



"To the best of my professional knowledge, judgment, and belief, this document meets applicable NRCS standards."

CONSTRUCTION SPECIFICATIONS FOR 90% SUBMITTAL

SUPPLEMENTARY GENERAL CONDITIONS AND SPECIAL PROVISIONS

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CONTRACT FCD 2004C017**

**WHITE TANKS FLOOD RETARDING STRUCTURE NO. 3
REMEDATION DESIGN PROJECT**

PCN 470.04.30



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CONTRACT FCD 2004C017
WHITE TANKS FRS NO. 3
REMEDIAATION DESIGN PROJECT
SUPPLEMENTARY GENERAL CONDITIONS

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SUPPLEMENTARY GENERAL CONDITIONS

The Supplementary General Conditions, while normally keyed to another document, for this project are a stand-alone document. This document provides the Contractor with Owner-specific requirements, interpretations of certain specifications, general project and contract requirements, and instructions for administering the contract.

These Supplementary General Conditions, have been written using the Uniform Standard Specifications and Details for Public Works Construction document that is sponsored and distributed by the Maricopa Association of Governments (MAG) as a template.

SPECIFICATIONS

Except as otherwise amended in these Supplementary General Conditions and the Construction Special Provisions, this project shall be constructed in accordance with all applicable Maricopa Association of Governments (MAG) Uniform Standard Specifications and Uniform Standard Details, dated 1998 including all revisions through 2004.

PRECEDENCE OF CONSTRUCTION DOCUMENTS

This Contract and its designated documents, whether taken separately or together, are to be interpreted according to full intent, meaning, and spirit, and shall be deemed to mutually explain each other and to be descriptive of any materials to be furnished and the work to be performed under this Contract. In cases of any difference or discrepancy between the Construction Documents, the order of precedence shall be:

- A) Addendum to the Invitation for Bids
- B) Contract Agreement
- C) Supplementary General Conditions
- D) Construction Special Provisions
- E) Project Plans
- F) MAG Uniform Standard Specifications and Uniform Standard Details

SECTION 101 ABBREVIATIONS AND DEFINITIONS

SUBSECTION 101.1 ABBREVIATIONS:

Wherever the following abbreviations are used in these specifications, standard details or on the plans, they are to be construed the same as the respective expressions represented.

AASHTO	American Association of State Highway and Transportation Officials
AAN	American Association of Nurserymen
AB	Aggregate base
Aban	Abandon
ABC	Aggregate base course
AC	Asphalt cement or concrete
ACB	Asphalt concrete base
ACI	American Concrete Institute
ACP	Asbestos cement pipe
ACPA	American Concrete Pipe Association
ACWS	Asphalt concrete wearing surface
AFRB	Arizona Fire Rating Bureau
AGC	Associated General Contractors of America, Inc.
Agg	Aggregate
ADOT	Arizona Department of Transportation
Ahd	Ahead
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
APA	American Plywood Association
Approx	Approximate
APWA	American Public Works Association
AR	Aged residue
ARS	Arizona Revised Statutes
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
Asph	Asphalt
ASTM	American Society for Testing Materials
Ave	Avenue
AWPA	American Wood Preservers Association
AWSC	American Welding Society Code
AWWA	American Water Works Association
Bbl	Barrel
BC	Beginning of curve
BCR	Beginning of curb return
Beg	Beginning
Bk	Book or Back
Blvd	Boulevard
BM	Bench Mark or Board Measure
Brg	Bearing
BST	Bituminous Surface Treatment
BTB	Bituminous Treated Base
BTU	British Thermal Units
BVC	Beginning of vertical curve
C	Centigrade or Curb
CB	Catch Basin
CBF&C	Catch basin frame & cover

CC or C/C	Center to Center
CE	City or County Engineer
Cem	Cement
CF	Curb face
cfs	Cubic Feet per second
CIP	Cast Iron pipe
CIPP	Cast-in-place concrete pipe
CL or C	Centerline
Cm	Centimeter
CMP	Corrugated metal pipe
CO	Clean out
Col	Column
Conc	Concrete
Const	Construct
CP	Concrete pipe (non-reinforced)
CTB	Cement Treated Base
Cu	Cubic
Deg	Degree
DF	Douglas Fir
DG	Decomposed granite
Dia	Diameter
Dim	Dimension
DIP	Ductile Iron Pipe
Div	Division
Dr	Drive
Drwg	Drawing
Dwy	Driveway
Ea	Each
Ease	Easement
E	East
EC	End of curve
ECR	End of curb return
El or Elv	Elevation
Equa or Eq	Equation
EVC	End of vertical curve
Ex or Exist	Existing
F	Fahrenheit
FB	Field book
FCDMC	Flood Control District of Maricopa County
F & C	Frame & cover
FH	Fire hydrant
FL or F	Floor line or flow line
Fl El	Floor Elevation
Fnd	Found
fps	Feet per second
FRS	Flood Retarding Structure
FRZ	Fissure Risk Zone
FS	Finished surface
FSS	Federal Specifications and Standards
Ft	Foot or feet
G	Gutter
Ga	Gage
Galv	Galvanized
GL	Ground line

gpm	Gallons per minute
Gr	Grade
H	High or height
HC	House connection
Hdwl	Headwall
Horiz	Horizontal
Hwy	Highway
ICA	Industrial Commission of Arizona
ID	Improvement District or inside diameter
IE	Invert Elevation
IEEE	Institute of Electrical and Electronic Engineers
In	Inch
Inv	Invert
IP	Iron Pipe
IPS	Iron Pipe Size
Irrig	Irrigation
Jt	Joint
JC	Junction Chamber
Jct	Junction
JS	Junction Structure
L	Length
Lb	Pound
L&T	Lead and tack
LD	Local depression
LF	Linear Feet
LH	Lamp hole
Lin	Linear
Long	Longitudinal
Lt	Left
M	Map or maps
MAG	Maricopa Association of Governments
Max	Maximum
MCR	Maricopa County Records
Meas	Measured
MH	Manhole
MHF&C	Manhole frame and cover
Min	Minutes or minimum
Misc	Miscellaneous
ML or M	Monument line
mm	Millimeter
Mon	Monolithic or monument
MTD	Multiple tile duct
N	North
NBS	National Bureau of Standards
NCPI	National Clay Pipe Institute
NE	Northeast
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NFRZ	Non-Fissure Risk Zone
NP	Non-plastic
NPI	Non pay item

NSC	National Safety Council
NSF	National Sanitation Foundation
NW	Northwest
No	Number
OC	On center
OD	Outside diameter
Oz	Ounces
P.C	Point of curvature
PCC	Point of compound curve or Portland Cement Concrete
PI	Point of intersection or plastic index
PL	Property line
POC	Point of Curve
POS	Point of Spiral
PP	Power pole
ppm	Parts per million
PRC	Point of reverse curve
Prod	Produced
Prop	Proposed or property
psi	Pounds per square inch
psf	Pounds per square foot
PT or POT	Point of Tangent
P&TP	Power and telephone pole
Pvmt	Pavement
Q	Rate of flow
R	Radius
RC	Reinforced concrete
RCP	Reinforced concrete pipe
Rd	Road
Rdwy	Roadway
Reinf	Reinforced, Reinforcing
Ret Wall	Retaining Wall
RGRCP	Rubber Gasket Reinforced Concrete Pipe
rpm	Revolutions Per Minute
Rt	Right
R/W	Right-of-way
S	South or slope
SAE	Society of Automotive Engineers
San	Sanitary
SC	Spiral to Curve
SCCP	Steel cylinder concrete pipe
SD	Storm drain or Sewer District
Sdl	Saddle
Sec	Seconds
Sect	Section
SE	Southeast
Sht	Sheet
Spec	Specifications
SPR	Simplified Practice Recommendation
Sp MH	Special manhole
Sq Ft Yd	Square Foot, Yard
SS	Sanitary sewer
St	Street
Sta	Station

Std	Standard
Str gr	Structural grade
Struct	Structure or structural
SW	Southwest
SWPPP	Storm Water Pollution Prevention Plan
T	Tangent Distance
TCE	Temporary Construction Encasement
Tel	Telephone
Temp	Temporary
TH	Test hole
TP	Telephone pole
Tr	Tract
Trans	Transition
TS	Traffic signal or Tangent to spiral
TSC	Traffic signal conduit
Typ	Typical
UL	Underwriters' Laboratories Inc.
USC & GS	United States Coast and Geodetic Survey
USGS	United States Geological Survey
V	Velocity of flow
VC	Vertical curve
VCP	Vitrified clay pipe
Vert	Vertical
W	West or width
WI	Wrought iron
WS	Wearing surface
Wt	Weight
Yd	Yard
'	feet or minutes
"	inches or seconds
°	degrees
%	percent
#	number or pound
@	at
/	per
=	equals

SUBSECTION 101.2 DEFINITIONS AND TERMS:

Whenever in these specifications or in other contract documents the following terms or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

Addendum: A supplement to any of the Contract Documents issued, in writing, after advertisement of but prior to the opening of bids for a contract.

Advertisement: The public announcement, as required by law, inviting bids for work to be performed or materials to be furnished.

Agency: The governmental agency for which the construction is being done, either by permit or contract.

Architect: The individual or firm who has accomplished the architectural services for the project, including his representatives.

Award: The formal action of the governing body is accepting a proposal.

Backfill: Material placed in an excavated space to fill such space. For trenches, this space will be the area from 1 foot above the top of the pipe or conduit to the existing or proposed finished grade of pavement.

Base Course: The upper course of the granular base of a pavement or the lower course of an asphalt concrete pavement structure.

Bedding: Is the material placed in the area from the bottom of the trench to 1 foot above the top of the pipe or conduit.

Bidder: Any qualified individual, firm, partnership, corporation or combination thereof, acting directly or through a duly authorized representative who legally submits a proposal for the advertised work.

Board of Supervisors: The Board of Directors acting under the authority of the laws of the State of Arizona and in their capacity of the Board of Directors of the Flood Control District of Maricopa County.

Bond Issue Project: A project financed from bonds issued by the City or County pledging credit or a revenue resource.

Bridge: A structure, including supports, erected over a depression or an obstruction, as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads and having a length measured along the center of roadway of more than 20 feet between undercopings of abutments or extreme ends of openings for multiple boxes.

(Length) The length of a bridge structure is the over-all length measured along the line of survey stationing back to back of backwalls of abutments, if present, otherwise end to end of the bridge floor; but in no case less than the total clear opening of the structure.

(Roadway Width) The clear width measured at right angles to the longitudinal centerline of the bridge between the bottom or curbs or guard timbers or in the case of multiple height of curbs, between the bottom of the lower risers.

Budget Project: A project financed by funds set aside in the annual budget or otherwise approved by the Flood Control District of Maricopa County Board of Directors.

Building: Any structure built for the support, shelter, or enclosure of persons, animals, chattel or movable property.

Building Code: A regulation adopted by the governing body establishing minimum standards of construction for the protection of the public health, safety, and welfare in terms of measured performance rather than in terms of rigid specification of materials and methods.

Calendar Day: Everyday shown on the calendar.

Call for Bids: The standard forms inviting proposals or bids.

Careful and prudent manner: conducting excavation in such a way that when it approaches within twenty-four inches of the underground facility located and marked by the owner or operator, by stakes, paint or in some customary manner, the exact location is manually determined, and the uncovered facility is supported and protected.

Change Order: A written order issued by the Engineer to the Contractor to make changes in the work or to perform extra work, and setting forth conditions for payment and/or adjustment in time of completion.

City: A municipal corporation, organized and existing under and by virtue of the laws of the State of Arizona.

City/County Clerk: The duly authorized person who performs the duties of clerk for the Contracting Agency.

Completion Time: The number of calendar days for completion of an act, including authorized time extensions. In case a calendar date of completion is shown in the proposal in lieu of the number of calendar days, the contract shall be completed by that date. The time within which an act is to be done shall be computed by excluding the first and including the last day; and if the last day be Sunday or a legal holiday, that shall be excluded.

Conflicting Utility: An existing utility, shown or not shown on the plans is conflicting when any part of the utility falls within the dimensions of the new installation, such that it would be in physical contact with the new installation.

Construction Documents: Supplementary General Conditions.

Construction Project: The erection, installation, remodeling, alteration, of durable facilities upon, under, or over the ground. This shall include, but is not limited to buildings, roadways and utility pipes, lines, poles or other structures.

Contingent Bid Item: This is a minor bid item which is likely, but not certain, to occur during the course of work. If the Engineer determines that this work is required, the Contractor will accomplish the work and payment will be made based on the contingent unit bid price included in the proposal. Since the quantity listed in the proposal is primarily for bid comparison, the amount of work required by the Engineer may vary materially from this.

Contract: The written instrument executed by the Contractor and the Contracting Agency by which the Contractor is bound to furnish all labor, equipment, and materials and to perform the work specified, and by which the Contracting Agency is obligated to compensate the Contractor therefor at the prices set forth therein. The Contract Documents are herewith by reference made a part of the contract as if fully set forth therein.

Contract Documents: All the integral documents of the contract, including but not limited to, Call for Bids, Plans, Standard Specifications and Details, Supplementary General Conditions, Proposal, Addenda, Performance Bond, Payment Bond, Certificates of Insurance, Ordinance, Contract, and Change Orders.

Contracting Agency: The Flood Control District of Maricopa County (District) entity that will be contracted for the performance of the work and for whom the work is being performed.

Contractor: The individual, firm, partnership, corporation or combination thereof entering into a contract with the Contracting Agency to perform the advertised work.

Council: The City Council, which by law constitutes the Legislative Department of the City.

County: Maricopa County, organized and existing under and by virtue of the laws of the State of Arizona.

Culvert: Any structure not classified as a bridge, which provides an opening under or adjacent to the roadway.

Days: Unless otherwise designated, days will be understood to mean calendar days.

District : The Flood Control District of Maricopa County.

Emergency: Unforeseen occurrences and combinations of circumstances involving the public welfare or the protection of work already done under the Contract Documents, or which endanger life or property and call for immediate action or remedy.

Engineer: The person appointed by the Flood Control District of Maricopa County Board of Directors to the office of Chief Engineer and General Manager of the Flood Control District of Maricopa County acting directly or through its authorized representative, the Division Manager of Planning and Project Management Division of the Flood Control District of Maricopa County.

Engineer of Record: The independent engineering and design firm responsible for the investigation, and preparation of contract drawings, special provisions, supplementary general conditions, and construction quality assurance plan under the direction of a Professional Engineer registered in the State of Arizona.

Equipment: (Construction) - All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of work. (Installed) - All material or articles used in equipping a facility as furnishings or apparatus to fulfill a functional design.

Extra Work: An item of work not provided for in the contract as awarded but found essential to the satisfactory completion of the contract within its intended scope.

Flooding: Flooding will consist of the inundation of the entire lift with water, puddled with poles or bars to insure saturation of the entire lift.

Force Account Work: Work done by personnel of the Contracting Agency as in-house work.

Foundation: For buildings or structures, this will be the substructure. For pipe this will be the native material or prepared material on which the pipe rests; normally, this is the bottom grade line of the trench.

Full Depth Pavement: An asphalt concrete pavement structure in which the granular base and sub-base are replaced by proportionate thickness of asphalt concrete.

General Conditions: This document which spells out the contract conditions by defining the duties and responsibilities of those who are signatory to the contract, namely the Owner and Contractor, as well as the duties and responsibilities of those affected by the Contract including subcontractors.

Improvement District Project: A project financed by assessments against the property included in a special assessment district authorized under, or implemented by an act of the legislature of the State and/or a procedural ordinance of the City or County.

Inspector: The Engineer's authorized representative assigned to make detailed inspections of contract performance.

Jetting: Jetting is the densification of material, using a continuous supply of water, under pressure, transmitted to the material through a rigid pipe of sufficient length to reach the bottom of the lift being densified. In all cases, the entire lift will be completely saturated working from the top to the bottom.

Laboratory: The established materials testing laboratory of the Contracting Agency's Engineering Department, or other laboratories acceptable to and/or authorized by the Engineer to test materials and work involved in the Contract.

Major Item: A major item shall be the total of any item of work and/or materials specified in the bid schedule that exceeds the amount established in Table 109-1.

Maricopa County Minority Business Office (MBO): The office responsible for administering the Maricopa County Minority and Women Owned Business Enterprise Program.

Maricopa County Minority and Women Owned Business Enterprise Program: The Program adopted by the Board of Supervisors effective January 1, 1992.

Materials: Any substance specified in the project, equipment and other material used or consumed in the performance of the work.

Median: The portion of a divided highway separating the roadways used by traffic going in opposite directions.

Non Pay Item: An item of work for which no separate payment will be made under the proposal, but which must be included as an incidental cost for payment on an associated item included in the proposal.

Notice of Award: A letter from the Flood Control District of Maricopa County advising the Contractor that he is the successful bidder and the Flood Control District of Maricopa County has accepted its proposal.

Notice to Proceed: A directive issued by the Engineer, authorizing the Contractor to start the work or improvements required in the Contract.

Obligee: One to whom another is obligated.

Open Trench: The excavated area shall be considered as open trench until all the aggregate base course for pavement replacement has been placed and compacted or, if outside of a pavement area, until the excavated area is brought to finish grade or natural grade.

Owner: The Flood Control District of Maricopa County, acting through its legally constituted officials, officers or employees.

Pavement: Any surfacing of streets, alleys, sidewalks, courts, driveways, etc., consisting of mineral aggregate bound into a rigid or semi-rigid mass by a suitable binder such as, but not limited to, Portland cement or asphalt cement.

Pavement Structure: The combination of sub-base, base course, and surface course placed on a subgrade to support the traffic load and distribute it to the roadbed.

Pay Item: A detail of work for which separate payments are to be made under the Contract, as specified in the proposal.

Payment Bond: The security provided by the Contractor solely for the protection of claimants, supplying labor and materials to the Contractor or his Subcontractors.

Performance Bond: The security provided by the Contractor solely for the protection of the Contracting Agency and conditioned upon the faithful performance of the contract in accordance with the plans, specifications and conditions thereof.

Permit: The license to do construction in public rights-of-way and/or easements; issued by an Agency to a Contractor working for another party.

Plans: All approved drawings or reproductions thereof pertaining to the work and details therefor, which are made a part of the Contract Documents.

Plant: The Contractor's and/or subcontractor's facilities, including but not limited to small tools and mobile equipment, located on and/or offsite, necessary for preparation of materials and prosecution of work for the project.

Principal: The individual, firm or corporation primarily liable on an obligation, as distinguished from a surety.

Profile Grade: The trace of a vertical plan intersecting the top surface of the proposed wearing surface, usually along the longitudinal centerline of the roadbed. Profile grade means either elevation or gradient of such trace according to the context.

Project: A specific coordinated construction or similar undertaking identified by a single project number and bid and awarded as one contract. On occasion two or more projects may be bid and awarded as a single contract.

Proposal: The offer of a bidder on the prescribed form, to perform the work and to furnish the labor and materials at the prices quoted.

Proposal Form: The approved form on which the Contracting Agency requires bids to be prepared and submitted for the work.

Proposal Guarantee: The security furnished with a bid to guarantee that the bidder will enter into the contract if his bid is accepted.

Proposal Pamphlet: The book or pamphlet pertaining to a specific project, containing proposal forms, special provisions and other information necessary for and pertinent to the preparation of the proposal or bid.

Referred Documents: On all work authorized by the Contracting Agency, any referenced documents in the specification, i.e., Bulletins, Standards, Rules, Methods of Analysis or test. Codes and Specifications of other Agencies, Engineering Societies or Industrial Associations, refer to the Latest Edition thereof, including Amendments, which are in effect and published at the time of Advertising for Bids or the issuing of a permit for the work, unless otherwise stated.

Right-of-way: A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to a street, highway, or other public improvement.

Road: A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

Roadside: A general term denoting the area adjoining the outer edge of the roadway. Extensive areas between the roadways of a divided highway may also be considered roadside.

Roadside Development: Those items necessary to the complete roadway which provide for the preservation of landscape materials and features; the rehabilitation and protection against erosion of all areas disturbed by construction through seeding, sodding, mulching and the placing of other ground covers; such suitable planting and other improvements as may increase the effectiveness and enhance the appearance of the roadway.

Roadway: The portion of the right-of-way intended primarily for vehicular traffic, and including all appurtenant structures and other features necessary for proper drainage and protection. Where curbs exist, it is that portion of roadway between the faces of the curbs.

Sewers: Conduits and related appurtenances employed to collect and carry off water and waste matter to a suitable point of final discharge.

Shop Drawings: Drawings or reproduction of drawings, detailing; fabrication and erection of structural elements, falsework and forming for structures, fabrication of reinforcing steel, installed equipment and installation of systems, or any other supplementary plans or similar data, which the Contractor is required to submit for approval.

Shoulder: The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

Sidewalk: That portion of the roadway primarily constructed for the use of pedestrians.

Special Provisions: The special conditions, requirements, additions, and/or revisions to the Standard Specifications, applicable to the work, to cover conditions or requirements peculiar to the project under consideration. However, for this project the special provisions are stand-alone and represent the specifications for construction.

Specifications: The descriptions, directions, provisions, and requirement for performing the work as contained in the Contract Documents.

Standard Details: Uniform detail drawings of structures or devices adopted as Standard Details by the Engineer.

Standard Specifications: Uniform general specifications adopted as Standard Specifications by the Engineer.

Storm Drain: Any conduit and appurtenance intended for the reception and transfer of storm water.

Street: Streets, avenues, alleys, highways, crossings, lanes, intersections, courts, places, and grounds now open or dedicated or hereafter opened or dedicated to public use and public ways.

Structures: Bridges, culverts, catch basins, drop inlets, retaining walls, cribbing, manholes, endwalls, sewers, service pipes underdrains foundation drains, fences, swimming pools, and other features which may be encountered in the work and not otherwise classed herein.

Sub-base: The lower course of the base of a roadway, immediately above the subgrade.

Subcontractors: Those having direct contracts with the Contractor and those who furnish material worked into a special design according to the Plans and Specifications for the work, but not those who merely furnish material not so worked.

Subgrade: The supporting structures on which the pavement and its special undercourses rest.

Substructure: All of that part of the structure or building below the bearings of simple and continuous spans, skewbacks of arches and tops of footings of rigid frames, together with the backwalls, wingwalls and wing protection railings.

Superintendent: The Contractor's authorized representative in responsible charge of the work.

Superintendent of Streets: The person duly appointed by the Council of the Contracting Agency, as provided by Sections 9-601 and 11-701 of the Arizona Revised Statutes.

Superstructure: The entire structure or building except the substructure.

Supplemental Specifications: Additions and revisions to the Standard Specifications that are adopted subsequent to issuance of the printed book.

Supplementary General Conditions: Requirements, or revisions, to the Standard General Conditions, applicable to the work, and to cover conditions or requirements peculiar to the project under consideration. However, for this project the supplementary General Conditions are stand-alone and represent the standard general conditions for the project.

Surety: The individual, firm or corporation, bound with and for the Contractor for the acceptable performance, execution, and completion of the work, and for the satisfaction of all obligations incurred.

Surface Course: The finished or wearing course of an asphalt concrete pavement structure.

Title or Headings: The titles or headings of the sections and subsections herein are intended for convenience of reference and shall not be considered as having any bearing on their interpretation.

Township, City, Town or District: A subdivision of the County used to designate or identify the location of the proposed work.

Traveled Way: The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

Underground Facility: any item which shall be buried or placed below ground for use in connection with the storage or conveyance of water, sewage, electronic, telephone or telegraphic communications, electric energy, oil, gas or other substances, and shall include, but not be limited to pipes, sewers, conduits, cables, valves, lines, wires, manholes, attachments and those portions of poles and their attachments below ground.

Utility: Pipe lines, conduits, ducts, transmission lines, overhead or underground wires, railroads, storm drains, sanitary sewers, irrigation facilities, street lighting, traffic signals, and fire alarm systems, and appurtenances of public utilities and those of private industry, businesses or individuals solely for their own use or use of their customers which are operated or maintained in, on, under, over or across public right-of-way or public or private easement.

Waterworks (Water Supply System): The reservoirs, pipe lines, wells, pumping equipment, purification works, mains, service pipes, and all related appliances and appurtenances utilized in the procurement, transportation and delivery of an adequate, safe, and palatable water supply for the Contracting Agency.

Work: Any or all of the improvements mentioned and authorized to be made, and the construction, demolition, reconstruction, and repair of all or any portion of such improvements, and all labor, services, incidental expenses, and material necessary or incidental thereto.

Working Day: A calendar day, exclusive of Saturdays, Sundays, and Contracting Agency recognized legal holidays, on which weather and other conditions not under the control of the Contractor will permit construction operations to proceed for the major part of the day with the normal working force engaged in performing the controlling item or items of work which would be in progress at that time.

SUBSECTION 101.3 EXPRESSIONS IN GENERAL CONDITIONS:

In order to avoid cumbersome and confusing repetition of expressions in these specifications, it is provided that whenever anything is, or is to be, done, if, as, or, when, or where contemplated required, determined, directed, specified, authorized, ordered, given, designated, indicated, considered necessary, deemed necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, insufficient, rejected, or condemned, it shall be understood as if the expression were followed by the words by the Engineer or to the Engineer.

End of Section

SECTION 102 BIDDING REQUIREMENTS AND CONDITIONS

SUBSECTION 102.1 ELIGIBILITY AND PREFERENCE:

The employment of Contractors and Subcontractors shall be governed by the provisions of the District.

SUBSECTION 102.2 CONTENTS OF PROPOSAL PAMPHLET:

The prospective bidder may examine and/or purchase plans, special provisions, and proposal pamphlets at the Engineering Office of the Contracting Agency advertising for bids.

The proposal pamphlet will state the location of the contemplated construction; give the description of the various quantities of work to be performed or materials to be furnished, and have a bid schedule of pay items for which unit bid prices are invited. In addition, it will state the form and amount of the proposal guarantee, the time in which the work shall be completed and include additional instructions not included in these specifications.

The plans, the special provisions, the contracting agency's supplements and all supplementary documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work.

Each and every provision of law and clause required by law to be inserted in the contract shall be deemed to be inserted herein, and the contract shall be read and enforced as though it were included herein.

SUBSECTION 102.3 INTERPRETATION OF QUANTITIES IN PROPOSAL:

The quantities appearing in the proposal are approximate only and are to be used for the comparison of bids. Payment to the Contractor will be made only for the actual quantities of work performed and accepted or materials furnished in accordance with the contract at the unit bid price in the proposal.

After the contract is awarded the quantities of work listed by any pay item, or all pay items, may be increased or decreased a reasonable amount at the discretion of the Contracting Agency, without in any way invalidating the unit bid price.

SUBSECTION 102.4 EXAMINATION OF PLANS, SPECIAL PROVISIONS AND SITE OF WORK:

The following is available for review at the District, and Contractors are encouraged to do so:

- A) Contract Form
- B) Bid Schedule
- C) Plans for the White Tanks FRS No. 3 Remediation Design Project
- D) Special Provisions
- E) Supplementary General Conditions
- F) Raw Survey Data Collected for Design
- G) Results of Soil Materials Testing for Design
- H) Logs of Soil Borings and Test Pits Conducted at the Site for Design

The Contracting Agency will prepare plans and special provisions in accordance with acceptable engineering standards, giving such direction as will enable any competent Contractor to carry them out.

The bidder shall examine the site of the proposed work and all documents pertaining to the work. It is mutually agreed that the submission of a proposal shall be considered prima facie evidence that the bidder has made such examination and is familiar with the character, quality and quantity of the work to be performed and material to be furnished.

Logs of the test holes, ground water levels, and any accompanying soil reports as furnished by the Contracting Agency are furnished for general information only. The field condition so set forth shall not constitute a representation or warranty, expressed or implied, that such conditions are actually existent. Bidders shall make their own investigations and form their own estimates of the site conditions.

Existing moisture conditions shall be no basis for claim for additional money or time extensions. The Contractor shall manipulate the existing soil as required to achieve stable soil conditions and the required densities, as well as safe and stable side slopes during construction activities.

After the submission of the proposal, no complaint or claim that there was any misunderstanding as to the quantities, conditions or nature of the work will be entertained.

Soil boring logs are included in the Geotechnical Report prepared by URS Corporation. The Geotechnical Report is available for review at the Owner's office, and Contractors are encouraged to do so. The Contractor shall manipulate the existing soil as required to achieve stable soil conditions and the required densities, as well as safe and stable side slopes during construction activities.

The project is located at the discharge point of multiple drainage courses. These drainage courses can convey considerable flood flows as well as low flow nuisance flows. The Owner is not responsible for monitoring these flows or notifying the Contractor of flood flows within these drainage courses.

SUBSECTION 102.5 PREPARATION OF PROPOSAL:

Proposals, including the Bidding Schedule, must be legibly written in ink or typed, with all prices given in numerals. In case of a conflict between the unit bid price and the extension, the unit bid price will govern.

It shall be the responsibility of prospective bidders to determine, prior to submission of a bid, if any addenda have been issued by the Flood Control District. This may be accomplished by calling 602-506-1501. Any addendum issued, if not already bound into the Special Provisions **must be attached and included as part of the Specifications** and any quantities on the Bidding Schedule requiring change shall be adjusted to the new figure by pen and ink. **Bids which do not have appropriate addenda attached and show appropriate changes to the Bidding Schedule, and receipt of addenda acknowledged in the Proposal shall be invalid.**

The bidder's Arizona State Contractor's License number and the classification under which it proposes to perform the work shall be shown on the proposal. An **"A" General Engineering License** is required for this contract. The two lowest bidders may be required to provide certification of prior satisfactory completion for similar construction and to furnish a copy of their license and the renewal certificate.

Allowances as shown on the Bid Schedule shall cover the cost to the Contractor, and if applicable, delivered to the site, unloaded and handled on the site, labor, and installation costs. The Contractor's taxes, bonds, insurance, overhead, profit, and other expenses contemplated for the original Allowance amount shall be included in the Base Bid, and not in the Allowance. Whenever the costs are more than or less than the Allowance, the Contract Sum shall be adjusted accordingly by Change Order, the amount of which will recognize proportionate changes, if any, in handling costs on the site, labor, installation costs, taxes, bonds, insurance, overhead, profit, and other expenses. Contractor's monthly Application for Payment shall include supporting documentation of Allowance funds.

The bidder shall submit his proposal on the forms obtained from the Contracting Agency. The bidder shall specify a unit bid price and extension in words, figures or both, whichever is required, for each pay item where units and approximate quantities are given.

The proposal total will be obtained by adding the extension amount or lump sum indicated for the individual pay items. If there is a conflict between words and figures, the words shall apply. If there is a conflict between the unit bid price and the extension for a particular pay item, the unit bid price shall govern. In either case, the Contracting Agency shall correct the discrepancy in accordance with the above procedure and the corrected proposal total will apply.

In addition, the following shall be completed by the bidder on the proposal:

- A) Acknowledge receipt of and agree that the proposal is based on the listed Addenda received with and/or after receipt of the proposal pamphlet.
- B) Note the bidders Arizona State Contractor's License number and classification.

- C) Signatures in ink and attested or witnessed as applicable.

SUBSECTION 102.6 SUBCONTRACTORS' LIST:

The List of Subcontractors' form will be attached to the proposal pamphlet. The bidder shall submit this form with his proposal, in a separate sealed envelope, listing the firm name and business address of each specialty subcontractor to whom he proposes to subcontract any portion of the work. Only one name shall be listed for each category. A list of subcontractors and suppliers (including any M/WBE participation) intended to be used on the project shall be submitted with the bid, on the form provided in the Proposal. Following Notice of Award, no change of the subcontractors named therein will be made unless first approved in writing by Owner.

The bidder may list himself to perform one or more of the listed categories of work for which he has any requisite State licenses when required.

SUBSECTION 102.7 IRREGULAR PROPOSALS:

Proposals will be considered irregular and may be rejected for the following reasons:

- A) If the proposal is on a form other than that furnished by the Contracting Agency; or if the form is altered or any part thereof is detached.
- B) If there are unauthorized additions, statements, conditional or alternate bids, or irregularities of any kind.
- C) If the bidder adds any provisions reserving the right to accept or reject an award, or to enter into a contract pursuant to an award.
- D) If the proposal does not contain a unit price for each pay item listed except in the case of authorized alternate pay items.
- E) If, when required, the bidder fails to accomplish and submit the List of Subcontractors' form
- F) If the Maricopa County Minority and Women-Owned Business Enterprises Assurances Affidavit is not completed and submitted.
- G) If any addenda are not acknowledged and attached.
- H) If the Owner's bond forms are not utilized.
- I) If the entire specifications document is not returned.
- J) If the statement from bidder's insurance carrier as required by Subsection 103.6 is not included.

SUBSECTION 102.8 PROPOSAL GUARANTEE:

No proposal will be read unless accompanied by a proposal guarantee in the proper amount and in the form provided in the proposal pamphlet. The guarantee shall be made payable and acceptable to the Contracting Agency as a guarantee that the bidder, if awarded the contract, will execute the contract documents and furnish the required bonds and certificates of insurance to be forfeited if the Contractor fails or refuses to enter into a contract as required by the bid documents. The proposal guarantee shall be in the form of a certified check, cashiers check, or surety bond for ten percent of the amount of the bid. The surety bond shall be executed solely by a surety company or companies holding a certificate of authority to transact surety business in the State of Arizona issued by the Director of the Department of Insurance. The surety bond shall not be executed by an individual surety or sureties. In addition, said company or companies shall be rated "Best A-" or better as required by the Contracting Agency, as currently listed in the most recent Best Key Guide, published by the A.M. Best Company.

SUBSECTION 102.9 SUBMISSION OF PROPOSAL:

The proposal and proposal guarantee shall be submitted in a sealed envelope. The outside, lower right-hand corner of which shall be marked as follows:

Bid of [NAME OF CONTRACTOR], Contractor
For WHITE TANKS FRS NO.3 REMEDIATION DESIGN PROJECT PCN 470.04.30
Construction Contract No. FCD 2004C017

Envelopes shall be mailed or delivered to the office of the Contracting Agency, and must be received before the time and date specified in the Call for Bids or any Addenda.

Proposals received after the time and date specified will be returned, unopened, to the bidder.

SUBSECTION 102.10 WITHDRAWAL OR REVISION OF PROPOSAL:

Any bidder may withdraw or revise a proposal after it has been deposited with the Contracting Agency, provided his request is received by the Contracting Agency, in writing or by telegram, before the time specified for opening proposals or as stipulated herein.

SUBSECTION 102.11 PUBLIC OPENING OF PROPOSALS:

Proposals will be opened and read publicly at the time and place specified in the Call for Bids or any Addenda. Bidders, their authorized agents and other interested parties are invited to be present.

When proposals for more than one project are to be opened at the same time, any bidder may, after the time set for the opening proposals, request to withdraw his second or succeeding proposal prior to the opening of proposals for that project. Should this occur, there will be a brief delay in the opening of proposals to permit the bidder to submit his request. Upon receipt of the bidder's written request, by the Contracting Agency, his proposal will be returned unopened.

SUBSECTION 102.12 DISQUALIFICATION OF BIDDERS:

Either of the following reasons may be considered as being sufficient for the disqualification of a bidder and the rejection of his proposal:

- A) Receipt of more than one proposal for the same work from an individual, partnership or corporation under the same or different names.
- B) Evidence of collusion among bidders or assistance from any officer of the Contracting Agency, or of any Department thereof.

SUBSECTION 102.13 SUCCESSFUL BIDDERS:

Unless otherwise specified in the proposal pamphlet, the successful bidder may obtain 7 sets of plans and special provisions, for the project from the Contracting Agency, at no cost.

End of Section

SECTION 103 AWARD AND EXECUTION OF CONTRACT

SUBSECTION 103.1 CONSIDERATION OF PROPOSALS:

After the proposals, for the contemplated work, have been opened and read as provided in these specifications, the respective totals will be checked and compared by the Contracting Agency. The basis of comparison will be to verify the accuracy of the total proposal by checking the extensions and additions. In the event of a discrepancy, in the amount bid for a pay item, the unit bid price will govern unless obviously in error. The results of such comparison will be considered public information.

The right is reserved to award the contract to the lowest and/or best responsible bidder, or to reject all proposals and to re-advertise for any reason the Contracting Agency determines.

In case all proposals are rejected, any subsequent changes, additions, addenda, or new sets of plans and special provisions will be provided to all purchasers of the first issue of the plans and special provisions at no additional charge, except that out-of-town bidders will pay shipping charges.

SUBSECTION 103.2 RETURN OF PROPOSAL GUARANTEE:

All proposal guarantees, except those of: the two lowest responsible bidders on Bond Issue and Budget Projects; the lowest responsible bidder or the lowest responsible bidders of alternative plans and specifications on Improvement District Projects, will be returned immediately following the opening and checking of proposals. The retained proposal guarantee or guarantees will be returned immediately after the contract documents have been executed by all parties.

SUBSECTION 103.3 AWARD OF CONTRACT:

The Contracting Agency, through its duly authorized body or agent will award the contract to the lowest and/or best responsible bidder, or all proposals will be rejected, as soon as practicable after the date of opening proposals.

No proposal shall be withdrawn for a period of 50 days after opening without consent of the Contracting Agency through the body or agent duly authorized to accept or reject the proposal except that in the case of Federally-assisted projects, or other projects award of which is conditioned on the approval of an agency not under the control of the Contracting Agency, withdrawal shall be made within a period of 50 days after opening without such consent.

If written notice of the acceptance of a proposal is delivered to the successful bidder within the times noted above, or at any time thereafter before such proposal has been withdrawn, the bidder shall execute and deliver a contract in the prescribed form, within 10 days after receipt of such notice or his proposal guarantee shall be forfeited as provided elsewhere herein. Concurrently with the contract, the Contractor shall submit all documentation required to enable the agency to execute the contract.

The successful bidder will be furnished a Notice of Award on:

- A) Bond Issue or Budget Projects by letter, to the address shown on the proposal.
- B) Improvement District Projects by publication in accordance with the requirements of ARS, Section 9-681.

SUBSECTION 103.4 CANCELLATION OF AWARD:

The Contracting Agency reserves the right to cancel the award of any contract at any time before the execution of said contract by all parties, without any liability against the Contracting Agency.

SUBSECTION 103.5 REQUIREMENT OF CONTRACT BONDS:

Concurrently with the submittal of the contract, the Contractor shall furnish the Contracting Agency the following bonds, which shall become binding upon the award of the contract to the Contractor.

- A) A Performance Bond in an amount equal to the full contract amount conditioned upon the faithful performance of the contract in accordance with plans, specifications and conditions thereof. Such bond shall be solely for the protection of the Contracting Agency awarding the contract.
- B) A Payment Bond in an amount equal to the full contract amount solely for the protection of claimants supplying labor or materials to the Contractor or his Subcontractors in the prosecution of the work provided for in such contract.

Each such bond shall include a provision allowing the prevailing party in a suit on such bond to recover as a part of his judgment such reasonable attorney's fees as may be fixed by a judge of the court.

Each such bond shall be executed by a surety company or companies holding a certificate of authority to transact surety business in the State of Arizona issued by the Director of the Department of Insurance. The bonds shall not be executed by an individual surety or sureties. The bonds shall be made payable and acceptable to the Contracting Agency. The bonds shall be written or countersigned by an authorized representative of the surety who is either a resident of the State of Arizona or whose principal office is maintained in this State, as by law required, and the bonds shall have attached thereto a certified copy of Power of Attorney of the signing official. In addition, said company or companies shall be rated "Best A-" or better as required by the Contracting Agency, as currently listed in the most recent Best Key Rating Guide, published by the A.M. Best Company.

SUBSECTION 103.6 CONTRACTOR'S INSURANCE:

A statement from the bidder's insurance carrier shall be included in the proposal certifying that it will furnish the specified kind and amounts of insurance to the bidder if it is awarded the contract. As required by law, the statement will be from an insurance carrier or carriers authorized to do business in the State of Arizona, or countersigned by an agent of the carrier authorized to do business in the State of Arizona. Concurrently with the execution of the contract, Contractor shall furnish a Certificate of Insurance, using the included Certificate, that names the additional insureds as set out in the Certificate. The Certificate shall also name the additional insureds as Certificate Holders. The types of insurance and the limits of liability shall be as indicated on the included form.

Subsection 103.6.1 General: The Contractor shall agree to carry all insurance which may be required by Federal and State Laws, County and City Ordinances, Regulations and Codes. Neither the Contractor nor any subcontractor shall commence work under a contract until the Contracting Agency has approved the insurance. The entire project covered by the contract will be at the Contractor's risk until final acceptance by the Contracting Agency.

Concurrently with the submittal of the contract, the Contractor shall furnish the Contracting Agency the following:

- (A) **Public Liability and Property Damage Insurance:** The Contractor shall provide and maintain, during the life of the contract, General Liability, Automobile Liability, and Worker's Compensation Insurance as follows:

INSURANCE	MINIMUM LIMITS OF LIABILITY
GENERAL LIABILITY	\$1,000,000 Combined Single Limit
Comprehensive Form	
Premises/Operations	
Underground Explosion	
and Collapse Hazard	
Exclusions Deleted	
(where applicable)	
Products/Completed	
Operations	
Contractual	
Independent Contractors	
(OCP)	
Broad Form Property Damage	
Personal Injury With Exclusion	
"C" Deleted	

AUTOMOBILE LIABILITY	\$1,000,000 Combined Single Limit
Owned	
Hired	
Non-Owned	
EXCESS LIABILITY	As required
Umbrella Form	
WORKER'S COMPENSATION & EMPLOYERS' LIABILITY	Statutory Limits
BUILDER RISK/COURSE OF CONSTRUCTION	As required

The Contracting Agency shall have no responsibility or liability for such insurance coverage.

The Contractor shall furnish a Certificate of Insurance on a form approved by the Contracting Agency. The Certificate shall be issued by an insurance company authorized to transact business in the State of Arizona, or be named on the list of Unauthorized Insurers maintained by the Arizona Department of Insurance. Insurance coverage shall not expire until all the work has been completed and the project has been accepted by the Contracting Agency. If an insurance policy does expire during the life of the contract, the Contractor shall provide a renewal certificate of the required insurance coverage to the Contracting Agency not less than thirty (30) days prior to the expiration date.

- (B) **Worker's Compensation and Employer's Liability:** A Letter of Certification, from the Industrial Commission of Arizona, that the Contractor is insured by the State Compensation Fund or is an authorized self-insurer or a Certificate of Insurance issued by an insurance company authorized by the Arizona Department of Insurance to provide Workmen's Compensation and Employer's Liability Insurance in the State of Arizona.
- (C) **Builders Risk/Course of Construction:** When the project includes construction of a new building or addition to an existing building, the Contractor shall also obtain insurance coverage for at least, as a minimum, the perils of fire, extended coverage, vandalism and malicious mischief for the full amount of the contract. The Contractor shall be responsible for any deductibles, mutual waiver of subrogation and any co-insurance for the construction that is the subject of this contract.
- (D) **Additional Insured:** The **Flood Control District of Maricopa County** shall be named as insureds on policies listed in (A) and (C) and this shall also be indicated on the Certificates of Insurance issued to the Contracting Agency. The Contractor's coverage shall be primary for any and all losses arising out of the performance of this contract. The Contractor's Insurance shall include additional insureds as indicated on the included Certificate of Insurance.
- (E) **Owner Protective Policy:** In addition to other insurance the Contractor is required herein to provide and maintain in its own name, the Contractor shall also provide and maintain a separate policy of insurance, at its sole cost and expense, naming the Contracting Agency as the insured and providing primary coverage for the Contracting Agency in an amount not less than One Million Dollars, or other minimum amount determined by the Agency, for personal injury or death, per person and per occurrence, and not less than \$500,000 for property damage for any damage or injury suffered as a result of any work performed by Contractor or its employees, representatives, contractors or subcontractors in connection with the Project or Permit. Such policy shall also provide the Contracting Agency coverage, in the amounts specified above, for any and all damages or injury suffered as a result of alleged acts or omissions of the Contracting Agency in connection with, directly or indirectly, the Project or Permit. Such policy shall be primary and not contributory to any insurance maintained by the Contracting Agency. The insurance company writing such policy must have a BEST rating of not less than "A-" and be licensed by the Arizona Department of Insurance to do business in the State of Arizona. The form of the policy must be approved by the Contracting Agency before the notice to proceed will be issued.

