, if requested by the contracting officer, are to be submitted for approval prior to road construction. Sustained grades shall not exceed 12 percent and all curves shall have open-sight line with as great a radius as practical. All roads shall be posted with curve signs and maximum speed limits that will permit the equipment to be stopped within one-half the minimum sight distance.

5.3.5 OPERATORS. Machinery and mechanized equipment shall be operated only by authorized qualified persons.

5.3.6 RIDING ON EQUIPMENT. Riding on equipment by unauthorized personnel is prohibited. Seating and safety belts shall be provided for the operator and all passengers.

5.3.7 GETTING ON OR OFF EQUIPMENT. Getting on or off equipment while the equipment is in motion is prohibited.

5.3.8 HOURS OF OPERATION. Except in emergencies, an equipment operator shall not operate any mobile or hoisting equipment for more than 12 hours without an 8-hour rest interval away from the job.

5.4 POWER CRANES AND HOISTS (TRUCK CRANES, CRAWLER CRANES, TOWER CRANES, GANTRY CRANES, HAMMERHEAD CRANES, DERRICKS, CABLEWAYS, AND HOISTS)

5.4.1 PERFORMANCE TEST. Before initial onsite operation, at 12-month intervals, and after major repairs or modification, power cranes, derricks, cableways, and hoists must satisfactorily complete a performance test to demonstrate the equipment's ability to safely handle and maneuver the rated loads. The tests shall be conducted in the presence of a representative of the contracting officer. Test data shall be recorded and a copy furnished the contracting officer.

5.4.2 PERFORMANCE TEST--POWER CRANES (Crawler mounted, truck mounted, and wheel mounted). The performance test is to be carried out with outriggers set and with a test load weighing 110 percent of the rated capacity when the boom angle is from 30° to 60° above the horizontal. The test is to consist of raising, lowering and braking the load and rotating the test load through 360° at the specified boom angle or radius. Cranes equipped with jibs or boom tip extensions are to be tested using both the main boom and the jib, with an appropriate test load in each case.

5.4.3 PERFORMANCE TEST--DERRICKS, GANTRY CRANES, TOWER CRANES, CABLEWAYS, AND HOISTS, INCLUDING OVERHEAD CRANES. This equipment is to be performance tested with a test load weighing 110 percent of the rated load. In testing cableways, the test load is to be traveled to the upstream and downstream limits of travel and thoroughly performance tested in at least three travel positions, including both limits of travel.

5.4.4 BOOM ANGLE INDICATOR. Power cranes (includes draglines) with booms capable of moving in the vertical plane shall be provided with a boom angle indicator in good working order.

5.4.5 CRANE TEST CERTIFICATION. The performance test required by 5.4.2 and 5.4.3 is fulfilled if the contractor provides the contracting officer a copy of the certificate of inspection made within the past 12 months by a qualified person or by a government or private agency satisfactory to the contracting officer.

5.4.6 POSTING FOR HIGH VOLTAGE LINES. A notice of the 10-foot (or greater) clearance required by OSHA 1926.550, Subpart N, shall be posted in the operator's cab of cranes, shovels, boom-type concrete pumps, backhoes, and related equipment.

5.4.7 BOOM STOPS. Cranes or derricks with cable-supported booms, except draglines, shall have a device attached between the gantry of the A-frame and the boom chords to limit the elevation of the boom. The device shall control the vertical motions of the boom with increasing resistance from 83° or less, until completely stopping the boom at not over 87° above horizontal.

5.4.8 SAFETY HOOKS Hooks used in hoisting personnel or hoisting loads over construction personnel or in the immediate vicinity of construction personnel shall be forged steel equipped with safety keepers. When shackles are used under these conditions, they shall be of the locking type or have the pin secured to prohibit turning.

5.5 ROLLOVER PROTECTIVE STRUCTURES (ROPS)

5.5.1 ROLLOVER PROTECTIVE STRUCTURES. OSHA 1926, Subpart W, Overhead Protection, Sections 1000 and 1002 are applicable regardless of the year in which the equipment was manufactured and regardless of the struck capacity of the equipment.

5.5.2 EQUIPMENT REQUIRING ROPS. The requirement for ROPS meeting 5.5.1 above applies to crawler and rubber-tired tractors such as dozers, push-and-pull tractors, winch tractors, tractors, tractors with backhoes, and mowers; off-highway, self-propelled, pneumatic-tired earthmovers, including scrapers, motor graders and loaders; and rollers, compactors, and water tankers (excluding trucks and cabs). These requirements shall also apply to agricultural and industrial tractors and similar equipment.



GENERAL WAGE DECISION NO. AZ88-2

Supersedes General Wage Decision No. AZ87-2

State: ARIZONA

County(ies): Statewide

Construction Type: Heavy & Highway

Construction Description: Heavy & Highway Construction Projects

Modification Record:

No.	Publication Date	Page No. (s)
1	Jan. 29, 1988	19
2	Apr. 22, 1988	17, 22-27
3	Apr. 29, 1988	17-18



AZ88-2

	Basic Hourly Rates	Fringe Benefits
BRICKLAYERS; Stonemasons:		
Northern Area:		
Zone A	14.95	2.39
Zone B	16.95	2.39
Zone C	17.95	2.39
Zone D	18.45	2.39
Zone E	20.45	2.39
Southern Area:		
Zone A:		
Bricklayers; Stonemasons	13.13	2.62
Manhole Builders	13.43	2.62
Zone B:		
Bricklayers; Stonemasons	13.50	2.62
Manhole Builders	13.80	2.62
Zone C:		
Bricklayers; Stonemasons	13.88	2.62
Manhole Builders	14.18	2.62
Zone D:		
Bricklayers; Stonemasons	14.63	2.62
Manhole Builders	14.93	2.62
CARPENTERS:		
Northern Area:		
Carpenters: Saw Filer	18.625	2.55
Piledrivermen	18.98	2.55
Millwrights	19.29	2.59
Central & Southern Areas:		
Carpenters: Saw Filer	16.125	2.55
Piledrivermen	16.48	2.55
Millwrights	16.29	2.59
CEMENT MASONS:		
Zone 1:		
Northern Area:		
Cement Masons	18.505	3.05
Concrete Troweling Machine; Sawing and Scoring Machine; Curb and Gutter Machine	18.74	3.05
Central & Southern Areas:		
Cement Masons	16.005	3.05
Concrete Troweling Machine; Sawing and Scoring Machine; Curb and Gutter Machine	16.24	3.05
Zone 2:		
Cement Masons	16.445	2.62
Concrete Troweling Machine; Sawing and Scoring Machine; Curb and Gutter Machine; Clary and similar type of power Screed Operator	16.68	2.62
ELECTRICIANS:		
Area 1:		
Electricians	16.81	1.30+ 3.75%
Cable Splicers	18.16	1.30+ 3.75%
Area 2:		
Electricians' Technicians; Cable Spli- cers:		



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Zone A	17.10	2.33+	3.5%
Zone B	20.22	2.33+	3.5%
Area 3:	18.74	12%+	1.40
Area 4:			
Electricians on projects having an electrical contract value of less than \$20 million	16.00	2.14+	3%
Electricians on projects having an electrical contract value of \$20 million or more	17.95	2.14+	3%
Area 5:			
Electricians	17.00	1.00+	11.5%
Cable Splicers	17.25	1.00+	11.5%
IRONWORKERS:			
Northern Area	19.00	4.82	
Southern Area	15.00	4.82	
Central Area	16.00	4.82	
*LABORERS:			
Area 1:			
Group 1	13.08	2.77	
Group 2	15.61	2.77	
Group 3	16.19	2.77	
Group 4	16.46	2.77	
Group 5	18.01	2.77	
Barricade Setter:			
Placement, removal, transport, and maintenance of the traffic control devices	5.90	1.27	
Area 2:			
Group 1	10.58	2.77	
Group 2	13.11	2.77	
Group 3	13.69	2.77	
Group 4	13.96	2.77	
Group 5	15.51	2.77	
Barricade Setter:			
Placement, removal, transport, and maintenance of the traffic control devices	5.90	1.27	
(Tunnel and Shaft Work):			
*Area 1:			
Group 1	15.985	2.77	
Group 2	16.24	2.77	
Group 3	16.44	2.77	
Group 4	16.98	2.77	
Group 5	17.295	2.77	
Group 5A	17.655	2.77	
*Area: 2			
Group 1	13.485	2.77	
Group 2	13.74	2.77	
Group 3	13.94	2.77	
Group 4	14.48	2.77	
Group 5	14.795	2.77	
Group 5A	15.155	2.77	
LINE CONSTRUCTION:			
Zone 1:			
Groundmen	13.41	4.75+	3.5%
Equipment Operator; Powdermen & Mechanics	15.83	4.75+	3.5%



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Linemen, Crane Operator, Sagger, and Pilot	18.15	4.75+	3.5%
Cable splicers	18.66	4.75+	3.5%
Zone 1-A:			
Groundmen	14.41	4.75+	3.5%
Equipment Operator; Powdermen & Mechanics	16.74	4.75+	3.5%
Linemen, Crane Operator, Sagger, and Pilot	18.15	4.75+	3-1/2%
Cable splicers	19.73	4.75+	3-1/2%
Zone 2:			
Groundmen	15.40	4.75+	3-1/2%
Equipment Operator; Powdermen & Mechanics	17.74	4.75+	3-1/2%
Linemen, Crane Operator, Sagger, and Pilot	20.12	4.75+	3-1/2%
Cable splicers	20.67	4.74+	3-1/2%
PAINTERS:			
Area 1:			
Zone A:			
Brush	11.60	1.90	
Brush, Steel & Bridge	12.10	1.90	
Spray	12.05	1.90	
Spray, Steel & Bridge	12.60	1.90	
Zone B: (\$0.75 per hour above Zone A BHR)			
Zone C: (\$1.75 per hour above Zone A BHR)			
Zone D: (\$2.00 per hour above Zone A BHR)			
Area 2:			
Zone A:			
Brush and Roller; Sandblaster (Nozzleman); Sheetrock Taper; Floor Coverer; Sandblaster (pot tender)	13.54	1.30	
Spray; Paperhanger	13.79	1.30	
Creosote Applier	13.87	1.30	
Swing Stage:			
Brush; Sandblaster	13.94	1.30	
Spray	14.19	1.30	
Steeplejack	14.40	1.30	
Steel and Bridge, Brush; Nozzleman and Pot Tender; Steel (steam cleaner); Electric and Air Tool Operator; Steel Sandblaster	14.67	1.30	
Steel Sandblaster	14.67	1.30	
Zone B: (\$1.00 per hour above Zone A (BHR)			
Zone C: (\$2.50 per hour above Zone A BHR)			
Area 3:			
Zone A:			
Brush	12.47	1.77	
Spray; Sandblaster	13.07	1.77	
Paperhanger	12.60	1.77	
Swing Stage, under 40 feet:			
Brush	12.77	1.77	
Spray	13.37	1.77	



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Swing Stage, over 40 feet:		
Brush	13.47	1.77
Spray	14.07	1.77
Structural Steel & Tanks:		
Brush	13.47	1.77
Spray & Sandblasters	14.07	1.77
Creosote Base and Bituminous material	12.87	1.77
Zone B: (\$0.75 per hour above Zone A BHR)		
Zone C: (\$1.50 per hour above Zone A BHR)		
Zone D: (\$2.75 per hour above Zone A BHR)		
PLUMBERS AND PIPEFITTERS:		
Zone 1	16.50	3.33
Zone 2	18.50	3.33
Zone 3:		
Commercial	16.84	3.58
Industrial	18.34	3.58
*POWER EQUIPMENT OPERATORS:		
Area 1:		
Group 1	13.55	3.28
Group 2	16.05	3.28
Group 3	16.63	3.28
Group 4	17.30	3.28
Group 5	18.12	3.28
Group 6	18.93	3.28
Group 7	19.40	3.28
Group 8	19.91	3.28
Group 9	20.84	3.28
Area 2:		
Group 1	11.05	3.28
Group 2	13.55	3.28
Group 3	14.13	3.28
Group 4	14.80	3.28
Group 5	15.62	3.28
Group 6	16.43	3.28
Group 7	16.90	3.28
Group 8	17.41	3.28
Group 9	18.34	3.28
TRUCK DRIVERS:		
Area 1:		
Group 1	15.60	2.87
Group 2	15.80	2.87
Group 3	16.14	2.87
Group 4	16.68	2.87
Group 5	16.91	2.87
Group 5A	17.21	2.87
Group 6	17.42	2.87
Group 7	18.04	2.87
Group 8	18.84	2.87
Group 8A	20.17	2.87
Group 8B	19.35	2.87
Group 8C	20.21	2.87
Area 2:		
Group 1	13.10	2.87



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Group 2	13.30	2.87
Group 3	13.64	2.87
Group 4	14.18	2.87
Group 5	14.41	2.87
Group 5A	14.71	2.87
Group 6	14.92	2.87
Group 7	15.54	2.87
Group 8	16.34	2.87
Group 8A	17.67	2.87
Group 8B	16.85	2.87
Group 8C	17.71	2.87

WELDERS -- Receive the rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR, 5.5 (a) (1) (11))

AREA DESCRIPTIONS

BRICKLAYERS; STONEMASONS:

Northern Area: Apache, Coconino and Gila Counties; Graham County (west and north of the San Francisco River to the Gila River); Greenlee County (west and north of the San Francisco River to the Gila River); Maricopa, Mohave, and Navajo Counties; Pinal County (north of a boundary line drawn west along the Gila River to the western City limits of Florence, a straight line from the extreme southwestern City limits of Florence to the extreme southern City limits of Coolidge, then a straight line to the extreme southern City limits of Casa Grande, with the line extending to the Maricopa/Pinal County Line); Yavapai, Yuma and La Paz Counties:

- Zone A: 0-50 road miles from the City Hall in Phoenix
- Zone B: 50-75 road miles from the City Hall in Phoenix
- Zone C: 75-100 road miles from the City Hall in Phoenix
- Zone D: 100-200 road miles from the City Hall in Phoenix
- Zone E: 200 road miles and over from the City Hall in Phoenix

Southern Area: Cochise County; Graham County (east and south of the San Francisco River to the Gila River); Greenlee County (east and south of the San Francisco River to the Gila River); Pima County; Pinal County (south of a boundary line drawn west along the Gila River to the western City limits of Florence, a straight line from the extreme southwestern City limits of Florence to the extreme southern City limits of Coolidge, then a straight line to the extreme southern City limits of Casa Grande, with the line extending to the Maricopa/Pinal County Line); Santa Cruz Counties:

- Zone A: 0-15 road miles from Tucson City limits
- Zone B: 15-30 road miles from Tucson City limits
- Zone C: 30-40 road miles from Tucson City limits
- Zone D: Over 40 road miles from Tucson City limits

CARPENTERS:

Northern Area: Area north of a straight line drawn between a point



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35 miles due north of the City Hall in Flagstaff and a point 35 miles due north of the City Hall in Kingman, extending to the Arizona/Nevada State Line on the west; and connecting to a point 35 miles due north of the City Hall in Holbrook, thence due east to the intersection of the Arizona/New Mexico State Line

Central and Southern Areas: All areas not included in the Northern Area

CEMENT MASONS:

Zone 1: Apache, Coconino, and Gila Counties; Graham County (north of Sentinel-Casa Grande-Safford Line); Greenlee County (north of Sentinel-Casa Grande-Safford Line); Maricopa County (north of Sentinel-Casa Grande-Safford Line); Mohave, and Navajo Counties; Pinal County (north of Sentinel-Casa Grande-Safford Line); Yavapai, Yuma and La Paz Counties:

NORTHERN AREA: Area North of a straight line drawn between a point 35 miles due north of the City Hall in Flagstaff and a point 35 miles due north of the City Hall in Kingman, extending to the Arizona/Nevada State Line on the west and connecting to a point 35 miles due north of the City Hall in Holbrook, thence due east to the intersection of the Arizona/New Mexico State Line.

CENTRAL and SOUTHERN AREAS: All Areas not included in the NORTHERN AREA

Zone 2: Southern parts of Cochise, Graham, Greenlee, Maricopa, and Pinal Counties; Pima and Santa Cruz Counties

ELECTRICIANS:

Area 1: Apache County (north of Highway #66)

Area 2: Coconino County; Navajo County (north and west of a boundary line beginning at a point where Clear Creek crosses the Coconino/Navajo County Line and then extending in a northeasterly direction along Clear Creek and northeasterly to Cottonwood Wash, along Cottonwood Wash extending northeasterly to where it intersects the Navajo Indian Reservation, then easterly along the Navajo Indian Reservation boundary line to a point where it intersects the Navajo/Apache County Line):

Zone A: 5 miles north-south, east and west of the Post Offices of Williams, Sedona, and Winslow

Zone B: Remainder of Area 2 not covered by Zone A

Area 3: Apache County (south of Highway #66); Gila County; Navajo County (south and east of a boundary beginning at a point where Clear Creek crosses the Coconino/Navajo County Line, then extending in a northeasterly direction along Clear Creek and northeasterly to Cottonwood Wash, along Cottonwood Wash extending northeasterly to where it intersects the Navajo Indian Reservation, then easterly along the Navajo Indian Reservation boundary line to a point where it intersects the Navajo/Apache County Line); Pinal County (north of the line, "First Standard Parallel South" and east of the line "Second Guide Meridian East")

Area 4: Maricopa and Mohave Counties; Pinal County (north and west of the boundary line beginning at a point where the Papago Indian Reservation Road #15 crosses the Pima/Pinal County Line, then extending in a northeasterly direction on the Papago Indian Reservation Road #15 to the intersection with the Florence Canal, north and east on the Florence Canal to the intersection with the line, "Second Guide Meridian East", then north to the Pinal/Maricopa



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County Line); Yavapai County
 Area 5: Cochise, Graham, Greenlee, and Pima Counties; Pinal County (south and east of the boundary line beginning at a point where the Papago Indian Reservation Road #15 crosses the Pima/Pinal County Line, then extending in a northeasterly direction on the Florence Canal, north and east on the Florence Canal to the intersection with the line, "Second Guide Meridian East", then north to the line, "First Standard Parallel South", and along that line to the Graham/Pinal County Line); Santa Cruz, Yuma, and La Paz Counties

***IRONWORKERS:**

Northern Area: the boundaries of the area shall be the Navajo & Hopi Indian Reservations, the City of Page & the Glen Canyon Dam
 Southern Area: shall consist of the following counties, Yuma, Graham, Pima, Santa Cruz, Yuma & Greenlee Cos. & those portions of Pinal & Gila Cos. located south of the 33rd parallel
 Central: Remaining Areas

LINE CONSTRUCTION:

Zone 1: Phoenix and Tucson 30 miles radius from the center of Town; Area within 10 mile radius from the City Hall in Yuma
 Zone 1-A: Flagstaff, Globe, and Kingman; and 10 mile radius from the center of Town
 Zone 2: Other areas not covered by Zone 1 and Zone 1-A

PAINTERS:

Area 1: Apache, Coconino, Navajo, and Yavapai Counties (north of Woodruff/Camp Wood Line); Mohave County (north of a line following the Geodetic Hualapai Boundary Line to the Colorado River, a distance of 23 miles east of Pierce Ferry and then intersecting the Arizona/Nevada State Line):

Zone A: 0-20 road miles from Courthouse in Flagstaff
 Zone B: 20-35 road miles from Courthouse in Flagstaff
 Zone C: 35-80 road miles from Courthouse in Flagstaff
 Zone D: 80 road miles and over from Courthouse in Flagstaff

Area 2: Apache, Coconino, Navajo, and Yavapai Counties (south of the Woodruff/Camp Wood Line); Gila, Graham, Greenlee, Maricopa, and Pinal Counties (north of 33rd Parallel); Mohave County (south of a line following the Geodetic Hualapai Boundary Line to the Colorado River, a distance of 23 miles east of Pierce Ferry and then intersecting the Arizona/Nevada State Line):

Zone A: 0-40 paved road miles from Courthouse in Phoenix; also, Luke and Williams Air Force Bases
 Zone B: 41-60 paved road miles from Courthouse in Phoenix
 Zone C: 61 paved road miles and over from Courthouse in Phoenix

Area 3: Cochise County; Graham, Greenlee, Maricopa and Pinal Counties (south of 33rd Parallel); Pima, Santa Cruz, Yuma, and La Paz Counties:

Zone A: 0-30 paved road miles from Stone and Congress in Tucson or from the County Courthouse in Yuma
 Zone B: 31-40 paved road miles from Stone and Congress in Tucson or from the County Courthouse in Yuma
 Zone C: 41-50 paved road miles from Stone and Congress in Tucson or from the County Courthouse in Yuma
 Zone D: 51 paved road miles and over from Stone and Congress in Tucson or from the County Courthouse



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in Yuma

PLUMBERS & PIPEFITTERS

ZONE 1

Base points shall be: Phoenix--the intersection of Central Avenue and Jefferson Street; Flagstaff, Yuma, Kingman, Prescott, Havasu City and Winslow -- the main Post Office building in each city. The "Free Zone" (Zone No. 1) from Phoenix shall be 40 miles from the stated base point. The Free Zone from Flagstaff, Yuma, Kingman, Prescott, Havasu City and Winslow shall be 20 road miles from the stated base point. In addition, all areas within the city limits of Phoenix, Chandler, Scottsdale, Tempe, Glendale, Mesa and Gilbert, as well as that area bordered or encompassed by Apache Trail on the north, Higley Road on the east, Elliott Road on the south and Arizona Avenue on the west, and Sun City West will be included as Free Zones. Any work contracted for outside of these Free Zones will be determined from the Phoenix base point.

ZONE 2

Pay Zone shall refer to all jobs outside of the Free Zones listed above.

ZONE 3

Seven Southern Counties of Arizona: Pima, Gila, Pinal, Graham, Greenlee, Santa Cruz, and Cochise

LABORERS; POWER EQUIPMENT OPERATORS; and TRUCK DRIVERS:

- Area 1: Area north of a straight line drawn between a point 35 miles due north of the City Hall in Flagstaff and a point 35 miles due north of the City Hall in Kingman, extending to the Arizona/Nevada State Line on the west; and connecting to a point 35 miles due north of the City Hall in Holbrook, thence due east to the intersection of Arizona/New Mexico State Line
- Area 2: All Areas not included in Area 1

GROUP DESCRIPTIONS

LABORERS

Group 1: Laborer, General or Construction; Tool Dispatcher or Checker; Manually Controlled Signal Operator; Fence Builder; Guard Rail Builder - highway; Chat Box Man; Dumpman and/or Spotter; Rip Rap Stone Man; Rock Slinger; Head Rock Slinger (\$.25); Form Stripper; Packing Rod Steel and Form Stripper; Packing Rod Steel and Pans; Cesspool Diggers and Installers; Astro Turf Layer; Clean Up - Bull Gang Trackman; Railroad Chipper (clearing and grubbing); Kettleman - Tarman; Spikers; Wrenchers - Creosote Tieman; Floor Sanders - Concrete; Sandblaster (Pot Tender); Powderman Tender; Fine Grader; All Tenders not herein separately classified; Window Cleaner Flaggers

Group 2: Concrete Laborer (belt, pipe and/or Hoseman); Cement Mason Tender; Cutting Torch Operator; Power-type Concrete Buggy; Bander



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Group 3: Chuck Tender (except tunnel); Guinea/Chaser; Operator and Tender of Pneumatic and Electric Tools; Concrete Vibrating Machines, Chain Saw Machines (on clearing and grubbing); Hydraulic Jacks and similar mechanical tools not separately herein classified; Pipe Caulker and/or Backup Man - Pipeline; Rigger and Signal Man - Pipeline; Pipe Wrapper; Cribber; Shorer (except tunnel); Pneumatic Gopher; Pre-cast, Manhole Erector

Group 4: Asphalt Raker and Ironer; Air and Water Washout Nozzleman (low and high pressure); Scaler (using Bos n's Chair or Safety Belt); Tamper (mechanical - all types); Sandblaster (Nozzleman); Concrete Saw (hand-guided); Concrete Cutting Torch; Gunite (Gunman, Mixerman, Rodman); bio-filter; Pressman; Installer; Operator; Hand-guided Trencher and similarly operated equipment; Driller (Jackhammer and/or Pavement Breaker); Grade Setter (pipeline); Pipe Layer (including but not limited to non-metallic transite and plastic pipe, water pipe, sewer pipe, drain pipe, underground tile and conduit)

Group 5: Drill Doctor and/or Air Tool Repairman; Scaler (Driller); Form Setter and/or Builder; Welder and/or Pipe Layer installing process piping; Driller - Core Diamond, Wagon, Air Track, Joy, Mustang, PR-143, 220 Gardner, Denver, Hydrasonic; Powder Man; Water Blaster Operator

(TUNNEL and SHAFT WORK)

Group 1: Bull Gang, Muckers, Trackman; Dumpmen; Concrete Crew (includes Rodders and Spreaders); Grout Crew; Swamper (Brakeman and Switchmen on tunnel work)

Group 2: Nipper; Chucktender, Cabletender; Vibratorman, Jackhammer, Pneumatic Tools (except Driller)

Group 3: Grout Gunman

Group 4: Timberman, Retimberman - wood or steel blaster, Driller, Powderman; Cherry Pickerman; Powderman - Primer House; Steel Form Raiser and Setter; Kemper and other Pneumatic Concrete Placer Operator; Miner - Finisher; Miners - Tunnel (hand or machine)

Group 5: Diamond Drill

Group 5A: Shaft and Raise Miner Welder

POWER EQUIPMENT OPERATORS

Group 1: Air Compressor Operator; Pump Operator; Conveyor Operator; Generator Operator (all); Power Grizzly Operator; Fireman (all); Welding Machine Operator; Tripper Operator; Concrete Mixer Operator, skip type; Highline Cableway Signalman

Group 2: Diler; Forklift and Ross Carrier Operator; Skiploader, 1 1/2 cu. yd. and less; Pavement Breaker; Roller Operator (except as otherwise classified); Wheel-type Tractor Operator (Ford-Ferguson



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type); Slurry Seal Machine Operator (driver Moto-paver); Power Sweeper

Group 3: Self-propelled Chip Spreading Machine Conveyor Operator; Dinky Operator, under 20 ton; Elevator Hoist Operator, Husky and similar

Group 4: Motor Crane Driver; Beltcrete Operator; Curing Machine Operator, Boring Bridge and Texture; Cross Tineing and Pipe Float; Straw Blower; Hydrographic Seeder; Hydrographic Mulcher; Jumbo Finishing Machine; Joint Insertor

Group 5: A-frame Boom Truck or Winch Truck Operator; Grade Checker (excluding Civil Engineer); Multiple Power Concrete Saw Operator; Screed Operator; Stationary Pipe Wrapping and Cleaning Machine Operator; Tugger Operator

Group 6: Aggregate Plant Operator (including crushing, screening, and sand plants, etc.); Asphalt Laydown Machine Operator; Asphalt Plant Mixer Operator; Boring Machine Operator; Concrete Mechanical Tamping, Spreading or Finishing Machine Operator (including Clary, Johnson or similar types); Concrete Pump Operator; Concrete Batch Plant Operator, all types and sizes; Conductor, Brakeman, or Handler; Drilling Machine Operator, all types and sizes except as otherwise classified; Field Equipment Serviceman; Kolman Belt Loader Operator or similar type, with belt width 48" or over; Locomotive Engineer (including Dinky 20 tons weight and over); Moto-paver and similar type equipment Operator; Operating Engineer Rigger; Pneumatic-tired Scraper Operator, up to and including 12 cu. yds. (Turnapull, Euclid, Cat, D.W. Hancock, and similar equipment); Power Jumbo Form Setter Operator; Pressure Grout Machine Operator (as used in heavy engineering construction); Road Oil Mixing Machine Operator; Roller Operator, on all type asphalt pavement; Self-propelled Compactor, with blade; Skip Loader Operator, all types with a rated capacity over 1-1/2 but less than 4 cu. yds.; Slip Form Operator (power driven lifting device for concrete forms); Soil Cement Road Mixing Machine Operator, single pass type; Stationary Central Generating Plant Operator, rated 300 K.W. or more; Surface Heater and Planer Operator; Traveling Pipewrapping Machine Operator

Group 7: Pneumatic-tired Scraper Operator, all sizes and types over 12 cu. yds. MRC (Turnapull, Euclid, Cat, D.W. Hancock and similar equipment); Tractor Operator (Pusher, Bulldozer, Scraper); Trenching Machine Operator

Group 8: Asphalt or Concrete Planing, Rotomill, and Milling Machine Operator; Auto Grade Machine Operator (CMI and similar equipment); Boring Machine Operator (including Mole, Badger and similar type); Concrete Mixer Operator, paving type and Mobile Mixers; Concrete Pump Operator, with boom attached (truck mounted); Crane Operator, Crawler and Pneumatic type under 100 ton capacity MRC; Crawler-type Tractor Operator, with boom attachment or Slope Bar; Derrick Operator; Forklift Operator for hoisting personnel; Gradall Operator; H.D. Mechanic and/or Welder; Helicopter Hoist Operator; Highline Cableway Operator (less than 20 tons rated capacity); Mass Excavator Operator (150 Bucyrus Erie and similar types); Mechanical Hoist Operator (two or more drums); Motor Grader Operator, any type



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power blade; Motor Grader Operator, with Elevating Grader attachment; Mucking Machine Operator; Overhead Crane Operator; Piledriver Engineer (portable, stationary or skid rig); Pneumatic-tired Scraper Operator, all sizes and types (Turnapull, Euclid, Cat, D.W. Hancock and similar equipment over 45 cu. yds. MRC); Power driven Ditch Lining or Ditch Trimming Machine Operator; Skip Loader Operator, all types rated capacity 4 cu. yds. but less than 8 cu. yds.; Slip Form Paving Machine Operator (including Gunnert, Zimmerman and similar types); Specialized Power Digger Operator, attached to wheel-type tractor; Tower Crane (or similar type) Operator; Tugger Operator (two or more); Universal Equipment Operator, Shovel, Backhoe, Dragline, Clamshell, etc., up to 8 cu. yds.

Group 9: Crane Operator, Pneumatic or Crawler, 100 ton hoisting capacity and over MRC rating; Helicopter Pilot, FAA qualified, when used in construction work other than executive travel and single casual rental; Highline Cableway Operator, over 20 ton rated capacity and using Traveling Head and Tail Tower; Remote-control Earth Moving Equipment Operator; Skip Loader Operator, all types with rated capacity of 8 cu. yds. or more; Universal Equipment Operator, Shovel, Backhoe, Dragline, Clamshell, etc., 8 cu. yds. and over

TRUCK DRIVERS

Group 1: Teamsters; Pick-ups; Station Wagon; Man Haul Driver

Group 2: Dump or Flatrack (2 or 3 axle); Water Truck (under 2500 gallons); Buggymobile (1 cu. yd. or less); Bus Driver; Self-propelled Street Sweeper; Shop Greaser

Group 3: Dump or Flatrack (4 axle); Dumpter or Dumpster (less than 7 cu. yds.); Water Truck (2500 gallons but less than 4000 gallons); Tireman

Group 4: Dumpter or Dumpster (7 cu. yds. but less than 16 cu. yds); Dump or Flatrack (5 axle); Water Truck (4000 gallons and over); Slurry type equipment Driver or Leverman; Vacuum Pump Truck Drivers; Flaherty Spreader or similar type equipment or Leverman; Transit Mix (8 cu. yds. or less mixer capacity); Ambulance Driver

Group 5: Dump or Flatrack (6 axle); Transit Mix (over 8 cu. yds. but less than 10.5 cu. yds. mixer capacity); Rock Truck (i. e. Dart, Euclid and other similar type end dumps, single unit) less than 16 cu. yds.

Group 5A: Oil Tanker or Spreader and/or Bootman, Retortman or Leverman

Group 6: Transit Mix (over 10.5 cu. yds. but less than 14 cu. yds. mixer capacity); Ross Carrier, Fork Lift or Lift Truck; Hydro Lift, Swedish Crane, Iowa 300 and similar types; Concrete Pump (when integral part of Transit Mix Truck); Dump or Flatrack (7 axle); Transport Driver (unless axle rating results in higher classification)

Group 7: Dump or Flatrack (8 axle)



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Group 8: Off-highway equipment Driver including but not limited to: 2 or 4 wheel power unit, i.e Cat, DW Series, Euclid, International and similar type equipment transporting material when top loaded or by external means including pulling Water Tanks, Fuel Tanks or other applications under Teamster Classifications; Rock truck (Dart, Euclid, or other similar end dump types) 16 cu. yds. and over; Ejectalls; Dumptor or Dumpster (16 cu. yds. and over); Dump or Flatrack (8 axle)

Group 8A: Heavy-duty Mechanic/Welder; Body and Fender Man

Group 8B: Field Equipment Servicemen or Fuel Truck Driver

Group 8C: Body and Fender man

BID BOND
(See Instructions on reverse)

DATE BOND EXECUTED (Must be same or later than bid opening date)

PRINCIPAL (Legal name and business address)

TYPE OF ORGANIZATION ("X" one)

- INDIVIDUAL PARTNERSHIP
 JOINT VENTURE CORPORATION

STATE OF INCORPORATION

SURETY(IES) (Name and business address)

PENAL SUM OF BOND				BID IDENTIFICATION	
PERCENT OF BID PRICE	AMOUNT NOT TO EXCEED			BID DATE	INVITATION NO.
	MILLION(S)	THOUSAND(S)	HUNDRED(S)		
				FOR (Construction, Supplies or Services)	

OBLIGATION:

We, the Principal and Surety(ies) are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally. However, 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. For all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit of liability is indicated, the limit of liability is the full amount of the penal sum.

CONDITIONS:

The Principal has submitted the bid identified above.

THEREFORE:

The above obligation is void if the Principal — (a) upon acceptance by the Government of the bid identified above, within the period specified therein for acceptance (sixty (60) days if no period is specified), executes the further contractual documents and gives the bond(s) 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 the principal; or (b) in the event of failure so to execute such further contractual documents and give such bonds, pays the Government for any cost of procuring the work which exceeds the amount of the bid.

Each Surety executing this instrument agrees that its obligation is not impaired by any extension(s) of the time for acceptance of the bid that the Principal may grant to the Government. Notice to the surety(ies) of extension(s) are waived. However, waiver of the notice applies only to extensions aggregating not more than sixty (60) calendar days in addition to the period originally allowed for acceptance of the bid.

WITNESS:

The Principal and Surety(ies) executed this bid bond and affixed their seals on the above date.

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

INDIVIDUAL SURETIES			
Signature(s)	1.	2.	
Name(s) (Typed)	1.	2.	

CORPORATE SURETY (IES)			
SURETY A	Name & Address	STATE OF INC.	LIABILITY LIMIT
			\$
	Signature(s)	1.	2.
Name(s) & Title(s) (Typed)	1.	2.	Corporate Seal

CORPORATE SURETY (IES) (Continued)

SURETY B	Name & Address		STATE OF INC.	LIABILITY LIMIT	<i>Corporate Seal</i>
	Signature(s)	1.	2.	\$	
	Name(s) & Title(s) (Typed)	1.	2.		
SURETY C	Name & Address		STATE OF INC.	LIABILITY LIMIT	<i>Corporate Seal</i>
	Signature(s)	1.	2.	\$	
	Name(s) & Title(s) (Typed)	1.	2.		
SURETY D	Name & Address		STATE OF INC.	LIABILITY LIMIT	<i>Corporate Seal</i>
	Signature(s)	1.	2.	\$	
	Name(s) & Title(s) (Typed)	1.	2.		
SURETY E	Name & Address		STATE OF INC.	LIABILITY LIMIT	<i>Corporate Seal</i>
	Signature(s)	1.	2.	\$	
	Name(s) & Title(s) (Typed)	1.	2.		
SURETY F	Name & Address		STATE OF INC.	LIABILITY LIMIT	<i>Corporate Seal</i>
	Signature(s)	1.	2.	\$	
	Name(s) & Title(s) (Typed)	1.	2.		
SURETY G	Name & Address		STATE OF INC.	LIABILITY LIMIT	<i>Corporate Seal</i>
	Signature(s)	1.	2.	\$	
	Name(s) & Title(s) (Typed)	1.	2.		

INSTRUCTIONS

1. This form is authorized for use when a bid guaranty is required. Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. The bond may express penal sum as a percentage of the bid price. In these cases, the bond may state a maximum dollar limitation (e.g., 20% of the bid price but the amount not to exceed _____ dollars).

4. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed herein. Where more than one corporate surety is involved, their names and addresses shall appear

in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)". In the space designated "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, two or more responsible persons shall execute the bond. A completed Affidavit of Individual Surety (Standard Form 28), for each individual surety, shall accompany the bond. The Government may require these sureties to furnish additional substantiating information concerning their financial capability.

5. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal"; and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

6. Type the name and title of each person signing this bond in the space provided.

7. In its application to negotiated contracts, the terms "bid" and "bidder" shall include "proposal" and "offeror".

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

All materials removed from the cleared and grubbed areas shall be burned or buried at location shown on the drawings or as specified in Section 6 of this specification.

5. MEASUREMENT AND PAYMENT

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.

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

6. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

a. Bid Item 1, Clearing and Grubbing

- (1) This item shall consist of clearing and grubbing of all areas shown on the drawings and staked in the field.
- (2) All materials removed from the cleared and grubbed areas shall be disposed of at the waste site or refuse sites as shown on the drawings. If refuse materials are disposed of by burying, they shall be buried a minimum of 24 inches below the existing ground surface in the refuse disposal areas shown on the drawings and as staked in the field. When disposal is complete, the refuse or waste disposal site areas shall be smoothed and graded to blend into the surrounding terrain.
- (3) Refuse materials are to be no larger than 2' - 0" in width or diameter and no longer than 2' - 0".
- (4) 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.
- (5) Measurement and payment will include compensation for Subsidiary Item, Structure Removal.

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

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

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 match marked with paint prior to disassembly. All pins, nuts, bolts, washers, plates and other loose parts shall be marked or tagged to indicate their proper locations in the structure and shall be fastened to the appropriate structural member or packed in suitable containers. Materials from fences designated to be salvaged shall be placed outside the work area on the property from which they were removed. Wire shall be rolled into uniform rolls of convenient size. Posts and rails shall be neatly piled.

5. DISPOSAL OF REFUSE MATERIALS

Refuse materials resulting from structure removal shall be burned or buried at locations shown on the drawings or as specified in Section 7 of the specification.

6. MEASUREMENT AND PAYMENT

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

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

a. Subsidiary Item, Structure Removal

- (1) This item shall consist of removing and disposing of the existing gunite, riprap, gabion structure, concrete, wire fence and trash rack as shown on the drawings and marked for removal.
- (2) The existing turnout gate and 36" CMP at University Drive are to be removed, salvaged and stored at the location where removed.
- (3) The riprap located north of Apache Boulevard shall be removed and salvaged on the east side of the right-of-way between Station 115+000 and Station 119+00 as shown on the drawings. The flap gate at Station 61+59.00 is to be salvaged and stored on-site.
- (4) Refuse materials shall be buried a minimum of 24 inches below the existing ground surface in the refuse areas shown on the drawings and staked in the field. When disposal is complete, the refuse sites shall be smoothed and graded to blend into the surrounding terrain.
- (5) Refuse materials are to be no larger than 2' - 0" in width or diameter and no longer than 2' - 0".
- (6) No separate payment will be made for this item. Compensation for this work will be included in the payment for Bid Item 1, Clearing and Grubbing.

CONSTRUCTION SPECIFICATION

5. POLLUTION CONTROL

1. SCOPE

The work shall consist of installing measures or performing work to control erosion and minimize the production of sediment and other pollutants to water and air during construction operations in accordance with these specifications.

2. MATERIALS

All materials furnished shall meet the requirements of the Material Specifications listed in Section 8 of this specification.

3. EROSION AND SEDIMENT CONTROL MEASURES AND WORKS

The work and measures shall include but not be limited to the following, as shown on the drawings or as specified in Section 8 of this specification.

Staging of Earthwork Activities - The excavation and moving of soil materials shall be scheduled so that the smallest possible areas will be unprotected from erosion for the shortest time feasible.

Seeding - Seedings to protect disturbed areas shall be used as specified on the drawings or in Section 8 of this specification.

Mulching - Mulching shall be used to provide temporary protection to soil surfaces from erosion.

Diversions - Diversions shall be used to divert water away from work areas and/or to collect runoff from work areas for treatment and safe disposition.

Stream Crossings - Stream crossings shall be used where fording of streams by equipment is necessary.

Sediment Basins - Sediment basins shall be used to settle and filter out sediment from eroding areas to protect properties and streams below the construction site.

Straw Bale Filters - Straw bale filters shall be used to trap sediment from areas of limited runoff. Bales are temporary and shall be removed when permanent measures are installed.

Waterways - Waterways shall be used for the safe disposal of runoff from fields, diversions and other structures or measures.

4. CHEMICAL POLLUTION

The Contractor shall provide watertight tanks or barrels or construct a sump sealed with plastic sheets to be used to dispose of chemical pollutants (such as drained lubricating or transmission oils, greases, soaps, asphalt, etc.) produced as a by-product of the project's work. At the completion of the construction work, sumps shall be voided without causing pollution as specified in Section 8 of this specification.

Sanitary facilities such as pit toilets, chemical toilets, or septic tanks shall not be placed adjacent to live streams, wells, or springs. They shall be located at a distance sufficient to prevent contamination of any water sources. At the completion of construction work, facilities shall be disposed of without causing pollution as specified in Section 8 of this specification.

5. AIR POLLUTION

Local and state regulations concerning the burning of brush or slash or disposal of other materials shall be adhered to.

Fire prevention measures shall be taken to prevent the start or the spreading of fires which result from project work. Fire breaks or guards shall be constructed at locations shown on the drawings.

All public access or haul roads used by the contractor during construction of the project shall be sprinkled or otherwise treated fully suppress dust.

6. MAINTENANCE, REMOVAL ,AND RESTORATION

All pollution control measures and works shall be adequately maintained in a functional condition as long as needed during the construction operation. All temporary measures shall be removed and the site restored to as nearly to original conditions as practicable.

7. MEASUREMENT AND PAYMENT

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. Subsidiary Item, Pollution Control

- (1) This item shall consist of all work and materials required to control or reduce pollution.
- (2) This specification shall apply to all construction activities within the Floodway Right-of-Way and construction easements, within the designated waste and refuse areas, and along approved haul roads between the designated waste areas and construction limits shown on the drawings.
- (3) The Contractor is required to adhere to all applicable local, State and Federal laws and regulations pertaining to the control of pollution as may result from construction of this project. These laws and regulations include but are not limited to:
 - (a) The "Policy on construction and related activities in water" adopted April 13, 1977, by the Water Quality Control Council of Arizona.
 - (b) The Clean Air Act (42 U.S.C. 1857 et seq. as amended by Pub. L. 91-604) Section 114, and Section 308 of the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq., as amended by Pub. L. 92-500) relating to inspection, monitoring, entry, reports, and information as well as the other requirements of these sections.
- (4) The Contractor is responsible for maintaining air, water, and vegetative quality within the work area. Methods include:
 - (a) Establishing turn areas, haul roads, work site access roads, temporary building sites, equipment yards, etc., in approved locations, and staging earthwork activities to prevent contamination of air and water, to minimize destruction of existing vegetation, and to minimize erosion.
 - (b) Operating mechanized equipment at the job site in a manner that will avoid destruction or removal of trees and shrubs other than as necessary for construction of the measure.

- (c) Limiting destruction of existing vegetation in the designated waste areas to that necessary to deliver and spread waste and to operate equipment.
- (5) Under Section 2, Materials, there are no material specifications required.
- (6) Under Section 3, Seeding, no seeding is required.
- (7) No separate payment will be made for this item. Compensation for this work will be included in the payment for Bid Item 3, Water, and Bid Item 4, Channel Excavation Common.

CONSTRUCTION SPECIFICATION

7. ENGINEERING CONSTRUCTION SURVEYS

1. SCOPE

The work consists of performing all surveys required for (1) layout of the work, (2) construction control, and (3) quantity surveys for progress payment estimates from baselines and bench marks established by the Government. It includes furnishing all the necessary equipment, labor, and materials. Not included is work required for making the original and final surveys for computing quantities.

2. EQUIPMENT AND MATERIALS

Equipment used for all construction surveys shall be of a quality and condition that provides the specified accuracy. The equipment shall be maintained in good working order and good adjustment. Records of calibration tests and adjustments shall be maintained and be available for inspection by the Government

Materials include all the necessary field notebooks, stakes, templates, platforms, equipment, spikes, steel pins, tools, and other accessories required for layout and construction control of all of the work.

3. QUALITY OF WORK

Surveys shall be certified by a Land Surveyor or Engineer licensed by the State. The work shall be performed to the accuracy and detail appropriate for the location and type of job. Daily quantities of earthwork may be estimated from load count or equivalent measurement (within 25 percent \pm); measurement for progress payments should be accurate within 10 percent \pm .

Notes, sketches, and other data shall be complete, recorded neatly, and organized in a manner that will allow reproduction of copies for job documentation.

Differential leveling shall be third order with such precision that the error of closure (in feet) shall not exceed plus or minus 0.1 times the square root of the distance (in miles). The elevations of bench marks and temporary bench marks shall be determined and recorded to the nearest 0.01 foot.

Transit traverses shall be third order with such precision that; (1) the linear error of closure shall not exceed one foot in 3,000 feet, and (2) the angular error of closure shall not exceed 1.0 minute times the square root of the number of angles turned.

Surveys will be reviewed periodically and randomly checked by the Government to assure that the specified quality is being maintained.

4. PRIMARY CONTROL

The base lines and bench marks for primary control, which are necessary to establish the lines and grades needed for construction, will be established by the Government. They will be shown on the drawings and located on the ground before construction.

The base lines and benchmarks shall be used as the origin of all surveys needed to establish lines and grades for construction.

5. CONSTRUCTION SURVEY AND MEASUREMENT RECORDS

All survey data will be recorded in fully identified, bound field notebooks. Pages shall be numbered consecutively. The required books shall be turned over to and become the property of the Government, prior to acceptance of the work or any part of this work. All entries shall be legible, reproducible, and follow the format in Soil Conservation Service TR-62, "Engineering Layout, Notes, Staking and Calculations." The bound field note books shall be available at all times during the progress of the work for examination and use by the Government. Copies of field book notes shall be made available to the Contracting Officer upon request. Electronically generated survey data and computations shall be bound, paginated, and referenced in the bound field notebook containing the survey control in a manner that will make all of the information intelligible and permanent. All field notes and printed data shall include the purpose or description of the work, the date the work was performed, the weather (if field work), the individual or individuals who performed and checked the work and sketches and other information pertinent to the work.

6. STAKING

The location and marking of all stakes shall be as shown in Soil Conservation Service TR-62 as supplemented below.

- a. Clearing and grubbing - The boundary of the clearing and grubbing areas shall be staked or flagged at 200-foot intervals or less if needed to clearly mark the limits of work.
- b. Excavation - Cut stakes shall be placed on the centerline at the intersection of the planned side slopes and natural ground line. All slope stakes shall be marked with the required cut, horizontal distance, and slope ratio. Offset reference stakes and hubs shall be placed at full stations, on at least one side of the proposed excavation.