Subsection 103.6.2 Indemnification of the Contracting Agency Against Liability: To the fullest extent permitted by law, the Contractor, its successors, assigns and guarantors, shall pay, defend, indemnify and hold harmless the Agency, its agents, representatives, officers, directors, officials and employees from and against all allegations, demands, proceedings, suits, actions, claims, damages, losses, expenses, including but not limited to, attorney fees, court costs, and the cost of appellate proceedings, all claim adjusting and handling expense, related to, arising from or out of or resulting from any actions, acts,

errors, mistakes or omissions caused in whole or part by the Contractor relating to work or services in the performance of the Contract, including but not limited to, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable and any injury or damages claimed by any of the Contractor's and Subcontractor's employees. Additionally, Contractor shall execute the Indemnification found in the Construction Documents.

SUBSECTION 103.7 EXECUTION AND APPROVAL OF CONTRACT:

The Contractor shall execute the contract with the Contracting Agency as follows:

- A) Bond Issue or Budget Projects within 10 calendar days after the date of Notice of Award of contract from the Contracting Agency.
- B) Improvement District Projects, not less than 15 or more than 20 calendar days after the date of the first publication of Notice of Award, if no objections have been filed.

The Contracting Agency will approve and execute the contract within 10 calendar days following receipt of signed contract and acceptable bonds and certificates of insurance.

No contract shall be considered in effect until it has been fully executed by all parties concerned.

Information relative to the execution of contract documents may be obtained from the Engineering Office of the Contracting Agency advertising for bids.

SUBSECTION 103.8 FORFEITURE OF PROPOSAL GUARANTEES:

If the Contractor fails or refuses to enter into the contract, within the time stated, then the Contracting Agency may declare a forfeiture of his proposal guarantee as liquidated damages for failure to enter into the contract.

End of Section

SECTION 104 SCOPE OF WORK

SUBSECTION 104.1 WORK TO BE DONE:

Subsection 104.1.1 General: The Contractor shall perform all work as may be necessary to complete the contract in a satisfactory and acceptable manner in full compliance with the plans, specifications and terms of the contract. Unless otherwise specified in the special provisions, the Contractor shall furnish all labor, materials, equipment, transportation, utilities, services and facilities required to perform all work for the construction of the project within the time specified.

The proposed work is located in unincorporated Maricopa County. The site is approximately 40 miles west of Phoenix and can be reached by proceeding west on Northern Avenue. The northern gate to the site is located on the south side of Northern Avenue, west of the Beardsley Canal. The overall construction activities associated with the remediation of the White Tanks Flood Retarding Structure (FRS) No. 3 will be completed in two (2) phases. The proposed Work outlined in these construction documents relates to the first phase (Phase 1) construction activities. Phase 2 activities are not part of this scope.

Principal construction features for the Phase 1 portion of the project include:

- A) Overexcavation to remove undesirable soil materials.
- B) Installation of two cutoff walls with Soil-Cement-Bentonite (SCB) backfill.
- C) Construction of a soil cement dam extension approximately 2,500 feet long.
- D) Two outlet pipes with appurtenant structures including; a Principal spillway, two manually operated sluice gates with trashrack structures, and an impact basin common to both pipes.
- E) Structural fill and Common fill construction over the soil cement dam extensions and for the transitions from the soil cement to the existing White Tanks FRS No. 3.
- F) Installation of various gradations of sand and gravel to serve as filters and/or drains.
- G) Closure activities for two existing outlet pipes within the existing White Tanks FRS No. 3.

The prescribed schedule for construction is as follows:

1. Excavate the upstream face of the existing White Tanks FRS No. 3 and upstream soil cement foundation.
2. Construct cutoff walls within soil cement foundation area.
3. Perform outlet pipe closure activities for the two (2) existing outlet pipes.
4. Construct the lower lifts of the soil cement extension and soil cement outlet works foundation.
5. Construct the outlet pipes and principal spillway.
6. Construct the soil cement extension with structural and common fill cover.
7. Construct the structural fill transitions to the existing White Tanks FRS No. 3.
8. Breach the existing White Tanks FRS No. 3 and complete the construction of the outlet works. **Note: Breaching of the existing White Tanks FRS No.3 cannot be performed until all upstream construction activities and structural fill transitions have been completed and approved.**

If feasible and practical, the period of time when White Tanks FRS No. 3 is breached shall be during the period of April to June.

The average elevation of the project is 1200 feet (NAVD 1988).

No interruption of traffic will be permitted on surface streets.

All water for construction purposes, drinking water, temporary electric power, heat and telephone service shall be arranged and provided for as per requirements of the work by Contractor at his expense.

The U.S. Army Corps of Engineers Section 404 Permit (**Appendix B**) outlines the requirements for the Contractor to follow during all construction activities at the site. Jurisdictional Waters of the United States identified at the site have been delineated on the Plans.

Inspection and Testing:

The Contractor will be responsible for all quality control for the project and will provide the Engineer with copies of the results of all tests performed by the Contractor Quality Control. The Owner and Engineer will provide quality assurance of the project. The construction quality assurance and quality control requirements are detailed in the Construction Quality Assurance Quality Control Plan included in **Appendix A**.

Quality control refers to those actions taken by the Contractor, and those parties charged with the procurement and installation of manufactured materials, and the placement and compaction of the soil materials, which provide a means to determine and sometimes quantify the characteristics of the product. The results of a quality control program are compared to the Special Provisions of other contractual or regulatory requirements. During each aspect of the handling of these materials, quality control is provided by the manufacturer, fabricator, or installer of the materials, or the supplier and earthworks contractor for the soils, to ensure that the materials and workmanship conform to the plans and Special Provisions. The Contractor and his suppliers and manufacturers retain quality control responsibility.

Quality assurance is a planned and systematic pattern of all means and actions intended to provide adequate confidence that the materials and procedures conform to the plans and Special Provisions, and any applicable regulatory requirements. The Owner, or their designated representative, provides quality assurance.

Subsection 104.1.2 Maintenance of Traffic: The Contractor's operations shall be in accordance with the traffic manual and/or policies of the appropriate public agency having jurisdiction over the project and Section 401. These operations shall cause no unnecessary inconvenience to the public and public access rights shall be considered at all times. Unless otherwise authorized in the specifications or on a temporary basis by the Engineer, traffic shall be permitted to pass through the work area. The Contractor shall coordinate with the various agencies both commercial and public, involved in the collection and removal of trash and garbage, so that adequate services are maintained.

Safe and adequate pedestrian and vehicular access shall be provided and maintained to fire hydrants, commercial and industrial establishments, churches, schools, parking lots, motel, hospitals, fire stations, police stations, and establishments of a similar nature. Access to residential properties shall be in accordance with Section 107.

Grading operations, roadway excavation and fill construction shall be conducted and maintained in such a manner as to provide a reasonably satisfactory and safe surface for vehicular and pedestrian traffic. When rough grading is completed, the roadbed shall be brought to and maintained in a reasonably smooth condition, satisfactory and safe for vehicular traffic at the posted speed limit. Pedestrian walkways shall be provided and maintained in a like manner. The Contractor shall accomplish any additional grading operations and/or repairs, including barricade replacement or repairs during working and nonworking periods which, in the opinion of the Engineer, are required.

In the event of abnormal weather conditions, such as windstorms, rainstorms, etc., the Contractor shall immediately inspect his work area and take all necessary actions to insure that public access and safety are maintained.

The Contractor shall provide the Engineer with the emergency address of his representatives as required by Section 105.

Subsection 104.1.3 Cleanup and Dust Control: Throughout all phases of construction, including suspension of work, and until final acceptance of the project, the Contractor shall keep the work area clean and free from rubbish, excess materials and debris generated by Construction Activities.

At disposal sites and storage sites, other than agency landfills, the Contractor shall be responsible for all required dust control measures. This includes temporary yard or staging areas.

The Contractor shall take whatever steps, procedures or means required to prevent any dust nuisance due to his construction operations. The dust control measures shall be maintained at all times to the satisfaction of the Engineer and in accordance with the requirements of the Maricopa County Bureau of Air Pollution Control Rules and Regulations.

Failure of the Contractor to comply with the Engineer's cleanup orders may result in an order to suspend work until the condition is corrected. No additional compensation or time will be allowed as a result of such suspension and the Engineer has the authority to take such other measures as may be necessary to remedy the situation. Subsection 104.2.5 applies.

Subsection 104.1.4 Final Cleaning Up: Before final acceptance, all private or public property and grounds occupied by the Contractor in connection with the work shall be cleaned of all rubbish, excess materials, temporary structures and equipment, and all parts of the work area shall be left in an acceptable condition.

SUBSECTION 104.2 ALTERATION OF WORK:

Subsection 104.2.1 By the Contracting Agency: The Owner may, at any time, by written order, and without notice to the sureties, make changes within the general scope of this contract in any one or more of the following:

- A) Drawings, designs, or specifications
- B) Method or manner of performance of the work
- C) Owner-furnished facilities, equipment, materials, services, or site
- D) Directing acceleration in the performance of the work

Any other written or oral order from the Owner that causes a change shall be treated as a change order under this section provided that the Contractor gives the Owner written notification within two working days after receipt of such direction stating:

- A) The date, nature, and circumstances of the conduct regarded as a change
- B) The particular elements of the contract performance for which the Contractor is seeking an equitable adjustment under this section, including any price or schedule adjustments
- C) The Contractor's estimate of the time by which the Owner must respond to the Contractor's notice to minimize cost, delay, or disruption of performance.

The Contractor shall diligently continue performance of this contract to the maximum extent possible in accordance with its provisions. Except as provided in this section, no order, statement, or conduct of the Owner shall be treated as a change or entitle the Contractor to an equitable adjustment. If any change under this section 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, the Owner shall make an equitable adjustment and modify the contract in writing. The equitable adjustment shall not include increased costs or time extensions for delay resulting from the Contractor's failure to provide notice or to diligently continue performance. No proposal for the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

Subsection 104.2.2 Due to Physical Conditions:

- A) Should the Contractor encounter or discover during the process of the work, subsurface or latent physical conditions at the site differing materially from those indicated in the contract, or unknown physical conditions at the site of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract, the Engineer shall be promptly notified in writing of such conditions before they are disturbed. The Engineer will thereupon promptly investigate the conditions and, if he finds they do so materially differ and cause an increase or decrease in the cost of or the time required for performance of the contract, an equitable adjustment will be made and the contract modified in writing accordingly.

- B) If at the time of opening up any portion of the work, material from which the subgrade, backfill or bedding is to be constructed contains an excess of moisture so that the required compaction cannot be obtained without additional manipulation, the Engineer will determine the cause of such condition. If the cause of such condition is determined to have been unforeseeable and beyond the control of and without fault or negligence of the Contractor, the Engineer will determine whether the material shall be aerated or removed and replaced. Such work shall be done as directed and will be paid for as provided in Section 109.
- C) Failure to notify the Engineer of the conditions described in A and B above prior to doing any work may be just cause to reject any claims for additional monies and/or time.
- D) Material in ditches and ditch banks that contains moisture in an amount considered excessive by the Engineer shall be removed and shall be aerated to the extent required by the Engineer before compaction is effected. No measurement or direct payment for the removal and aeration of such material will be made.
- E) After any portion of the work has been opened up, saturation of material caused by irrigation water, storm drainage, weather or such similar causes will be considered as within the responsibility of the Contractor.

Subsection 104.2.3 Due to Extra Work: The Contractor shall perform unforeseen work, for which there is no unit bid price in the proposal, whenever it is deemed necessary or desirable by the Engineer in order to fully complete the work as contemplated. Such work shall be governed by all applicable provisions of the contract documents and payment will be made in accordance with the provisions set forth in Section 109.

Should the Contractor claim that any instructions received involve extra work under the contract, he shall give the Engineer written notice within two work days after receipt of such instructions, and in any event before proceeding to execute the work, except in emergencies endangering life or property. No claim shall be valid unless written notice is given.

If this extra work is performed by others, the Contractor agrees to cooperate fully with the other source accomplishing this work and agrees that this action shall not invalidate the Contract or release the surety.

The Owner may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract in any one or more of the following:

- A) Drawings, designs, or specifications;
- B) Method or manner of performance of the work;
- C) Owner-furnished facilities, equipment, materials, services, or site;
- D) Directing acceleration in the performance of the work.

Any other written or oral order from the Owner that causes a change shall be treated as a change order under this section provided that the Contractor gives the Owner written notification within two work days after receipt of such direction stating:

- A) The date, nature, and circumstances of the conduct regarded as a change;
- B) The particular elements of the contract performance for which the Contractor is seeking an equitable adjustment under this section, including any price or schedule adjustments;
- C) The Contractor's estimate of the time by which the Owner must respond to the Contractor's notice to minimize cost, delay, or disruption of performance.

The Contractor shall diligently continue performance of this contract to the maximum extent possible in accordance with its provisions. Except as provided in this section, no order, statement, or conduct of the Owner shall be treated as a change or entitle the Contractor to an equitable adjustment. If any change under this section 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, the Owner shall make an equitable adjustment and modify the contract in writing. The equitable adjustment shall not include increased costs

or time extensions for delay resulting from the Contractor's failure to provide notice or to diligently continue performance. No proposal for the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

Subsection 104.2.4 At the Contractor's Request: Changes in the plans or specifications, which do not materially affect and are not detrimental to the work or to the interests of the Contracting Agency, may be granted to facilitate the work. Requests shall be in writing and submitted to the Engineer for approval. These changes, if approved and when resulting in a saving to the Contractor, will be made at an equitable reduction in cost or in no case at any additional cost to the Contracting Agency.

The Contractor and any lower-tier subcontractors shall submit itemized cost estimates or price proposals for any owner-directed change order or Contractor-initiated claim.

Cost estimates or pricing proposals shall be itemized to include direct labor by man-hours, individual craft, hourly wage rate and verifiable labor burden. Other direct costs shall include rental and operator rates for rented or owned equipment, material trucking expenses and other costs clearly identified and directly allocable to contract performance. Material costs shall be itemized by item description, quantity for each item, unit price per item, including applicable sales tax markup, and extended total price per item. The Contractor shall provide copies of material supplier quote sheets, invoices or purchase orders, as appropriate. In case of a conflict between the unit price and the extended total for a specific item, the unit price will govern.

Lump sum cost estimates or price proposals shall be rejected and returned to the Contractor for itemization as described above. Failure of the Contractor to submit properly itemized cost estimates or price proposals shall not constitute an excusable delay and will result in a change order being unilaterally priced at the Owner's fair estimated price.

Subsection 104.2.5 Due to the Failure of the Contractor to Properly Maintain the Project:

- A) If the Contractor fails to provide adequate Maintenance of Traffic or Cleanup and Dust Control or to correct deficiencies resulting from abnormal weather conditions, the Engineer has the authority to suspend the work wholly or in part until this condition has been corrected.
- B) If the Contractor fails to comply with the Engineer's written order to provide adequate maintenance of traffic, cleanup, dust control, or to correct deficiencies resulting from abnormal weather conditions, the Engineer has the authority to have this work accomplished by other sources.
- C) The Contractor agrees to cooperate fully with the other source accomplishing this work and agrees that this action shall not invalidate the Contract or release the surety.

Subsection 104.2.6 Value Engineering:

- A) **General.** The Contractor is encouraged to voluntarily develop, prepare, and submit value engineering change proposals (VECPs). The Contractor shall share in any instant contract savings realized from accepted VECPs, in accordance with paragraph (F) below. The Owner reserves the right to make alterations to the contract, in accordance with procedures elsewhere within this contract. Such alterations will not be eligible for inclusion in any VECP.
- B) **Definitions.**

Contractor's development and implementation costs means those costs the Contractor incurs on a VECP in developing, testing, preparing, and submitting the VECP as well as those costs incurred by the Contractor to make the changes required by the Owner's acceptance of the VECP.

Owner costs means those owner costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistical support. The term does not include the normal administrative costs of processing the VECP.

Instant contract savings means the estimated reduction in Contract cost of performance resulting from acceptance of the VECP, minus the allowable Contractor's development and implementation costs, minus subcontractor's development and implementation costs (see paragraph (G) below).

Value engineering change proposal (VECP) means a proposal that (1) requires a change to the contract; (2) results in reducing the contract price or estimated cost without impairing essential functions or characteristics; and (3) does not involve a change in deliverable end item quantities, schedule, or a change to the contract type.

- C) **VECP Preparation.** As a minimum, the Contractor shall include in each VECP the information described in subparagraphs (1) through (7) below. If the proposed change affects contractually required schedule and cost reporting, it shall be revised to incorporate proposed VECP modifications. The VECP shall include the following:
- (1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effects of the change on the end item's performance. All design changes must be submitted on 24"x 36" standard drawing sheets along with supporting calculations. Each drawing sheet and at least the content sheet of the calculations shall be sealed by an Engineer registered in the State of Arizona.
 - (2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revision.
 - (3) A separate, detailed cost estimate for the affected portions of the existing contract requirements and the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (G) below.
 - (4) A description and estimate of costs the Owner may incur implementing the VECP, such as test and evaluation and operating and support costs. This is an estimate based only on the Contractor's understanding of additional efforts to be expended by the Owner, should the VECP be accepted. The final cost will be determined by the Owner.
 - (5) A prediction of any effects the proposed change would have on collateral costs to the agency, i.e., costs of operation or maintenance.
 - (6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.
 - (7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved and previous Owner actions, if known.
- D) **Submission.** The Contractor shall submit VECPs to the Owner's Engineer.
- E) **Owner Action.**
- (1) The Owner will notify the Contractor of the status of the VECP within 15 calendar days after receipt from the Contractor. If additional time is required, the Owner will notify the Contractor within the 15-day period and provide the reason for the delay and the expected date of the decision. The Owner will process VECPs expeditiously; however, it shall not be liable for any delay in acting upon a VECP.
 - (2) If the VECP is not accepted, the Owner will notify the Contractor in writing, explaining the reasons for rejection.
 - (3) The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Owner.
 - (4) Any VECP may be accepted, in whole or in part, by the Owner's award of a change order to this contract, citing this subsection. The Owner may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a change order incorporates a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The Owner's decision to accept or reject all or any part of any VECP shall be final and not subject to disputes or otherwise subject to litigation.

- F) **Cost Sharing.**

- (1) **Rates.** The Owner's share of savings is determined by subtracting the Owner's costs from instant contract savings and multiplying the result by 50 percent. The Contractor's share shall be the remaining 50 percent.
 - (2) **Payment.** Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a change order to this contract to accept the VECP, reduce the contract price or estimated cost by the amount of instant contract savings, and provide the Contractor's share of savings by adding the amount calculated to the contract price.
- G) **Subcontracts.** The Contractor may include an appropriate value engineering clause in any subcontract. In computing any adjustment in this contract's price under paragraph (F) above, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Owner under this contract, but shall exclude any value engineering incentive payments; provided that these payments shall not reduce the Owner's share of the savings resulting from the VECP.

End of Section

SECTION 105 CONTROL OF WORK

SUBSECTION 105.1 AUTHORITY OF THE ENGINEER:

Subsection 105.1.1 Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to subsections 105.3.1 and 106.4. Engineer will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without Engineer's prior written acceptance that will be evidenced by either a Change Order or an approved Shop Drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. Engineer will record time required by Engineer and Engineer's Consultants in evaluating substitutes proposed or submitted by Contractor pursuant to subparagraphs 105.3.1 and 106.4(B) and in making changes in the Construction Documents (or in the provisions of any other direct contract with Owner for work on the project) occasioned thereby. Whether or not Engineer accepts a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer and Engineer's Consultants for evaluating each such proposed substitute item.

The Engineer will decide all questions which may arise as to the quality and acceptability of materials furnished and work performed and as to the rate of progress of the work; all questions which may arise as to the interpretation of the plans and specifications; all questions as to the acceptable fulfillment of the contract on the part of the Contractor. The Engineer's estimates and decisions shall be final and conclusive. In case any question should arise, relative to the Contract Documents, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive final approval of the work being questioned under the contract.

In giving instructions, the Engineer may make minor changes in the work, not involving extra work and not inconsistent with the purpose of the work, except in emergencies endangering life or property.

The Engineer will suspend the work wholly or in part due to the failure of the Contractor; to correct conditions unsafe for the workmen or the general public; for failure to carry out provisions of the contract; for failure to carry out orders; for such periods as he may deem necessary due to unsuitable weather; for conditions considered unsuitable for the prosecution of the work or for any other condition or reason deemed to be in the public interest.

SUBSECTION 105.2 PLANS AND SHOP DRAWINGS:

Shop Drawings means drawings, submitted to the Engineer by the Contractor pursuant to the contract, showing in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit, and attachment details) of materials or 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.

Product Data is information on manufactured items, either stock or modified, and includes descriptive literature, operating data, performance curves, certified dimensional drawings, wiring or schematic control diagrams, piping, instrumentation, parts lists, and operating, maintenance, and lubrication manuals.

The Contractor shall submit, for review, a proposed schedule of shop drawings and product data submittals. This schedule will include concrete and asphalt concrete mix designs unless they are previously approved supplier's mix design. The schedule will show the needed response date for each submittal and will indicate the relationship of the submittal to the project construction schedule.

The Contractor shall submit five (5) copies of each shop drawing, product data or mix design to the Engineer for review. Each submittal shall be numbered sequentially and shall be submitted in accordance with the schedule established in conjunction with the Contracting Agency so as to cause no delay in the work schedule. The Contractor shall certify, by stamp or letter, that he has reviewed and approved the submittal and that it conforms to the requirements of the contract documents. If this certification is not included, the submittal will be returned without action.

At the time of each submittal, the Contractor shall define and delineate in writing, separate from the certification, any deviations from the contract documents. If the Engineer accepts this deviation, he will authorize the deviation by issuing a change order or if the deviation is minor by endorsement to the letter.

The Engineer will review and return the submittals in accordance with the previously established response date. The review will be only for conformance with the design concept of the work and for compliance with the information contained in the contract documents. The review of a specified item, as such, will not indicate review of the assembly in which the item functions. Review by the Engineer will not relieve the Contractor from responsibility for any errors or omissions in the submittals nor from his responsibility for complying with the contract documents. The only exception is deviations accepted in accordance with the preceding paragraph.

If the submittal is acceptable, one (1) copy with each page stamped "Furnish as Submitted" will be returned to the Contractor. The Contractor shall submit additional copies (as required) to the Engineer.

If the Engineer determines that the submittal requires corrections or is to be rejected, one (1) copy stamped "Furnish as Noted" or "Revise and Resubmit" will be returned to the Contractor. The Contractor shall submit five (5) corrected or new copies.

The copy stamped "Furnish as Submitted," returned to the Contractor, shall become a part of the contract documents and shall be kept at the job site. Any work done prior to the receipt of this review will be at the Contractor's risk and expense.

Subsection 105.2.1 Plans and Shop Drawings: Shop drawings means drawings, submitted to the Engineer by the Contractor pursuant to the contract, showing in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor the explain in detail specific portions of the work required by the contract.

Product Data is information on manufactured items, either stock or modified, and includes descriptive literature, operating data, performance curves, certified dimensional drawings, wiring or schematic control diagrams, piping, instrumentation, parts lists, and operating, maintenance and lubrication manuals.

SUBSECTION 105.3 CONFORMITY WITH PLANS AND SPECIFICATIONS:

All work performed and all materials furnished shall be in conformity with the lines, elevations, grades, cross sections, dimensions and material requirements, including tolerances, shown on the plans or indicated in the specifications.

In the event the Engineer finds the materials or the finished product in which the materials are used not in conformity with the plans and specifications, but that reasonably acceptable work has been produced, he shall then make a determination if the work shall be accepted and remain in place. In this event, the Engineer will document the basis of acceptance by contract modification which will provide for an appropriate adjustment in the contract price for such work or materials as he deems necessary to conform to his determination based on engineering judgment.

In the event the Engineer finds the materials or the finished product in which the materials are used or the work performed are not in conformity with the plans and specifications and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected by the Contractor at no additional cost to the Contracting Agency.

In all instances wherein the items and/or specifications require installation or construction in accordance with either manufacturers' or suppliers' recommendations and/or instructions, said recommendations and/or instructions shall be submitted with the applicable portion clearly marked for approval prior to the commencement of work on that item or portions of the contract.

Subsection 105.3.1 Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated and expressly required by the Construction Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Construction Documents. The procedure for review by Engineer will be similar to that provided in subparagraph 106.4(B).

SUBSECTION 105.4 COORDINATION OF PLANS AND SPECIFICATIONS:

The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, he shall immediately notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.

SUBSECTION 105.5 COOPERATION OF CONTRACTOR:

The Contractor will be supplied with a minimum of seven sets of approved plans and construction specifications, one set of which the Contractor shall keep available on the work at all times.

The Contractor shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Engineer, his inspectors, and other Contractors in every way possible.

The Contractor shall at all times be present at the work in person or represented by a competent superintendent. The superintendent shall be authorized to receive and fulfill instructions from the Engineer and who shall supervise and direct the work. No less than fourteen days prior to the scheduled/planned Notice to Proceed, the Contractor shall submit to the Engineer for review and approval, the name and qualifications of the proposed superintendent. When the superintendent is approved, he shall not be changed by the Contractor without written approval of the Engineer. Instructions and information given by the Engineer to the Contractor's superintendent shall be considered as having been given to the Contractor.

- A) All phases of the project such as concrete work, pipe work, etc., shall be under the direct supervision of a foreman or his designated representative on the site who shall have authority to accept instructions, with respect to that particular phase of the project, and take action required to properly carry out the work.
- B) In the event of noncompliance with the above, the Engineer may require the Contractor to stop work on that part of the project until the required supervision is present.

The Contractor shall file with the Engineer, the names, addresses, and telephone numbers of representatives who can be contacted, at any time, in case of emergency. These representatives must be fully authorized and equipped to correct unsafe or excessively inconvenient conditions on short notice.

Emergencies may arise during the progress of the work which may require special effort or require extra shifts of men to continue the work beyond normal working hours. The Contractor shall be prepared in case of such emergencies from whatever cause, to do all necessary work promptly.

Subsection 105.5.1 Partnering: The Owner intends to encourage the foundation of a partnering relationship with the Contractor and its subcontractors. This partnering relationship will be structured to draw on the strength of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance, intended to achieve completion within budget, on schedule, and in accordance with plans and specifications.

This partnering relationship will be bilateral in makeup. Any cost associated with effectuating partnering will be covered by the Bid Item. The initial partnering workshop shall be scheduled after award of the contract, and prior to the Notice to Proceed, and shall be facilitated by a third party competent in the fundamentals of partnering, and mutually acceptable to Contractor and Owner. The Contractor shall be responsible for scheduling, coordinating, and hiring the third party facilitator, and planning all of the partnering meetings in consultation with the Engineer. The Owner will be responsible to notify and coordinate attendance at the partnering meetings by other agencies. To achieve the desired partnering relationships, the Contractor will need to encourage attendance by its major subcontractors on the project. Follow-up workshops will be held periodically throughout the duration of the contract as agreed to by the Contractor and Owner.

An integral aspect of partnering is the resolution of disputes in a timely, professional, and non-adversarial manner. Alternative dispute resolution (ADR) methodologies will be encouraged in place of the more formal dispute resolution procedures. ADR will assist in promoting and maintaining an amicable working relationship to preserve the partnering relationship. ADR in this context is intended to be a voluntary, non-binding procedure available for use by the parties to this contract to resolve any dispute that may arise during performance.

Payment for Partnering will be made on the basis of invoices of actual costs, and will be for a total amount not to exceed the amount shown in the bid schedule for the item.

ITEM 105-1 – PARTNERING ALLOWANCE.

Subsection 105.5.2 Pre-Construction Meeting: After award of the contract, a pre-construction meeting shall be scheduled at a location and time (prior to mobilization and start of construction) to be agreed upon between the Owner and the Contractor. The Contractor shall make all necessary arrangements to have key personnel of his company and of his principal subcontractors present at the meeting. Each representative shall have authority to make commitments and act for his firm. The purpose of the pre-construction meeting is to discuss any specific concerns or potential problems that the Contractor is aware of, to provide general information appropriate to the contract, to identify responsible individuals for various functions within each organization, and to develop tentative dates for the start of construction. The Contractor shall submit to the Engineer during the pre-construction meeting the following documents:

1. Material data safety sheets
2. Manufacturers' certificates for all materials
3. Shop drawings
4. Preliminary survey layout, staking and excavation plans
5. Preliminary work schedule
6. Preliminary traffic control plan
7. Emergency telephone numbers
8. Signing authority letter
9. Name and telephone number of the certified safety professional
10. Any other documents specified in the Supplementary General Conditions and Special Provisions

The pre-construction meeting will cover topics such as critical elements of the work schedule, payment application and processing of invoices. Additionally, a scheduled start date for the work will be determined.

The Contractor shall be responsible to take minutes of the pre-construction meeting and distribute copies to all meeting participants. The meeting minutes shall be distributed within 48 hours of the meeting. At the subsequent construction progress meeting, the minutes will be attested or revised, as appropriate. The cost for attendance at the pre-construction meeting, and preparation and distribution of meeting minutes shall be incidental to the project and no extra payment will be made.

Subsection 105.5.3 Construction Progress Meetings: Construction progress meetings shall be scheduled weekly, or as considered necessary by the Owner. The Contractor shall make all arrangements to have key personnel of his company and of his principal subcontractors present at all progress meetings; representatives shall have authority to make commitments and act for their firms. The Contractor shall assume full responsibility to act for and commit any subcontractor employed by the Contractor, whether or not such subcontractor is represented at the meeting.

During the construction progress meeting the Owner's representative will act as chairman and will advise the Contractor of any administrative matters connected with the contract. The Contractor shall submit for review his two-week rolling schedule. The Contractor's representative at these meetings shall be prepared to discuss and resolve construction problems and concerns, material delivery and vendor data submittals status, construction progress as measured against the Contractor's approved construction schedule and the Contractor's short range construction activities as provided on his two-week rolling schedule. The Contractor shall not be relieved of his responsibility to fulfill all of the terms of the contract as a result of any inferences drawn or suggestions made available at these meetings.

The Contractor shall be responsible to take minutes of the construction progress meetings and distribute copies to all meeting participants. The meeting minutes shall be distributed within 48 hours of the meeting. At the subsequent construction progress meeting, the minutes will be attested or revised, as appropriate. The cost for attendance at meetings, and preparation and distribution of meeting minutes shall be incidental to the project and no extra payment will be made.

SUBSECTION 105.6 COOPERATION WITH UTILITIES:

Subsection 105.6.1 General: The Contracting Agency will notify all utility companies, all pipe line owners, or other parties affected, and endeavor to have all necessary adjustments of the public or private utility fixtures, pipe lines, and other appurtenances within or adjacent to the limits of construction, made as soon as practicable.

The Contractor shall comply with the requirements of ARS-40-360.21 through 40-360.29 (one call system, Blue Stake) in notification to the interested utility owners prior to start of construction. The Contractor shall resolve all problems with the utility owners concerned.

Where water users association facilities obstruct construction of the work, the Contractor shall contact officials of the association relative to the shutdown of irrigation water and shall acquaint himself with and conform to the requirements of the association.

Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the owners at their expense except as otherwise provided for in the special provisions or as noted on the plans. In the event an existing service is found to be in a materially different location than shown on the plans and requires additional or more costly work on the part of the Contractor, the procedures in Section 104, will apply.

It is understood and agreed that the Contractor has considered in his proposal all of the permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans and that no additional compensation will be allowed for any delays, inconvenience, or damage sustained by him due to any interference from the said utility appurtenance or the operation of moving them. If delays are encountered because utility owners have not relocated or adjusted their facilities, the contract time will be adjusted in accordance with Section 108.

It shall be the responsibility of the Contractor to ascertain the need for bracing or shoring of utility poles during the construction of the project and no additional compensation will be allowed for such bracing or shoring.

In general, the contract will indicate various utility items, certain of which are to be relocated or adjusted by the utility owner and others by the Contractor. Any work performed by the Contractor for any utility company, separate from the contract shall be paid for by the utility company and will not be a part of the agency contract.

An attempt has been made to determine the location of all underground utilities, drainage pipes, and structures; however, it shall be the Contractor's responsibility to cooperate with the pertinent utility companies so that any obstructing utility installation(s) may be adjusted. The location of the underground and overhead utilities as shown on the plans is based on the best available information. The Contractor shall not assume that this represents an exact location of the line. No guarantee is made to the accuracy of the location shown on the plans. The Contractor shall determine for himself the exact location of all utilities. Should Contractor's operations result in damage to any utility the location of which has been brought to its attention, he shall assume full responsibility for such damage. There also exists the strong likelihood that other abandoned older and undocumented underground utility and irrigation lines exist within the project area. **Contractor shall contact Arizona Blue Stake (telephone number 263-1100) a minimum of two (2) working days before beginning any underground work.** In addition, Blue Stake notification(s) shall be maintained on a current basis.

There may be utilities located within the project limits. As many as possible have been identified and shown in the approximate or anticipated locations. The Contractor shall bid his work recognizing that such utility interferences exist, and that other such utility crossings may exist that are not shown on the plans. The Contractor shall consider these utility interferences when bidding the project. All existing utilities shall be **protected-in-place (P.I.P.)**. It may be necessary for some of the utilities to be relocated to avoid conflict with construction. Appropriate bid item allowances have been provided for any such occurrences, and the Contractor shall bid them accordingly.

The following telephone numbers should put the Contractor in contact with the proper personnel:

Maricopa Municipal Water District #1 (MWD)	
Glen Vortherms	623-546-8266
Salt River Project Power Distribution (SRPPD)	
Greg Wilson	602-236-8643
Craig Wacker	602-236-6324
Salt River Project Power Transmission (SRPPT)	
Brent Bornmann	602-236-8073
Salt River Project Irrigation (SRP)	
Gary Bastian	602-236-4609

Arizona Public Service (APS)	
Steve Goodman	602-371-6965
AT&T Fiber Optic Telephone	
Franco Jauregui	909-898-4776
Qwest Communications	
Tom Meador	480-768-4284
Cox Communication (COX)	
Carl McKay	602-322-7214
El Paso Natural Gas (EPNG)	
Bill Ward	
Southwest Gas (SWG)	
Gene Florez	602-484-5302
Union Pacific Railroad Company (UPRR)	
Sam Kephart	602-257-2531

It shall be the responsibility of the Contractor to verify the location of all utilities prior to any construction activities in a particular area where such facilities may exist. All existing overhead and underground utilities shall be P.I.P. unless noted otherwise on the plans, these Supplementary General Conditions, and the Special Provisions.

At all times during construction, the Contractor shall comply with all laws, ordinances, rules, regulations, and safety requirements, including but not limited to the National Electric Safety Code, and the Occupational Safety and Health Standards for General Industry and specific requirements of electric utility companies when working in the vicinity of these high voltage lines.

Subsection 105.6.2 Notifications Requirement in the Event of Any Damage to or Dislocation of Underground Facilities: In the event of any damage to or dislocation of any underground facility, the Contractor responsible for the excavation operation shall immediately notify the owner of such facility and shall not attempt to repair any facility, except those intended for the conveyance or storage of water and sewage. The excavation shall be left open until the arrival of representatives of the owner. The owner will dispatch its representative promptly to examine the underground facility and, if necessary, make repairs.

Subsection 105.6.3 Construction Water: Construction water may be available from Maricopa Water District (MWD). The Contractor shall contact MWD to determine the availability of such water. The cost for such uses of these water resources is considered incidental to the project.

SUBSECTION 105.7 COOPERATION BETWEEN CONTRACTORS:

The Contracting Agency reserves the right at any time to contract for and perform other or additional work on or near the work covered by the contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct his work so as not to interfere with or hinder the progress or completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with his contract and shall protect and save harmless the Contracting Agency from any and all damages or claims that may arise because of inconvenience, delay, or loss experienced by him because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange his work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project. He shall join his work with that of others in an acceptable manner and shall perform it in proper sequence to that of the others.

The Contracting Agency will not honor any claim for extra compensation due to delays, extra work, or extension of time caused by any other Contractors working within the limits of the same project.

SUBSECTION 105.8 CONSTRUCTION STAKES, LINES AND GRADES:

The Engineer will set construction stakes establishing lines and grades for road work, curbs, gutters, sidewalks, structures and centerlines for utilities and necessary appurtenances as he may deem necessary, he will furnish the Contractor with all necessary information relating to the lines and grades. These stakes and marks shall constitute the field control by and in accordance with which the Contractor shall establish other necessary controls and perform the work. The following applies to the stakes, lines, and grades relative to construction:

- A) The Engineer will furnish a Benchmark which the Contractor will use to set line and grade for all construction. All other surveying required for the project shall be the Contractor's responsibility. The Engineer will not set any construction stakes.
- B) Before any construction work is started, the Contractor shall perform all base surveys and cross sections of existing conditions that may be required as a basis for quantity determination.
- C) The Contractor shall submit original construction surveyor's notes duly signed by a Registered Land Surveyor to the Engineer at the end of the project. Copies of the survey notes shall be submitted to the Engineer during construction as and when requested.
- D) As-built drawings shall be prepared by updating original mylar drawings as provided by the Owner. Any changes required are to be made in red ink having waterproof, opaque, and reproducible characteristics. Deleted items shall be crossed out or lined out; no erasures will be allowed. Paper as-built progress drawings shall be maintained in a current condition at all times until completion of the work and shall be available for review by the Engineer at all times. The final as-built mylar drawings shall be sealed by an Engineer registered in the State of Arizona and shall be provided by the Contractor to the Engineer prior to project close-out and prior to the final contract payment. As-builts will also be provided in electronic format using files on disk or CD as provided by the Owner.

The Contractor shall perform the work in accordance with the Engineer's stakes and marks, and shall be charged with full responsibility for conformity and agreement of the work with such stakes and marks.

The Contractor shall be held responsible for the preservation of all stakes and marks, and if the construction stakes or marks have been carelessly or willfully destroyed or disturbed by the Contractor, the cost for replacing them will be charged against him and will be deducted from the payment for the work.

The Contractor shall give notice to the Engineer not less than two (2) working days in advance of when he will require survey services in connection with any portion of the work.

The Contractor shall set the construction stakes for buildings establishing lines, grades, and elevations to include necessary utilities and appurtenances and shall be responsible for their conformance with plans and specifications. The Engineer will establish or designate a control line or bench mark of known location and elevation for use as a reference.

SUBSECTION 105.9 DUTIES OF INSPECTOR:

The Engineer may provide the Inspector, assistants, and other field staff to assist the Engineer in observing performance of the work of the Contractor. Through onsite observations of the work in progress and field checks of materials and equipment, the Inspector shall endeavor to provide further protection for the Contracting Agency against defects and deficiencies in the work of the Contractor, but, the furnishing of such services will not make the Inspector responsible for or give the Inspector control over construction means, methods, techniques, sequences, or procedures or for safety precautions or programs, or responsibility for the Contractor's failure to perform the work in accordance with the contract documents.

Inspectors employed by the Contracting Agency will be authorized to inspect all work done and materials furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication or manufacture of the materials to be used. The inspector will not be authorized to alter or waive the provisions of the contract. The inspector will not be authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

The inspector will, however, have the authority to reject work or materials until any questions at issue can be referred to and decided by the Engineer.

SUBSECTION 105.10 INSPECTION OF WORK:

Inspection of the work by the Engineer or his authorized representative shall not be considered as direct control of the individual workman and his work. The direct control shall be solely the responsibility of the Contractor's foreman and superintendent.

The Engineer shall be permitted to inspect all materials, and each part or detail of the work at any time for the purpose of expediting and facilitating the progress of the work. He shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection. Any work done or materials used without supervision and inspection by an authorized Contracting Agency representative may be ordered removed and replaced at no additional cost to the Contracting Agency. Failure to reject any defective work or materials shall not in any way prevent later rejection when such defect is discovered nor obligate the Engineer to final acceptance.

When any unit of government or political subdivision is to pay a portion of the cost of the work covered by the contract, its representatives shall have the right to inspect the work. Such inspection shall in no sense make any unit of government or political subdivision a party to the contract, and shall in no way interfere with the rights of either party to the contract.

SUBSECTION 105.11 REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK:

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness or any other cause, found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner.

No work shall be done without lines and grades having been given by the Engineer. Work done contrary to the instructions of the Engineer, work done beyond the lines shown on the plans, or as given, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at no additional cost to the Contracting Agency.

SUBSECTION 105.12 MAINTENANCE DURING CONSTRUCTION:

The Contractor shall maintain the work during construction and until the project is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces to the end so that the roadway or structures are kept in satisfactory conditions at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations. All cost of maintenance work during construction and before the project is accepted shall be included in the unit bid price on the various pay items.

SUBSECTION 105.13 FAILURE TO MAINTAIN ROADWAY OR STRUCTURE:

If the Contractor, at any time, fails to perform maintenance during construction, the Engineer will immediately notify the Contractor of such noncompliance. If the Contractor fails to remedy unsatisfactory maintenance within 24 hours after receipt of such notice, the Engineer may immediately proceed to maintain the project. The entire cost of this maintenance will be deducted from monies due or to become due the Contractor on his contract.

SUBSECTION 105.14 PARTIAL USE OR OCCUPANCY:

Should an urgent or unforeseen need occur, the Contractor agrees to let the Contracting Agency use or occupy a unit or portion of the project, such as a structure, utility service, or a section of road or pavement, prior to final acceptance.

Prior to such use or occupancy the Contracting Agency will prepare a written agreement with the Contractor and accomplish a partial acceptance inspection. The written agreement will include a revised construction schedule, responsibilities for maintenance of the partial acceptance and continued construction of the original project to final acceptance, payments, insurance and bond requirements.

SUBSECTION 105.15 ACCEPTANCE:

(A) **PARTIAL ACCEPTANCE:** If at any time during the prosecution of the project the Contractor substantially completes a unit or portion of the project, such as a structure, utility service, or a section of road or pavement, he may request the Engineer to make final inspection of that work. If the Engineer finds, upon inspection, that the work has been satisfactorily completed in compliance with the contract he may accept the work as being completed and the Contractor may be relieved of further responsibility for that work. Such partial acceptance shall in no way void or alter any terms of the contract.

(B) **FINAL ACCEPTANCE:** Upon due notice from the Contractor of presumptive completion of the entire project, the Engineer will make an inspection. If all construction provided for and contemplated by the contract is found completed to his satisfaction, that inspection shall constitute the final inspection and the Engineer will make the final acceptance. The Contractor will be notified in writing of this acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same, and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection provided the work has been satisfactorily completed. In such event, the Engineer will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of the final inspection.

End of Section

SECTION 106 CONTROL OF MATERIALS

SUBSECTION 106.1 SOURCE OF MATERIALS AND QUALITY:

All construction materials to be used on the work or incorporated into the work, equipment, plant, tools, appliances or methods to be used on the work shall be subject to the inspection and approval or rejection of the Engineer.

The materials used on the work shall meet all quality requirements of the contract. In order to expedite the inspection and testing of materials, the Contractor shall notify the Engineer of his proposed source of materials prior to delivery. At the option of the Engineer, materials may be approved at the source of supply before delivery is started. If it is found after trial that sources of supply for previously approved materials do not produce specified products the Contractor shall furnish materials from other sources.

Unless otherwise noted, all materials used in the project shall be new and unused. Additionally, any new materials used in this project that are damaged during the construction of the project and prior to final acceptance, as determined by the Engineer, shall be replaced by the Contractor with new material at no additional cost to the Contracting Agency.

Select Material, Aggregate Base, Mineral Aggregate, concrete, steel products and pipe shall be obtained from commercial sources. Contractor shall pay all royalties, or any other charges or expenses, incurred in connection with the securing and hauling of the material. Contractor will be required to furnish Engineer with a list of its proposed commercial sources prior to use, and shall present certificates stating that the material produced from any commercial sources is in accordance with the Special Provisions and these Supplementary General Conditions.

SUBSECTION 106.2 SAMPLES AND TESTS OF MATERIALS:

All materials to be incorporated in the work may be subject to sampling, testing and approval, and samples furnished shall be representative of the materials to be used. The Engineer may select samples, or may require that samples be delivered by the Contractor to a laboratory designated by the Engineer.

The Contracting Agency will pay for the initial or normal test required by the Engineer to guard against unsuitable materials or defective workmanship. Additional tests, required due to failure of the initial or normal test(s), shall be paid for by the Contractor. The Engineer will designate the laboratory which will accomplish the additional test(s).

The procedures and methods used to sample and test materials will be determined by the Engineer. Unless otherwise specified, samples and tests will be made in accordance with either the Materials Testing Manual of the Contracting Agency or the standard methods of AASHTO or ASTM, which were in effect and published at the time of advertising for bids.

The laboratory responsible for the test shall furnish at least one copy of the test results to the Contracting Agency or his designated representative, to the Contractor, and to the appropriate material supplier.

With respect to certain manufactured materials, the Engineer may permit the use of some materials prior to sampling and testing provided they are delivered with either a certificate of compliance or analysis or both, stating that the materials comply in all respects with the requirements of the specifications. These certificates shall be furnished in triplicate and clearly identify each delivery of materials to the work area. The certificates shall be signed by a person having legal authority to bind the supplier or manufacturer.

SUBSECTION 106.3 PLANT INSPECTION:

The Engineer may undertake the inspection of materials at the source. In this event, the following conditions shall be met:

- A) The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom he has contracted for materials.

- B) The Engineer shall have full entry at all times to such parts of the plant as may concern the manufacture or production of the materials being furnished.

It is understood that the Contracting Agency reserves the right to retest all materials, prior to use in the work, upon delivery.

SUBSECTION 106.4 TRADE NAMES AND SUBSTITUTIONS:

Whenever an item of material or equipment is specified or described in the Construction Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quantity required. Unless the specification or description contains or is followed by words reading that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment of other Suppliers may be accepted by Engineer under the following circumstances:

- A) "Or-Equal": If in the Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.
- B) Substitute Items: If in Engineer's sole discretion an item does not qualify as an "or-equal" item under subparagraph 106.4 (A), it will be considered a proposed substitute item. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. The procedure for review by Engineer will include the following and may be supplemented in the Construction Specifications and as Engineer may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall first make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice Contractor's achievement of completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Construction Documents (or in the provisions of any other direct contract with Owner for work on the project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other Contractors affected by the resulting change, all of which will be considered by Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish additional data about the proposed substitute.
- C) Contractor's Expense: All data to be provided by Contractor in support of any proposed "or-equal" or substitute item will be at Contractor's expense.
- D) If the final placement of a product will remain the property of the municipality or utility and/or owned by the municipality or utility, that entity is responsible for issuing written approval for any equivalent or "or-equal" products. The Contractor or Supplier will submit to that entity the request and documentation for written approval of a product substitution. The Contractor will provide the entity's written approval to the Engineer at the Pre-Construction Meeting.

Plans and specifications may contain references to equipment, materials or patented processes by manufacturer, trade name, make or catalog number. Unless the name is followed by words indicating that no substitution is permitted, such references shall be regarded as establishing a standard of quality, finish, appearance, performance or, as indicated, a selection based upon compatibility with existing equipment or materials.

The use of an alternate or substitute item or source may be permitted, subject to the following:

- A) No consideration will be given to a substitution prior to the award of the contract.
- B) Only substitutions submitted by the Contractor will be accepted for review. The substitution shall be submitted in writing to the Engineer.
- C) The submittal shall certify that the substitution will perform the functions and achieve the results called for by the general design, be similar and of equal substance, and be suited to the same use as that specified.
- D) The submittal shall state any required changes in the contract documents to adapt the design to the proposed substitution. This will include all changes required of other contractors/subcontractors affected by the resulting changes.
- E) The submittal shall contain an itemized estimate of all costs and credits that will result directly or indirectly from the acceptance of such substitution, including costs of design, license fees, royalties, testing, Engineer's evaluation, claims of other contractors/subcontractors, etc. Also, the submittal shall include any adjustment in the contract time created by the substitution.
- F) The Contractor, on request of the Engineer, shall submit samples or any additional information the Engineer may deem necessary to evaluate the acceptability of the substitution. The Engineer will evaluate the information provided, perform tests when necessary and make comparisons. The Engineer will then make the final decision as to the acceptability of the proposed substitution. The Contractor will be notified in writing by the Engineer as to whether his substitution has been accepted or rejected.
- G) The submittal, for purposes of review, number of copies, etc., shall follow the procedures as outlined in Section 105.2, except in the case of response time. If the Engineer does not respond in a timely manner, which in turn, impacts the substitution, the Contractor shall continue to perform the work in accordance with the contract and the substitution will be considered rejected. Also, no adjustment in the contract time will be granted for nonacceptance of the substitution.
- H) There will be no additional costs to the Contracting Agency for the substitution. If the substitution yields a net savings in the contract price, the amount of savings shall be divided between the Contracting Agency and the Contractor in a percentage established by the Contracting Agency.
- D) If the substitution is accepted and an adjustment in the contract cost and/or contract time is in order, a change order will be issued to the Contractor for the changes.

SUBSECTION 106.5 STORAGE OF MATERIALS:

The Contractor shall provide storage facilities and exercise such measures as will insure the preservation of the quality and fitness of all materials and/or equipment to be used in the work. Stored materials and/or equipment, even though approved before storage, may again be inspected prior to their use in the work. Stored items shall be located so as to facilitate their prompt inspection. That portion of the right-of-way and easements not required for public travel may be used for storage purposes, when approved by the Engineer. Any additional storage area as required must be provided by the Contractor. Private property shall not be used for storage purposes without written permission of the owner or lessee. If requested, by the Engineer, copies of such written permission shall be made available.

The Contractor shall obtain approval of the Engineer when using vacant property to park and service equipment and store materials for use. The Contractor will obtain prior written approval of the property owner for such use and submit a copy of the approval to the Engineer prior to use of the property.

The Contractor shall grade all construction yards, easements and limits of construction which are disturbed by construction or construction related activities to the lines and grades shown on the plans; or as a minimum, where no line or grade is shown, to a condition similar to or better than the pre-existing condition.

Subsection 106.5.1 Contractor Access: The proposed work is located in unincorporated Maricopa County. The site is approximately 40 miles west of Phoenix and can be reached by proceeding west on Northern Avenue to just beyond the Beardsley Canal. Access to the project is along an unimproved road across MWD and/or District property for which the Owner has obtained a service road right-of-way. The gated service road is located on the south side of Northern Avenue and parallels the Beardsley Canal for about 1/2-mile then turns southwest to the northern end of White Tanks FRS No. 3, which is fenced and gated. This is the only construction access available. Use of the access will require prior coordination with the MWD.

Maricopa Municipal Water District #1 (MWD)
14825 West Grand Avenue
Phoenix, Arizona
623-546-8266

SUBSECTION 106.6 HANDLING MATERIALS:

All materials and/or equipment shall be handled in such a manner as to preserve their quality and fitness for the work.

SUBSECTION 106.7 UNACCEPTABLE MATERIALS:

All materials and/or equipment not conforming to the requirements of the specifications, whether in place or not, may be rejected. Rejected materials and/or equipment shall be removed immediately from the site of work unless otherwise permitted by the Engineer. No rejected material and/or equipment, the defects of which have been subsequently corrected, shall be used until approved in writing by the Engineer.

SUBSECTION 106.8 FURNISHED MATERIALS:

Materials and/or equipment, furnished by the Contracting Agency, will be delivered or made available to the Contractor as indicated in the special provisions. The cost of handling and placing shall be considered as included in the contract price for the pay item with which they are used.

The Contractor will be held responsible for all materials and/or equipment accepted by him and will make good any shortages, deficiencies and damages which may occur after such acceptance.

End of Section

SECTION 107 LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

SUBSECTION 107.1 LAWS TO BE OBSERVED:

The Contractor shall keep fully informed of all Federal and State laws, County and City ordinances, regulations, codes and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any way affect the conduct of the work. He shall at all times observe and comply with all such laws, ordinances, regulations, codes, orders and decrees; and shall protect and indemnify the Contracting Agency and its representatives against any claim or liability arising from or based on the violation of such, whether by himself or his employees.

The attention of the Contractors is directed to the provisions of the following sections, Arizona Revised Statutes.

- A) ARS 23-373. Contracts negotiated between public Contractors and public employers shall contain the following contractual provisions:

In connection with the performance of work under this contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of race, religion, color or national origin. The aforesaid provision shall include, but not be limited to, the following: Employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the contracting officer setting forth the provision of the nondiscrimination clause.

The Contractor further agrees to insert the foregoing provision in all subcontracts, except subcontracts for standard commercial supplies or raw materials.

- B) When Federal-aid funds are used on a project, the prevailing basic hourly wage rates and fringe benefit payments, as determined by the Secretary of Labor pursuant to the provisions of the Davis-Bacon Act, shall be the minimum wages paid to the described classes of laborers and mechanics employed to perform the contract.
- C) ARS 40-360.22 Excavations: determining location of underground facilities; providing information. This statute requires that no person shall begin excavating before the location and marking are complete or the excavator is notified that marking is unnecessary and requires that upon notification, the owner of the facility shall respond as promptly as practical, but in no event later than two working days. The "Blue Stake Center" (263-1100) was formed to provide a more efficient method of compliance with this statute.

This section is not applicable to an excavation made during an emergency which involves danger to life, health or property if reasonable precautions are taken to protect underground facilities.

- D) ARS-40-360.23. Making excavations in careful, prudent manner: liability for negligence. This statute states that obtaining information as required does not excuse any person making any excavation from doing so in a careful and prudent manner nor shall it excuse such persons from liability for any damage or injury resulting from his negligence.
- E) ARS-40-360.28 Civil penalty; liability. If the owner or operator fails to locate, or incorrectly locates the underground facility, pursuant to this article, the owner or operator becomes liable for resulting damages, costs and expenses to the injured party.
- F) ARS 32-2313. Business license; business name; branch office registration; renewal. No person, partnership, corporation or association shall engage in the business of general pest or weed control without being duly licensed/certified by the Structural Pest Control Board.

SUBSECTION 107.2 PERMITS:

Contractor shall obtain all permits and licenses, including those required by the City of Surprise, State of Arizona, Maricopa County, U.S. Government, or any other local or federal agency, and shall pay all charges, fees, taxes, and provide all notices

necessary and incidental to the due and lawful prosecution of the work. In particular, the Contractor will obtain all necessary AZPDES and SWPPP permits as required and in accordance with Subsection 107.2.1.

Corps of Engineers Section 404 Permit:

The Owner has applied for and obtained the necessary 404 Permit. A copy of the permit and associated stipulations is provided in **Appendix B**. The Contractor will review and abide by the permit and stipulations.

ADWR and NRCS Construction Approval:

The Arizona Department of Water Resources (ADWR) has determined that this project is under the jurisdiction of their Dam Safety Program. The project is also under the jurisdiction of the Natural Resources Conservation Service (NRCS). The Owner has applied for and received and obtained approval from ADWR and NRCS to construct the modifications to White Tanks FRS No. 3. All plans, specifications, addendums, plan and specification changes, shop drawings, Value Engineering proposals, and other documents pertinent to the modification of White Tanks FRS No. 3 will be reviewed by ADWR and NRCS. Any changes to the project plans, specifications, or materials will require advance approval by the District, ADWR, and NRCS. Construction means, methods, materials, products, and quality control will be reviewed, inspected, and subject to approval by ADWR and NRCS. Acceptance of the constructed facilities by the Owner will be contingent on approval by ADWR and NRCS. As such, it is imperative that the Contractor shall follow all the requirements specified on the plans and specifications, and maintain strict quality control for all construction work.

Subsection 107.2.1 – AZPDES Permit Requirements:

- A) This project is subject to the Arizona Pollutant Discharge Elimination System (AZPDES) Storm water requirements for construction sites under the Arizona Department of Environmental Quality's (ADEQ's) General Permit for Arizona. Under provisions of that permit, the Contractor shall be designated as permittee, and shall take all necessary measures to assure compliance with the AZPDES General Permit for Arizona as well as all other applicable Federal, State and local laws, ordinances, statutes, rules and regulations pertaining to storm water discharge. As the permittee, the Contractor is responsible for preparing, in a manner acceptable to the ADEQ, all documents required by this regulation, including but not necessarily limited to:
1. Storm Water Pollution Prevention Plan (SWPPP) for the project, including certification of compliance form. Contractor shall be required to develop, implement, update and revise the SWPPP, as necessary, in order to assure compliance with the ADEQ permit requirements. The SWPPP shall be retained on the project site at all times during construction.
 2. Notice of Intent (NOI) to assure compliance with the AZPDES General Permit for Arizona, including certification of signatures.
 3. Notice of Termination (NOT) of coverage under AZPDES General Permit for Arizona.
- B) The Contractor shall submit the completed and duly signed NOI forms to ADEQ no later than seven (7) business days after the contract award. Proof of the submittal date must be provided to the Owner. If the work is within 1/4 mile of an Impaired or Unique Water, the SWPPP needs to be submitted with the NOI to ADEQ. If the location is farther away than that, no SWPPP needs to be submitted to ADEQ but a copy of the SWPPP must be available on site.
- C) When the discharge is to an Impaired or Unique water or is in or near endangered species habitat as identified by ADEQ's smart NOI permitting system, applicants are not authorized under this permit for a minimum of 32 business days following the receipt of the NOI and SWPPP. ADEQ may notify operators within this time frame that there is cause for SWPPP amendment, or denial of coverage as specified in Parts 1.D.5 and 1.D.6 of the general permit. If notification is not received in the 32-business-day time frame, the Contractor may assume coverage under this permit according to ADEQ requirements. Contractor must notify Owner of the status of the NOI prior to commencing work. The applicant shall submit the NOI (application) to:

Arizona Department of Environmental Quality
Water Permits Section/Stormwater NOI (5415B-3)

1110 W. Washington Street
Phoenix, Arizona 85007
or fax to (602) 771-4674

If the facility has the potential to discharge to a municipal separate storm sewer system (MS4), the applicant must also forward a copy of the completed NOI to the owner/operator of the MS4 system at the time it is submitted to the Department.

Failure by the Contractor (or Subcontractors of any tier) to submit NOI's within the mandated time frame shall result in delay of the construction start date, and no claim for extension of time will be granted for such delay. A copy of the completed NOI shall be posted at the construction site and a copy of the general permit and SWPPP should be on-site at all times.

- D) Inspections of all storm water pollution control devices on the project shall be performed by Contractor every 7 days or at least once every 14 calendar days, and also within 24 hours of the end of a storm event of 0.50 inches or more as required under provisions of the AZPDES general permit for Arizona. A reduced inspection frequency may be used provided the conditions in Part IV.H.2 of the general permit have been met. Contractor shall prepare reports on such inspections and retain the reports for a period of three years after the general permit coverage expires or is terminated. Inspection reports shall be submitted monthly to Owner along with progress payment requests. Additionally, Contractor shall maintain all storm water pollution control devices on the project in proper working order, which shall include cleaning and/or repair during the duration of the project.
- E) Contractor warrants that its employees and Subcontractors of any tier and their employees shall at all times comply with all applicable laws, ordinances, statutes, rules and regulations set forth by all federal, state and local governments and ADEQ in connection with AZPDES permitting requirements and laws and regulations pertaining to air, groundwater and surface water quality.

Fines and penalties imposed by ADEQ against Owner or the Contractor for Contractor's failure to comply with any of the requirements of AZPDES General Permit of Arizona shall be borne by the Contractor.

- F) Upon project completion, acceptance and demobilization, Contractor shall submit its completed, duly executed NOT form to ADEQ at the address listed in Section (C) above, thereby terminating all AZPDES permit coverage for the project. Contractor shall then surrender to Owner copies of the SWPPP, inspection information and all other documents prepared and maintained by the Contractor in compliance of the AZPDES permit coverage for the project. Contractor shall retain the originals of such documents for a period of three (3) years following the completion of the project.
- G) The Lump Sum price for the SWPPP shall include all material, labor, and all other costs relating to the preparation, installation and maintenance of the SWPPP during project construction, including assuring proper operation of the pollution control devices installed, and all maintenance, cleaning, and disposal costs associated with clean-up and repair following storm events, runoff or releases on the project. The Lump Sum price for the SWPPP shall be inclusive of all costs, and no additional claims shall be made by Contractor under any other specification provision of these documents, including Changed Conditions. Payment for this bid item shall be upon completion and acceptance of the project, as per Section 109.1.
- H) Copies of all required forms and guidance for preparing the SWPPP are available in the "Drainage Design Manual for Maricopa County, Volume III Erosion Control." The manual is available at the Flood Control District, 2801 West Durango Street, Phoenix, Arizona 85009. For appropriate guidance and forms as provided by ADEQ, the Contractor should refer to the ADEQ website at:
<http://www.adeq.state.az.us/environ/water/permits/stormwater.html#const>.

Payment for Construction AZPDES/SWPPP permit requirements shall be made on the basis of lump sum for all work described in Subsection 107.2.1 for:

ITEM 107-1 AZPDES/SWPPP PERMITS

Subsection 107.2.2 – Other Permits: The following permits have been obtained by the Owner for the construction of the dam. The Contractor shall follow all terms and conditions of each permit as they apply to his operations.

State 401 Water Quality Certification:

The Corps of Engineers and the Arizona Department of Environmental Quality have determined that this activity is precertified for a Section 401 permit under nationwide permit no. 3. The following are general requirements of the certification:

**THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY –
POLICY FOR PROTECTING WATER QUALITY DURING FACILITY
CONSTRUCTION**

Appropriate items as listed below should be included in specifications for construction and related activities in or near watercourses. Adherence to the cited procedures should assure compliance with Water Quality Standards for Navigable Waters, A.A.C. R18-11-1. Specifications should require the person responsible for the activity to submit a program for effective control of water pollution to the person in charge of the project which includes procedures for protecting water from pollution with fuels, oils, bitumens, calcium chloride, silt, cement, asphalt, tires, batteries and other harmful materials, and for conducting and scheduling operations so as to avoid or minimize silting of the water.

**SPECIFIC PROCEDURES FOR PREVENTING WATER POLLUTION
MAY INCLUDE:**

1. *Provision for temporary pollution control measures such as: dikes, basins, ditches, diversions, silt fences and the application of straw and seed, to be functional prior to land disturbing activities.*
2. *Erosion control measures including minimizing clearing and grubbing and limiting exposure of erodible surface to 750,000 square feet for each construction phase or location.*
3. *Construction of footings in water by sheet pile cofferdam method and pumping water from within the dam to settling ponds before returning it to the watercourse.*
4. *Isolation of the construction area by dikes and/or berms.*
5. *Erection of barriers, covers, shields and other protective devices as necessary to prevent any construction materials, equipment or contaminants/pollutants from falling or being thrown into a watercourse.*
6. *Construction of drainage facilities with armoring when necessary to control erosion and sedimentation.*
7. *Provision of an adequate means, such as a bypass channel, to carry a stream free from mud and silt around operations which remove material from beneath a flowing stream.*
8. *A requirement for the transportation of materials across live streams to be conducted without muddying the stream. Mechanized equipment should not be operated in stream channels of live streams except as may be necessary to construct crossings or barriers and fill for channel modifications.*

9. A requirement for wash water from aggregate washing or other operations containing mud or silt to be treated by filtration or retention in a settling pond, or ponds adequate to prevent water from transporting sediment into streams or watercourses.
10. A requirement for oily or greasy or substances originating from the contractor's operations not be placed where they will later enter a stream or watercourse.
11. Provisions for Portland cement or fresh Portland cement concrete not be allowed to enter flowing water of streams.
12. A requirement to return the flow of streams as nearly as possible to a meandering thread without creating a possible future bank erosion problem when operations are completed.
13. A requirement that material derived from roadway work should not be deposited in a stream or watercourse where it could be washed away by stream flows.

Contractor shall follow all the requirements in the 401 Water Quality Certification permit. The permit will be attached to the bid documents.

US Army Corps of Engineers, 404 Permit (Appendix B to SGCs):

The Corps of Engineers has determined, under Section 404 of the Clean Water Act (33 U.S.C. 1344), that the contract work complies with the terms of the 404 Permit Number: 2004-00476-SDM (Reference Appendix B to SGCs).

The Contractor must comply with all General and Special Condition(s) of the 404 permit.

SUBSECTION 107.3 PATENTED DEVICES, MATERIALS AND PROCESSES:

If the Contractor employs any design, device, material, or process covered by letters of patent or copyright, he shall provide for such use by suitable legal agreement with the patentee or owner. The Contractor and the surety shall indemnify and save harmless the Contracting Agency, any affected third party or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Contracting Agency for any costs, expenses, and damages which it may be obligated to pay by reason of any infringement, at any time during the prosecution or after the completion of the work.

SUBSECTION 107.4 ARCHAEOLOGICAL REPORTS:

Attention is directed to Sections 41-844 and 41-846 Arizona Revised Statutes. In view of the above, it shall be a provision of every contract that when archaeological features are encountered or unearthed in the excavation of material pits or of the roadway prism, or other excavation, the Contractor shall report promptly to the Director of the Arizona State Museum and the Contracting Agency. The Contractor will be allowed extra time as appropriate in accordance with the provisions of Section 108.

Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the Contractor, or any person working on his behalf, shall be immediately reported to the Engineer. The Contractor shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Engineer. An evaluation of the discovery will be made by authorized personnel and the Engineer to determine appropriate actions to prevent the loss of significant cultural or scientific resources. The Contractor shall prevent his employees from trespassing on, removing, or otherwise disturbing such resources.

SUBSECTION 107.5 SAFETY, HEALTH AND SANITATION PROVISIONS:

The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements and regulations of the Arizona State Department of Health or as specified by the Maricopa County Health Department, Sanitary Code.

The Contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions, on his own responsibility or as the Engineer may determine, reasonably necessary to protect the life and the health of employees on the job, the safety of the public and to protect property in connection with the performance of the work covered by the contract.

Precaution shall be exercised by the Contractor at all times for the protection of persons (including employees) and property. The Contractor shall comply with the provisions of all applicable laws, pertaining to such protection including all Federal and State occupational safety and health acts, and standards and regulations promulgated thereunder.

The entire construction site shall be considered a "Hard Hat Area" and all personnel in the area will be required to wear a hard hat.

Subsection 107.5.1 Asbestos Materials: If asbestos materials are encountered during any building remodeling/demolition work, the Contractor shall comply fully with the Arizona Administrative Code, A.A.C. R18-2-901 and notify the Engineer. As stated in Section 350 of the Special Provisions, the upstream portions of the outlet pipes to be removed and the remaining portions of the upstream outlet pipes to be grouted in place, are known asbestos-containing-materials (ACM's). The asbestos lab testing results are included in Appendix C. An extension of contract time will be granted for any delay resulting from the discovery of asbestos materials, other than those outlined in these specifications, in accordance with Section 108.

Subsection 107.5.2 Lead-Containing Paint: Paint and similar surface coating materials that contain lead compounds and in which the lead content exceeds 0.06 percent of the total weight of the non-volatile content of the paint or the weight of the dried paint film is declared a banned hazardous product and will not be used (Consumer Product Safety Act Part 1303 dated 9-1-77).

Subsection 107.5.3 Compliance with the Arizona Communication Standard: Owner will provide Contractor with Material Safety Data Sheets (MSDS) for any products known to exist on the site that are deemed health hazards, Contractor will provide a copy of Owner-provided MSDS to all Subcontractors.

Contractor will provide Owner and all Subcontractors with MSDS for any products that have or are deemed health hazards that will be brought onto the site or created on the site by either Contractor or by any Subcontractors.

Contractor will provide Owner with a statement certifying that all personnel (Contractor and Subcontractor) employed by Contractor or by a Subcontractor on the job site have received the required Hazard Communication Standard training.

Subsection 107.5.4 Contractor's Status During any Hazard Remediation: If remediation of any discovered Regulated waste such as petroleum products (i.e. oil, grease), asbestos or hazardous waste not identified in this contract is necessary, the Owner will address the problem, and if this interferes with the project's critical path, then the CPM and project schedule will be reviewed and revised as mutually acceptable by the Engineer and Contractor to minimize the impact to the **total project schedule**. An extension in contract time for any delay to Contractor then resulting may be granted by Owner in accordance with Subsection 108.7.

If any Regulated substance, asbestos, or hazardous substance is encountered that results in a changed condition, then a change order may be issued in accordance with the contract.

If the delay impacts the CPM in such a manner that Contractor is prevented from continuing work on any portion of the project, and Owner issues a suspension of work order, then Contractor shall be entitled to compensation in the form of a **one-time payment** of Demobilization and Rebmobilization costs, which shall be no more than 6 percent of the original bid item for mobilization.

SUBSECTION 107.6 PUBLIC CONVENIENCE AND SAFETY:

The Contractor shall at all times so conduct his work as to assure the least possible obstruction to traffic and adjacent residents. The safety, convenience, and the protection of persons and property, of the general public and residents along the street, highway, and areas adjacent to the work area shall be provided for by the Contractor.

Subsection 107.6.1 Contractor's Marshaling Yard: Contractors shall notify the Engineer when using vacant property to park and service equipment and store material for use on the Contracting Agency construction contracts.

- A) Any use of vacant property adjacent to or near the project for parking or servicing equipment and/or storing of material will require the Contractor to obtain written approval from the property owner.
- B) A copy of the property owner's approval shall be submitted to the Engineer, stating the use of the Marshaling Yard in connection with the project.
- C) The Yard shall be adequately maintained to control dust and mud from leaving the property.
- D) Work in the Marshaling Yard shall be scheduled so as to comply with the Agency Noise Ordinance.
- E) Equipment, materials, etc., shall be located so as to minimize impact on adjacent properties.
- F) The Contractor shall clean up property promptly upon completion of use.
- G) Contractor's notification to the Engineer shall specify in detail how the Contractor proposes to comply with (C) through (F) above.
- H) The Contractor shall obtain a written release from the property owner after completion of use. A copy of the release shall be presented to the Engineer.

Subsection 107.6.2 Noise Level: The Contractor shall comply with the Agency Code concerning work hours and noise level during construction.

Subsection 107.6.3 Project Signs Allowance: Contractor shall provide and install five project information signs, at locations to be determined by the Engineer, before beginning construction to inform the public of the forthcoming project, construction dates, and suggested alternate travel routes. Project signs shall include the names of all agencies participating in the project. The signs shall also include the 24-hour hot line complaint telephone number. Signs shall be constructed in accordance with the "Project Sign Information" drawing to be provided to the Contractor at the pre-construction meeting. The signs shall be installed at the location(s) approved by the Engineer. The Contractor shall maintain the signs as necessary, and update the information as requested by the Engineer. Payment shall be made according to the allowance in the Bidding Schedule in installments of 50% upon installation, and the remaining 50% upon final payment for the work by bid schedule.

ITEM 107-2 PROJECT SIGNS ALLOWANCE.

Subsection 107.6.4 Public Information and Notification: Informing the public on a regular basis of construction activities and associated disruptions and inconveniences will be extremely important on this project. The Contractor shall employ a specialty public information service as a subcontractor to provide the community relations program for the project as described herein. The name and address of the public information subcontractor shall be submitted with the bid as specified in subsection 102.6 of the Supplementary General Conditions. Contractor shall work closely with his subcontractor in developing and carrying out the community relations program, but shall not expect to actually perform the work of providing the public information services. Contractor shall submit a history of the subcontractor's qualifications and experience in public information services at the pre-construction conference for acceptance by the Engineer. The community relations program shall be designed to run the full length of calendar days in the contract for this project. The program will include but not be limited to:

1. Distributing a pre-construction information letter to all residents, business, etc., within one (1) mile of the project site.

2. Printing and distribution of public notices and/or newsletters as required or as directed by the Engineer. All printed materials must be in both English and Spanish.

The Contractor will use these or other means to inform the local citizens of necessary operations which create high noise levels, street closures, limited access, water and sewer service disruption, detour locations, haul route and material delivery routes, hours of construction and disruption of bus, trash, school bus and other delivery/pick-up routes.

The Contractor will be required to furnish a private line telephone to be used solely for receiving incoming calls from local citizens with questions or complaints concerning construction operations or procedures. The Contractor shall publish this telephone number and maintain a 24-hour answering service. The answering service must be fluent in both English and Spanish and shall be operated by Contractor personnel during all hours that work is being performed on the job site. The Contractor shall maintain a log of incoming calls, responses, and action taken which shall be submitted to the Engineer weekly and/or upon request.

Prior to the start of work, the Contractor shall notify, by letter, all affected businesses and residents of construction plans and schedules within the geographic area identified above. In addition, all schools and emergency services which serve the geographic area will also be notified even though they may be located outside the geographic area described above. The letter shall contain, as a minimum, the following information:

1. Name of Contractor
2. 24-hour telephone compliant number
3. Brief description of the project
4. Name of Contractor Project Superintendent
5. Name of Engineer
6. Name of area supervisor
7. Construction schedule including anticipated work hours
8. Traffic regulations including land restrictions
9. Town of Surprise's telephone number

The Contractor shall submit a Public Information and Notification Plan to the Engineer at the pre-construction meeting. No payments shall be made for this item until the Engineer approves the plan.

The plan and work, which is eligible for reimbursement, shall include: meetings with impacted businesses, schools, emergency services, residents, etc.; scheduling; preparation and distribution of newsletter at least monthly; and maintaining a 24-hour telephone hot line for complaints.

The Contractor shall submit a final report/evaluation of the Public Information and Notification process performed for this project. This report shall be submitted before the Contractor receives final payment.

Payment will be based on invoices, and will be for a total amount not to exceed the amount shown in the bid schedule for the item, "PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE," for work performed in notifying and coordinating with the local population impacted by this project. To cover the cost for administration and supervision, the General Contractor may add an amount equal to not more than 5 percent of the accumulated total invoiced billing for actual public information services provided by a Subcontractor. This cost for administration and supervision will be considered included in the "PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE."

ITEM 107-3 PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE

SUBSECTION 107.7 BARRICADES AND WARNING SIGNS:

The Contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient lights, danger signals, signs and other traffic control devices, and shall take all necessary precautions for the protection of the work and safety of the public. Roads, partially or fully closed to traffic, shall be protected by effective barricades, and obstructions shall be illuminated during hours of darkness. Suitable warning signs shall be provided to properly control and direct traffic.

The Contractor shall erect warning signs in advance of any place on the project where operations may interfere with the use of the road by traffic, and at all intermediate points where the new work crosses or coincides With an existing road. Such

warning signs shall be constructed and erected in accordance with the Traffic Barricade Manual prepared or adopted by the Contracting Agency's Traffic Engineering Department, which is hereby made a part of these specifications.

SUBSECTION 107.8 USE OF EXPLOSIVES:

The use of explosives will **NOT** be permitted for any construction activities on the project.

SUBSECTION 107.9 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE:

The Contractor shall limit all construction activities to the areas shown in the plans and shall not disturb any areas other than as required for construction as shown on the plans.

Under no circumstances shall the disposal of debris from construction operations create a blemish on the landscape. Material, which is to be stockpiled or disposed of off-site, shall not encroach on running or intermittent streams, or other waters of the U.S. unless the Contractor has obtained the appropriate permits in accordance with applicable state and federal regulations.

The Contractor shall protect-in-place all existing structures and other features as identified on the plans, including but not limited to transmission towers, canals and related irrigation control structures, adjacent residential and commercial structures, fences, and walls, and existing vegetation located outside of the right-of-way limits.

The Corps of Engineers Section 404 Permit provided in **Appendix B** allows for the dam remediation construction activities, to impact 11.5 acres of waters of the United States, in order to maintain the flood control functions at White Tanks FRS No. 3. In addition to the permit's General Conditions, the Contractor must comply with the permit Special Conditions.

The Contractor will grade all Temporary Construction and Permanent Easement areas, and project areas which are disturbed during construction to the lines and grades shown on the plans, or as a minimum, where no lines and grades are shown, to a condition similar to or better than the pre-existing condition.

The Contractor shall restore the area of all temporary drain locations to as good as or better than pre-existing conditions, including backfilling any temporary ditches and removing any temporary berms and pipes.

The Contractor shall be responsible for the preservation of all public and private property and shall protect carefully from disturbance or damage all land monuments and property marks until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the prosecution of the work, resulting from any act, omission, neglect, or misconduct in his manner or method of executing the work, or at any time due to defective work or materials, and said responsibility will not be released until the project shall have been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the nonexecution thereof by the Contractor, he shall restore, at no cost to the Contracting Agency, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring as may be directed, or he shall make good such damage or injury in an acceptable manner. Such damage will include but not be limited to landscaped areas. The contractor shall regrade the disturbed area as directed and restore the surface material to match existing in type and quality.

When construction is within temporary construction easements, the Contractor shall restore all disturbed areas to a condition equal to or better than the existing improvements. Such restoration will include but not be limited to asphalt, walkways, fences, lights, sprinklers, landscaping, etc. In the case of landscaping, the Contractor may remove and store sod and plant material. If, in the determination of the Engineer, the sod and/or plant material did not survive the transplanting in good condition, the Contractor shall replace the sod and/or plant material to match in type and quality. Also, the Contractor may salvage any sprinkler system materials, lighting materials, etc. In the event that it is not feasible to reinstall the salvaged material, new material shall be installed.

The Contractor shall not dump spoil or waste material on private property without first obtaining from the owner written permission for such dumping. All such dumping shall be in strict conformance with the Grading and Drainage Ordinance of the Contracting Agency.

Access to private property shall be maintained to keep inconvenience to the property owner to a minimum. Prior to any construction in front of driveways the Contractor shall notify the property owner 24 hours in advance. Inconvenience caused by construction across driveways and sidewalks shall be kept to a minimum by restoring the serviceability as soon as possible. If it is necessary to leave open excavation for a long period of time, the Contractor shall provide structurally adequate steel plates to bridge the excavation.

SUBSECTION 107.10 CONTRACTOR'S RESPONSIBILITY FOR WORK:

The Contractor shall properly guard, protect, and take every precaution necessary against injury or damage to all finished or partially finished work, by the action of the elements or from any other cause until the entire project is completed and accepted by the Engineer. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work before final acceptance at no cost to the Contracting Agency. Partial payment for completed portions of the work shall not release the Contractor from such responsibility.

In case of suspension of the work for any cause whatever, the Contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project and shall erect any necessary temporary structures, signs, or other facilities at no cost to the Contracting Agency.

The Contractor shall be responsible for completing work under the following conditions:

- A) Storm water runoff in the area generally flows from the west. The project is located at the discharge point of multiple drainage courses. These drainage courses can convey considerable flood flows as well as low flow nuisance flows. The area within the project limits upstream of the existing White Tanks FRS No. 3 is subject to impoundment of these flows. The Contractor shall take all necessary precautions to protect his work from damage that may be caused by such runoff and ponding.
- B) No payment will be made for providing excavation protective works for such things as dewatering. The cost thereof shall be included in the bid price for the construction or installation of the items to which said excavation protective works are incidental or appurtenant.
- C) The Contractor shall take all necessary action to protect the public from the construction work area. The Contractor will also notify the Engineer of any unauthorized personnel in the project area, including the presence of the general public.
- D) The Contractor will refer to **Appendix B** for the 404 Permit and associated stipulations that the Contractor must abide by during construction.
- E) The Contractor shall maintain dust control measures at all times during the project.
- F) The Contractor shall not remove any vegetation, plants and/or trees outside the rights-of-way.
- G) Where no fences exist, or where existing fences are to be removed, the Contractor shall provide temporary fencing.
- H) The Contractor shall take all necessary action to ensure that all construction materials are stored in such a manner that storm runoff from the storage area does not divert the flows or block the historical runoff patterns.
- I) The Contractor will contact MWD at least 14 calendar days in advance of any of any construction activities that affect the Beardsley Canal and/or existing MWD facilities.
- J) Management of surface flows, subsurface flows, and groundwater within the project limits, may be necessary in order to construct the project. The Contractor will develop a plan for such water management and submit it to the Engineer for review. Payment for water management including all equipment, labor, materials, and restoration of any disturbed areas shall be made on the basis of the lump sum price bid for water management.

ITEM 107-4 WATER MANAGEMENT

SUBSECTION 107.11 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTY AND SERVICES:

At points where the Contractor's operations are adjacent to properties of utility firms or other property, damage to which might result in considerable expense, loss, or inconvenience, work shall not commence until all arrangements necessary for the protection thereof have been made.

The Contractor shall cooperate with the owners of any underground or overhead utilities in their removal and rearrangement operations in order that these operations may progress in a reasonable manner, that duplication of work may be reduced to a minimum, and that services rendered by those parties will not be unnecessarily interrupted.

If any utility service is interrupted as a result of accidental breakage, the Contractor shall promptly notify the proper authority and shall cooperate with the said authority in the restoration of service. No work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority.

The Contractor shall expose all underground utilities and structures which might interfere with the construction of the project, in order to permit survey location prior to construction.

The Contractor shall assume full responsibility for damages to any underground facility/utility as a result of failing to obtain information as to its location, failing to excavate in a careful, prudent manner or failing to take measures for protection of the facilities/utilities. The Contractor is liable to the owner of the underground facility/utility for the total cost of the repair.

SUBSECTION 107.12 FURNISHING RIGHT-OF-WAY:

The Contracting Agency will provide right-of-way, easements, and temporary construction easements (TCE) for all work in advance of construction. Any exceptions will be indicated in the special provisions.

SUBSECTION 107.13 PERSONAL LIABILITY OF PUBLIC OFFICIALS:

In carrying out any provisions of these specifications, or in exercising any power or authority granted to them by or within the scope of the contract, there shall be no liability upon the Contracting Agency, Engineer, or their authorized representatives, either personally or as officials of the Contracting Agency, it being understood that in all such matters they act solely as agents and representatives of the Contracting Agency.

SUBSECTION 107.14 NO WAIVER OF LEGAL RIGHTS:

Upon completion of the work, the Contracting Agency will expeditiously make final inspection and notify the Contractor of acceptance. Such final acceptance, however, shall not preclude or stop the Contracting Agency from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Contracting Agency be precluded or stopped from recovering from the Contractor or his surety, or both, such overpayment as it may sustain, or by failure on the part of the Contractor to fulfill his obligations under the contract. A waiver on the part of the Contracting Agency of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract and in addition to any specific remedy provided the Contracting Agency in the contract documents, shall be liable to the Contracting Agency for latent defects, fraud or such gross mistakes as may amount to fraud, or as regards the Contracting Agency's rights under any warranty or guaranty or remedy required by law.

End of Section

SECTION 108 COMMENCEMENT, PROSECUTION AND PROGRESS

SUBSECTION 108.1 NOTICE TO PROCEED:

Contractor shall commence work within thirty (30) calendar days after the date of the Notice to Proceed or receipt of the AZPDES General Permit, whichever is the first to occur, and complete all work within two-hundred and forty (240) calendar days beginning the day following the effective date specified in the Notice to Proceed.

The Contractor shall notify the Field Engineering Inspection Section 24 hours in advance of the time and place where work will begin and the Survey Section 2 working days in advance for staking.

SUBSECTION 108.2 SUBLETTING OF CONTRACT:

For this project, Contractor shall perform, with its own organization, work amounting to 50 percent (50%) or more of the total contract cost.

The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the contract or contracts, or of his right, title, or interest therein, without written consent of the Contracting Agency.

Subcontracts shall be in accordance with and the Contractor shall be bound by the following provisions:

- A) All subcontracts shall be subject to the approval of the Engineer.
- B) All subcontracts shall be in writing and shall provide that all work to be performed thereunder shall be performed in accordance with the terms of the contract.
- C) Subcontractors shall conform to the regulations governing employment of labor.
- D) The subcontracting of any portion of the work will in no way release the Contractor of his liability under the contract and bonds.
- E) On all contracts for pipeline construction, roadway construction or roadway maintenance, the Contractor shall perform, with his own organization, work amounting to not less than 50 percent of the total contract cost.

On other types of contracts the individual agency shall determine the percentage or waive this requirement.

SUBSECTION 108.3 CORRESPONDENCE TO THE CONTRACTOR:

A written notice, to the Contractor from the Contracting Agency, shall be considered delivered and the service thereof completed, when said notice is posted, by certified mail, to the said Contractor at his last given address, or delivered in person to the Contractor or his authorized representative on the work.

SUBSECTION 108.4 CONTRACTOR'S CONSTRUCTION SCHEDULE:

Contractor shall submit a proposed work schedule to Engineer for review before starting work using the Primavera or other similar software program that is acceptable to the Engineer. Weekly updates shall be submitted to Owner's Inspector at the weekly coordination meeting.

Contractor shall be solely responsible for the planning, scheduling and execution of the work to assure timely completion of the project.

Subsection 108.4.1 Contractor's Billing Schedule: The Contractor shall furnish the Engineer an Estimated Billing Schedule, which shall include the estimated amount of each billing for the total project at the pre-construction conference, and thereafter at monthly intervals as agreed to between the Contractor and Engineer.

SUBSECTION 108.5 LIMITATION OF OPERATIONS:

The normal work week shall be 40 hours, Monday through Friday, and the work hours will be determined at the pre-construction meeting. This does not imply that this contract can be completed on time utilizing normal working hours. The Contractor shall furnish sufficient forces and shall work such hours including night shifts and overtime operations as necessary to ensure the completion of the work within the time required. To work other than normal working hours, for other than emergency situations, the Contractor shall give the Engineer at least 24 hours advance notification and receive written approval before working. Should the Contractor elect to perform any work after regular working hours, on weekends, or legal holidays, any charges incurred by the Owner for inspection of the work, surveys or tests of materials will be deducted from monies due or to become due to the Contractor.

The Contractor shall conduct the work at all times in such a manner and sequence that will assure the least interference with traffic and inconvenience to the public. The Engineer may require the Contractor to finish a section on which work is in progress before work is started on any additional sections if the opening of such section is essential to public convenience.

All traffic affected by the construction will be regulated in accordance with the current Traffic Barricade Manual prepared or adopted by the Contracting Agency's Traffic Engineering Department.

Except in emergencies endangering life or property, written permission shall be obtained from the Engineer to perform any work after regular working hours, on weekends, or legal holidays. Prior to the start of such work, the Contractor shall arrange with the Engineer for the continuous or periodical inspection of the work, surveys and tests of materials, when necessary.

If, in the opinion of the Engineer, the Contractor has fallen behind the approved progress schedule, the Contractor shall take such steps as may be required by the Engineer, including but not limited to, increasing the number of personnel, shifts, and/or overtime operations, days of work, and/or amount of construction equipment until such time as the work is back on schedule. He shall also submit for approval no later than the time of submittal of the next request for partial payment, such supplementary schedule or schedules as may be deemed necessary to demonstrate the manner in which the approved rate of progress will be regained, all at no additional cost to the Contracting Agency.

SUBSECTION 108.6 CHARACTER OF WORKMEN; METHODS AND EQUIPMENT:

The Contractor shall at all times employ sufficient labor and equipment for prosecuting the several classes of work to full completion in the manner and time required by the specifications.

All workmen shall be competent and have sufficient skill, knowledge and experience in their class of work and in the operation of equipment required to perform all work properly and satisfactorily.

Any person employed by the Contractor or any Subcontractor who, in the opinion of the Engineer, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Engineer, be removed from the work by the Contractor or Subcontractor employing such person, and shall not be employed again in any portion of the work without the approval of the Engineer. The Contractor or Subcontractor shall keep the Contracting Agency harmless from damages or claims for compensation that may occur in the enforcement of this section.

Should the Contractor or Subcontractor fail to remove such person as required above, or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Engineer may suspend the work by written notice until such orders are complied with.

All equipment which is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the project shall be such that it will not damage property adjacent to the work area.

When the methods and equipment to be used by the Contractor in accomplishing the construction are not prescribed, the Contractor is free to use any methods or equipment that he demonstrates to the satisfaction of the Engineer will accomplish the work in conformity with the requirements of the specifications.

When the specifications state the construction shall be performed by the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of

equipment other than those specified, he may request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed to be used and an explanation of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing construction work in conformity with the specifications. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet the specifications, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining construction with the specified methods and equipment. The Contractor shall remove the deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the construction items involved nor in contract time as result of authorizing a change in methods or equipment under these provisions.

SUBSECTION 108.7 DETERMINATION AND EXTENSION OF CONTRACT TIME:

The number of calendar days allowed for the completion of the work included in the contract will be as stated in the proposal and will be known as the contract time.

When the contract time is on a calendar day basis it shall consist of the number of calendar days specified, including all weekends and legal holidays. All calendar days elapsing between the effective dates of any written notice from the Engineer to suspend work and to resume work following suspensions, not the fault of the Contractor, shall be excluded.

When the contract completion time is a fixed calendar date it shall be the date on which all work on the project shall be completed and meet final inspection.

If the Contractor finds it impossible for reasons beyond his control to complete the work within contract time as specified or as extended, he shall immediately submit a written request to the Engineer for an extension of time setting forth therein the reasons which he believes will justify the granting of his request. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the Engineer finds that the work was delayed because of conditions beyond the control and through no fault of the Contractor, he may extend the time for completion in such amount as the conditions justify. The extended time for completion shall then be in full force and effect the same as though it were the original time for completion.

SUBSECTION 108.8 GUARANTEE AND WARRANTEE PROVISIONS:

The Contractor shall guarantee the work against defective workmanship or materials for a period of 1 year from the date of its final acceptance under the contract, ordinary wear and tear and unusual abuse or neglect excepted.

Any omission on the part of the Engineer to condemn defective work or materials at the time of construction shall not be deemed an acceptance, and the Contractor will be required to correct defective work or materials at any time before final acceptance and within 1 year thereafter.