Earth Fill - Fill stakes shall be placed on the centerline and at the toes of the planned slopes and shall be marked with the fill, horizontal distance, constructed slope ratio, and stationing. Offset reference stakes and hubs shall be provided as a minimum on both sides of the fill at full stations.

Earthwork slope stakes shall be placed as a minimum at full stations, break in the original ground surface, and at other intermediate stations as necessary to insure accurate location of construction. Slope stakes and cross sections shall be at right angles to the centerline. Distances shall be measured horizontally; rod readings shall be taken vertically and recorded to the nearest 0.1 foot.

7. MEASUREMENT AND PAYMENT

Payment will be made as the work proceeds, after receipt of invoices from the contractor showing (contractor or subcontractor) surveying costs and cost of supplies. If the total of incremental payments is less than the contract lump sum for surveys, the balance will be included in the final contract payment. Total payment will be the contract lump sum price for surveys, regardless of actual cost to the contractor.

Payment will not be made under this item for the purchase cost of materials and equipment having a residual value.

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

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the item 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 20, Surveys

- (1) This item shall consist of furnishing personnel, equipment, materials and performing surveys required for:
 - (a) Construction layout
 - (b) Computation of quantities
 - (c) "As-Built" construction drawings
- (2) The Contractor shall provide the Government Representative a statement of qualifications, including specific experience of each of the survey personnel assigned to the job.
- (3) The Contractor shall provide the Government Representative a schedule of surveys to be performed each month.
- (4) In Section 1, Scope, the last sentence does not apply.
- (5) Base lines and bench marks for primary control will be located on the left side of the right-of-way approximately at every 500 foot stations, PC's and PT's.

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. Mobilization will not be considered as work in fulfilling the contract requirement for commencement of work.

Mobilization shall include the cost for transportation of personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary facilities as the site not covered in specific bid items, and other preparatory work at the site. The cost of the entire amount of premiums paid for performance and payment bonds, including coinsurance and reinsurance agreements as applicable shall be paid upon request when evidence of full payment to the surety has been provided to the Contracting Officer.

Work done under this specification 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 changed 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 item or 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 price 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 2, Mobilization

- (1) This item consists of the mobilization of the Contractor's equipment and forces for construction of the Floodway and appurtenances.

CONSTRUCTION SPECIFICATION

10. WATER FOR CONSTRUCTION

1. SCOPE

The work shall consist of furnishing, transporting, and using water for construction purposes in accord with the applicable specifications.

2. FACILITIES AND EQUIPMENT

The Contractor shall build and maintain such access and haul roads as are needed, and shall furnish, operate, and maintain all pumps, piping, tanks, and other facilities needed to load, transport, and use the water as specified.

These facilities shall be equipped with meters, tanks, or other devices by which the volume of water supplied can be measured.

3. DUST ABATEMENT AND HAUL ROAD MAINTENANCE

Water for dust abatement and haul road maintenance 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.

4. EARTHFILL, DRAINFILL, ROCKFILL

Water for earthfill, drainfill, or rockfill shall be used in the fill materials as specified in the applicable construction specifications.

5. CONCRETE, MORTAR, GROUT

Water used in mixing or curing concrete, pneumatically applied mortar, or other portland cement mortar or grout shall meet the requirements of the applicable construction specifications and shall be used in conformance with those specifications. Payment for water used in these items is covered by the applicable concrete, mortar or grout specification.

6. MEASUREMENT AND PAYMENT

For water items for which specific unit prices are established in the contract, the volume of water furnished and used in accordance with the specifications will be measured to the nearest 1000 gallons.

Except as otherwise specified, the measurement for payment will include all water needed at the construction site except as noted in Section 5 to perform the work required under the contract in accordance with the specifications but will not include water wasted or used in excess of the amount needed. It will not include water used in concrete which is mixed elsewhere and transported to the site.

Payment for water 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 furnishing, transporting, and using the water.

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, Water

- (1) This item shall consist of furnishing and applying all water necessary for performance of the work described in this contract.
- (2) All water shall be metered. The meters shall be two percent, plus or minus, of the true quantity. The Contractor shall provide certification of the water meters accuracy prior to use.
- (3) Water meters shall be installed at approved locations that measure only the quantity needed to complete the work described in this contract.

Measurement for payment will be based on the meter's location according to the following criteria:

- (a) Within 50 feet of the first lateral line of the pre-wet system.
 - (b) Water that is applied by trucks or trailers shall be metered into a water tower (Klein-Tanks) prior to its use.
- (4) Water may be obtained from the Roosevelt Water Conservation District, Higley, Arizona (Mike Leonard, Telephone 963-3414).
 - (5) Measurement and payment will be based on metered quantity of water and shall include compensation for Subsidiary Item, Pollution Control.

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 drainage way in which its headworks are located.

Unless otherwise specified, the Contractor shall furnish to the Contracting Officer, 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 Contracting Officer 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 8, the Contractor shall maintain the borrow areas in drainable condition or otherwise provide for timely and effective removal of surface and ground waters that accumulate

within the borrow areas from any source. Borrow material shall be processed as necessary to achieve proper and uniform moisture content for placement.

If pumping to dewater borrow areas is included as an item of work in the bid schedule, each pump used for this purpose shall be equipped with a water meter in the discharge line. Accuracy of the meters shall be such that the measured quantity of water is within 3 percent, plus or minus, of the true quantity. Means shall be provided by the Contractor to check the accuracy of the water meters when requested by the Contracting Officer.

5. EROSION AND POLLUTION CONTROL

Removal of water from the construction site, including the borrow areas shall be accomplished in such a manner that erosion and the transmission of sediment and other pollutants are minimized.

6. 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 Contracting Officer.

7. MEASUREMENT AND PAYMENT

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. Subsidiary Item, Removal of Water

- (1) This item shall consist of all removal or diversion of surface and ground water from the construction area shown on the drawings.
- (2) The diversion or dewatering plans submitted to the Contracting Officer for approval shall be specific to each structure site or section of work. Any diversions or dikes proposed in the existing floodway shall incorporate "fuse" or breakaway sections or otherwise be capable of rapid removal in the event of unusual surface water flows during construction.
- (3) No separate payment will be made for the removal of water. Compensation for this work will be included in the payment for Bid Item 4, Channel Excavation, Common.

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 on to 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

To the extent they are needed, all suitable materials from the specified excavations shall be used in the construction of required permanent earthfill or rockfill. 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.

6. DISPOSAL OF WASTE MATERIALS

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 workers, 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 earthfill 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 4.5 sacks of cement per cubic yard. The concrete shall be placed and cured as specified by the Contracting Officer.

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

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. Excavation required because unsuitable conditions result from the Contractor's improper construction operations, as determined by the Contracting Officer will not be included for measurement and payment.

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 neat lines and grades as shown on the drawings.

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 overexcavation will be made in accordance with the following provisions:

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 improper construction operations as determined by the Contracting Officer.

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

12. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

a. Bid Item 4, Channel Excavation

- (1) This item shall consist of all excavation required to construct the floodway and appurtenances, except that designated as Structure Excavation and Trench Excavation.
- (2) Suitable materials resulting from this excavation and not required for Bid Item 8, Structure Backfill; Bid Item 7, Earthfill; and Bid Item 21, Soil Cement, shall be wasted as specified in Section 6 of this specification and the areas shown on the drawings as specified in Subsidiary Item, Waste Disposal.
- (3) Measurement and payment will include compensation for subsidiary items; Pollution Control, Removal of Water and Waste Disposal.

b. Bid Item 5, Structure Excavation, Common

This item shall consist of the excavation required for installation of:

- (1) The 54" headwall and outlet protection at Station 35+84.50.
- (2) Major side inlets and collection systems at the following locations:

35+18
60+72.50
78+05.00
89+11.00
93+97.84
119+73.56
143+66.00
150+66.00

- (3) Sewer manhole adjustment at Station 89+42.00.
- (4) Outlet protection for 44 collector channel inlets and two connecting pipes from adjacent subdivision.
- (5) Cutoff walls for soil-cement and concrete.

c. Bid Item 6, Trench Excavation

This item shall consist of the excavation required for installation of the 54" diameter concrete pipe at Station 35+84.50 and for the PVC underdrains on the side inlet spillways and the concrete channel lining.

d. Subsidiary Item, Collector Channel Inlet Excavation

- (1) This item shall consist of the excavation required for installation of 44 collector channel inlets and 2 connector pipes from adjacent subdivisions at the locations shown on the drawings.
- (2) Payment for collector channel inlet excavation shall be included in Bid Item 16, Collector Channel Inlets.

CONSTRUCTION SPECIFICATION

23. EARTHFILL

1. SCOPE

The work shall consist of the construction of earth embankments and other earthfills 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 earthfill shall be stripped to remove vegetation and other unsuitable materials or shall be excavated as specified.

Except as otherwise specified, each 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 earthfill, and the surface materials of the foundation shall be compacted and bonded with the first layer of earthfill.

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 earthfill can be compacted against them to effect a good bond between the fill and the abutments.

Rock foundation and abutment surfaces shall be cleared of all loose materials by hand or other effective means and shall be free of standing water when fill is placed upon them. Occasional rock outcrops in earth foundations for earthfill, 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 earthfill conforming to the specifications for the earthfill 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.

Earthfill 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, moisture content, 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 approximately 2 percent shall be maintained to insure effective drainage, and except as otherwise specified, for drainfill or sectional zones.
- 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 material not meeting the requirements of this specification, 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 at the contact of the in place and new fills.

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 disking.

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 either be removed or scarified and moistened by sprinkling to an acceptable moisture content prior to placement of the next layer of fill.

6. COMPACTION

Earthfill 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, or manually directed power tampers or plate vibrators. Unless otherwise specified, heavy equipment including backhoe mounted power tampers, or vibrating compactors and manually directed vibrating rollers, shall not be operated within 2 feet of any structure. Towed or self-propelled 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 or bedded precast conduits prior to 7 days after placement of the concrete cradle or bedding; 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 (impact basins)	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
Cantilever outlet bents (backfilled both sides simultaneously)	3 days

7. REWORKING OR REMOVAL AND REPLACEMENT 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, D 2167, D 2922 or D 2937 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 or if using the nuclear gauge, added to the specified density to bring it to the measure of equivalent composition for comparison. The density so computed will be used to determine the percent compaction of the fill matrix. Unless otherwise specified, moisture content will be determined by one of the following methods: ASTM Method D-2216, D-3017.

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 earthfill 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 earthfill required to fill voids resulting from over excavation 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 improper construction operations as determined by the Contracting Officer.

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

Payment for each type and compaction class of earthfill 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.

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 7, Earthfill

- (1) This item shall consist of placing and compacting all earthfill required to construct the floodway as shown on the drawings except that earthfill designated as Bid Item 8, Structure Backfill, Bid Item 9, Drainfill and Subsidiary Item, Pipe Backfill.
- (2) Material included in the fill shall:
 - a. Consist of suitable CL, ML, SC, or SM Material (Unified Soil Classification System) obtained from the required excavation.
 - b. Have a plasticity index no greater than 15.
- (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 ASTM D 698, Method A (Standard Proctor Test) or Rapid Compaction Test (Test No. S-6) SCS National Engineering Handbook, Section 19.
- (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) In Section 8, Testing, densities of fill will be determined in accordance with ASTM 1556. The moisture content of the material incorporated in the fill shall be maintained within the range of the optimum moisture content to three (3) percentage points below the optimum moisture content as determined by ASTM D 2216.

b. Bid Item 8, Structure Backfill

- (1) This item shall consist of placing and compacting backfill for the following structures as shown on the drawings:
 - a. The 50' head wall at Station 35+84.50
 - b. The double 6' x 7' box culvert at Station 128+92.
 - c. The 54" concrete pipe at Station 35+84.50.
 - d. Sewer manhole adjustment at Station 86+42.00.

- (2) Backfill material shall:
- a. Consist of suitable CL, ML, SC, or SM Material (Unified Soil Classification System) obtained from the required excavation.
 - b. Contain a minimum of 15 percent passing the #200 sieve when determined on a dry weight basis, in accordance with ASTM D 1140.
 - c. Have a plasticity index no greater than 15.
- (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 ASTM D 698 Method A (Standard Proctor Test) or the Rapid Compaction Test (Test No. S-6) SCS National Engineering Handbook, Section 19.
- (4) The maximum size of rock fragments incorporated in the fill shall be two (2) inches.
- (5) The maximum thickness of a layer before compaction shall be six (6) inches.
- (6) In Section 8; Testing, densities of fill will be determined in accordance with ASTM D 1556. The moisture content of the material incorporated in the fill shall be maintained within the range of the optimum moisture content to three (3) percentage points below the optimum moisture content as determined by ASTM D 2216.
- (7) Measurement and payment will include the reduction in volume for the 54" concrete pipe.

c. Subsidiary Item, Pipe Backfill

- (1) This item shall consist of placing and compacting backfill required to construct the collector channel inlets and connector pipes from adjacent subdivisions.
- (2) Pipe backfill material shall be free of rock fragments larger than 2" in maximum dimension.
- (3) Backfill material shall:
 - a. Consist of suitable CL's, ML's, SC's, SM's (Unified Soil Classification System) obtained from the required excavation.
 - b. Not have a Plasticity index greater than 15.

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- (4) 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 ASTM D 698, Method A (Standard Proctor Test); the rapid compaction test (Test No. S-6) SCS National Engineering Handbook, Section 19.
- (5) The maximum thickness of layer before compaction shall be six (6) inches.
- (6) In Section 8, Testing, densities of fill will be determined in accordance with ASTM D 1556. The moisture content of the material incorporated in the fill shall be maintained within the range of the optimum moisture content to three percentage points below the optimum moisture content as determined by ASTM D 2216.
- (7) No separate payment will be made for pipe backfill. Compensation for this work will be included in Bid Item 16, Collector Channel Inlets.

d. Subsidiary Item, Waste Disposal

- (1) This item shall consist of transporting, placing or stockpiling all waste to the waste sites shown on the drawings, and at other locations of the Contractor's choosing outside the project limits.
- (2) Waste material shall consist of all surplus or unsuitable material resulting from the required excavations.
- (3) Waste disposal site #1 shall receive 15,000 cu. yd. of waste material and the waste area shown along the west right of way shall be filled to the limits shown on the drawings prior to the completion of the project. The Contractor may make his own arrangements with Larry Cooper of Higley Greenfield and Associates, 277-4926, for any additional waste disposal at site #1.
- (4) Section 6, Compaction, does not apply to this item.
- (5) Material wasted within the waste disposal sites shown on the drawings shall be placed in layers not to exceed two (2) feet in depth. Full coverage of the waste area shall be obtained before the next two foot layer is placed. The finished surface shall not vary more than one-half (0.5) foot, plus or minus, from the average grade, except that in the waste areas adjoining the right floodway berm, the finished surface shall not vary more than 0.2 foot, plus or minus, from the grades given on the drawings.
- (6) No special moisture content for waste material will be required.
- (7) No separate payment will be made for waste disposal. Compensation for this work will be included in the payment for Bid Item 4, Channel Excavation, Common.

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CONSTRUCTION SPECIFICATION

24. DRAINFILL

1. SCOPE

The work shall consist of furnishing, placing and compacting drainfill required in the construction of structure drainage systems.

2. MATERIALS

Method 1 Drainfill materials shall conform to the requirements of Material Specification 521. At least 30 days prior to the 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 Drainfill 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 substance, and standing water when the drainfill is placed. Earth surfaces upon or against which drainfill will be placed shall not be scarified.

4. PLACEMENT

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

Drainfill 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 drainfill.

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 drainfill placement. Each crossover shall be cleaned of all contaminating materials and shall be inspected and approved by the Engineer before additional drainfill is placed.

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

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

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

Drainfill shall not be placed adjacent to structures until the concrete has attained the strength specified in Section 9 of this specification. The strength shall 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 C 31 for determining when a structure may be put in service.

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

<u>Structure</u>	<u>Time Interval</u>
Retaining walls and counterforts (impact basins)	14 days
Walls backfilled on both sides simultaneously	7 days
Conduits and galleries, cast-in-place (with inside forms in place)	7 days
Conduits and galleries, cast-in-place (inside forms removed)	14 days
Conduits, precast, cradled	2 days
Conduits, precast, bedded	1 day
Cantilever outlet bents backfilled on both sides simultaneously	3 days

5. CONTROL OF MOISTURE

The moisture content of drainfill 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 to adjacent earth fill. Except as specified in Section 9, control of moisture content will not be required.

6. COMPACTION

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

Class A compaction. Each layer of drainfill shall be compacted to a relative density of not less than 70 percent as determined by ASTM Method D 4254

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

- 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. A pass is defined as at least one complete coverage of the roller wheel, tire or drum over the entire surface of the layer.
- 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.

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 cranes or hoists will not be permitted.

7. TESTING

The Engineer will perform such tests as are required to verify that the drainfill materials and the drainfill in place meet the requirements of the specifications. These tests are not intended to provide the Contractor with 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 drainfill within the neat lines shown on the drawings will be measured and computed to the nearest cubic yard. Where the Engineer directs placement of drainfill outside the neat lines to replace unsuitable foundation material, the volume of such drainfill will be included, but only to the extent that the unsuitable condition is not a result of the Contractor's improper construction operations as determined by the Contracting Officer.

Payment for drainfill will be made at the contract unit price for each type of drainfill, 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.

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. Bid Item 9, Drainfill

- (1) This item shall consist of furnishing and placing the drain fill under the R/C channel lining and under the side inlet structures for the drain pipes as shown on the drawings.
- (2) The gradation for the drainfill material shall meet the following requirements:

Sieve Size	Percent Passing
2 in.	100
3/4 in.	90-100
1/2 in.	85-100
No. 4	62-100
No. 10	41- 85
No. 20	20- 65
No. 40	0- 48
No. 140	0- 15
No. 200	0- 5

- (3) The moisture content shall be maintained in a range that will minimize segregation.
- (4) In Section 6, Compaction, Class III compaction shall apply.
- (5) The material passing the #40 sieve shall be non-plastic.
- (6) Measurement and payment shall be according to Section 8 and will include Subsidiary Item, Removal of Water.

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 designated 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. 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.

Pozzolan shall conform to ASTM C618, Class F, except the loss on ignition shall not exceed 3.0 percent.

Water-reducing, set-retarding admixture 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

Concrete shall be classified as follows:

<u>Class of Concrete</u>	<u>Water Content (gallons/bag)</u>	<u>Cement Content (bag/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:

<u>Type of Structure</u>	<u>Slump (inches)</u>
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

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 test results or other evidence satisfactory to the Contracting Officer that the proposed materials meet the requirements of the specifications.

When acceptable sources, types and gradings of aggregates are designated in the contract, test results or other data to verify that the aggregates meet the specification will not be required. Grading will be tested at the site.

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 the 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

During the course of the work, the Engineer will perform such tests as are required to assure the concrete meets the contract requirements. Tests performed by the Engineer are not for the purpose of providing the Contractor with the information required for proper work execution and performance and shall not relieve the Contractor of the necessity to perform tests for that purpose.

The following tests will be performed by the methods indicated:

<u>Test</u>	<u>Method</u> <u>(ASTM Designation)</u>
Sampling	C 172 <u>1/</u>
Slump Test	C 143 <u>1/</u>
Air Content	C 231 <u>1/</u> or C173 <u>1/</u>
Compression Test Specimens	C 31 <u>1/</u> , C 42 or C 684 <u>2/</u>
Compressive Strength	C 39 <u>2/</u> , or C 42
Unit Weight	C 138

1/ Test of a portion of a batch may be made on samples representative of that portion for any of the following purposes:

- (1) Determining uniformity of the batch.

- (2) Checking compliance with requirements for slump and air content when the batch is discharged over an extended period of time.
- (3) Checking compliance of the concrete with the specifications when the whole amount being placed in a small structure, or a distinct portion of a larger structure, is less than full batch.

2/ For each strength test of specimens made according to ASTM Designation C 39, or C 684, 3 standard test specimens shall be made. The test result shall be the average of the strength of the 3 specimens, except that if 1 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 1 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, 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 percentage 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 as 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 corrected by 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 water⁴ 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

Mixers and mixing shall be in accordance with recommended standards set forth in ACI 304, some specific interpretations of which are stated below.

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 forms. 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.

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. If less water than the design maximum water-cement ratio has been incorporated in the batch, water to compensate for up to 1-inch loss in slump may be added, up to the design maximum water cement ratio. Withholding some of the mixing water until the concrete arrives on the job, then adding the remaining water and turning the mixer 30 revolutions at

mixing speed may overcome transporting conditions. When loss of slump or workability cannot be offset by these measures, complete mixing shall be performed on the job using centrally dry batched materials, or by on site batching and mixing.

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.

Control shall be provided to insure that the batch cannot be discharged until the required 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. Volumetric batching and continuous mixing at the construction site will be permitted. 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 documented 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--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 batch 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 from rain, and from more than 20 minutes exposure to the sun 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 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 form release agent on 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 sand blasting 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. All ice, snow and frost shall be removed and the temperature of all surfaces to be in contact with the new concrete shall be no colder than 40°F.

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.

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 specifications.

Other preparations include but are not limited to the concrete batching plant, mixing and delivery equipment and system, placing and finishing equipment and system, schedule of work, work force and heating or cooling facilities as applicable. All deficiencies are to be corrected 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 can be consolidated with a minimum of lateral movement.

Concrete shall not be dropped more than 5 feet vertically unless suitable equipment is used to prevent segregation.

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 to 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.

Surfaces of construction joints shall be cleaned of all unsatisfactory concrete, laitance, coatings, stains or debris by either 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-waterjets will not be permitted and the wet sandblasting method will be required after the concrete has hardened.

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 has given 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.

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
Columns, walls, spillway riser - with side or vertical load	7 days
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 <u>1/</u>	3 days
Concrete supporting not more than 20 feet of wall in place above it ¹	24 hours

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

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 the 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 mixed not richer than 1 part cement to 3 parts sand. Patching mortar shall be mixed in advance and allowed to stand without addition of water until it has reached the stiffest consistency that will permit placing. Manipulation of the mortar with a trowel during this period shall be performed as required to insure the proper consistency.

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 repaired 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 otherwise

After placing and consolidating the concrete, all exposed surfaces shall be accurately struck off to grade. Following strike-off, the surfaces shall be immediately smoothed by darbying or bull floating before any free water has bled to the surface. The concrete will then be allowed to rest until the bleed water and water sheen has left the surface and the concrete has stiffened to where it will sustain foot pressure with only about 1/4 inch (6mm) indentation. At this time all joints and edges that will be exposed to view that are not chamfered shall be finished with edging and/or molding tools. After edging and hand-jointing is complete, all exposed surfaces shall be floated with wood or magnesium floats. The floating should work the concrete no more than necessary to remove screed, edger and jointer marks and produce a compact surface, uniform in texture.

Joints and edges on unformed surfaces shall be chamfered or finished with molding tools.

21. CURING

Concrete shall be cured in accordance with the recommended practice of ACI 308, of which some specific interpretations are set forth below.

Concrete shall be prevented from drying for a period of at least 7 days after it is placed. Exposed surfaces and concrete formed in absorption wood forms shall be kept continually wet during the entire curing period or until the forms have been removed. After forms have been removed, the exposed surface shall be kept continuously wet until patching and repair are complete and until the curing period is completed or until a curing compound is applied.

Moisture can be maintained by sprinkling, flooding or fog spraying or by covering with continuously moistened canvas, cloth mats, straw, sand or an approved material. Water and/or covering shall be applied in such a way that the concrete surface is not eroded or otherwise damaged.

Except as otherwise specified in Section 26, curing compound may be used for exposed surfaces or formed surfaces after patching and repair have been completed. Unless otherwise specified, the curing compound shall be white pigmented and conform to ASTM C 309 Type 2, Class A or B. If surface coatings are to be applied to concrete where curing compound is

used, Type 2, Class B shall be used and allowed to age a minimum of 30 days prior to the application of the coating. Clear curing compound (Type 1) or clear with fugitive dye (Type 1-D) may only be used only when specified in Section 26.

Curing compound shall be thoroughly mixed before applying using a continuously agitating pressure sprayer at a uniform and agitated during application. It shall be applied using continuously agitating pressure sprayer 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 pinholes or other imperfections.

All 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.

Unless otherwise specified in Section 26, curing compound shall not be applied to construction joints or other areas that are to receive additional concrete, paint, or other material that requires a positive bond.

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

22. REMOVAL, REPLACEMENT, 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 Contracting Officer will determine the required extent of removal, replacement or repair and advise the Contractor, in writing, of this determination.

Prior to starting repair work the Contractor shall obtain the Contracting Officer's approval of this plan for making the repair. The appropriate methods described in Chapter VII of the Concrete Manual, Bureau of Reclamation, U.S. Department of the Interior, shall be used as the primary reference for repairs. 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

Approval of the Contractor's repair plan 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.

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

23. CONCRETING IN COLD WEATHER

Concreting in cold weather shall be performed in accordance with ACI 306 Recommended Practice for Cold Weather Concreting, of which some specific interpretations are set forth below.

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 140°F just prior to mixing with the cement.
- b. When the minimum daily atmosphere 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

Concreting in Hot Weather shall be in accordance with the recommended practice of ACI 305, of which some specific interpretations are set forth below.

For the purpose of the specification hot weather is defined as any combination of high temperature, low relative humidity and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise resulting in abnormal properties.

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 shall apply:

- a. The Contractor shall maintain the temperature of the concrete below 90°F during mixing, conveying, and placing.
- b. The concrete shall be placed in the work immediately after mixing. Truck mixing shall be delayed only until 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 other means to maintain adequate moisture 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. 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.
- f. Concrete surfaces, especially flatwork placed with large areas of surface, shall be covered as soon as the concrete has sufficiently hardened and shall be kept continuously wet for at least 24 hours of the curing period. This protective method may be continued for the required curing period or until curing compound as specified in g., below is applied:
- g. Moist curing may be discontinued before the end of the curing period if white pigmented curing compound is applied immediately, following the procedures specified in Section 21.
- h. In extreme conditions it may be necessary to (1) restrict placement to late afternoon or evening (2) restrict the depth of layers to assure coverage of the previous layer while it will still respond readily to vibration, (3) suspend placement until conditions improve, and (4) remove forms, repair, patch and reapply wet curing by small areas at a time.

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, drainfill, or bedding, the volume of concrete required to fill voids resulting from over excavation outside the neat lines or pay limits will be included in the measurement for payment where such over excavation 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 improper construction operations, as determined by the Contracting Officer.

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 other 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.

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 10. Concrete Channel Lining

- (1) This item shall consist of furnishing, forming, and placing all concrete required to construct the reinforced concrete channel lining between approximate Station 155+50.00 and Station 156+51.34 and the channel lining for the side channel for the double 6'x7' box culvert at Station 128+92.
- (2) In Section 2. Materials, the materials shall be as follows:
 - (a) Portland Cement shall be Type II, IIA, or IP(MS)
 - (b) Performed expansion joint filler shall conform to Material Specification 535 and ASTM D 1752, Type 1.
 - (c) The joint sealing compound shall be a Type S, Grade NS. Use NT or T, low-modulus silicone conforming to the requirements of ASTM C-920 that can tolerate submergence by intermittent flood flows. The sealant shall have the capability to withstand without failure an increase of 100 percent and a decrease of at least 50 percent of the joint width as measured at the time of application when tested in accordance with ASTM C-719. The elongation shall be a minimum of 1,000 percent without failure when tested in accordance with ASTM D-412. A bond breaker tape or other manufacturer approved material shall be used if the sealant compound is not compatible with the in-place preformed joint filler. The manufacturer's representative shall be present during initial installation to insure that proper surface preparation, mixing, application and handling techniques are being used by the Contractor.
- (3) In Section 3. Classes of Concrete, the concrete shall be Class 4000X.
- (4) Coarse aggregate shall be size No. 57 in accordance with ASTM C 33.
- (5) Waterstops shall be class II, Type B, D, or E size designation 20 with a center bulb diameter of not less than one inch. All

splices except straight butt splices shall be factory made. Straight butt splices shall be made according to the manufacturer's recommendations.

- (6) Pozzolan shall be used as a partial substitute for portland cement not to exceed a maximum substitution of 20 percent based on absolute volume.
- (7) Concrete shall be integrally colored. The cured concrete color shall blend with the natural earth tones at the site and may be produced using Harvest Goldenrod additive, pigment #5084 at a rate of two pounds per sack of cement, as produced by Davis Colors or similar quality products by Colorful Admixtures of L.M. Scofield. The Contractor shall provide a cured trial test sample on an exposed footing or slab to verify the color. Color matching of concrete patching materials shall also be established by the Contractor in a trial sample.

b. Bid Item 11, Concrete Structures

- (1) This item shall consist of finishing, forming, and placing all concret required to construct:
 - (a) The 54" headwall and apron at Station 35+84.50.
 - (b) The double 6' x 7' box culvert with headwalls and downstream apron at Station 128+63.00.
 - (c) The outlet protection for the 54" pipe at Station 35+84.50.
- (2) In Section 2, Materials, the materials shall be as follows:
 - (a) Portland cement shall be Type II, IIA, or IP(MS).
 - (b) Preformed expansion joint filler shall conform to Material Specification 535 and ASMD 1752, Type 1.
 - (c) The joint sealing compound shall be a Type S, grade NS, use NT or T, low-modulus silicone conforming to the requirements of ASTM C-920 that can tolerate submergence by intermittent flood flows. The sealant shall have the capability to withstand without failure, an increase of 100 percent and a decrease of at least 50 percent of the joint width as measured at the time of application when tested in accordance with ASTM C-710. The elongation shall be a minimum of 1,000 percent without failure when tested in

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accordance with ASTM D-412. A bond breaker tape or other manufacturer approved material shall be used if the sealant compound is not compatible with the in-place preformed joint filler. The manufacturer's representative shall be present during initial installation to insure that proper surface preparation, mixing, application and handling techniques are being used by the Contractor.

- (d) Curing compound shall be clear and meet the requirements of Specification 534 and ASTM C-309, Type 1D, Class B.
- (3) In Section 3, Classes of Concrete, the concrete shall be Class 4000X.
- (4) Coarse aggregate shall be size No. 57 in accordance with ASTM C 33.
- (5) Water stops shall be Class II, Type B, D, or E size designation 20 with a center bulb diameter of not less than one inch. All splices except straight butt splices shall be factory made. Straight butt splices shall be made according to the manufacturer's recommendation.
- (6) In Section 19, all patched or formed surfaces that will be exposed shall have a rubbed finish.

Rubbed finishes require the surface to be rubbed with a medium coarse carborundum stone, using water for lubrication and cleaning. The rubbing shall be started as soon as possible after the forms are removed, patching is finished, and the patching mortar has set thoroughly.

Rubbing shall be continued until all form marks, projections and irregularities have been removed and a uniform surface has been obtained. After rubbing is completed, the surface shall be washed to remove loose powder and shall be left free from unsound patches, paste, powder, and objectionable marks.

- (7) Pozzolan shall be used as a partial substitute for portland cement not to exceed a maximum substitution of 20 percent based on absolute volume.
- (8) Concrete shall be integrally colored. The cured concrete color shall blend with the natural earth tones at the site and may be produced using Harvest Goldenrod additive, pigment #5084 at a rate of 2 pounds per sack of cement, as produced by Davis Colors

or similar quality products by Colorful Admixtures of L.F. Scofield. The contractor shall provide a cured trial test sample on an exposed footing or slab to verify the color. Color matching of concrete patching materials shall also be established by the Contractor on a trial sample.

c. Bid Item 12. Cement

- (1) This item shall consist of furnishing and handling all cement required for construction of Bid Item 10, Concrete Channel Lining; Bid Item 11, Concrete Structures; Bid Item 13, Concrete for Minor Structures; and Bid Item 21, Soil-Cement.
- (2) Cement shall be Type II, IIA, or IP(MS).
- (3) If Type IP(MS) is used, pozzolan shall not exceed 20 percent based on absolute volume and the R factor $R = \text{CaO}_5 / \text{Fe}_2\text{O}_3$ shall be less than 1.5.

d. Bid Item 13. Concrete for Minor Structures

- (1) This item shall consist of furnishing, forming and placing all concrete required to construct the concrete pipe collars, the collector channel inlet base slabs and driveway entrances for the maintenance road at the locations shown in the drawings.
- (2) In Section 3, Classes of Concrete, the concrete shall be Class 2500X, and the cement shall be Type II, IIA or IP(MS).
- (3) Pozzolan shall be used as a partial substitute for portland cement not to exceed a maximum substitution of 20 percent based on absolute volume.
- (4) Coarse aggregate shall be size No. 57, in accordance with ASTM C33.
- (5) Curing compound shall be Type 2 conforming to Material Specification 534 and ASTM C 309.
- (6) Measurement and payment shall be according to Section 25 of this specification and shall include Subsidiary Item; Pavement Replacement, Manhole Adjustment and Plug for Abandoned Pipe.

e. Subsidiary Item. Pavement Replacement

- (1) This item shall consist of the pavement replacement for constructing driveway entrances for the maintenance roads at the locations shown on the drawings.
- (2) The pavement shall be replaced according to the detail shown on the drawings.
- (3) The asphalt concrete used for pavement replacement shall match the thickness of the existing pavement and shall conform to the following requirements.
 - (a) The asphalt shall be produced from crude asphalt petroleum or a mixture of refined liquid asphalt and refined solid asphalt. It shall be free from admixture with any residues obtained by the artificial distillation of coal, coal tar, or paraffin oil and shall be homogeneous and free from water.
 - (b) Asphalt shall not be heated during the process of its manufacture, storage, or during construction so as to cause injury as evidence by the formation of carbonized particles.
 - (c) Paving asphalt shall be classified by viscosity and shall conform to the requirements set forth in the following table:

SPECIFICATION DESIGNATION	TEST METHOD		VISCOSITY GRADE		
	ASTM	AASHTO	AR-2000	AR-4000	AR-8000

TEST ON RESIDUE FROM RTFC
 PROCEDURE CALIF. METHOD
 346E(1)

Absolute Viscosity at 140°F.. poise		T-202	1500-2500	3000-5000	6000-10.000
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Kinematic Viscosity at 275°F.. cs. min.		T-201	200	275	400
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Penetration at 77°F.. 100g/5 sec. min.	D-5	T-49	40	25	20
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Percent of original penetration at 77°F.. min. (3)	D-5	T-49	40	45	50
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Ductility at 77°F. cm. min.	D-113	T-51	100(2)	75	75
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TEST ON ORIGINAL AS-
 PHALT

Flast Point, Pensky- Martens. °F.min.	D-93	T-73	425	440	450
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Solubility on Trich- loroethylene % min.	D-2042	T-44	99	99	99
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- (1) TFO may be used but RTFC shall be the referee method.
 - (2) If the ductility at 77° is less than 100 cm., the material will be acceptable if its ductility at 60° is more than 100 cm.
 - (3) Original penetration as well as penetration after RTFC loss.

(d) Asphalt concrete shall be placed only when the surface is dry, and when the atmospheric temperature in the shade is 40°F. or above. No asphalt concrete shall be placed when the weather is foggy or rainy, or when the base on which the material is to be placed contains moisture in excess of the optimum. Asphalt concrete shall be placed only when the Engineer determines that weather conditions are suitable.

(e) Asphalt concrete shall be delivered and placed at a temperature no higher than necessary for placing.

finishing and spreading, but shall be high enough to accomplish this work. Tarpaulins shall be furnished and used to cover all loads during transportation if difficulties in spreading, finishing, or compacting, as determined by the Engineer, are experienced and the temperature of the mixture taken at a point 6 inches below the exposed top surface is below 200°F. at the point of delivery in the truck. No free treating fluid shall be present in the truck bodies at the time of asphalt concrete loading.

- (f) The handling of the completed mixture shall at all times be such as to prevent segregation, and the material as spread shall be free from areas of excess coarse, or fine material. Float rock developed in the process of raking shall be placed on an underlying course or otherwise disposed of. In no case shall it be scattered over the surface of a final course.
- (g) The asphalt to be mixed with the mineral aggregate shall be paving grade asphalt and shall be AR-2000 to AR-8000 as described in 3.c.
- (h) Coarse aggregate is material retained on the No. 4 sieve and fine aggregate is material passing the No. 4 sieve.
- (i) Blending sand shall be clean hard and sound material, either naturally occurring sand or crushed fines which will readily accept asphalt coating. The exact grading requirements shall be such that, when it is mixed with the mineral aggregate, the combined product shall meet the requirements of the designated mix as specified elsewhere in this specification.
- (j) Mineral filler shall conform to the requirements of AASHTO M-17. The mineral filler shall be dry hydrated lime conforming to the requirements of ASTM C-207 Type N, or portland cement conforming to Material Specification 531 or other approved mineral filler shall be added to the aggregate in accordance with the requirements contained herein. The amount of mineral filler to be used shall be determined by the Engineer. The method of adding the mineral filler shall be such that the aggregate is uniformly coated and the mineral filler is uniformly distributed without loss or waste within the material prior to adding the asphalt to the mixture.
- (k) When aggregate is subject to stripping, via one of two procedures below, dry hydrated lime conforming to the requirements of ASTM C-207 Type N, portland cement conforming to Material Specification 531 or other approved

antistripping agent shall be added. Hydrated lime and portland cement shall be added in accordance with this specification. Other approved non-stripping agents shall be added in accordance with the manufacturer's recommendations and approved by the Engineer.

(1) Prepare a test sample of the paving mixture. Spread it out in a loose thin layer and allow to air-season for 24 hours before testing. A suitable size sample (approximately 1/2 contents of a one quart container) shall be tested by placing it in a glass jar with a tight screw cap. The sample shall be completely covered with distilled water at room temperature. The jar and contents shall be allowed to stand for a period of 24 hours. Then the sample shall be vigorously shaken for a period of 15 minutes. The sample of mixture shall be examined for stripping.

(2) ASTM D-1075

(1) The combined aggregates sampled after all processing, except the adding of asphalt and mineral filler, shall conform to the following quality requirements:

The ratio of the percentage of aggregate by weight passing the No. 30 sieve, to that passing the No. 8 sieve, shall not exceed 65 percent in all dense graded asphalt concrete mixes.

At least 75 percent by weight of the aggregate retained on the No. 8 sieve shall consist of particles which have at least one rough, angular surface produced by crushing.

(m) The surface course and base course shall consist of Type E - 3/8 and B-1 dense graded asphalt concrete material respectively. Unless otherwise authorized by the Engineer no work shall be started on the project, nor any mixture accepted therefor, until the Contractor or his supplier has submitted samples of the materials intended for use and the Engineer has established a satisfactory job-mix formula based upon tests of the materials furnished. The formula shall indicate the definite percentage for each sieve fraction of aggregate, and for bituminous cement; also the intended temperature of completed mixture at the time it is discharged from the mixer. The material furnished shall conform to the approved job-mix formula within the tolerances specified herein:

Aggregate passing sieve No. 4 and larger \pm 5 percent

Aggregate passing sieves No. 8 and 30 \pm 5 percent
 Aggregate passing sieve No. 200 \pm 2 percent
 Temperature of mixing and placing \pm 25°F.

The tolerances used in conjunction with the job-mix formula shall be such that the resulting gradation shall be within the specification limits. The amount of liquid asphalt, by weight, to be added to the different gradations of the mineral aggregate shall be as specified and determined by the Engineer. The amount specified by the Engineer shall be within the following range of the percentages of the total mixed material:

Mix Description	Percentage Asphalt Range
B-1. (Base Course)	5.0 to 6.0
E-3/8. (Surface Course)	5.5 to 6.5

The allowable tolerance in percentage of asphalt content from that percentage specified by the Engineer, when sampled and tested in accordance with AASHTO T-164 and T-168 as modified by Contracting Agency, shall be plus or minus 0.3 percent.

- (n) The grading of the combined aggregates shall be such as to conform to the requirements indicated in the following tabulations in which the percentages shown are based on the weight of dry aggregate only.

Mineral Aggregate-Percentage by Weight Passing
 Type Dense Graded Mixes

Sieve Size	Base Course B-1	Surface Course E-3/8
1"	100	
3/4"	80-100	
1/2"	65-85	
3/8"	55-75	100
No. 4	40-60	65-85
No. 8	25-45	45-70
No. 30	10-30	20-40
No. 100		5-15
No. 200	2-8	3-8

- (o) The mineral aggregate and asphalt shall be mixed at a central mixing plant of the pug mill type either by weight

proportioning of mineral aggregate and asphalt and batch mixing, or by volumetric proportioning of mineral aggregate and asphalt and mixing in a continuous type mixer, as the Contractor may elect.

The right is reserved to order the use of any drying, proportioning and mixing equipment discontinued which, in the opinion of the Engineer, fails to dry and proportion the aggregates or mineral filler properly or fails to produce a satisfactory mixture.

Filler material, if required, shall be added separately and in a thoroughly dry condition. Heating of filler material will not be required.

The amount of filler material to be used will be specified by the Engineer and shall be accurately proportioned by weight or by volumetric methods.

The amount of asphalt to be added to the mineral aggregate shall be as specified in this specification.

The temperature of the mineral aggregate shall not be higher than necessary for spreading and finishing at the time of adding the paving asphalt, and in no case shall the temperature for the Dense Graded Mixes exceed 325°F., nor shall it exceed 250°F. for Open Graded Mixes.

Asphalt shall be added to the mineral aggregate at a temperature conforming to the range of temperature specified.

Thermometric equipment shall be provided to indicate the temperature of the asphalt near the charging valve at the mixer.

All scales shall be certified as to accuracy and sealed at least annually by the Sealer of Weights and Measures, and rechecked or ordered by the Engineer. Each scale installation shall be provided with certified weights as follows:

The Contractor shall provide not less than 20 certified weights, each weighing 50 pounds, to be used by the Engineer in checking scales used on the project. Each weight shall be numbered and show the corresponding certified weight. The scales and weights shall remain the property of the Contractor and no payment will be made for their use.

The asphalt concrete manufacturer shall make whatever alterations are necessary to his equipment enable the Sealer of Weights and Measures to conveniently check, calibrate and seal the aggregate and asphalt scales used in production of asphalt concrete.

Scales shall be so located that the mixer operator and the plant inspector have an unobstructed close-up-view of the indicating or registering devices. They shall indicate that true net weight without the application of any factor. The dial for dial type scales shall not be less than 12 inches in diameter and the figures thereon shall be clearly legible.

- (p) The mixer shall be of the twin-shaft pug mill type and shall be operated at the speed recommended by the manufacturer. It shall be equipped with paddles of sufficient size and number to deliver a thorough and uniform mixture. Should the paddles or other parts of the pug mill become worn to such extent as to adversely affect the quality of the mixing or allow leakage from the discharge gate, they shall be promptly replaced.

The amount of material that may be mixed per batch shall not exceed the rated capacity of the plant, or that which will permit complete mixing of all the materials.

Dead areas in the mixer, in which the material does not move or is not sufficiently agitated, shall be corrected either by a reduction in the volume of materials or by other adjustments.

All boxes, hoppers, buckets or similar receptacles used for weighing mineral aggregate, filler material, and asphalt, as well as all scales used in batching materials shall be insulated against the vibration or movement of the rest of the plant, so that the error in weighing, with the entire plant operating, will not exceed 2 percent for any setting nor 1-1/2 percent for any batch.

Dial heads or readout devices shall be mounted separate from batch plant or tower supports. This will nullify most vibrations from readout.

The aggregate scales shall be either multiple beam or springless dial type having a capacity exceeding 1-1/2 times the total amount of materials to be weighed in one operation. Each scale gradation shall be approximately 1/1000 of the total capacity of the scale.

Asphalt shall be measured by weight in a heated insulated bucket suspended from a springless dial scale system having a capacity of not more than 500 pounds with one pound graduations, for mixers with a manufacturer's rated capacity of 4,000 pounds or less, and not more than 1,000 pounds with one pound graduations for mixers with a manufacturer's rated capacity of over 4,000 pounds, or scales of equal accuracy.

Asphalt shall be introduced into the mixer by means of a distributing pan fixed to the side of the mixer, by gravity distribution along the center of the mixer parallel to the mixer shafts, or by pressure spraying. The pan shall be equipped with movable vanes in order that the flow of asphalt may be directed across the width of the pan as desired. The vanes shall be equipped with a means of quick adjustment and a positive lock to prevent shifting.

Filler material shall be introduced into the mixer through the weight box, or introduced into the center of the mixer.

The entire batch shall be continuously mixed until all the materials are thoroughly blended into one homogeneous mass. The maximum mixing time for any one batch shall be hereinafter specified for that particular type mix. The time of mixing a batch shall begin on the charging stroke of the weigh hopper dumping mechanism and shall end when discharge from the mixer has started. The mixer shall be equipped with a time lock mechanism which locks the mixer discharge gate for the mixing period and activates an indicator light, or bell, which shall be used in signaling the end of the mixing time. The time lock and indicator light or lights, shall be actuated by the charging stroke of the weigh hopper charging mechanism. There shall also be provided an interlock and indicator light to provide for the dry mixing time for the introduction of filler which shall be a minimum of 4 seconds and not more than 15 seconds as required by the Engineer. The device shall be accurate to within 2 seconds. The time of mixing shall not be less than 30 nor more than 45 seconds, or as otherwise directed by the Engineer. If for any reason the mix cannot be discharged when the mixing cycle is completed, power to the mill shall be cut off or the mix shall be wasted. The mixing shall begin with the introduction of the asphalt into the mixer, and shall end when the mixer gate is opened. When asphalt is introduced by spraying, the spraying time shall not exceed 15 seconds. In any event, mixing shall continue until uniform coating of the aggregate is obtained.

The mixer platform shall be of ample size to provide safe and convenient access to the mixer and other equipment. Mixer and weigh-box housing shall be provided with hinged gates of ample size to permit ready sampling of the discharge of aggregates from each of the plant bins.

Means shall also be provided for convenient and accurate sampling of the mixture.

- q. A temperature indicating device reading to 500°F. and accurate to 5°F. shall be fixed in the asphalt line or storage tank at a suitable location.

The temperature of the mixture discharged into the hauling vehicles shall not vary more than 30°F. for successive batches. The discharge end of the asphalt binder circulating pipe shall be maintained below the surface of the asphalt binder in the storage tank to prevent discharging hot bituminous binder into open air. The Contractor shall provide in the asphalt feed lines connecting the plant storage tanks to the asphalt weighing system or spray bar, a suitable sampling outlet. The sampling device shall consist of a 1/2 inch or 3/4 inch valve constructed in such a manner that a one gallon sample may be withdrawn slowly at any time during plant operations. The valve shall be maintained in good condition and if it fails to function properly, it shall be replaced. The sampling device shall be placed in a location that is readily accessible and in an area free of dangerous obstructions. A drainage receptacle shall be provided for flushing the devices prior to sampling.

The beds of trucks used to haul asphalt concrete mixtures shall be coated with a light film of distillate or light oil before loading. If, in the opinion of the plant inspector, there is an excessive amount of oil on the beds, the truck driver shall be required to raise the bed of the truck and drain off the excessive amount of oil.

Mixtures shall be delivered to the site of the work without segregation of the ingredients and within the temperature range specified.

- r. The trench must be compacted to its required density as shown on plans and required ABC must be in place prior to the placement of the asphalt concrete.
- s. Sufficient rolling equipment shall be furnished to compact and finish satisfactorily the amount of the mixture being placed.

In lieu of smooth steel wheel and pneumatic roller specified herein, the Contractor may utilize one (1) vibratory steel wheel compactor in compaction of asphalt concrete.

Vibratory steel wheel compactor shall be self-propelled, with a minimum weight of 8 tons, equipped with an automatic device capable of properly moistening the wheel or wheels without adding an excess of water or other approved material. Vibratory compactor shall be operated with the larger wheel in the forward position. Rolling procedures, surface tolerance and compactive results when utilizing vibratory compactor shall be as specified herein.

All rollers used in compaction of asphalt concrete shall be self-propelled and reversible, with a minimum weight of 8 tons. All rollers shall be equipped with an automatic device capable of properly moistening the wheels without adding an excess of water or other approved material. Pneumatic-tired rollers for use in breakdown rolling shall be equipped with skirt-type devices mounted around the tires so that the temperature of the tires will be maintained during the rolling process.

Pneumatic-tired rollers shall be of the 2 axle tandem type, having a rolling width of not less than 5 feet. All tires shall be of the same size and shall have treads satisfactory to the Engineer. The roller shall be so constructed that operating weight per tire shall not be less than 2,000 pounds and the tires shall be spaced so that the entire gap between adjacent tires will be covered by the tread of the following tire. Except as otherwise specified, each tire shall be inflated to 90 psi and at all times the air pressure in each tire shall not vary more than 5 psi from the specified pressure.

The required rollers shall be on the project and in acceptable operating condition, prior to the placement of any asphalt material.

Breakdown rolling shall begin as soon as the mixture will bear the roller without undue displacement. Rolling shall be longitudinal, overlapping on successive trips by at least 1/2 but not more than 3/4 the width of the rear wheels. Alternate trips of the roller shall be of slightly different lengths. The motion of the roller shall at all times be slow enough to avoid displacement of the mixture. Final compaction and finish rolling shall be done by means of tandem power roller. Rolling shall continue until the specific gravity of the compacted mixture is not less than 95 percent of the specific gravity

of specimens composed of the same materials in similar proportions or composed of the same mixture compacted in the laboratory by the 75 blow method of ASTM D-1559.

At any place not accessible to the roller, the mixture shall be thoroughly compacted with tampers and finished, where necessary, with a hot smoothing iron to provide a uniform and smooth layer over the entire area compacted in this manner.

The completed surfacing shall be thoroughly compacted, smooth, and true to grade and cross-section, and free from ruts, humps, depressions or irregularities. An acceptable surface shall not vary more than 1/4 inch from the lower edge of a 25 foot straightedge when the straightedge is placed parallel to the centerline of the roadway. The straightedge shall be furnished by the Contractor and shall be acceptable to the Engineer.

t. The base prepared by the Contractor, on which the asphalt concrete is to be placed, shall be smooth, firm, and true to grade as shown on the plans, and shall be so maintained throughout the period of placing asphalt concrete.

(4) The aggregate base course shall meet the requirements as specified in the following:

Materials for use as aggregate base shall be classified in the order of preference as follows:

Crushed Aggregate
Processing Natural Material
Decomposed Granite

When the base material without further qualification is specified, the Contractor may supply any of these materials. When a particular classification of base material is specified, the Contractor may substitute any higher classification of base material for the specified classification.

Except where materials are being obtained from a previously approved source, the Contractor shall give the Engineer 10 days advance notice, in writing, of the source of the base material he intends to use in order to allow sufficient time to perform the necessary tests.

a. Crushed aggregate shall consist of crushed rock or crushed gravel or a combination thereof.

Rock and gravel shall be clean, hard, sound, durable, uniform in quality, and free of any detrimental quantity of soft, friable, thin elongated, or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substance.

The loss by abrasion in the Los Angeles abrasion machine, determined as prescribed in ASTM C-131, Grading A, shall not exceed 10 percent, by weight, after 100 revolutions nor 40 percent after 500 revolutions.

Crushed rock shall consist of the product obtained by crushing rock, stone, or gravel so that at least 50 percent by weight of aggregate retained on the No. 4 sieve for 3/4 inch or larger maximum sizes, and 50 percent retained on the No. 8 sieve for maximum sizes less than 3/4 inch shall consist of particles which have at least one rough, angular surface produced by crushing. All material that will pass a grizzly with bars spaced 15 inches apart, clear opening, shall be crushed when producing from the Contracting Agency's source.

The gradation of crushed rock shall comply with ASTM D-448.

Material designated herein as gravel shall be composed entirely of particles that are either fully or partially rounded and water-torn. Crushed rock obtained by crushing rock which exceeds ASTM D-448 maximum gradation sizes may be combined provided it is uniformly distributed throughout and blended with the gravel. The quality and gradation requirements shall be as stated in this specification.

Grading B of ASTM C-131 shall be used. The percentage of wear of the material shall not exceed 40 after 500 revolutions.

The aggregate shall be well graded when tested in accordance with ASTM C-136 and C-117. The percentage composition by weight shall be within the following limits.

<u>Sieve Sizes</u> (Square Openings)	Percentage by Weight Passing Sieve Aggregate <u>Base</u>
3"	
1-1/2"	
1-1/8"	100
No. 4	38-65
No. 8	25-60
No. 30	10-40
No. 200	3-12
P.I. Max	5

- b. Processed natural material shall consist of hard, durable fragments of stone or gravel and a filler of sand or other finely divided mineral matter. It shall be free from an excess of soft disintegrated pieces, alkali, adobe, vegetable matter, loam, or other deleterious substances.

When sampled and tested in accordance with standard test methods, the aggregate shall meet the following requirements:

- (1) Percentage of Wear: When tested in accordance with ASTM C-131, the percentage of wear shall not exceed 40 percent after 500 revolutions.
- (2) Plasticity Index: When tested in accordance with AASHTO T-90, the plasticity index shall not be more than 5.
- (3) Liquid Limit: When tested in accordance with AASHTO T-89, the liquid limit shall not exceed more than 25 percent.

Crushed material is not required, but may be incorporated in the finished product.

The aggregate shall conform to the sieve analysis in this specification except that the least dimension of the maximum particle size shall not exceed 2/3 of the compacted thickness of the specified lift being placed.

- c. Decomposed granite shall be any granitoid igneous rock which has been weathered in place and which has as principal constituents granular fragments of quartz and feldspar. It may also contain fragments of granitic rock not yet broken down into the component minerals. This material shall remain stable when saturated with water.

Particles larger than 3 inches, which will not be broken in the process of rolling and tamping during construction, shall not be used.

Decomposed granite shall conform to the following requirements:

- (1) When tested in accordance with this specification, not more than 20 percent shall pass the No. 200 mesh sieve.
- (2) The P.I. of material passing the No. 200 sieve prior to testing shall not be less than 3 nor greater than 10.

A quantity of sufficient size to have a dry weight of 15 pounds shall be selected and dried to constant weight at a temperature between 215°F. and 230°F. Fifteen pounds of this material shall then be subjected to 500 revolutions in a Los Angeles abrasion machine, except that nothing shall be placed in the drum other than the material to be tested.

The material that has been subjected to the breakdown shall be tested in accordance with ASTM C-117 to determine the percentage of material finer than a No. 200 mesh sieve by washing.

- d. The aggregate base course should be compacted to a 95% density by means of pneumatic tamps, hydro-hammers or other approved devices which secure uniform and required density without injury to related structures.
5. Backfill shall be sound earthen material free from broken concrete, broken pavement, wood or other deleterious material. Unless otherwise specified, this may be native material with no piece larger than 8 inches, select material or aggregate base course. Pieces larger than 3 inches will not be used in the final 12 inches below the pavement subgrade.

The backfill material shall be compacted with hand and/or mechanical work methods using equipment such as rollers, pneumatic tamps, hydro-hammers or other approved devices which secure uniform and required density without injury to related structures.

The trench backfill shall be thoroughly compacted to not less than the densities shown on the plans when tested and determined by ASTM D-2922 and D-3017.

Granular material shall mean material for which the sum of the plasticity index and the percent of the material passing a No. 200 sieve shall not exceed 23.

Where mechanical compaction is used, backfill shall be placed in lifts the height of which shall not exceed that which can be effectively compacted depending on the type of material, type of equipment and methods used.

6. The existing pavement shall be trimmed to a neat true line with straight vertical edges free from irregularities with a saw specifically designed for this purpose.
7. The existing pavement shall be cut and trimmed after placement of the required ABC and just prior to placement of the asphalt concrete and the trimmed edges shall be painted with a light coating of asphalt cement or emulsified asphalt immediately prior to constructing the new abutting asphalt concrete pavement.
8. The Contractor shall do such grading in the area adjacent to backfilled trenches and structures as may be necessary to leave the area in a neat and satisfactory condition approved by the Engineer.
9. Other surfaces, in which the surface is broken into or damaged by the installation of the new work, shall be resurfaced in kind or as specified to the satisfaction of the Engineer.
10. No separate payment for pavement replacement will be made. Compensation will be included in Bid Item 13, Concrete for Minor Structures.

f. Subsidiary Item, Manhole Adjustment

- (1) This item shall consist of adjusting to grade the manhole at the location shown on the drawings.
- (2) The manhole shall be constructed of precast manhole rings in accordance with the details shown on the drawings and shall meet the requirements of ASTM C-478.
- (3) Use of water tight seal should be Type 2, 1-1/2"x1" in accordance with Federal Specification SS-S-210A.
- (4) In Specification 21, Section 8 shall apply.
- (5) In Specification 23, Section 6, Compaction Class C shall apply.

- (6) No separate payment will be made for manhole adjustment. Compensation for this work will be included in the payment for Bid Item 13, Concrete for Minor Structures.

g. Subsidiary Item. Plug for Abandoned Pipe

- (1) This item shall consist of plugging the abandoned 36" pipe at Brown Road.
- (2) Bricks shall conform to the requirements of ASTM C-32, Grade MM.
- (3) Masonry Cement used shall conform to ASTM C-91, with the exception that the average compressive strength shall not be less than 2500 psi at 28 days.
- (4) Fine aggregate for mortar shall conform to ASTM C-404 and C-144.
- (5) Hydrated lime used shall conform to ASTM C-207, Type S.
- (6) Mortar proportions by volume are as follows: One part masonry cement to 1/4 part hydrated lime to 2-1/4 to 3 parts aggregate.
- (7) No separate payment will be made for the pipe plug. Compensation will be included in Bid Item 13, Concrete for Minor Structures.

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 four 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

Splices of reinforcement shall be made only at locations shown on the drawings and provided by the steel schedule. Placement of bars at the lap splice locations shown, when not in contact, shall not be farther apart than one-fifth the shown lap length and in any case no greater than 6 inches.

6. SPLICING WELDED WIRE FABRIC

Unless otherwise specified, welded wire fabric shall be spliced in the following manner:

- a. Adjacent sections shall be spliced end to end (longitudinal lap) by overlapping a minimum of one full mesh plus 2 inches plus the length of the two end overhangs. The splice length is measured from the end of the longitudinal wires in one piece of fabric to the end of the longitudinal wires in the lapped piece of fabric.
- b. Adjacent sections shall be spliced side to side (transverse lap) a minimum of one full mesh plus 2 inches. The splice length shall be measured from the centerline of the first longitudinal wire in one piece of fabric to the centerline of the first longitudinal wire in the lapped piece of fabric.

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 or side form spacers that may be exposed on any face of slabs, walls, beams or other concrete surfaces shall have a protective coating or finish by means of hot dip galvanizing, epoxy coating, plastic coating, or be stainless steel. Metal chairs and spacers not fully covered by a protective coating or finish shall have a minimum cover of $\frac{1}{2}$ inch of concrete over the unprotected metal portion. 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 $\frac{3}{4}$ 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.

High density or structural plastic rebar accessories, designed to insure maximum concrete bond, may be substituted for metal or concrete accessories in spacer applications as approved by the Contracting Officer. Exposure of plastic rebar accessories at the finished concrete surface shall be kept to a minimum. Plastic rebar accessories, if used, shall be staggered along adjacent parallel bars and shall be placed at intervals no closer than 12 inches. Plastic rebar accessories shall not be used in concrete section 6 inches or less in thickness.

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. STORAGE

Steel reinforcement stored at the work site shall be placed above the ground surface on platforms, skids or other supports and protected from mechanical damage or corrosion.

9. MEASUREMENT AND PAYMENT

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 and 34-2. Computation of weights for welded wire fabric not shown in Table 34-2 shall be based on ACI Standard 315. 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 extralength 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 diagram; furnishing and attaching ties and supports; and furnishing, transporting, storing, cutting, bending, cleaning and securing all reinforcements.

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 to which they are made subsidiary are identified in Section 10 of this specification.

TABLE 34-1. STANDARD REINFORCING BARS

Bar Size No.	Wt. (lb./ft.)
3	0.376
4	0.668
5	1.043
6	1.502
7	2.044
8	2.670
9	3.400
10	4.303
11	5.313
14	7.65
18	13.60

TABLE 34-2. RECTANGULAR WELDED WIRE FABRIC 1/

Style Designation		Weight, Lb. Per 100 Sq. Ft.
By Steel Wire Gauge	By W-Number	
6 x 6 - 10 x 10	6 x 6 - W1.4 x W1.4	21
6 x 6 - 8 x 8	6 x 6 - W2.1 x W2.1	30
6 x 6 - 6 x 6	6 x 6 - W2.9 x W2.9	42
6 x 6 - 4 x 4	6 x 6 - W4.0 x W4.0	58
4 x 4 - 10 x 10	4 x 4 - W1.4 x W1.4	31
4 x 4 - 8 x 8	4 x 4 - W2.1 x W2.1	44
4 x 4 - 6 x 6	4 x 4 - W2.9 x W2.9	62
4 x 4 - 4 x 4	4 x 4 - W4.0 x W4.0	85
4 x 12 - 8 x 12	4 x 12 - W2.1 x W0.9 <u>2/</u>	25
4 x 12 - 7 x 11	4 x 12 - W2.5 x W1.1 <u>2/</u>	31

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

2/ Welded smooth wire fabric with wires smaller than Size W1.4 is manufactured from galvanized wire.

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 14. Steel Reinforcement

- (a) The 54" headwall apron and outlet protection at Station 35+84.50
 - (b) The double 6'x7' box culvert with headwalls and apron at Station 128+63.00
 - (c) The concrete channel lining for the side inlet at Station 128+92
 - (d) The concrete channel lining between Station 155+50.00 and Station 156+51.34
 - (e) The concrete pipe collars as shown on the drawings
- (2) In Section 3, Bar Schedule Lists and Diagrams, the Contractor shall provide any such bar schedules a minimum of 15 working days prior to placement of the subject reinforcing steel.
- (3) In Section 5, Splicing for Reinforcement, splices of reinforcement shall be made at the locations shown on the drawings and as permitted in the notes on the drawings. Placement of bars at the lap splice locations shown, where not in contact, shall not be farther apart than one-fifth of the shown lap length and in any case no greater than 6 inches.
- (4) All steel bars shall be Grade 40 if it is immediately available. If Grade 40 is not immediately available, Grade 60 may be used exclusively or in combination with Grade 40 provided that the conditions under which the grades are used in combination are acceptable to the Engineer and further provided that there is no additional cost. Development and anchorage length shall be figured based on Grade 40 only.
- (5) Measurement and payment for steel reinforcement shall be according to Section 9 of this specification.

CONSTRUCTION SPECIFICATION

42. CONCRETE PIPE CONDUITS AND DRAINS

1. SCOPE

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

2. MATERIALS

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

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

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

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

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

Hot-pour joint sealer shall conform to the requirements of Material Specification 536.

Cold-applied sealing compound shall conform to the requirements of Material Specification 536.

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

Joint packing shall be commercial grade oakum.

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

3. LAYING AND BEDDING

Pipe and tile shall be laid to the line and grade shown on the drawings. Pipe shall be laid with the bell or groove at the upstream end of each section.

- a. Concrete Cradles or Bedding. Pipe to be cradled or bedded on concrete shall be set to the specified line and grade and temporarily supported on precast concrete blocks or wedges until the cradle or bedding concrete is placed. Concrete blocks or wedges used to temporarily support the pipe during placement of bedding or cradle shall be of a class of concrete equal to or better than that used in the bedding or cradle.

- b. Earth, Sand, or Gravel Bedding. The pipe shall be firmly and uniformly bedded throughout its entire length to the depth and in the manner specified on the drawings. The pipe shall be loaded sufficiently during backfilling around the sides to prevent its being lifted from the bedding.

Perforated pipe shall be laid with the perforations down and oriented symmetrically about a vertical centerline. Perforations shall be clear of any obstructions when the pipe is laid.

Elliptical pipe and pipe with elliptical or quadrant reinforcement shall be layed so that the vertical axis, as indicated by markings on the pipe, is in a vertical position.

4. JOINTS

Pipe joints shall conform to the details shown on the drawings and to the requirements of Section 5 and 6 of this specification applicable to the type of joint specified. Except where unsealed joints are indicated, pipe joints shall be sound and watertight at the pressure specified.

5. JOINTING BELL AND SPIGOT PIPE

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

The joint shall be connected in accordance with the manufacturer's recommendations.

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

- b. Rubber Gasket Joints, Sewer and Culvert Pipe or Irrigation Pipe. The pipe shall be joined in accordance with the gasket manufacturer's recommendations except as otherwise specified.

c. Mastic Sealed Joints. At the time of assembly the inside surfaces of the bell and the outside surfaces of the spigot shall be clean, dry and primed as recommended by the manufacturer of the sealing compound. A closely twisted gasket of joint packing of the diameter required to support the spigot at the proper grade and to make the joint concentric shall be made in one piece of sufficient length to pass around the pipe and lap at the top. The gasket shall be laid in the bell throughout the lower third of the circumference. The end of the spigot shall be laid in the bell throughout the lower third of the circumference. The end of the spigot shall be laid on the gasket and the spigot shall be fully inserted into the bell so that the pipe sections are closely fitted and aligned. The gasket then shall be lapped at the top of the pipe and thoroughly packed into the annular space between the bell and the spigot.

(1) Hot-Pour Joint Sealer. The sealing compound shall be heated to within the temperature range recommended by the manufacturer and shall not be overheated or subjected to prolonged heating. After the joint is assembled, with the pipe in its final location, a suitable joint runner shall be placed around the joint with an opening left at the top. Molten sealing compound shall be poured into the joint as rapidly as possible without entrapping air until the annular space between bell and spigot is completely filled. After the compound has set, the runner may be removed. Alternate joints may be poured before the pipe is lowered into the trench. In this case, the joint shall be poured with the pipe in a vertical position without the use of the runner. The compound shall have thoroughly set before the pipe is placed in the trench, and the pipe be handled so as to cause no deformation of the joint during placement.

(2) Cold-Applied Sealing Compound. The annular space between bell and spigot shall be completely filled with the sealing compound. The compound shall be mixed on the job in accordance with the manufacturer's recommendations and in relatively small quantities so that setting will not be appreciable before application.

(3) Preformed Sealing Compound. Joint packing will not be required, except as recommended by the manufacturer of the sealing compound. Preformed strips or bands of the sealing compound shall be applied to the bell and spigot prior to assembly of the joint in accordance with the manufacturer's recommendations. Any compound extruded from the interior side of the joint during assembly shall be trimmed even with the interior surface of the pipe.

d. Cement Mortar Sealed Joints. Cement mortar for joints shall consist of one part by weight of portland cement and two parts by weight of fine sand with enough water added to produce a workable consistency. At the time of assembly the inside surface of the bell and the outside surface of the spigot shall be clean and moist.

- (1) With Packing. A closely twisted gasket of joint packing of the diameter required to support the spigot at the proper grade and to make the joint concentric shall be made in one piece of sufficient length to pass around the pipe and lap at the top. The gasket shall be saturated with neat cement grout, laid in the bell throughout the lower third of the circumference and covered with mortar. The end of the spigot shall be fully inserted into the bell so that the pipe sections are closely fitted and aligned. A small amount of mortar shall be placed in the annular space throughout the upper two-thirds of the circumference. The gasket then shall be lapped at the top of the pipe and thoroughly packed into the annular space between the bell and the spigot. The remainder of the annular space then shall be filled completely with mortar and beveled off at an angle of approximately forty-five (45) degrees with the outside of the bell. If the mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. After the mortar has set slightly, the joint shall be wiped inside the pipe. In pipe too small for a man to work inside, wiping may be done by dragging an approved swab through the pipe as the work progresses.
- (2) Without Packing. The lower portion of the bell shall be filled with stiff mortar of sufficient thickness to make the inner surface of the abutting sections flush. The spigot end of the pipe to be joined shall be fully inserted into the bell so that the sections are closely fitted and aligned. The remaining annular space between the bell and spigot shall then be filled mortar and the mortar neatly beveled off at an angle of approximately forty-five (45) degrees with the outside of the bell. After the mortar has set slightly, the joint shall be wiped inside the pipe. In pipe too small for a man to work inside, wiping may be done by dragging an approved swab through the pipe as the work progresses.
- (e) Unsealed Joints. When unsealed joints are specified, they shall conform to the details shown on the drawings.

6. JOINING TONGUE AND GROOVE PIPE

- a. Cement Mortar Sealed Joint. Mortar shall be as specified for bell and spigot joints. The tongue end of the Section being placed shall be covered with mortar and firmly pressed into the groove of the laid Section in such manner that the tongue fits snugly and truly in the groove and that mortar is squeezed out both on the interior and exterior of the joint. Care shall be taken that no mortar falls from the groove end during the abutting operation. Immediately after the pipe sections have been abutted, exposed external surface mortar shall be pressed into the joint and any excess mortar removed, after which the interior surface of the joint shall be carefully pointed and brushed smooth, and all surplus mortar removed.

- b. Mastic Sealed Joints. Strips or bands of preformed sealing compound shall be applied to the tongue and groove prior to assembly of the joint in accordance with the manufacturer's recommendations. Any compound extruded from the interior side of the joint during assembly shall be trimmed even with the interior surface of the pipe.
- c. Rubber Gasket Joints. The pipe shall be joined in accordance with the gasket manufacturer's recommendations except as otherwise specified.
- d. Unsealed Joints. When unsealed joints are specified, they shall conform to the details

7. BANDING

When external mortar bands are specified, they shall conform to the details shown on the drawings.

8. CURING MORTAR JOINTS AND BANDS

The external surfaces of mortar joints shall be covered with moist earth, sand, canvas, burlap or other approved materials and shall be kept moist for 10 days or until the pipe is backfilled.

Water shall not be turned into the conduit within 24 hours after the joints are finished. Hydrostatic pressure shall not be applied to the conduit prior to 14 days after the joints are finished.

9. PRESSURE TESTING

Pressure testing of the completed conduit will not be required.

10. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the quantity of each kind, size, and class of pipe or tile will be determined to the nearest 0.1 foot by measurement of the laid length along the invert centerline of the conduit. Payment for each kind, size, and class of pipe or tile will be made at the contract unit price for that kind, size, and class. Such payment will constitute full compensation for furnishing, transporting and installing the pipe or tile complete in place.

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 15. 54" Diameter Concrete Culvert Pipe

- (1) This item shall consist of furnishing and installing the 54" diameter rubber gasket reinforced concrete pipe as shown on the drawings.
- (2) The pipe shall be installed to the elevations shown on the drawings.
- (3) The 54" diameter pipe shall conform to Material Specification 542, Concrete Culvert Pipe for ASTM C-76 Class III concrete pipe bell and spigot with rubber gasket joint per ASTM C-443.
- (4) The type of cement for the concrete pipe shall be Type II or IIA.

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 2 coats of one of the following paint options.

Painting shall be by use of one of the following options based upon installed exposure of the pipe as determined by the Contracting Officer:

Normal exterior or interior atmospheric exposure:

- a. Zinc dust - zinc oxide primer, Federal Specification TT-P-641, Type I or Type II.
- b. Single package, moisture cured urethane primer in silver metallic or color, or
- c. Zinc-rich cold galvanizing compound, brush, or aerosol application.

Submergence in water exposure:

- a. Zinc dust-zinc oxide primer, Federal Specification TT-P-641, Type III.
- b. Zinc dust paint, Military Specification MIL-P-21035.
- c. Zinc Dust Chlorinated Rubber, Federal Specification TT-P-1046a, or
- d. Epoxy-Polyamid, Department of Defence Specification DOD-P-15145 B.

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

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 16, Collector Channel Inlets

1. This item shall consist of furnishing and installing all collector channel inlets and pipes connecting to adjacent subdivisions including the pipe and dropshaft to the lines, grades and elevations shown on the drawings.
2. The pipe and fittings shall conform to the Material Specification 551. The pipe shall be close riveted Class I, Shape 1 with coating G in accordance with Federal Specification WW P-405. Coupling bands shall be watertight. Fiber bonding may be substituted for asbestos bonding in the coating.
3. In Section 7, Measurement and Payment, the following method shall apply. The quantity of pipe and other material will not be measured for payment. Payment for each inlet will be made at the contract unit price for one inlet. Payment for one inlet will include compensation for all material, labor, equipment, tools, subsidiary items, collector channel inlet excavation, and pipe backfill.

CONSTRUCTION SPECIFICATION

81. METAL FABRICATION AND INSTALLATION

1. SCOPE

The work shall consist of furnishing, fabricating and erecting metal work, including the metal parts of composite structures.

2. MATERIALS

Unless otherwise specified, materials shall conform to the requirements of Metal 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 Aluminium Construction Manual, "Specifications for Aluminum Structures," Section 6 and Section 7, The Aluminum Association, November 1976.

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

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.

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 17, Metal Fabrication

- (1) This item shall consist of providing and fabricating the structural steel trash racks for the collector channel inlets, the steel barrier for the 54" pipe at Station 35+84.50 and the pipe handrail for the double 6'x7' box culvert at Station 128+63.00.
- (2) In Section 2, Materials, the materials shall be as follows:
 - (a) Steel shall conform to the requirements of ASTM Specification A575, Grade M1015 to Grade M1031.
 - (b) Bolts, nuts, washers and assembly (including tightening) shall conform to ASTM Specification A307. Washers shall be case hardened.
- (3) In Section 3, Fabrication, all welds shall conform to the American Welding Society Standards (AWS) A5.1 and A5.5. Electrodes shall be E70XX.
- (4) In Section 5, Protective Coatings, the trash racks, steel barriers and handrails shall be galvanized to conform to the requirements of Material Specification 582.
- (5) Any damage to the galvanizing or zinc coating shall be repaired by thoroughly brushing the damaged area removing all loose and cracked coating and removing all dirt and greasy material with solvent. The area shall then be painted with two coats of zinc dust 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 the total surface area is damaged, the item will not be accepted.
- (6) The handrails shall be standard weight galvanized pipe and fittings conforming to the requirements of ASTM A120 and Federal Specification WW-P-521. All posts shall be embedded in a high strength, non-shrink, non-settling mortar.
- (7) Measurement and payment shall include subsidiary items: animal guards and watertight manhole frame and cover.

b. Subsidiary Item. Animal Guards

- (1) This item shall consist of furnishing and installing the metal animal guards in the plastic drain pipes as shown on the drawings.
- (2) Materials shall conform to Specification 581, Metal.
- (3) No separate payment will be made for animal guards. Compensation for this item will be included in the payment for Bid Item 17, Metal Fabrication.

c. Subsidiary Item. Watertight Manhole Frame and Cover

- (1) This item shall consist of furnishing and installing 30" watertight manhole frames and covers conforming to ASTM A-48, Class 30A at the locations shown on the drawings.
- (2) Installation shall be according to the detail shown on the drawings.
- (3) The frame and cover shall be cast iron and the frame shall weigh approximately 210 lbs. and the cover shall weigh approximately 276 lbs. The weight of the casting can be no more than 2% less than the specified weight.
- (4) No separate payment will be made for watertight manhole frames and covers. Compensation for this item will be included in Bid Item 17, Metal Fabrication.

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 requirement of Military Specification MIL-P-23377D, Int. Amend. 2, Epoxy Chromate Metal Primer.

Type 3 paint shall conform to the requirements of Federal Specification TT-P-86, Type II, or Type III Red Lead Base Paint.

Type 4 paint shall conform to the requirements of Federal Specification TT-P-86, Type I, Red Lead Base Paint.

Type 5 paint shall conform to the requirements of Federal Specification TT-P-636, Synthetic Primer.

Type 6 paint shall conform to the requirements of Military Specification MIL-C-22750D Amend. 1, Epoxy-Polyamide.

Type 7 paint shall conform to the requirements of Federal Specification TT-E-489, Alkyd Semi 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 be a single package moisture cured urethane primer in a silver metallic color.

Type 11 paint shall conform to the requirements of Federal Specification TT-P-641, Type III Zinc Dust-Zinc Oxide Primer; Federal Specification TT-P-1046a, Zinc Dust Chlorinated Rubber; or Zinc Dust Paint meeting the requirements of Military Specification MIL-P-21035.

Type 11 paint shall conform to the requirements of Department of defense Specification DOD-P-15145B, Epoxy-Polyamide.

Type 13 paint shall conform to the requirements of Material Specification 583. The paint shall be mixed at the time of use.

Paints of Types 1, 3, and 5 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 PREPARATION

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 (near white blast) 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 (hand tool clean) 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 (acid clean) 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 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 or Type 2 paint and two or more top coats of Type 6 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 or Type 2 paint and two top coats of Type 6 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 3, Type 4 or Type 5 paint and two top coats of Type 7 or Type 8 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 3 or Type 5 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 3 or Type 5 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 or Type 10 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 11 or Type 12 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 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 13 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 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 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 an approved coal tar epoxy, tackifier solvent such as xylene (ASTM D 846) or methyl isobutyl ketone (MIBK) (ASTM D 1153) followed by application of the second paint coat between 5 minutes and 20 minutes following the wipe down; or (2) the first coat shall 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 with the temperature of the item to be painted or if 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

The thickness of the dry paint film for Paint Systems A, H, and I may be accepted based on the measured weight film thickness using a suitable wet film thickness gauge. Other testing instruments employed by the Engineer to determine dry paint film thickness may include an Elcometer, pipe pit gauge, Mikrotest meter, or similar devices that can verify the thickness of dry paints.

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 metal work 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 construction details are:

a. Subsidiary Item Cleaning and Painting Metalwork

- (1) This item shall consist of cleaning and painting the identification plaque.
- (2) Paint System E shall be used for the identification plaque. The two topcoats of paint shall be white with the lettering on the plaque painted with dark green enamel.
- (3) Payment for cleaning and painting the identification plaque shall be included in Bid Item 18, Identification Plaque.

CONSTRUCTION SPECIFICATION

93. IDENTIFICATION MARKERS OR PLAQUES

1. SCOPE

The work shall consist of furnishing and installing identification markers or plaques at the designated locations.

2. MATERIALS

The markers or plaques shall be constructed of the specified materials, and shall meet all requirements for lettering, painting, finishing, and related items as shown on the drawings or as specified in Section 6 of this specification.

3. CONSTRUCTION METHODS

The markers or plaques shall be installed at locations and in the manner or condition specified.

4. MONUMENTS

Unless otherwise specified the markers or plaques shall be mounted on concrete monuments or on existing structures. The monuments shall be of the type, kind, and size and located as specified.

5. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, payment for each type, kind, and size of marker or plaque complete in place, will be made at the contract unit price for that type, kind, and size.

For items of work for which specific lump prices are established in the contract, payment for identification markers or plaques 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.

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 construction details are:

Bid Item 18, Identification Plaque

- (1) This item shall consist of providing two (2) identification plaques and appurtenances as shown on the drawings.
- (2) Cleaning and painting shall meet the requirements of Specification 82.
- (3) Metal fabrication shall meet the requirements of Specification 81.
- (4) The location of the identification plaques shall be as determined by the Engineer.
- (5) Payment for each type, kind, and size of identification plaque complete in place, will be made at the contract unit price for that type, kind, and size and shall include compensation for Subsidiary Item; Cleaning and Painting Metalwork.

CONSTRUCTION SPECIFICATION

94. CONTRACTOR INSPECTION

1. Scope

The work shall consist of providing all equipment, materials, labor and services necessary to ensure that the specified quality is maintained on all work performed. The Contractor shall be responsible for the day-to-day quality control.

2. Equipment and Materials

Equipment for materials testing shall be of the quality and condition required to meet the test specifications cited in the contract references. Equipment shall be in good condition and properly adjusted. Calibration of equipment shall be done at the frequency specified in Section 8. Records of equipment calibration tests shall be available to the government at all times. Nuclear devices shall be operated and maintained by qualified operators and as prescribed by applicable state and federal regulations.

Materials include but shall not be limited to: sand for density tests, bound field books and forms for record-keeping, concrete specimen molds, and all other equipment and materials prescribed by the test procedures referenced in the contract.

The quality of materials used in quality control testing and the equipment employed shall: meet the appropriate standards specified and the standards of the industry, be appropriate for its intended use, and provide the accuracy specified by the contract requirements unless otherwise specified in Section 8 of this specification.

3. Inspection Personnel

Inspections and materials testing shall be accomplished by qualified personnel: a licensed engineering firm, testing laboratory, certified inspection technicians, or licensed and experienced personnel from the contractor's organization. The contractor's written inspection plan shall identify the names and qualifications, training, and experience of all quality control personnel who will actually be performing the inspection and quality control work.

4. Inspection System

The Contractor shall develop and conduct an inspection system adequate to maintain quality control of all work performed and materials and equipment used. The inspection system established shall be based upon a plan and implemented by the necessary mobilization of personnel, equipment and materials. Inspection shall include the initial work needed to verify

adequacy of completed work and provide controls for any corrective work. The inspection system and records to substantiate daily conduct of the system shall be kept by the Contractor and are subject to review by the Contracting Officer, at any time.

The Contractor's inspection system shall cover all aspects of quality control and shall specifically address any testing and inspection requirements detailed in Section 8 of this specification. The planned inspection system shall also identify the Contractor's primary quality control manager and provide an organizational listing of the individual quality control personnel and their specific duties, experience and qualifications.

If the government's quality assurance inspections indicate that the contractor's inspection system is not adequate or is not producing the desired results, corrective actions shall be taken by the Contractor in both the inspection system, its plan and the work. The Contracting Officer may direct that changes be made in the inspection system including, but not limited to, the removal of unsatisfactory quality control personnel.

5. Pre-Construction Conference

After the contract is awarded and before construction operations are started the Contractor shall meet with the Contracting Officer and discuss the contractor's inspection plan. The meeting shall develop a mutual understanding regarding inspection details including the form of documentation to be used for recording the quality control operations, inspections, management procedures and the interrelationship of Contractor and government inspection efforts. The finalized plan will be approved by the Contracting Officer and it shall become a part of the contract.

6. Records

The inspection records shall be kept daily and shall document both acceptable and deficient features of the work. They shall include complete records of required material tests, submittal and approval of shop drawings, manufacturer's recommendation and certifications, and a complete record of materials delivery, quality examination, certification and storage. Tests performed by the Contractor (including sub contractors) shall be a part of the record. All records shall be on forms acceptable to the Contracting Officer and shall be legible, properly dated and identified as to the responsible tester, the material or item tested, and its location of placement in the structure. In addition, these records shall include factual evidence that required activities or tests have been performed, including but not limited to the following:

1. Type and number of control activities and tests involved and the location (elevation, station and offset) of the work tested.

2. Result of control activities or tests.
3. Method of testing used (e.g. citation of reference specification).
4. Nature of defects, cause for rejection, etc.
5. Proposed remedial action.
6. Corrective actions taken and quality control testing.

7. Measurement and Payment

For items of work for which lump sum prices are established in the contract, payment for contractor inspection will be made at the contract lump sum price. Such payment shall constitute full compensation for all labor, materials, equipment, transportation and all other items necessary and incidental to completion of the work. Progress estimates for payment of this bid item will be based on the percent completion of all contract items (dollar value) used in preparing the regular progress payments.

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 are identified in Section 8 of this specification.

8. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

a. Bid Item 22, Contractor Inspection

1. This item shall consist of furnishing the personnel, equipment and material required by the Contractor to perform the testing and inspection that is necessary to implement an inspection system that will insure the specified quality is being maintained for:
 - (a) All Excavation
 - (b) Earthfill, Structure Backfill, and Pipe Backfill
 - (c) Soil Cement
 - (d) Steel Reinforcement
 - (e) Drainfill
 - (f) All Concrete Pipe and CMP
2. The moisture-density determinations required for the quality control of earthfill, structure backfill and pipe backfill shall be performed in accordance with Method A, ASTM D 698 (Standard Proctor Test) or test No. S-6 (Rapid Compaction Control Method) as described in Section 19 of the SCS National Engineering Handbook. Testing for densities of fill shall be determined in accordance with ASTM Method D-1556 and the moisture content by ASTM D-2216.
3. Prior to establishing fill production operations, it shall be demonstrated and verified by test results that the proposed equipment fleet is capable of producing fill of the quality specified.
4. For production operations the initial moisture-density test frequency shall be one(1) test per 2,000 cubic yards of compacted earthfill and one (1) test per each structure requiring compacted structure backfill or pipe backfill. When approved by the Contracting Officer, the testing frequency may be modified as the job progresses, provided the quality of the fill is consistent or when the testing frequency is not compatible with the daily production.
5. The plasticity and classification of earthfill material shall be determined whenever a significant difference in fill material is encountered or 5,000 cubic yards, whichever occurs first. Tests for plasticity and classification of structure backfill and pipe backfill shall be made at each source of material being used.

6. The gradation of drainfill shall be determined in accordance with ASTM C 136 and C117. The inspection plan shall include those tests and inspections required during the processing or importation operation to verify that the processed material is within the specified limits. During placement operations one (1) sieve analysis of the in-place drainfill will be performed. Sieve analysis will be performed at more frequent intervals whenever the tested in-place material does not meet the gradation requirements, or visual inspections indicate the need to increase the frequency.
7. The placing of steel reinforcement shall be monitored by quality control personnel. Prior to scheduling the delivery of concrete, a certification that all bars are the correct size and positioned as specified shall be given to the Contracting Officer.
8. The installation of all concrete pipe and CMP pipe shall be monitored by quality control personnel for proper size, quality, and installation.
9. The moisture-density determinations required for the quality control of soil-cement shall be performed in accordance with Method B, ASTM D558 or Test No. S-6 (Rapid Compaction Control Method) as described in Section 19 of the SCS National Engineering Handbook. Testing for densities of the soil cement shall be determined in accordance with ASTM D1556 (sand cone) or ASTM D2922 and D3017 (nuclear) methods. The moisture content shall be determined by ASTM D2216 with an oven dry temperature of $60 \pm 5^{\circ}\text{C}$.

For production operations the initial moisture-density tests shall be as needed to determine adequate compaction procedures. Test frequency thereafter shall be one(1) test per 250 cubic yards of compacted soil cement.

10. Testing equipment shall be calibrated after it is delivered to the site and whenever erratic or unreasonable test results are being obtained.

The sand used for testing fill densities shall be calibrated whenever there is a change in the humidity or lot of sand.

11. Suitable lab facilities will be set up at the site and will be used exclusively for testing purposes.
12. The contractor shall designate an experienced quality control manager and inspection staff whose primary responsibility will be implementing the inspection system. The manager shall be on site during major construction activities and will not be involved in directing production oriented activities unless it

pertains to achieving the specified quality for the work being performed. The quality control manager shall be employed by and answerable to the Contractor. The manager's duties cannot be delegated to a subcontractor or others.

13. The names and qualifications of proposed quality control personnel shall be submitted to the Contracting Officer for review and approval prior to the pre-construction conference. Any changes in quality control personnel will require the approval of the Contracting Officer.
14. Copies of all test results and inspection reports (visual inspections of earthwork and concrete form works, steel placement verifications, etc.), required by the approved inspection plan shall be submitted to the Contracting Officer within 24 hours of when the test or inspection report is completed and certified.

CONSTRUCTION SPECIFICATION

206 SOIL-CEMENT

1. SCOPE

The work shall consist of the furnishing, placing, compacting, and curing a mixture of soil material, Portland cement and water. The mixture shall be uniformly mixed, blended, compacted, finished and cured as specified. It shall conform to the lines, grades, thicknesses, and cross section(s) shown on the plans.

2. MATEIRALS

Soil materials shall be obtained from the required excavations or designated borrow locations and shall meet the requirements stated below.

Deleterious materials such as sod, brush, or roots shall be separated from soil materials during the selection, blending, and routing operations. Maximum size of rock particles shall be 2 inches. Soil materials, cement content, and moisture content other than those specified in Section 15 may be used as approved by the Engineer. Proposed alternatives must meet one of the following requirements to be considered:

- (a) If the soil material to be used has similar gradation and Atterberg limits as the soils specified, the same cement content and water content shall be used. The Contractor shall provide gradation and Atterberg test data from a reputable commercial soil testing laboratory verifying gradation and Atterberg limits.
- (b) If the soil materials do not have the same gradation and Atterberg limits as the soils specified, the Contractor shall provide soil-cement durability tests, moisture-density relations data, Atterberg limits and gradation tests from a reputable commercial soil testing laboratory. The soil-cement mix ratio and water content shall also be provided by the lab. As a minimum, the following durability tests shall be provided; ASTM D 559 and ASTM D 560. The moisture-density relations are to be in accordance with ASTM D 558. The tests must indicate a soil-cement of a quality equal to or exceeding the quality specified.

Portland cement shall conform to the requirements of Material Specification 531 for the specified type. Mixing of different brands or types of cement will not be allowed.

Portland cement shall be furnished in sacks, barrels, or bulk. Sacked cement that is stored at the job site shall be used in the same order as the deliveries to the site. Each shipment of sacked cement shall be stored so that it may be readily distinguished from other shipments. Emptied cement sacks shall be burned or buried in accordance with Construction Specification 5 unless otherwise specified.

Water used in mixing or curing soil-cement shall be clean and free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances and shall meet the requirements for water as specified in ASTM C 94.

Pozzolanic Materials, if used, shall comply with requirements of ASTM C 618 Class F, Specifications for Fly Ash, and Raw or Calcined Natural Pozzolan, except the loss of ignition shall not exceed 3.0 percent.

Curing compounds shall conform to the requirements of Material Specification 534 for the type of curing compound specified. A liquid petroleum asphalt curing material may be used as specified in Section 15. Application of the curing compound shall be in accordance with Section 12 of this specification and the manufacturer's recommendations.

3. OPERATIONS OF PITS OR STOCKPILES OF SOIL MATERIALS

All work involved in the opening and operation of borrow pits or stockpiles shall be performed by the Contractor. The pits or stockpiles shall be opened in such a manner as to expose a near vertical face of the soil material for a suitable working depth. The face should not exceed five feet in height without benching back if it poses a threat to workers.

Material shall be excavated in successive vertical cuts extending across the pit or stockpile. When approved by the Engineer, successive horizontal cuts on a horizontal oriented working face may be permitted in homogeneous soils. All pockets or strata of unsuitable materials not meeting the quality requirements specified in Section 2 shall be wasted. The method of operating the pit or stockpile and the blending of materials shall be changed when such action is necessary to obtain material conforming to the specifications. Upon completion of the work, the pits shall be graded and dressed to minimize erosion and drain freely.

4. FOUNDATION PREPARATION

Before soil-cement processing begins, the subgrade placement area shall be graded, shaped, and compacted in conformance with the lines and grades shown on the plans. The subgrade shall firmly support the construction equipment. Immediately prior to the placement of the soil-cement, the compacted subgrade surface shall be moistened to approximately the same moisture content as specified for the soil-cement, and shall be kept moist until the soil-cement is placed.

5. DESIGN OF SOIL-CEMENT MIXTURE

General The materials and proportion of the soil-cement mixture shall constitute the "job-mix". After a job-mix has been approved, neither the source, character or grading of the soil nor the type, brand, or quantity of cement or pozzolanic material shall be changed without prior approval of the Engineer. A change in materials or proportions requires the establishment of a new job-mix supported by evidence, as required for the

initial job-mix, that the proposed new materials and mix proportions will produce soil-cement of the strength specified.

The use of calcium chloride or other accelerators or antifreeze compounds will not be allowed unless approved by the Engineer.

The Contractor shall use the soil, fly ash, cement, and moisture content as determined by the Engineer in accordance with laboratory tests. During the course of the work, the Engineer shall adjust the job-mix proportions as needed to achieve the specified compressive strength.

The percent of cement to be used in the mix will be determined by dividing the weight of cement by the oven dry weight of the soil material.

6. MIXING

The mixing plant shall be capable of producing a uniform mixture of soil, cement, and water. The plant shall be equipped with measurement devices that will proportion the mix in the specified quantities. Prior to use, all measurement devices shall be calibrated and certified by a technician approved by the Engineer. The actual quantities of the mix shall not vary more than 2 percent from the specified quantities, unless otherwise specified. The water content shall be percentage of moisture in the mixture at the time of compaction.

The Engineer shall have free access to the mixing plant at all times for inspection of the plant's operation and for sampling the soil-cement mixture and its components.

Method 1 Mixing of the soil, cement, and water shall be accomplished in a stationary mixing plant. The plant may be either a batch type or a continuous flow type design. The plant may use either weight or volume proportioning. The scale or metering devices shall be sensitive to one percent of the maximum load that may be required or imposed. The mixer shall be a pugmill, revolving-blade or rotary-drum system.

Facilities for efficiently storing, handling and proportioning unmixed materials shall be provided at the plant.

Method 2 Mixing of the soil, cement, and water shall be accomplished in a truck mixer. The mixer shall meet the requirements for truck mixers contained in ASTM C 94.

The following provisions apply to all methods of mixing. The mixing time shall be controlled so that all ingredients shall be mixed for at least 30 seconds or longer as may be necessary to insure a thorough, uniform and homogeneous mixture of soil, cement, pozzolanic materials (if used) and water. Mixing time may be adjusted based on tests and field determinations. The mixing time shall be considered as the interval between the time the cement contacts the soil and water and the time the mixture leaves the mixing unit or when the mixer speed is reduced to the

agitating speed. The soil and cement shall be mixed sufficiently to prevent cement balls from forming before the water is added. The water may be applied through the mixing machine or separately by approved pressure distributing equipment.

Soils containing plastic silt or clay lumps larger than 1-inch shall be pulverized or screened out of the raw soil prior to mixing.

7. TRANSPORTING

The soil-cement mixture shall be transported from the mixing plant to the site of placement in vehicles having tight, clean and smooth beds or mixer trucks. Haul time shall not exceed 30 minutes. Haul time shall be the elapsed time from when the water and cement are mixed together and the mixture is spread onto the foundation or soil-cement surface.

The Contractor shall protect the soil-cement mixture if transported during unfavorable weather. Any material excessively wet by precipitation will be subject to rejection.

Equipment shall not be operated on a finished and compacted layer of the soil-cement, except where specifically permitted. Any damage resulting to the finished surfaces of the soil-cement from such operation shall be repaired by the Contractor at no cost to the Government.

Earth ramps crossing over completed soil-cement must have a minimum compacted thickness of 2 feet. Where ramps are constructed over soil-cement that is not to finished grade, all foreign materials and the uppermost 1 inch of the top layer of soil-cement must be removed prior to the continuation of the soil-cement construction.

8. PLACEMENT

Soil-cement shall not be placed until the required excavations and preparation of the foundation are completed and the foundation has been inspected and approved by the Engineer.