Should any defects develop within 1 year from the date of final acceptance due to faults in workmanship or materials the Contractor shall, within 14 calendar days of receipt of written notice from the Contracting Agency, begin making the necessary repairs to the satisfaction of the Engineer. Such work shall include the repair or replacement of other work or materials damaged or affected by making the above repairs or corrective work, all at no additional cost to the Contracting Agency.

If defects develop which are determined by the Engineer to be an emergency, the Engineer shall notify the Contractor, via the most expeditious means, regarding the nature and condition of the defects. In turn, the Contractor shall immediately dispatch necessary forces to correct the defect or the emergency condition. If the Contractor, in his initial action, resolves the emergency condition but not the defect, a letter as discussed above will follow and normal procedures for corrections will be employed. If immediate or appropriate action, satisfactory to the Engineer, is not taken by the Contractor, or if the Contractor cannot be contacted, the Engineer will deploy necessary forces to correct and/or secure the deficiency. Costs of the Engineer's action shall be paid by the Contractor and/or his bonding agency. Should it later be determined that the defects requiring such emergency action are not the responsibility of the Contractor, the Contractor will be paid for all costs incurred as a result of these demands in accordance with Subsection 109.5. Such action by the Engineer will not relieve the Contractor of the guarantees required by this section or elsewhere in the Contract Documents.

In case of work, materials, or equipment for which written warranties are required by the special provisions, the Contractor shall provide or secure from the appropriate Subcontractor or supplier such warranties addressed to and in favor of the Contracting Agency and deliver same to the Engineer prior to final acceptance of the work. Delivery of such warranties shall not relieve the Contractor from any obligation assumed under any other provisions of the contract.

The warranties and guarantees provided in this subsection of the contract documents shall be in addition to and not in limitation of any other warranties, guarantees or remedies required by law.

SUBSECTION 108.9 FAILURE TO COMPLETE ON TIME:

The actual cost per calendar day incurred by the District for Administrative and Inspection Services on this project will be added to the daily charges as indicated by MAG TABLE 108-1, LIQUIDATED DAMAGES, and will be deducted from money due or to become due to the Contractor for each and every calendar day that work shall remain incomplete after the time specified for the completion of the work in the proposal, or as adjusted by the Engineer. Nothing contained in this provision shall prohibit the Owner from deducting from money due or to become due to the Contractor for any other costs incurred by the Owner directly attributable to the delay in completing this contract.

For each and every calendar day that work shall remain incomplete after the time specified for the completion of the work in the proposal, or as adjusted by the Engineer, the sum per calendar day shown in table 108-1, unless otherwise specified in the proposal form, may be deducted from monies due to or to become due to the Contractor, not as a forfeit or penalty but as liquidated damages. This sum is fixed and agreed upon between the parties because the actual loss to the Contracting Agency and to the public caused by delay in completion will be impractical and extremely difficult to ascertain and determine.

Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time fixed for its completion may have been extended, will in no way operate as a waiver on the part of the Contracting Agency of any of its rights under the contract.

TABLE 108-1		
LIQUIDATED DAMAGES		
Original Contract Amount		Daily Charges
From More Than	To and Including	Calendar Day or Fixed Date
\$ 0	\$ 25,000	\$ 210
25,000	50,000	250
50,000	100,000	280
100,000	500,000	430
500,000	1,000,000	570
1,000,000	2,000,000	710
2,000,000	5,000,000	1,070
5,000,000	10,000,000	1,420
10,000,000	-	1,780

SUBSECTION 108.10 FORFEITURE AND DEFAULT OF CONTRACT:

It is further agreed to by the Contractor that if he:

- A) Fails to begin the work under the contract within a reasonable time, or
- B) Fails to perform the work with sufficient workmen and equipment or with sufficient materials to assure the prompt completion of said work, or
- C) Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or
- D) Discontinues the prosecution of the work, or
- E) Fails to resume work which has been discontinued within a reasonable time after notice to do so, or

- F) At any time colluded with any party or parties, or
- G) Allows any final judgment to stand against him unsatisfied for a period of 14 calendar days, or
- H) For any cause whatsoever, fails to carry on the work in an acceptable manner, the Engineer will give notice in writing to the Contractor and his surety of such delay, neglect, or default, and advise them that the work must be resumed immediately.

If the Contractor or surety, within a period of 14 calendar days after such notice, has not proceeded in accordance therewith, then the Contracting Agency will, upon written notification from the Engineer of the fact of such delay, neglect or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the prosecution of the work out of the hands of the Contractor. The Contracting Agency may appropriate or use any or all materials and equipment on the ground as may be suitable and acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the Engineer will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Contracting Agency, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due said Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Contracting Agency the amount of such excess.

SUBSECTION 108.11 TERMINATION OF CONTRACT:

The Contracting Agency may terminate the contract or a portion thereof if conditions encountered during the progress of the work make it impossible or impracticable to proceed with the work or a local or national emergency exists.

When contracts, or any portion thereof, are terminated before completion of all work in the contract, adjustments in the amount bid for the pay items will be made on the actual quantity of work performed and accepted, or as mutually agreed for pay items of work partially completed or not started. No claim for loss of anticipated profits will be considered.

Termination of the contract or any portion thereof shall not relieve the Contractor of his responsibilities for the completed work nor the surety of its obligation for and concerning any just claims arising out of the work performed.

End of Section

SECTION 109 MEASUREMENTS AND PAYMENTS

SUBSECTION 109.1 MEASUREMENT OF QUANTITIES:

All work completed under the contract will be measured by the Engineer according to United States standard measures. The methods of measurement and computation to be used in determination of quantities of materials furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

A station, when used as a definition or term of measurement, will be 100 linear feet.

Unless otherwise specified, longitudinal measurements will be made along the grade line.

Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the Engineer.

The term ton will mean the short ton consisting of 2,000 pounds avoirdupois.

Unless otherwise specified, structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.

In computing volumes of excavations or fill, the average end area method or other acceptable methods as determined by the Engineer will be used.

Volumes will be computed at 60°F, using ASTM D-1250 for Asphalt or ASTM D-633 for Tars.

Lumber will be measured by the thousand board foot measure actually used in the work. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.

The term lump sum, when used as a pay item, will mean complete payment for the work described.

Sundry items which have a basis for measurement and payment herein and which are incidental to or required in the construction of the work but are not included as items in the bid schedule shall be considered an integral part of the contract, and all labor, materials, etc. required for such items shall be furnished by the Contractor and the cost of same included in the unit price bid.

SUBSECTION 109.2 SCOPE OF PAYMENT:

Measurement and payment for pay items in the proposal will be as indicated in the applicable standard specification or in the special provisions.

When payment is specified to be made on the basis of weight, the weighing shall be done on certified platform scales sealed by the State Inspector or the City Sealer of Weights and Measures as defined by ARS Sections 44-2112 and 44-2116. The Contractor shall furnish the Engineer with duplicate Weighmaster's Certificates showing the actual net weights together with the information required by ARS Section 44-2142. The Contracting Agency will accept the certificates as evidence of the weight delivered.

Payment for the various items in the proposal will be made at the unit price bid in the proposal, and shall be compensation in full for furnishing all labor, materials, equipment and appurtenances necessary to complete the work in a satisfactory manner as shown on the plans and as required in the specifications, with all connections, testing, and related work completed. Each item, fixture, piece of equipment, etc., shall be complete with all necessary connections and appurtenances, for the satisfactory use and operation of said item. No additional payment will be made for work related to any item unless specifically called for in the proposal. This compensation shall also cover all risk, loss, damage or expense of whatever character arising out of the nature of the work or the prosecution thereof, subject to the provisions of Section 107.

In addition to the contained provisions, the work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site, the establishment of all

offices, buildings, and other facilities necessary for work on the project, and for all other work operations that must be performed and costs incurred prior to beginning work on the various items on the project site.

The "complete-in-place" rate shall include but not necessarily be limited to all labor, material and equipment costs for preparation, installation, construction, modification, alteration, or adjustment of the items, which shall include all costs for salaries and wages, all payroll additives to cover employee benefits, allowances for vacation and sick leave, company portion of employee insurance, social and retirement benefits, all payroll taxes, contribution and benefits imposed by any applicable law or regulation and any other direct or indirect payroll-related costs. The rate shall also include but not necessarily be limited to all costs for indirect charges or overhead, mileage, travel time, subsistence, materials, freight charges for material to Contractor's facility or project site, equipment rental, consumables, tools, insurance to the levels specified in Section 103.6 CONTRACTOR'S INSURANCE, all applicable taxes, as well as Contractor's fee and profit. This rate shall further include all site clean-up costs and hauling of construction debris to disposal sites designated by the Engineer.

Payment will be made for only items listed in the proposal and will not be made in accordance with the measurement and payment provisions of the MAG Standard Specifications where this differs from the items listed in the proposal. All materials and work necessary for completion of this project are included in proposal items. Any work or materials not specifically referred to in these items are considered incidental to the item and are included in the unit price. **Payment shall not be made for unused materials.**

It is the responsibility of the bidders to contact all municipalities in the area to determine if they will charge Contractor sales taxes or any fees for work on this project. Any such taxes or fees shall be paid by Contractor.

SUBSECTION 109.3 ASSIGNMENT OF PAYMENTS:

The Contractor shall not assign payments of a contract or any portion thereof without approval of surety and written consent of the Contracting Agency.

Claims for monies due or to become due the Contractor may be assigned to a bank, trust company, or other financing institution, and may thereafter be further assigned and reassigned to any such institution. Any such assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in such financing. Any assignment of money shall be subject to all proper setoffs and withholdings in favor of the Contracting Agency and to all deductions provided for in these specifications.

SUBSECTION 109.4 COMPENSATION FOR ALTERATION OF WORK:

Subsection 109.4.1 By The Contracting Agency: Compensation for alternations of work will be:

- A) For a decrease greater than 20 percent in either the total cost of the contract or the total cost of a major item and when a reasonable cost analysis supports an increase in the pro rata share of fixed cost chargeable to this item in total, an increase adjustment in the monies due the Contractor may be made. This adjusted compensation will not exceed 80 percent of the original lump sum contract amount or, if for a unit price item, the adjustment will not exceed 80 percent of the original extended until bid price. This does not apply to items labeled as contingent bid item in the bid proposal.
- B) For an increase greater than 20 percent, any adjustment made will only apply to that cost in excess of 120 percent of the original bidding schedule. If either party presents a reasonable cost analysis that shows a change in the pro rata share of fixed costs chargeable to this item in total, an increase or decrease adjustment will be made. This increase or decrease adjustment will be made on such basis as is necessary to cover a reasonable estimate of cost, plus an allowance, not to exceed 15 percent, for overhead and profit. If the parties are unable to reach an agreement, the Engineer has the authority to order the excess work done on an actual cost basis as specified in Subsection 109.5.
- C) For either an increase or decrease in cost, no claim shall be made by the Contractor for any loss of anticipated profits.

Subsection 109.4.2 Due to Physical Conditions: Compensation for alternation of work due to physical conditions will be:

- A) If the Engineer, after his investigation of the site conditions, agrees that they materially differ from those indicated in the contract and would cause an increase in the Contractor's bid cost of accomplishing the work, new unit bid prices or a lump sum cost (for the additional work only) may be negotiated. If the parties are unable to reach an agreement on price, the Engineer has the authority to order this additional work accomplished on an actual cost basis as specified in Subsection 109.5.
- B) If the Engineer, after his investigation of the site conditions, finds that these conditions do not materially differ from those indicated in the contract, he has the authority to order the work to be accomplished at the original bid price(s).

Subsection 109.4.3 Due to Extra Work: If the Contractor can present valid, factual evidence, satisfactory to the Engineer, that the work in question is an item not provided for in the contract as awarded then a unit bid price or lump sum cost, for this item only, may be negotiated. If the parties are unable to reach an agreement on price or cost, the Engineer has the authority to order the extra work accomplished on an actual cost basis as specified in Subsection 109.5.

Subsection 109.4.4 Made at the Contractor's Request: Any alterations, if approved, will be a reduction in cost or at no additional cost to the Contracting Agency.

Subsection 109.4.5 Due to Failure of Contractor to Properly Maintain the Project:

- A) For any suspension of work during normal working hours due to failure of the Contractor to properly maintain the project, there will be no additional compensation or time allowed.
- B) If the Engineer provides the Contractor with a written order to provide adequate maintenance of traffic, adequate cleanup, adequate dust control or to correct deficiencies resulting from abnormal weather conditions and the Contractor fails to comply in the time frame specified, the Contracting Agency may have the work accomplished by other sources.

The Contracting Agency will deduct the cost of accomplishing the work from monies due or to become due to the Contractor. Computation of the cost will be in accordance with Subsection 109.5.4.2.

Subsection 109.4.6 Allowable Mark-Ups: Only the allowable mark-ups as defined in Subsection 109.5 shall be allowed. Additional compensation for other items shall not be considered or allowed.

SUBSECTION 109.5 ACTUAL COST WORK:

The compensation for actual cost work performed by the Contractor (Subcontractor) shall be determined by the Engineer in the following manner.

Subsection 109.5.1 Equipment: For all equipment, the use of which has been authorized by the Engineer, except for small tools and manual equipment, the Contractor will be paid in accordance with the latest Schedule of Equipment Rates used by the Arizona Department of Transportation.

Subsection 109.5.2 Material: For all material, accepted by the Engineer and used in the work, the Contractor will be paid the actual cost of such material including transportation cost, to which total cost will be added a sum equal to 15 percent thereof.

Subsection 109.5.3 Labor: For all labor and for the foreman, when he is in direct charge of the operation, the Contractor will be paid:

- A) The actual wages paid plus the current percentage thereof as determined by the Arizona Department of Transportation which is deemed to cover the Contractor's cost incurred as a result of payment imposed by State or Federal Law and payments that are made to, or on behalf of, the workman other than the actual wage. Actual wage is defined as the required current hourly rate paid to the labor classification concerned and does not include any fringe benefits or dislocation allowances. If the Contractor is not required to pay fringe benefits equivalent to the Current rates published in the Federal Register, an equitable deduction will be made from the current percentage established by the Arizona Department of Transportation.

- B) For the first \$50,000 of labor cost computed under paragraph (A) above, the Contractor will be paid an amount equal to (15) fifteen percent for overhead and profit.
- C) For all labor cost computed under paragraph (A) above, in excess of \$50,000 but not exceeding \$100,000, the Contractor will be paid an amount equal to (12) twelve percent for overhead and profit.
- D) For any labor cost computed under paragraph (A) above in excess of \$100,000 the Contractor will be paid an amount equal to (10) ten percent for overhead and profit.

Subsection 109.5.4 Work Performed by Subcontractors or Other Sources:

Subsection 109.5.4.1 Work Performed by Subcontractors: If it is determined by the Engineer that portions of the Actual Cost Work to be performed requires specialized labor or equipment not normally used by the Contractor and such work is then authorized to be performed by a subcontractor(s), the subcontractor(s) will be paid by the Contractor in accordance with the actual cost work procedures outlined herein. The Contractor will be paid by the Contracting Agency the full amount of the subcontract plus the following percentages for administration and supervision.

- A) For the first \$10,000 accumulated total of all change order work performed by subcontractors (less mark-up for overhead and profit), the Contractor will be paid an amount equal to 10 percent of the accumulated total for administration and supervision. If the accumulated total is \$3,000 or less, the Contractor will be paid \$300 for administration and supervision.
- B) For all change order work in excess of \$10,000 accumulated total performed by subcontractors (less mark-up for overhead and profit), the Contractor will be paid an amount equal to 5 percent of the accumulated total for administration and supervision.

Subsection 109.5.4.2 Work performed by Other Sources: If the Contracting Agency has work performed by other sources, in accordance with Subsection 109.4.5 (B), the Contracting Agency will deduct, from monies due or to become due to the Contractor, the full amount of the cost of accomplishing the work by other sources plus the following percentages for administration and supervision:

- A) For the first \$10,000 accumulated total of work performed by other sources, the Contracting Agency will deduct an amount equal to 10 percent of the accumulated total for administration and supervision. If the accumulated total is \$3,000 or less, the Contracting Agency will deduct \$300 for administration and supervision.
- B) For all work in excess of \$10,000 accumulated total performed by other sources, the Contracting Agency will deduct an amount equal to 5 percent of the accumulated total for administration and supervision.

Subsection 109.5.5 Documentation:

- A) Except in emergency situations, the Contracting Agency will not be liable for any Actual Cost Work performed by the Contractor prior to written authorization by the Engineer or prior to full execution of a written agreement by all parties concerned.
- B) Payment for work performed on an actual cost basis will not be made until the Contractor has furnished the Engineer, on forms agreed to by the Contracting Agency, duplicate itemized statements of such work, including subcontractor(s) costs, detailed as follows:
 - 1. Name, classification, date, daily hours, total hours, rate and extension for each laborer and foreman.
 - 2. Designation, dates, daily hours, total hours, rental rates and extension for each unit of equipment, and machinery.
 - 3. Quantities of material, prices, extension and transportation cost on a daily basis. These charges shall be substantiated by vendor invoices.

- C) The Engineer will compare his records with the statement furnished by the Contractor, resolving any differences and making the required adjustments. This statement when agreed upon and signed by both parties, shall be the basis of payment for the work performed.

Subsection 109.5.6 Bonds and Insurance: The Contractor shall be paid for the actual cost plus (10%) ten percent for Administrative cost when the Contractor can provide evidence of payment for premiums on required payment and performance bonds, premiums on railroad and/or airport extended liability insurance, and premiums for property damage and/or public liability insurance. No duplication of payment for Contractor's costs included under Subsection 109.5.3(A) will be allowed.

Subsection 109.5.7 Authority of Engineer: The Engineer is in charge of Actual Cost Work and has the authority to direct which labor and equipment will be used, to suspend operations, and to refuse to pay for any labor or equipment which he feels is not doing productive work.

SUBSECTION 109.6 PAYMENT FOR IMPROVEMENT DISTRICT PROJECTS:

Payment to the Contractor shall be made in accordance with ARS Sections 9-621 to 9-710, both inclusive.

As soon as the Contractor has fulfilled his contract, the Superintendent of Streets shall estimate the benefits arising from the work and make assessments to cover the work performed and specified in the contract, including incidental expenses in accordance with ARS Section 9-686.

The Contractor agrees to accept payment in the form of Assessments with attached Warrants and/or Improvement Bonds at the rate of interest declared in the resolution of intention prepared by the Contracting Agency.

SUBSECTION 109.7 PAYMENT FOR BOND ISSUE AND BUDGET PROJECTS:

- A) **Partial Payments:** The Contracting Agency will make a partial payment to the Contractor on the basis of an estimate prepared by the Contractor or Engineer for work completed through the last day of the preceding calendar month. Payment will be within 14 calendar days after the estimate has been certified and approved by the Engineer and received by the owner.

The Contracting Agency will retain 10 percent of all estimates as a guarantee for complete performance of the contract in accordance with ARS Section 34-221, unless the Contractor elects to deposit securities in accordance with ARS Section 34-221, Paragraph 5.

When the Contractor is fifty percent completed, one-half of the amount retained shall be paid to the Contractor provided he is making satisfactory progress on the contract and there is no specific cause or claim requiring a greater amount to be retained. After the contract is fifty percent completed, no more than five percent of the amount of any subsequent progress payments made under the contract will be retained providing the Contractor is making satisfactory progress on the project. Except that, if at any time the owner determines satisfactory progress is not being made, ten percent retention shall be reinstated for all progress payments made under the contract subsequent to the determination. Payment or release of retained funds shall be made to the Contractor within thirty (30) days following final payment to the Contractor [reference (B) following], and Contractor furnishing to Engineer satisfactory receipts for all labor and material billed and waivers of liens from any and all persons and Subcontractors holding claims against the work. Additionally, Contractor shall furnish a completed Certificate of Performance to Engineer evidencing it has satisfactorily discharged all its duties in connection with the work to be performed under this Contract. The form of Certificate of Performance shall be provided to Contractor in an attachment to the Construction Documents.

Any material or equipment which will become an integral part of the completed project will be considered for partial payment in the Contractor's monthly progress payments. The intent of making partial payments is to provide the Contractor payment for direct material or equipment purchased. The purpose is to minimize the effect of escalating costs by procuring key materials. It is not the intent to pay for all materials but only those meeting the following conditions.

- (1) A total value of all items requested for payment must be greater than \$20,000. No payment will be processed until the material or equipment has been observed, reviewed or verified by the Contracting Agent representative. Only the material or equipment meeting the requirements of the plans and specifications will be paid. Payment for material or equipment does not constitute final acceptance.
 - (2) Materials or equipment must be stored or stockpiled either on site, in a warehouse, or secured storage area. The Contractor assumes all responsibility for protection of these materials or equipment and shall insure them to cover loss or damage to same without additional liability or added costs to the Agency for providing this security, insurance, and storage.
 - (3) The Contractor will provide access to the storage area or warehouse upon request of the Contracting Agent's representative for the purpose of verifying the inventory of items paid for under this section. None of the materials or equipment paid for under this section will be removed from the storage site until incorporated into the work of the project. The storage site shall be within the general geographical area of the project.
 - (4) The Contractor shall provide a paid invoice and/or lien waiver for items paid for under this section. The Agency will not pay more than the invoice price for the item or items, less retention.
 - (5) The Engineer may exclude individual payment requests which in the Engineer's judgment do not warrant storage and prepayment under the intent of this section.
- B) **Final Payment:** When the project has been accepted as provided in Section 105, and within 340 calendar days after final inspection of work completed under the contract, the Engineer will render to the Contracting Agency and the Contractor, a final estimate which will show the amount of work performed and accepted under the contract. All prior estimates and partial payments will be subject to correction in the final estimate for payment.

The final payment will be made to Contractor by Owner within thirty (30) days following receipt of the As-built Plans, Certificate of Performance, Engineer's final estimate and receipt by Owner of Consent of Contractor's Surety to said final payment. If payment will be longer than thirty (30) days as aforesaid, Owner will provide Contractor specific written findings for reasons justifying the delay in payment.

The acceptance of the project and the making of the final payment shall not constitute a waiver by the Contracting Agency/Owner of any claims arising from faulty or defective work appearing after the completion or from failure of the Contractor to comply with the requirements of the contract documents.

Contractor's monthly pay estimates will be processed by Owner's Construction Branch during the last week of the month.

SUBSECTION 109.8 PAYMENT FOR DELAY:

The procedures contained in this Subsection shall not be construed to void any provision of the contract which require notice of delays, provides for negotiation of other procedures for settlement or provide for liquidated damages.

Subsection 109.8.1 Failure to Locate or Incorrect Location of Utilities: ARS 40-360 states "that if the owner or operator fails to locate or incorrectly locates the underground facility, pursuant to this article, the owner or operator becomes liable for resulting damages, costs and expense to the injured party." The Contracting Agency will deny any claims for damages or delays if another owner or operator is at fault.

Subsection 109.8.2 Contracting Agency Delays: ARS 34-221 states "A contract for the procurement of construction shall include a provision which provides for negotiations between the Agent and the Contractor for the recovery of damages related to expenses incurred by the Contractor for a delay for which the Agent is responsible, which is unreasonable under the circumstances and which was not within the contemplation of the parties to the contract."

In this case, if the Contractor sustains damages which could not have been avoided by the judicious handling of forces, equipment and plant or by reasonable revision in the Contractor's schedule of operation, the compensation for such damages will be negotiated. The Contractor shall notify the Engineer of the condition in writing by the next work day. Failure to notify the Engineer within this time may be just cause to reject any claims for such damages.

Compensation for such damages will be negotiated as follows:

- A) The Engineer shall be satisfied that the Contractor has made every reasonable effort to prosecute the work despite any delays encountered or revisions in the Contractor's scheduling of work.
- B) The Compensation paid to the Contractor shall be in accordance with Section 109.

Subsection 109.8.3 Extension of Contract Time: For any such delays, the contract time will be adjusted in accordance with Subsection 108.7.

TABLE 109-1	
DOLLAR VALUE OF MAJOR ITEM	
Original Contract Amount	Dollar Value of Major Item
\$0.00 to \$1,000,000.00	\$50,000 or 10% of original contract amount, whichever is less
\$1,000,000.00 to \$5,000,000.00	5.0% of original contract amount
\$5,000,000.00 or greater	\$250,000.00 or 2.5% of original contract amount whichever is greater

End of Section

SECTION 110 NOTIFICATION OF CHANGED CONDITIONS AND DISPUTE RESOLUTION

The Contractor and Owner will follow the established rules of the Maricopa County Procurement Code.

End of Section





"To the best of my professional knowledge, judgment, and belief, this document meets applicable NRCS standards."

CONSTRUCTION SPECIAL PROVISIONS (90% SUBMITTAL)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONTRACT FCD 2004C017

**WHITE TANKS FLOOD RETARDING STRUCTURE NO. 3
REMEDATION DESIGN PROJECT**

PCN 470.04.30

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CONTRACT FCD 2004C017
WHITE TANKS FRS NO. 3
REMEDIATION DESIGN PROJECT**

SPECIAL PROVISIONS

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SECTION 201 CLEARING AND GRUBBING

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 201.1 DESCRIPTION:

This work shall consist of removing objectionable material from the boundaries of work and such other areas as may be specified in the special provisions. Clearing, grubbing and stripping shall be performed in advance of grading operations.

Clearing, grubbing and stripping shall be performed within the limits of work only, including borrow areas, excavation limits, foundation footprint, and fill zone. Do not clear excessive areas.

Within the general limits of the work, selected areas have been designated to not be disturbed. These areas are delineated on the plans and shall be protected with temporary fencing during construction. All protective fencing shall be in place before any earth moving equipment is moved onto the site and before any salvage, clearing or grubbing takes place. Protective fencing shall consist of (at a minimum) of two strands of gold rope on T-Bar posts. The posts are to be placed a minimum of 30 feet on center.

SUBSECTION 201.2 PRESERVATION OF PROPERTY:

Existing improvements, adjacent property, utilities and other facilities, and trees and plants not to be removed, shall be protected from injury or damage resulting from the Contractor's operations, see Section 107.

SUBSECTION 201.3 CONSTRUCTION METHODS:

The construction site and areas to the toe of an embankment, the top of a cut slope, the slope rounding limit or to a line 10 feet outside the edge of the surfaced area, whichever is greater, but not beyond the boundaries of work, shall be cleared of all trees, stumps, brush, roots, rubbish, debris and other objectionable matter, except as follows.

All trees and shrubs found suitable for improvement and beautification, which will not interfere with excavation or embankment or cause disintegration of the improvements shall not be disturbed. In any event, the Contractor shall avoid, as far as practicable, injury to shrubbery, vines, plants, grasses and other vegetation growing outside of the clearing limits. The dragging and the piling of materials of various kinds and the performing of other work which may be injurious to vegetation shall, insofar as practicable, be confined to areas which have no vegetation or which will be covered by embankment or disturbed by excavation during grading operations.

Vegetative and deleterious material shall be carefully removed and discarded from fill material. Hand removal of small roots may be required. Dispose of material generated from clearing and grubbing activities shall be disposed of at an approved landfill or greenwaste recycling facility. Cavities left below subgrade elevation by removal of stumps or roots shall be carefully backfilled and compacted. All tree trunks, stumps, brush, limbs, roots, vegetation and other debris removed in clearing and grubbing shall be removed and disposed of so as to leave the construction site and adjacent areas in a neat and finished condition, free from unsightly debris.

All areas cleared and grubbed shall be stripped of the top 6-inches of soil to remove potential seed beds from the Work areas. The stripped material shall be either stockpiled or wasted as the Owners discretion at an approved location and shall be segregated from designated fill materials.

SUBSECTION 201.4 REMOVAL AND DISPOSAL OF SALVAGEABLE ITEMS:

Items and materials of salvage value as determined by the Engineer, unless incorporated in the new work, shall remain the property of the Contracting Agency and shall be stored in adjacent areas as directed by the Engineer. Such items and materials shall be carefully removed and in such a manner as to permit reuse.

SUBSECTION 201.5 MEASUREMENT:

Measurement shall be made for clearing and grubbing on an acre basis.

Measurement shall be made for stripping on an acre basis.

No measurement shall be made for removal and disposal of tree trunks, stumps, brush, limbs, roots, vegetation, and other debris removed in clearing and grubbing.

No measurement shall be made for stockpiling and/or wasting stripped materials.

SUBSECTION 201.5 PAYMENT:

Payment for clearing and grubbing shall be made on the basis of the bid price per acre.

Payment for stripping shall be made on the basis of the bid price per acre.

No separate payment shall be made for the removal and disposal of tree trunks, stumps, brush, limbs, roots, vegetation, and other debris removed in clearing and grubbing as such; the cost thereof shall be included in the price of clearing and grubbing.

No separate payment shall be made for stockpiling and/or wasting of stripped materials.

BID ITEM 201-1 CLEARING AND GRUBBING

BID ITEM 201-2 STRIPPING

End of Section

SECTION 202 MOBILIZATION

(Add this section to the MAG Uniform Standard Specifications.)

SUBSECTION 202.1 DESCRIPTION:

The work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, and for all other work and operations that must be performed and costs incurred prior to beginning work on various items on the project site. A field office is required for this project.

SUBSECTION 202.2 FIELD OFFICE:

This work shall consist of providing and maintaining a furnished Field Office for the exclusive use of and occupancy by the Engineer and the Engineer's staff.

The office shall be a building or mobile trailer erected at a location convenient to the project. The Contractor's and the Engineer's offices shall not be in the same building or mobile trailer, although the offices shall be located next to each other or within reasonable walking distance.

The Contractor may furnish equivalent facilities in an existing building provided such facilities and building are located to provide convenient service.

The field office shall be an approved and weatherproof building or mobile trailer providing a minimum of 600 square feet of clear floor space, not including the toilet area. The structure shall have a minimum ceiling height of seven (7) feet and shall be provided with weatherproof doors equipped with adequate locking devices. Windows shall also be provided with adequate locking devices. The Contractor shall also provide the following:

- a. Lighting – Electric light, non-glare type luminaries to provide a minimum illumination level at desk height level.
- b. Heating & Cooling – Adequate electrically powered equipment to maintain an ambient air temperature of 72 degrees F plus or minus 8 degrees.
- c. Toilet – A commode and wash sink in a separately enclosed room within the building or mobile trailer, properly ventilated and complying with applicable sanitary codes. Contractor shall provide toilet paper, paper towels and soap. A septic/water tank with a pump will be provided.
- d. Maintenance – The Contractor shall maintain all facilities and furnished equipment in good working condition, and the office shall be cleaned weekly.
- e. Fire Extinguisher – Two non-toxic, dry chemical, fire extinguishers meeting Underwriters Laboratories, Inc. approval for Class A, Class B, and Class C fires with a minimum rating of 2A:20B:10C.
- f. Electricity – Contractor shall provide a generator to provide electric power.
- g. Furnishings – Two office desks with drawers, five office chairs (padded, swivel type), one drafting table (adjustable height) 3 feet by 6 feet, two 8-foot conference tables, twelve folding chairs, two four-drawer legal size file cabinets, and one draftsman's stool. All furnishings shall be in good working order.
- h. Fax, Printer, Copier – Contractor shall provide a working 3-in-1 fax, printer, and copier for the exclusive use of the Engineer.

- i. First Aid Kit – Contractor shall provide a first aid kit.
- j. Potable Water Supply – Contractor shall provide a potable water supply and pay for all water service.

The office shall be fully equipped and made available for the Engineer's use and occupancy prior to the start of any Contract work and not later than 10 days after the date of Notice to Proceed. The Engineer will notify the Contractor, in writing, of the acceptability of the Field Office provided. The Contractor shall maintain the field office in operating condition until seven (7) days after acceptance of the Contract work.

The Contractor shall maintain all facilities in good operating condition and appearance for the designated period, after which all portable buildings or trailers, fencing, surfacing, and utilities shall be removed from the site, the areas cleaned and seeded if required and left in a neat and acceptable condition.

SUBSECTION 202.3 CLEANUP:

Contractor is responsible for cleanup of the site daily during construction and upon completion of the project. Cost of cleanup will be considered incidental to the project and no separate payment will be made for cleanup.

SUBSECTION 202.4 MEASUREMENT:

Evaluation of measurement for payment for mobilization shall be based on equipment and materials delivered to the site and the level of work being accomplished commensurate with the scope of work.

SUBSECTION 202.5 PAYMENT:

Payment for mobilization shall be made on the basis of the lump sum price bid and shall be full compensation for supplying and furnishing all materials, facilities, and services and performing all work involved as specified herein. The lump sum price bid shall not exceed three percent (3%) of the total project bid amount exclusive of mobilization. No additional payment will be made for occupancy and services during periods of contract time extension due to engineering changes.

BID ITEM 202-1 MOBILIZATION

End of Section

SECTION 206 STRUCTURE EXCAVATION AND BACKFILL

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 206.1 DESCRIPTION:

Structure excavation shall consist of the excavation of material from the upstream dam face and toe of the White Tanks FRS No. 3 for the construction of the Soil Cement structure and other excavation designated on the plans or in these special provisions as structure excavation.

Structure backfill shall consist of fill materials as described in Section 211 for the soil cement dam extension and the transitions from the soil cement extension to the existing White Tanks FRS No. 3, including placing and compacting backfill material to the lines designated on the plans or specified or as directed by the Engineer. Areas of incidental fill shall be further identified and approved as needed to complete Work as designed.

Structure excavation and backfill shall include the furnishing of all materials and equipment and the providing of other facilities which may be necessary to perform the excavations and place and compact the backfill as they are required or generally called out by the plans, special provisions or Engineer.

SUBSECTION 206.2 FOUNDATION MATERIAL TREATMENT:

SUBSECTION 206.2.1 Methods:

Pleistocene soils will be exposed during excavation for the soil cement dam extension foundation, cutoffs, and transitions from the soil cement extension to the existing White Tanks FRS No. 3. The soil cement embankment for the dam extension, cutoffs, and transitions from the soil cement extension to the existing White Tanks FRS No. 3, to the fullest extent practical, is to be founded within the Pleistocene soils. The limits of the proposed foundations for the various parts of the work are approximately as indicated on the drawings. The required excavation will be in the range of 10 to 12 feet, typically, except for limited areas where it may extend as deep as 15 to 25 feet. The Engineer reserves the right to change the depth to, or the width of, the foundations if, conditions exposed in the foundation excavations, or as determined by exploratory drilling, warrant such modifications.

It will be necessary to carefully excavate to the surface of the Pleistocene soils but not significantly into these soils. Where pockets or zones of Holocene soils are encountered, or where deeper zones of Holocene soils are encountered, it may be required to remove these soils to a depth to be determined during construction by the Engineer. The intent of cleaning is to create a relatively smooth and evenly sloped surface on which to place the dam extension embankment materials. Excessive cleaning of the types of soils anticipated to be encountered could be detrimental and, ultimately, not result in achieving the desired foundation surface. It will be important for the Engineer to closely observe this construction activity, and for the Contractor to cooperate with the Engineer in completing the foundation preparation and treatment. Approval by ADWR of the foundation surface prior to placement of soil cement or structural fill will be required.

Hand tools, where required or permitted by these specifications include, but are not limited to air, water, air/water jets, shovels, bars, picks, wedges, and brooms. Light power tools may be used in lieu of hand tools only when such use is approved. An air jet shall consist of a nozzle with a supply hose connected to a suitable source of compressed air. The compressed air shall have a pressure between 90 and 110 psi. The compressed air shall be controllable at the nozzle. An air/water jet shall consist of a nozzle with associated controls and supply hoses connected to suitable sources of compressed air and water. Water shall be introduced into the air stream at the nozzle when needed, at a rate of up to 30 gpm. The air and water shall be separately controllable at the nozzle. A water jet shall consist of a nozzle with a supply hose connected to a suitable source of water. The system shall be capable of delivering up to 200 gpm. The flow rate shall be controllable at the nozzle.

Within foundation areas where soil cement is to be placed for the dam extension embankment, backfilling to fill depressions shall be accomplished with structural fill for the embankment in accordance with Section 211. Within foundation areas where structural fill is to be placed for the transition from the soil cement to the existing White

Tanks FRS No. 3, backfilling to fill depressions shall be accomplished with structural backfill as part of the first lift of this material for the embankment in accordance with Section 211.

Upon completion of the cutoff wall construction, the Contractor shall excavate a minimum of two (2) feet into the Pleistocene soils between the cutoff walls to establish the soil cement foundation elevation. The foundation excavation and surface requirements shall be as previously stated. The exposed edges of the Soil-Cement-Bentonite (S-C-B) backfill used in the cutoff wall construction shall be cleaned to achieve a surface free of adhering soil materials. This cleaning process shall be non-intrusive to the S-C-B material and shall be approved by the Engineer prior to implementation.

SUBSECTION 206.2.2 Preliminary Cleanup:

When the excavation has reached the approximate limits shown or when the Engineer determines that a satisfactory foundation may have been reached, the Engineer may direct that a preliminary cleanup be performed on all or any part of the foundation surface. This cleanup shall consist of removing all debris, loose rock, sand, silt, and other objectionable material by hand tools followed by air, water, air/water jets, or any combination of additional methods approved or directed. The Engineer may require that the excavation be continued and the preliminary cleanup procedure repeated until a satisfactory foundation surface is reached.

SUBSECTION 206.2.3 Final Cleanup and Foundation Preparation:

Unless otherwise directed, final cleanup and foundation preparation shall be performed. This work shall consist of removing loose material, pockets of fines, sand, gravel and other objectionable material from the foundation surface including areas of depressions and open joints. The loose material need not be removed where the width of the opening is less than ½-inch. Picking, barring, and hand excavation may be necessary to obtain a foundation surface free from loose or shattered materials. Irregularities in the excavation surfaces shall be trimmed to form a reasonable uniform slope on the abutments. Overhangs shall not be permitted at any location. The final Pleistocene soil surface shall be thoroughly cleaned by use of air jets, water jets or air/water jets, or other approved methods, and shall be maintained in a clean condition until the placement of structural fill or soil cement thereon.

SUBSECTION 206.3 INSPECTION:

All foundation excavations shall be inspected and approved by the Engineer and ADWR prior to placing any sand/gravel materials, soil cement, structural fill or common fill materials. Any loose or disturbed zones shall be removed and replaced with structural fill as directed by the Engineer.

When any structure excavation is completed and the foundation/subgrade is exposed, the Contractor shall notify the Engineer who will make an inspection of the excavation, foundation, or subgrade. The foundation shall also be inspected by ADWR. No fill shall be placed until the excavation, foundation, or subgrade has been approved by the Engineer and ADWR. Any loose or disturbed zones should be removed and replaced with structural fill as directed by the Engineer.

Inspection of the excavation limits is required to verify lines and grades and subgrade compaction. Materials testing for density of in-place subgrade is required prior to backfill operations.

SUBSECTION 206.4 INCIDENTAL STRUCTURE BACKFILL:

Incidental structure backfilling operations shall conform to the following requirements: incidental structure backfill shall not be placed until the subgrade has been inspected by the Engineer and approved for the backfilling, and incidental structure backfill shall not be placed on foundation areas to receive soil cement.

No special treatment of the foundation (subgrade) beneath the incidental structural fill is required unless the in-situ soil is disturbed, or loosened, or a depth of 3 inches or more. In the event the foundation/subgrade is disturbed, the Contractor is required to moisture condition the loose soil layer and recompact. It is the Engineer's discretion to require that a uniform thickness of subgrade be scarified and moisture conditioned prior to recompaction operations.

All soil materials to be incidental structural fill and subgrade preparation shall be placed in approximately 8-inch loose lifts to produce a compacted lift thickness of approximately 6 inches. The incidental structural fill shall be compacted to a minimum of 95 percent of maximum dry density in accordance with ASTM D-698. Compaction of fill shall be accomplished to a uniform moisture content within range of minus 2 percent of its optimum to optimum.

Compaction against the principal spillway and inlet structures associated with the outlet works within three (3) feet of the walls shall be accomplished using non-wheeled, hand-operated compaction equipment only.

SUBSECTION 206.5 MEASUREMENT:

Measurement for payment of foundation preparation, including preliminary and final cleanup, shall be per square yard.

Measurement for payment of excavation of the White Tanks FRS No. 3 dam face and dam extension foundation shall be per in-place cubic yard.

No measurement for payment shall be made for incidental structure backfilling, compaction, or placement. The cost of incidental structure backfill shall be included in the unit prices for foundation preparation and structural excavation.

SUBSECTION 206.6 PAYMENT:

Payment of foundation preparation shall be made on the basis of the price bid per square yard.

No payment shall be made for excavation and backfill as such, the cost thereof shall be included in the bid price for construction of the items to which such excavation and backfill is incidental or appurtenant.

Payment of excavation of the existing White Tanks FRS No. 3 dam extension foundation shall be made on the basis of the price per cubic yard.

BID ITEM 206-1 FOUNDATION PREPARATION

BID ITEM 206-2 EXCAVATION OF DAM FACE AND TOE

End of Section

SECTION 210 BORROW EXCAVATION

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 210.1 LOCAL BORROW:

Local borrow shall consist of material excavated and used in the construction of fills and soil cement or for use as selected material or for other construction purposes. Local borrow shall be obtained by excavating from the designated borrow sources outside the planned or authorized construction areas and within the right-of-way and limits of the project. Local borrow shall be excavated to the lines and grades established by the Engineer.

Investigative soil data showing the borrow material is "generally" consistent with project requirements can be made available for the Contractor's understanding and use; however, it remains the Contractor's responsibility to satisfy the gradation and compaction requirements for fill. Copies of the Geotechnical and Design Reports that contain soils data (including sieve analysis) from limited investigations will be made available for review upon request in accordance with Subsection 102.4 of the Supplementary General Conditions.

The Contractor is required to excavate borrow material and stockpile the material at a pre-approved location. Stockpiling is necessary to sample and perform laboratory testing to prequalify the material before it is placed. It may be necessary to blend and/or screen the material to meet the gradation requirements of the soil cement or structural fill. The additional handling and processing of the material to meet the gradation specification shall be the responsibility of the Contractor. The Contractor is also required to remove and stockpile the upper 6 inches of material within the grading limits as per Section 201 of these Special Provisions.

SUBSECTION 210.2 IMPORTED BORROW:

Although not anticipated, the contractor may be required to locate and conduct operations at a secondary borrow site, importing fill to the site.

Imported borrow shall consist of material required for construction and unless otherwise designated in the special provisions, the Contractor shall make his own arrangements for obtaining imported borrow and he shall pay all costs involved. Imported borrow shall be obtained from sources indicated on the plans, designated in the special provisions, or approved by the Engineer.

The material shall be free from wood, vegetation, or other deleterious matter. The maximum size of this material shall not be greater than 3 inches.

The Contractor shall notify the Engineer sufficiently in advance of opening any material sites so that cross section elevations and measurements of the ground surface after stripping may be taken and sufficient time for pre-qualification material testing and acceptance.

Borrow pits shall be excavated to regular lines to permit accurate measurement; depth of excavation throughout the area of borrow pits shall be as uniform as practicable and the side slope shall be dressed to such slope as may be directed, leaving the borrow pit area in a clean and safe condition. Borrow sites other than the one identified for the project require prior approval by the Engineer and are subject to materials testing.

SUBSECTION 210.3 PLACING AND COMPACTING:

Local borrow and imported borrow shall be placed and compacted as specified in Section 211. The Contractor shall verify there is sufficient space available in fill locations for placing any excavated material, before placing borrow. Any excess excavation which develops as a result of placing borrow in advance of completing excavations shall be disposed of by the Contractor at no additional cost to the Contracting Agency and a corresponding reduction in the quantity of borrow to be paid for will be made, for which the Contractor will have no claim for compensation.

SUBSECTION 210.4 MEASUREMENT:

No measurement for payment shall be conducted for borrow excavation.

SUBSECTION 210.5 PAYMENT:

No payment shall be made for borrow excavation. The cost thereof shall be included in the bid price for Section 211, Section 215, and Section 221 for which such borrow excavation is considered incidental or appurtenant.

End of Section

SECTION 211 FILL CONSTRUCTION

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 211.1 DESCRIPTION:

Fill construction shall consist of constructing the coarse aggregate apron along the upstream toe of the soil cement, graded filter at the interface of the soil cement and structural fill transition, drain rock and drain sand for the impact basin wall drains, structural fill associated with dam construction and common fill associated with dam construction. It shall also include the placing and compacting of approved fill material to the lines and grades in accordance with the Plans.

The Contractor's approach will require methodical planning and sequencing and may include, but is not required to, constructing access ramps on one or both sides of the embankment.

SUBSECTION 211.1.1 Coarse Aggregate Apron:

Work specified in this subsection includes excavation and coarse aggregate backfill required along the upstream toe of the soil cement embankment to construct the coarse aggregate apron structure upstream of the soil cement dam extension as shown on the Plans. The earthwork described in this section shall be coordinated with the requirements specific to fill construction and associated subsections.