Equipment for spreading the soil-cement mixture shall be suitable for the purpose and shall be operated in such a manner as to produce a reasonably smooth, uniform surface. The equipment shall be controllable so as to produce uniform layers not more than the specified maximum thickness. The layer of soil-cement, or each successive lift when layering is required, shall be spread and compacted as soon as possible after the preceding layer is completed and approved. Soil-cement shall be placed in horizontal layers or layers conforming to the plane of the subgrade.

If the time elapsed between completion of compaction on a layer and start of placement of the next layer is greater than 2 hours, the Contractor shall scarify the surface to a depth of 1 inch. The Contractor shall clean off the scarified surface thoroughly by power brooming or other approved methods prior to proceeding. The broomed surface shall then be thoroughly moistened over its entire surface before the next layer of soil-cement is placed.

Soil-cement shall not be mixed or placed when the air temperature is below 45 degrees Fahrenheit (F). Soil-cement shall not be placed on a frozen foundation, or if the soil to be processed is frozen, or if weather conditions are such that the material being processed cannot be completely compacted and protected before the onset of damaging weather (such as overnight lows below 40 degrees F, cold fronts, rainstorms, etc.). The use of accelerators or antifreeze compounds will not be allowed, unless otherwise specified. The temperature of fresh soil-cement shall not be allowed to drop below 32 degrees F for a period of 7 days. If temperatures are expected to be below 45 degrees F, the Contractor's method for protection shall be approved by the Engineer prior to placement of any soil-cement.

9. CAMPACTION

- (a) Equipment The Contractor may use any type of compaction equipment to obtain the specified density of the soil-cement mixture, provided such equipment does not have any projections or tamping feet which penetrate to previously compacted layers. Wheel rolling with only the hauling equipment shall not be an acceptable method of compaction.
- (b) Compaction Requirements Soil-cement shall be uniformly compacted to a density not less than the minimum density specified. Optimum moisture and maximum density shall be determined by ASTM D 558. Soil Conservation Service Test No. S-6 (USBR Test E-25), Rapid Compaction Control Method, as referenced in NEH-19, may be used as equivalent to ASTM D 558. The compaction shall begin on all areas within 30 minutes after the addition of water to the soil-cement mixture. The compaction shall proceed in such a manner that the length of time between spreading of the soil-cement mixture and completion of compaction shall not exceed 1 hour for each layer.
- (c) Other Requirements If the surface of a layer of soil-cement has been rutted or compacted unduly by hauling or other equipment, the Contractor shall scarify and recompact such surfaces. When required to maintain uniformity of the layer surface, blading in connection with compaction operations shall be employed. If blading is required, raw unmixed soil shall not be bladed onto the mixed soil-cement.

10. CONSTRUCTION JOINTS

At the end of each workday, or when the adjacent placing operation is shut down for a period longer than 2 hours, a vertical construction joint shall be made along all unfinished edges of the thoroughly compacted soil-cement. Just before placing operations are resumed, the construction joint shall be shaved to remove all dry soil-cement and all curing compound from the face of the joint.

11. REMOVAL AND REPLACEMENT

Rejected or defective soil-cement shall be removed and replaced in accordance with these specifications, when:

- (a) Compaction operations are interrupted for any reason prior to the completion of compaction and the soil-cement mixture is left undisturbed for more than 30 minutes.
- (b) The soil-cement mixture, prior to completion of compaction, becomes excessively wet so that the moisture content exceeds the specified limits.
- (c) The compacted soil-cement does not meet the density and moisture requirements; except that when the moisture is lower than required, the soil-cement mixture may be reworked, thoroughly mixed and compacted within the 1 hour time limit as stated in section 9. (b)., Compaction Requirements.
- (d) The finished surface is rough or below grade such that a thin "scab" section would be required to smooth the surface or bring the surface to grade.

12. PROTECTING AND CURING

- (a) Moistening Bonding Surfaces Compacted surfaces of soil-cement that are to receive an overlying layer of soil-cement or concrete shall be kept moist, until placement of the overlying or adjacent layer of soil-cement or concrete. The Contractor will not be required to keep such surfaces moistened for longer than 7 days.

- (b) Curing Finished Exposed surfaces

Concrete curing compound conforming to ASTM C 309 of the type specified shall be applied at a rate of not less than one (1) gallon per 150 square feet of surface using constantly agitating, pressure spray equipment. It shall form a uniform, continuous, adherent film that shall not check, crack, or peel.

Any curing membrane that is removed from the surface or damaged within 7 days after application shall be repaired immediately. The surfaces of each section of soil-cement to be treated with curing compound shall be moistened with a light spray or water immediately after the section has been compacted. As soon as the surface film of moisture disappears, but while the surface still has a damp appearance, the curing compound shall be applied. Special care shall be taken to insure ample coverage with the compound at edges, corners and around rough spots. After application of the curing compound has been completed and the coating is dry to the touch, any required repair of the soil-cement surfaces shall be performed. Each repair,

after being finished, shall be moistened and coated with curing compound in accordance with foregoing requirements. The Contractor shall have all equipment and materials required for curing at the site ready for use before placement of soil-cement begins.

13. INSPECTION AND TESTING

The Engineer shall make such inspection and tests as necessary to verify that the soil-cement materials and soil-cement in place meet the specified requirements.

All testing of soil-cement or its individual components, unless otherwise specified, will be in accordance with the latest applicable ASTM specifications. These tests are not intended to provide the Contractor with information he needs to assure that the material and workmanship meets the requirements of the specifications and their performance will not relieve the Contractor of the responsibility of performing tests for that purpose.

Tests for density and moisture will be performed at any location chosen by the Engineer. If the soil-cement does not pass the minimum moisture and density requirements specified, it shall be reworked or removed at the Contractor's expense. The Contractor shall not place any additional soil-cement until the rejected material has been removed, or reworked, and meets the density requirements specified.

14. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the quantity of soil-cement will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. The quantity of soil-cement 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 improper construction operations, as determined by the Engineer.

Payment for soil-cement will be made at the contract unit price per cubic yard. The payment will constitute full compensation for all labor, materials, equipment, transportation, tools and all other items necessary and incidental to completion of the work, but not including furnishing and handling cement or other items listed for payment elsewhere in the contract.

Measurement for payment of cement will be made to the nearest 100 pounds by actual weight. For each load of cement delivered, the Contractor shall furnish to the Engineer a statement or delivery ticket showing the weight of the cement in the load. Payment for cement will be made at the contract unit price for furnishing and handling the 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. No payment will be made for cement used in wasted soil-cement, cement used in replacement of damaged or defective soil-cement, cement used in extra soil-cement required as a result of overexcavation and cement used in soil-cement placed by the Contractor in excavations intentionally performed to facilitate his operation.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for items of work to which it is made subsidiary. Such payment and the items to which they are made subsidiary are identified in Section 15 of this specification.

15. 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, Soil-Cement

(1) This item shall consist of the placement of soil-cement required for installation of:

(a) Major side inlets and collection systems in the following locations:

Station 35+18.00
Station 60+72.50
Station 89+11.00
Station 93+97.84
Station 119+73.56
Station 143+66.00
Station 150+66.00

(b) Outlet protection for 44 collector channel inlets and 2 pipes connecting to adjacent subdivisions.

(c) Erosion protection in the main floodway between the following stations:

Station 118+74.00 to Station 121+10.64
Station 126+71.23 to Station 129+98.28
Station 154+20.00 to Station 155+00.00
Station 156+51.34 to Station 158+19.00

(2) The subgrade area shall be compacted to a minimum density of 95% as specified in Specification 23, Earthfill. The subgrade in cut areas shall have the top loose layer compacted to a minimum density of 95%.

(3) The minimum design requirement for the soil-cement shall be such that it has a compressive strength of 750 psi at the end of 7 days as determined from ASTM D-1632 and ASTM D-1633. The amount of cement determined by laboratory testing shall be monitored throughout construction of the project with modifications as required to meet field conditions.

(4) Soils to be used for soil-cement shall meet the following gradation:

Sieve Size

Percent Passing (Dry Weight)

1-1/2"
#4
#200

98-100
60-80
5-15

The Plasticity Index shall be a maximum of five (5). Materials may be obtained from off site borrow sources as the Contractor chooses.

- (5) Portland cement shall be Type II, IIA or IP(MS).
- (6) If Type IP(MS) is used, pozzolan shall not exceed 20 percent based on absolute volume and the R factor $R = \text{CaO}_5 / \text{Fe}_2\text{O}_3$ shall be less than 1.5.
- (7) At the time of compaction, the moisture content shall not be below optimum and shall not be more than 2 percentage points above optimum when the mean air temperature during construction hours does not exceed 90 degrees F. Testing shall be in accordance with ASTM D-2216 at an oven temperature of $60 \pm 5^\circ\text{C}$.
- (8) The compacted layers of soil-cement shall not exceed eight (8) inches in thickness, nor be less than four (4) inches in thickness.
- (9) Section 9, Compaction, soil-cement shall be uniformly compacted to a minimum of 98% of maximum density as determined by ASTM D-558. Method B or Test No. S-6 (Rapid Compaction Control Method) as described in Section 19 of the SCS National Engineering Handbook. Testing for density shall be determined in accordance with ASTM D-1556 or ASTM D-2922 and ASTM D-3017.
- (10) Section 12, Protecting and Curing, the curing compound shall be Type I-D, Class B.

CONSTRUCTION SPECTIFICATION 207

PLASTIC PIPE DRAINS

1. SCOPE

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

2. MATERIALS

The poly (vinal chloride) (PVC) pipe and fittings shall conform to the requirements of the following American Society for Testing and Materials (ASTM) Standard Specifications:

- a. D 1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- b. D 2241 Poly (Vinyl Chloride) PVC) Plastic Pipe (SDR-PR).
- c. D 2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- d. D 2467 Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe, Fittings, Schedule 80.
- e. D 2672 Bell End Poly (Vinyl Chloride) PVC) Plastic Pipe.
- f. D 3034 Type PSM Ploy (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- g. D 2729 Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- h. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch for Water.

The Acrylonitrile-Butadiene-Styrene (ABS) plastic pipe and fittings shall conform to the requirements of the following ASTM Standard Specifications:

- a. D 2282 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR).
- b. D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80.
- c. D 2468 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40.
- d. D 2469 Socket-type Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 80.

Rubber gasket joints shall conform to ASTM Specification D 3139 or D 3212, as appropriate for PVC Pipe.

Solvent for cemented joints shall conform to ASTM Specification D 2729 (PVC) or D 2235 (ABS) as appropriate.

Perforations for perforated pipe shall be as provided by ASTM C 2729 unless otherwise specified in Section 9.

The compound used in manufacturing the pipe shall meet the requirements of one of the following materials:

1. Poly (vinyl chloride) (PVC) as specified in ASTM D 1784.

Material	Code Classification
Type I, Grade 1	12454-B
Type I, Grade 2	12454-C
Type II, Grade 1	14333-D
Sewer Pipe and Fittings	13364-B, C, or D

2. Acrylonitrile-butadiene-styrene (ABS) as specified in ASTM D 1788.

Material	Code Classification
Type 1, Grade 3	3-5-5
Type 2, Grade	4-4-5

The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign matter, or other defects. The pipe shall be as uniform in color, capacity, density, and other physical properties as is commercially practicable.

3. HANDLING THE PIPE

Pipe stored outdoors for prolonged periods shall be covered with a material that will provide protection from ultraviolet light damage. Pipe must be delivered to the job site and handled by means that shall provide adequate support and not subject it to undue stresses or damage. Individual loads of pipe shall be limited in height and supported so that the bottom rows of pipe are not crushed. All special handling, stacking, and storage requirements of the manufacturer shall be strictly observed. Pipe shall be unloaded carefully and stored as close as practical to the final point of placement. When handling and placing the pipe, care shall be taken to prevent severe impact blows, abrasion damage, and gouging or cutting by any hard or sharp objects such as metal surfaces or rocks.

4. LAYING AND BEDDING THE PIPE

Pipe shall be laid to the lines and grades shown on the drawings and as specified in Section 9.

Construction shall progress in the upstream direction with the bell ends pointed upstream. The spigot ends shall be pulled into the bell ends of previously laid sections. The ends of pipes and fittings shall be free of all foreign material when assembled.

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.

Care shall be taken to prevent permanent distortion and damage when handling the pipe during unusually warm or cold weather. The pipe shall be firmly and uniformly bedded throughout its entire length to the specified depth with the material and in the manner specified in Section 9, or as shown on the drawings. Blocking or mounding shall not be used to bring the pipe to final grade.

For pipe with bell joints, the bedding material shall be excavated at the locations of the bells to provide continuous equal support for the bells as well as for the entire length of pipe.

5. JOINTS

Pipe joints shall conform to the requirements specified in Section 9 or the details shown on the drawings. Except where unsealed joints are indicated, joints shall be sound, watertight, and shall equal or exceed the strength requirements of the pipe specified. Joints and connections shall leave the inside of the line free of any obstructions that may tend to reduce its capacity. When a lubricant is required to facilitate joints assembly, it shall have no deleterious effect on the gasket or pipe materials.

Pipe shall be installed and joined in accordance with the manufacturer's recommendations except as otherwise specified in Section 9.

6. PRESSURE TESTING

Pressure testing of the completed drain pipe will not be required.

7. BACKFILL

Backfill shall be in accordance with Construction Specification 23 or 24, as appropriate, and as shown on the drawings.

8. MEASUREMENT AND PAYMENT

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 centerline of the drain pipe. 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 placing the pipe, including fittings, and other appurtenances, necessary or incidental to installing the drain pipe. Payment for excavation, backfill and work incidental thereto shall be in accordance with Section 9 of this specification and 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 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. ITEM OF WORK AND CONSTRUCTION DETAILS

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

a. Bid Item 19. Drain Pipe

- (1) This item shall consist of furnishing and installing the drain pipe and fittings under the soil-cement side inlets and concrete channel linings shown on the drawings.
- (2) The pipe shall be 4 inch diameter; SDR 35. Type PSM PVC Sewer Pipe conforming with ASTM D 3034.
- (3) In Section 5, Joints, the pipe and fittings shall be furnished with solvent cement joints in accordance with ASTM D 3034 and ASTM D 2855.
- (4) Pipe shall be perforated as provided by ASTM C-508 where called for on the plans.
- (5) In Section 8, Measurement and Payment, payment will include full compensation for all pipe and fittings for the drain outlet pipes.

MATERIAL SPECIFICATION

306. ASPHALT LIQUID SLOW, MEDIUM, AND RAPID CURING

1. SCOPE

This specification covers the quality of liquid petroleum asphalt cutback material used for the curing of concrete and soil-cement work.

2. MATERIALS

Asphaltic materials shall be loaded and shipped in sealed tank cars, tank trucks, or barrels completely free from all foreign matters. Asphaltic material contaminated by any foreign matter will be rejected by the Engineer.

- a. Slow Curing Asphalt - Slow curing asphalt, designated by the letters SC, shall consist of natural, uncracked residual oils processed from asphaltic or semi-asphaltic base crude petroleum, or a blend of such oils with uncracked gas-oil type distillates which do not volatilize readily. Slow curing asphalt shall not foam when heated to 225 degrees F. The residue of specified penetration shall be smooth and homogeneous in appearance and the material shall conform to Federal Specification SS-A-671 and ASTM D 2026.
- b. Medium Curing Cutback Asphalt - Medium curing cutback asphalt, designated by the letters MC, shall consist of an uncracked petroleum asphalt base stock produced by the processing of asphaltic or semi-asphaltic base crude petroleum that has been blended with a kerosene type solvent. The base stock for all MC materials shall be straight run asphalt produced within the penetration range of 100 to 300, and the end point of the kerosene type solvent shall not exceed 525 degrees F. Medium curing cutback asphalts shall be free from water, shall show no separation, and shall conform to Federal Specifications SS-A-671 and ASTM D 2027.
- c. Rapid Curing Cutback Asphalt - Rapid curing cutback asphalt, designated by the letters RC, shall consist of an uncracked petroleum asphalt base stock produced by the processing of asphaltic or semi-asphaltic base crude petroleum that has been blended with a naphtha or gasoline type solvent. The base stock for all RC materials shall be straight run asphalt produced within the penetration range of 70 to 150. Rapid curing cutback asphalts shall be free from water, shall show no separation, and shall conform to Federal Specifications SS-A 671 and ASTM D 2028.

3. INSPECTION, TESTING, AND CERTIFICATION

All tests performed on asphaltic materials (SC, MC, RC) shall conform to ASTM specifications D 2026, D 2027, or D 2028, respectively, and any other ASTM specification cited therein.

The materials certificate shall include manufacturer's certified statement that the materials supplied conform to the appropriate ASTM and federal specifications.

MATERIAL SPECIFICATION

521. AGGREGATES FOR DRAINFILL AND FILTERS

1. SCOPE

This specification covers the quality of mineral aggregates for the construction of drainfill and filters.

2. QUALITY

Drainfill 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.

Aggregates of crushed limestone shall be thoroughly washed and screened. Course aggregate 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

Drainfill 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. The percentage of material finer than the No. 200 sieve shall be determined by the method in ASTM Designation C 117.

4. STORING AND HANDLING

Drainfill and filter aggregates shall be stored and handled by methods that prevent segregation of particle sizes or contamination by mixing with other materials.

MATERIAL SPECIFICATION

522. AGGREGATE FOR PORTLAND CEMENT CONCRETE

1. SCOPE

This specification covers the quality of fine aggregate and coarse aggregate for use in the manufacture of portland cement concrete.

2. QUALITY

Aggregate shall conform to the requirements of ASTM Specification C-33 for the specified sizes. Aggregates that fail to meet any requirement may be accepted only when: (1) the specified alternate conditions of acceptance can be proved prior to the use of the aggregates on the job and within a period of time such that no work under the contract will be delayed by the requirements of such proof; or, (2) the specification for concrete expressly contains a provision of special mix requirements to compensate for the effects of the deficiencies.

3. REACTIVITY WITH ALKALIES

The potential reactivity of aggregates with the alkalies in cement shall be evaluated by petrographic examination and, where applicable, the chemical method of test, ASTM Designation C 289, or by the results of previous tests or service records of concrete made from similar aggregates from the same source. The standards for evaluating potential reactivity shall be as described in ASTM Specification C 33, Appendix A1.

Aggregates indicated by any of the above to be potentially reactive shall not be used, except under one of the following conditions:

- a. Applicable test results of mortar bar tests, made according to ASTM Method C 227, are available which indicate an expansion of less than 0.10 percent at six months in mortar bars made with cement containing not less than 0.8 percent alkalies expressed as sodium oxide; or
- b. Concrete made from similar aggregates from the same source has been demonstrated to be sound after 3 years or more of service under conditions of exposure to moisture and weather similar to those anticipated for the concrete under these specifications.

Aggregates indicated to be potentially reactive, but within acceptable limits as determined by mortar bar test results or service records, shall be used only with "low alkali" cement, containing less than 0.60 percent alkalies expressed as sodium oxide.

4. STORING AND HANDLING

Aggregate of each class and size shall be stored and handled by methods that prevent segregation of particles sizes or contamination by intermixing with other materials.

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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-reducing and set-retarding admixtures for portland cement concrete.

2. QUALITY

Water-reducing and set-retarding admixtures shall conform to the requirements of ASTM Specification C 494, except that resistance to freezing and thawing shall be determined in all cases, and the minimum relative durability factor shall be 95.

3. TYPES

Admixtures shall be Type A, Water-Reducing or Type D, Water-Reducing and Retarding, as defined in ASTM Specification C 494.

4. PERFORMANCE IN THE JOB MIX

When added in the manner and amount recommended by the manufacturer to the concrete used on the job, with no change in the cement content or proportions of the aggregates, admixtures shall have the following effects:

Type A or Type D: The water content at the required slump shall be at least 5 percent less with the admixture than without. The air content shall remain within the range specified, but shall not exceed 8 percent in any case.

Type D: The time of initial setting, determined as prescribed in ASTM C 494, shall be from 1 to 3 hours longer with the admixture than without.

MATERIAL SPECIFICATION

534. CURING COMPOUND (FOR CONCRETE)

1. SCOPE

This specification covers the quality of liquid membrane-forming compounds suitable for spraying on concrete surfaces to retard the loss of water during the curing process.

2. QUALITY

The curing compound shall meet the requirements of ASTM Specification C 309.

Unless otherwise specified the compound shall be Type 2.

3. DELIVERY AND STORAGE

All curing compound shall be delivered to the site of the work in the original container bearing the name of the manufacturer and the brand name. The compound shall be stored in a manner to prevent damage to the containers and to protect water-emulsion types from freezing.

MATERIAL SPECIFICATION

535. PREFORMED EXPANSION JOINT FILLER

1. SCOPE

This specification covers the quality of preformed expansion joint fillers for concrete.

2. QUALITY

Preformed expansion joint filler shall conform to the requirements of ASTM Specification D 1752, Type I, Type II or Type III, unless bituminous type is specified. Bituminous type preformed expansion joint filler shall conform to the requirements of ASTM Specification D 994, or D 1751.

MATERIAL SPECIFICATION

537. NON-METALLIC WATERSTOPS

1. SCOPE

This specification covers non-metallic waterstops for use in joints of concrete structures.

2. CLASSIFICATION

- a. Classes. Non-metallic waterstops shall be of the following classes, as specified:

Class I shall be made of either natural or synthetic rubber.

Class II shall be made of vinyl chloride polymer or copolymer.

- b. Types. Non-metallic waterstops may be either split or solid and shall conform to the following types, as specified (see Figure 1):

Type A shall have ribbed anchor flanges and a smooth web. Flanges may be of uniform thickness or may have either a converging or a diverging taper toward the edges.

Type B shall have ribbed anchor flanges and a smooth web containing a hollow tubular center bulb having: (1) a wall thickness equal to at least one-half the web thickness and (2) the inside diameter (D) specified in the contract. Flanges may be of uniform thickness or may have either a converging or a diverging taper toward the edges.

Type C shall have a single, circular, bulb-type anchor flange at each edge and a smooth web.

Type D shall have a single, circular, bulb-type anchor flange at each edge and a smooth web containing a hollow tubular center bulb having: (1) a wall thickness equal to at least one-half the thickness of the web and (2) the inside diameter (D) specified in the contract.

Type E shall have ribbed anchor flanges and a web molded or extruded in the form of a round or U-shaped bulb of the dimensions specified in the contract. The web bulb shall be connected at the open end of the "U" by a thin membrane (having a thickness of not less than 1/64-inch or more than 1/5 the web thickness) designed to: (1) prevent infiltration of wet concrete into the bulb and (2) tear when expansion of the joint occurs. Flanges may be of uniform thickness or may have either a converging or a diverging taper toward the edges. Auxiliary positioning or nailing flanges may be provided so long as they do not interfere with the functioning of the web bulb.

Type F shall have ribbed anchor flanges with at least two extra heavy ribs (designed to resist displacement of the waterstop during placement of concrete) on each flange and a smooth web having a positioning or nailing flange attached at the center.

Type G shall be of special design conforming to the details shown on the drawings.

- c. Sizes. Waterstops of Types A through F shall be of the sizes listed herein, as specified (see Table 1). Type G waterstops shall have the dimensions shown on the drawings.

3. PHYSICAL REQUIREMENTS

The extruded or molded materials shall exhibit the properties specified herein when tested by the methods specified in Section 4 of this specification.

a. Class I Waterstops

- (1) The hardness (Shore A durometer) shall be not less than 60.
- (2) The specific gravity shall be not more than 1.2.
- (3) The tensile strength shall be not less than 2500 pounds per square inch.
- (4) The ultimate elongation shall be not less than 450 percent.
- (5) The compression set shall be not more than 30 percent.
- (6) The water absorption (by weight) shall be not more than 5 percent.
- (7) The decrease in tensile strength and ultimate elongation after aging shall be not more than 20 percent.
- (8) There shall be no sign of failure due to brittleness at a temperature of minus 35°F.

b. Class II Waterstops

- (1) The hardness (Shore A durometer) shall be not less than 60.
- (2) The specific gravity shall be not more than 1.4.
- (3) The tensile strength shall be not less than 1400 pounds per square inch.

- (4) The ultimate elongation of the web shall be not less than 280 percent and that of the flanges shall be not less than 200 percent.
- (5) 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.
- (6) The decrease in either tensile strength or ultimate elongation after accelerated extraction shall be not greater than 15 percent.
- (7) 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 5311-1.

- 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;
 - (5) Fresh medium shall be substituted every day;
 - (6) Samples need not be dipped in acetone.
- j. The effects of alkalis shall be determined by Method 6251 under the following conditions:
 - (1) Sample 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 packaged and stored by methods that will protect them from prolonged exposure to direct sunlight or excessive heat.

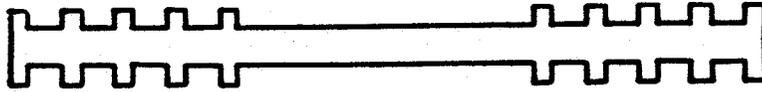
TABLE 1. SIZES OF WATERSTOPS

<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

FIGURE 1

TYPES OF NON-METALLIC WATERSTOPS

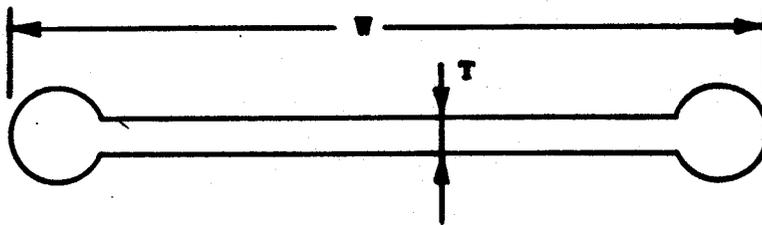
TYPE A



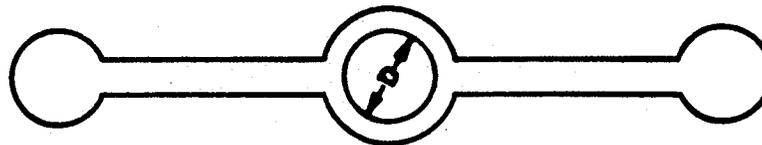
TYPE B



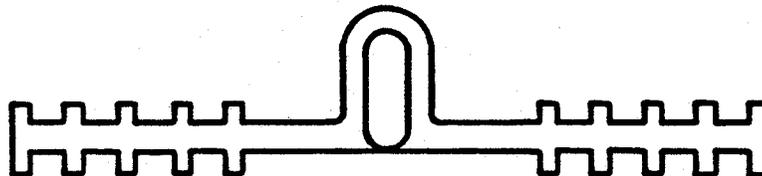
TYPE C



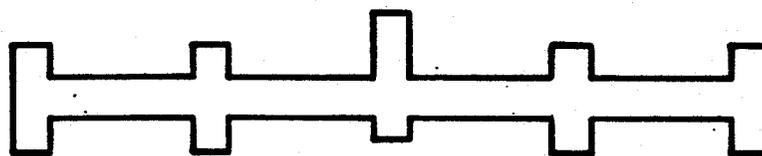
TYPE D



TYPE E



TYPE F



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.

3. DIMENSIONS OF WELDED WIRE FABRIC

Gauges, spacing and arrangement of wires in welded steel wire fabric shall be as defined in ACI Standard 315 of the American Concrete Institute for the specified style designations.

4. STORAGE

Steel reinforcement stored at the site of the work shall be stored above the ground surface on platforms, skids or other supports and shall be protected from mechanical injury and corrosion.

MATERIAL SPECIFICATION

542. CONCRETE CULVERT PIPE

1. SCOPE

This specification covers the quality of nonreinforced and reinforced concrete culvert pipe.

2. NONREINFORCED PIPE

Nonreinforced concrete culvert pipe shall conform to the requirements of ASTM Specification C 14 for the class of pipe specified.

3. REINFORCED PIPE

- a. Round pipe. Round reinforced concrete culvert pipe shall conform to the requirements of ASTM Specification C 76 or ASTM C 655 for the class of pipe specified.
- b. Arch pipe. Reinforced concrete arch culvert pipe shall conform to the requirements of ASTM Specifications C 506 for the class of pipe specified.
- c. Elliptical Pipe. Reinforced concrete elliptical culvert pipe shall conform to the requirements of ASTM Specification C 507 for the class of pipe specified.

4. REINFORCED BOX SECTIONS

Reinforced concrete box sections shall be manufactured meeting the requirements of ASTM Specifications C 789 or C 850 based on the design specified.

5. RUBBER GASKET JOINTS

When rubber gasket joints are specified, the joints and gaskets shall conform to the requirements of ASTM Specification C 443.

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 iron or steel corrugated pipe and fittings shall conform to the requirements of 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 for 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 Federal Specification WW-P-405 for the specified types of coatings.

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.

<u>Product</u>	<u>ASTM Specification</u>
Standard structural shape	B 308
Extruded structural pipe and tube	B 429

Extruded bars, rods, shapes and tube	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 B 633, Service Condition SC 3 or ASTM Specification A 165, Type TS, unless otherwise specified.

6. RIVETS

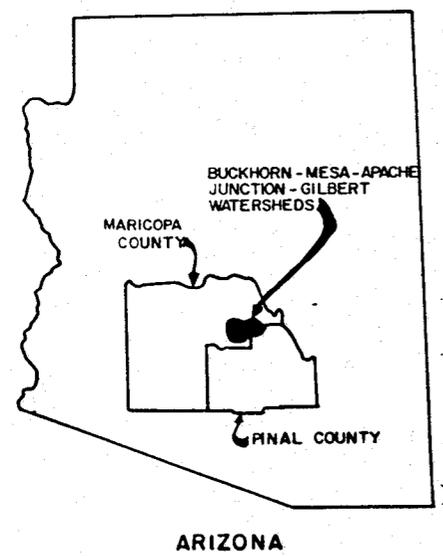
Unless otherwise specified, steel rivets shall conform to the requirements of ASTM Specification A 502, Grade 1. Unless otherwise specified, aluminum alloy rivets shall be Alloy 606-T6 conforming to the requirements of ASTM Specification B 316.

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."

BUCKHORN - MESA - APACHE JUNCTION - GILBERT WATERSHEDS PROTECTION AND FLOOD PREVENTION PROJECT MARICOPA COUNTY, ARIZONA PLANS FOR THE CONSTRUCTION OF EAST MARICOPA FLOODWAY REACH 6



PREPARED FOR THE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT
 BY
 SOIL CONSERVATION SERVICE
 U.S. DEPARTMENT OF AGRICULTURE

INDEX OF DRAWINGS

DRAWING No.	SHEET No.	TITLE
85015-AZ-CH	1.	INDEX OF DRAWINGS
	2.	LOCATION MAP
	3.	PLAN & PROFILE STA. 29+08.41 TO STA. 45+00.00
	4.	PLAN & PROFILE STA. 45+00.00 TO STA. 65+00.00
	5.	PLAN & PROFILE STA. 65+00.00 TO STA. 85+00.00
	6.	PLAN & PROFILE STA. 85+00.00 TO STA. 105+00.00
	7.	PLAN & PROFILE STA. 105+00.00 TO STA. 125+00.00
	8.	PLAN & PROFILE STA. 125+00.00 TO STA. 145+00.00
	9.	PLAN & PROFILE STA. 145+00.00 TO STA. 161+74.12
	10.	TYPICAL SECTIONS STA. 30+70.00 TO STA. 161+30.00
	11.	TYPICAL SECTIONS STA. 129+98.28 TO STA. 161+30.00
	12.	SIDE INLET AND RAMP DETAILS
	13.	SIDE INLETS AND FLOODWAY TRANSITION STA. 29+00.00 TO STA. 37+00.00
	14.	SIDE INLETS AND FLOODWAY TRANSITION STA. 59+00.00 TO STA. 81+00.00
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	17.	SIDE INLETS AND FLOODWAY TRANSITION STA. 150+00.00 TO STA. 158+90.67
	18.	PIPE CONNECTION FOR ADJACENT SUBDIVISIONS AND COLLECTOR CHANNEL TABLES AND MISC. DETAILS
	19.	STRUCTURAL DETAILS FOR DOUBLE 6'X7' BOX CULVERT
	20.	STRUCTURAL DETAILS FOR DOUBLE 6'X7' BOX CULVERT
	21.	STRUCTURAL DETAILS FOR DOUBLE 6'X7' BOX CULVERT
	22.	BARRIER DETAIL, PLUG FOR ABANDONED PIPE AND PAY LIMITS FOR 54" CONCRETE PIPE
	23.	MANHOLE ADJUSTMENT & DRIVEWAY DETAILS
	24.	BRIDGE OPENING DETAIL AND EROSION PROTECTION AT UNIVERSITY DRIVE
	25.	IDENTIFICATION SIGN

STRUCTURAL NOTES

- EXPOSED CONCRETE EDGES SHALL BE CHAMFERED ONE INCH OR ROUNDED.
- REINFORCING BAR SPACING IS CENTER TO CENTER OF BAR. BAR COVER IS CLEAR DISTANCE FROM SURFACE OF BAR AND FACE OF CONCRETE AND SHALL BE TWO INCHES FOR FORMED AND TOP SURFACES AND THREE INCHES FOR SURFACES PLACED AGAINST 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 AS FOLLOWS EXCEPT WHERE SPECIFICALLY SHOWN OTHERWISE. SPLICES SHALL BE STAGGERED SO THAT NO MORE THAN 1/2 OF THE BARS ARE SPLICED AT ONE LOCATION. BAR SPLICES SHALL BE LAPPED AS FOLLOWS:

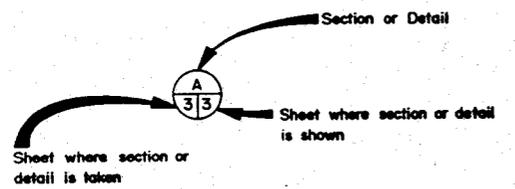
SIZES	LAP (IN.)
4	18
5	23
6	27
7	34
8	44
- ALL EXPOSED METAL INCLUDING ANCHOR BOLTS, NUTS, WASHERS, ETC. SHALL BE GALVANIZED UNLESS OTHERWISE NOTED.
- ALL CONCRETE SHALL BE 4000X EXCEPT AS NOTED.

GENERAL NOTES

- ELEVATIONS ARE IN FEET AND BASED ON SCS DATUM "ANDERSON".
- ALL STATIONING REFERS TO SURVEY BASELINE OF FLOODWAY AND IS THE MEASURED HORIZONTAL DISTANCE. THE SURVEY BASELINE AND THE CENTERLINE OF THE FLOODWAY ARE ONE IN THE SAME EXCEPT THROUGH CURVES WHERE STATIONING EQUATIONS HAVE BEEN MADE FOR THE FLOODWAY CENTERLINE.
- 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.
- ALL FLOODWAY CROSS SECTIONS ARE SHOWN LOOKING IN THE DIRECTION OF INCREASING STATIONS UNLESS OTHERWISE NOTED.
- LOCATION OF UTILITIES SHOWN ON THE DRAWINGS IS APPROXIMATE AND IS NOT INTENDED TO BE ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING AND COORDINATING HIS WORK WITH ALL UTILITY COMPANIES.

BENCHMARKS

- BM#1. UNIVERSITY DRIVE AT THE FLOODWAY 1347.58 CHISELED SQUARE IN THE EAST END OF THE SOUTH BRIDGE WALL (CANAL BRIDGE)
- BM#2. BROWN ROAD AT THE FLOODWAY 1351.63 B.C. IN THE WEST END OF THE NORTH WALL OF THE CANAL BRIDGE
- BM#3. APACHE BOULEVARD (MAIN STREET) AT THE FLOODWAY 1345.95 B.C. IN THE SOUTH BRIDGE WALL (CANAL BRIDGE)
- BM#7. BROADWAY ROAD AT THE FLOODWAY 1346.41 BLACK X NORTHWEST CORNER OF THE FLOODWAY BRIDGE WALL



LEGEND

- TEST PIT
- ▲ BENCHMARK
- P- POWER LINE
- T- TELEPHONE LINE
- + COORDINATE GRID POINTS
- △ SURVEY MONUMENTS
- △ AERIAL CONTROL POINTS
- TCE TEMPORARY CONSTRUCTION EASEMENT
- SURVEY BASELINE
- EXISTING DOWNGUY

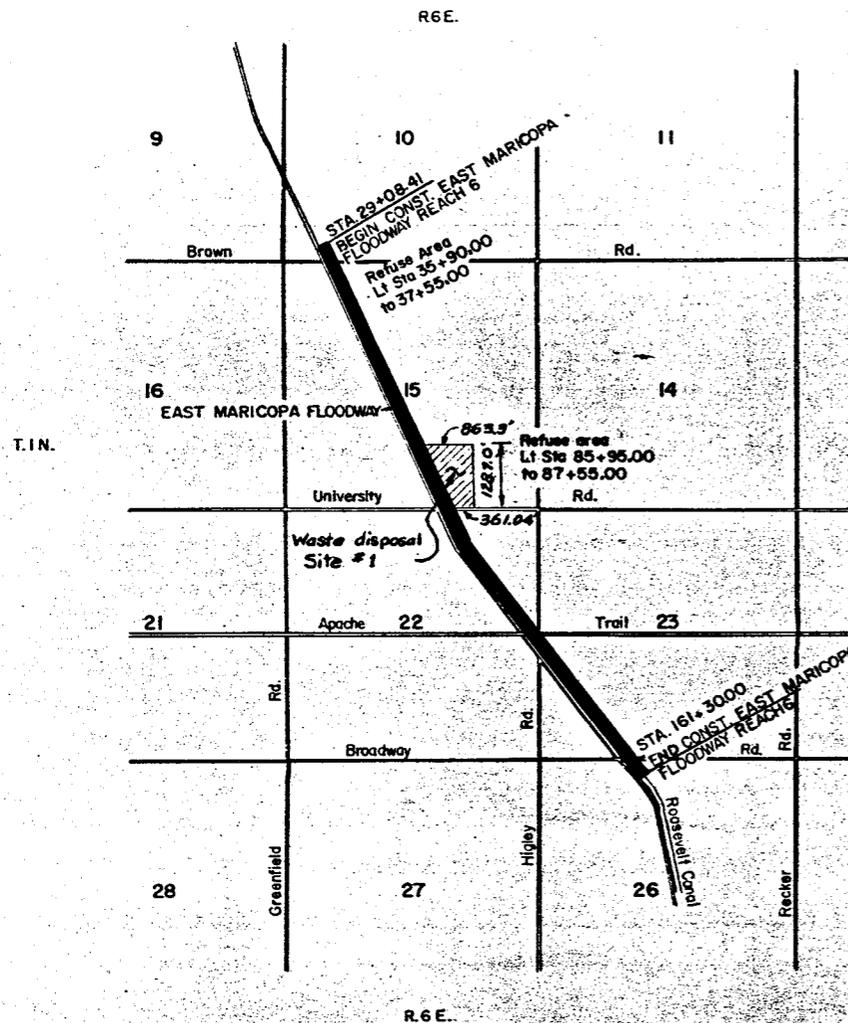
INDEX OF DRAWING
EAST MARICOPA FLOODWAY REACH 6
 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
 MARICOPA COUNTY, ARIZONA

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

Designed: <i>RDB/DBS</i>	Date: <i>2/17/88</i>	Approved: <i>[Signature]</i>	Title: <i>Senior Professional Engineer</i>
Drawn: <i>A.S./J.H.</i>	Date: <i>2/22/88</i>	Title: <i>HEAD, ENG. STAFF, WEST</i>	
Checked: <i>[Signature]</i>		Sheet: <i>25</i>	Drawing No.: 85015-AZ-CH

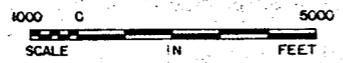
EAST MARICOPA - NATURAL RESOURCE CONSERVATION DISTRICT APPROVED DATE <i>4-12-88</i> CHAIRMAN BOARD OF SUPERVISORS	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY APPROVED DATE <i>4-8-88</i> CHIEF ENGINEER
---	--

REVISIONS

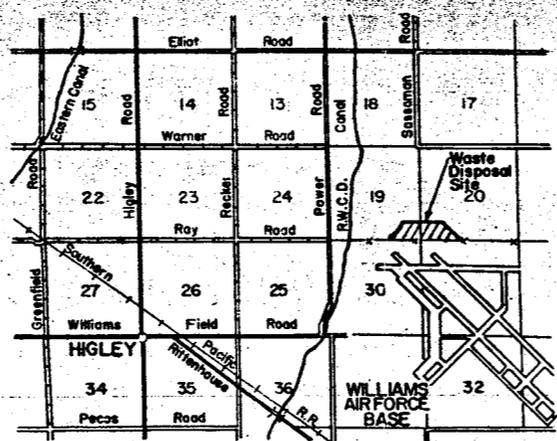


DEFINITIONS
Waste (Spec. 21) All surplus or unsuitable excavated material.
Refuse (Spec. 2.83) All materials resulting from clearing and grubbing and structure removal.

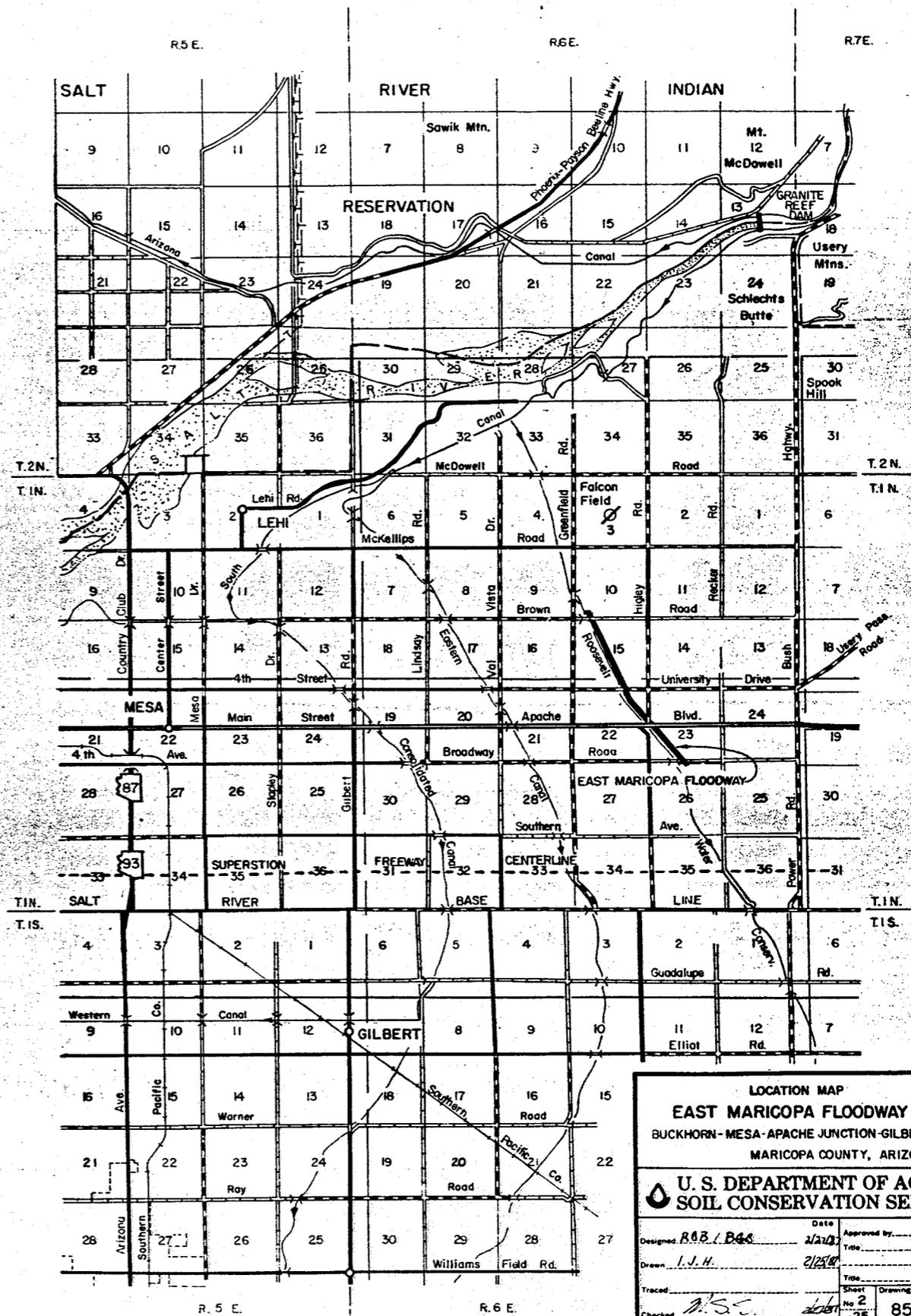
LOCATION MAP



Notice shall be given to Williams Air Force Base prior to use of waste disposal site.
 Contact: Air Manager, Lt. Col. Jerry Homewood 988-5297
 Base Engineers Office, Mike R. Toriello 998-6887



WASTE DISPOSAL SITE #2
 Maximum fill height (above existing ground) for waste site shall be 3.00'.



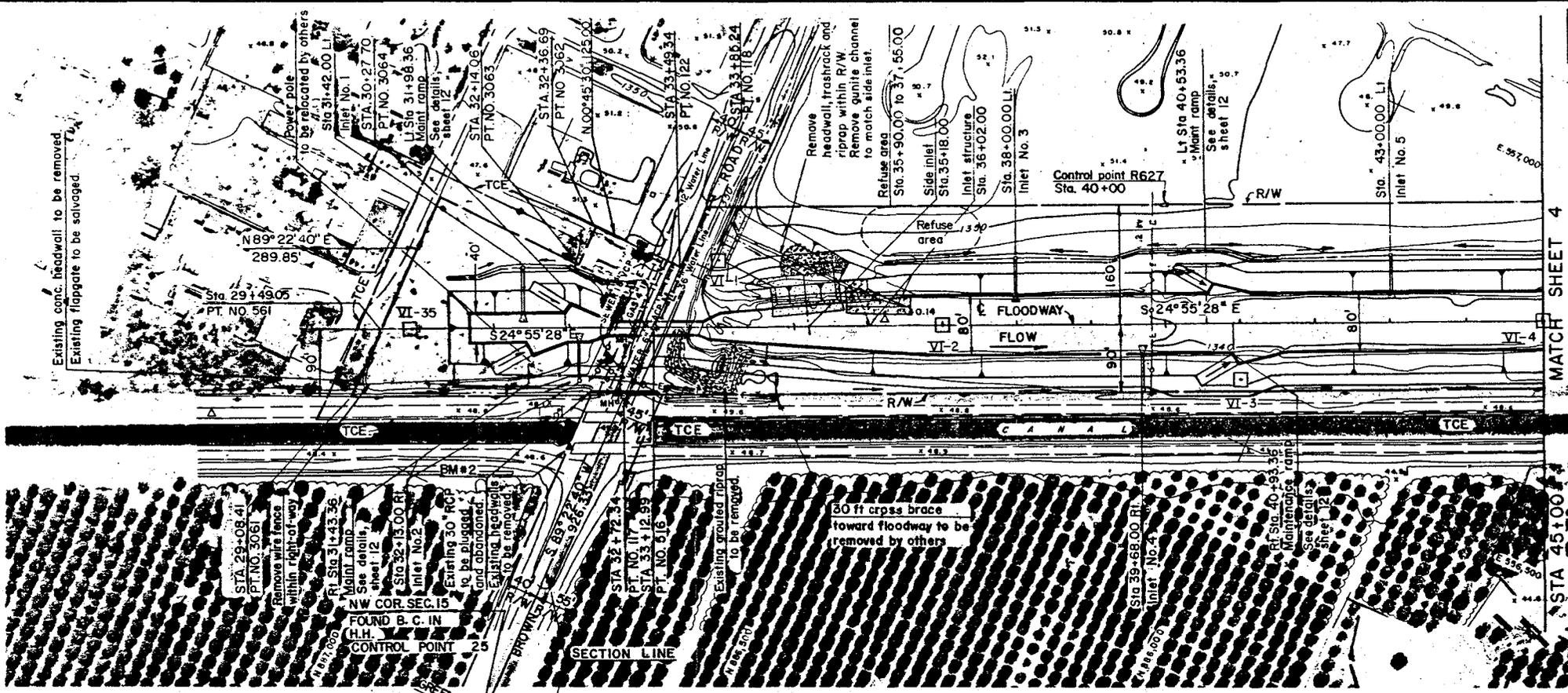
LOCATION MAP
EAST MARICOPA FLOODWAY REACH 6
 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
 MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed: *R.B.B./B.S.* Date: *1/21/81* Approved by: _____
 Drawn: *L.J.H.* Title: _____
 Traced: _____
 Checked: *A.S.C.* Sheet No. *2* of *25* Drawing No. **85015-AZ-CH**



Contractor to use caution around power poles on west side of floodway when grading the collector channels.

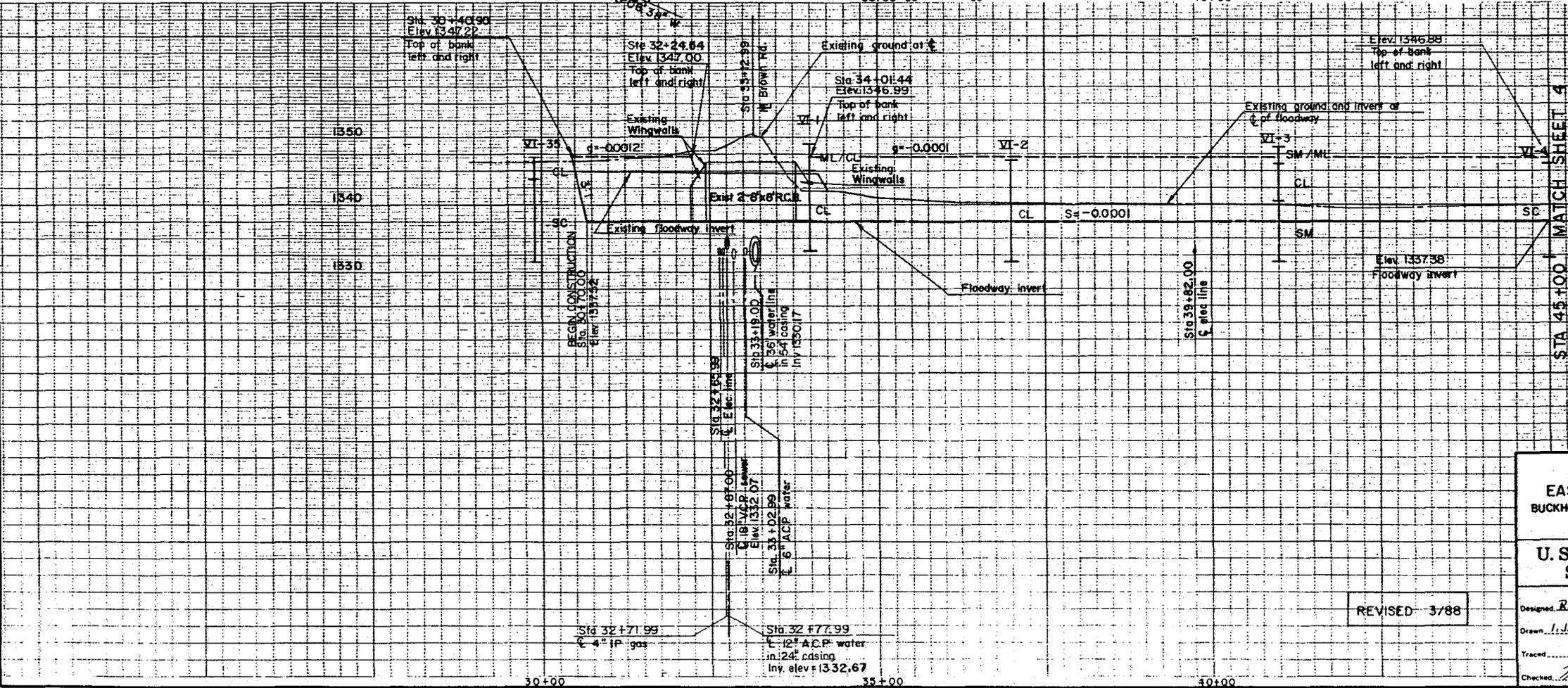
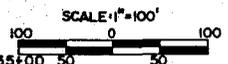


SECTION 10
T-I-N, R-6-E

SECTION 15
T-I-N, R-6-E

Sta 29+08.41 to Sta 37+00.00 see detail sheet 13 for transition, side inlets and floodway terminus.

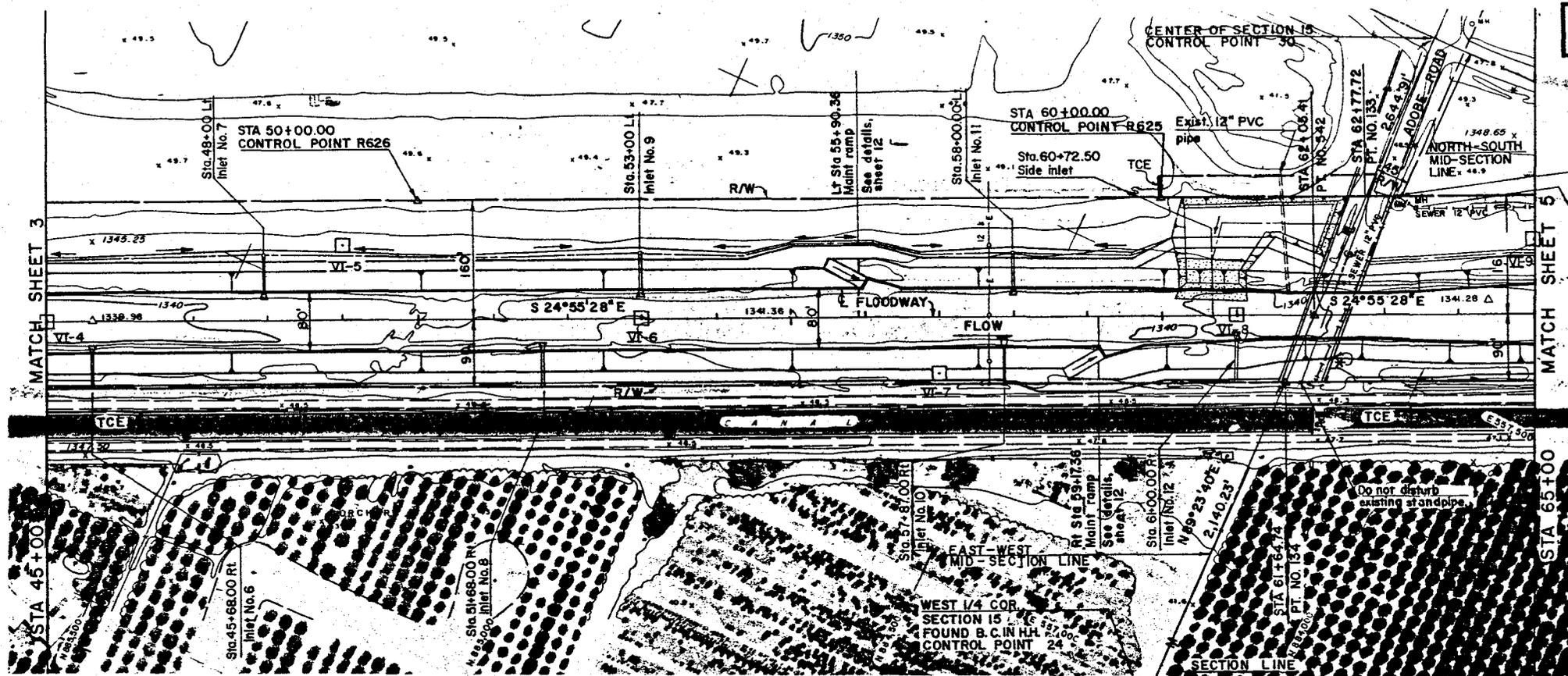
See sheet 18 for collector channel elevations and inlets.



PLAN & PROFILE
 STA. 29+08.41 TO STA. 45+00
EAST MARICOPA FLOODWAY REACH 6
 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
 MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DESIGNED: ROR, P.E. DATE: 2/27/88 APPROVED BY: [Signature] TITLE: [Blank]
 DRAWN: I.J.M. DATE: 2/25/88
 TRACED: [Signature] SHEET: 3 OF 25 DRAWING NO.: 85015-AZ-CH
 CHECKED: [Signature] DATE: 3/88



Existing M.H.
Rim elev. 1348.40
Invert 1332.83

Existing M.H.
Rim elev. 1348.50
Invert 1332.68

* Power pole to be relocated by others.

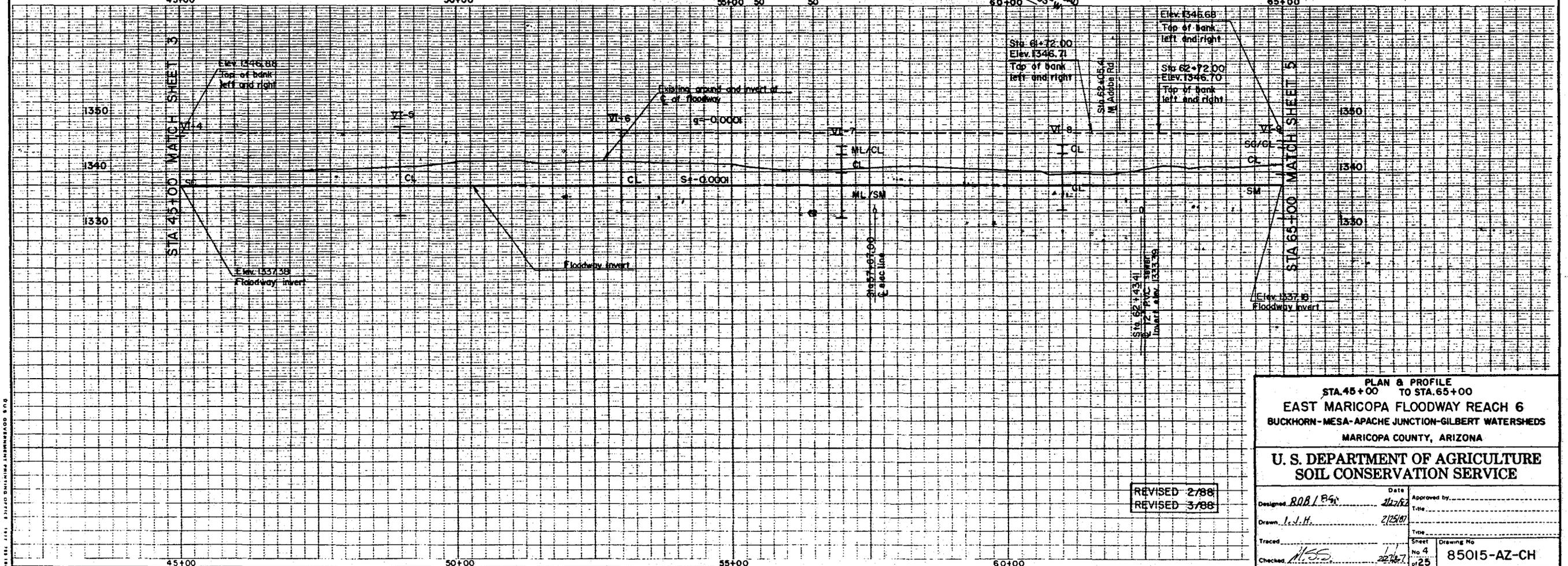
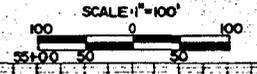
Contractor to use caution around power poles on west side of floodway when grading the collector channel.

SECTION 15
T-I-N, R-6-E

SECTION 15
T-I-N, R-6-E

See sheet 18 for collector channel elevations and inlets.

Sta 59+37.98 to sta 65+06.02, see detail sheet 14 for transition and side inlets.



PLAN & PROFILE
STA. 45+00 TO STA. 65+00
EAST MARICOPA FLOODWAY REACH 6
BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed <i>ROB/EG</i>	Date <i>11/2/88</i>	Approved by _____
Drawn <i>J.J.H.</i>	Date <i>2/25/89</i>	Title _____
Traced _____	Type _____	Sheet No. 4
Checked <i>M.S.S.</i>	Date <i>2/25/89</i>	of 25
		Drawing No. 85015-AZ-CH

REVISED 2/88
REVISED 3/88



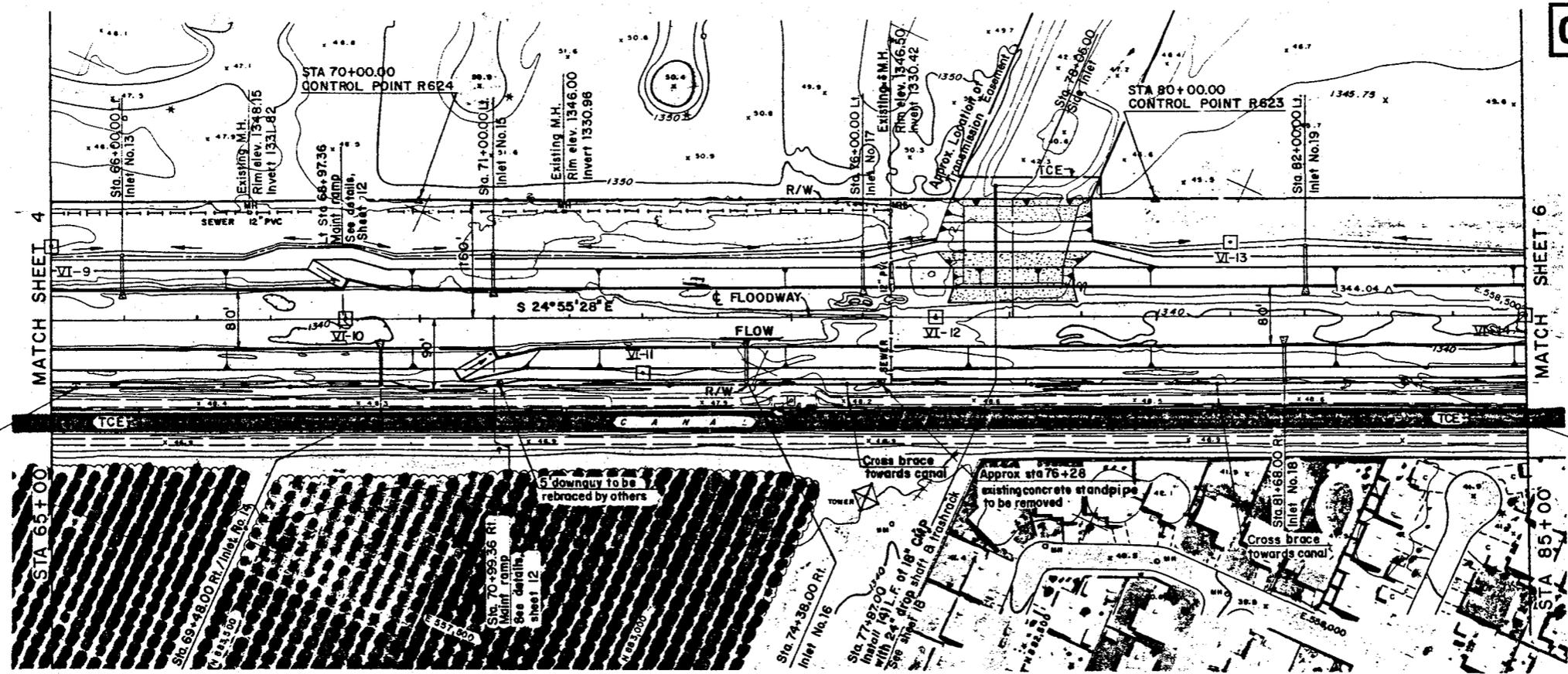
Contractor to use caution around power poles on west side of floodway when grading the collector channels.

5' downguy to be rebraced others

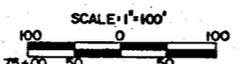
5' downguy to be rebraced by others

SECTION 15
T-I-N, R-6-E

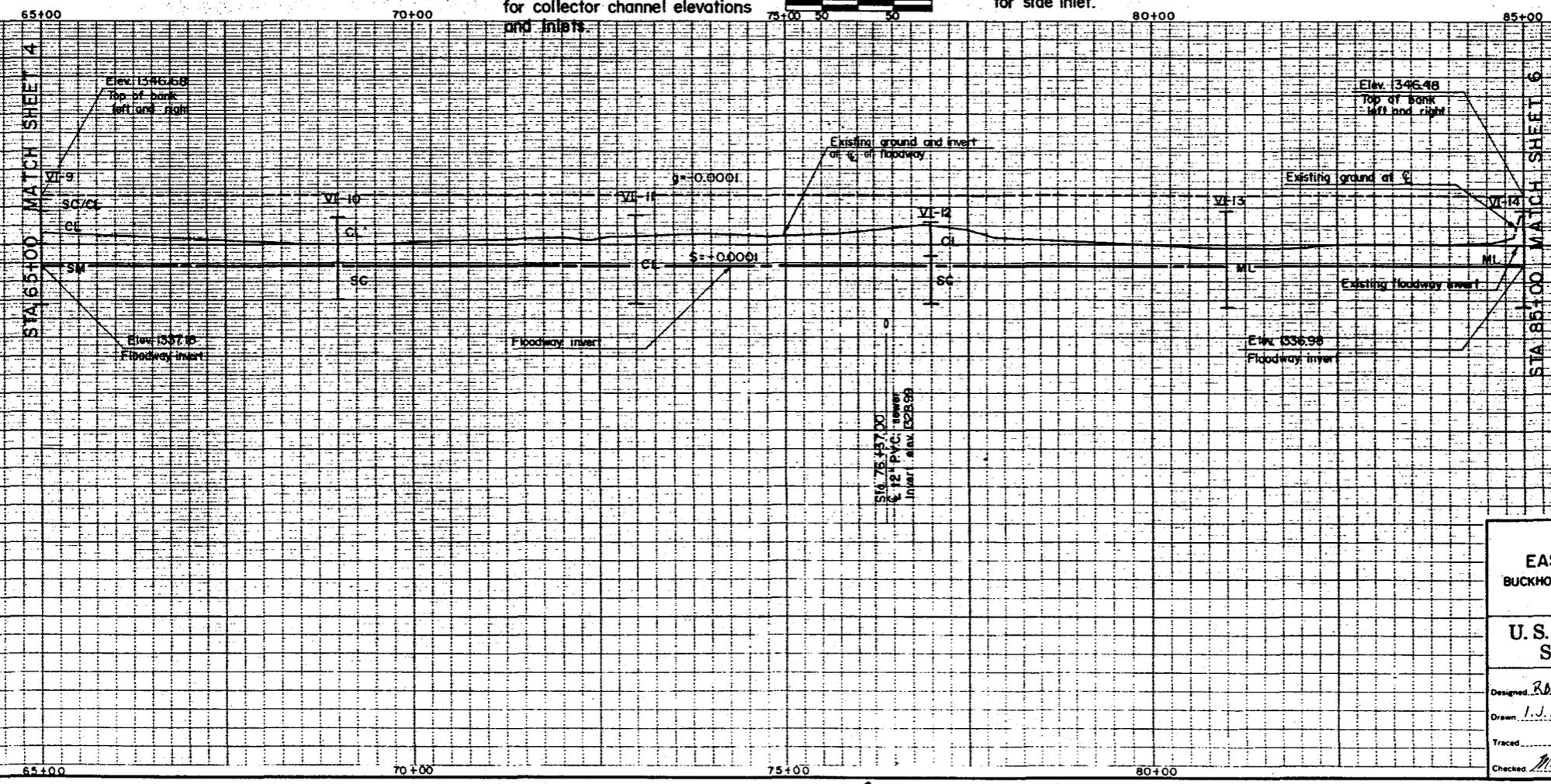
SECTION 15
T-I-N, R-6-E



See sheet 18 for collector channel elevations and inlets.



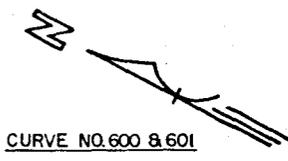
Sta 75+00 to sta 81+00, see detail sheet 14 for side inlet.



PLAN & PROFILE
STA. 65+00 TO STA. 85+00
EAST MARICOPA FLOODWAY REACH 6
BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
MARICOPA COUNTY, ARIZONA

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

Designed <i>RDB, ESE</i>	Date <i>2/21/87</i>	Approved by _____
Drawn <i>J.J.H.</i>	Title <i>2/29/87</i>	Title _____
Traced _____	Sheet No. <i>5</i>	Drawing No. 85015-AZ-CH
Checked <i>MCS</i>	Scale <i>1/25</i>	



CURVE NO. 600 & 601

- Δ = 10°04'43"
- D = 05°03'09"
- R = 1,134.04'
- T = 100.00'
- L = 199.48'
- C = 199.23'

CURVE NO. 602 & 603

- Δ = 05°44'21"
- D = 02°52'19"
- R = 1,994.99'
- T = 100.00'
- L = 199.83'
- C = 199.75'

CURVE NO. 608

- Δ = 12°32'37"
- D = 02°19'56"
- R = 2,456.83'
- T = 270.01'
- L = 537.87'
- C = 536.79'

SECTION 22
T-I-N, R-6-E

Approx. Sta. 105+00.00
Existing concrete pad to be removed.

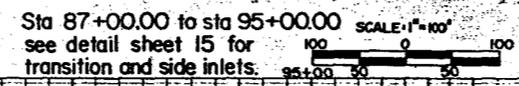
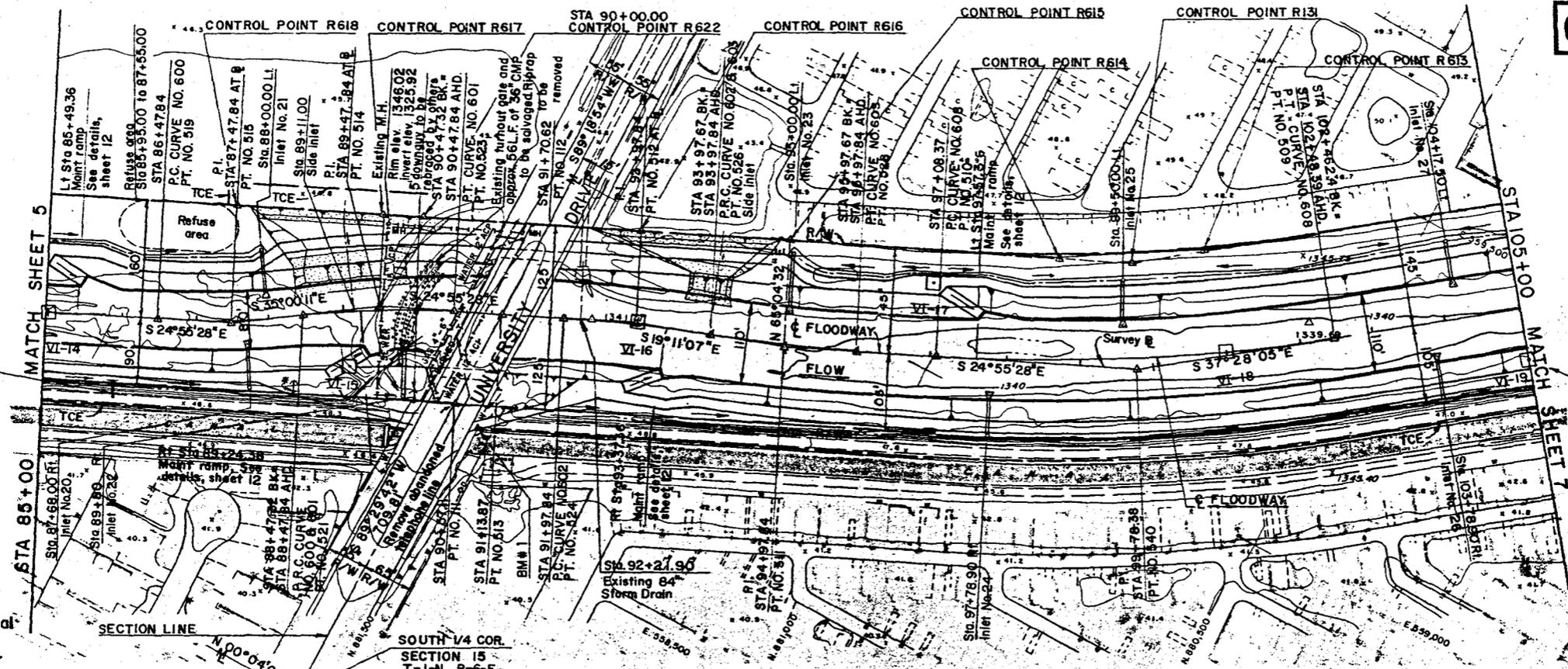
Contractor to use caution around power poles on west side of floodway when grading the collector channels.

Crossbrace towards canal

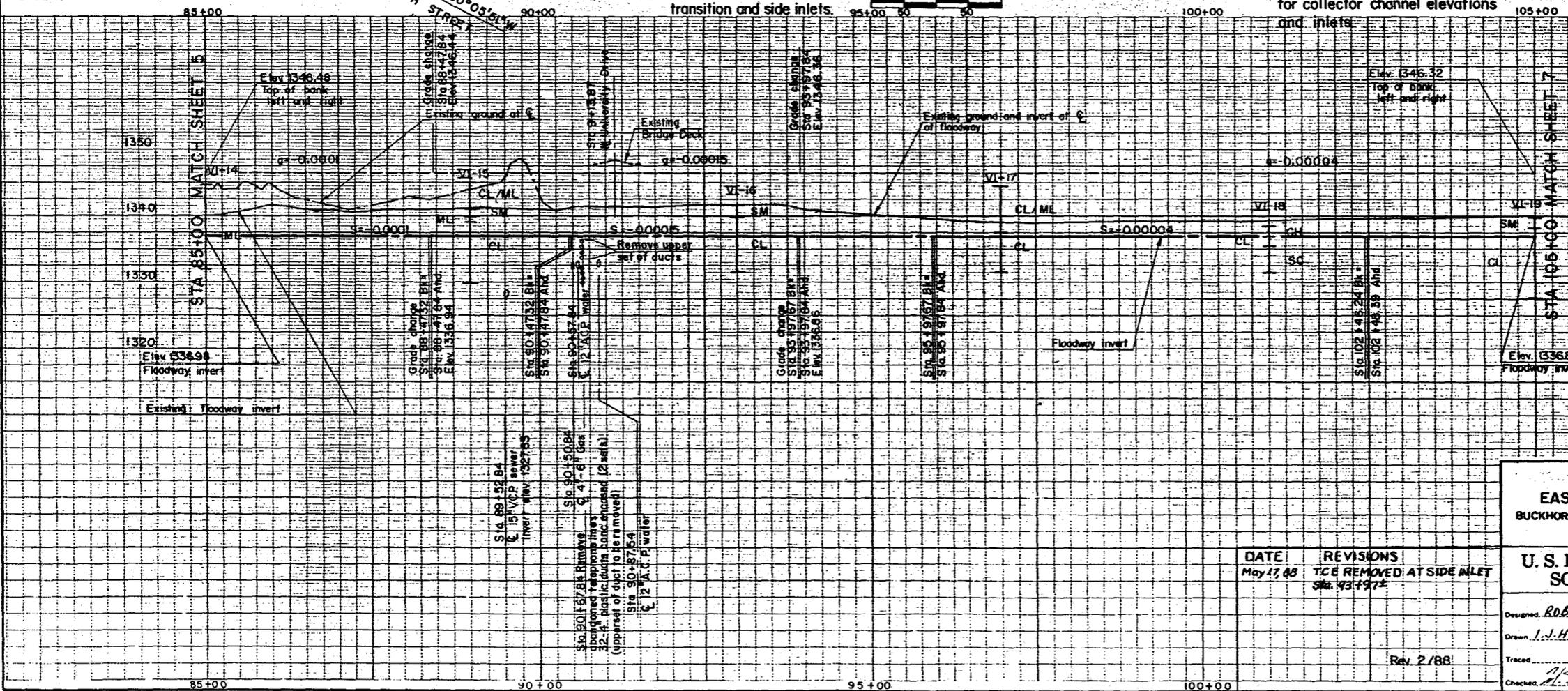
* Power pole to be relocated by others

SECTION 15
T-I-N, R-6-E

See sheet 24 for typical section of University Drive bridge and pier erosion protection detail.



See sheet 18 for collector channel elevations and inlets.



PLAN & PROFILE
STA. 85+00 TO STA. 105+00
EAST MARICOPA FLOODWAY REACH 6
BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
MARICOPA COUNTY, ARIZONA

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

DATE	REVISIONS
May 17, 88	TCE REMOVED AT SIDE INLET Sta. 93+197

Designed: <i>R.O.B. PGR</i>	Date: <i>12/1/87</i>	Approved by: _____
Drawn: <i>J.H. / AS</i>	Date: <i>2/25/88</i>	Title: _____
Traced: _____	Date: _____	Title: _____
Checked: <i>2/5/88</i>	Date: <i>2/25/88</i>	Sheet No. 6 of 25
Rev. 2/88		Drawing No. 85015-AZ-CH

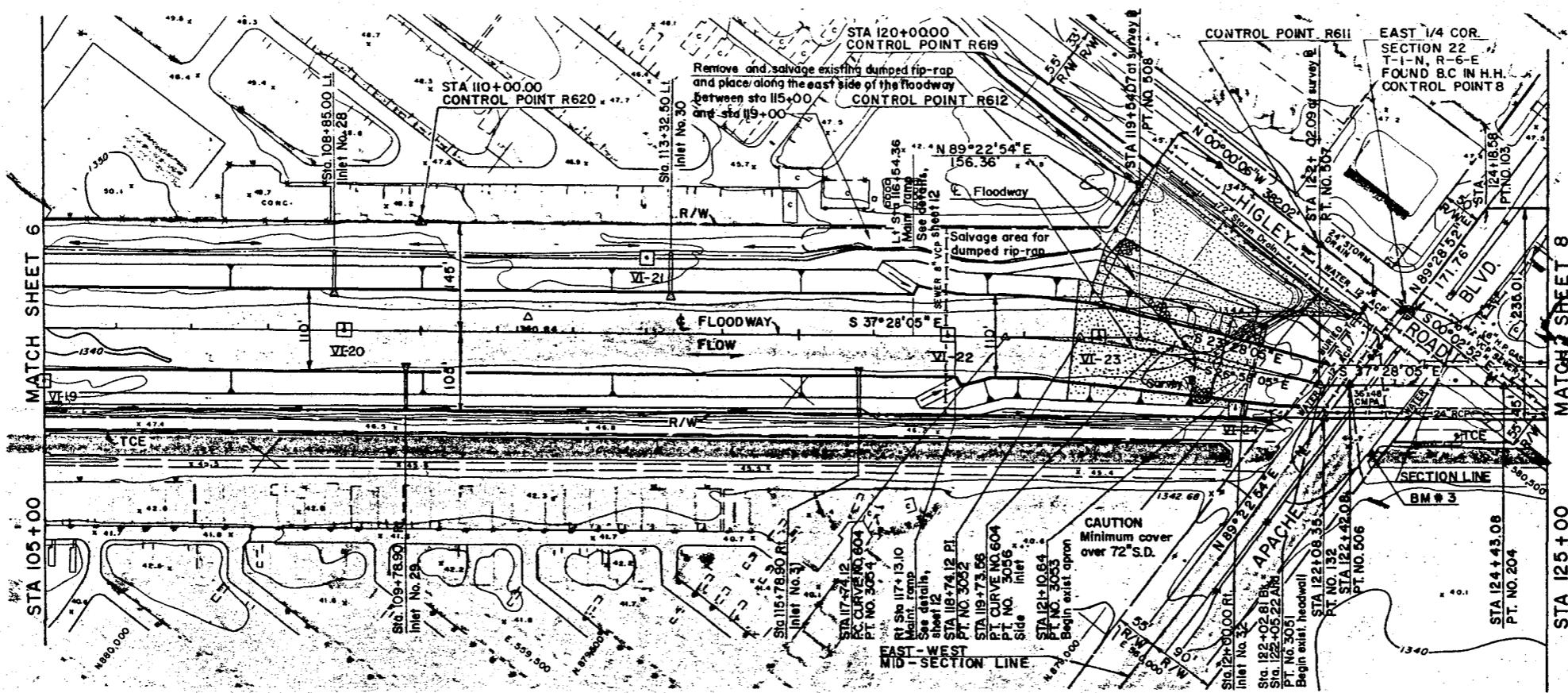
SECTION 23
T-I-N, R-6-E

CURVE NO. 604

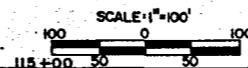
$\Delta = 10^{\circ}30'00''$
 $D = 05^{\circ}15'53''$
 $R = 1088.29'$
 $T = 100.00'$
 $L = 199.44'$
 $C = 199.16'$

SECTION 22
T-I-N, R-6-E

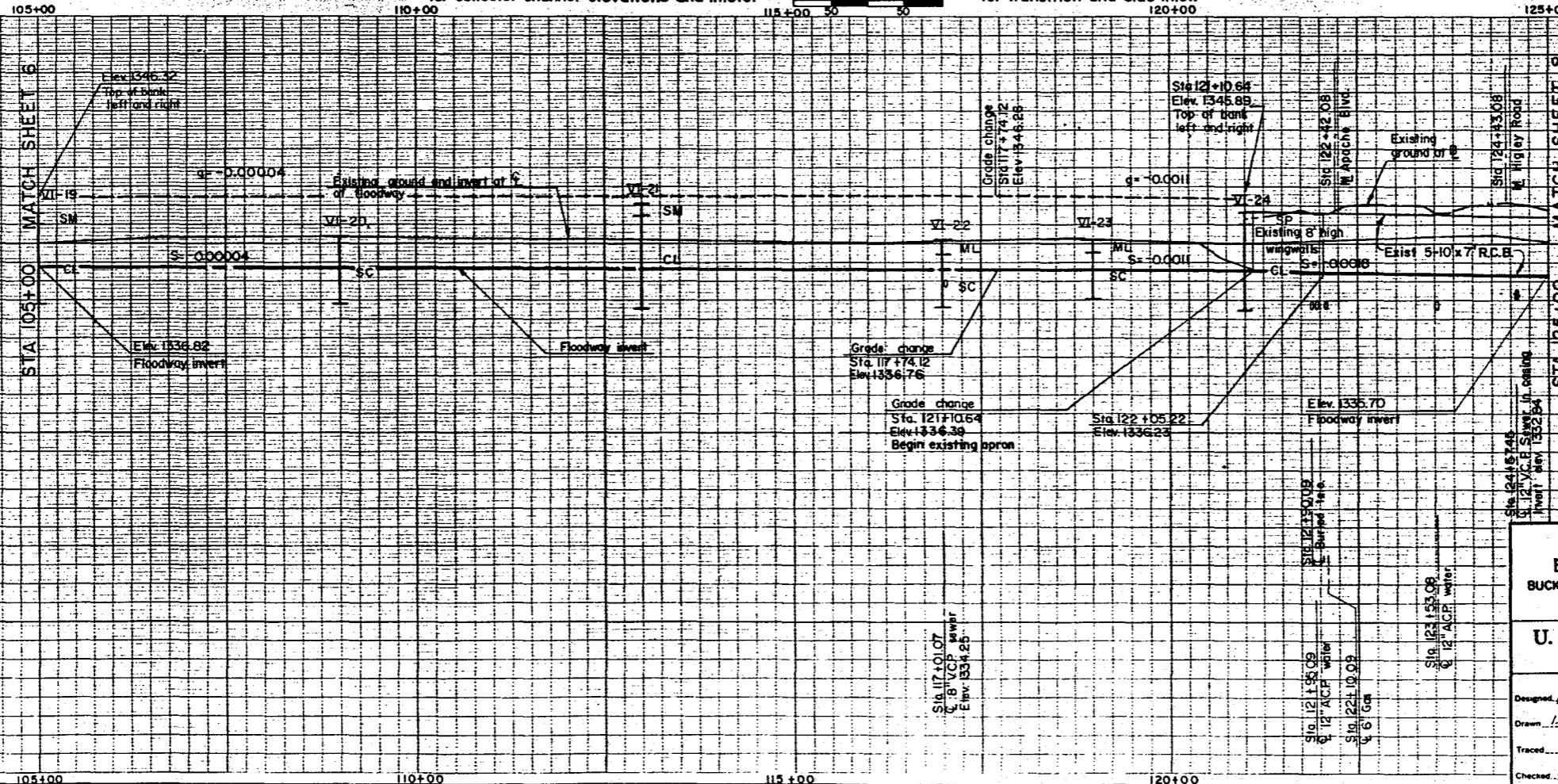
SECTION 22
T-I-N, R-6-E



See sheet 18
for collector channel elevations and inlets.



Sta 117+74.12 to Sta 125+00.00, see detail sheet 16
for transition and side inlet.

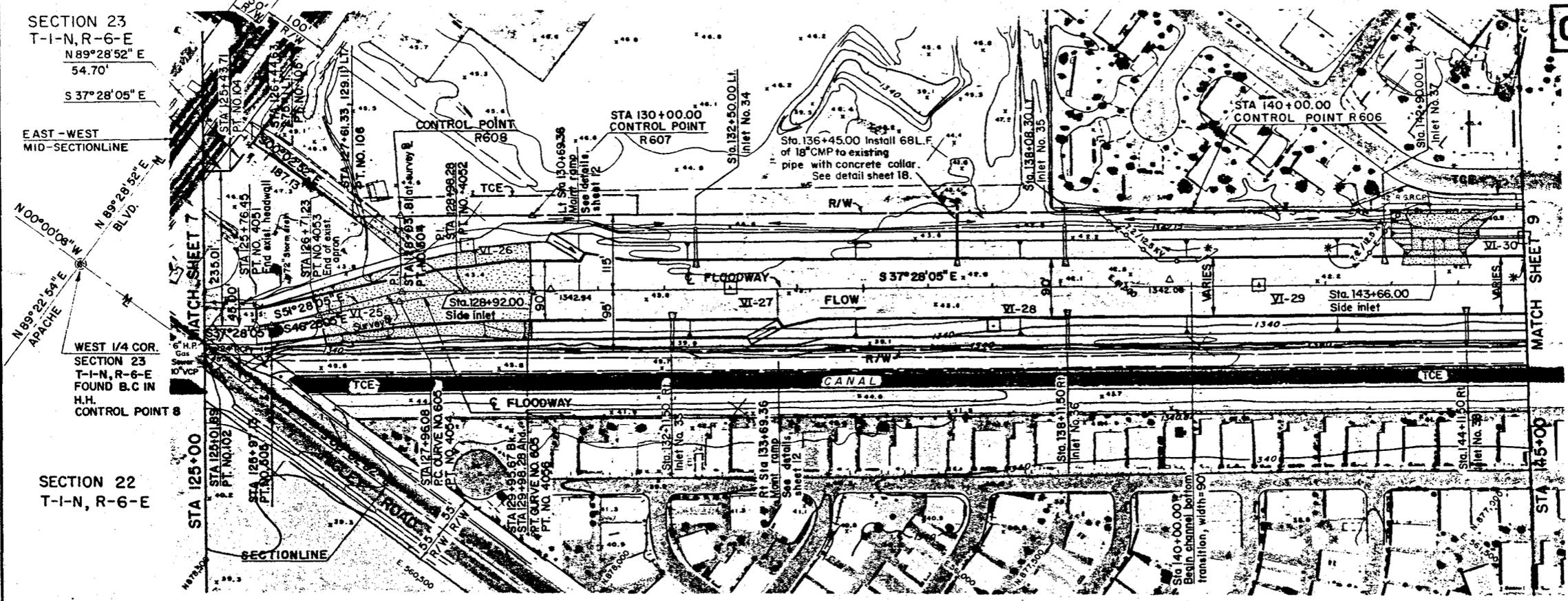


PLAN & PROFILE
STA. 105+00 TO STA. 125+00
EAST MARICOPA FLOODWAY REACH 6
 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
 MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed: *R.A. B...* Date: *2/21/87* Approved by: _____
 Drawn: *L.J.H. / A.S.* Title: _____
 Traced: _____ Sheet: _____ Drawing No: _____
 Checked: *M.S.S.* No. 7 of 25 **85015-AZ-CH**

SECTION 23
T-I-N, R-6-E
N 89°28'52" E
54.70'
S 37°28'05" E



CURVE No. 605
 $\Delta = 09^{\circ}00'00''$
 $D = 04^{\circ}30'33''$
 $R = 1270.62'$
 $T = 100.00'$
 $L = 199.59'$
 $C = 199.38'$

Limits of floodway bottom width transition from sta 140+00.00 to 151+50.00 shown on sheets 8 and 9 only.

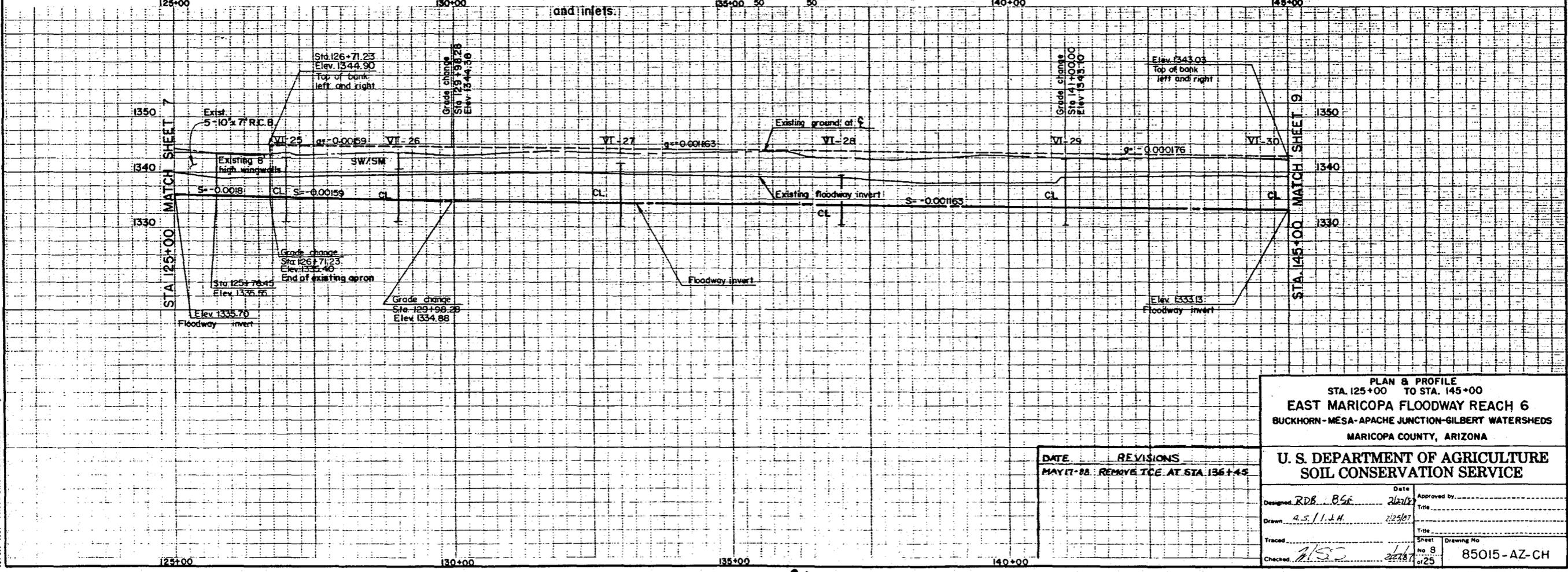
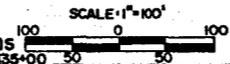
SECTION 23
T-I-N, R-6-E

Underground electric and power poles * to be relocated by others

Sta 125+00.00 to Sta 131+00.00 see detail sheet 16 for transition and side inlet.

See sheet 18 for collector channel elevations and inlets.