The backfill material for the coarse aggregate apron shall be engineered coarse aggregate. The coarse aggregate shall be imported, commercially manufactured material, uniformly washed and conform to the following requirements:

- A) Coarse Aggregate (Sand) complying with ASTM C-33 Coarse Aggregate. In addition, the coarse aggregate apron material for this project shall have a maximum of 5 percent particles passing the No. 4 sieve.
- B) Certificates of compliance or recent test results signed and stamped by a representative of the commercial supplier that ensures the material delivered to the site meets the requirements of ASTM C-33, size number 357.
- C) Pre-qualified coarse aggregate apron material shall be subject to further laboratory testing to ensure uniformity in material delivered to the site in accordance with the QA/QC plan.

Coarse aggregate apron material shall be ASTM C-33 coarse aggregate (Size Number 357) and manufactured by a certified commercial material supplier.

TABLE 211-1	
COARSE AGGREGATE APRON MATERIAL	
Sieve	Percent Passing
2 ½ inch	100
2 inch	95-100
1 inch	35-70
½ inch	10-30
No. 4	0-5
ASTM C-33, Size Number 357 Coarse Aggregate	

SUBSECTION 211.1.2 Graded Filter:

Work specified in this subsection includes excavation and installation of the graded filter backfill required at the interface of the soil cement and structural fill transitions as shown on the Plans. The earthwork described in this section shall be coordinated with the requirements specific to fill construction and associated subsections.

The backfill material for the graded filter shall be engineered sand. The filter material shall be imported, commercially manufactured, uniformly washed and conform to the following requirements:

- A) Fine Aggregate (Sand) complying with ASTM C-33 Coarse Aggregate. In addition the graded filter material for this project shall have a maximum of 5 percent particles passing the No. 4 sieve.
- B) Certificates of compliance or recent test results signed and stamped by a representative of the commercial supplier that ensures the material delivered to the site meets the requirements of ASTM C-33.
- C) Pre-qualified graded filter shall be subject to further laboratory testing to ensure uniformity in material delivered to the site in accordance with the QA/QC plan.

The graded filter shall be ASTM C-33 coarse aggregate (Size Number 357) and manufactured by a certified commercial material supplier.

TABLE 211-2	
GRADED FILTER MATERIAL	
Sieve	Percent Passing
2 ½ inch	100
2 inch	95-100
1 inch	35-70
½ inch	10-30
No. 4	0-5
ASTM C-33, Size Number 357 Coarse Aggregate	

SUBSECTION 211.1.3 Drain Rock:

Work specified in this subsection shall consist of drain rock construction to the lines and grades as shown on the Plans. The minimum limits of the drain rock are delineated on the Plans.

The drain rock material for the impact basin wall drains shall be engineered coarse aggregate. The drain rock shall be imported, commercially manufactured material, uniformly washed and conform to the following requirements:

- A) Coarse Aggregate complying with ASTM C-33 Coarse Aggregate. In addition the drain rock material for this project shall have a maximum of 5 percent particles passing the 3/8-inch sieve.
- B) Certificates of compliance or recent test results signed and stamped by a representative of the commercial supplier that ensures the drain rock delivered to the site meets the requirements of ASTM C-33, size number 5.
- C) Pre-qualified drain rock material shall be subject to further laboratory testing to ensure uniformity in material delivered to the site in accordance with the QA/QC plan.

Drain rock material shall be ASTM C-33 coarse aggregate (Size Number 5) and manufactured by a certified commercial material supplier.

TABLE 211-3	
DRAIN ROCK MATERIAL	
Sieve	Percent Passing
1 ½ inch	100
1 inch	90-100
¾-inch	20-55

½ inch	0-10
3/8-inch	0-5
ASTM C-33, Size Number 5 Coarse Aggregate	

SUBSECTION 211.1.4 Drain Sand:

Work specified in this subsection, shall consist of drain sand construction to the lines and grades as shown on the Plans. The minimum limits of the drain sand are delineated on the Plans.

The drain sand material for the impact basin wall drains shall be engineered fine aggregate sand. The drain sand shall be imported, commercially manufactured material, uniformly washed and conform to the following requirements:

- D) Fine Aggregate (Sand) complying with ASTM C-33 Fine Aggregate. In addition the drain sand material for this project shall have a maximum of 10 percent particles passing the No. 100 sieve.
- E) Certificates of compliance or recent test results signed and stamped by a representative of the commercial supplier that ensures the drain sand delivered to the site meets the requirements of ASTM C-33, Fine aggregate.
- F) Pre-qualified drain sand material shall be subject to further laboratory testing to ensure uniformity in material delivered to the site in accordance with the QA/QC plan.

Drain sand material shall be ASTM C-33 fine aggregate and manufactured by a certified commercial material supplier.

TABLE 211-4	
DRAIN SAND MATERIAL	
Sieve	Percent Passing
3/8-inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	0-10
ASTM C-33, Fine Aggregate	

SUBSECTION 211.1.5 Structural Fill:

The work under this subsection shall consist of structural fill construction to the lines and grades shown on the Plans. The minimum limits of fill are delineated on the Plans.

Construction of the structural fill shall be in accordance to the drawing lines, grades, and elevations without deviation unless specific express written approval from the Engineer. The Contractor is responsible for quality control to achieve completed dimensions and elevations as designed. The Contractor also has an obligation to notify the Engineer upon discovery of discrepancies within the dimensions or elevations prior to work for clarification or approved field design changes.

Structural fill shall consist of embankment soils excavated from the existing White Tanks FRS No. 3 and on-site native soils, free of vegetation, debris, organic contaminants, obtained from the borrow source(s) delineated on the Plans. The fill shall also meet the following requirements:

TABLE 211-5	
STRUCTURAL FILL	
Sieve	Percent Passing
3 inches (75 mm)	100
1 inches (25 mm)	90 to 100
½ inches (12.5 mm)	55 to 100
No. 4 (4.75 mm)	28 to 70
No. 16 (1.18 mm)	0 to 28
No. 200 (0.075 mm)	0 to 5

In addition, the structural fill shall meet the following soil engineering properties:

Maximum Particle Size:	3 inches
Plasticity Index:	<10
Soil Type:	CL, ML, GM, GC, SC or SM (per Unified Soil Classification System)

Investigative soils data indicate gradation and plasticity index and classification of existing soil from the borrow area(s) and existing White Tanks FRS No. 3 would be appropriate borrow for fill for the new construction. Copies of the Geotechnical and Design Reports that contain soils data (including sieve analysis) from limited investigations will be made available for review upon request in accordance with Subsection 102.4 of the Supplementary General Conditions.

SUBSECTION 211.1.6 Common Fill:

The work under this section shall consist of common fill throughout the grading limits of the project. The minimum limits of common fill are delineated on the Plans. Construction of the common fill shall be in accordance to the drawing lines, grades, and elevations without deviation unless specific express written approval from the Engineer. The Contractor is responsible for quality control to achieve completed dimensions and elevations as designed. The Contractor also has an obligation to notify the Engineer upon discovery of discrepancies within the dimensions or elevations prior to work for clarification or approved field design changes.

Common fill shall consist of embankment soils excavated from the existing White Tanks FRS No. 3 and on-site native soils obtained from the borrow area(s). There are no gradation or plasticity index requirements for landscape fill.

SUBSECTION 211.2 PLACING:

SUBSECTION 211.2.1 Coarse Aggregate Apron:

Specific approval of the coarse aggregate apron material upon review of pre-qualification and subsequent laboratory conformance testing results shall be obtained from the Engineer prior to placement.

Placement shall be conducted using the appropriate combination of heavy equipment, small equipment, and labor. Placement of coarse aggregate material to accurate lines, grades, and thickness, without contamination, is essential. Deviations from dimensions shall not be permitted without the Engineer's approval.

The coarse aggregate apron material shall be placed in uniform lifts thickness not to exceed 12 inches as measured in its loose state, prior to compaction. Each lift shall be placed near horizontal and continuous along its length to ensure optimal compaction conditions.

The Contractor is responsible for protecting the coarse aggregate apron material from being commingled with replacement embankment material. In the event sloughing from either adjacent soil zones occurs, the Contractor shall remove and replace any commingled coarse aggregate apron materials and soil.

SUBSECTION 211.2.2 Graded Filter:

Specific approval of the graded filter upon review of pre-qualification and subsequent laboratory conformance testing results shall be obtained from the Engineer prior to placement.

Placement shall be conducted using the appropriate combination of heavy equipment, small equipment, and labor. Placement of graded filter material to accurate lines, grades, and thickness, without contamination, is essential. Deviations from dimensions shall not be permitted without the Engineer's approval.

The graded filter shall be placed in uniform lifts thickness not to exceed 12 inches as measured in its loose state, prior to compaction. Each lift shall be placed near horizontal and continuous along its length to ensure optimal compaction conditions.

The Contractor is responsible for protecting the graded filter from being commingled with soil embankment materials. In the event sloughing from either adjacent soil zones occurs, the Contractor shall remove and replace any commingled filter material and soil.

SUBSECTION 211.2.3 Drain Rock:

Specific approval of the drain rock material upon review of pre-qualification and subsequent laboratory conformance testing results shall be obtained from the Engineer prior to placement.

Placement shall be conducted using the appropriate combination of heavy equipment, small equipment, and labor. Placement of drain rock material to accurate lines, grades, and thickness, without contamination, is essential. Deviations from dimensions shall not be permitted without the Engineer's approval.

Drain rock materials shall be placed in one lift to the minimum requirements shown on the Plans.

The Contractor is responsible for protecting the drain rock material from being commingled with replacement embankment material. In the event sloughing from either adjacent soil zones occurs, the Contractor shall remove and replace any commingled drain rock and soil.

SUBSECTION 211.2.4 Drain Sand:

Specific approval of the drain sand material upon review of pre-qualification and subsequent laboratory conformance testing results shall be obtained from the Engineer prior to placement.

Placement shall be conducted using the appropriate combination of heavy equipment, small equipment, and labor. Placement of drain sand material to accurate lines, grades, and thickness, without contamination, is essential. Deviations from dimensions shall not be permitted without the Engineer's approval.

Drain sand materials shall be placed in one lift to the minimum requirements shown on the Plans.

The Contractor is responsible for protecting the drain sand material from being commingled with replacement embankment material. In the event sloughing from either adjacent soil zones occurs, the Contractor shall remove and replace any commingled drain sand and soil.

SUBSECTION 211.2.5 Structural Fill:

Specific approval of structural fill upon review of pre-qualification and subsequent laboratory conformance testing results shall be obtained from the Engineer prior to placement and construction.

Placement of structural fill requires a well-planned method and approach from the Contractor. The Contractor will be required to submit a plan for fill placement for approval prior to beginning the work. Placement shall be conducted using the appropriate combination of heavy equipment, small equipment, and labor. The Plans indicate measurements that define the limits of the fill. Deviations from dimensions shall not be permitted without the Engineer's approval.

Structural fill shall be moisture conditioned prior to spreading at its final destination and placed in uniform lifts and compacted to the minimum requirements.

The maximum particle size is 3 inches in its greatest dimension. Material containing oversize rock will be rejected by the Engineer. However, should occasional random oversize material be encountered and the material otherwise meets the gradation requirements, the Contractor may employ hand labor and equipment to hand pick the oversize rock out of the loose lifts, only upon specific approval of the Engineer. Clods or hard lumps of earth of 6 inches in greatest dimension shall be broken up and moisture conditioned before compacting the material in embankment.

The loose thickness of each layer of fill material before compacting shall not exceed 8 inches.

On-site undisturbed soils or compacted soils subsequently disturbed or removed by construction operations should be replaced by materials compacted as specified above.

Nesting of coarse particles will not be permitted.

The minimum compressive strength required before backfill against and over the top of concrete structures shall apply as described in Section 725. Damage caused by premature fill placement shall be replaced or repaired as recommended by Owner at no cost to Owner. Do not operate heavy equipment over the basin outlet pipe and buried concrete structures until at least 1.5 feet of fill materials have been placed and compacted over the top in conformance with the requirements specified herein. Select and operate compaction equipment so that concrete structures and the basin outlet pipe are not damaged nor overstressed during compaction operations. Use hand-operated mechanical tampers for compaction of fill adjacent to concrete structures and the basin outlet pipe where rolling equipment is impracticable for use in compaction.

SUBSECTION 211.2.6 Common Fill:

Placement of common fill requires a well-planned method and approach from the Contractor. The Contractor will be required to submit a plan for fill placement for approval prior to beginning the work. Placement shall be conducted using the appropriate combination of heavy equipment, small equipment, and labor. The Plans indicate measurements that define the limits of the fill. Deviations from dimensions shall not be permitted without the Engineer's approval.

Common fill shall be moisture conditioned prior to spreading at its final destination and placed in uniform lifts and compacted to the minimum requirements.

The loose thickness of each layer of fill material before compacting shall not exceed 8 inches.

Nesting of coarse particles will not be permitted.

SUBSECTION 211.3 COMPACTING:

SUBSECTION 211.3.1 Coarse Aggregate Apron:

The coarse aggregate apron material shall be loosely placed to the lines and grades shown on the Plans. There are no compaction requirements for this material.

SUBSECTION 211.3.2 Graded Filter:

The graded filter shall be compacted to a minimum of 95 percent of the maximum relative density. This compaction shall be achieved by multiple passes using vibratory compaction equipment suitable for the trench compaction. The Contractor is responsible for selecting the compaction equipment to achieve required relative densities. Different equipment or thinner lift thickness' will be at the Contractor's expense.

SUBSECTION 211.3.3 Drain Rock:

The drain rock material shall be loosely placed to the lines and grades shown on the Plans. There are no compaction requirements for this material.

SUBSECTION 211.3.4 Drain Sand:

The drain sand material shall be loosely placed to the lines and grades shown on the Plans. There are no compaction requirements for this material.

SUBSECTION 211.3.5 Structural Fill:

Structural fill shall be constructed in compacted layers of uniform thickness and each layer shall be compacted in accordance with the requirements herein specified. Structural fill construction shall consist of material compacted to a uniform density of not less than 95 percent of the maximum dry density and within a moisture range of 4 percent minus optimum to 2 percent above optimum. The maximum dry density will be determined by ASTM D-698.

Areas over which fills are to be placed over one (1) hour previously shall be scarified to a depth of 3 inches and re-conditioned to the appropriate moisture content to provide a bond between the existing ground and the material to be deposited thereon.

Compaction operations shall be accomplished by mechanical and vibratory methods, including padded foot rollers. Water settling or jetting shall not be permitted.

SUBSECTION 211.3.6 Common Fill:

Common fill shall be constructed in compacted layers of uniform thickness and each layer shall be compacted in accordance with the requirements herein specified. Common fill construction shall consist of material compacted to a uniform density of not less than 85 percent of the maximum dry density and within a moisture range of 4 percent minus optimum to 2 percent above optimum. The maximum dry density will be determined by ASTM D-698.

Areas over which fills are to be placed over one (1) hour previously shall be scarified to a depth of 3 inches and re-conditioned to the appropriate moisture content to provide a bond between the existing ground and the material to be deposited thereon.

Compaction operations shall be accomplished by mechanical and vibratory methods, including padded foot rollers. Water settling or jetting shall not be permitted.

SUBSECTION 211.4 TESTS:

Pre-qualification testing and conformance testing prior to placement will be conducted on the sand material, gravel material and structural fill in accordance with the QA/QC Plan.

The structural fill and common fill shall be thoroughly compacted to not less than the stated densities when tested and determined by ASTM D-2922 (nuclear gauge) and D1556 (sand cone), with the percent of density adjusted in accordance with the rock correction procedure for maximum density determination, to compensate for the rock content larger than that which will pass a No. 4 sieve.

Failing results is the responsibility of the Contractor. Rework, fill replacement, and retesting shall be at the Contractor's expense.

SUBSECTION 211.5 MEASUREMENT:

Measurement of fill construction used to construct the coarse aggregate apron, graded filter, drain rock, drain sand, structural fill and common fill shall be per in-place cubic yard volumes, within the limits of dimensions shown on the Plans. The Engineer will compute the quantities of fill by a method which is best suited to obtain an accurate determination.

SUBSECTION 211.6 PAYMENT:

Payment of fill construction for the coarse aggregate apron, graded filter, drain rock, drain sand, structural fill and common fill shall be made on the basis of the bid price per cubic yard of fill (in-place) as stipulated in the proposal. Payment shall include, excavation, placing, compaction, grading, hauling, removal, dust control, disposal of excess material, survey as required, and all other miscellaneous items necessary to accomplish the work in conformance with the plans.

No payment will be made for fill construction to replace unsuitable material or for rework due to failing tests or overbuilding for construction convenience and then cut back to the required lines and grades; the cost thereof shall be included in the price bid for the construction of the items to which such fill is incidental or appurtenant.

BID ITEM 211-1 COARSE AGGREGATE APRON

BID ITEM 211-2 GRADED FILTER

BID ITEM 211-3 DRAIN ROCK

BID ITEM 211-4 DRAIN SAND

BID ITEM 211-5 STRUCTURAL FILL

BID ITEM 211-6 COMMON FILL

End of Section

SECTION 215 EARTHWORK FOR OPEN CHANNELS

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 215.1 DESCRIPTION:

Earthwork for open channels shall consist of excavation, overexcavation, fill, grading, and disposal of excavated and removed material. Open channels for the purpose of this section refers to the outlet works channel and cut through the existing White Tanks FRS No. 3.

SUBSECTION 215.2 STRIPPING:

When stripping is indicated on the Plans or specified in the special provisions, the Contractor shall strip the soil from the designated areas to the depths shown or specified or as directed by the Engineer. The material obtained from stripping operations shall be disposed of away from the site unless otherwise specified, shown on the Plans or authorized by the Engineer.

Soil loosened below the stripping depth specified or designated by the Engineer, shall be compacted. Soil removed below stripping depth shall be replaced with approved material and compacted up to the designated grade. All such filling and compacting shall be done by the Contractor at no additional cost to the Contracting Agency.

SUBSECTION 215.3 EXCAVATION:

Excavation in open cut channels may be made to provide faces of the excavation that are firm and unyielding, are such as will stand or can be made to stand without sloughing, and are at all points are in accordance to the lines and grades shown on the Plans.

Excavation made below subgrade shall be backfilled and compacted to a uniform density of not less than 95 percent. However, no payment will be made for such overexcavation or material used for such backfill.

Where it becomes necessary to excavate beyond normal lines of excavation in order to remove boulders or other interfering objects, the voids remaining after the removal of such boulders or interfering objects shall be backfilled as specified below, or as otherwise approved by the Engineer.

When the void is in the side of the excavation, it shall be filled with suitable material as approved by the Engineer, placed in the manner and to the same uniform density as the backfill in the vicinity of the void.

The removal of boulders or other interfering objects and the backfilling of voids caused by such removals shall be done by the Contractor at no additional cost to the Contracting Agency. The cost of such work shall be included in the prices bid for the various items of work.

If during the progress of excavation, material is encountered, which, in the opinion of the Engineer, is unsuitable for subgrade for the channel to be constructed on, the Engineer may direct the Contractor to excavate beyond the pay lines shown on the Plans. However, the suitability of subgrade shall be determined by the Engineer on the basis of its ability to withstand the load of the proposed channel and not upon the capacity to withstand the loads which may be placed upon it by the Contractor's equipment. Should the Contractor be directed to excavate beyond the pay lines shown on the Plans, said pay lines will be extended to include such ordered excavation; and the pay lines for subdrainage material, if used, will be adjusted accordingly.

Excavation to the lines and grades shown on the Plans is required and deviations to the Plans for purpose of borrow ease or quantities shall be prior approved by the Engineer.

Materials used or work performed by the Contractor, to stabilize the subgrade so it will withstand loads, which may be placed upon it by his equipment, shall be accomplished by the Contractor at no additional cost to the Contracting Agency.

SUBSECTION 215.4 FILL AND BACKFILL:

Unless otherwise specified in the special provisions, material obtained from the project excavations may be presumed to be suitable for use as structural fill or backfill for the channel provided it is free of all organic material, rubbish, debris, and other objectionable material. Backfilling operations for the channel shall conform to the following requirements: structural backfill shall not be placed until the subgrade has been inspected by the Engineer and approved for backfilling.

No special treatment of the foundation (subgrade) beneath the structural fill is required unless the in-situ soil is disturbed, or loosened, at a depth of 3 inches or more. In the event the foundation/subgrade is disturbed, the Contractor is required to moisture condition the loose soil layer and recompact the layer. It is the Engineer's discretion to require that a uniform thickness of subgrade be scarified and moisture conditioned prior to recompaction operations.

All soil materials to be backfilled shall be placed in approximately 8-inch loose lifts to produce a compacted lift thickness of approximately 6 inches. The structural fill shall be compacted to a minimum of 95 percent of maximum dry density in accordance with ASTM D-698. Compaction of fill shall be accomplished within a moisture range of 4 percent minus optimum to 2 percent above optimum.

SUBSECTION 215.5 GRADING:

Grading of the unlined channel shall conform to the following tolerances:

A vertical tolerance of none above and 3 inches below the specified grade will be allowed on:

- (1) Channel bottom
- (2) Channel side slopes in both cut and fill

Regardless of the construction tolerances specified, excavation and grading shall be performed so that finished surfaces are in uniform planes with no abrupt breaks in the surface. Construction tolerances specified above for grading are solely for purposes of field control.

The Contractor will maintain the specified grade along the length of the channel as shown on the Plans. The grade is of the utmost importance. Abrupt crowns or depressions shall be eliminated to the practical extent possible by fine grading.

SUBSECTION 215.6 TESTS:

The channel bottom shall be proof-rolled using rubber-tired equipment with a gross vehicle weight of no less than 30,000 pounds. Proof-rolling shall be conducted with no less than two passes with overlapping tire path and shall be witnessed by the Engineer.

SUBSECTION 215.7 MEASUREMENT:

Measurement for excavation of the channel shall be per cubic yard basis and shall be made according to the quantity of material excavated from natural ground to the finished subgrades shown on the Plans. The Engineer will verify the quantities of excavation by a method, which in his opinion is best suited to obtain an accurate determination.

No measurement shall be made for excavation to subgrade for riprap placement.

SUBSECTION 215.8 PAYMENT:

Payment of excavation for the channel shall be made on the basis of the price bid per cubic yard of excavation as stipulated in the proposal, and shall include stripping, excavation, stockpiling, fill, backfill, compaction, grading, hauling, removal and disposal of excess excavated material and debris.

BID ITEM 215-1 EXCAVATION, DIVERSION CHANNEL

End of Section

SECTION 220 RIPRAP CONSTRUCTION

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 220.1 DESCRIPTION:

The construction of plain riprap within the outlet works downstream channel shall consist of furnishing and placing stone to the depth and limits as shown on the Plans.

Riprap construction shall be coordinated with the placement of geotextile filter fabric per drawing sections and details.

SUBSECTION 220.2 MATERIALS:

Materials furnished for riprap shall conform to the requirements of Section 703 and as stated in this Section.

In order to maintain slope stability where plain riprap is constructed, stones shall be angular in shape and conform to the gradation requirements set forth in the table below.

TABLE 220-1		
RIPRAP		
Description	Size	
	Zone 1	Zone 2
D ₅₀	5 inches	9 inches
Minimum Stone Size	2 inches	4 inches
Maximum Stone Size	12 inches	18 inches

A geotextile fabric underlay shall be furnished in accordance with Section 230.

SUBSECTION 220.3 PREPARATION OF GROUND SURFACES:

The bed for the riprap shall be shaped and trimmed to provide even surfaces. A footing (toe) trench shall be excavated along the toe of the slope as shown on the plans. The bed (or subgrade) shall be proof rolled along the slope and bottom to establish a firm surface.

Place the geotextile filter fabric to the same dimensions that are to receive riprap in accordance with Section 230.

Protect the position and integrity of the geotextile during placement of the riprap.

SUBSECTION 220.4 PLAIN RIPRAP:

Riprap shall be placed by heavy equipment and hand labor as required. Stone shall be placed to provide a minimum of voids. Stones shall be placed with their longitudinal axis normal to the face of the embankment and so arranged that each stone above the foundation course have at least a 3-point bearing on the underlying stones. Bearing on smaller stones used to chink voids will not be acceptable. Interstices between stones shall be chinked with small stones and spalls. The finished surface shall be even and tight and shall not vary from the planned surface by more than 3 inches per foot of depth.

Riprap may initially be placed by dumping from loader-type equipment in a careful, methodical manner. However, hand placement to the outer dimensions and hand repositioning shall be conducted to the Engineer's satisfaction in the field. Care shall be taken when placing the riprap to not tear or stretch the filter fabric. If tearing of the fabric is observed, the Engineer will require changes in placement methods to protect the fabric. A cushion layer of sand and

gravel will be provided over the fabric with sufficient thickness to prevent tearing when dumping the riprap. If used, the cushion layer shall be a pervious mixture of sand, gravel, and small cobbles with a minimum of fines. Special care shall be exercised in placing riprap in all areas within 3 feet of structures to avoid damage to such structures.

Place the riprap to the limits, elevation, and thickness shown on the plans. Elevation measurements shall be staked prior to placement of riprap and to be inspected and verified in the field by the Engineer.

The toe trench shall be excavated as shown on the Plans for riprap placement. The trench shall be continuous along the toe of slope.

SUBSECTION 220.5 MEASUREMENT:

Measurement of riprap construction shall be per cubic yard for completed bid item, in place, within the limits of dimensions shown on the plans. The Engineer will compute the quantities of riprap by a method, which, in his opinion, is best suited to obtain an accurate determination.

SUBSECTION 220.6 PAYMENT:

Payment for riprap construction shall be made on the basis of the price bid per cubic yard to the neat lines shown on the plans, and shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all the work involved in constructing the riprap and aggregate structures complete in place as specified on the plans, and in the special provisions. This includes, but is not limited to, preparation of ground surfaces, excavation and backfill, geotextile fabric, riprap, aggregate, and cleanup.

BID ITEM 220-1 RIPRAP ZONE 1 (D₅₀ = 5-INCH)

BID ITEM 220-2 RIPRAP ZONE 2 (D₅₀ = 9-INCH)

End of Section

SECTION 221 SOIL CEMENT

(Add this section to the MAG Uniform Standard Specifications.)

SUBSECTION 221.1 DESCRIPTION:

The work shall consist of furnishing all labor, equipment and materials and constructing soil cement as required by the Plans, including the soil cement southern Fissure Risk Zone (FRZ) portion of the dam construction and the soil cement outlet works foundation.

The Contractor shall submit a plan showing his intended method of constructing the soil cement at least two weeks prior to the start of soil cement production. The plan shall be sufficient in detail to clearly describe the planned execution of the work. Such plan shall include, but not necessarily be limited to, mixing plant, transport equipment, spreading equipment, and compacting equipment, indicating number and capacities of each type of equipment. The plan shall clearly define the methods for constructing soil cement vertical joints between daily soil cement construction output and identify the amount of overbuild necessary to achieve a thoroughly compacted soil cement core structure to the neat lines shown on the Plans.

It should be noted that the construction of the soil cement core and surrounding structural and common fill materials shall be simultaneous to achieve the desired 0.6:1 (H:V) sideslopes of the soil cement core as shown on the Plans. Therefore, the Contractor shall outline this approach in the work plan.

The Contractor shall have full responsibility for administration of a Quality Control Plan for soil cement, which shall meet the same quality control requirements as Section 105 and as specified in this Section 221.

The plan shall also show the access planned for performing the work.

SUBSECTION 221.2 MATERIALS:

SUBSECTION 221.2.1 Portland Cement:

Portland Cement shall comply with the latest Specifications as approved by the Engineer for Portland Cement (ASTM C-150, Type II [low alkali]), and shall conform to the requirements of Subsection 725.2.

SUBSECTION 221.2.2 Water:

Water shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. Water shall contain not more than 1,000 parts per million of chlorides as CL or of sulfates as SO_4 . Water shall be sampled and tested in accordance with the requirements of AASHTO T-26.

SUBSECTION 221.2.3 Aggregate:

Soil aggregate for use in soil cement may be produced by the Contractor by processing, screening, crushing and/or blending soils obtained from the required excavations. Soil aggregate for soil cement shall contain no deleterious material. Before mixing as soil cement, the soils shall be stockpiled and samples, and shall be approved by the Engineer, in accordance with the requirements of Section 221.9 of these Special Provisions. The distribution and gradation of materials in the soil cement shall not result in lenses, pockets, streaks, or layers of material differing substantially in texture or gradation from surrounding material.

The maximum allowable plasticity index for soil cement aggregate shall be eight (8). Soil aggregate for soil cement shall conform to the following gradation requirements when tested in accordance with ASTM C-136 and C-117:

Sieve #	Percent Passing, by Dry Weight
2"	100%
No. 4	50% to 80%
No. 200	5% to 45%

Plasticity index shall be less than eight (8) when tested in accordance with the requirements of AASHTO T-90.

Soil aggregate for soil cement shall not contain clay/silt lumps larger than one (1) inch.

Blending of soil aggregate by combining soils from separate soil stockpiles shall be performed by utilization of separate storage feed bins at the plant, to the satisfaction of the Engineer.

SUBSECTION 221.2.4 Fly Ash:

Fly ash shall not be allowed as cementitious material.

SUBSECTION 221.3 EQUIPMENT:

The FRZ soil cement dam embankment and outlet works foundation may be constructed with any combination of machines and/or equipment, except as noted herein, that will produce completed soil cement meeting the requirements for soil pulverization, cement and water application, mixing, saw cutting, excavating, transporting, placing, compacting, finishing, and curing as provided in these Specifications.

SUBSECTION 221.4 CONSTRUCTION REQUIREMENTS:

SUBSECTION 221.4.1 Required Contractor Submittals:

Approval by the Engineer shall not relieve the Contractor of the responsibility for achieving the desired result of constructing sound soil cement, free from defects, according to the Specifications and Plans, or as directed by the Engineer.

Prior to the start of construction, the Contractor shall submit, in writing, for approval, the following items:

1. The approximate length of soil cement embankment or other structure to be placed prior to starting compaction operations.
2. The type of compaction equipment to be used.
3. The number and type of watering equipment to be used.
4. The method to be used to keep surfaces continually moist until subsequent layers of soil cement are placed.
5. The method to be used to cure permanently exposed soil cement surfaces.
6. The proposed size and number of soil aggregate stockpiles.
7. The mix design to be used in conformance with the requirements specified herein.

SUBSECTION 221.4.2 Preparation:

Before soil cement processing begins, the area on which soil cement will be placed shall be graded and shaped to lines and grades as shown on the Plans or as directed by the Engineer. The foundation area that will receive soil cement shall be prepared in accordance with Section 206.

The subgrade beneath all soil cement shall be compacted to a minimum of 95% of the maximum dry density. Optimum moisture and maximum dry density shall be determined in accordance with ASTM D698. Field density tests shall be performed in accordance with ASTM D1556 (sand cone method) or ASTM D2922 (nuclear).

SUBSECTION 221.4.3 Mixing:

Soil cement shall be mixed in an approved central-type plant having a stationary twin shaft pugmill mixer of the continuous-mixing type or an approved batch-type pugmill. The mixing plant shall be designed, coordinated, and operated to produce a soil cement mixture of the proportions specified within the required tolerances. The plant shall be equipped with positive means for controlling and maintaining a constant time of mixing. Twin shaft pugmills shall also be equipped with a positive means for maintaining a constant speed of rotation of the shafts.

The plant shall be equipped with screening, feeding, and weighing and metering measuring devices that will add the soil, cementitious material(s), and water into the mixer in the specified quantities. The blades of twin shaft continuous pugmill mixers shall be adjustable for angular position on the shaft and reversible to retard the flow of the mix.

When the quantity of water is controlled by metering, the Contractor shall make provisions whereby the quantity of water delivered through the meter can be readily converted to weight. A water storage tank may be required to prevent the adverse effects created by surge drawdown.

A variable speed belt or a remotely operated gate, calibrated to accurately deliver any specified quantity of material shall control the soil aggregate feed rate. The feed rate shall be readily adjustable from the control panel to compensate for changes in the moisture content of the soil or to change soil aggregate proportions when blending is required and separate bins are utilized. The combined aggregate belt feeding the mixer shall be equipped with an approved belt scale. The belt scale shall operate automatic controls which will govern the proportions of cementitious material and water as ratios of the total soil aggregate, with provisions for ready changing of the proportions.

When a continuous mixing plant with a fixed soil aggregate feed rate system is used, the belt shall travel at a constant speed. The feed system shall continuously deliver aggregate to the mixer at a constant feed rate, calculated on a dry weight basis, at any locked gate setting. The feed system shall be mechanically interlocked with all other feed devices. The soil aggregate feed monitoring system shall provide and record the rate of and total quantity of soil aggregate fed into the mixture.

The plant shall be equipped with a hydraulically- or mechanically-operated discharge holding bin having a minimum capacity of twenty (20) tons.

Mixing shall be sufficient to secure a homogeneous, intimate, uniform mixture of the soil, and water within the specified tolerances. Soil and cementitious material shall be mixed sufficiently to prevent cementitious balls from forming when water is added.

Mixing shall not proceed when the soil aggregate or the area on which the soil cement is to be placed is frozen. Soil cement shall not be mixed or placed when the air temperature is below 40°F (5°C).

At the completion of moist mixing, any lumps consisting of silt, clay and/or cementitious material shall be so pulverized that, exclusive of gravel-sized and larger stones, 100% shall pass a one (1) inch sieve, and at least 80% by dry weight shall pass a No. 4 sieve.

In the production of soil cement, the percent of cementitious material shall not vary by more than +0.3 percent of the contents specified by the Engineer.

Silos and feeders shall be equipped and operated so as to provide uniform rates of feed and prevent caking. Provisions shall be made to allow for ready, safe sampling of the cementitious material(s).

The weighing and metering systems shall include digital readouts, which continuously display, and shall provide an hourly printed record of, the following information:

1. The total discharged quantity per hour of each weighed or metered material.
2. The cumulative total discharged quantity of each weighed or metered material.
3. The moisture content of the combined soil aggregate currently entering the mixer.
4. The cumulative total discharged weight of soil aggregate moisture.

The Contractor shall give copies of the hourly printed records of discharged quantities and soil aggregate moisture information to the Engineer at the end of each day of soil cement mixing.

Measuring devices shall be calibrated prior to production of soil cement and as deemed necessary by the Engineer. All measuring device calibration shall be approved by the Engineer and performed at the Contractor's expense.

Each measuring device shall be calibrated throughout its range to within an accuracy between plus/minus two (2.0) percent and shall be inspected and calibrated as often as the Engineer deems necessary to assure their accuracy. A certified lab shall perform calibrations.

The Contractor shall notify the Engineer at least 48 hours in advance of the initial plant calibration. Prior to or at the time of this notification, the Contractor shall provide a Plant Operating Manual to the Engineer.

SUBSECTION 221.4.4 Required Moisture:

At the time of compaction, the moisture content of the soil cement shall be in the range of optimum to optimum plus 2.0 percent when the mean air temperature during construction hours does not exceed 90°F. The relationship between the soil cement's moisture content and its optimum moisture content will be determined in accordance with ASTM D-558 or AASHTO T-134. When the mean air temperature does exceed 90°F, or there is a breeze or wind which promotes the rapid drying out of the soil cement mixture, the moisture content of said mix shall be increased as needed at the direction of the Engineer, but shall be less than that quantity that will cause the soil cement to become unstable during compaction and finishing operations.

SUBSECTION 221.4.5 Sampling Facilities:

Free and safe access to the plant must be provided to the Engineer at all times for inspection of the plants operation.

The Contractor shall provide suitable facilities and shall take representative samples of materials as they enter the mixer, are discharged from the mixer, and are discharged from the gob hopper. The frequency of the Engineer's sampling of the combined said aggregate feed shall be at the discretion of the Engineer, but will not be less than once a day or once for each 500 cubic yards of soil cement produced. These samples shall be used for the Contractor's quality control and the Engineer's Quality assurance testing. The Contractor shall furnish all necessary platforms, tools, equipment and trained personnel for obtaining samples.

SUBSECTION 221.4.6 Handling:

The soil cement mixture shall be transported from the mixing area to the embankment or drop structure locations in clean equipment provided with suitable protective devices in unfavorable weather. The total elapsed time between the addition of water to the mixture and the start of compaction shall be the minimum possible. In no case shall the total elapsed time exceed thirty (30) minutes. (This time may be reduced by the Engineer when the air temperature exceeds 90° F or when there is a breeze or wind, which promotes rapid drying of the soil cement mixture.) Compaction shall start as soon as possible after spreading.

The Contractor shall take all necessary precautions to prevent damage to completed soil cement by the equipment and to prevent the deposition of raw earth or foreign materials between layers of soil cement. Earth ramps crossing completed soil cement must have at least two (2) feet compacted thickness. Where ramps are constructed over soil cement that is not to grade, all foreign materials and the uppermost one (1) inch of the previously placed soil cement mixture must be removed prior to continuation of the soil cement construction.

SUBSECTION 221.4.7 Placing:

The mixture shall be placed on the moistened subgrade or previously completed soil cement with spreading equipment that will produce layers with a thickness as is necessary for compaction to the required dimensions of the completed soil cement layers. The width of each layer is that which will allow for full compaction of the design width at any given height of the soil cement embankment, with one-half (1/2) foot of excess on either embankment face that will not be trimmed. The compacted layers of soil cement shall not exceed eight (8) inches in thickness nor be less than four (4) inches in thickness. The maximum depth of compacted soil cement that shall be placed per day shall be five (5) feet.

Each successive layer shall be placed as soon as practicable after the compaction of the preceding layer has been verified by the Engineer.

The Contractor shall schedule placement of all soil cement such that the construction activities are consistent and consecutive with no lags between successive lifts, unless otherwise approved by the Engineer, or unless prevented by inclement weather.

All soil cement surfaces that will be in contact with succeeding layers of soil cement shall be kept continuously moist by fog spraying until placement of the subsequent layer, except that the Contractor will not be required to keep such surfaces continuously moist for a period longer than seven (7) days.

Mixing shall not proceed when the soil aggregate or the area on which the soil cement is to be placed is frozen. Soil cement shall not be mixed or placed when the air temperature is below 40°F (5°C).

SUBSECTION 221.4.8 Compaction:

The running average of five consecutive in-place density tests shall not be less than 98% of the maximum density obtained by ASTM D-558, with no individual test less than 95%. The Contractor shall remove and replace all soil cement not meeting these requirements at his own cost. Optimum moisture and maximum density shall be determined in accordance with ASTM D-558. Field density tests shall be performed in accordance with ASTM D1556 (Sand Cone Method) or ASTM D-2922 (Nuclear Method). Moisture contents shall be measured and reported to the nearest 0.1%.

Wheel-rolling with hauling, grading, spreading, or watering equipment, exclusively, shall not be an acceptable method of compaction. Vibratory compaction methods or equipment shall not be used when their use contributes to sloughing or caving of the soils which the soil cement is to be placed against.

At the start of compaction, the mixture shall be in a uniform, loose condition throughout its full depth. Its moisture content shall be as specified in Subsection 221.4.4 herein. No section shall be left undisturbed for longer than thirty (30) minutes during compaction operations. Compaction of each layer shall be done in such a manner as to produce a dense surface, free of compaction planes, in not longer than one (1) hour from the time water is added to the mixture. Whenever the Contractor's operation is interrupted for more than two (2) hours, the top surface of the completed layer, if smooth, shall be scored to a depth of at least one (1) inch with a spike tooth instrument, or by other means approved by the Engineer, prior to placement of the next lift. The spacing of scores shall not exceed eighteen (18) inches, measures across the direction of soil cement placement. The surface, after said scoring, shall be swept using a power broom or other method approved by the Engineer to completely free the surface of all loose material prior to actual placement of the soil cement mixture for the next lift.

SUBSECTION 221.4.9 Finishing:

Surface compaction and finishing of each layer shall be done in such a manner as to produce a dense surface free of compaction planes or loose material in no more than two (2) hours from the time compaction is started or three (3) hours from the time water is added to the mixture.

The 0.6:1 (H:V) sideslopes of the soil cement do not require any special finishing during construction. These slopes shall be constructed simultaneously with the surrounding structural and common fill materials.

After compaction of the final lift, the top surface of the soil cement shall be shaped to the required lines, grades, and cross sections and rolled to a reasonably smooth surface.

With the exception of the north and south ends of the soil cement core, all sideslopes greater than 2:1 shall be shaped to the required lines grades, and cross-sections and rolled to a uniform, smooth slope.

The north and south ends of the soil cement core shall be stepped outside of the neat line indicated on the Plans. These steps shall be approximately three feet in depth (vertically) and six feet in length (horizontally). These steps shall be overbuilt, thoroughly compacted, and trimmed to achieve the step dimensions shown on the Plans.

SUBSECTION 221.4.10 Curing:

Temporarily exposed surfaces shall be kept moist as set forth in Subsection 221.4.7.

Care shall be exercised to ensure that no curing material other than water is applied to surfaces that will be in contact with succeeding layers of soil cement.

Permanently exposed surfaces of the soil cement shall be kept moist during the seven (7) day cure period. Whenever atmospheric temperatures are expected to drop below 30° F, soil cement shall be protected from freezing for seven (7) days after its construction by a covering of loose earth, straw, or other suitable material approved by the Engineer.

SUBSECTION 221.4.11 Construction Joints:

At the end of each day's work, or whenever construction operations are interrupted for more than two (2) hours, a transverse construction joint shall be formed in the last-placed lift by cutting back into the complete lift to form a full-depth vertical face.

SUBSECTION 221.4.12 Maintenance:

The Contractor shall be required, within the limits of the Contract, to maintain the soil cement in good condition until all work is completed and accepted. Maintenance shall include immediate repairs of any defects that may occur. This work shall be done by the Contractor at his own expense and repeated as often as necessary. Faulty work shall be replaced for the full depth of the layer.

SUBSECTION 221.5 INSPECTION AND TESTING:

The Engineer, with the assistance and cooperation of the Contractor, will make such inspections and tests as he deems necessary to verify the conformance of the work to the Contract Documents. These inspections and tests will include, but will not be limited to: (1) the taking of test samples of the soil cement and its individual components at all stages of processing and after completion, and (2) the close observation of the operation of all equipment used on the work. Only those materials, machines, and methods meeting the requirements of the Contract Documents will be approved by the Engineer.

All testing of soil cement or its individual components, unless otherwise provided specifically in the Contract Documents, shall be in accordance with the latest applicable test methods in effect as of the date of advertisement for bids on the project.

Testing for proper compaction shall be done on at least every other lift of compacted soil cement and at least once for every 500 cubic yards of soil cement. The Engineer shall choose test locations. If the lift being tested does not meet the specified density requirements, it must be reworked as directed by the Engineer until it passes or be removed by the Contractor at the Contractor's expense. The Contractor shall not be permitted to continue placing lifts of soil cement on any lift which has failed the compaction tests until such time as that lift has been reworked, retested, and passed as to meeting density and moisture content requirements.

The initial acceptance of material shall in no way preclude further examination and testing at any time, during the course of construction or subsequent warranty period, if the Engineer suspects the material is no longer properly represented by the acceptance sample. The acceptance at any time of any material incorporated into the work shall not bar its future rejection if it is subsequently found to be defective in quality or uniformity.

SUBSECTION 221.6 MIX DESIGN METHODOLOGY:

The design requirements for the soil cement shall be such that it has a minimum compressive strength of 500 psi at seven (7) days for the soil cement dam extension embankment as indicated on the Plans. The Contractor will determine the mix proportions of the aggregate, cement and water, and the Contractor shall furnish soil cement conforming to the requirements specified herein. The job-mix design with the supporting test results will be made available to the Engineer for review and approval prior to the Contractor incorporating any of the material into the work.

Included in the job-mix design data shall be the type of cement and source of aggregate. A new mix design will be required any time the Contractor requests a change in material, or proportioning of the materials, from that given in the approved mix designs.

SUBSECTION 221.7 MIX DESIGN FOR THIS PROJECT:

Trial soil cement mixes were prepared during the design of the soil cement core. These mix designs are included in the Geotechnical Report for the project. A cement content of approximately nine (9) percent was used to achieve the desired strength requirements.

The percent of cementitious material to be used in the mix shall be calculated to be the weight of cementitious material divided by the total weight of the dry soil cement materials. The actual mix designs used on this project shall be determined by the Contractor for each soil aggregate stockpile after construction of stockpiles has been completed.

The cement content may be increased at any time by the Engineer if, in the Engineer's opinion, increased cement content is needed to assure design strength. An increase in cement content may be justified by inconsistencies in production methods and aggregate quality, variable test results, and test results which drop below acceptable standard deviation.