See detail sheet 15 for side inlet at Sta 143+66.00

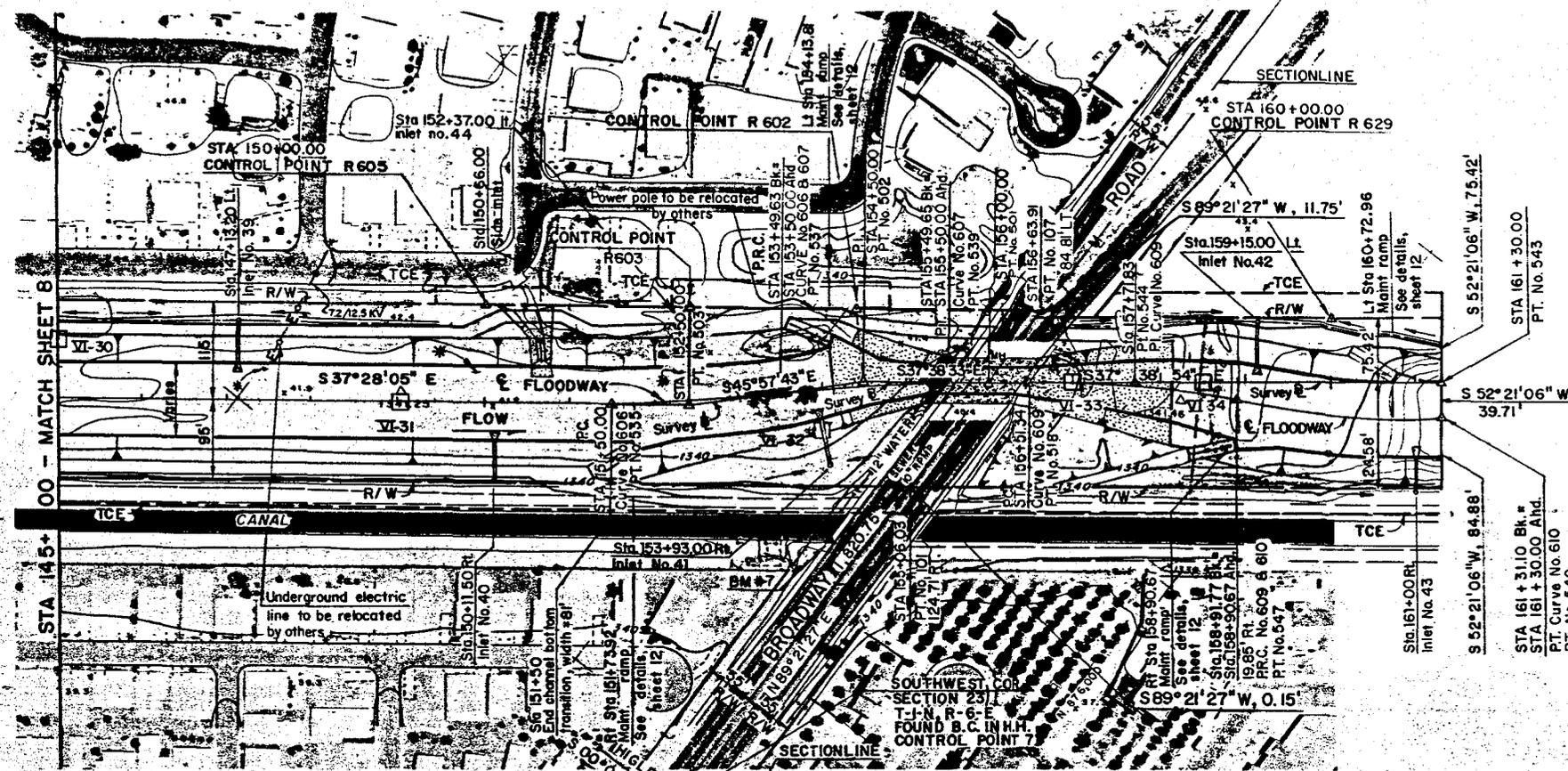


PLAN & PROFILE
STA. 125+00 TO STA. 145+00
EAST MARICOPA FLOODWAY REACH 6
BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DATE	REVISIONS
MAY 17-88	REMOVE TCE AT STA 136+45

Designed: RDB, BSE	Date: 2/2/88	Approved by: _____
Drawn: A.S./J.H.	Date: 2/25/87	Title: _____
Traced: _____	Sheet No. 8 of 25	Drawing No. 85015-AZ-CH
Checked: A.S.	Date: 2/2/87	



CURVE No. 606	CURVE No. 609 & 610
$\Delta = 08^{\circ} 29' 38''$	$\Delta = 09^{\circ} 29' 01''$
$D = 04^{\circ} 15' 17''$	$D = 03^{\circ} 56' 40''$
$R = 1346.63'$	$R = 1452.53'$
$T = 100.00'$	$T = 120.49'$
$L = 199.63'$	$L = 240.43'$
$C = 199.45'$	$C = 240.15'$

CURVE No. 607
$\Delta = 08^{\circ} 19' 10''$
$D = 04^{\circ} 10' 02''$
$R = 1374.96'$
$T = 100.00'$
$L = 199.65'$
$C = 199.47'$

Power poles
* to be relocated by others

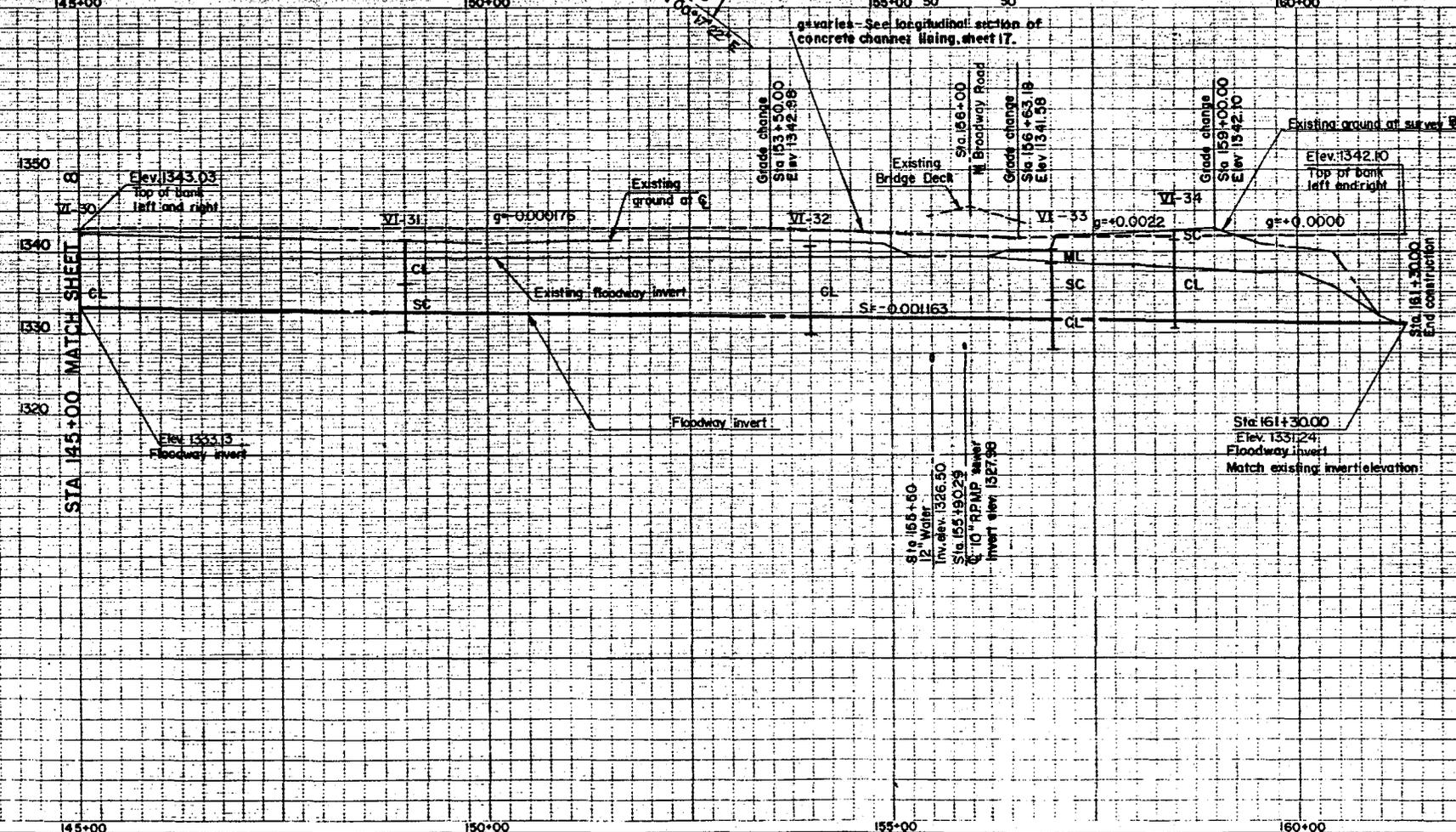
SECTION 26
T-I-N, R-6-E

See detail sheet 17 for side inlet at sta 150+66.00

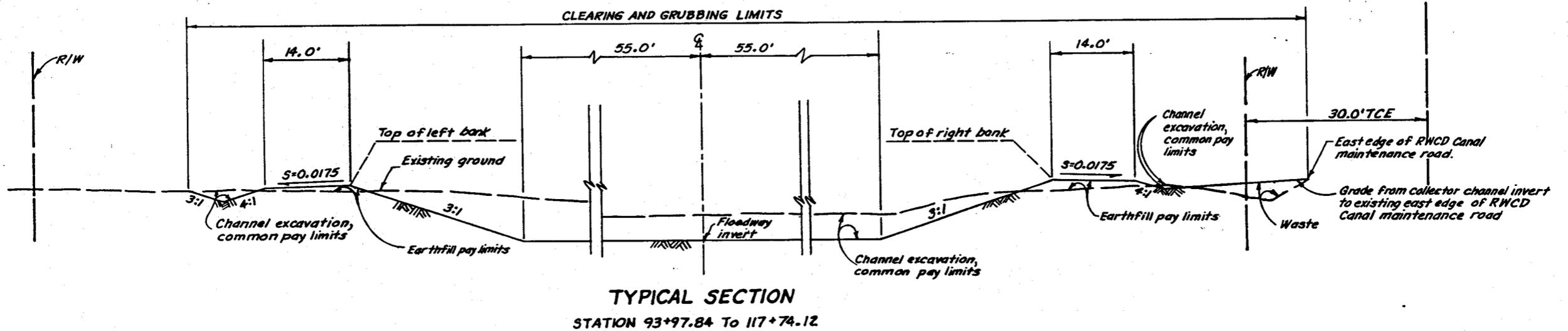
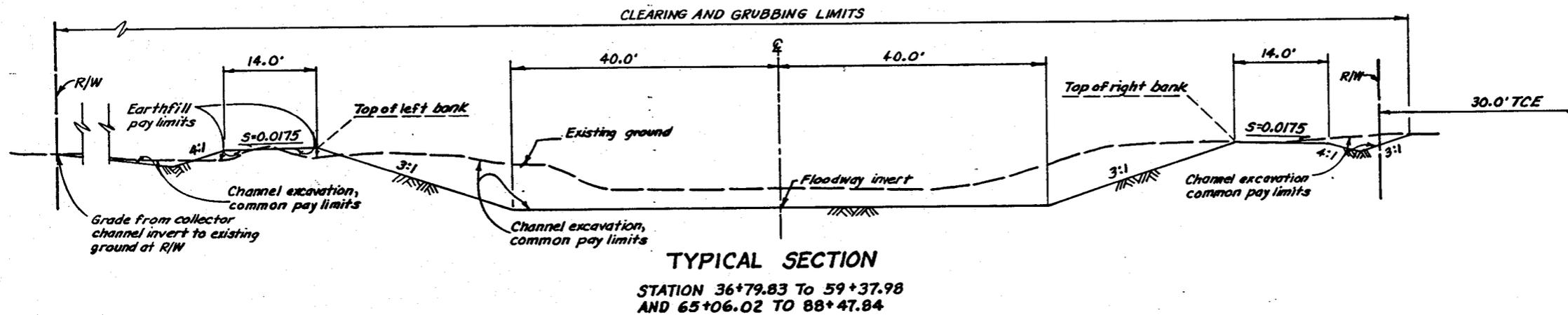
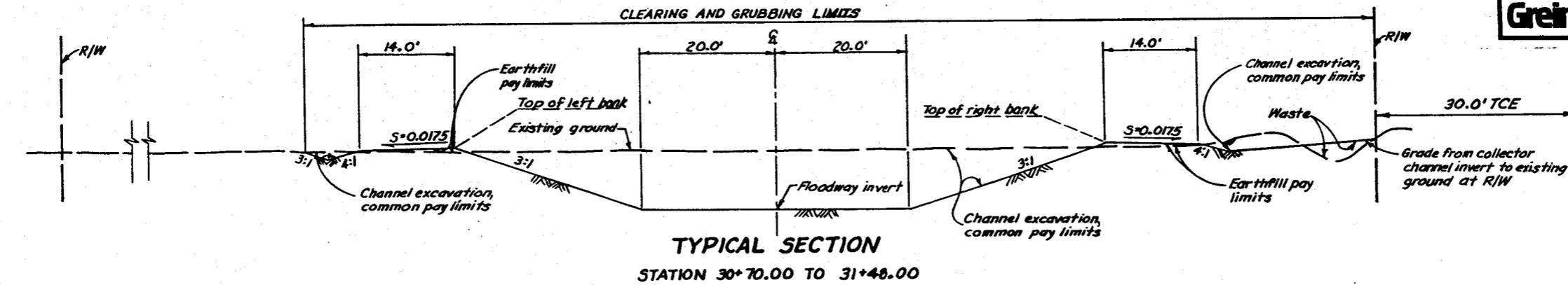
SECTION 23
T-I-N, R-6-E

Sta 153+50.00 to sta 161+30.00
see detail sheet 17 for transition.

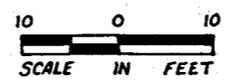
See sheet 18
for collector channel elevations and inlets.



PLAN & PROFILE STA. 145+00 TO STA. 161+30 EAST MARICOPA FLOODWAY REACH 6 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS MARICOPA COUNTY, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed <i>RDB, RBS</i>	Date <i>2/22/88</i>	Approved by _____	Title _____
Drawn <i>AJ, J.H.</i>	Date <i>2/25/87</i>	Traced _____	Sheet No. 9 of 25
Checked <i>SS</i>	Date _____	Drawing No. 85015-AZ-CH	

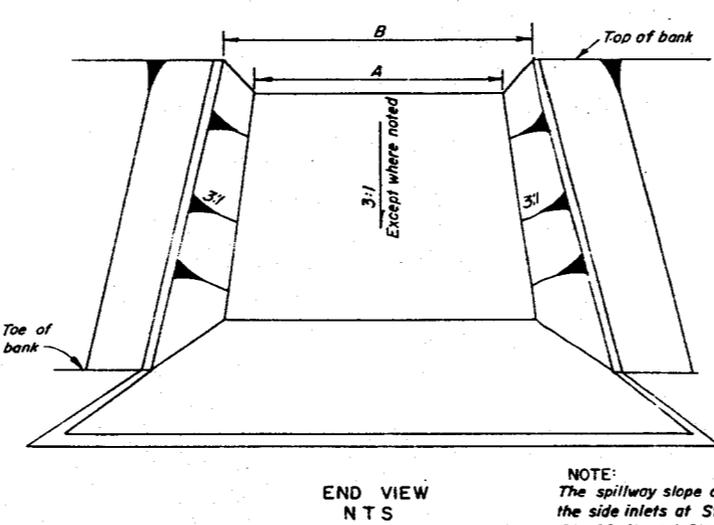
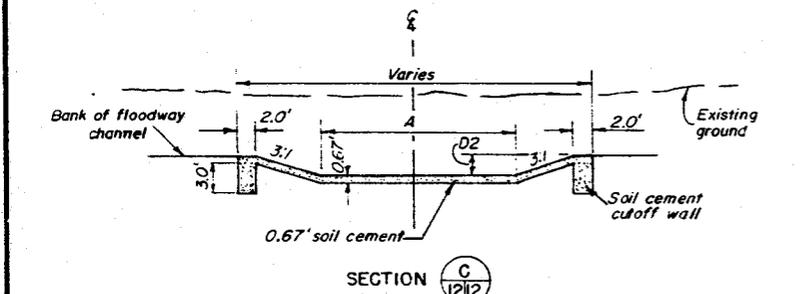
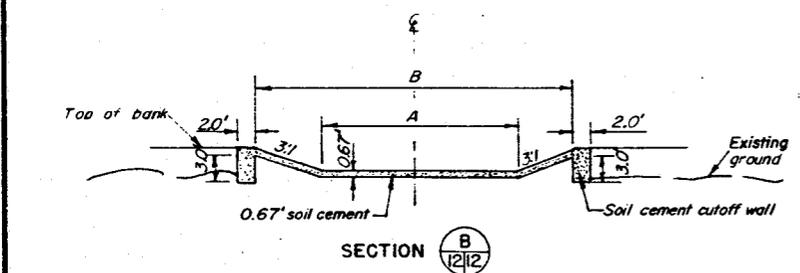
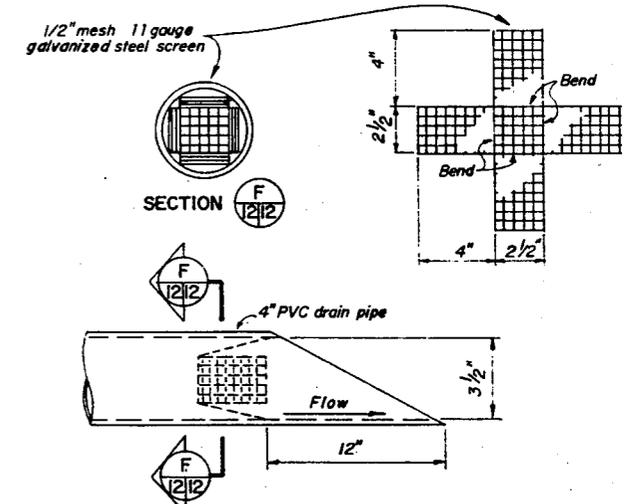
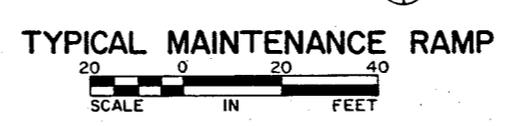
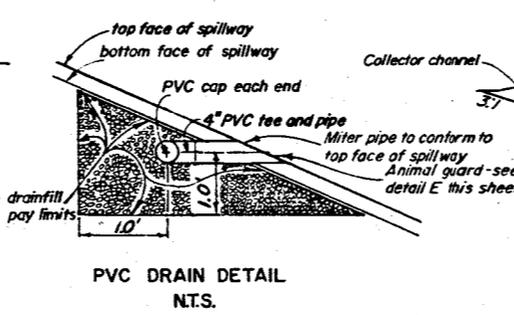
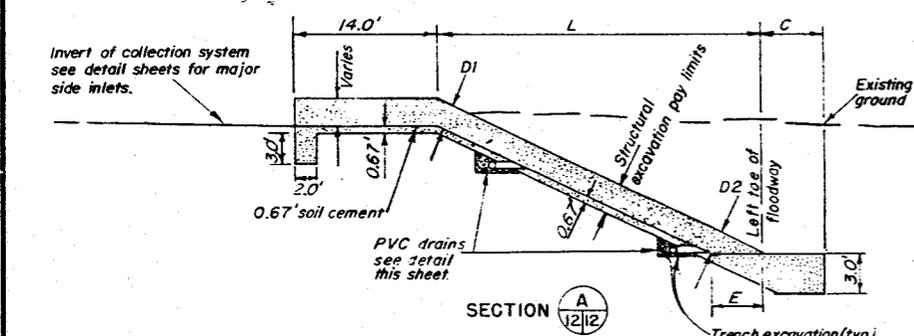
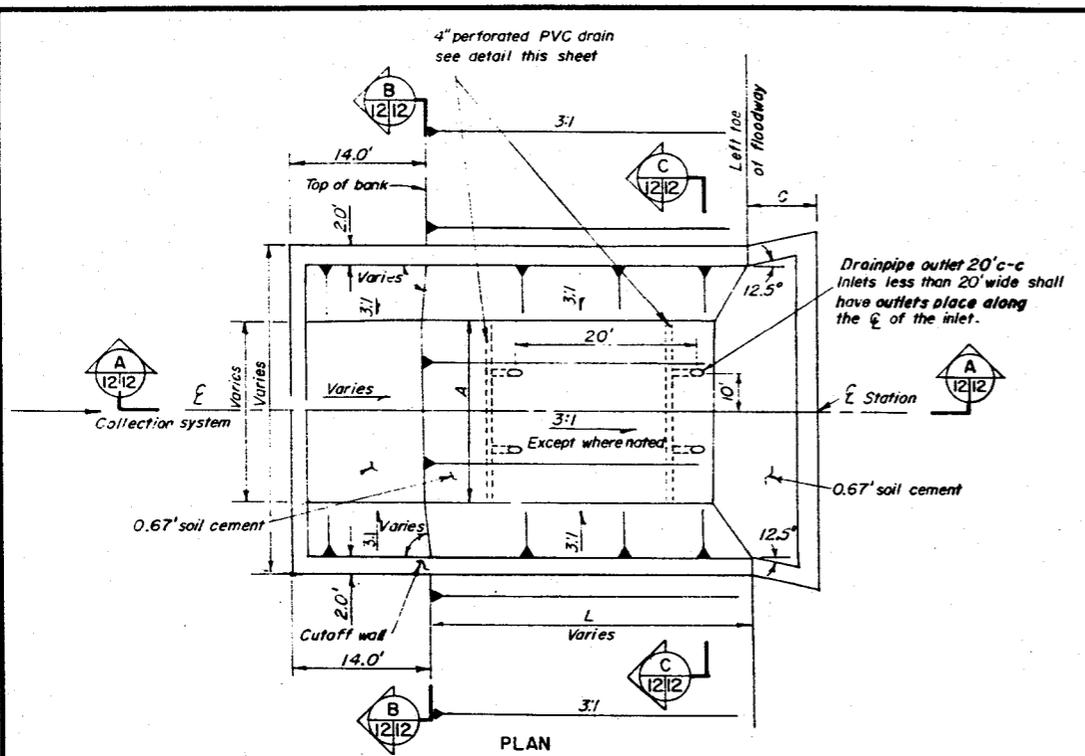
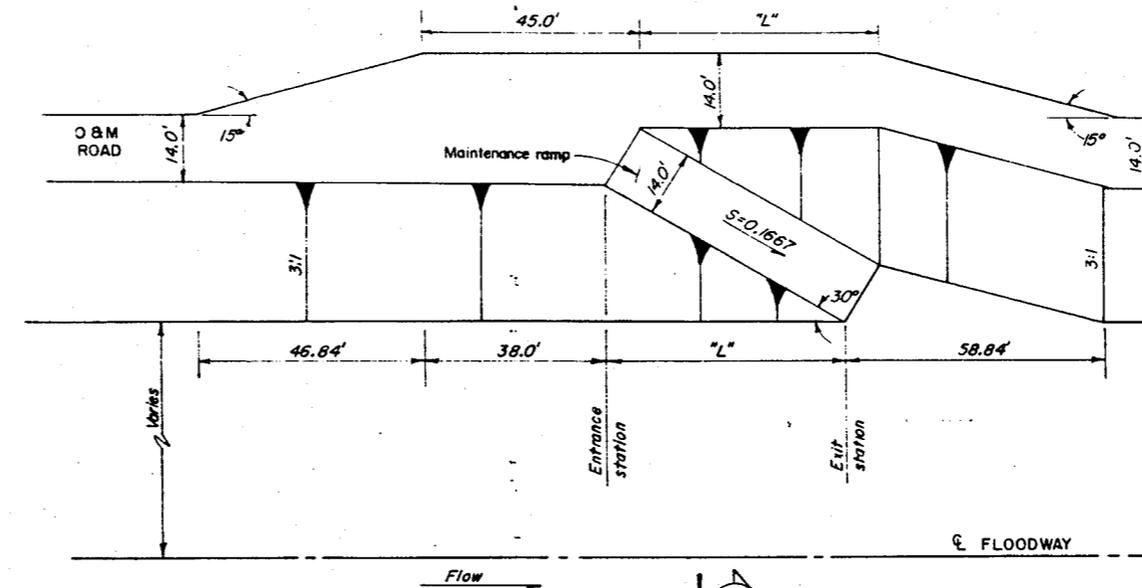


- Note:**
1. All sections are viewed looking downstream.
 2. See sheet 18 for depth of collector channels.
 3. TCE - Temporary construction easement



TYPICAL SECTIONS STA 30+70.00 TO STA 117+74.12 EAST MARICOPA FLOODWAY REACH 6 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS MARICOPA COUNTY, ARIZONA	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designed: <u>208/1844</u> Drawn: <u>L.J.H.</u> Titled: _____ Checked: <u>155</u>	Date: <u>2/2/88</u> Approved by: _____ Title: _____ Date: <u>2/2/88</u> Title: _____ Drawing No.: <u>10</u> of <u>25</u>
85015-AZ-CH	

MAINTENANCE RAMP LOCATIONS		
Entrance station	Exit station	"L"
30+94 R1	31+43.36	49.36'
31+49 L1	31+98.36	49.36'
40+44 R1	40+93.36	49.36'
40+04 L1	40+53.36	49.36'
55+41 L1	55+90.36	49.36'
58+68 R1	59+17.36	49.36'
68+48 L1	68+97.36	49.36'
70+50 R1	70+99.36	49.36'
85+00 L1	85+49.36	49.36'
88+75 R1	89+24.36	49.36'
92+88 R1	93+37.36	49.36'
97+08 L1	97+57.36	49.36'
116+05 L1	116+54.36	49.36'
116+6374 R1	117+13.10	49.36'
130+20 L1	130+69.36	49.36'
133+20 R1	133+69.36	49.36'
151+19 R1	151+73.92	54.92'
153+58 L1	154+13.81	55.81'
158+37.98 R1	158+90.67	52.69'
160+47 L1	160+72.96	55.96'

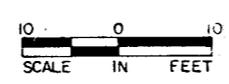


SIDE INLET LOCATIONS							
Inlet Station	A	B	C	D1	D2	E	L
35+18.00L1	80.00'	91.16'	10.00'	1.86'	1.86'	5.58'	28.50'
60+72.50L1	70.00'	90.64'	13.00'	3.44'	3.44'	10.32'	28.50'
78+05.00L1	140.00'	167.60'	20.00'	4.60'	1.33'	4.00'	28.00'
89+11.00L1	120.00'	151.80'	12.00'	5.30'	2.50'	5.00'	26.00'
93+97.84L1	50.00'	58.58'	10.00'	1.43'	1.43'	4.29'	26.50'
119+73.56L1	160.00'	188.36'	N.A.	4.71'	1.52'	4.55'	28.50'
143+66.00L1	70.00'	131.28'	14.00'	3.83'	3.83'	11.49'	29.37'
150+66.00L1	8.00'	19.46'	11.00'	1.91'	1.91'	5.73'	31.44'

- NOTES:**
- Varying dimensions on side inlets are shown on the structure detail sheet for each side inlet.
 - Caution. Side slopes of inlet at Sta 143+66.00 vary from 8:1 at the crest to 3:1 at the toe.

NOTE:
 The spillway slope on the side inlets at Sta 78+05, Sta 89+11, and Sta 119+73.56 is 5:1. See sheets 14, 15, and 16.

TYPICAL SIDE INLET



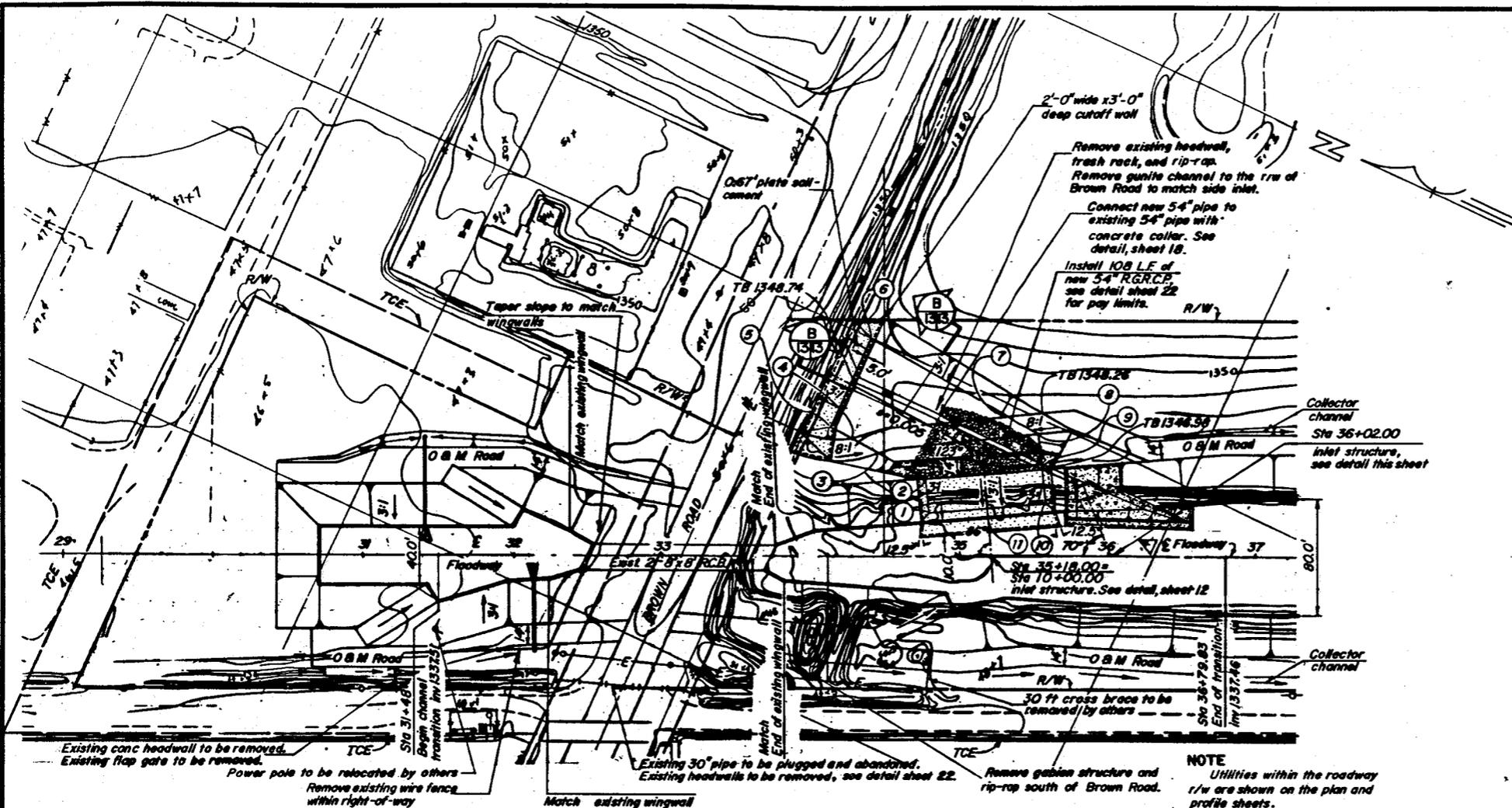
ANIMAL GUARD DETAIL E N.T.S.

NOTE:
 An animal guard shall be installed in each 4" PVC drain pipe located in the soil cement spillways and concrete channel lining. A commercial animal guard may be substituted as approved by the contracting officer.

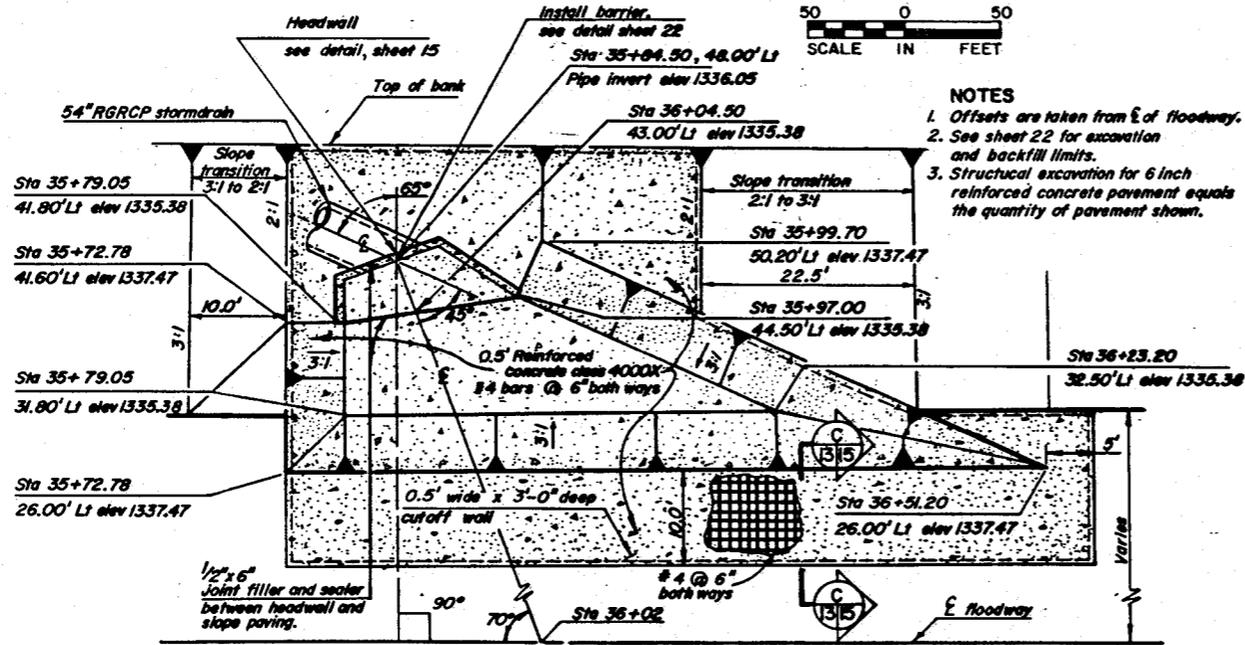
SIDE INLET AND RAMP DETAILS
EAST MARICOPA FLOODWAY REACH 6
 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
 MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed: *ROB / B96* Date: *4/2/77* Approved by: _____
 Drawn: *J.W.H. / AS* Title: *2/25/87* _____
 Traced: _____ Sheet: _____ Drawing No: _____
 Checked: *11/53* No. 12 Drawing No. 85015-AZ-C-H



NORTH FLOODWAY TERMINUS AND MAJOR INLET SOUTH OF BROWN ROAD

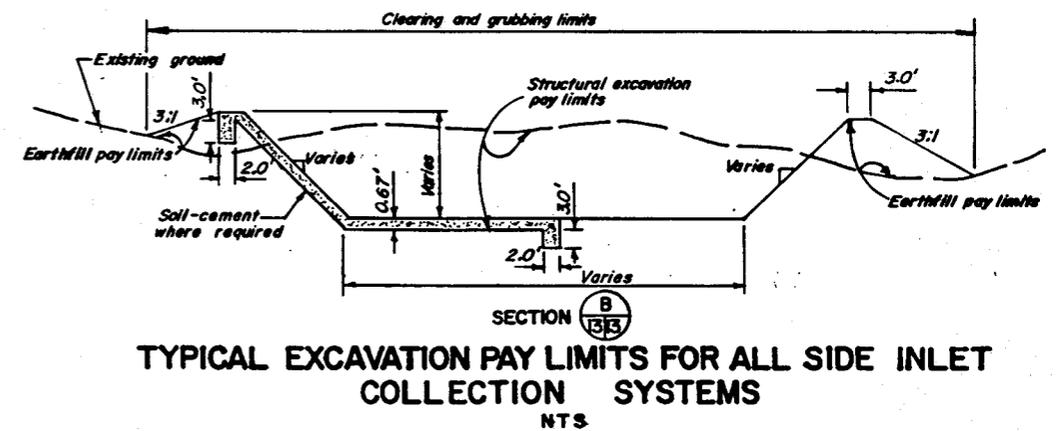


EROSION PROTECTION FOR 54" STORM DRAIN STA. 36+02.00

SCALE IN FEET

STA. 36+02.00

SCALE IN FEET



TYPICAL EXCAVATION PAY LIMITS FOR ALL SIDE INLET COLLECTION SYSTEMS

SIDE INLETS AND FLOODWAY TRANSITION STA. 29+00.00 TO STA. 37+00.00	
EAST MARICOPA FLOODWAY REACH 6 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS MARICOPA COUNTY, ARIZONA	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designed: <i>RBB / RBB</i>	Date: <i>3/11/87</i>
Drawn: <i>L.H./A.S.</i>	Title: _____
Checked: <i>M.S.S.</i>	Sheet: <i>13</i>
	Drawing No.: 85015-AZ-CH

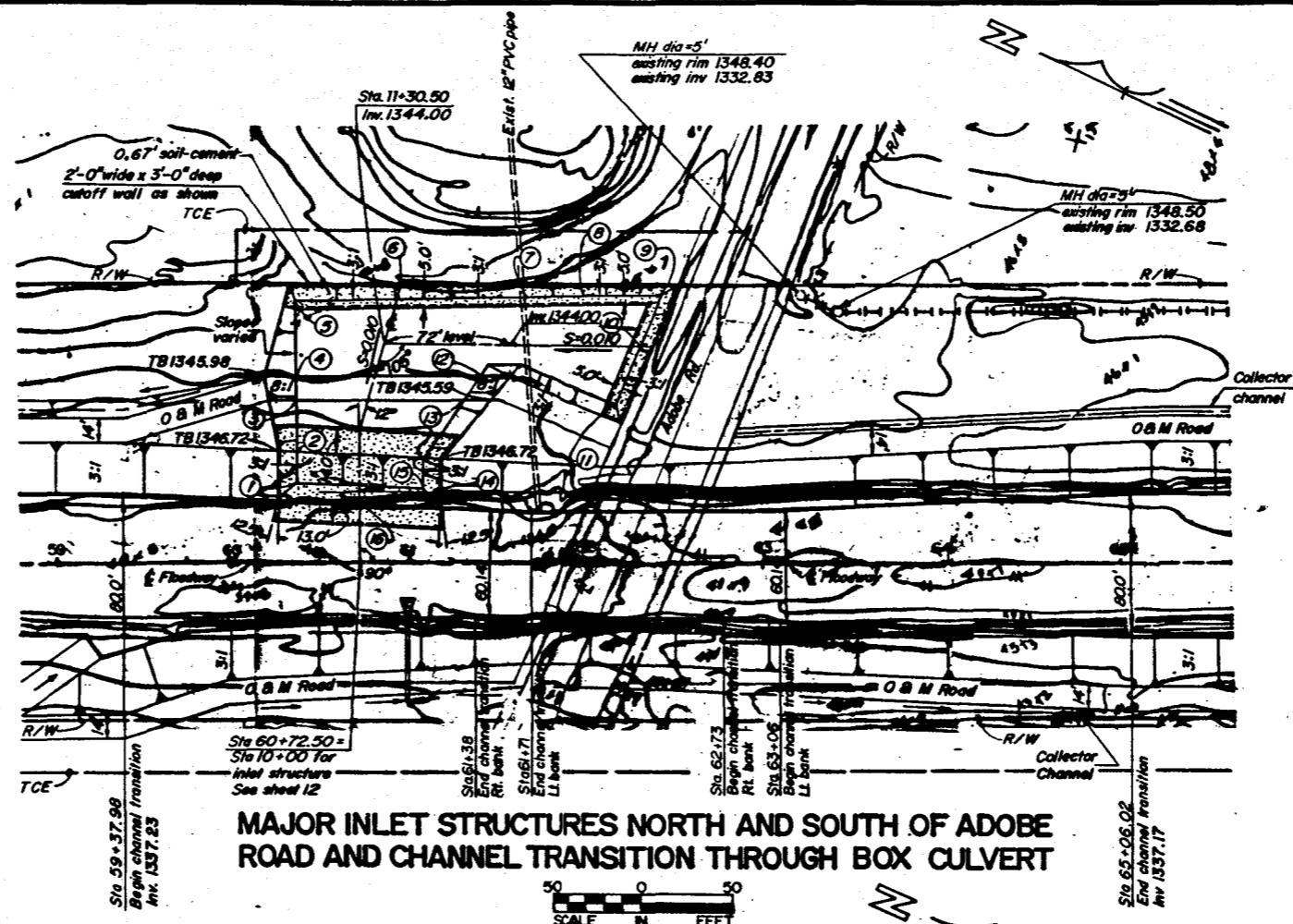
REVISED 2/88
REVISED 3/88

- ① Sta 10+43.89, 35.0'lt. Inv 1337.22
- ② Sta 10+62.07, 35.0'lt. Inv 1343.28
- ③ Sta 10+93.07, 42.0'lt. Inv 1343.59
- ④ Sta 11+07.07, 46.0'lt. Inv 1343.73
- ⑤ Sta 11+54.00, 57.0'lt. Inv 1344.20
- ⑥ Sta 11+63.00, 0.0'rt. Inv 1346.00
- ⑦ Sta 11+54.00, 77.0'rt. Inv 1344.20
- ⑧ Sta 11+57.00, 107.0'rt. Inv 1344.42
- ⑨ Sta 11+57.00, 151.0'rt. Inv 1344.75
- ⑩ Sta 11+30.50, 153.0'rt. Inv 1346.35
- ⑪ Sta 10+91.00, 141.0'rt. Inv 1344.75
- ⑫ Sta 11+07.07, 58.0'rt. Inv 1343.73
- ⑬ Sta 10+93.07, 52.0'rt. Inv 1343.59
- ⑭ Sta 10+62.07, 35.0'rt. Inv 1343.28
- ⑮ Sta 10+43.89, 35.0'rt. Inv 1337.22
- ⑯ Sta 10+33.57, 0.0'rt. Inv 1337.28

Note: Offsets are parallel to the centerline of the floodway from the centerline of this structure.

NOTES

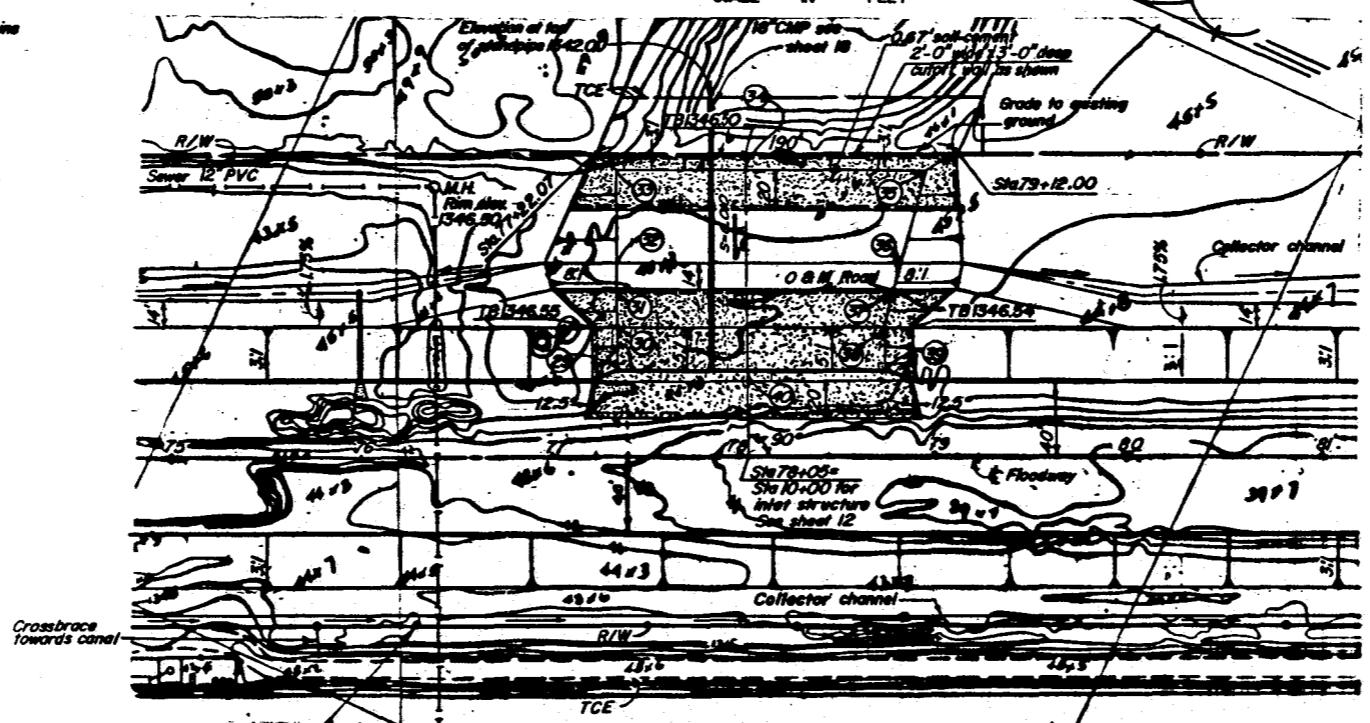
1. Utilities within the roadway r/w are shown on the plan and profile sheets.
2. Taper floodway slopes to match existing wingwalks at Adobe Road.
3. Typical pay limits for collection basins shown on section B, sheet 13.



MAJOR INLET STRUCTURES NORTH AND SOUTH OF ADOBE ROAD AND CHANNEL TRANSITION THROUGH BOX CULVERT

NOTE
 Offset distances are perpendicular to the centerline of this structure unless otherwise noted.

- ⑰ Sta 10+44.00, 70.0'lt. Inv 1337.05
- ⑱ Sta 10+68.50, 70.0'lt. Inv 1341.95
- ⑲ Sta 10+88.50, 70.0'lt. Inv 1342.15
- ⑳ Sta 11+02.50, 70.0'lt. Inv 1342.29
- ㉑ Sta 11+48.00, 70.0'lt. Inv 1342.75
- ㉒ Sta 11+60.00, 0.0'rt. Inv 1342.75
- ㉓ Sta 11+48.00, 92.0'rt. Inv 1342.75
- ㉔ Sta 11+02.50, 80.0'rt. Inv 1342.29
- ㉕ Sta 10+88.50, 75.0'rt. Inv 1342.15
- ㉖ Sta 10+68.50, 70.0'rt. Inv 1341.95
- ㉗ Sta 10+44.00, 70.0'rt. Inv 1337.05
- ㉘ Sta 10+44.00, 0.0'rt. Inv 1337.05



MAJOR INLET STRUCTURE AT TRANSMISSION EASEMENT

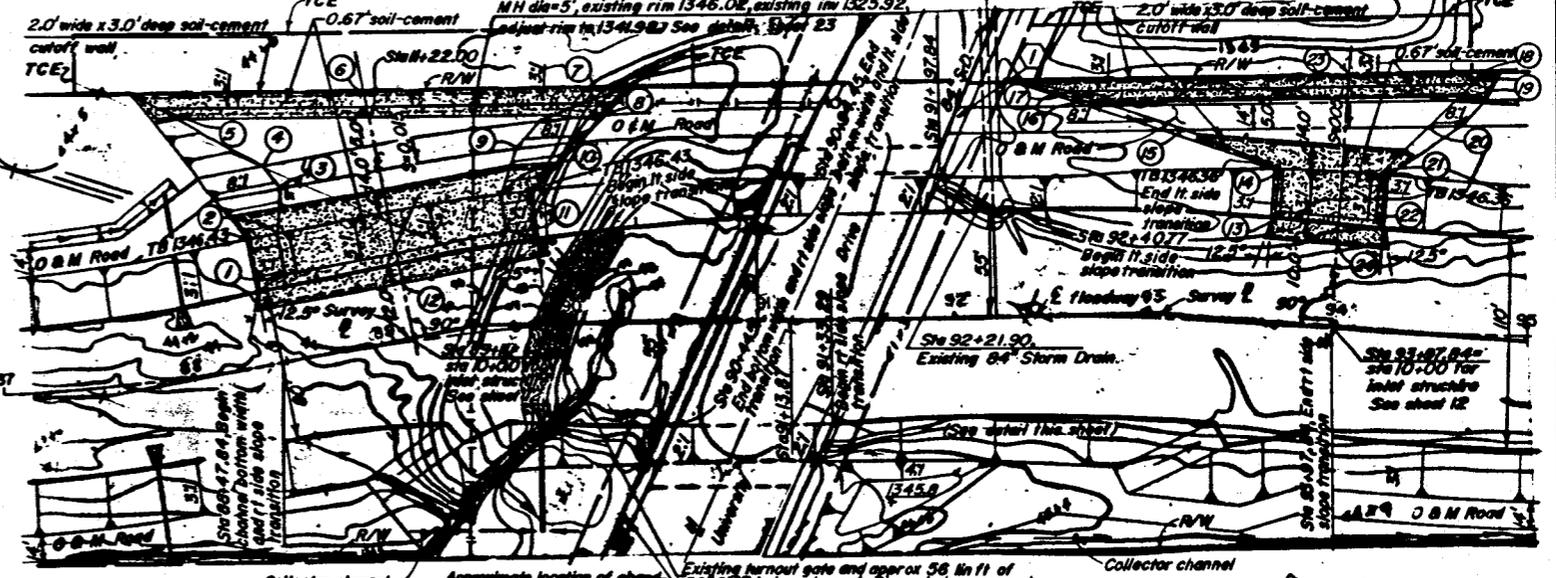
Approx sta 76+28.00 existing 36" concrete standpipe to be removed.

REVISED 2/88
 REVISED 3/88

SIDE INLETS AND FLOODWAY TRANSITION STA. 59+00.00 TO STA. 81+00.00 EAST MARICOPA FLOODWAY REACH 6 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS MARICOPA COUNTY, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed JOB / BGR	Date 3/2/88	Approved by _____	Title _____
Drawn J.J.H.	Sheet 22/28	Checked J.S.S.	Drawing No. 85015-AZ-CH

POINT LOCATIONS FOR INLET NORTH OF UNIVERSITY DRIVE

- | | | |
|--|---|--|
| ① Sta 10+47.00, 60.00' ft, inv 1336.93 | ⑤ Sta 11+46.00, 108.00' ft, inv 1342.02 | ⑨ Sta 10+91.00, 73.00' ft, inv 1341.58 |
| ② Sta 10+68.00, 60.00' ft, inv 1341.13 | ⑥ Sta 11+36.00, 0.00' ft, inv 1344.79 | ⑩ Sta 10+67.00, 60.00' ft, inv 1341.13 |
| ③ Sta 10+90.50, 53.00' ft, inv 1341.47 | ⑦ Sta 11+04.50, 108.00' ft, inv 1342.02 | ⑪ Sta 10+47.00, 60.00' ft, inv 1336.93 |
| ④ Sta 11+04.50, 60.00' ft, inv 1341.68 | ⑧ Sta 11+02.00, 89.00' ft, inv 1341.84 | ⑫ Sta 10+31.00, 0.00' ft, inv 1336.93 |



MAJOR INLET STRUCTURES NORTH AND SOUTH OF UNIVERSITY DRIVE AND CHANNEL TRANSITION THROUGH UNIVERSITY DRIVE BRIDGE

- NOTES**
- Utilities within the roadway r/w are shown on the plan and profile sheets.
 - Stationing is referenced to E of floodway.
 - Offset distances are perpendicular to the centerline of this structure.
- ① Sawcut and remove existing curb, gutter and sidewalk. Construct driveway entrance, see detail sheet 23.
- Typical pay limits for collection basin shown on section B, sheet 13.



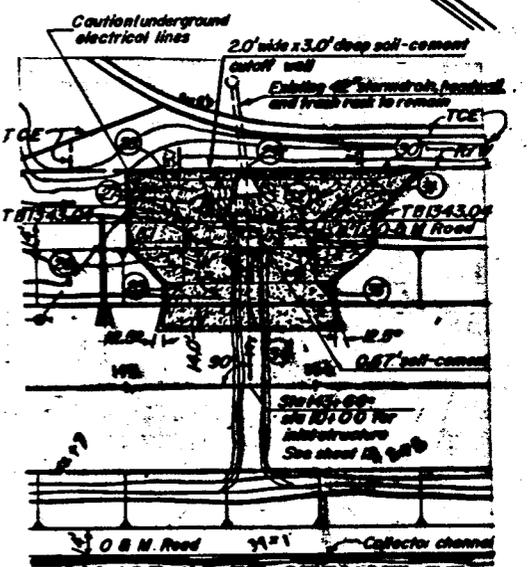
POINT LOCATIONS FOR INLET SOUTH OF UNIVERSITY DRIVE

- | | |
|--|---------------------------------------|
| ⑬ Sta 10+59.29, 30.5' ft, inv 1336.06 | ⑲ Sta 11+21.00, 57.0' ft, inv 1345.09 |
| ⑭ Sta 10+63.50, 30.5' ft, inv 1344.93 | ⑳ Sta 11+07.00, 44.0' ft, inv 1345.09 |
| ⑮ Sta 11+07.00, 64.0' ft, inv 1345.09 | ㉑ Sta 10+63.50, 19.5' ft, inv 1344.93 |
| ⑯ Sta 11+21.00, 122.5' ft, inv 1345.09 | ㉒ Sta 10+59.29, 19.5' ft, inv 1336.06 |
| ⑰ Sta 11+30.00, 148.5' ft, inv 1345.16 | ㉓ Sta 11+30.00, 0.0' ft, inv 1345.16 |
| ⑱ Sta 11+30.00, 66.0' ft, inv 1345.16 | ㉔ Sta 10+55.00, 0.0' ft, inv 1336.06 |

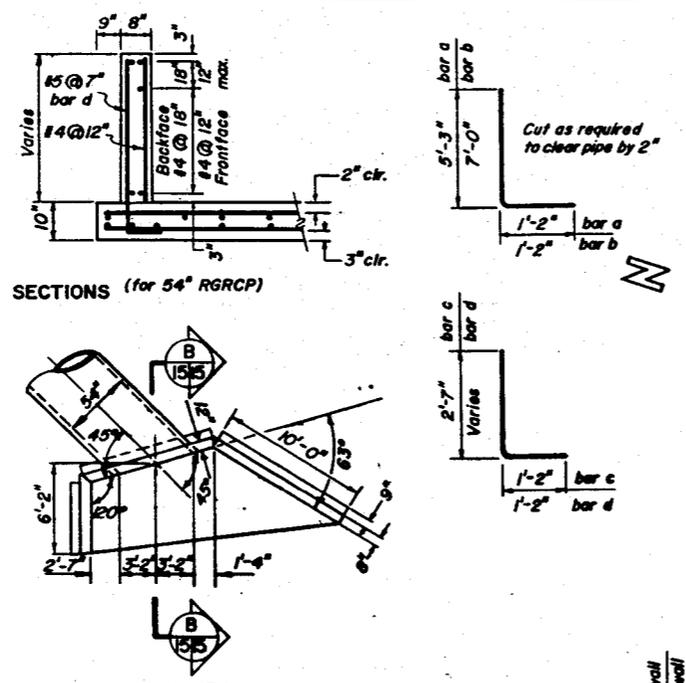
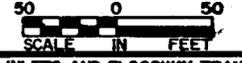
POINT LOCATIONS FOR INLET AT STA 143+66.00

- | | |
|---------------------------------------|---------------------------------------|
| ⑳ Sta 10+55.18, 35.0' ft, inv 1333.29 | ㉕ Sta 11+10.00, 70.0' ft, inv 1339.40 |
| ㉑ Sta 10+72.94, 35.0' ft, inv 1339.21 | ㉖ Sta 10+65.94, 35.0' ft, inv 1339.20 |
| ㉒ Sta 10+65.94, 35.0' ft, inv 1339.20 | ㉗ Sta 10+72.94, 35.0' ft, inv 1339.21 |
| ㉓ Sta 10+72.94, 35.0' ft, inv 1339.21 | ㉘ Sta 10+55.18, 35.0' ft, inv 1333.29 |
| ㉔ Sta 10+55.18, 35.0' ft, inv 1333.29 | ㉙ Sta 10+43.57, 0.0' ft, inv 1333.29 |

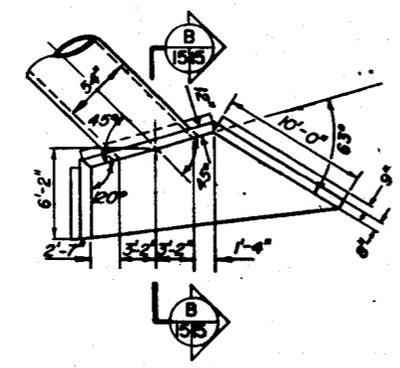
NOTE
 Offset distances are perpendicular to the centerline of the inlet structures.



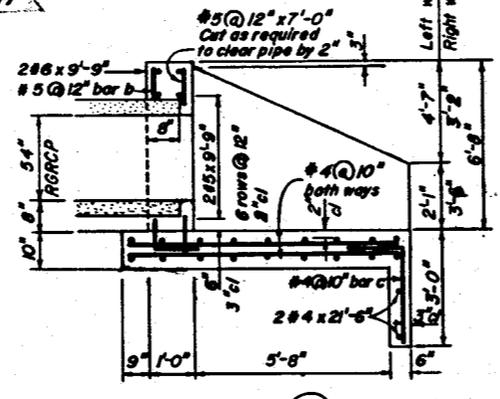
MAJOR INLET STRUCTURE AT STA 143+66.00



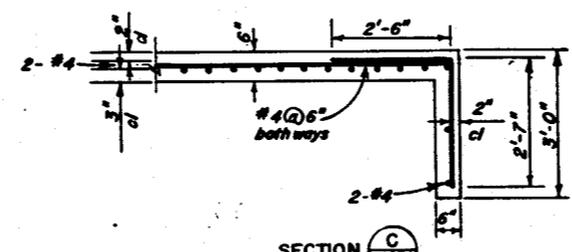
WINGWALL SECTIONS (for 54\"/>



PLAN VIEW (for 54\"/>



HEADWALL DETAIL NTS



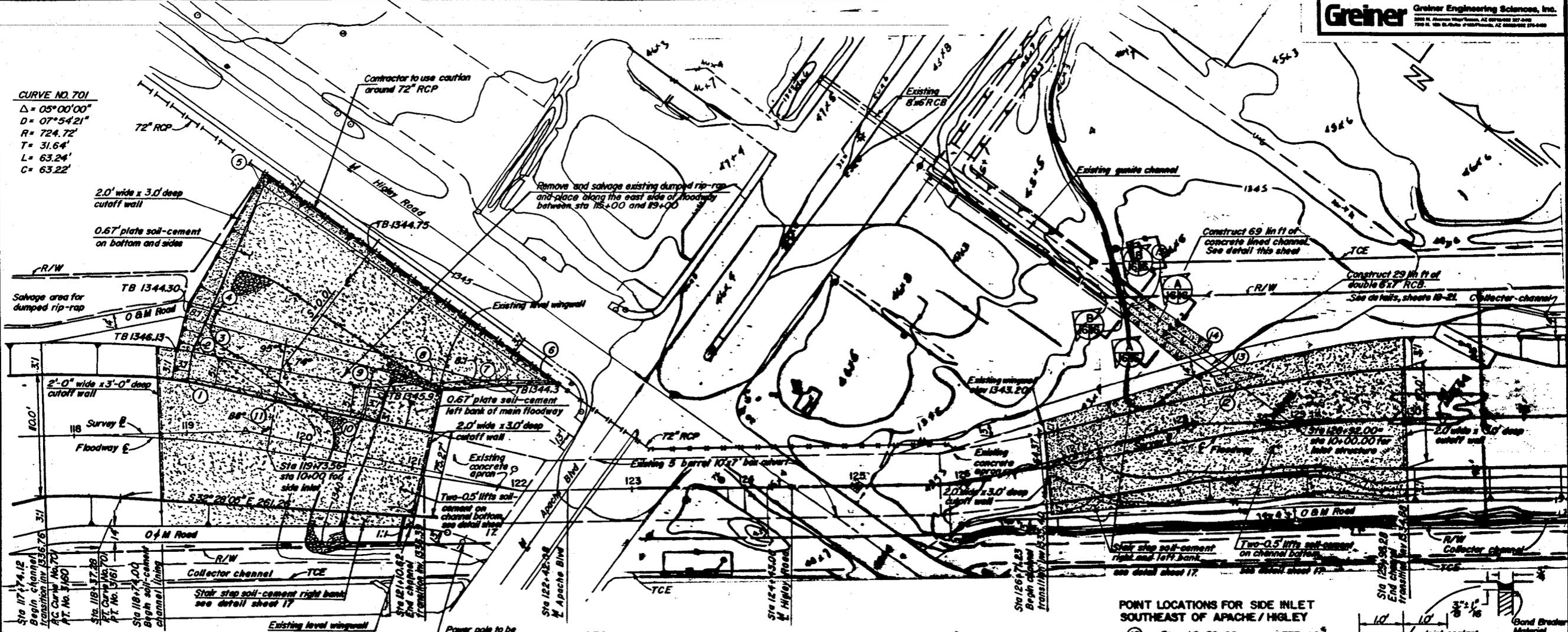
SECTION C CUT-OFF WALL DETAIL NTS

SIDE INLETS AND FLOODWAY TRANSITION
 STA. 87+00.00 TO STA. 95+00.00 AND STA. 143+66.00
EAST MARICOPA FLOODWAY REACH 6
 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
 MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

Designed: R.D.B. R.L.S.	Date: 2/2/82	Approved: _____
Drawn: J.H./A.S.	Title: _____	Checked: _____
Sheet: 15 of 25	Drawing No.: 85015-AZ-CH	

CURVE NO. 701
 $\Delta = 05^{\circ}00'00''$
 $D = 07^{\circ}54'21''$
 $R = 724.72'$
 $T = 31.64'$
 $L = 63.24'$
 $C = 63.22'$



POINT LOCATIONS FOR SIDE INLET NORTHWEST OF APACHE/HIGLEY

- ① Sta 10+49.58, 80.0'rl, Inv 1338.54
- ② Sta 10+73.53, 80.0'rl, Inv 1341.33
- ③ Sta 10+98.53, 86.0'rl, Inv 1341.58
- ④ Sta 10+80.53, 83.0'rl, Inv 1341.74
- ⑤ Sta 12+04.20, 111.0'rl, Inv 1342.84
- ⑥ Sta 12+04.20, 192.0'rl, Inv 1342.84
- ⑦ Sta 11+72.53, 146.0'rl, Inv 1341.74
- ⑧ Sta 11+42.53, 113.0'rl, Inv 1341.58
- ⑨ Sta 10+73.53, 80.0'rl, Inv 1341.33
- ⑩ Sta 10+49.58, 80.0'rl, Inv 1338.54
- ⑪ Sta 10+46.03, 0.0'rl, Inv 1338.54

NOTE
 Utilities within the roadway r/w are shown on the plan and profile sheets.
 Typical pay limits for collection basins shown on section B, sheet 13.

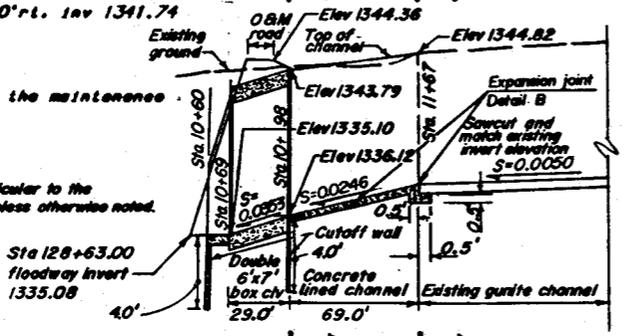
POINT LOCATIONS FOR SIDE INLET SOUTHEAST OF APACHE/HIGLEY

- ⑫ Sta 10+60.00, Inv 1338.10
- ⑬ Sta 10+69.00, Inv 1338.10
- ⑭ Sta 10+98.00, Inv 1338.12
- ⑮ Sta 11+67.00, Inv 1337.02

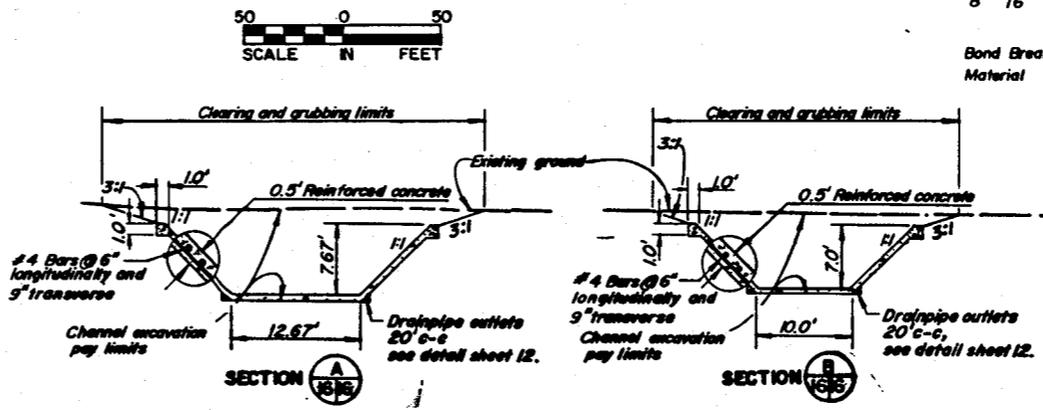
MAJOR INLET STRUCTURES, FLOODWAY TRANSITION AND EROSION PROTECTION AT APACHE BLVD AND HIGLEY RD

Offset is parallel to the maintenance road.

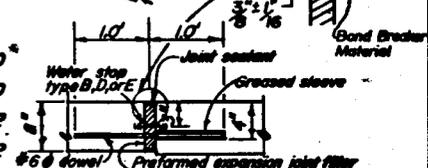
NOTE
 Offset distances are perpendicular to the centerline of this structure unless otherwise noted.



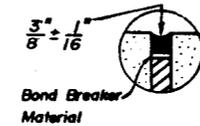
PROFILE FOR DOUBLE 6'x7' BARREL BOX CULVERT AND CHANNEL LINING



CONCRETE LINED CHANNEL DETAIL



EXPANSION JOINT DETAIL A



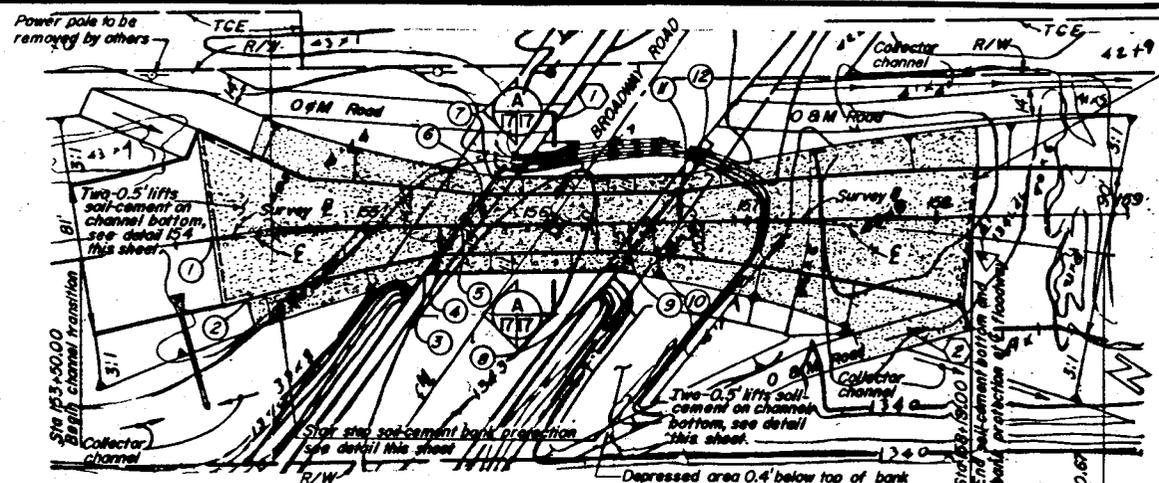
EXPANSION JOINT DETAIL B

SIDE INLETS AND FLOODWAY TRANSITION
 STA 117+74.12 TO STA 131+00.00
EAST MARICOPA FLOODWAY REACH 6
 BUCKHORN-MESA-A-APACHE JUNCTION-GILBERT WATERSHEDS
 MARICOPA COUNTY, ARIZONA

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

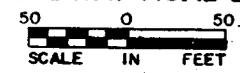
Designed: <i>RAE / BAA</i>	Date: <i>3/22/87</i>	Approved by: _____
Drawn: <i>J.S.H.</i>	Title: _____	_____
Traced: _____	Sheet: <i>16</i>	Drawing No. _____
Checked: <i>A.S.S.</i>	No. of Sheets: <i>25</i>	85015-AZ-CH

REVISED 3/88



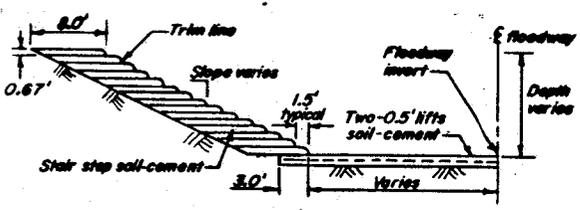
FLOODWAY TRANSITION AND EROSION PROTECTION AT BROADWAY ROAD BRIDGE

NOTE
 Utilities within the roadway r/w are shown on the plan and profile sheets.



- ① Sta 154+20.00 at bottom of floodway, begin soil cement lining.
- ② Sta 154+32.00 at banks of floodway, begin soil cement lining.
- ③ Sta 155+30.37 at top of right bank, end soil cement lining and begin concrete lining.
- ④ Sta 155+38.16 at bottom of right bank, end soil cement lining and begin concrete lining.
- ⑤ Sta 155+50.00 at centerline of floodway, end soil cement lining and begin concrete lining.
- ⑥ Sta 155+61.84 at bottom of left bank, end soil cement lining and begin concrete lining.
- ⑦ Sta 155+69.26 at top of left bank, end soil cement lining and begin concrete lining.
- ⑧ Sta 156+31.09 at top of right bank, end concrete lining and begin soil cement lining.
- ⑨ Sta 156+39.50 at bottom of right bank, end concrete lining and begin soil cement lining.
- ⑩ Sta 156+51.34 at centerline of floodway, end concrete lining and begin soil cement lining.
- ⑪ Sta 156+63.18 at bottom of left bank, end concrete lining and begin soil cement lining.
- ⑫ Sta 156+70.56 at top of left bank, end concrete lining and begin soil cement lining.

- ① Sawcut and remove existing curb, gutter, and sidewalk. Construct driveway entrance. See detail sheet 23.
- ② Ramp to be trimmed to grade after placement of soil-cement.

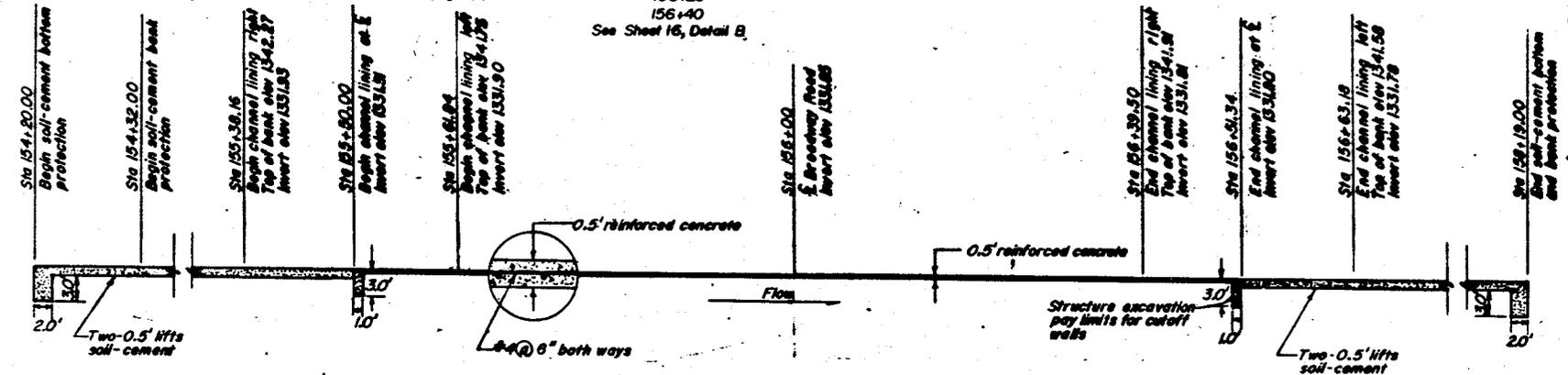


TYPICAL SECTION STAIR STEP SOIL-CEMENT EROSION PROTECTION FOR MAIN FLOODWAY

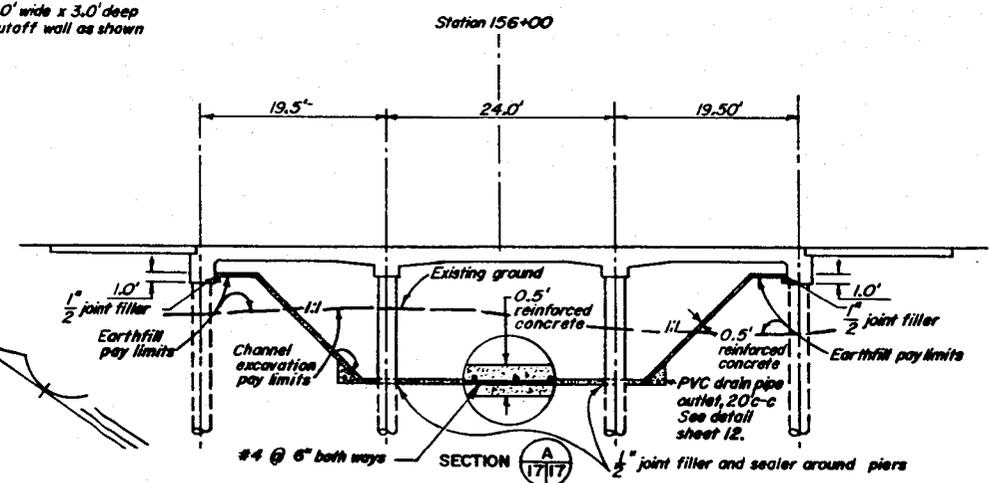
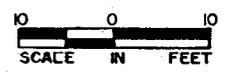


CHANNEL LINING EXPANSION JOINT LOCATIONS

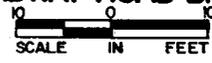
- 155+60
 - 155+80
 - 156+00
 - 156+20
 - 156+40
- See Sheet 16, Detail B.



LONGITUDINAL SECTION OF CONCRETE CHANNEL LINING ALONG C OF FLOODWAY AT BROADWAY ROAD BRIDGE

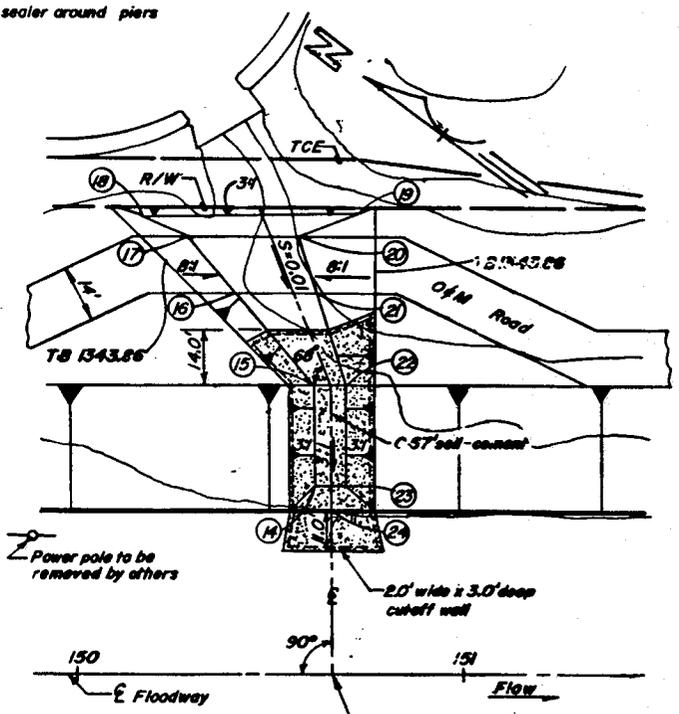


CHANNEL LINING DETAIL AT BROADWAY ROAD BRIDGE



- ⑭ Sta 10+46.43, 4.0' ft. Inv 1332.44
- ⑮ Sta 10+72.14, 4.0' ft. Inv 1341.01
- ⑯ Sta 10+98.14, 15.0' ft. Inv 1341.27
- ⑰ Sta 11+14.14, 20.0' ft. Inv 1341.43
- ⑱ Sta 11+19.40, 32.0' ft. Inv 1341.48
- ⑲ Sta 11+19.40, 26.0' ft. Inv 1341.48
- ⑳ Sta 11+14.14, 11.0' ft. Inv 1341.43
- ㉑ Sta 10+98.14, 8.0' ft. Inv 1341.27
- ㉒ Sta 10+72.14, 4.0' ft. Inv 1341.01
- ㉓ Sta 10+46.43, 4.0' ft. Inv 1332.44
- ㉔ Sta 10+40.70, 0.0' ft. Inv 1332.44

NOTE
 Offsets are parallel to the centerline of the floodway from the centerline of this structure.
 Typical pay limits for collection basins shown on section B, sheet 13.



MAJOR INLET STRUCTURE AT STA 150+66 NTS

SIDE INLETS AND FLOODWAY TRANSITION STA 150+00.00 TO STA 156+90.67 EAST MARICOPA FLOODWAY REACH 6 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

Designed: *RPE / RAG* Date: *2/27/88* Approved by: _____
 Drawn: *I.N.H. / AS* Title: _____
 Traced: _____
 Checked: *J.S.S.* No. 17 of 25 Drawing No. **85015-AZ-CH**

REVISED 3/88

SUMMARY OF INLET LOCATIONS FOR LEFT AND RIGHT SIDE COLLECTOR CHANNELS

Inlet No.	Station	Elev A	Elev B	Elev C	Elev D	H (ft)	Pipe length (ft)	Pipe slope (ft/ft)
1	Lt. 31+42.00	1345.75	1346.26	1339.51	1337.51	7.50	46.90	0.043
2	Rt. 32+13.00	1345.75	1346.26	1339.50	1337.50	7.50	46.90	0.043
3	Lt. 39+00.00	1344.65	1345.15	1338.40	1337.45	7.50	49.70	0.019
4	Rt. 39+68.00	1345.48	1345.98	1339.23	1337.43	7.50	46.30	0.039
5	Lt. 43+00.00	1344.60	1345.10	1338.35	1337.40	7.50	49.70	0.019
6	Rt. 45+68.00	1345.42	1345.92	1339.17	1337.37	7.50	46.30	0.039
7	Lt. 48+00.00	1344.50	1345.00	1338.25	1337.35	7.50	49.90	0.018
8	Rt. 51+68.00	1345.35	1345.85	1339.11	1337.31	7.50	46.30	0.039
9	Lt. 53+00.00	1344.50	1345.00	1338.25	1337.30	7.50	49.70	0.019
10	Rt. 57+87.00	1345.30	1345.80	1339.05	1337.25	7.50	46.30	0.039
11	Lt. 58+00.00	1344.45	1344.95	1338.20	1337.25	7.50	49.70	0.019
12	Rt. 61+00.00	1345.39	1345.89	1339.14	1337.22	7.50	46.30	0.041
13	Lt. 66+00.00	1344.42	1344.92	1338.17	1337.17	7.50	49.90	0.020
14	Rt. 69+48.00	1345.18	1345.68	1338.93	1337.13	7.50	46.30	0.039
15	Lt. 71+00.00	1344.32	1344.82	1338.07	1337.12	7.50	49.70	0.019
16	Rt. 74+38.00	1345.39	1345.89	1339.14	1337.07	7.50	46.30	0.045
17	Lt. 76+00.00	1344.32	1344.82	1338.07	1337.07	7.50	49.70	0.020
18	Rt. 81+68.00	1345.02	1345.52	1338.81	1337.01	7.50	46.30	0.039
19	Lt. 82+00.00	1342.70	1343.20	1337.95	1337.01	6.00	55.70	0.017
20	Rt. 87+68.00	1345.00	1345.50	1338.75	1336.95	7.50	46.30	0.039
21	Lt. 88+00.00	1342.99	1343.49	1338.24	1336.94	6.00	54.30	0.024
22	Rt. 89+80.00	1345.08	1345.58	1338.83	1336.92	7.50	38.90	0.049
23	Lt. 95+00.00	1344.11	1344.61	1337.86	1336.86	7.50	70.00	0.014
24	Rt. 97+78.90	1344.89	1345.39	1338.64	1336.84	7.50	46.30	0.039
25	Lt. 99+50.00	1344.05	1344.55	1337.81	1336.84	7.50	49.60	0.020
26	Rt. 103+78.90	1344.87	1345.37	1338.62	1336.82	7.50	46.30	0.039
27	Lt. 104+17.50	1343.96	1344.46	1337.71	1336.82	7.50	49.90	0.018
28	Lt. 108+85.00	1344.05	1344.55	1337.80	1336.80	7.50	49.90	0.020
29	Rt. 109+78.90	1344.85	1345.35	1338.60	1336.80	7.50	46.30	0.039
30	Lt. 113+32.50	1343.96	1344.46	1337.71	1336.78	7.50	49.60	0.019
31	Rt. 115+78.90	1344.82	1345.32	1338.57	1336.77	7.50	46.30	0.039
32	Lt. 121+00.00	1344.47	1344.97	1338.22	1336.42	7.50	28.40	0.053
33	Rt. 132+11.50	1342.68	1343.18	1336.43	1334.63	7.50	46.30	0.039
34	Lt. 132+50.00	1341.48	1341.98	1335.23	1334.63	7.50	50.70	0.014
35	Lt. 138+08.30	1340.98	1341.48	1334.73	1333.94	7.50	50.30	0.016
36	Rt. 138+11.50	1341.99	1342.49	1335.74	1333.94	7.50	46.30	0.039
37	Lt. 142+90.00	1340.50	1341.00	1334.25	1333.37	7.50	51.20	0.017
38	Rt. 144+11.50	1341.59	1342.09	1335.34	1333.24	7.50	47.20	0.044
39	Lt. 147+13.20	1340.67	1341.17	1334.42	1332.89	7.50	51.60	0.030
40	Rt. 150+11.50	1341.48	1341.98	1335.23	1332.54	7.50	49.00	0.085
41	Lt. 153+93.00	1341.38	1341.88	1335.13	1332.10	7.50	50.00	0.081
42	Lt. 159+15.00	1339.82	1340.32	1333.57	1331.49	7.50	52.80	0.039
43	Rt. 161+00.00	1340.87	1341.37	1334.62	1331.24	7.50	36.30	0.093
44	Lt. 152+37.00	1341.86	1342.36	1334.86	1332.28	7.50	62.50	0.041

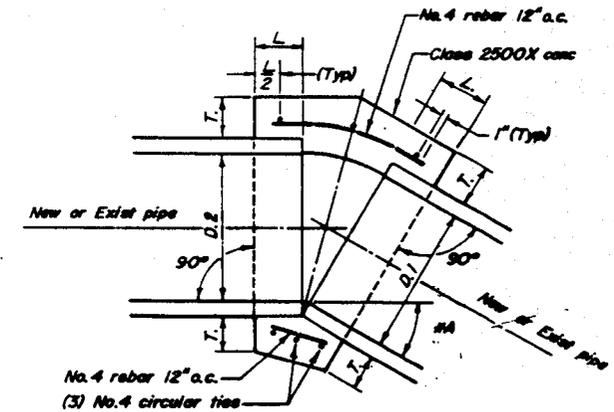
SUMMARY OF INVERT ELEVATIONS FOR LEFT AND RIGHT SIDE COLLECTOR CHANNELS

Station	Inv Elev	Remarks	Station	Inv Elev	Remarks
Lt. 30+40.99	1346.47	Inlet at Sta. 31+42.00	Rt. 97+82.90	1346.09	Inlet at Sta. 103+78.90
Rt. 30+40.99	1346.97	Inlet at Sta. 32+13.00	Lt. 102+00.00	1346.58	Grade break.
Lt. 32+93.00	1346.30	Inlet at Sta. 31+42.00	Lt. 102+00.00	1346.58	Inlet at Sta. 99+80.00
Rt. 33+68.00	1346.74	Inlet at Sta. 39+68.00	Lt. 103+82.50	1346.07	Inlet at Sta. 104+17.80
Lt. 35+25.00	1346.21	Inlet at Sta. 39+00.00	Rt. 103+82.50	1346.07	Inlet at Sta. 109+78.90
Rt. 39+71.60	1346.68	Inlet at Sta. 45+68.00	Lt. 106+35.00	1346.56	Grade break.
Lt. 40+50.00	1346.18	Grade break.	Lt. 106+35.00	1346.56	Inlet at Sta. 104+17.80
Lt. 45+50.00	1346.18	Inlets at Sta. 38+00.00 and Sta. 43+00.00	Rt. 109+82.50	1346.05	Inlet at Sta. 108+85.00
Rt. 45+71.60	1346.62	Grade break.	Lt. 111+35.00	1346.54	Grade break.
Lt. 50+50.00	1346.08	Inlets at Sta. 43+00.00 and Sta. 48+00.00	Rt. 115+82.50	1346.03	Inlet at Sta. 121+00.00
Rt. 51+71.60	1346.55	Inlet at Sta. 51+68.00	Lt. 116+00.00	1346.52	Inlet at Sta. 113+32.50
Lt. 53+50.00	1346.03	Grade break.	Rt. 126+11.50	1344.74	Inlet at Sta. 132+11.50
Rt. 57+71.60	1346.50	Inlet at Sta. 57+87.00	Lt. 130+00.00	1343.67	Inlet at Sta. 132+90.00
Lt. 58+50.00	1346.03	Grade break.	Rt. 132+15.10	1343.88	Inlet at Sta. 138+11.50
Rt. 57+71.60	1346.50	Inlets at Sta. 53+00.00 and Sta. 58+00.00	Lt. 135+00.00	1343.05	Grade break.
Lt. 60+00.00	1345.98	Inlet at Sta. 61+00.00	Rt. 138+15.10	1343.19	Inlets at Sta. 132+80.00 and Sta. 138+08.30
Rt. 63+68.00	1346.44	Inlet at Sta. 69+48.00	Lt. 140+50.00	1342.41	Grade break.
Lt. 63+00.00	1346.90	Inlet at Sta. 68+00.00	Rt. 144+15.10	1342.79	Inlets at Sta. 138+08.30 and Sta. 142+90.00
Rt. 69+71.60	1346.38	Grade break.	Lt. 145+50.00	1342.28	Grade break.
Lt. 73+80.00	1346.85	Inlets at Sta. 68+00.00 and Sta. 71+00.00	Lt. 149+43.00	1342.19	Inlets at Sta. 143+00.00 and Sta. 147+13.20
Rt. 74+41.60	1346.59	Grade break.	Rt. 150+15.10	1342.68	Inlet at Sta. 147+13.20
Lt. 77+00.00	1345.81	Inlet at Sta. 78+00.00	Rt. 158+55.00	1341.24	Inlet at Sta. 153+93.00
Rt. 79+12.00	1344.24	Inlet at Sta. 82+00.00	Lt. 157+00.00	1341.02	Inlet at Sta. 161+00.00
Lt. 81+71.60	1345.25	Inlet at Sta. 87+68.00	Rt. 161+30.00	1341.87	Inlet at Sta. 159+15.00
Lt. 85+00.00	1345.72	Grade break.			
Rt. 87+71.60	1346.20	Inlets at Sta. 82+00.00 and Sta. 88+00.00			
Rt. 91+78.90	1346.14	Inlet at Sta. 90+00.00			
Lt. 97+00.00	1346.60	Grade break.			
		Inlets at Sta. 95+00.00 and Sta. 99+80.00			

SUMMARY OF PIPE CONNECTIONS FROM ADJACENT SUBDIVISIONS

See sheet 22 for pay limits

Station	Diameter	US Inv	DS Inv	Length	Comments
Lt. 77+87.00	18" CMP	1338.18	1337.04	141 L.F.	Construct as per collector channel inlet detail this sheet. Install concrete collar and outlet apron.
Lt. 135+45.00	18" CMP	1343.00	1338.95	58 L.F.	Tie-in at east r/e and install concrete collar and outlet apron.



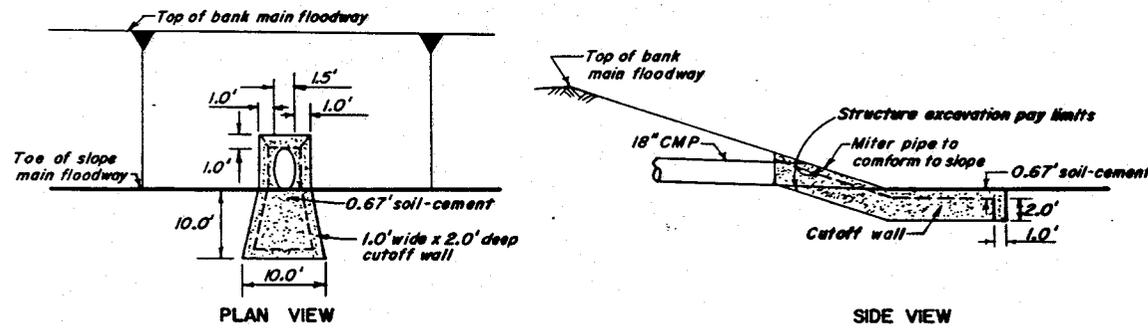
CONCRETE COLLAR DETAIL

- NOTES**
- Where pipes of different diameters are joined L and T should be those of the larger pipe. D = D.1 or D.2, whichever is greater.
 - The diameter of the circular ties shall be... Outside diameter of pipe + T.

Table

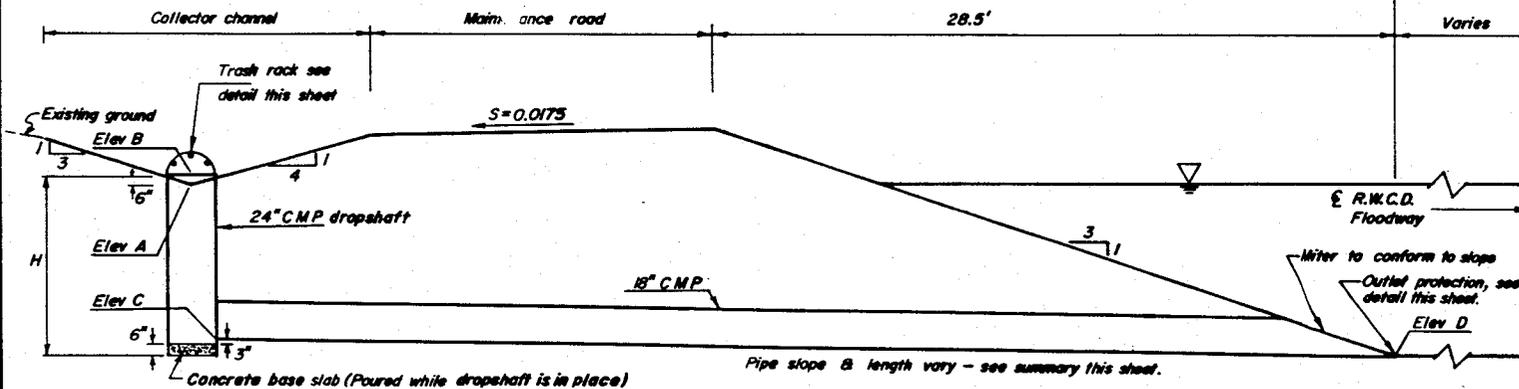
D.	L.	T.
18"	1.0'	5"
54"	1.5'	10"

*A = Angle of Deflection



OUTLET PROTECTION FOR COLLECTOR CHANNEL INLETS

NTS

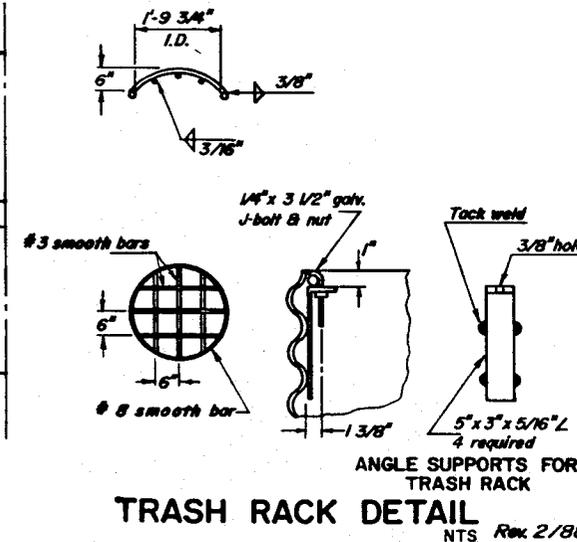


TYPICAL COLLECTOR CHANNEL INLET

Note Looking downstream for left side and looking upstream for right side. See sheet 22 for pay limits.

SCALE IN FEET

Trash rack steel and CMP to be galvanized after fabrication.



TRASH RACK DETAIL

NTS Rev. 2/88

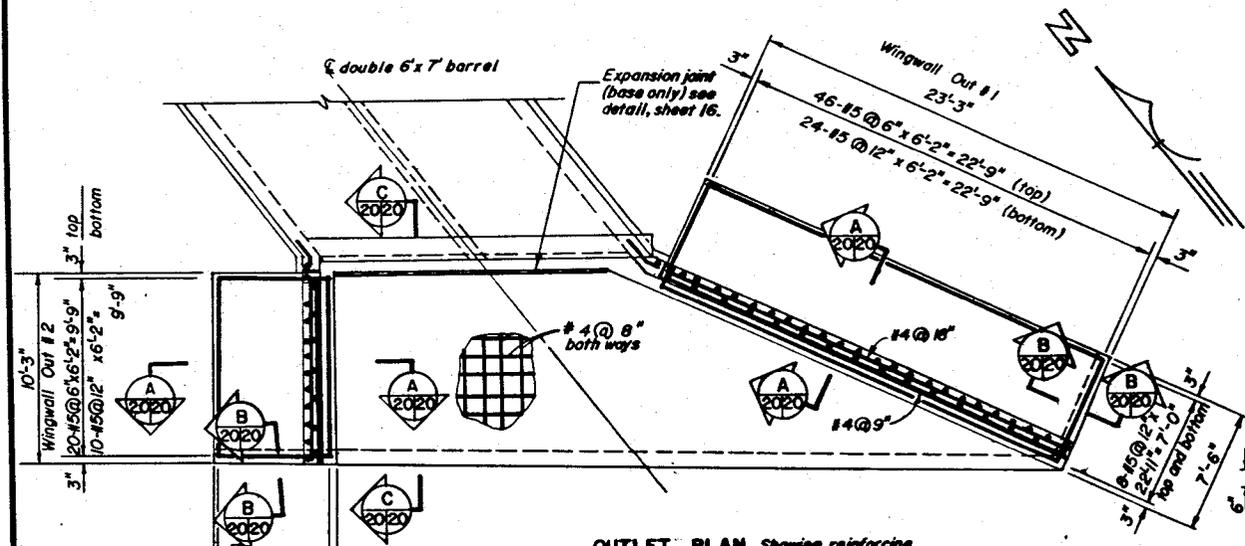
PIPE CONNECTION FOR ADJACENT SUBDIVISIONS AND COLLECTOR CHANNEL TABLES & MISC. DETAILS

EAST MARICOPA FLOODWAY REACH 6
BUCKHORN - MESA - APACHE JUNCTION - GILBERT WATERSHEDS
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

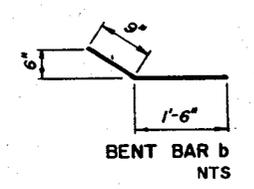
Designed: RDB / EAB
Drawn: A5 / J.J.H.
Checked: NBS

Date: 3/10/88
Title: 22387
Sheet: 18 of 25
Drawing No.: 85015-AZ-GH

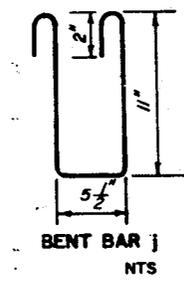


OUTLET PLAN. Showing reinforcing

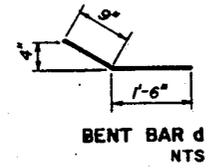
NOTE
Wingwalls not to scale for clarity.