SUBSECTION 221.8 STOCKPILING OF AGGREGATE:

Soil aggregate stockpiles shall be constructed on level, firm ground free of brush, trees, stumps, roots, rubbish, debris, and other objectionable or deleterious material, and shall be located so as to provide a distance of not less than fifty (50) feet from the outside bottom edge of conical stockpiles built up under processing plant conveyors or any other existing stockpiles. Stockpiles shall not be placed in native channel bottoms or in areas where other engineered project elements are to be constructed. The stockpiles shall be constructed in layers, each layer not exceeding two (2) feet in thickness. Ramps formed for stockpile construction shall be of the same material as that being stockpiled, and will be considered a part of the stockpile. Before steepening a ramp, any contaminated surface material shall be removed. The stockpile height shall be limited to a maximum of twenty-four (24) feet.

Stockpiled material shall be thoroughly mixed throughout its depth, width, and length before utilization. The material shall be homogeneous and uniform in color, gradation, and moisture throughout.

Sampling of stockpiles will be done by the Engineer. After the stockpiles have been sampled and approved, material shall not be added to them. Each stockpile shall be completed and approved at least fourteen (14) days prior to start of soil cement production from the stockpile.

SUBSECTION 221.9 SAMPLING AND USE OF STOCKPILES:

During construction of stockpiles to be utilized in the production of soil cement, the Contractor will be solely responsible for monitoring the uniformity of the material being placed therein to assure conformance with the gradation requirements specified for said soil material. The Contractor's attention is directed to the geotechnical investigation and design reports prepared for this project and which are on file at the office of the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, AZ 85009.

Stockpiles for use in soil cement production shall be constructed to the following minimum size:

1. 120,000 cubic yards, or
2. The total quantity of material required to complete all soil cement when the quantity of material required for blending into the soil aggregate is less than 120,000 cubic yards.

Upon completion of each stockpile, the Contractor shall notify the Engineer in order to allow for verification of the soil gradation determined during random site sampling. The Contractor shall provide the manpower and equipment necessary to sample each stockpile in accordance with the following procedure:

Under the direction of the Engineer, the Contractor shall use a front-end loader to excavate a face for the full height of the stockpile, extending into the stockpile a distance required by the Engineer, at a minimum of four (4) different sampling locations around the perimeter of the stockpile. The Contractor shall excavate one (1) additional sampling location for each 5,000 cubic yards in the stockpile in excess of 120,000 cubic yards. The front-end loader shall then be used to channel the total excavated face at each location from the bottom of the top in one operation, and the material obtained shall be dumped on the ground in piles.

The Engineer or his representative will then sample each of the sample piles by channeling it with a hand shovel at four (4) locations equally spaced around the perimeter.

Approval of a stockpile shall not relieve, in any degree, the full responsibility of the Contractor to furnish, in its final position, a material conforming to all the specification requirements.

SUBSECTION 221.10 FIELD QUALITY CONTROL:

The Contractor shall establish and maintain an effective quality control program for soil cement, which will be his means of ensuring compliance with Contract requirements and of maintaining records of his control. The program shall include, but not limited to the following: aggregate manufacture and gradations, moisture, batching requirements and mix proportions at the mixing plant, insuring adequate materials are on hand, and all other tests and inspections required by these Specifications.

All quality control tests shall be performed in strict accordance with the applicable standards as specified hereinafter. The quality control program for soil cement shall be established by the Contractor and be proposed to the Engineer for review and approval at least two weeks prior to soil cement production. The Contractor shall supply all equipment and provide qualified personnel for testing and fulfillment of his quality control program. No soil cement placement or aggregate production will be allowed until the Contractor has received approval of an acceptable quality control program. The Contractor's program shall be similar in nature to the quality control program established in the following paragraphs. If at any time, in the opinion of the Engineer, the Contractor's proposed system is inadequate or fails to ensure compliance with the Specification, the Contractor will be required to adopt a new system which, at a minimum, conforms strictly to the requirements stated in the following paragraphs.

(A) Aggregate Gradations:

1. Testing: At least once during each shift that soil cement is placed and that aggregates are produced, aggregates shall be checked for the characteristics specified in Section 221.2.3. A recheck sample is required for any test out of Specifications. The location from which samples are taken may be selected by the Contractor providing that they give an accurate indication of gradations of materials as they enter the mixer. However, provisions must be made for accurate sampling of aggregates on the feed belts.
2. Action Required: Whenever a test result is outside of the specification limits, the Engineer shall be immediately notified and a recheck sample taken. If the recheck sample is outside of the specification limits, the Engineer shall be immediately notified again, the process shall be considered out of control, and positive steps shall be taken by the Contractor to rectify the situation. The Engineer will advise the Contractor if production and placement of soil cement shall be stopped at that time. The Contractor will be responsible for all costs incurred as a result of stopping any soil cementing operations due to out of specification materials.

(B) Aggregate Moisture Determination;

- I. Testing: At least once during each shift of placement for each aggregate size used, moisture content determinations shall be made in accordance with ASTM C-566 (ASTM C-70 where appropriate for fine aggregate if it is stockpiled separately). The location from which the sample is selected may be determined by the Contractor, providing that it is typical of materials entering the soil cement.
2. Action Required: The Engineer may test for verification any field determinations of moisture contents made by the Contractor. This verification will use the oven drying procedure. If there is a discrepancy between the Contractor's test results and the verification tests, immediate steps shall be taken to identify the source of the problem and correct it so that accurate field determinations are obtained. When moisture content determinations indicate a change in water entering the soil cement with the aggregates, the placement foreman shall be contacted to see if a corresponding adjustment in water added at the soil cement mixer is necessary to obtain maximum compaction at the placement site.

(C) Soil Cement Plant Control: When the mixing plant is operating, the measurement of all constituent materials including cement, each size of aggregate, water and admixtures, shall be continuously controlled. The aggregate weights and amount of added water to compensate for free moisture in the aggregates shall be adjusted as necessary. A daily report shall be prepared indicating the type and source of cement used during that day; the amount, type and source of admixtures used; aggregate size groups used; required mix proportions per cubic yard for each mix design used; the amount of water as free moisture in each size of aggregate; and the aggregate and water weights per cubic yard for each mix design of soil cement made during plant operation.

(D) Scales for Weigh Batching:

1. Tests and Checking: The accuracy of scales shall be checked by test weights prior to the start-up of soil cementing operations. Such tests shall also be made whenever there are variations in properties of the soil cement that could result from batching errors. The accuracy of each batching device when weight batching procedures are used shall be routinely checked during a weighing operation by noting and recording the required weight and the weight actually batched. Rechecks shall be made at least every four shifts of operation thereafter and whenever there are variations in the properties or control of soil cement that could result from batching errors.
2. Action Required: Whenever either the weighing accuracy or batching accuracy is found not to comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made.

(E) Volumetric Feed Calibrations:

1. Tests and Checking: The accuracy of volumetric feeds shall be checked by collecting all material delivered during a unit of time to the mixer and also by washout tests of material exiting from the mixer. Suitable methods and equipment shall be provided for obtaining and handling samples at the mixing plant. The weight of material corresponding to a standard time interval, and the resulting proportions of materials per cubic yard, shall be determined. The accuracy of volumetric feeds shall be determined at least three times during check out of the mixing plant prior to production operations and soil cement placement. Rechecks shall be made at least every four shifts of operation thereafter and whenever there are variations in the properties of control of soil cement that could result from volumetric feed errors. The sample shall be of sufficient size to give accurate determinations and calibration may require weights in excess of 500 pounds per item checked.
2. Action Required: Whenever the volumetric feed is found not to comply with Specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made.

(F) Testing Soil Cement Mixes:

1. General: Fresh soil cement shall be sampled and tested for compliance with the Specification and for additional information required by the Engineer. Samples and tests will primarily be made at the placing location at the time of placement, but may also be required at the mixing plant. The Contractor shall provide a method of readily obtaining representative soil cement samples from the plant and any gob hopper locations.
2. Mixer Performance: A complete mixer performance test of three different batches of soil cement or runs through a volumetric plant shall be made on each stationary mixer in accordance with the Army Corps of Engineers CRD-C 55 prior to the start of soil cement placing. Additional tests may be made at any time to support a Contractors request for reduction of mixing time. Whenever mixer adjustments are necessary because of failure of a mixer to comply, the mixer shall be retested after adjustment. The abbreviated test may be used for this purpose. Abbreviated tests shall be run routinely on each mixer at least once every five days.
3. Temperature:
 - a. Testing: At least one test of temperature shall be made at the mixing plant and at the placement on a randomly selected batch of each mix design of soil cement used per shift of placement. Additional tests shall be made when rapid set time or workability loss is reported by the placing foreman or Engineer's inspector, or when cold weather problems occur. The temperature of air and soil cement shall be reported during the period of cure and cold weather protection when those restrictions are applicable.
 - b. Action Required: Whenever the mix temperature falls below 50° F or is above 90° F, the Contractor shall notify the Engineer immediately. All other temperatures shall be included as standard data in the quality control reports.
4. Moisture Content:
 - a. Tests and Checking: At least once during each four hours of production placement at the mixing plant, and once every two hours at the placement site (immediately after compaction), the moisture content shall be determined on the soil cement mix using a nuclear gauge in accordance with AASHTO T-239. The gauge shall be calibrated against oven-dry samples of each mix design used. If, after three days of production placement, consistent moisture control is achieved, the rate of testing may be decreased to one test per eight hours at the plant and one test per four hours at the placement, In any case, at

least three tests shall be made in different areas of each layer of soil cement placed. The placing foreman shall continuously monitor the apparent effectiveness of compaction equipment from a visual standpoint, and shall notify the mixing plant whenever the mix becomes too dry or too wet.

- b. Action Required: Whenever moisture content tests indicate a change from what has been established as the optimum batching and placing moisture for maximum density and efficiency of compaction equipment, a corresponding adjustment shall be made in the mix water added at the mixing plant and the adjustment shall be noted. Whenever the placing foreman observes a condition of moisture which begins to consistently allow the vibratory rollers to sink excessively in the mix, cause excessive paste to develop at the surface, or leave an open appearing unconsolidated surface, an adjustment shall be made in the mix water added at the plant and the adjustment shall be noted.
5. Cement Content: The Contractor shall obtain samples of the soil cement mix at the mixing plant and/or placement area for determination of cement content using a chemical chloride titration or similar procedure. The test equipment shall also allow moisture content determinations to be made. The equipment shall be provided by the Contractor and all testing shall be by the Contractor.
 6. Density:
 - a. Testing and Checking: At least once every two hours during placement, but not less than once every 500 cubic yards of soil cement, the density and moisture content of soil cement after compaction shall be determined with a nuclear density gauge in accordance with AASHTO T-238, previously calibrated against sand cone densities. The Contractor shall maintain a nuclear gauge in good working condition on the placement area at all times. The Engineer shall have access to the gauge at all times and shall be allowed to use it for quality assurance check tests.

Each lift of soil cement shall be tested by the nuclear gauge in at least six, separate locations for density. The direct transmission mode shall be used and readings shall be taken in each quadrant of a circle obtained by rotating the gauge 90° each after each reading around the transmission probe. The probe shall be inserted into pre-driven holes of diameter recommended by the manufacturer to a depth of at least 10 inches for each reading. Density shall be as specified in Subsection 221.4.8 of this Special Provision. The vibratory roller operators shall continually monitor their "on board" compaction meters as an indicator of any areas which have not been fully compacted.

- b. Action Required: Whenever a roller operator finds that his compaction meter indicates insufficient compaction, he shall continue rolling until the required compaction meter readout is achieved. If this requires more than an estimated six passes, the Engineer shall be notified by the placing foreman, and the Contractor shall determine the actual density with a nuclear gauge. Whenever the nuclear gauge indicates compaction of less than specified in Subsection 221.4.8 of this Special Provision, a retest shall be made. If the retest indicates incomplete compaction, the Engineer shall be notified, additional rolling shall be immediately provided and a determination shall be made as to whether the lower density resulted from insufficient passes of the roller or a change in the mix properties. If the mix properties have changed, adjustments such as increasing or decreasing the moisture content shall be made at the mixing plant. If the problem persists, the Engineer may require the Contractor to adjust the proportions of aggregates, and/or cement. If the lower density is the result of incomplete rolling, the operator shall be notified and the Engineer may require removal of the incompletely compacted material at no cost. If the same operator repeatedly rolls less than the required number of passes, and/or if his compaction

meter repeatedly indicates underrolling due to deliberate action or inattentiveness, he shall be replaced with a different operator.

(G) Compaction Equipment:

1. Tests and Checking: Before any compactor is used in soil cement construction, it shall be checked for current dimensions, weight and vibratory capacity. At least once per four shifts of use, a spot recheck of frequency shall be made. At least once per each shift of placement for the first five days of operation by any new operator, his performance shall be spot checked for the correct number of passes, correct spread, coverage of the area being rolled, and good rolling practice. Thereafter, spot checks shall be made on each operator at least every four shifts.
2. Action Required: Compaction equipment not meeting the physical dimensions and weights required in subsection 221.12 shall be removed from the site. Any roller having improper frequency shall be corrected before being used for soil cement compaction. Roller operators running at speeds in excess of Specification requirements shall be immediately notified and shall correct any noted improper practices or be replaced by another operator.

(H) Dumping and Spreading:

1. Tests and Checking: The placing foreman or other designated representative shall continually observe and monitor dumping and spreading operations to ensure that they are done in a manner that minimizes segregation and spreading after dumping. Each lift of soil cement shall be routinely checked in its spread, uncompacted condition for evenness and correct thickness that will result in a smooth, even, compacted layer having thickness as required.
2. Action Required: Whenever thickness checks on uncompacted soil cement indicate an excess or shortage of material, the lift shall be immediately bladed off or supplemented to establish the correct thickness before compaction. Whenever a compacted layer thickness or elevation exceeds the specified thickness by two inches, the Engineer shall be immediately notified and he will determine whatever corrective action is necessary.

(I) Preparation for Soil Cement Placement: The Contractor shall inspect foundations and construction joints in sufficient time prior to each soil cement placement in order to certify that the area is ready to receive soil cement. The results of inspections shall be reported in writing as a part of the quality control reports. The placing foreman shall supervise all placing operations and shall be responsible for measuring and recording concrete temperatures, ambient temperature, weather conditions, time of placement, yardage placed and method of placement. The placing foreman shall not permit placing to begin until he has verified that an adequate number of vibratory rollers and spreading equipment of the right size, in working order, and with competent operators are available.

(J) Construction Joints: Vertical construction joints are to be provided at the end of each day's work or when work is halted for two hours or more. The joints shall be trimmed to a straight line and vertical to the full depth of the lift. Before resuming placement of new soil cement, loose material shall be removed from the joint.

(K) Curing, Protection and Joint Surfaces:

1. Moist Curing: At least once each shift around the clock, seven days per week, an inspection shall be made of all areas subject to moist curing and joint protection. The surface moisture condition shall be noted and recorded. If an isolated area has been allowed to dry, that area shall be considered as improperly cured. The Contractor shall immediately wet the surface and take positive steps to insure that the problem does not reoccur.
2. Protection: At least once each shift, around the clock, seven days per week, an inspection shall be made of all areas subject to cold weather protection or protection against damage.

Deficiencies shall be noted. During removal of cold weather protection, measurement of soil cement and ambient temperature shall be made at least every three hours.

- (L) Finishing: After compaction, the soil cement shall be further shaped, if necessary, to the required lines, grades, and cross sections, and rolled to a reasonably smooth surface.
- (M) Backfill: It is anticipated that the common fill and structural fill will be placed simultaneously outside of the soil cement core in order to achieve the 0.6:1 slope of the soil cement structure. This common fill (and in some areas structural fill) shall be placed to the lines and grades shown on the Plans.
- (N) Reports: Mixing plant control reports and all results (both passing and failing) of tests conducted at the site shall be delivered to the Engineer daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in the preceding paragraphs. Such, reports of failures and the action taken shall be confirmed in writing in the routine reports. The Engineer has the right to examine all Contractor quality control records.

SUBSECTION 221.11 ACCEPTANCE SAMPLING AND TESTING:

Rejection of soil cement will occur due to improper temperatures, and/or density for the soil cement mixture delivered to the site, placed and compacted.

(A) Sampling and Testing of Soil cement:

1. General: Fresh soil cement shall be sampled and tested for compliance with the Specification. Samples and tests will be made at the placing location at the time of placement. The Contractor shall provide a method of readily obtaining representative soil cement samples from the placement locations.
2. Temperature: At least one test of temperature shall be made at the placement location on a randomly selected batch of each mix design of soil cement used per shift of placement. Additional tests shall be made when rapid set time or workability loss is reported or when cold weather problems occur.
3. Moisture Content: At least once during each four hours at the placement site (immediately after compaction), the moisture content shall be determined on the soil cement mix using a nuclear gauge in the direct transmission mode. The probe shall be driven to a depth of at least 10 inches for each reading. The gauge shall be calibrated against oven-dry samples of each mix design used. If, after three days of production placement, consistent moisture control is achieved, the rate of testing may be decreased to one test per eight hours of placement.

In any case, at least three tests shall be made in different areas of each layer of soil cement placed.

4. Density: At least once every two hours during placement, but not less than once every 500 cubic yards of soil cement, the density and moisture content of soil cement after compaction shall be determined by the Engineer with a nuclear density gauge in accordance with AASHTO T-238, previously calibrated against sand cone densities. Each lift of soil cement shall be tested by the nuclear gauge in at least six separate locations for density. The direct transmission mode shall be used and readings shall be taken in each quadrant of a circle obtained by rotating the gauge 90° each after each reading around the transmission probe. The probe shall be inserted into pre-driven holes of diameter recommended by the manufacturer to a depth of at least 10 inches for each reading. The Engineer may check densities at any time to ensure compliance with the Specification and to require more compaction or removal.

5. Soil Cement Compressive Strength: The Contractor shall cast, transport, and cure specimens for compressive strength tests and test the specimen for compressive strength at time intervals as directed by the Engineer, but not less than one set of three cylinders per 500 cubic yards of soil cement placed. The cylinders shall be prepared and tested in accordance with the requirements of Arizona Test Method 241 a.

- (B) Acceptance of Soil Cement: Acceptance and penalties for placed soil cement which meets the above mixture requirements or is allowed to remain in place shall be determined by the results of the in-place density tests. Soil cement represented by density tests, which do not meet the minimum density specified, may be allowed to remain in place at the discretion of the Engineer. No payment will be made for such soil cement.

SUBSECTION 221.12 CONTROL STRIPS:

At the beginning of work on the soil cement portions of the overall construction activities, the Contractor shall construct a soil cement control strip. The control strip construction shall be used to demonstrate equipment and procedures necessary to attain the required densities for the specified lift thickness.

Each control strip, if constructed to acceptable density and surface tolerances, may remain in place and become an integral part of the completed embankment. Unacceptable control strips (i.e., those that fail to meet the specified requirements for density or surface tolerances) shall be replaced at the Contractor's expense. A control strip shall have an area of not less than 500 square yards and the compacted thickness specified for the construction of the lift, which it represents.

Compaction equipment shall be capable of obtaining the specified compaction requirements without detrimentally affecting the compacted material. The equipment shall be modern, efficient compacting units meeting the requirements of this section.

Rollers shall be the self-propelled drum drive vibratory type which will be capable of transmitting dynamic impact to the surface to be compacted through a steel drum by means of revolving weights, eccentric shafts, or other equivalent methods. The compactor shall have a gross weight of not less than 21,000 pounds and shall produce a dynamic force of at least 400 pounds per lineal inch of drum width at the operating frequency, which is used during construction. The roller shall have a vibrating frequency of at least 1,800 CPM (cycles per minute). The roller shall have a smooth drum or drums with a drum diameter between 4 and 5.5 feet and a width of between 5.5 and 8 feet. The engine driving the eccentric mass shall have a rating of not less than 125 horsepower. Heavier compacting equipment may be required to achieve the soil cement density requirements.

The equipment used in the construction of the control strip shall be of the same type and weight to be used on the remainder of the lift represented by the control strip.

The materials used in the construction of the control strip shall conform to the specification requirements. They shall be furnished from the same source and shall be of the same type used in the remainder of the lift represented by the control strip. The underlying surface upon which a control strip is to be constructed shall have the prior approval of the Engineer.

SUBSECTION 221.14 MEASUREMENT:

Measurement for the soil cement between the limits shown by the specified lines, grades, and cross-sections shown on the Plans shall be per cubic yard completed-in-place. The Contractor shall compute the volume of soil cement placed by the average end area method from the cross sections required in the Plans developed for the soil cement and placing the neat line soil cement limits on the cross sections.

SUBSECTION 221.15 PAYMENT:

Payment for placement of soil cement shall be made on the basis of a price bid per cubic yard for soil cement. Such payment shall constitute full reimbursement for performing all work and for furnishing all equipment, labor, and materials necessary to complete the soil cement dam extension embankment and drop structures, watering, mixing, placing, compacting, curing, inspection, and testing assistance and all other incidental operations. Such payment shall also constitute full reimbursement for cement. Any waste of soil cement by the Contractor during the handling, mixing, placing, etc., operations shall not be paid for.

ITEM 221-1 SOIL CEMENT DAM EMBANKMENT

ITEM 221-2 SOIL CEMENT FOUNDATION FOR OUTLET WORKS

End of Section

SECTION 225 WATERING

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 225.1 DESCRIPTION:

Water for compacting embankments, constructing subgrade, placement of screened gravel and crushed materials, and for laying dust caused from grading operations, shall be applied in the amounts and places as directed by the Engineer.

The moisture content of soil shall be kept at a level sufficient to insure that dust will be kept at a minimum for the excavation, hauling, and disposal or placement of soil.

All fill materials shall be moisture conditioned with uniform water application prior to spreading or placement to desired location. Blend soil with water to ensure uniform moisture content. Moisture content shall be adjusted to within the required range as specified in Section 206 and Section 211.

SUBSECTION 225.2 WATER SUPPLY:

Water shall consist of providing a water supply sufficient for the needs of the project for construction purposes such as moisture conditioning, excavation, dust control and the Contractor's means of hauling and applying the water required.

The Contractor shall make arrangements for and provide all necessary water for his construction operation and domestic use at his own expense.

If the Contractor purchases water from a water utility at a fire hydrant on or near the project, all arrangements shall be made by the Contractor at his own expense and payment made direct to the water utility as agreed upon. The Contractor shall use only those hydrants designated by the water utility in charge of water distribution and in strict accordance with its requirements for hydrant use. The Contractor shall furnish all connections, wrenches, valves and small tools that may be necessary to meet the requirements of the water utility pertaining to hydrant use. Coordination and use of a local fire hydrant is the responsibility of the Contractor. There are no fire hydrants on District property.

Water may be available from the Beardsley Irrigation Canal depending on the season and volume needed. Permits must be obtained from Maricopa Water District for the use of this water. The permit paperwork may be obtained at the Maricopa Water District offices located at 19420 North Grand Avenue, Surprise, AZ.

SUBSECTION 225.3 CONSTRUCTION EQUIPMENT:

The tank truck and/or trailer shall meet all safety and licensing regulations and the water shall be applied by sprinkling with tank trucks equipped with spray bars and suitable apparatus.

The location of any temporary water impoundments or tanks shall be approved by the Owner.

SUBSECTION 225.4 MEASUREMENT:

No measurement will be made of watering. The Contractor is responsible for measurement and recording of progress and total water used as agreement is made with the utility or water district.

SUBSECTION 225.5 PAYMENT:

No payment will be made for watering as such; the cost thereof shall be included in the Contractor's bid price for the construction operation to which such watering is incidental or appurtenant.

END OF SECTION

SECTION 231 GEOTEXTILE

(Add this section to the MAG Uniform Standard Specifications.)

SUBSECTION 231.1 DESCRIPTION:

The work under this section consists of furnishing and installing geotextile filter fabric in accordance with the Plans and these Specifications. Geotextile filter fabric shall be placed to the same limits and dimensions as the riprap construction, as indicated on the plans.

SUBSECTION 231.2 SUBMITTALS:

All brands of geotextile and all seams to be used shall be accepted on the basis of mill certificates or affidavits. The Contractor shall furnish the Engineer, in duplicate, a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the geotextile. The mill certificate or affidavit shall attest that the geotextile meets the chemical, physical and manufacturing requirements stated in this specification.

If requested by the Engineer, the Contractor shall provide samples for testing to determine compliance with any or all of the requirements in this specification. When samples are to be provided, they shall be submitted a minimum of 30 days prior to the beginning of installation of the product. A written certificate of compliance signed by a legally authorized official from the company shall be submitted, in duplicate, upon delivery of the product. The certificate shall state that the product shipped to the site meets the chemical requirements and exceeds the minimum average roll value listed in Table 231-1. Upon request, the contractor shall supply quality control and quality assurance tests for the product. All samples of fabric provided shall be from the same production lot as will be supplied for the contract, and shall be the full manufactured width of the geotextile by at least 10 feet long, except that samples for seam strength may be a full width sample folded over and the edges stitched for a length of at least 5 feet. Samples submitted for testing shall be identified by manufacturers lot designation. For needle punched geotextile, the manufacturer shall certify that the geotextile has been inspected using permanent on-line metal detectors and does not contain any needles.

SUBSECTION 231.3 SHIPMENT, HANDLING, AND STORAGE:

Only approved geotextile rolls shall be delivered to the project site. All products shall be labeled, shipped, stored, and handled in accordance with ASTM D-4873. No hooks, tongs, or other sharp instruments shall be used for handling geotextile.

SUBSECTION 231.4 MATERIALS:

The geotextile shall be a non-woven geosynthetic fabric, suitable for erosion control. The geotextile shall equal or exceed the minimum average roll values listed in Table 231-1. Strength values listed are for the machine direction.

Property	Requirement	Test Method
Grab Tensile Strength, lb	205	ASTM D-4632
Grab Elongation at Break, %	50	ASTM D-4632
Puncture Strength, lb	130	ASTM D-4833
Trapezoidal Tear, lb	90	ASTM D-4533
Average Opening Size, U.S. Standard Sieve Size	80	ASTM D-4751
Permittivity, Second ¹	1.2	ASTM D-4491
Mass per Unit Area, oz/yd ²	8	ASTM D-5261

Fibers used in the manufacturing of the geotextile shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of polyolefins, polyesters, or polyamides. Stabilizers and/or inhibitors shall be added to the base polymer if necessary to make the filaments resistant to deterioration caused by ultraviolet light and heat exposure. Reclaimed or recycled fibers or polymer shall not be added to the formulation. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. The edges of the geotextile shall be finished to prevent the outer fiber from pulling away from the geotextile.

Manufactured roll length and width shall be standard for the industry. Used or scrap pieces will not be accepted.

SUBSECTION 231.4.1 Seams:

The seams of the geotextile shall be sewn with thread of a material meeting the chemical requirements given above for geotextile yarn or shall be bonded by cementing or by heat. Seams shall be tested in accordance with method ASTM D- 1683. The strength of the seam shall be not less than 90 percent of the required grab tensile strength of the unaged geotextile in any principal direction.

SUBSECTION 231.4.2 Securing Pins:

The geotextile may be secured to the embankment or foundation soil by pins to prevent movement prior to placement of revetment materials. Other appropriate means to prevent movement such as staples, sand bags, and stone may also be used. Securing pins shall be inserted through both strips of overlapped geotextile along the line passing through midpoints of the overlap. Securing pins shall be removed as riprap, cushioning material or gabions are placed to prevent tearing of geotextile or enlarging holes

The maximum pins spacing shall be 5 feet or less. On steep slopes or when windy conditions prevail at the construction site, the number of pins may be increased upon the demand of the Engineer.

SUBSECTION 231.5 INSPECTIONS, VERIFICATIONS, AND TESTING:

SUBSECTION 231.5.1 Manufacturing and Sampling:

Geotextile and factory seams shall meet the requirements specified in Table 230-1.

SUBSECTION 231.5.2 Site Verification and Testing:

Samples may be collected upon delivery to the site at the request of the Engineer. Samples shall be tested to verify that the geotextile meets the requirements specified in Table 231-1. Samples shall be identified by manufacturers name, type of geotextile, lot number, roll number, and machine direction. Testing shall be performed at an approved laboratory. Test results from the lot under review shall be submitted and approved prior to deployment of that lot of geotextile. Rolls which are sampled shall be immediately rewrapped in their protective covering.

SUBSECTION 231.6 SURFACE PREPARATION:

The surface on which the geotextile will be placed shall be prepared, to a relatively smooth surface condition, in accordance with the applicable portion of this specification and shall be free, to the extent practical, from obstruction, debris, depressions or erosion features.

SUBSECTION 231.7 INSTALLATION OF THE GEOTEXTILE:

SUBSECTION 231.7.1 General:

The geotextile shall be placed in the manner and at the locations shown. At the time of installation, the geotextile shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage.

SUBSECTION 231.7.2 Placement:

The geotextile shall be placed with the machine direction parallel to the axis of the channel and laid smooth and free of tension, stress, folds, wrinkles or creases. The strips shall be placed to provide a minimum width of 24 inches of overlap for each joint. Temporary pinning of the geotextile to help hold it in place until the riprap is placed shall be allowed. The temporary pins shall be removed as the structural fill or riprap is placed to relieve high tensile stress which may occur during placement of material on the geotextile. Trimming shall be performed in such a manner that the geotextile shall not be damaged in any way.

SUBSECTION 231.7.3 Protection:

The geotextile shall be protected at all times during construction from contamination by surface runoff and any geotextile so contaminated shall be removed and replaced with uncontaminated geotextile. Any damage to the geotextile during its installation or during placement of riprap shall be replaced by the Contractor at no cost to the Contracting Agency.

The work shall be scheduled so that the covering of the geotextile with a layer of the specified material is accomplished within 7 calendar days after placement of the geotextile. Failure to comply shall require replacement of geotextile.

The geotextile shall be protected from damage prior to and during the placement of riprap. Care shall be taken to ensure that the utilized cushioning materials beneath riprap do not impede the flow of water. Before placement of riprap or structural fill, the Contractor shall demonstrate that the placement technique will not cause damage to the geotextile. In no case shall any type of heavy equipment or motorized vehicle be allowed on the unprotected geotextile.

SUBSECTION 231.7.4 Overlapping:

The overlap of geotextile rolls shall be 24 inches. Appropriate measures will be taken to insure required overlap. When placing geotextile on a slope, installation shall begin at the bottom of the slope and progress upward. The uphill fabric shall overlap the downhill fabric.

SUBSECTION 231.7.5 Sewn Seams:

High strength thread shall be used such that seam test conforms to ASTM D-1683. The thread shall meet the chemical, ultraviolet, and physical requirements of the geotextile, and the color shall be different from that of the geotextile. The seam strength shall be equal to the strength required for the fabric in the direction across the seam. Overlapping J-type seams are preferable over prayer-type seams as the overlapping fabric reduces the chance of openings occurring at the seam.

SUBSECTION 231.8 MEASUREMENT:

Measurement for installed geotextile for riprap completed-in-place shall be per square yard to the nearest 1 square yard of protected area to the lines and dimensions shown on the drawings or to the limits authorized by the Engineer in the field. No additional measurement of lapped material will be made.

SUBSECTION 231.9 PAYMENT:

Payment for geotextile for riprap shall be made on the basis of the price bid per square yard and shall constitute full compensation to the contractor for providing all plant, labor, material, and equipment and performing all operations necessary for the complete and satisfactory installation of the geotextile. The following items are included in the contract unit prices for geotextile for riprap and shall not be counted a second time in the process of determining the extent of geotextile placed: Material and associated equipment and operation used in laps, seams, or extra length; securing pins and associated material, equipment, and operations. No payment will be made for geotextiles replaced because of waste, contamination, damage, repair, or due to contractor fault or negligence.

BID ITEM 231-1 GEOTEXTILE

End of Section

SECTION 310 UNTREATED BASE

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 310.1 DESCRIPTION:

Untreated base, i.e., Aggregate Base Material in accordance with Section 702, placed as surfacing for the operation and maintenance roads shall comply with this section unless the use of a different type of material is specifically authorized by the Engineer.

SUBSECTION 310.2 PLACING:

Untreated base 6 inches or less in compacted thickness may be placed in a single layer.

After distributing, the base material shall first be watered and then immediately bladed to a uniform layer that will net, after rolling, the required thickness. If the materials deposited are not uniformly blended together, the blading operation shall be continued to such extent as may be necessary to eliminate segregation. The quantity of water applied shall be that amount which will assure proper compaction resulting in a relative compaction of not less than 95 percent of the maximum dry density as determined by ASTM D-698. Care shall be exercised in connection with watering operations to avoid wetting the subgrade or any lower base course to detrimental extent.

Upon completion, the base surface shall be true, even and uniform conforming to the grade and cross section specified. Untreated base may vary not more than ½ inch above or below required grade and cross section.

SUBSECTION 310.3 DEFICIENCY:

When in the opinion of the Engineer there is reason to believe that a deficiency in thickness, or an excess of plasticity exists, measurements or samples will be taken. If the deficiency is ½ inch or more in thickness, additional material will be placed to correct the deficiency. If the deficiency is a plasticity index of over 7, the Engineer may require removal of the material and replacement with material complying with the Specifications.

SUBSECTION 310.4 MEASUREMENT:

Measurement for untreated base shall be per ton unless an alternative basis of measurement is provided for in the proposal.

SUBSECTION 310.5 PAYMENT:

Payment for untreated base will be made on the basis of the price bid per ton unless an alternate basis of payment is provided in the proposal. Costs for excavation and preparation of subgrade shall be included in this or the other items of work.

BID ITEM 310-1 UNTREATED BASE

End of Section

SECTION 350 REMOVAL OF EXISTING STRUCTURES

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 350.1 DESCRIPTION:

The work includes the demolition, removal, disposal and closure activities associated with the two (2) existing outlet structures and relevant appurtenances, existing monuments, and existing fencing necessary for the accomplishment of the improvements. The disposal of all construction debris waste material removed under this item shall be the responsibility of the Contractor. The disposal site shall be approved by the Engineer.

The fencing shall be reinstalled to match the existing fence materials upstream of the new dam embankment and downstream of the new outlet works and anywhere else where the removal of fencing is deemed required to conduct construction related activities. Where the fencing requires realignment, it shall be accomplished by the Contractor to maintain the same fencing offset from the dam as the existing fence.

SUBSECTION 350.2 METHODS:

The removal of existing improvements shall be conducted in such a manner as not to injure utilities or any portion of the improvement that is to remain in place.

All construction debris and waste materials shall be disposed of at an approved landfill. If a Maricopa County landfill is selected for disposition of waste materials and/or debris, a Maricopa County Landfill Use Permit will be required. Application for permit can be made at the Maricopa County Landfill Office, located at 2801 West Durango Street, Phoenix, Arizona 85009 (telephone (602) 269-2661).

The project construction limits shall be cleared of all trash and construction debris. Such material as collected shall be disposed of at an approved landfill site and shall be subject to landfill fees so assessed, which will be included in the unit price bid for this item.

Weigh tickets from all landfill disposal must be furnished to the Engineer.

Work associated with asbestos containing materials shall be performed by qualified and certified personnel that can carry out the applicable regulations governing the removal and disposal of such material.

The grouting of the existing CMP pipes in place shall be done in such a manner as to provide thoroughly grouted outlet pipes through the existing White Tanks FRS No. 3. The Contractor shall provide a detailed work plan with shop drawings outlining the method, materials, and equipment to be used for the grouting procedures as well as a thorough quality control and quality assurance plan for the process. This process shall produce continuously grouted pipes, free of voids, while maintaining the integrity of the existing pipes (i.e. not blowing out the pipes within the existing White Tanks FRS No. 3). No grouting shall commence until the Owner and Engineer have approved the grouting plan.

SUBSECTION 350.3 MISCELLANEOUS REMOVAL:

The work shall include, but not be limited to, the following, where called for on the Plans.

- A) Demolition, removal, disposal and closure activities associated with the two (2) existing outlet structures and appurtenances within the existing White Tanks FRS No. 3 to the limits shown on the Plans. These outlets include the following:
 - 1. Sluice gates, stems, sideslope guides, and crest hand-wheel operators.
 - 2. Trashracks.

3. Concrete inlet aprons, guide foundations, hand-wheel testers, and outlet headwalls and joint encasements.
 4. Shotcrete around inlet apron.
 5. Sideslope water level indicators.
 6. Corrugated Metal Pipe (CMP) upstream and downstream of the existing White Tanks FRS No. 3.
- B) Grouting in-place of the remaining portions of the two outlet pipes through the existing White Tanks FRS No. 3.
- C) Demolition of all subsidence monuments within the limits of construction along the upstream face of the existing White Tanks FRS No. 3.
- D) Demolition and relocation of the existing barbed wire perimeter fencing (as necessary) along the upstream and downstream side of the existing White Tanks FRS No. 3 and where necessary within the property boundary and any TCEs to accommodate construction activities. Barbed wire fence shall be re-erected or replaced upon completion of the project.

The demolition of the upstream portions of the existing outlet pipes requires a specialty contractor to handle and dispose of the pipe and coating that consists of asbestos-containing materials (ACM). The Contractor is responsible for coordinating this work and retaining subcontractors as necessary.

The Contractor may have to temporarily remove part of an existing barbed wire fence along the property line to maintain access to the work zone. It is the Contractor's responsibility to minimize the amount of impacted fence and to restore the fence to at least its original condition. As observed at the time of a pre-bid site walk, the barbed wire fence is a standard 4-strand with diagonal reinforcing posts at intersections to alignment or grade. New replacement barbed wire and/or tee posts will be the responsibility of the Contractor and no additional compensation will be made for materials or labor.

SUBSECTION 350.4 MEASUREMENT:

Measurement of miscellaneous demolition, removal, and disposal of outlet structures and relevant appurtenances will be based on a lump sum price for all work listed for Items (A) and (B) within Subsection 350.3.

Measurement for barbed wire fencing demolition and replacement shall be per linear foot of the constructed fencing.

SUBSECTION 350.5 PAYMENT:

Payment for all miscellaneous demolition, removals (construction debris) required for construction of the project shall be made on a lump sum basis per applicable proposal bid items, which price shall be full compensation for the item complete, as described herein and on the Plans.

Payment for perimeter fencing that must be temporarily removed and replaced shall be made on a lump sum basis.

Payment for barbed wire fencing demolition and replacement shall be made on a linear foot basis per applicable proposal bid item, which price shall be full compensation for the item complete as herein and on the Plans.

BID ITEM 350-1 CLOSURE OF EXISTING OUTLET STRUCTURES

BID ITEM 350-2 REMOVE AND REPLACE PERIMETER FENCE

End of Section

SECTION 401 TRAFFIC CONTROL

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 401.1 DESCRIPTION:

Traffic control necessary for delivery of bulk soil and aggregate materials or oversize materials shall conform to Section 701 of the Arizona Department of Transportation (ADOT) Specifications. References made to approval authority shall be understood to be Flood Control District of Maricopa County acting on behalf of ADOT.

All traffic control shall conform to the Special Provisions for this project, including Part VI of the "Manual On Uniform Traffic Control Devices For Streets And Highways" (U.S. Department of Transportation, Federal Highway Division) and the associated ADOT supplement.

It shall be Contractor's responsibility to provide, erect and maintain and remove after completion of the work all necessary signs, barricades, barriers, berms, lights, high level warning devices, delineators, and any other required devices, uniformed officers, and flagman, necessary to properly mark and control the construction area for the safe and efficient movement of traffic. Temporary traffic control devices shall be installed prior to the start of work necessitating traffic safety. It shall be Contractor's responsibility to construct the required detour lanes in order to make the road available to traffic.

Approval of the Contractor's traffic control method by The District, or Federal guidelines shall not relieve Contractor of its responsibility to protect the work, the Contractor's personnel, or the general public.

SUBSECTION 401.2 TRAFFIC CONTROL DEVICES AND EQUIPMENT:

Devices and equipment may include flashing barricades, signage, and high-visibility cones.

SUBSECTION 401.3 FLAGMEN OR PILOT CARS:

Flagmen or pilot cars shall consist of providing sufficient flagmen, uniformed off-duty law enforcement officers or pilot cars to expedite the safe passage of traffic for mobilization of heavy equipment or delivery of materials on narrow rural roads.

SUBSECTION 401.4 TRAFFIC CONTROL MEASURES:

The application of all traffic control measures shall be based primarily upon the conditions existing at the time that such measures are deemed necessary. Prior to the start of any work that would interrupt the normal flow of traffic, sufficient and adequate devices and measures shall be provided and erected as directed by the Engineer. These devices shall be immediately removed when no longer needed.

SUBSECTION 401.5 GENERAL TRAFFIC REGULATIONS:

A traffic lane shall be a minimum of 10 feet of clear street width with a safe motor vehicle operating speed of at least 25 miles per hour.

An intersection shall be all of the area within the right of way intersection streets plus 300 feet beyond the edge of the intersected right of way on all legs of the intersection.

Local access shall be maintained to all properties on the project at all possible times. When local access cannot be maintained, the Contractor must notify the affected property owner at least 24 hours in advance and restore access as soon as possible.

All temporary traffic control devices and equipment shall be ballasted with sandbags or other approved ballast.

The "SPEED LIMIT 25" sign shall be used on temporary detour roads or on traffic lanes that are severely restricted. The contractor shall conform to applicable regulations governing oversize loads for equipment mobilization and material delivery and truck traffic safety for the delivery of soil and aggregate materials.

Access to all adjacent properties shall be maintained at all times. When access cannot be maintained, Contractor shall notify the adjacent residents at least 48 hours in advance of the access closure.

Contractor shall maintain or relocate all existing signal indications, warning signs, STOP, YIELD, and street name signs erect, clean and in full view of the intended traffic at all times. Portable signs should be used to supplement blocked or removed signs. Contractor shall reset all disturbed signs to permanent locations when construction is completed. The Contractor shall cover all existing signs that are in conflict with the traffic control signing. Contractor is responsible for the cost of replacing lost or damaged traffic signs.

Subject to the approval of the Engineer, the Contractor shall furnish and install the 25-MPH Construction Zone Speed Limit Signs. The Contractor shall maintain the signs erect, clean and in full view of the intended traffic at all times.

SUBSECTION 401.5.1 Special Traffic Regulations:

The public shall be adequately notified of construction operations using methods including distribution of construction alert publications.

Prior to construction activities, the Engineer shall be notified regarding any road closures or temporary impedance of traffic.

Construction shall not commence or proceed without an approved Traffic Control Plan. The Traffic Control Plans shall address all construction staging and special provisions requirements.

At the time of the Pre-Construction conference, the Contractor shall designate an employee, other than the Project Superintendent, who is well qualified and experienced in construction traffic control and safety, to be available on the project site during all periods of construction to set up, maintain and coordinate safe barricading whenever construction restricts traffic. This individual shall be authorized to receive and fulfill instructions from the Engineer and shall supervise and direct the work. Instructions and information given by the Engineer to this individual shall be considered as having been given to the Contractor.

SUBSECTION 401.6 MEASUREMENT:

No measurement for a lump sum payment will be made for traffic control implemented by the Contractor for construction or delivery of equipment or materials.

SUBSECTION 401.7 PAYMENT:

Payment for traffic control shall be made on the basis of the lump sum price bid and shall be full compensation for all work, including mobilization, placing, storing, removal and maintenance of all traffic control devices, signing and striping, flag persons, and other activities incidental to the implementation of the approved traffic control plan.

BID ITEM 401-1 TRAFFIC CONTROL

End of Section

SECTION 405 MONUMENTS

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 405.1 DESCRIPTION:

The primary scope of work is the utilization and protection of existing survey monuments. Construction of new survey monuments is required as per the plans and in the event an existing monument was inadvertently damaged or altered.

The Contractor is required to utilize at least two of the four benchmarks shown on the plans to tie-in construction layout for work and as-built survey data. In addition, construction activity involving heavy earthmoving equipment shall be conducted using delineated work zones and planned haul routes that avoid existing subsidence monuments (including project survey control stakes). The Contractor has the responsibility of protecting the survey monuments from damage and inadvertent altering from its own earthmoving equipment and construction activity, including its subcontractors.

SUBSECTION 405.2 MATERIALS:

Construction materials for a new monument will be required as per the plans and if the Contractor inadvertently damaged an existing monument and therefore is responsible for its replacement.

Materials required for the protection of existing monuments includes, but is not limited to, painted lath or staking, flagging, barricades, orange safety fence, etc.

SUBSECTION 405.3 CONSTRUCTION:

In constructing precast monuments, the forms shall not be removed until after the concrete has hardened. The exposed surface of the finished monuments shall be uniform, of even texture, and shall be free from holes, cracks and chipped edges. The precast monuments shall not be transported to the work site until the concrete has cured.

Cast-in-place monuments shall be cast in drilled holes without the use of forms.

Brass caps shall be placed in survey monuments before the concrete block has reached initial set and shall be firmly bedded in the concrete. The concrete block shall be so located that, the reference point will fall within a 1-inch circle in the center of the brass cap.

SUBSECTION 405.4 INSTALLATION:

Survey monuments shall be reset in position to equal the recorded location of the altered or damaged monument with tolerances allowed in the industry and agreed upon by the District.

SUBSECTION 405.5 MEASUREMENT:

Monuments will be measured per each completed monument installed.

SUBSECTION 405.6 PAYMENT:

Payment for monuments shall be made on the basis of the price bid per each complete monument installed.

No payment shall be made for protection or possible replacement of a new survey monument. Should the replacement of a survey monument be necessary, the Contractor shall bear the associated costs for construction and independent detailed survey and seal by a registered land surveyor. The Contractor will be paid an allowance (with no unit of measure) to utilize the monument for survey reference and materials and methods required to adequately protect monuments in the work or haul areas.

BID ITEM 405-1 MONUMENTS

End of Section

SECTION 460 AESTHETIC TREATMENT

(Add this section to the MAG Uniform Standard Specifications.)

SUBSECTION 460.1 GENERAL:

This work under this section includes all work and materials necessary to furnish and install the complete aesthetic treatment shown or as indicated in the plans and specifications including the respective notes, legends, and detail drawings that are not covered by any other Bid Item to concrete aprons, principal spillway, impact basin, trashracks, and steel railing. All work shall conform to the requirements of the plans and specifications.

SUBSECTION 460.1.1 Concrete Forms:

Provide and install specialized formwork for aesthetic treatments of concrete aprons, principal spillway, and impact basin.

SUBSECTION 460.1.2 Form Liners:

Provide and install form liners for aesthetic treatment of concrete aprons, principal spillway, and impact basin.

Form liners used for this work shall consist of Flex-Liner® elastomeric formliner for creating textures (patterns in architectural concrete) in poured-in-place or precast concrete as distributed by Scott System, Inc., 10777 East 45th Avenue, Denver, Colorado 80239, or approved equal. The patterns for the form liners to be used are as follows:

- A) Pattern No. 110 – Fractured Granite; for the principal spillway
- B) Pattern No. 116A – Chiseled Limestone; for the outlet works, inlet aprons, and impact basin.

SUBSECTION 460.1.3 Colored Concrete:

Provide and install colored treatments of concrete aprons, principal spillway, and impact basin.

Concrete colorant to be used for the concrete aprons, principal spillway, and impact basin shall be "Outback-05 lbs 667" distributed by Davis Colors, 3700 East Olympic Boulevard, Los Angeles, California 90023, or approved equal.

SUBSECTION 460.1.4 Painted Metal Fabrications:

Provide and install painted aesthetic treatment to metal trashracks, sluice gate and apputenances, and impact basin steel railing (with or without aesthetic features) per Section 530. The color for the paint shall be as noted on the plans and specifications.

SUBSECTION 460.2 MEASUREMENT:

Measurement of aesthetic concrete forms and/or form liners will be based on a per square foot area price for all concrete areas to receive such treatment.

Measurement of concrete colorant will be based on a per cubic yard price for all concrete to receive such treatment.

No measurement will be made for painting for the metal trashracks, sluice gate and apputenances, and impact basin steel railing. The cost shall be included in the cost of the appurtenant bid items.

SUBSECTION 460.3 PAYMENT:

Payment for aesthetic concrete forms and/or form liners will be based on a per square foot area price for all concrete areas to receive such treatment.

Payment for concrete colorant will be based on a per cubic yard price for all concrete to receive such treatment.

No payment will be made for painting for the metal trashracks, sluice gate and apputenances, and impact basin steel railing. The cost shall be included in the cost of the appurtenant bid items.

BID ITEM 460-1 FORM LINERS

BID ITEM 460-2 CONCRETE COLORANT

End of Section

SECTION 505 CONCRETE STRUCTURES

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 505.1 DESCRIPTION:

Concrete structures consisting of two inlet structures and appurtenances at each sluice gate location, principal spillway, impact basin, and pipe encasement shall be constructed in conformity with the Plans and the Specifications. Concrete for use in work constructed under this specification and testing thereof shall conform to the requirements of Section 725 and 726. Reinforcing shall conform to the requirements of Section 727.

It should be noted that the inlet structure and appurtenances refers to all reinforced concrete structures associated with the inlet and sluice gate components including the following:

- Inlet structure
- Hoisting equipment vault at the dam crest
- Sideslope vent pipe and gate stem foundation

It should also be noted that the principal spillway refers to all reinforced concrete structures and metal structures associated with the principal spillway including all reinforced concrete and trashracks.

SUBSECTION 505.2 SUBGRADE FOR CONCRETE STRUCTURES:

Each subgrade upon which concrete is placed shall be firm and free from water. When the subgrade is in dry earth or soil cement, it shall be moistened with water from a spray nozzle immediately before concrete is placed.

When the design details for the project provide for the construction of filter or drain material consisting of gravel or combination of gravel and sand, which material becomes subgrade for concrete, the placing of steel reinforcement and pouring of concrete shall follow the placing of the filter or drain material as closely as practical. The filter or drain material shall be kept dewatered to the extent necessary to prevent any portion of concrete materials being carried away before the concrete has attained its final set. No payment will be made for the work required to keep such materials dewatered, other than such costs as may be included in the prices bid for various items of work or amount bid for dewatering when the schedule provides an item for same.

SUBSECTION 505.3 FORMS:

Forms shall be of suitable material and of type, size, shape, quality, and strength to enable construction as designed. The forms shall be true to line and grade, mortar tight, and sufficiently rigid to resist any appreciable amount of springing out of shape during placing of the concrete. The responsibility for their adequacy shall rest with the Contractor. All dirt, chips, sawdust, nails, and other foreign matter shall be completely removed from forms before any concrete is deposited. The surfaces of forms shall be smooth and free from irregularities, dents, sags and holes that would appreciably deface the finished surface. Forms previously used shall be thoroughly cleaned of all dirt, mortar and foreign matter before being reused, and the reuse of forms shall be subject to the approval of the Engineer. Before concrete is placed in forms, all inside surfaces of the forms shall be thoroughly treated with an approved releasing agent that will leave no objectionable film on the surface of the forms that can be absorbed by the concrete. Care shall be exercised that no releasing agent is deposited on previously placed concrete.

Specialized formwork and form liners shall be incorporated on all surfaces that will not be completely enclosed or hidden below the permanent surface of the ground as shown on the Plans. Form liners shall be installed in accordance with manufacturer's recommended procedures.

Wood forms for copings and curbs shall have a thickness of not less than 1-1/2 inches and a width of not less than the full depth of coping or curb.

Unless otherwise shown on the Plans, all sharp edges shall be chamfered with 3/4-inch triangular fillets. Forms for curved surfaces shall be so constructed and placed that the finished surface will not deviate appreciably from the arc of the curve.

Forms shall be so constructed that portions, where finishing is required, may be removed without disturbing the portion of forms to remain.

Forms shall, as far as practicable, be so constructed that the form marks will conform to the general lines of the structure.

Form clamps or bolts, approved by the Engineer, shall be used to fasten forms. The use of twisted wire loop ties to hold forms in position will not be permitted, nor shall wooden spreaders be used unless authorized by the Engineer. Clamps or bolts shall be of sufficient strength and number to prevent spreading of the forms. They shall be of such type that they can be entirely removed or cut back 1 inch below the finished surface of the concrete. Forms for outside surfaces shall be constructed with stiff wales at right angles to the studs and all form clamps shall extend through and fasten such wales, all based on the rate of concrete pour.

The Contractor may, at his own option, pour such portions of the concrete for the structure directly against the side of the excavation or sheathing without the use of outside forms, provided that the following conditions are met.

- A) If concrete is poured directly against the sides of the excavation, the faces of the excavation must be firm and compact, and be able to stand without sloughing off and be at all points outside the concrete lines shown on the Plans.
- B) If concrete is poured against sheathing, such sheathing shall be closely fitted and shall be outside of the concrete lines shown on the Plans. Those surfaces against which the concrete is to be poured shall be faced with building paper. Except as otherwise specified all sheathing shall be removed, but not until either at least 7 days after placing concrete or until the concrete has attained a strength in compression of not less than 2,000 psi. Care should be used in pulling sheathing so as to avoid damaging the concrete. Voids left by the removal of sheathing, piles and/or similar sheathing supports shall be backfilled with material having sand equivalent of not less than 30 and consolidated by jetting as directed by the Engineer. When, in the opinion of the Engineer, field conditions or the type of sheathing or methods of construction used by the Contractor are such as to make the removal of sheathing impracticable, that portion of the sheathing against which concrete has been poured may be left in place.

Regardless of the method used in pouring concrete without outside forms the following stipulations shall hold:

- A) The reinforcing steel shall be accurately set and held firmly in place, to the satisfaction of the Engineer.
- B) No direct payment will be made for building paper, sheeting, gunite or concrete placed outside of concrete lines shown on the Plans. The cost thereof shall be absorbed in the prices bid for the various items of work.
- C) The Contractor shall assume all risks of damage to the work or to existing improvements due to any reason whatsoever that may be attributable to the method of construction outlined above.

SUBSECTION 505.3.1 Removal of Forms:

Forms shall be removed before the members of the structure, which they support, are poured or placed so that the quality of the concrete may be inspected. Such forms shall be so constructed that they may be removed without disturbing other forms, which resist direct load or bending stress.

Forms may be removed after 24 hours. The periods of time at which the Contractor may remove forms, as set forth above, are permissive only and subject to the Contractor's assuming all risks that may be involved in such

removals. At his option, except for surfaces to be finished, the Contractor may leave the forms in place for such longer periods as are, in his opinion, required.

SUBSECTION 505.4 - PLACING REINFORCEMENT:

Reinforcing bars shall be accurately placed as shown on the Plans and shall be firmly and securely held in position by wiring at intersections with wire not smaller than No. 16 gage and by using concrete or metal chairs, spacers, metal hangers, supporting wires and other approved devices of sufficient strength to resist crushing under full load. Wooden supports shall not be used.

Placing bars on layers of fresh concrete as the work progresses and adjusting bars during the placing of concrete will not be permitted. Before placing in the forms, all reinforcing steel shall be thoroughly cleaned of mortar, oil, dirt, loose mill scale, loose or thick rust and coatings of any character that would destroy or reduce the bond. No concrete shall be deposited until the placing of the reinforcing steel has been inspected and approved.

Bundle bars shall be tied together at not more than 6-foot centers.

SUBSECTION 505.4.1 Splicing:

Splices of bars shall be made only where shown on the Plans or as approved by the Engineer. Where bars are spliced they shall be lapped at least 42 inches, unless otherwise shown on the Plans.

Welding of reinforcing steel will not be permitted unless specifically authorized by the Engineer.

SUBSECTION 505.4.2 Bending Reinforcement:

Bends and hooks in bars shall be made in the manner prescribed in the ACI, Manual of Standard Practice.

Bars shall not be bent nor straightened in a manner that will injure the material. Bars with kinks or unspecified bends shall not be used.

SUBSECTION 505.4.3 Welded Wire Fabric:

Welded wire fabric shall be held firmly in place and spliced not less than 2 meshes.

SUBSECTION 505.5 PLACING CONCRETE:

Where a schedule for placing concrete is shown on the Plans, no deviation will be permitted therefrom unless approved in writing by the Engineer.

The placing of concrete for a given pour shall start at the low point and shall proceed up grade, unless otherwise permitted by the Engineer.

With the exception of concrete placed in slope aprons, all concrete shall be compacted by means of high frequency internal vibrators of a type, size and number approved by the Engineer. The number of vibrators employed shall be ample to consolidate the incoming concrete to a proper degree within 15 minutes after it is deposited in the forms. In all cases, at least 2 vibrators shall be available at the site of the structure in which more than 25 cubic yards of concrete is to be placed. The vibrators shall not be attached to or held against the forms or the reinforcing steel. The locations, 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. Fresh concrete shall be spread in horizontal layers insofar as practicable and the thickness of the layers shall not be greater than can be satisfactorily consolidated with the vibrators. If additional concrete is to be placed, care shall be taken to remove all laitance and to roughen the surfaces of the concrete to insure that fresh concrete is deposited upon

sound concrete surfaces. Layers of concrete shall not be tapered off in wedge-shaped slopes, but shall be built with square ends and level tops.

Mixed concrete, after being deposited, shall be consolidated until all voids are filled and free mortar appears on the surface. The concrete shall be placed as nearly as possible in its final position and the use of vibrators for extensive shifting of the mass of fresh concrete will not be permitted.

Fresh concrete shall not be permitted to fall from a height greater than 6 feet without the use of adjustable length pipes or elephant trunks.

The use of approved external vibrators for compacting concrete will be permitted when the concrete is inaccessible for adequate compaction provided the forms are constructed sufficiently rigid to resist displacement or damage from external vibration.

During the placing of concrete, care shall be taken that methods of compaction used will result in a surface of even texture free from voids, water or air pockets, and that the coarse aggregate is forced away from the forms in order to leave a mortar surface. Spades or broad-tined forks shall be provided and used to produce the desired results if required by the Engineer.

The use of chutes in conveying or depositing concrete will be allowed only at the discretion of the Engineer, and wherever they are used they shall be laid at such inclination as will permit the flow of concrete of such consistency as is required. The use of additional water in mixing the concrete to promote free flow in chutes of low inclination will not be allowed. Where necessary in order to prevent segregation, chutes shall be provided with baffle boards or a reversed section at the outlet.

SUBSECTION 505.5.1 Joints:

The work shall be so prosecuted that construction joints will occur at designated places shown on Plans unless specifically permitted otherwise by the Engineer. The Contractor shall complete, by continuous depositing of concrete, section for the work comprised between such joints. The joints shall be kept moist until adjacent concrete is placed.

All construction joints at the bottom of walls or arches, at the top of walls, and all longitudinal construction joints having a keyed, stepped or roughened surface shall be cleaned by sandblasting prior to pouring the adjacent concrete. Any quality of sand may be used which will accomplish the desired results.

The sandblasting operations shall be continued until all unsatisfactory concrete, and all laitance, coatings, stains, debris, and other foreign materials are removed. The surface of the concrete shall be washed thoroughly to remove all loose material. The method used in disposing of wastewater employed in washing the concrete surfaces shall be such that the wastewater will not stain, discolor, or affect exposed surfaces of the structures. The method of disposal will be subject to the approval of the Engineer.

All horizontal construction joints or those on slight slopes, shall be covered with Class D mortar as specified in Section 776.

Expansion and contraction joints in the concrete structures shall be formed where shown on the Plans and as directed. In general, such joints shall have smooth abutting surfaces, painted or separated and sealed as detailed on the Plans. No reinforcement shall be extended through the joints, except where specifically noted or detailed on the Plans. Concrete or mortar shall not be permitted to lap these joints in such a manner as to effect a tie or bond that would later promote spalling.

No direct payment will be made for furnishing and placing asphaltic paint, premolded asphaltic filler or other types of joint separators; their costs shall be included in the price bid for the item of work of which they are a part.

SUBSECTION 505.5.2 Adverse Weather Concreting:

- A) Hot Weather Concreting: Hot weather is defined as any combination of high ambient temperature, low relative humidity, and wind velocity which would tend to impair the quality of fresh concrete. These effects become more pronounced as wind velocity increases. Since last minute improvisations are rarely successful, preplanning and coordination of all phases of the work are required to minimize these adverse effects.

As an absolute minimum, the Contractor shall insure that the following measures are taken:

1. An ample supply of water, hoses, and fog nozzles are available at the site.
2. Spare vibrators are on hand in the ratio of one spare vibrator for each three in use.
3. Preplanning has been accomplished to ensure prompt placement, consolidation, finishing, and curing of the concrete.
4. Concrete temperature on arrival should be approximately 45°F. and in any event shall not exceed 80°F. The use of cold water and ice is recommended.
5. The subgrade is moist, but free of standing water.
6. Fog spray is utilized to cool the forms and steel.

Under extreme conditions of high ambient temperature, exposure to the direct rays of the sun, low relative humidity, and wind, even strict adherence to these measures may not produce the quality desired and it may be necessary to restrict concrete placement to early morning only. If this decision is made, then particular attention must be directed to the curing process since the concrete will be exposed to severe thermal stresses due to temperature variation; heat of hydration plus midday sun radiation versus nighttime cooling.

- B) Cold Weather Concreting: Concrete shall not be placed on frozen ground. nor shall it be placed when the ambient temperature is below 40°F. unless adequate means are used to heat the aggregate and/or water and satisfactory means have been taken for protecting and heating the concrete during the curing period.
- C) Wet Weather Concreting: Placing of concrete shall be discontinued when the quantity of rainfall is such as to cause a flow or wash to the surface. Any concrete already placed and partially cured shall be covered to prevent dimpling. A construction joint will be installed prior to shut down.
- D) Replacement of Damaged or Defective Concrete: Upon written notice from the Engineer, all concrete which has been damaged or is defective, shall be replaced by the Contractor at no cost to the Contracting Agency.
- E) Recommended Reference:
1. ACI-305 Hot Weather Concreting
 2. ACI-306 Cold Weather Concreting
 3. ACI-308 Recommended Practices for Curing Concrete

SUBSECTION 505.6 CURING:

As soon after the completion of the specified finishing operations as the condition of the concrete will permit without danger of subsequent damage thereto, all exposed surface shall either be sprinkled with water,

covered with earth, sand or burlap; sprayed with a curing compound or sealed with a material conforming with Section 726.

Concrete that is water cured must be kept continuously wet for at least 10 days after being placed; preferably being covered, if possible, with at least 2 layers of not lighter than 7 ounce burlap, except that handrail, baserail, railing posts, tops of walls, and similar parts of the structure, if water cured, must be covered with burlap as above prescribed, immediately following the finishing treatment specified therefor, and such covering shall not be removed in less than 4 days. Roadway areas, floors, slabs, curbs, walks, and the like that are water-cured may be covered with sand to a depth of at least 2 inches, in lieu of the burlap as specified above, as soon as the condition of the concrete will properly permit, and such covering must remain wet and in place until the concrete so covered is at least 10 days old unless otherwise directed by the Engineer or provided by special provisions.

When a sprayed impervious membrane is used, it shall be applied under pressure through a spray nozzle in such manner and quantity as to entirely cover and seal all exposed surfaces of the concrete with a uniform film. To insure complete coverage, membrane shall be applied in two applications for a total coverage of 150 square feet per gallon. The membrane, however, shall not be applied to any surface until all of the finishing operations have been completed; such surfaces being kept damp, until the membrane is applied. All surfaces on which a bond is required, such as construction joints, shear planes, reinforcing steel, and the like, shall be adequately covered and protected before starting the application of the sealing medium in order to prevent any of the membrane from being deposited thereon; and any such surface with which the seal may have come in contact shall immediately thereafter be cleaned. Care shall be exercised to avoid and prevent any damage to the membrane seal during the curing period. Should the seal be broken or damaged before the expiration of 10 days after the placing of the concrete, the break shall be immediately repaired by the application of additional impervious membrane over the damaged area.

Should any forms be removed sooner than 10 days after the placing of the concrete, the surface so exposed shall either be immediately sprayed with a coating of the membrane seal, or kept continuously wet by the use of burlap or other suitable means until such concrete has cured for at least 10 days.

When tops of walls are cured by the membrane sealing method the side forms, except metal forms, must be kept continuously wet for the 10 days following the placing of the concrete.

If due to weather conditions, materials used, or for any other reason, there is any likelihood of the fresh concrete checking or cracking prior to the commencement of the curing operations, it shall be kept damp, but not wet, by means of an indirect fine spray of water until all danger of such checking or cracking is past, or until the curing operations are started in the particular area affected.

Since hot weather leads to more rapid drying of concrete, protection and curing are far more critical than in cool weather. Water curing should be used wherever it is practical and should be continuous to avoid volume changes due to alternation of wetting and drying. The need for adequate continuous curing is greatest during the first few hours after placement of concrete in hot weather.

SUBSECTION 505.7 FINISHING CONCRETE:

Immediately after the removal of forms as provided above, all concrete surfaces shall be finished in accordance with the requirements specified below.

All surfaces scheduled to be covered with backfill shall be finished so as to be free of open and rough spaces.

All surfaces that will remain exposed in the completed work **and not textured by use of form liners** shall be finished so as to be free of open and rough spaces, depressions or projections. All angles and fillets shall be sharp and true and the finished surface shall present a pleasing appearance of uniform color.

All top surfaces of the concrete structures **not textured by use of form liners** shall be finished to a smooth surface and shall be cured by an approved method.

If rock pockets or honeycomb are of such an extent and character as to affect materially the strength of the structure and to endanger the steel reinforcement the Engineer may declare the concrete defective and require the removal and replacement of that portion of the structure affected by the Contractor at no additional cost to the Contracting Agency.

If finishing operations are not carried out as set forth below, all placing of concrete shall stop until satisfactory arrangements are made by the Contractor to promptly correct defective finishing work and to carry out finishing operations as specified.

One of the classes of finish as specified shall be applied to the various surfaces as set forth under applicability of finishes.

No finishing or patching shall be permitted until the surface has been inspected by the Engineer.

SUBSECTION 505.7.1 Finishing Green Concrete:

Class I Finish – All bolts, wires and rods shall be clipped and recessed. All holes, honeycomb, rock pockets and other surface imperfections shall be cleaned out, thoroughly moistened and carefully patched with mortar. Mortar shall be composed of 1 part of cement and 2 parts of fine sand. A portion of the required cement for mortar shall be white as required to match the color of the surrounding concrete.

Class II Finish – The surface shall be patched and pointed as specified above for Class I Finish and then promptly covered with polyethylene film, wet burlap or wet cotton mats. If polyethylene film is used, the film shall be held securely to the surface by means of weights, adhesive or other suitable means. Only white polyethylene film for covering will be acceptable.

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

Class III Finish - The surface shall be treated as specified above under Class II Finish except that after brushing, the surface shall again be securely covered with polyethylene film, wet burlap or wet cotton mats. In not less than 1 day nor more than 4 days, the surface shall be uncovered and rubbed with a carborundum stone. This rubbing shall continue until the entire surface is of a smooth texture and uniform color. During the process, the use of a thin mixture of equal parts of sand and cement with water will be permitted. At the time a light dust appears, the surface shall be brushed or sacked, care being taken to carry this brushing in one direction so as to produce a uniform texture.

SUBSECTION 505.7.2 Finish Hardened Concrete:

If for reasons either beyond the control of the Contractor or with the approval of the Engineer, more than 6 days have elapsed between the time of placing concrete and the time of the removal of forms, the concrete shall be considered as hardened. Prior to finishing hardened concrete, the surface shall be covered with burlap or cotton mats and kept thoroughly wet for a period of at least 1 hour. Finishing shall be identical to the respective requirements for Class I, Class II and Class III Finish for green concrete, except that the use of a mechanically operated carborundum stone will be required for Class II and Class III Finishes.

SUBSECTION 505.7.3 Applicability of Finishes:

Surfaces requiring Class I Finish – All formed structures that are to be covered by backfill and those surfaces that are normally not in view of either vehicular or pedestrian traffic such as the buried surfaces on the pipe encasement.

Surfaces requiring Class II Finish – All exposed surfaces **not subject to the incorporation of form liners or aesthetic texturing.**

When surfaces of uniform texture and pleasing appearance are obtained through the use of first class metal forms, paper tubing or the use of special form coatings and the use of special care, such surfaces may, upon approval of the Engineer, be excluded from the surfaces requiring Class II Finish.

SUBSECTION 505.8 MEASUREMENT:

Measurement for inlet structure and appurtenances, principal spillway, impact basin, and pipe encasement shall be per cubic yard of concrete required by the Plans.

SUBSECTION 505.9 PAYMENT:

Payment for concrete structures will be made on the basis of the price bid per cubic yard. Such payment shall include full compensation for furnishing all labor, materials, tools and equipment, reinforcement, curing, placing of concrete and doing all work required to construct the structures in conformity with the Plans and Specifications.

BID ITEM 505-1 REINFORCED CONCRETE INLET STRUCTURE AND APPURTENANCES

BID ITEM 505-2 REINFORCED CONCRETE PRINCIPAL SPILLWAY

BID ITEM 505-3 REINFORCED CONCRETE IMPACT BASIN

BID ITEM 505-4 REINFORCED CONCRETE OUTLET PIPE ENCASEMENT

End of Section

SECTION 516 TRASHRACKS

(Add this section to the MAG Uniform Standard Specifications.)

SUBSECTION 516.1 DESCRIPTION:

A shop-fabricated trashrack shall be provided and installed at each sluice gate location shown on the Plans. Each trashrack shall be installed on the upstream side of the outlet pipe structure and anchored to the concrete inlet structure.

The trashracks shall be shop-fabricated to the dimensions and specified materials shown on the plans. All surfaces shall be shop primed.

SUBSECTION 516.1.1 Shop Drawings:

The Contractor shall prepare and submit to the Engineer for approval, complete shop drawings that shall show details, dimensions, sizes of materials, and all information and data necessary for the metal work, including full details of the match markings and hinge mechanism. Any materials fabricated by the Contractor prior to the approval of the drawings will be at his risk. The Contractor shall be responsible for the correctness of the drawings and for shop fits and field corrections, even though the drawings may have been approved by the Engineer.

SUBSECTION 516.1.2 Materials:

Rolled steel shapes, plates and bars shall conform to ASTM A36 and A572.

High strength bolts should conform to ASTM A325.

Anchor bolts should conform to ASTM A307. Provide two hexagonal nuts and two plain washers per bolt.

SUBSECTION 516.1.3 As-Built Plans:

When required by the special provisions, the Contractor shall furnish to the Engineer, before formal acceptance of the work, detailed plans of the structure as built. Inasmuch as the plans will be retained by the Contracting Agency as permanent records, they must be in the form of printable transparencies of quality satisfactory to the Engineer.

SUBSECTION 516.1.4 Methods and Equipment:

When requested by the Engineer, before starting erection of any structural members, the Contractor shall inform the Engineer fully as to the methods he proposes to follow and the amount and character of equipment he proposes to use. The use of such methods and equipment shall be subject to the approval of the Engineer. Approval by the Engineer shall not be considered as relieving the Contractor of the responsibility for the safety of his methods or equipment or for carrying out the work in full accordance with the plans and specifications.

SUBSECTION 516.1.5 Epoxy Anchors:

Anchoring adhesive shall be a two-component solid epoxy based system supplied in manufacturer's standard side-by-side cartridge and dispensed through a static-mixing nozzle supplied by the manufacturer. Epoxy shall meet the minimum requirements of ASTM C881 specification for Type I, II, IV, and V, Grade 3, Class B, C, and D and must develop minimum 12,650-psi compressive yield strength after 7 days. Epoxy must have a heat deflection temperature of a minimum 136°F (58°C). Adhesive shall be installed per manufacturer's instructions.

SUBSECTION 516.2 FABRICATION:

Prior to trashrack fabrication, the Contractor and Fabricator shall inspect the completed concrete inlet structures to verify dimensions and incorporate any deviations from the Plans into the trashrack fabrication.

An inspector or other authorized representative of the Engineer may examine the metals and metal items to be fabricated before they are worked in the shop and may exercise constant surveillance over the work during its progress, with full power to reject materials or workmanship not conforming to the plans and specifications.

The Contractor shall give the Engineer sufficient advance notice to permit ample time for the inspection of materials before commencement of the fabricating operations.

No fabricating, machining, cutting, welding, assembling, or painting shall be done except with the knowledge of the Engineer. Any work done otherwise will be subject to rejection.

The acceptance of any material or finished member by the Engineer shall not be a bar to subsequent rejection if it is later found to be defective. Rejected material and workmanship shall be promptly replaced.

The trashrack fabricator shall provide the Engineer shop drawings detailing the materials to be used, proposed dimensions, hinge details, and all other details appurtenant to the design. No fabrication shall commence until the shop drawings have been approved by the Owner and Engineer.

SUBSECTION 516.3 INSTALLATION:

Drill anchor bolt holes 1/8-inch larger than the specified anchor bolt diameter as shown on the Plans. Anchors shall be installed perpendicular to the surface unless otherwise stated on the Plans. Surfaces to receive epoxy shall be clean and sound. Epoxy should not be installed in or through standing water. The concrete temperature must be 40° F or above at the time of installation. For best results, the concrete should be 70° – 80° F at the time of application, therefore not during the heat of the day. Mixed material in the nozzle can harden in 5-7 minutes at a temperature of 40° F or above.

All structural steel members inset to the concrete inlet structure shall be grouted solid upon completion of the trashrack installation. Materials used for grouting procedures shall be in accordance with Section 776 – Masonry Mortar and Grout.

Care should be taken during the installation of the trashrack to ensure no damage occurs to the concrete inlet structure. Any damage deemed detrimental to structural integrity of the inlet structure by the Engineer shall be repaired or replaced, to the satisfaction of the Owner and Engineer, at the expense of the Contractor.

SUBSECTION 516.4 WORKMANSHIP:

Workmanship and finish shall be equal to the best general practice in the industry.

Rolled material before being laid off or worked shall be straight. If straightening is necessary, it shall be done by methods approved by the Engineer. Kinks and bends may be cause for rejection of the material. Following the straightening of a bend or buckle, the surface of the metal shall be carefully inspected for evidence of fracture.

Portions of the work exposed to view shall be finished neatly. Shearing, flame cutting and chipping shall be done carefully and accurately. Undercut gusset plates will not be accepted. All sharp comers and edges, and edges that are marred, cut or roughened in handling or erection, shall be slightly rounded by grinding or other suitable means.

The completion of trashracks metal items shall not be less in quality and workmanship than that standard considered being the commercial standard for the kind of member being furnished. Punched and drilled holes shall be burred and, unless otherwise specified, sheared and machined edges shall be finished by grinding to an appropriate radius. Riser, sprue, or vent marks on castings shall be ground flush with the adjacent surface. Blow holes in castings shall not be repaired by any method except as authorized in advance by the Engineer. Exposed edges of sheet metal shall be dressed with a stone or file to remove the sharp edges or comers. Drilled or punched holes, which are improperly located or misaligned shall be cause for rejection and may not be corrected without the prior approval of the Engineer. All parts of assemblies shall be fabricated so that they may be assembled without forcing or drifting.

Welders proposed to be used on miscellaneous metal fabrication will be subject to qualifications.

SUBSECTION 516.5 PAINTING:

Trashracks shall have a shop prime coat and second coat of approved rust-inhibitive paint, pain number I-D as listed in Section 790. Application shall be as specified in Section 530. The thickness of the prime coat and second coat shall be not less than three (3) mils.

After installation, surfaces where the shop coat has been abraded or otherwise damaged shall be touched up. Match marks and identification marks shall be properly cleaned off and painted over. The paint shall be identical to that used for the shop prime coat.

Paint shall be applied to the trashracks at the fabrication shop and touched up in the field both by spray methods as described in Section 530.

SUBSECTION 516.6 MEASUREMENT:

Measurement for trashracks shall be per each completed structure installed.

SUBSECTION 516.7 PAYMENT:

Payment for furnishing and installing trashracks shall be made on the basis of the price bid per each and shall include all labor, materials, tools, equipment, and incidentals, mounting, and for doing all the work involved in furnishing the complete in-place, trashrack as shown on the plans, and as specified in the specifications, and as directed by the Engineer.

BID ITEM 516-1 TRASHRACK

End of Section

SECTION 517 CAST IRON SLUICE GATES

(Add this section to the MAG Uniform Standard Specifications.)

SUBSECTION 517.1 DESCRIPTION:

The complete sluice gate shall include, but not be limited to; cast iron sluice gate and guides, wall thimble, operating stem, stem guides, operating floorstand, sluice gate frame, wedges, seat facings, lift mechanism, and all other appurtenances or accessories required for the application. These items shall be referred to herein as sluice gate and appurtenances.

A shop-fabricated sluice gate and all appurtenances shall be provided and installed at each of the two (2) inlet structures shown on the Plans. Each sluice gate shall be installed on the upstream side of the outlet pipe structure and anchored to the concrete inlet structure.

The sluice gate and appurtenances shall be shop-fabricated to the dimensions and specified materials shown on the plans. All surfaces shall be shop primed and finish painted.

The sluice gates shall be in the quantities and sizes indicated on the Plans and listed in Table 517-1 Gate Schedule. The sluice gates and appurtenances shall be as manufactured by Rodney Hunt Company or approved equal.

SUBSECTION 517.1.1 Shop Drawings:

The Contractor shall prepare and submit to the Engineer for approval, complete shop drawings which shall show details, makes, models, dimensions, sizes of materials, and all information and data necessary for the sluice gate and appurtenances, including full details of the match markings. Any materials fabricated by the Contractor prior to the approval of the drawings will be at his risk. The Contractor shall be responsible for the correctness of the drawings and for shop fits and field corrections, even though the drawings may have been approved by the Engineer.

SUBSECTION 517.1.2 Materials:

All materials used in construction of the sluice gates and appurtenances will be the best suited for the application and shall conform to AWWA C-560 and the following specifications.

Part	ASTM Designation
Iron castings for wall thimbles, frame, disc and guides, stem guides, floorstands, and other items	A-126, Class-B
Bronze castings for wedges, thrust nut, lift nut, and coupling	B-584, C86500
Bronze for seat facings in frame and disc	B-21, C46400
Bronze tongue and guide liners	B-98, C65500
Stainless steel for stems	A-276, Type 304
Stainless steel for fasteners	A-276, Type 304

SUBSECTION 517.1.2.1 Sluice Gates:

Sluice gates shall be cast iron; fully bronze mounted, and will have side wedges for seating head conditions and side, top, and bottom wedges for unseated head conditions. All gate components will be designed to safely withstand the heads listed in Table 517-1 Gate Schedule.

TABLE 517-1 GATE SCHEDULE					
Quantity	Size	Design Seating Head	Design Unseating Head	Operating Head	Type Operation
2	48-inch	25 feet	0 feet	20 feet*	Manual Operated Floorstand

* Under full reservoir conditions, sluice will normally operate under no reservoir head.

SUBSECTION 517.1.2.2 Frame:

The frame shall be cast iron, one-piece construction with mounting flange and circular opening. All contact surfaces of the frame shall be machined. The frame shall have machined dovetailed grooves on the front face into which bronze seat facings shall be driven and machined to a 63 micro-inch finish. The back of the frame will be machined to bolt directly to the machined face of a wall thimble, pipe flange, or for mounting on the concrete. Frames for sluice gates subject to unseating heads will have integrally cast pads machined with keyways to receive top and bottom wedge seats.

SUBSECTION 517.1.2.3 Disc or Slide:

The disc shall be cast iron, one-piece construction, rectangular with integrally cast vertical and horizontal ribs. A reinforcing rib along each side shall be provided to insure rigidity between the side wedges. The disc will have machined dovetail grooves on the seating face into which bronze seat facings shall be driven and machined to a 63 micro-inch finish. A tongue on each side, extending the full length of the disc, will be machined on all sides with a 1/16-inch clearance maintained between the disc tongue and gate guide groove. Wedge pads for side, top and bottom wedges, when required, shall be cast integrally on the disc and machined to receive adjustable bronze wedges. A heavily reinforced nut pocket will be cast integrally on the on the vertical centerline and above the horizontal center, and be of such shape to receive the square-backed thrust nut.

SUBSECTION 517.1.2.4 Guides:

The guides shall be cast iron, one-piece, designed to withstand the total thrust due to water pressure and the wedging action. The guides shall be machined on all contact surfaces, and a groove shall be machined the entire length of the guide to allow 1/16-inch clearance maintained between the disc tongue and guide groove. The guides shall be of such length as to retain and support at least one half the disc in the full open position. The guides shall be integrally cast with or attached to the frame with silicon bronze or stainless steel studs and nuts, and shall be dowelled to prevent any relative motion between the guides and frame. A reinforcing rib extending from the guide flange over the top of the wedge seat shall be provided. Bronze wedge seats shall be securely attached to machined pads on the guides.

SUBSECTION 517.1.2.5 Wedges:

The wedges shall be solid cast bronze, machined on all contact surfaces. They shall be attached o the disc with studs and nuts and shall have adjusting screws with lock nuts.

SUBSECTION 517.1.2.6 Seat Facings:

All seat facings shall be malleable extruded bronze of a composition, which will increase in wearing ability with cold working. The extruded seat facings will be of special shape to fill and permanently lock in the machined dovetailed grooves when driven into place. Attaching pins and screws will not be allowed. The installed seat facings shall be machined to a 63 micro-inch finish or better.

SUBSECTION 517.1.2.7 Bell Thimbles:

Bell thimbles shall be furnished for sluice gate connection to a 48-inch steel pipe. Contractor is responsible for coordinating the bell thimble fabrication to match the steel pipe fitting at the inlet structure. Incompatible fitting shall be replaced and/or corrected at no additional cost to the Owner. Thimbles shall be cast iron, one-piece construction of adequate section to withstand all operational and reasonable installation stresses. The thimble shall have a pipe connection cast at the top side of the thimble for the connection of a 6-inch, schedule 40 carbon steel vent pipe. Bell thimbles shall be internally braced during concrete placement. A center ring or water stop shall be cast around the periphery of the thimble. The front flange shall be machined and have tapped holes for the sluice gate attaching studs, and metal stamped vertical centerlines with the word "TOP" for correct alignment. Large rectangular thimbles shall be provided with holes in the invert to allow air to escape during concrete placement beneath the thimble. A permanent gasket for uniform thickness or suitable mastic shall be provided between the sluice gate and thimble.

SUBSECTION 517.1.2.8 Stems:

The operating stem shall be of a size to safely withstand, without buckling or permanent distortion, the stresses induced by normal operating forces. In addition, the stem will be designed to transmit in compression at least 2-1/2 times the rated output of the floorstand with a 40-pound effort on the crank. The threaded portion of the stem shall have machine cut threads of the 29° Acme type. Stems of more than one section shall be joined by bronze couplings threaded and keyed to the stems. All threaded and keyed couplings of the same size shall be interchangeable. Manually operated, rising stem gates shall be provided with an adjustable stop collar on the stem above the floorstand lift nuts.

SUBSECTION 517.1.2.9 Stem Guides:

Stem guides shall be cast iron, bronze bushed, mounted on cast iron brackets. They shall be adjustable in two directions and shall be spaced at sufficient intervals to adequately support the stem. Stem guide spacing shall not exceed an L/r ratio of 200, and shall not be spaced greater than 10 feet except where required by gate travel.

SUBSECTION 517.1.2.10 Manually Operated Floorstands:

Manual operation shall be by crank operated floorstand as indicated on the plans and as specified in Table 517-1 Gate Schedule.

Crank operated type shall have either single or double gear reduction depending upon the lifting capacity required. The crank operated type shall be provided with a threaded cast bronze lift nut to engage the operating stem. Roller bearings shall be provided above and below a flange on the operating nut to support both opening and closing thrusts.

Floorstands shall operate the gates under the specified operating head with not greater than a 40 pound pull on the crank. Gears, where required, shall be steel with machine-cut teeth designed for smooth operation. The stainless pinion shafts on crank operated floorstands, whether single or double ratio, shall be supported on tapered roller bearings or needle bearings. All components shall be totally enclosed in a cast iron case and cover. Positive mechanical seals shall be provided on the operating nut, and the pinion shaft as to exclude moisture and dirt and prevent leakage of lubricant out of the hoist. Lubricating fittings shall be provided for the lubrication of all gears and bearings. Removable crank shall be designed for rough treatment and minimum weight.

Floorstands shall include a high strength pedestal designed to position the input, shaft, or crank approximately 36-inches above the operating floor. An arrow with the word "OPEN" shall be permanently attached or cast on the

floorstand indicating the direction of rotation to open the gate. The operating mechanism shall be equal in all respects to the Rodney Hunt floorstand shown on the Plans and listed in Table 517-1 Gate Schedule.

SUBSECTION 517.2 INSTALLATION:

The sluice gate equipment and appurtenances shall be installed in accordance with the Installation Manual furnished by the gate manufacture. Extreme care should be used in the handling, storage, and installation of this equipment to prevent damage or distortion of the equipment and to insure proper performance.

SUBSECTION 517.2.1 Performance:

The sluice gates shall be substantially watertight under design head conditions. The leakage shall not exceed 0.1 gpm per foot of periphery for seating heads up to 50 feet, and for unseating heads up to 30 feet.

SUBSECTION 517.3 WORKMANSHIP:

All work shall be performed in accordance with the best modern practice for the manufacture of high-grade machinery. All parts shall have accurately machined mounting and bearing surfaces so that they can be assembled without fitting, chipping, or remachining. All parts shall conform accurately to the design dimensions and shall be free of all defects in workmanship or material that will impair their service. The sluice gates shall be completely shop assembled to insure proper fit and adjustment of all parts.

SUBSECTION 517.4 PAINTING:

The gate manufacture shall be responsible for the shop prime and finish painting of all gates and appurtenances supplied under this contract. All coatings shall conform with VOC Emissions Regulations in effect at the manufacturing location and at the project site to allow touch-up or recoating to be performed with the same products. The type of paint shall be consistent with the application as approved by the Owner. The color, number of coats, mil thickness, and surface preparation shall be in accordance the paint manufactures recommendations for the application and with Section 530 and 790 of these Special Provisions. All coatings shall be free of carcinogens as listed on the IARC monographs. All coatings shall be applied in accordance with the paint manufactures recommendations for thinning, technique, and safety precautions.

SUBSECTION 517.5 SHOP TESTING:

The completed assembled gate shall be inspected for proper seating. Seat facings shall be machined and wedges adjusted to exclude a 0.004-inch thickness gauge between the frame and disc seating surfaces. The gate disc shall be fully opened and closed in its guide system to insure that it operates freely. Floorstand shall be shop operated to insure proper assembly and operation.

SUBSECTION 517.6 MEASUREMENT:

Measurement for sluice gates and appurtenances shall be per each completed structure installed.

SUBSECTION 516.7 PAYMENT:

Payment for fabricating, furnishing and installing sluice gates and appurtenances shall be made on the basis of the price bid per each and shall include all labor, materials, tools, equipment, and incidentals, mounting, and for doing all the work involved in fabricating, furnishing the complete in-place, sluice gate and appurtenances as shown on the plans, and as specified in the specifications, and as directed by the Engineer.

BID ITEM 517-1 SLUICE GATE AND APPURTENANCES

End of Section

SECTION 520 STEEL HANDRAILS

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 520.1 DESCRIPTION:

Metal handrail shall consist of furnishing all materials and constructing steel handrail, including railing, posts, fittings and anchorages. Metal handrail shall be fabricated, installed and painted, when required, in accordance with the details shown on the Plans and the Specifications.

SUBSECTION 520.2 FABRICATION:

Prior to beginning any work on the fabrication of the railing, the Contractor shall submit shop drawings for approval, showing complete railing details.

Materials furnished for metal handrail shall conform to the requirements specified on the plans.

The Engineer shall be furnished complete copies in triplicate of all mill reports on steel materials furnished.

Railings shall be fabricated from welded or seamless members of the size and thickness shown on the plans. Steel members shall conform to the requirements of ASTM A-53, Grade B structural steel conforming to ASTM A-36, or tubular sections of hot rolled mild steel, as shown.

Welding shall be performed by the electric arc process and shall be done in conformance with Specifications for Welded Highway and Railway Bridges of the AWS. All butt welds on exposed surfaces shall be ground flush with adjacent surfaces.

Railing panels shall be straight and true to dimensions.

For structures on curves, either horizontal or vertical, the railing shall conform closely to the curvature of the structure.

SUBSECTION 520.3 ERECTION:

The railing shall be carefully erected, true to line and grade. Posts and balusters shall be vertical and parallel with the deviation from the vertical for the full height of the panel not exceeding 1 inch. After erecting the railing, any abrasions or exposed steel shall be repaired in accordance with Section 530.

SUBSECTION 520.4 MEASUREMENT:

Measurement for steel railing will be measured by the linear foot from end to end along the face of the railing including terminal sections.

SUBSECTION 520.5 PAYMENT:

Payment for handrailing shall be made on the basis of the price bid per linear foot and shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all work involved in constructing the railing complete in place as shown on the Plans and specified herein.

BID ITEM 520-1 STEEL HANDRAIL

End of Section

SECTION 530 PAINTING

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 530.1 DESCRIPTION:

This work shall consist of furnishing paint and other necessary materials and painting metal surfaces in accordance with the details shown on the Plans and these Specifications. Surfaces to be painted include the trashracks, sluice gates, sluice gate stem, sluice gage mechanical lift mechanism, and steel hand railings on the outlet works impact basin.