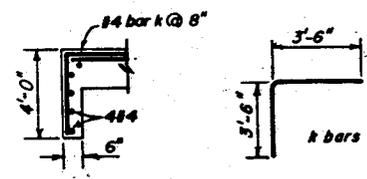
BENT BAR b
NTS



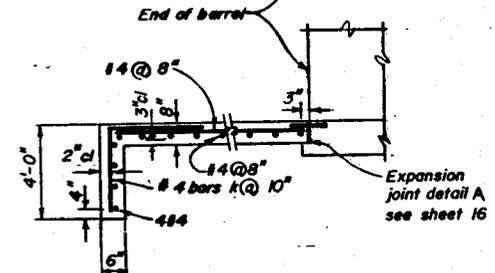
BENT BAR j
NTS



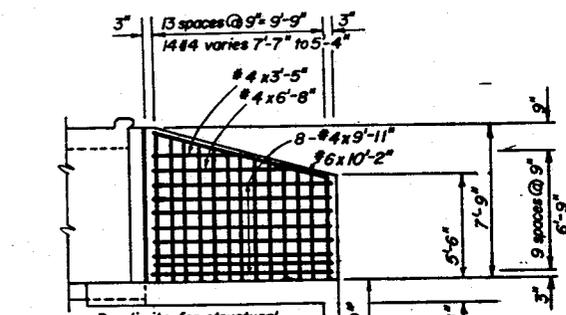
BENT BAR d
NTS



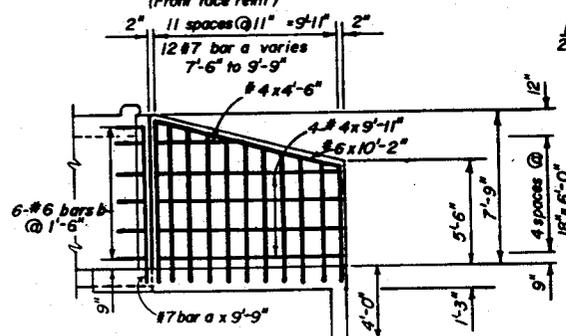
SECTION B
NTS
BENT BAR k
NTS



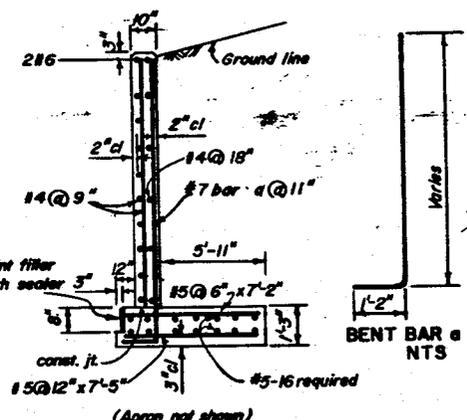
SECTION C
NTS
BENT BAR l
NTS



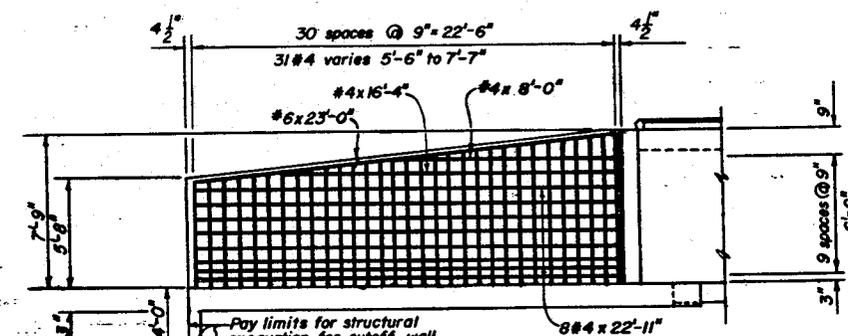
WINGWALL OUT #2 ELEVATION
(Front face reinf)



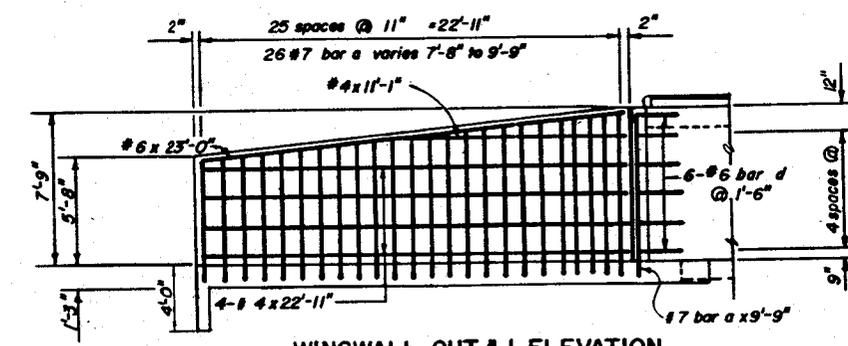
WINGWALL OUT #2 ELEVATION
(Back face reinf)



SECTION A
NTS

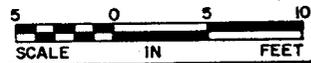


WINGWALL OUT #1 ELEVATION
(Front face reinf)

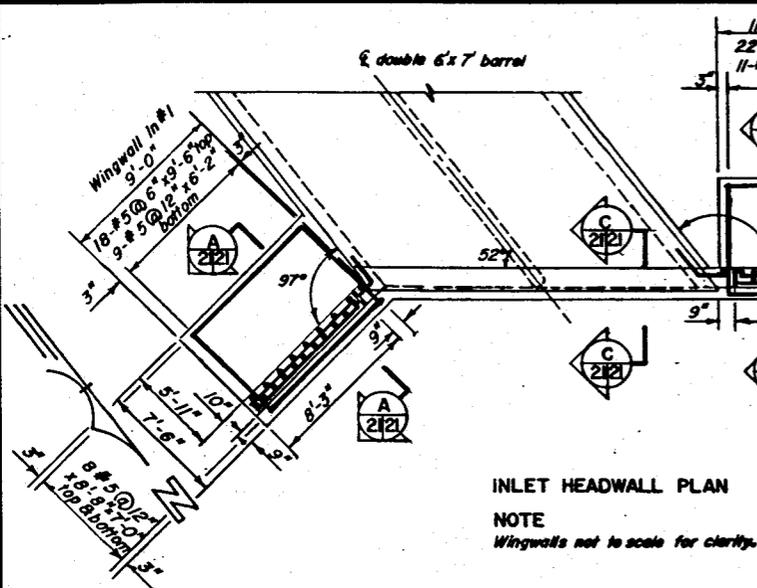


WINGWALL OUT #1 ELEVATION
(Back face reinf)

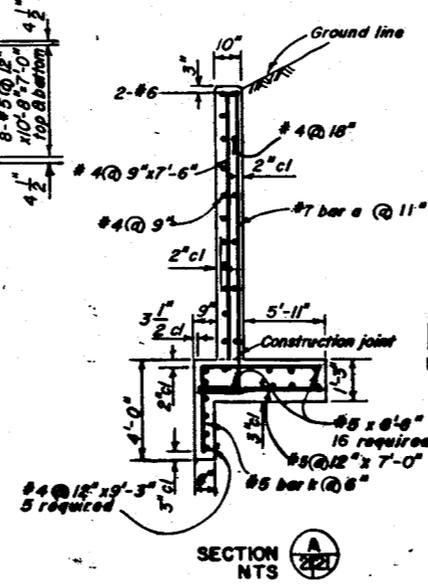
DOUBLE 6'x7' BOX CULVERT DETAILS



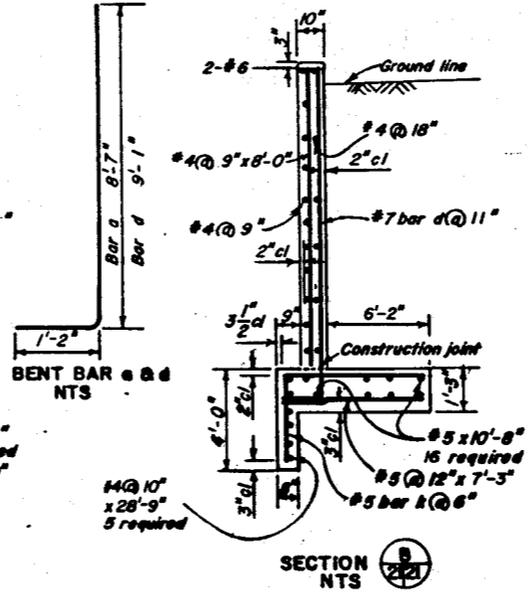
STRUCTURAL DETAILS FOR DOUBLE 6'x7' BOX CULVERT		EAST MARICOPA FLOODWAY REACH 6	
BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS		MARICOPA COUNTY, ARIZONA	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed: <i>RLE</i>	Date: 2-27-87	Approved by:	
Drawn: <i>L.J.H./AS</i>	Title: 22x187	Checked:	
Sheet: 20	Drawing No. 85015-AZ-CH	of 25	



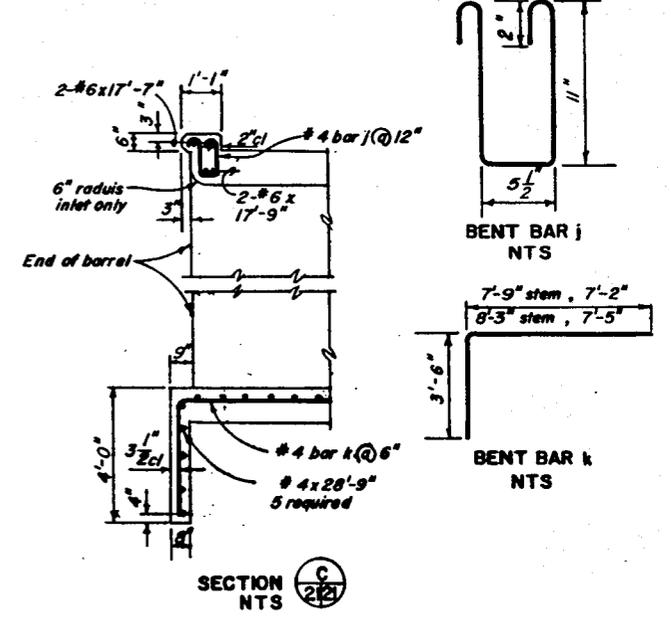
INLET HEADWALL PLAN
 NOTE
 Wingwalls not to scale for clarity.



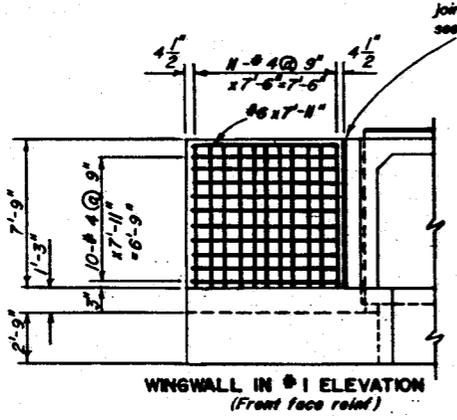
SECTION A
 NTS



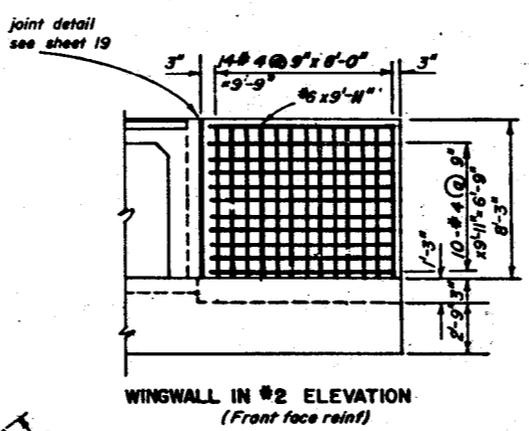
SECTION B
 NTS



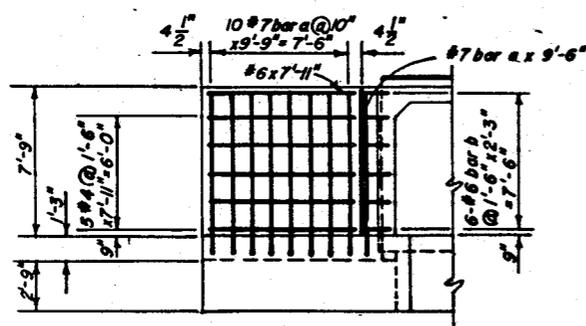
SECTION C
 NTS



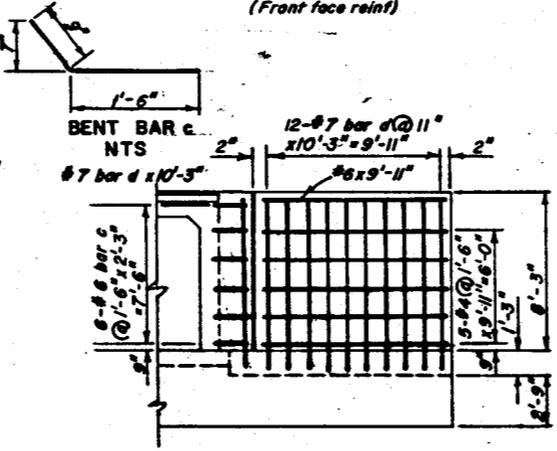
WINGWALL IN #1 ELEVATION
 (Front face reinf)



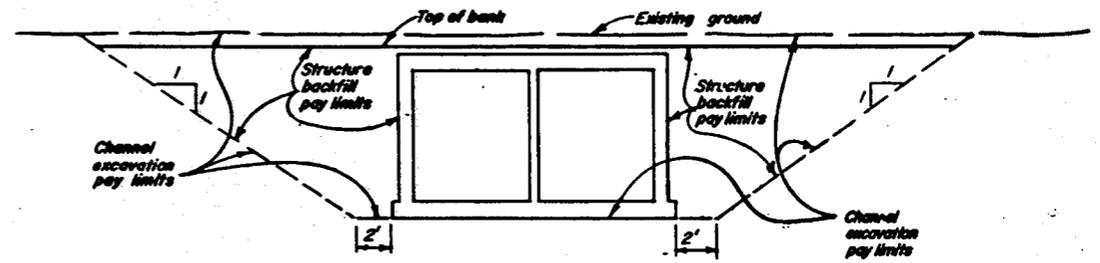
WINGWALL IN #2 ELEVATION
 (Front face reinf)



WINGWALL IN #1 ELEVATION
 (Back face reinf)

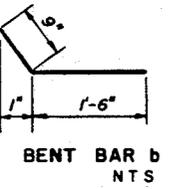


WINGWALL IN #2 ELEVATION
 (Back face reinf)



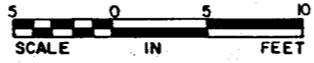
EXCAVATION AND BACKFILL PAY LIMITS
 NTS

NOTE
 Space bar j so as not to interfere with handrail connection.

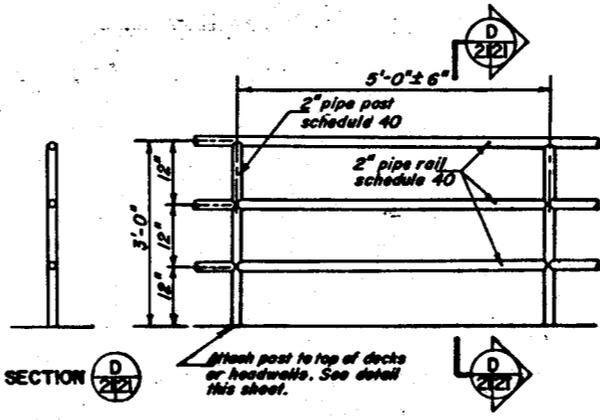


BENT BAR b
 NTS

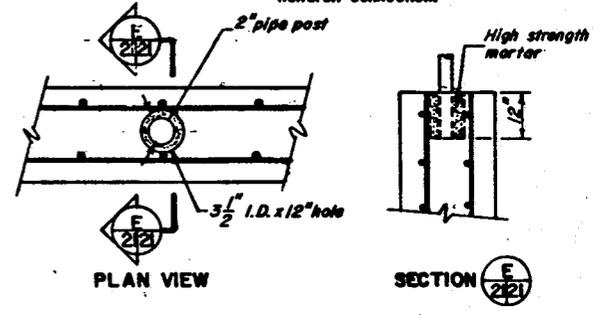
DOUBLE 6'x7' BOX CULVERT DETAILS



NOTE
 Railings and posts will be fabricated from welded or seamless members of the size shown.

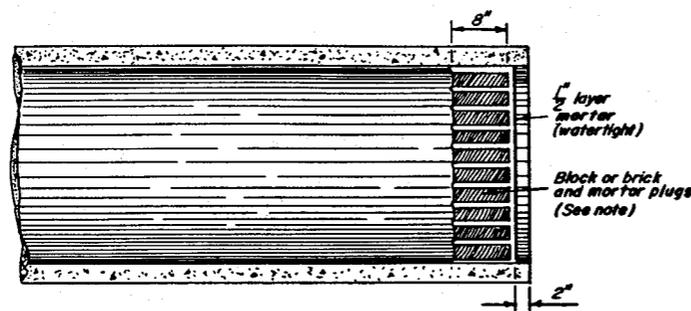


ELEVATION OF DETAIL
PIPE HANDRAIL DETAIL
 NTS



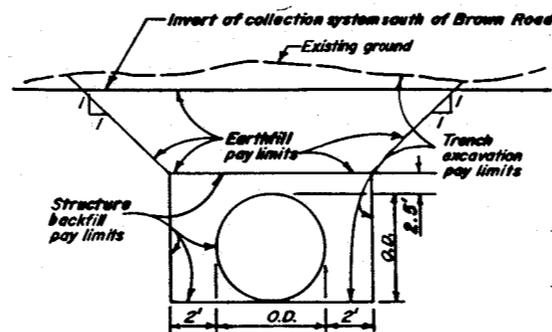
PIPE HANDRAIL CONNECTION DETAIL
 NTS

STRUCTURAL DETAILS FOR DOUBLE 6' x 7' BOX-CULVERT	
EAST MARICOPA FLOODWAY REACH 6	
BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS	
MARICOPA COUNTY, ARIZONA	
U. S. DEPARTMENT OF AGRICULTURE	
SOIL CONSERVATION SERVICE	
Designed: R.D.B. R.L.E.	Date: 2/27/87
Drawn: L.H.H.	Title: 2/29/87
Checked: J.S.S.	Sheet: 21
Project: 85015-AZ-CH	Scale: 1/4" = 1'-0"

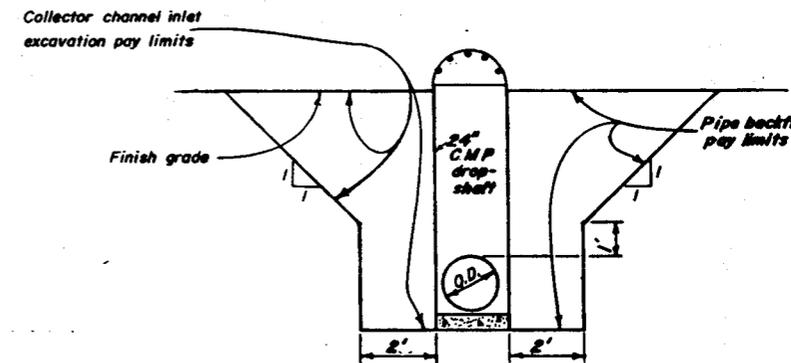


PLUG DETAIL FOR ABANDONED PIPE
 NTS

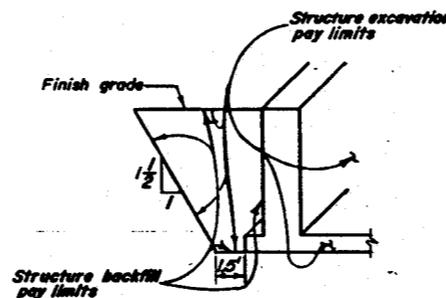
- NOTES**
1. If depth of cover is less than 5' or greater than 10' increase plug thickness minimum of 4".
 2. See sheet 13 for location.



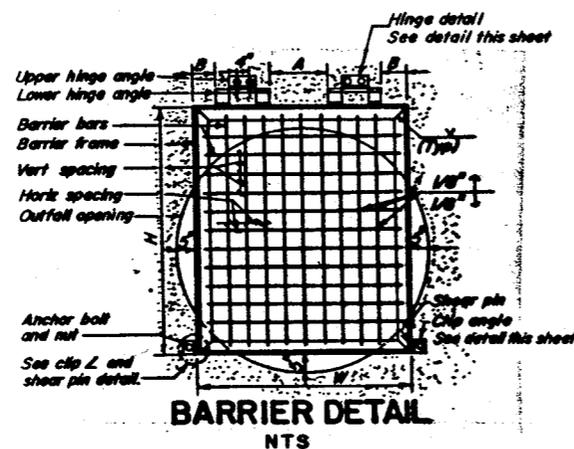
EXCAVATION AND BACKFILL PAY LIMITS FOR 54" CONCRETE PIPE
 NTS
 See sheet 13 for location



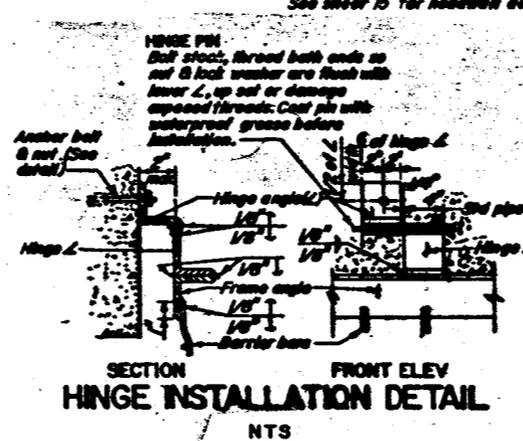
EXCAVATION AND BACKFILL PAY LIMITS FOR COLLECTOR CHANNEL INLETS AND PIPE CONNECTIONS FROM ADJACENT SUBDIVISIONS
 NTS
 See sheet 18 for collector channel inlet details



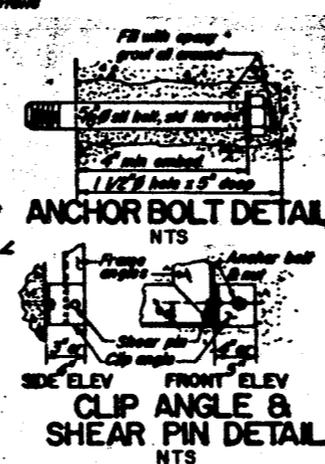
END VIEW OF WINGWALL
EXCAVATION AND BACKFILL PAY LIMITS FOR A 54" HEADWALL AND WINGWALLS
 NTS
 See sheet 15 for headwall details



BARRIER DETAIL
 NTS



SECTION HINGE INSTALLATION DETAIL
 NTS



ANCHOR BOLT DETAIL
 NTS
CLIP ANGLE & SHEAR PIN DETAIL
 NTS

- NOTES FOR BARRIER DETAILS**
1. All shear pin angles shall fit snug and truly face to face. Cover with waterproof grease prior to installation of pin.
 2. Galvanize all ferrous parts after fabrication.
 3. The shear pin holes in the angle shall be drilled for a tight fit of the shear pin.
 4. The aluminum shear pin material will be furnished by the contractor.
 5. Frame, and hinge angles shall have the outstanding legs cut for outside.
 6. All anchor bolts shall be 5/8" diameter bolts embedded 4" (minimum) into epoxy grout.
 7. All shear pins are to be passed both ends after installation.
 8. Shear pin material shall be commercially pure aluminum wire, alloy 1100, temper O.
 9. See barrier schedule this sheet for variable dimensions.
 10. Cover all movable contact surfaces with a coat of waterproof grease prior to installation.

STATION	SIZE OF OUTFALL CONDUIT	FRAME ANGLES	SHEAR PIN CLIP ANGLES	SHEAR PINS	ANCHOR BOLTS	HINGE PINS	HINGE ANGLES	HINGE STANDARD PIPE	HINGE TO FRAME WELDS	ANGLE TO ANGLE WELDS	BARRIER BARS PLAN	NO. OF EQUAL BARRIER BAR SPACES (HORIZ)	NO. OF EQUAL BARRIER BAR SPACES (VERT)	H OUT TO OUT FRAME ANGLES	W OUT TO OUT FRAME ANGLES	A	B
36+02.00	54"	3x3x7/16	5x3x1/4	2-1/8"	5/8"	3/4"	2 1/2" x 2 1/2" x 1/4"	1"	1/8"	1/8"	1/2"	6	8	54°	44°	5'	5'

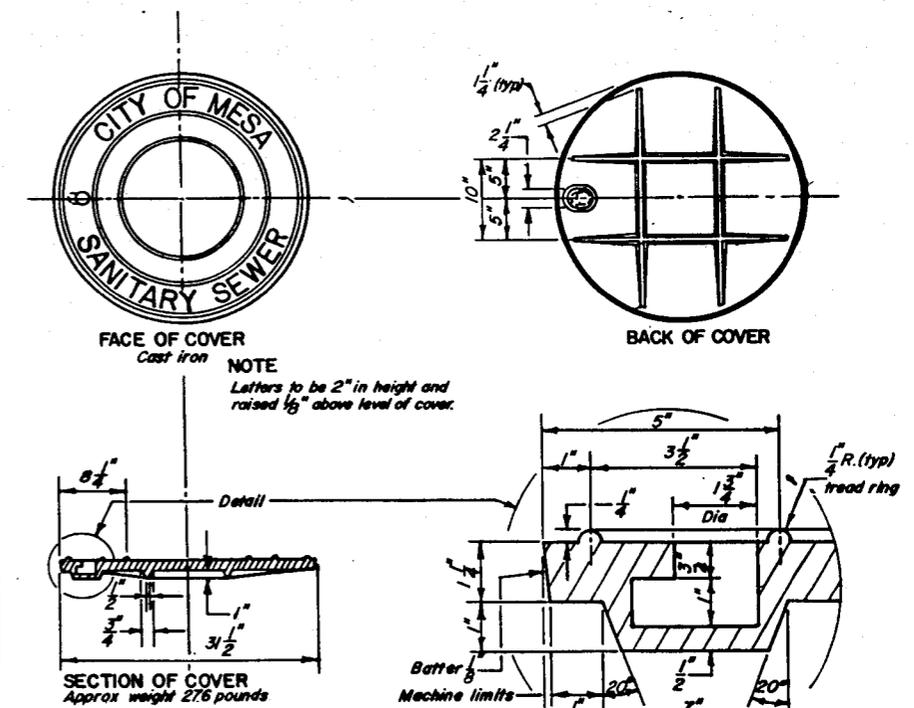
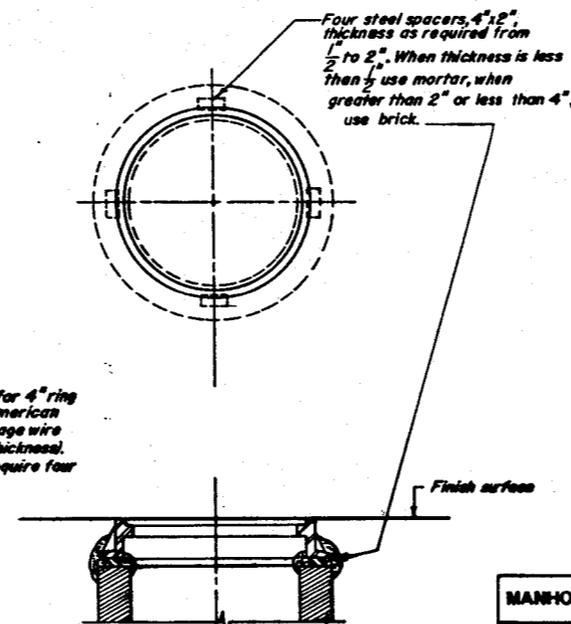
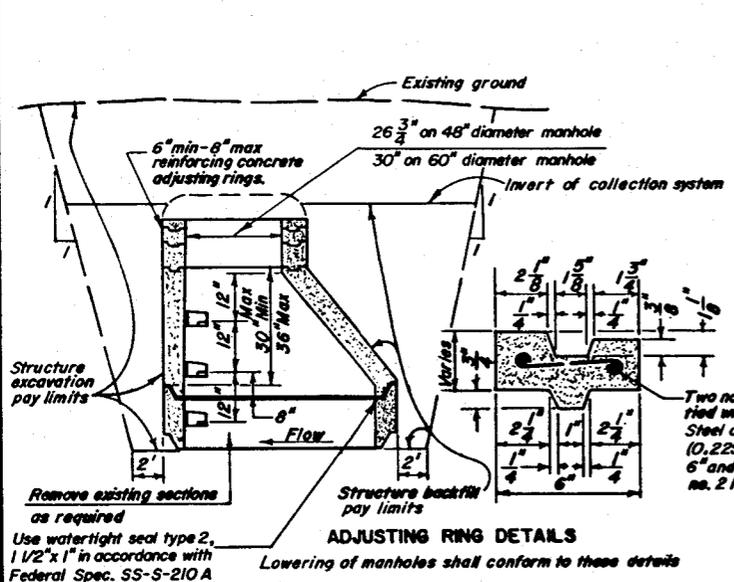
BARRIER SCHEDULE (All dimensions are in inches)

BARRIER DETAIL, PLUG FOR ABANDONED PIPE, PAY LIMITS FOR 54" CONCRETE PIPE
EAST MARIOPA FLOODWAY REACH 6
 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS
 MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Date: _____
 Designed: RRB/DBB 2/22/88 Approved by: _____
 Drawn: I.J.H. 2/25/88 Title: _____
 Traced: _____
 Checked: MS skb no. 22 Drawing No. _____
 of 25 85015-AZ-CH

Rev. 2/88

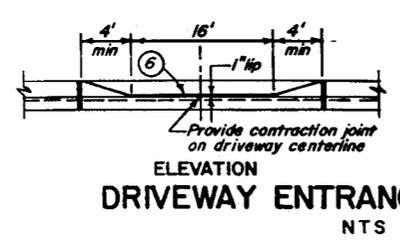
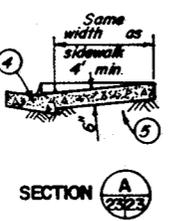
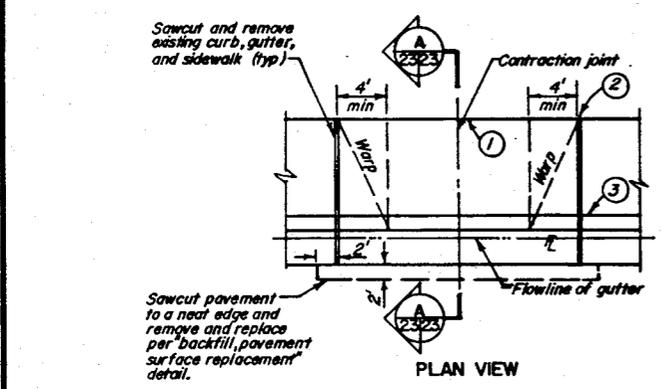


ADJUSTING RING DETAILS
 Lowering of manholes shall conform to these details

NOTES

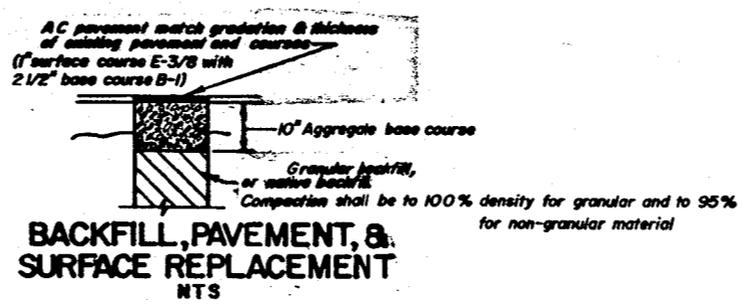
1. Pre-cast, reinforced manhole sections shall be manufactured in accordance with A.S.T.M. C-478.
2. Manhole steps shall be installed at site of manhole section manufacture. Steps shall be mounted with 2 to 1 sand/cement dry pack mortar.

SEWER MANHOLE ADJUSTMENT DETAILS
 NTS

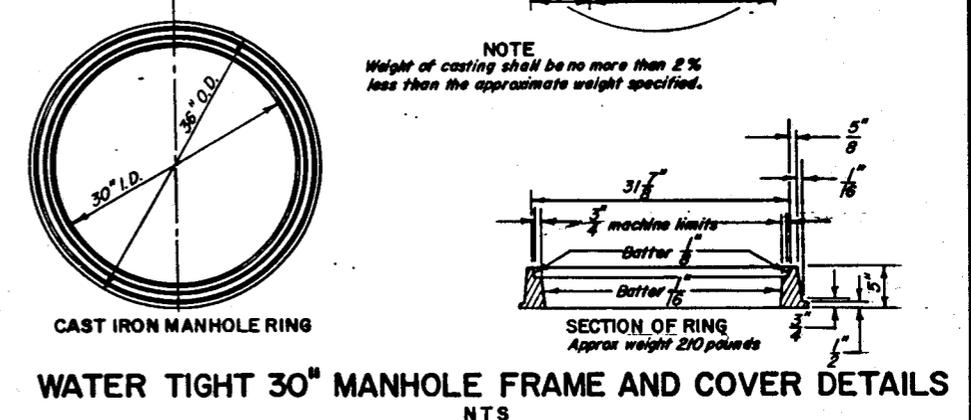


DRIVEWAY ENTRANCE DETAILS
 NTS

- NOTES**
- 1 Back of existing sidewalk.
 - 2 1/2" expansion joint through curb and gutter.
 - 3 Back of curb - construction joint or score mark.
 - 4 Class 2500X concrete.
 - 5 Subgrade preparation compaction to 95% density.
 - 6 Depressed curb.



BACKFILL, PAVEMENT, & SURFACE REPLACEMENT
 NTS

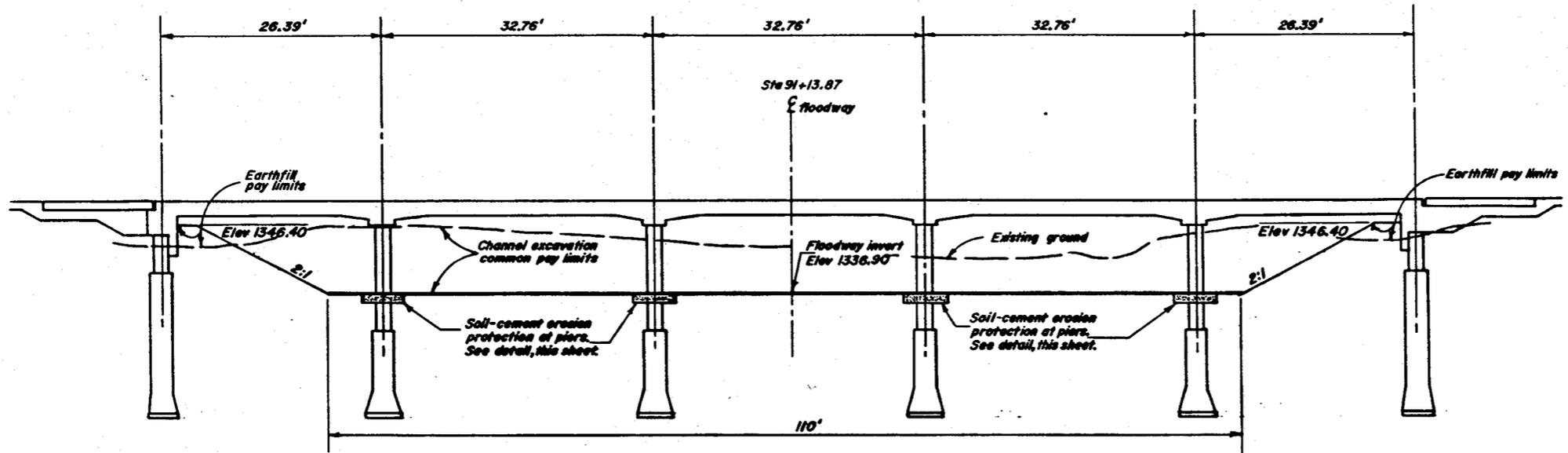


**WATER TIGHT 30\"/>
 NTS**

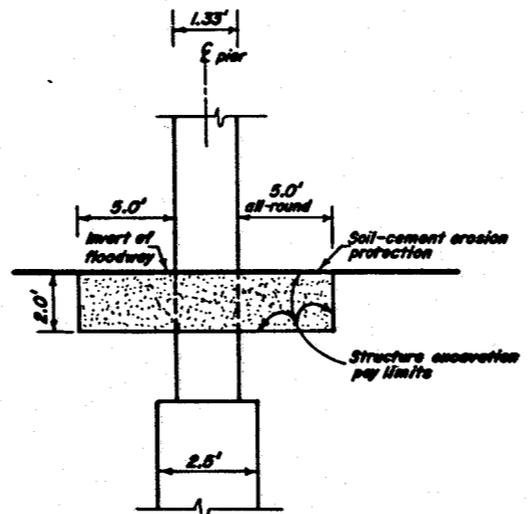
MANHOLE ADJUSTMENT & DRIVEWAY DETAILS			
EAST MARICOPA FLOODWAY REACH 6			
BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS			
MARICOPA COUNTY, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed: ROB/BAB	Date: 2/21/82	Approved by:	
Drawn: I.J.H./AS	Date: 2/24/82	Title:	
Traced:		Sheet:	
Checked: MSS	Date: 2/27/82	No. 23 of 25	85015-AZ-CH

Rev. 2/88

5 span concrete bridge with 68.0' clear roadway
 Skew 24°25'10" left



SECTION OF UNIVERSITY DRIVE BRIDGE SHOWN
 PERPENDICULAR TO CENTERLINE OF FLOODWAY
 N T S



SOIL-CEMENT EROSION PROTECTION
 AT BRIDGE PIERS
 N T S

BRIDGE OPENING DETAIL AND EROSION PROTECTION AT UNIVERSITY DRIVE EAST MARICOPA FLOODWAY REACH 6 BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS MARICOPA COUNTY, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designer <i>R.D. / B.A.</i> Drawn <i>L.V.H.</i> Traced Checked <i>J.S.S.</i>	Date <i>2/21/51</i> Title Sheet No. <i>24</i> of <i>25</i>	Approved by Title Drawing No.	85015-AZ-CH

BUCKHORN-MESA-APACHE JUNCTION AND GILBERT WATERSHEDS

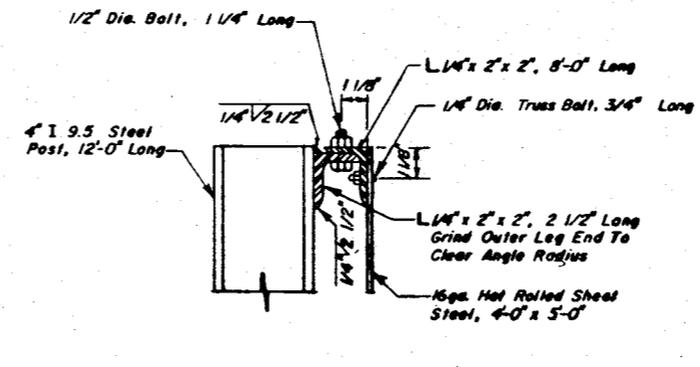
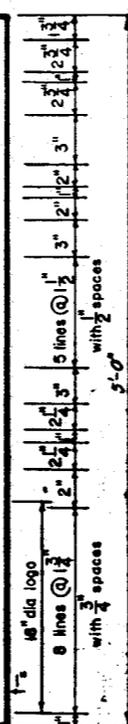
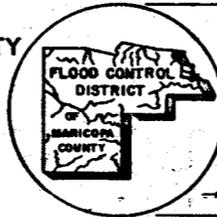
EAST MARICOPA FLOODWAY REACH 6

MAXIMUM PEAK FLOW 2400 CUBIC FEET PER SECOND
 LENGTH OF REACH 13,222 FEET
 MAXIMUM WIDTH OF BOTTOM 110 FEET
 AVERAGE DEPTH OF CHANNEL 9.5 FEET
 VOLUME OF EARTH EXCAVATION 300,000 CUBIC YARDS

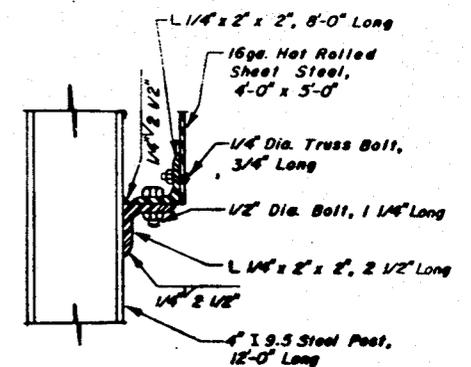
BUILT UNDER THE WATERSHED PROTECTION
AND FLOOD CONTROL ACT



BY
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 EAST MARICOPA N.R.C.D.
 WITH THE ASSISTANCE OF
 SOIL CONSERVATION SERVICE
 OF THE
 U.S. DEPARTMENT OF AGRICULTURE
 198_



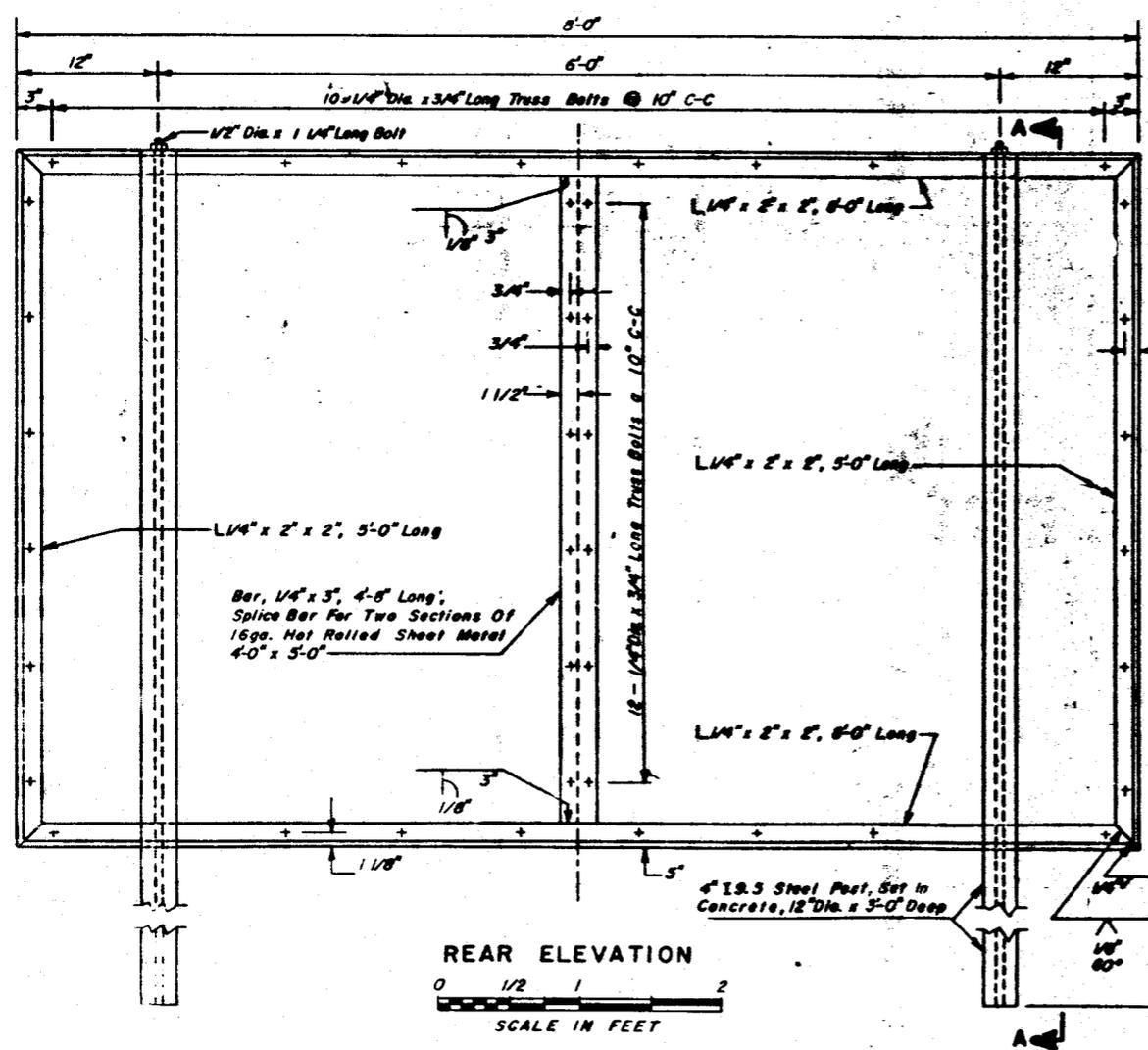
DETAIL "A"



DETAIL "B"



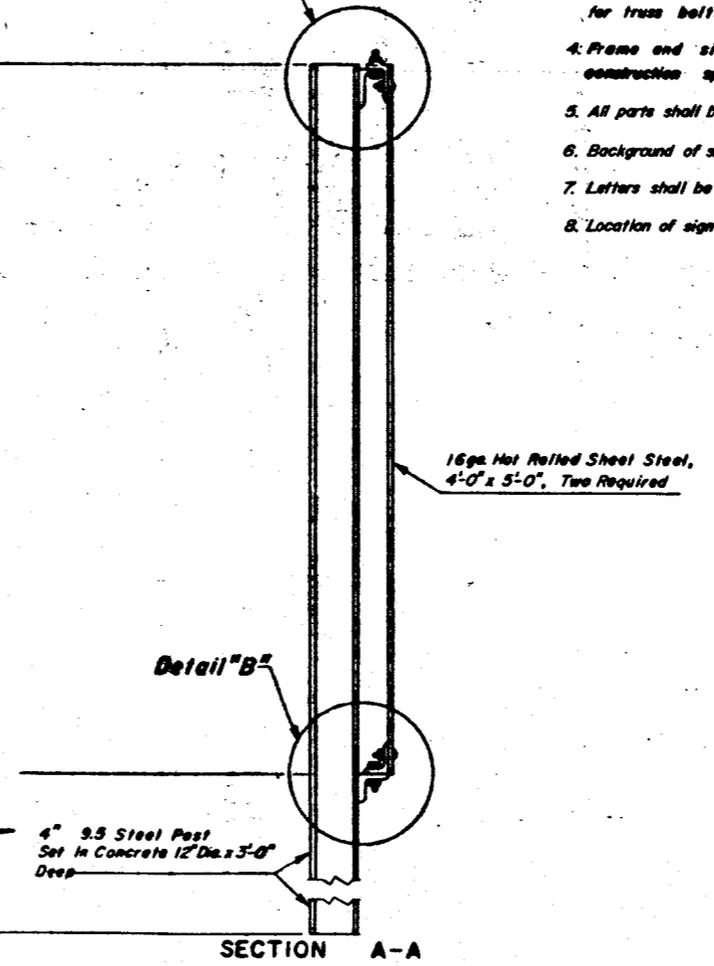
LETTERING LAYOUT



REAR ELEVATION
SCALE IN FEET: 0, 1/2, 1, 2

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 truss bolts in securing sign sheet steel sections to frame
4. Frame and sign shall be painted in accordance with construction specification 82.
5. All parts shall be painted with base coat before assembly.
6. Background of sign shall be painted with a white enamel.
7. Letters shall be painted with a dark green enamel.
8. Location of sign is to be determined by the Engineer.

IDENTIFICATION SIGN	
EAST MARICOPA FLOODWAY REACH 6	
BUCKHORN-MESA-APACHE JUNCTION-GILBERT WATERSHEDS	
MARICOPA COUNTY, ARIZONA	
U. S. DEPARTMENT OF AGRICULTURE	
SOIL CONSERVATION SERVICE	
Design: I.J.H.	Date: 2/25/87
Drawn: I.J.H.	2/25/87
Checked: M.S.S. RM	2/25/87
Approved: _____	Title: _____
Drawn: _____	Title: _____
Checked: _____	Title: _____
Drawing No. 85015-AZ-CH	