SUBSECTION 530.2 MATERIALS:

Materials used in paint for painting shall conform to the requirements of Section 790.

SUBSECTION 530.3 WEATHER CONDITIONS:

Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather. Except as provided below, painting will not be permitted when weather conditions during application are such that the atmospheric temperature will drop below 35°F. during the drying period. If fresh paint is damaged by the elements, it shall be replaced by the Contractor at no additional cost to the Contracting Agency.

Subject to the approval of the Engineer, the Contractor may provide suitable enclosures to permit painting during inclement weather. Provisions must be made to control atmospheric conditions artificially inside the enclosures within limits suitable for painting throughout the painting operation. The cost of providing and maintaining such enclosures shall be considered as included in the prices paid for the various contract items of work and no additional payment will be made therefore.

SUBSECTION 530.4 APPLICATION:

Painting shall be done in a neat and workmanlike manner. Unless otherwise specified paint shall be applied either by brush, roller, or spray methods.

If brushes are used, they shall have sufficient body and length of bristle to spread the paint in a uniform coat. In general, the primary movement of the brush shall be such as to fill thoroughly all irregularities in the surface, after which the coating shall be smoothed by a series of parallel strokes. Paint shall be evenly spread and thoroughly brushed out. If a considerable amount of brush marks appear, it will be considered that the paint has been improperly applied. If rollers are used, they shall be of a type that do not leave a stippled texture in the paint file.

On all surfaces which are inaccessible for brushing, the paint shall be applied by spray or by sheepskin daubers especially constructed for the purpose, or by other means approved by the Engineer.

If spray methods are used, the operator shall be thoroughly experienced. Runs, sags, thin areas in the paint coat, or skips and holidays shall be considered as evidence the work is unsatisfactory and the Contractor may be required to apply the remainder of the paint by brush.

A water trap acceptable to the Engineer shall be furnished and installed on all equipment used in spray painting.

Mechanical mixers shall be used to mix the paint. The paint shall be mixed a sufficient length of time, prior to use, to thoroughly mix the pigment and vehicle together. Paint shall be kept thoroughly mixed while being applied.

SUBSECTION 530.5 THINNING PAINT:

Paints specified are formulated ready for application and no thinning will be allowed. If the paint becomes thick in cool weather, it shall be heated in the container immersed in hot water.

SUBSECTION 530.6 PROTECTION OF WORK:

The Contractor shall protect all parts of the structure against disfigurement by spatters, splashes, and smirches of paint or of paint materials. The Contractor shall be responsible for any damage caused by his operations to vehicles, persons, or property, and shall provide protective means to guard against such damage at his expense.

Paint stains which might result in an unsightly appearance shall be removed or obliterated by the Contractor.

When ordered by the Engineer, if traffic causes an objectionable amount of dust, the Contractor shall sprinkle the adjacent roadbed and shoulders with water for a distance on each side of the location where painting is being done sufficient to abate the dust nuisance. The Contractor shall furnish and post at his own expense DRIVE SLOWLY signs and take other necessary precautions to prevent dust and dirt from accumulating on freshly painting surfaces.

SUBSECTION 530.7 SAFETY PRECAUTIONS:

The following safety precautions shall be observed in addition to those prescribed by law in Section 107. The applicable sections of NACE, A Manual for Painter Safety.

SUBSECTION 530.8 SURFACE PREPARATION FOR PAINTING:

Surface preparation for painting of the steel shall conform to the surface preparation specifications of the Steel Structures Painting Council.

Unless otherwise specified, the commercial blast method shall be used.

After erection and riveting or welding, all surfaces of structural steel which will be exposed to air in the completed structure and the repainting of existing steel structures where partial painting is required, the method of cleaning will be as directed by the Engineer or as specified in the special provisions.

SUBSECTION 530.9 PAINTING:

Paint: Unless otherwise required on the Plans or in the special provisions, the paints to be applied to structural steel surfaces shall consist of a shop prime coat, a second coat, and a finish coat. The total dry film thickness of the prime and second coat shall be not less than 3 mils. The dry thickness of the paint will be measured in place with a calibrated magnetic film thickness gauge.

Excessively thick coats of paint will not be permitted. The thickness of each coat shall be limited to that which will result in uniform drying throughout the paint film.

Unless specified otherwise on the Plans or in the special provisions, the paint coats shall be as specified for general use on structural steel in Section 790. Succeeding coats of paint, not otherwise materially different in color, shall have carbon black mixed into the paint in accordance with Section 790 to produce a perceptible color difference between the paint coat being applied and the preceding coat.

Any damage to sound paint on areas not designated for treatment, resulting from the Contractor's operations, shall be repaired as directed by the Engineer.

(B) Application of Paint: Painting of structural steel, except for shop applied prime coats and sections which will be inaccessible after erection as described below, shall be done after erection unless otherwise specified in the special provisions. Requests to do any additional painting prior to erection shall be submitted by the Contractor and approved by the Engineer in writing before such work is started. Painting prior to erection will be limited to a prime coat of paint, except that surfaces exposed to the atmosphere which would be inaccessible for painting after erection shall be painted the full number of coats prior to erection. Any deficiencies in the prime coat of paint, or any second coat shall be corrected to the satisfaction of the Engineer prior to the application of the finish coat of paint.

The surface of the paint coat being covered shall be free from moisture, dust, grease, or any other deleterious material which would prevent the bond of the succeeding coat. In spot painting, any old paint which lifts after application of the touch-up coat, shall be removed by scraping and the area repainted before application of the next coat.

The finish coat shall not be applied until the required total film thickness of the undercoats of paint, as described above is obtained.

Open seams at contact surfaces of built-up members which would retain moisture shall be caulked with red lead paste before applying the second coat of paint.

Except for anchor bolt assemblies, steel embedded in concrete need not be painted. Anchor bolt assemblies shall be painted or dipped with 1 coat of paint prior to installation.

With the exception of abutting chord and column splices and column and truss shoe bases, machine finished surfaces shall be coated with a rust inhibitor which can be easily removed. Surfaces of iron and steel castings which have been machine finished shall be painted with a coat of shop paint.

SUBSECTION 530.10 TESTING:

Paint and paint materials shall be sampled and tested prior to use. Tests shall be conducted in accordance with methods specified by ASTM or by methods set forth in Federal Standard 141. In the absence of any such methods, other suitable methods may be designed and utilized by the Engineer. Lots or batches of paint of proprietary brand, as defined in Section 790, which have been previously sampled and tested by the Contracting Agency, and approved, may be used without further testing, if permitted by the Engineer.

SUBSECTION 530.11 PAYMENT:

No payment for the preparation of surfaces, shop prime coat and field touch-up coats on structural steel and miscellaneous metal items shall be made as such; the cost thereof shall be included in the prices for the structural steel and miscellaneous metal items. No payment for second and finish coats on structural steel or miscellaneous metal items shall be made as such; the cost thereof shall be included in payments for the structures, except that payment for cleaning all painting on miscellaneous metal items shall be considered as included in the price for the item when a separate price therefore is included in the proposal.

End of Section

SECTION 606 VERTICAL CUTOFF WALL CONSTRUCTION

(Add this section to the MAG Uniform Standard Specifications.)

SUBSECTION 606.1 DESCRIPTION:

The work covered by this specification consists of furnishing all plant, labor, equipment, appliances, and materials, and performing all operations in connection with the excavation and backfilling of the vertical cutoff walls in accordance with the Plans and Special Provisions.

Vertical cutoff walls will be required beneath the FRZ portion of the dam. These trenches will be excavated to a minimum width of 36 inches and in accordance with the lines and grades shown on the Plans. Backfill materials will consist of Soil-Cement-Bentonite (S-C-B) slurry as described in Section 730, Soil-Cement-Bentonite.

It is anticipated that cutoff trench slurry stabilization will be required for the depth of trenches shown on the Plans. The Contractor may choose, at their own risk, to excavate open trenches with no slurry support. However, any portions of the cutoff trenches that slough or cave during excavation or backfilling procedures shall be reconstructed, to the satisfaction of the Owner, at the expense of the Contractor.

SUBSECTION 606.1.1 References:

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A) AMERICAN PETROLEUM INSTITUTE (API)

1. API Specification 13A – Specification for Drilling Fluid Materials.
2. API Specification 13B-1/ISO 10414-1 – Recommended Practice for Field Testing Water Based Drilling Fluids Petroleum and natural gas industries-Field testing of drilling fluids – Part 1 – Water Based Fluids (Modified).

SUBSECTION 606.1.2 Definitions:

- A) Slurry: A stable, colloidal suspension of powdered bentonite in water.
- B) Mud Engineer: A specialist who has a minimum of one (1) year of proven, successful, acceptable experience in the use, testing, and control of bentonite slurry.
- C) Slurry Trench Specialist: An Engineer who has a minimum of ten (10) years of proven, successful, acceptable experience in slurry wall construction and supervision and is knowledgeable in all aspects of slurry wall construction which includes but is not limited to:
1. Mixing methods required to properly mix the bentonite-water slurry, cement-bentonite slurry, and plastic concrete and soil-cement-bentonite backfill.
 2. Slurry trench excavation, both panelized and continuous trenches, including successful slurry trench excavation experience in rock foundations and/or in foundation conditions similar to those described in these specifications.
 3. Backfill placement procedures for cement-bentonite, soil-cement-bentonite, and plastic concrete.
 4. A thorough knowledge of construction equipment and material testing required for successful slurry trench excavation and cutoff wall construction.

- D) **Emergency Slurry Loss:** An emergency slurry loss is defined as any slurry loss which cannot adequately be controlled or stopped by the introduction of additional slurry and/or sand and gravel material into the trench.
- E) **Slurry Trench Construction Method of Excavation:** The process of excavating a vertical-walled trench while keeping the trench filled with slurry to maintain stability of the trench during construction.
- F) **Panel:** An independently constructed section of slurry trench that overlaps into adjacent panels throughout the full depth of the trench.
- G) **Backfill:** Unless further qualified, the term "backfill" when used as a noun in this section refers generically to material (soil-cement-bentonite backfill, plastic concrete or emergency backfill materials) to be placed into the vertical walled trench, displacing the supporting slurry.

The term "backfill" when used as a verb in this section refers to the act of placing material ("backfill") into the trench, thereby displacing the supporting slurry.

- H) **Soil-Cement-Bentonite Backfill (or S-C-B Backfill):** A specified low strength, homogeneous mixture of processed soil, cement, and hydrated bentonite slurry used as backfill in cutoff wall construction. Soil-cement-bentonite backfill is essentially a very low strength plastic concrete. See Section 730, Soil-Cement-Bentonite Backfill, for more complete information.
- I) **Plastic Concrete:** A specified mixture of cement, hydrated bentonite slurry, and fine and coarse aggregate.
- J) **Cutoff Wall:** A vertical-walled trench excavated below grade by slurry trench construction methods and backfilled with selected materials to produce an impervious barrier.

Where the term "cutoff wall" is used in these specifications, it shall designate the continuous vertical-walled impervious barrier to be constructed at the upstream and downstream toe of the future soil cement embankment as shown on the Plans.

The cutoff wall at the site will be created by placement of soil-cement-bentonite backfill into overlapping vertical-walled trench panels excavated by slurry trench construction methods. At the Contractor's option, the cutoff wall may also be created using plastic concrete during excavation of the vertical-walled trench by slurry trench construction methods.

- K) **Industrial Excavation Rate:** The term "industrial excavation rate" is the ratio of total production time and the excavation production achieved. Total production time includes the total time from when the excavation team (personnel and equipment) begins work until the end of the shift, including raising and lowering equipment; maintenance; breakdowns; and moving the equipment.

SUBSECTION 606.2 MATERIALS:

The Contractor shall maintain at the jobsite a sufficient quantity of raw materials and other supplies such that the work can proceed uninterrupted by material shortages. The slurry and S-C-B backfill to be used shall be suitable for the project. The Contractor shall select wall backfill design mixes based upon the target requirements for strength and hydraulic conductivity (permeability) specified for the wall and on the results of the testing specified in Subsection 606.6.1. The Contractor shall undertake any additional tests necessary to assist in material selection to verify compliance with the specifications, and to demonstrate the impermeability and strength of the walls.

SUBSECTION 606.2.1 Bentonite Powder and Bentonite Slurry:

A) Bentonite Powder

1. The bentonite shall be natural sodium cation-based montmorillonite powder (Premium-Grade Wyoming-type bentonite) that conforms to the standards set forth in the most current API Standard 13A. No chemically treated bentonite will be allowed.
2. No bentonite from the bentonite manufacturer shall be used prior to acceptance by the Owner. All bentonite will be subject to inspection, sampling, and verification of quality of testing by or under the supervision of the Owner. Bentonite shall be protected from moisture during transit and storage.

B) Bentonite Slurry at Time of Introduction Into the Trench

1. Provide stable, colloidal suspension of powdered bentonite in water.
2. Provide slurry mixture of not less than 17.5 pounds of bentonite per barrel (42 gallons) of water or the equivalent of 5 percent bentonite measured as the dry weight of bentonite to the amount of water by weight. Additional bentonite may be required depending on the hardness and temperature of the water and the quality of the bentonite. Examine the water source and evaluate its effect on the slurry trench construction.
3. Do not combine any additives with the bentonite without the expressed written consent of the Owner's Representative.
4. Bio-polymer slurry fluids will not be permitted.
5. Provide fully hydrated slurry initially introduced into the excavated trench, or prior to transferring from one panel to another where applicable, having the following properties:
 - a. A minimum apparent viscosity of 32 seconds as measured through a Marsh funnel viscosimeter.
 - b. A density of not less than 64.5 pounds per cubic foot.
 - c. A pH not less than 7.0 and no greater than 11.
 - d. A filtrate cake thickness less than 2 millimeters (mm) when tested in accordance with API Standard Procedures.
 - e. A filtrate loss between 15 and 20 cubic centimeters (cc) when tested in accordance with API Standard Procedures.

C) Bentonite Slurry During Trench Excavation

1. Provide slurry in the trench, as measured midway between the top and the bottom of the trench, having the following properties:
 - a. An apparent viscosity of more than 38 seconds but less than 60 seconds as measured through a Marsh funnel viscosimeter.
 - b. A density of not less than 74 pounds per cubic foot.
 - c. A pH not less than 7.0 and not greater than 12.
 - d. Filtrate loss of less than 30 and cake thickness less than 5 mm.

2. Whenever the slurry in the trench falls outside any of the above limits, immediately recirculate, remove, or adjust the slurry to achieve slurry having compliance with the properties above.

D) Bentonite Slurry Just Prior to Trench Backfilling

1. Recycle or replace as much of the slurry as is necessary in order to meet or better the following characteristic values of the bentonite slurry immediately prior to backfill operations:
 - a. Density, as measured at the bottom of the trench, not exceeding 75 pounds per cubic foot.
 - b. Suspended solids in the slurry not exceeding 5 percent, by volume, as measured at the top, middle, and bottom of the trench. Perform this test as outlined in API Specification 13A.
 - c. Maximum filtrate loss of 25 cc, cake thickness less than 3 mm.
 - d. Maximum Marsh funnel viscosity of 45 Marsh seconds.

SUBSECTION 606.2.2 Water:

Provide water suitable for producing slurry meeting requirements of this section. Water sources for the construction of the project are discussed in Section 225, Watering.

SUBSECTION 606.2.3 Additives:

Admixtures of the type used in the control of oil-field drilling muds such as thinners, softening agents, dispersants, flocculants, retarders or plugging or bridging agents may be added to the water or the slurry to permit efficient use of bentonite and proper workability of the slurry. However, use of additives shall be in compliance with any applicable state and local regulations or standards and shall be subject to the approval of the Owner. In addition, the Contractor shall have on file a written statement as to the use of any such additive, its effect on the slurry, its long-term stability, and its effect on the environment.

SUBSECTION 606.3 EQUIPMENT:

SUBSECTION 606.3.1 Trench Excavation Equipment:

Provide sufficient labor, adequate numbers and type of excavation equipment, and sufficient supply of spare critical replacement parts or backup equipment to complete all cutoff and tie-in wall excavation within the schedule specified in these Special Provisions.

Use suitable slurry trench excavation equipment such as backhoes, cable clamshells, hydraulic clamshells, hydromills (hydrofraise-type cutters consisting of hydraulically operated, horizontal shaft cutter drums mounted in a vertical frame with a high capacity, reverse circulation pump to remove cuttings), or combinations thereof, to excavate the vertical-walled trenches by slurry trench construction methods. Use equipment capable of excavating the required minimum width of trench in a single pass of the equipment and adequate to ensure that the required width of trench can be carried to the final depth of cut continuously along the trench line. The equipment must be capable of maintaining the required verticality tolerance such that the (required) overlap between panels is provided over the entire depth of the wall, thereby maintaining continuity. The anticipated maximum depth of the trench is approximately 30 feet. However, provide equipment capable of excavating a trench down to 40 feet in depth.

Special chopping, chiseling or other suitable equipment may be used as well as pre-drilling to satisfactorily accomplish the required excavation.

Use additional equipment such as air lifts, slurry desanders and other appropriate means as needed to clean the trench bottom and/or slurry in accordance with Subsection 606.4.7.

Provide equipment that does not create live-load surcharges that contribute to the instability of the trench.

SUBSECTION 606.3.2 Slurry Batching Plant:

Provide slurry batching plant including a mixer capable of producing a colloidal suspension of bentonite in water and complete with pumps, valves, hoses, supply lines, and all other equipment needed to adequately supply the slurry to the trench. Prepare all slurry for use in the trench using a suitable mixer. Do not mix slurry in the trench. Store the bentonite-water slurry, as required, until the mixture is fully hydrated and the resulting slurry is homogeneous as determined by a consistent Marsh funnel reading. The Contractor will be allowed to recirculate and reuse bentonite slurry but shall be responsible at all times for the quality of the slurry, and shall avoid at all times contamination of the same. Do not pump slurry directly from one panel to another without testing slurry properties as listed in Subsection 606.2.1-B.

All equipment associated with slurry production and transport to the trenches shall be capable of operating under the conditions at the site (i.e., hot weather).

SUBSECTION 606.3.3 S-C-B Backfill Equipment:

The Contractor shall furnish all necessary plant and equipment for efficiently handling and transporting materials, mixing/batching backfill, and placing backfill to construct the various walls; and for quality control testing of the materials used in such processes. The Contractor shall obtain and maintain at the jobsite a supply of spare critical replacement parts or backup equipment sufficient to allow the wall construction to proceed with minimum loss of time due to mechanical breakdown or equipment failure.

SUBSECTION 606.3.4 S-C-B Backfill Mixing Plant:

Mixing of the processed soil, cement, and bentonite slurry to be used in the soil-cement-bentonite mixture shall be accomplished in a mixing plant. The mixer shall be an approved twin pugmill-type or a continuous-mixing type designed for either weight or volume proportioning. The plant shall have a rated capacity of at least 200 cubic yards per hour and shall be designed, coordinated and operated so as to produce a uniform mixture within the limits required by these specifications. A water supply sufficient for the rated capacity of the plant shall be provided for S-C-B backfill production. Prior to the start of any backfill placement, the Contractor's proportioning and mixing equipment shall be checked with respect to meeting specifications requirements. Proportioning checks shall be made at various plant operating speeds to cover the range of planned operating speeds. Actual batch weight checks shall be made. Proportioning checks shall also be performed continuously during construction. Facilities for efficiently storing, handling, and proportioning unmixed materials shall be provided at the plant.

The Contractor shall provide facilities, satisfactory to the Contracting Officer, for safely procuring representative soil and soil-cement-bentonite samples from the mixing plant.

Satisfactory means shall be provided to obtain the proper amount of cement, soil, and slurry (bentonite and water). All measuring devices shall be sensitive to a 2 percent variation above or below the actual weight in pounds required. Proportioning may be on the volume basis: Provided, that the sensitivity specified for the weight basis is maintained.

The plant shall include a water-metering device capable of providing accurate metering for the plant process(s) listed in this specification.

The plant shall be equipped with a positive, adjustable governor for controlling the mixing time of each batch. The mixing time shall be considered as the interval between the time the cement contacts the soil and slurry and time the mixture leaves the, mixing unit.

Batching plants designed for weight proportioning shall include means for accurately weighing soil and cement in a weight box or hopper suspended on scales, ample in size to hold a full batch without hand raking or running over. The weight box or hopper shall be supported on fulcrums and knife edges so constructed that they will not be easily thrown out of alignment or adjustment. Scales may be either of the beam type with over-and-under indicator or springless-dial type and shall be of a standard make and design, sensitive to one-half of one percent of the maximum load that may be required. If the beam-type scale is used, there shall be included a separate beam for soil and for

cement, each beam being connected so as to actuate the over-and-under indicator, and a tare beam for balancing the hopper.

A scale check shall be conducted initially, each time equipment is moved, and at least once per month or as often as the Contracting Officer deems necessary to ensure scale accuracy. Where applicable, the accuracy of the weighing devices in the batch plant shall be tested and sealed by a certified weighmaster of the State of Arizona.

Plants designed for continuous mixing shall include a means for accurately proportioning soil and cement and shall be equipped to ensure positive interlocking control of the flow of the soil and cement from bins. The cement feeder shall be capable of operating at a range of operating speeds with no loss of accuracy.

The Contractor shall also provide a protected working space, approximately 10 feet by 20 feet in size, which shall be adjacent to the mixing plant and free from vibration. The Contractor shall furnish the necessary utilities such as water, heat, and electrical power for the working space area for operation of Government testing equipment and for execution of tests by Government personnel.

SUBSECTION 606.3.4.1 Safety Requirements:

Adequate and safe stairways to the mixer platform and guarded ladders to other plant units shall be placed where required for accessibility to all plant operations. All gears, pulleys, chains, sprockets, and other dangerous moving parts shall be thoroughly guarded and protected. Ample and unobstructed space shall be provided on the mixing platform. A clean and unobstructed passage shall be maintained at all time in and around the truck loading space.

A positive lockout procedure shall be developed for all maintenance and cleaning operations. This procedure shall be included in the Contractor's Safety Program, submitted and approved prior to equipment setup, in accordance with the clause entitled "Safety and Health."

SUBSECTION 606.3.5 Transportation Equipment:

Equipment for transporting the soil-cement-bentonite mixture shall have tight, clean, smooth beds or belts, and protective covers. If truck hauling is used, a sufficient number of trucks shall be provided to ensure continuous operation. Trucks shall be equipped with agitators.

SUBSECTION 606.3.6 Placement Equipment:

Provide suitable tremie pipe(s) as specified below. The tremie pipe(s) shall be fabricated of rapid connect, watertight, heavy-gauge steel pipe strong enough to withstand all handling stresses. The tremie pipe(s) shall have a minimum diameter of 10 inches to permit free-flow of the S-C-B backfill. The tremie pipe(s) shall be marked to allow quick and accurate determination of the distance from the surface of the slurry to, the mouth of the tremie pipe. The tremie pipe(s) shall be provided with a funnel or hopper to facilitate transfer of S-C-B material from the delivery device to the tremie.

A sufficient number of tremie pipes shall be provided so that the backfill does not flow horizontally a distance of more than 7-1/2 feet from a tremie pipe (i.e., tremie pipes shall be placed a maximum of 15 feet on centers), unless otherwise approved by the Contracting Officer. Where more than one tremie pipe is used in the same placement simultaneously, the backfill level at each pipe shall be maintained nearly level with respect to each other.

A stable stationary frame or platform shall be provided to support the tremie pipe(s) during the placement. The tremie pipe(s) shall be equipped with a suitable power hoist or crane to facilitate vertical movement during placement.

Depending upon the method selected for sealing the tremie pipe(s) at the beginning of the placement, an adequate supply of end-closure devices or "go-devils" shall be available.

SUBSECTION 606.3.7 Inspection of Plant and Equipment:

The Contracting Officer shall have access at all times to all parts of the plant for checking the adequacy of the equipment in use, for inspecting the operation of the plant and for verification of weights or proportions and character of material.

The Contractor shall maintain all equipment in calibration at all times.

SUBSECTION 606.4 CONSTRUCTION REQUIREMENTS:

SUBSECTION 606.4.1 Required Contractor Submittals:

Submit the following in accordance with this section and the Supplementary General Conditions.

SUBSECTION 606.4.1.1 Qualifications:

A) Qualifications of Contractor in Slurry Trench Construction

1. Submit evidence satisfactory to the Owner that the Contractor is experienced and competent in slurry trench construction in hard rock foundations. Include the following:
 - a. Detailed listing of 3 comparable slurry trench projects satisfactorily completed in the last 5 years, including but not limited to:
 - i. Client name, client reference name and phone contact number.
 - ii. Project location and construction date.
 - iii. Slurry and backfill properties and mixing equipment summary.
 - iv. Foundation materials/conditions and excavation techniques used, including length, width, and depths of excavation.
 - v. Employee names associated with each project.
 - b. Employee names and experience resumes of personnel that will be assigned to this contract.
 - c. Equipment inventory available to this contract.

B) Qualifications of Slurry Trench Specialist(s) and Mud Engineer(s)

1. Submit credentials of slurry trench specialist(s) and mud engineer(s) for approval.

SUBSECTION 606.4.1.2 Cutoff Wall Excavation Plan:

Submit a cutoff wall excavation plan for approval. Include the following:

- A) Details of the anticipated sequence for cutoff wall excavation. Include discussions of coordination with other required activities such as site clearing and grubbing, work pad construction and soil-cement embankment construction, and other critical required activities.
- B) Provide plan and profile drawings detailing each panel (anticipated lengths, widths, depths) and number each and every panel.
- C) Details of proposed primary excavation procedures. Include discussion on type of trench-support fluid (bentonite slurry); specific details of primary equipment and/or procedures to excavate cemented alluvium

if encountered and coordination with chiseling, blasting, and/or pre-drilling/boring activities, if proposed; and procedures for verifying panel continuity at the final depths.

- D) Complete descriptions, numbers (quantity), and schedules of primary excavation equipment, including expected excavation rates.
- E) Details of contingency plans to excavate cemented alluvium should primary excavation plans (equipment and procedures) prove not to be effective. Provide complete descriptions, numbers, and availability (to Contractor) of "secondary" excavation equipment.
- F) Details of any anticipated pre-excavation or other temporary construction required along wall alignments to facilitate vertical trench excavation and/or maintain slurry levels within required tolerances provided in this section.
- G) Provide details for joint contact and methods of verification to ensure a minimum 24-inch, continuous watertight connection between panels.

SUBSECTION 606.4.1.3 Slurry Plan:

Submit a slurry plan, for approval, that details methods which will maintain the slurry properties under any foreseeable conditions. Include the following:

- A) List of equipment necessary to the slurry operation, their capacities and production rates, which equipment will be considered backup.
- B) Proposed location(s) of all machinery, slurry pond(s) or tank(s), stockpiles, test trailers and slurry lines.
- C) Manufacturer's certification (dated after award of this contract) of bentonite to be used at the site and details on availability of the selected bentonite powder. Certification must state following:
 - 1. Contractor's name and address.
 - 2. Name of project and location.
 - 3. List the specific requirements being certified.
- D) Proposed slurry mix design; include the concentrations/percentages of the constituents and plans for additives/control agents if any.
- E) Reports of Contractor's water quality tests.
- F) Discussions on the suitability/compatibility of reservoir water, groundwater, and foundation soil constituents at the site as it relates to the Contractor's slurry mix designs and specification requirements for both freshly mixed slurry and slurry in the trench. Include discussion on any anticipated need for additives or control agents, as result of water quality tests or soil constituents, to achieve the requirements.
- G) Discussion slurry mixing, hydration, recirculation, and desanding methods, procedures, and equipment.
- H) Details on Contractor's quality assurance/quality control of slurry.
- I) Details of continuous (24-hours each day, 7 days per week, weekends and holidays) monitoring system for slurry level in the trench(es).
- J) Details of slurry disposal plans and prevention of water pollution in accordance with the Supplementary General Conditions and Special Provisions.

SUBSECTION 606.4.1.4 Slurry Loss Response Plan:

Submit a slurry loss response plan which recognizes the risk of slurry loss in pervious geologic units or the caving of the wall excavations. Address in the response plan the following requirements:

- A) Have at all times a quantity of slurry, equal to twice the volume of slurry being used in the largest panel(s), available for immediate use to maintain trench wall stability until such time as the slurry loss response procedures have become fully effective. The available slurry may be composed of waste or dirty slurry and used in an emergency after all the clean slurry in reserve has been transferred to the draining panel. The waste or dirty slurry available for an emergency slurry loss not to be more than 1/3 of the total available for emergencies. Do not use the available slurry from any other panel which is under excavation or which is being filled with backfill. Provide sufficient pumping capacity to pump this entire amount of slurry to the excavation within 30 minutes. Provide the pumping capable of being started immediately. It is the responsibility of the Contractor to initiate steps to slow or stop all slurry losses and to notify the Owner when a response has been initiated.
- B) Have a minimum of 100 cubic yards of sand and gravel material within a ¼ mile haul distance of the point(s) of excavation and the equipment to deliver these materials to any trench(es) under excavation. Introduce these materials into the trench to slow or stop a slurry loss.
- C) The capability of rapidly thickening or solidifying by chemical additives, cement or other approved methods, the slurry, and if necessary completely backfilling the trench with additional sand and gravel. The method should also provide for rapidly injecting the thickening or solidifying agent to the bottom of the trench. If cement is used in the trench as a thickening agent, the Contractor will be required to replace all the slurry with fresh slurry prior to continuing the excavation.

SUBSECTION 606.4.1.5 Trench Quality Control Plan:

Submit a trench quality control plan for approval. Include the following:

- A) Procedures and equipment for sounding of trench bottom and surface of backfill in trench, as required. Provide descriptions/drawings of sounding tools to be used.
- B) Procedures and equipment for cleaning trench bottom, hardened S-C-B backfill surfaces or "cold" joints, as required, and vertical joints prior to backfill placement.
- C) Procedures and equipment for verifying continuity of panels at depth prior to backfill placement.
- D) Procedures and equipment for establishing a vertical profile of all sides of the trench prior to commencement of backfill operations. Include methods for verifying that vertical profile of all excavated panels meet the requirements of this section.

SUBSECTION 606.4.1.6 Soil-Cement-Bentonite Backfill Plan:

Submit, for approval, S-C-B backfill plan, including:

- A) Sources of processed soil and gradations. If produced utilizing on-site sources, include borrow areas to be used; quantities and descriptions of materials anticipated from each area; methods and details of all processing required or anticipated to produce the processed soil, including types of equipment; anticipated screen sizes; amount of crushing, if any; removal of oversize; washing; blending of materials; and anticipated amounts and types of waste and oversize.
- B) Specifications for mixing plant and proportioning equipment and details of mixing of hydrated bentonite slurry, cement, and processed soil to obtain homogeneous mixture meeting the requirements of this section.

- C) Details of trial proportioning, batching operations, and testing to define and adjust the strength, initial setting characteristics, and permeability of the S-C-B backfill. Include details of equipment and test procedures for permeability testing in triaxial-type permeability cell, in accordance with these specifications.
- D) Details of Contractor's quality control program including testing to be performed, testing procedures and equipment, frequency of testing.
- E) Schedule and sequence of operations including backfill preparation, placement, and details of coordination with vertical trench excavation operations.
- F) Layout of operations including but not limited to drawings depicting location(s) of mixing plant and bentonite and cement storage area(s). If plant is mobile, include discussions of movement of plant as it relates to excavation and backfill sequencing.
- G) Methods of measuring, batching and recycling all S-C-B ingredients in the mixing plant.
- H) Methods, procedures, and equipment used to transport S-C-B backfill from mixing plant to trench.
- I) Methods and procedures used to minimize segregation of backfill during handling, transporting, and placement (particularly initial tremie placement).
- J) Backfill placement methods, materials and procedures, including number of tremies, tremie spacing, anticipated placement rates, methods of raising tremies, and complete descriptions of equipment to be used.
- K) Details of coordination with geomembrane connection to top of the (S-C-B) walls.
- L) Details and procedures for protection of (upper) surface of the backfill from desiccating following completion of backfilling and prior to construction of upstream blanket, including procedures for dealing with settlement and cracking in upper backfill surface prior to "capping."

SUBSECTION 604.1.7 S-C-B Backfill Mix Design:

Submit laboratory mix designs and test results for the proposed S-C-B backfill.

SUBSECTION 606.4.1.8 Emergency Backfilling Plan:

Submit emergency backfilling plan, for approval, for precluding trench instability and potential embankment failure due to rising reservoir water surfaces during storm or flood events. Include the following:

- A) Equipment and labor capability of Contractor to continuously backfill open excavations.
- B) Coordination with excavation plan including discussions on considerations given to setting panel lengths.
- C) Materials and sources/locations of materials to be used.
- D) Backfill procedures and details of disposal of slurry displaced as result of emergency backfilling.
- E) Re-excavation procedures (following retreat of reservoir waters).

SUBSECTION 606.4.1.9 Excavated Material Disposal Plan:

Submit an excavated material disposal plan, for approval, which details the disposal of the excavated material from the slurry trench. Include the following:

- A) Descriptions of hauling equipment.

- B) Quantities and expected composition.
- C) Details for the prevention of slurry contamination of the surrounding environment.
- D) Locations, slopes, depths, the construction of drainage or containment berms, compaction guidelines, and capping of material at final destination.

SUBSECTION 606.4.1.10 Certification:

- A) Submit a certificate of compliance and a copy of the test reports from the bentonite manufacturer for each lot of bentonite shipped to the site stating that the bentonite complies with all applicable standards and with the specifications.
- B) Submit manufacturer's certification (dated after the award of this contract) that the cement (and pozzolan, if applicable) to be used at the site was tested during production in accordance with Section 725, together with a report of the test results, and details of the availability of the selected materials. Certifications and test reports shall be submitted for each lot of cement (and pozzolan) from which the shipments are drawn and shall be submitted to the Owner.
- C) Certifications must state the following:
 - 1. Contractor's name and address.
 - 2. Name of project and location.
 - 3. List the specific requirements being certified.

SUBSECTION 606.4.1.11 Sampling:

Written notification to the Owner ten days prior to the commencement of production of any processed soil for S-C-B backfill, as to location and time of production, so arrangements can be made for sampling and testing of the material produced for compliance to the gradation requirement of this section.

SUBSECTION 606.4.1.12 Reports and Drawings:

Submit the following reports:

- A) Daily Report: Submit two copies of a daily (24 hour) report, by 10 a.m. of the day following the reported construction, to the onsite Owner's representative. Include the following items:
 - 1. Results of construction control testing required in these specifications. The Contractor shall furnish records of all observations, measurements, and tests performed, identified with the location and time of testing. These records shall be furnished no later than 48 hours after the tests, measurements, and/or observations were made, or as otherwise directed by the Owner.
 - 2. Listing of equipment (hours operated per shift). Include equipment breakdowns (down time) that exceed 10 minutes.
 - 3. Depth soundings performed on excavation and backfill surfaces, include both time, station, and panel number.
 - 4. Area of excavation completed (in square feet and station to station) per working shift and daily total.
 - 5. Materials encountered during trench excavation.

6. Specific details of unusual conditions and/or problems encountered (and dispositions or solutions, if applicable). Include time, station, panel number, and depths, where applicable.
 7. Volume of backfill placed in trench (in cubic yards and station to station) per working shift and daily total.
 8. All other items required in these specifications or requested by the Owner.
- B) Weekly Report: Submit two copies of a weekly report, by 10 a.m. Monday of the following week, to the onsite Owner's representative. Include the following:
1. Updated plan and profile drawings of the cutoff and tie-in walls to the Owner's representative each week, showing completed panels and as-built dimensions along with any proposed changes from original submittal in panel lengths, depths, and/or widths in response to drilling and sampling data or efficiency of Contractor's excavation and backfill operations. Show points of depth measurement.
 2. Items (excavation and backfill) completed for week reported and to-date for total wall, by stations, area (in square feet), and volume (in cubic yards).
 3. Summary of industrial excavation rates for each piece of excavation equipment and for each shift during the time period covered by the report, in square feet per shift.
 4. All test data for the week reported.
 5. All other items required by these specifications and/or requested by the Owner.
- C) Final Report: Submit final report following completion of cutoff and tie-in wall construction. Include the following:
1. A marked copy of the final (as-built) plan and profile of the walls identifying the individual panels and measured depth points.
 2. Total area of trench completed.
 3. Total volume of backfill utilized.
 4. Average industrial excavation rate for each piece of excavation equipment, in square feet per shift.
 5. Summary tables of test data.
 6. Problems encountered.
 7. Dates of wall construction.
 8. Detailed narrative description of wall construction.

SUBSECTION 606.4.2 Preparation:

Strip existing ground surface beneath permanent construction for cutoff wall in accordance with these Special Provisions.

Following stripping, construct workpads along cutoff wall alignment against upstream face of dam embankment in accordance with these Special Provisions and as shown on the Plans.

SUBSECTION 606.4.3 Sequencing and Scheduling:

Perform excavation of the cutoff walls in accordance with the approved wall excavation plan.

Sequence placements of S-C-B backfill in accordance with approved trench backfill plan.

After completion of a slurry trench panel excavation, begin backfill placement in that trench within a 24-hour time period. Complete the operations which measure verticality, remove sand or cuttings from the bottom of the trench, and bring slurry into quality control compliance before backfill placement may begin.

Continuously batch and place S-C-B backfill until backfill completely fills the trench panel, from bottom to top of the full length of the panel.

Construct the walls in a manner which minimizes interference with completion of other parts of the work. Minimize interference with haul roads, existing service roads, removal of water from the foundation, and other construction activities.

SUBSECTION 606.4.4 Guide Walls:

Construct reinforced concrete guide walls following preparation in accordance with Subsection 606.4.2 above, but prior to excavating any portion of the vertical-walled trenches for cutoff wall or tie-in walls.

Construct the guide walls of sufficient width, depth, and strength to ensure proper trench and excavation equipment alignment while maintaining surface trench wall stability. Construct each guide wall having a minimum width of 1 foot and a minimum depth of 3 feet. Construct the top of the guide walls to lengths and elevations in accordance with approved wall excavation plan. Construct the guide walls exhibiting less than a 0.1 percent deviation from vertical on the inside facing walls. Reinforcement shall be sufficient to provide support for construction equipment and installation procedures.

Concrete for guide walls shall be in accordance with Section 725, Portland Cement Concrete Materials. Remove all loose, soft or unsuitable material from guide wall trenches prior to concrete placement.

Depending on their condition, guide walls may be left in the dam embankment (beneath slope protection) and in work pads (beneath the upstream blanket) after completion of the wall, with the approval of the Owner.

The Contractor shall provide, install, and maintain all layout and necessary survey marks to locate the cutoff and tie-in walls within the tolerances provided in these Special Provisions. "Permanent" survey control points shall be provided at the ends of the walls and at one-hundred (100)-foot maximum intervals along the guide walls between the ends. These control points shall be surveyed to establish initial elevation and final elevation to an accuracy of ± 0.1 -foot and these control points shall be maintained and protected from damage throughout the work. In addition, the Contractor shall incorporate these points into a system for accurately locating stations along the wall alignments and relating them to the plans.

SUBSECTION 606.4.5 Trench Excavation and Requirements:

Locate the trench along the alignment shown on the drawings or in accordance with the approved excavation plan.

Excavate the vertical trenches for cutoff walls using the slurry trench method of excavation to the dimensions and verticality tolerances in accordance with the requirements of this section.

Excavate the trench with vertical walls to a width not less than 36 inches at any depth or at any wall station. Excavate the trench from top of existing ground (following stripping and surface preparation) or from top of workpads depending on location along the cutoff wall alignments. Excavate to the depth specified on the Plans or as directed by the Owner.

Support trench with bentonite slurry as specified in this section during excavation. Introduce slurry into the trench at the beginning of excavation and maintain until backfilling operations are completed.

In the event that trench excavation is halted, for any period of time, maintain slurry quality and adequate slurry levels in the trench to maintain trench stability, in accordance with these Special Provisions.

SUBSECTION 606.4.5.1 Wall Excavation:

The trench centerline shown on the Plans for the cutoff wall represents the actual location of the trench with respect to the newly constructed soil cement embankment. Any changes in the cutoff wall alignment must be approved by the Owner prior to construction.

Construct cutoff wall walls consisting of interconnected vertical-walled panels. Perform slurry trench excavation continuously until the trench panel is completed to the designated depths along the trench centerline from the starting to the finishing point.

Sequence excavation for trench panels in accordance with approved wall excavation plan.

The cutoff wall panel lengths used by the Contractor should be determined based on the Contractor's capability to continuously batch and place a sufficient quantity of backfill to completely fill the excavated panel from bottom to top for the full length) either within a 10-hour working shift or in accordance with approved S-C-B backfill plan, but before initial setting of the backfill has occurred. Additional consideration should be given when determining cutoff wall panel lengths for the possibility of having to rapidly backfill open trenches under emergency backfilling situations as discussed in Subsection 606.4.5-A.

Do not place soil-cement-bentonite backfill in the slurry trench until the final acceptable depth has been achieved, the trench has been cleaned and sounded, and the trench has been approved for backfilling by the Contracting Officer. Backfill trench in accordance with these Specifications.

Approval of trench (for backfilling) by Contracting Officer, involves the following:

- A) Sounding of trench to verify that specified final depth has been achieved and that sediment and debris have been removed by cleaning operations.
- B) Trench bottom and hardened panel joints have been adequately cleaned and prepared.
- C) Visual observations of samples extracted on 25 foot maximum spacings from trench bottom confirm that the trench is keyed into bedrock.
- D) Panel continuity at final depth has been verified.
- E) Minimum joint overlap of 24 inches has been achieved for the entire depth of the panel.

Before of adjacent trench panels will be allowed, the backfill in the trench will have been allowed to set undisturbed for a minimum of 3 days following the completion of the placement, and testing of the backfill from each panel shall have demonstrated that the backfill has achieved a compressive strength of not less than 50 pounds per square inch.

Sequence excavation and backfilling operations in order to minimize the time any portion of the trench is left open (supported only by slurry).

SUBSECTION 606.4.5.2 Verticality:

The deviation of the trench excavation from vertical not to exceed 1 percent drift to depth in either an upstream or downstream direction over the entire depth of the panel. The deviation of the wall excavation allowed from vertical in the plane of the wall must be such that the joint contact requirement stated in this section is achieved.

The method of measuring verticality shall be by Kodex sonic imaging, continuous inclinometer measurement on excavation equipment, by reverse pendulum sounding, or by other methods in accordance with approved quality control plan.

SUBSECTION 606.4.5.3 Excavation Soundings:

Sound trench a maximum spacing of every 10 feet along alignment to measure final depth and formation penetration of the trench in the presence of the Owner. Sound trench immediately following cleaning of trench bottom and prior to placement of S-C-B backfill or solidification of cement-bentonite, where applicable. Perform sounding of trench using two separate sounding tools at each location, one with an end area of 1 square inch, weighing at least 7 pounds, and the other with an end area of 20 square inches, also weighing at least 7 pounds. The sounding tools shall be a type approved by the Owner. The difference in depth measurements between sounding tools indicates accumulated debris or sediment. If difference in depth measurements occurs, re-clean trench bottom and re-sound.

SUBSECTION 606.4.5.4 Panel and Joint Continuity:

Construct joints in manner that maintains the minimum required continuity or overlap between panels perpendicular to the joint throughout its entire depth.

The joint shall be capable of being a watertight joint to prevent groundwater from passing through. Create joint between adjacent panels using stop-end pipes, hydromill excavation, or other approved methods in accordance with approved wall excavation plan.

At any depth along a panel joint, provide minimum width of joint contact between adjacent panels of 36 inches. The quality of the trench and continuity of the joints shall be verified prior to backfilling of secondary panels as provided in Subsection 606.4.8 and in accordance with approved quality control plan.

Clean joint thoroughly using excavation equipment cutter teeth, a scratcher, or other type of approved joint cleaner to remove any contaminated slurry, and/or loose, cracked or contaminated S-C-B backfill from previous hardened backfill at the joint prior to subsequent backfill placement. All cleaning equipment shall be operated in a manner as to prevent removal of materials from and damage to the filter cake on the walls of the trench.

SUBSECTION 606.4.6 Trench Stability:

Maintain the stability of the excavated trench at all times for the entire length and depth of trench. Maintain slurry densities, filtrate properties and levels within specified limits and controlling equipment surcharges, live-load surcharge passage of equipment, surcharge from working platform construction, stockpile surcharges, and any other loading conditions that may affect trench stability. Conduct all construction activities to minimize caving, sliding, or sloughing of the trench walls. Ensure that any stockpile surcharges do not affect trench stability.

Do not permit the level of the bentonite slurry to drop more than 2 feet below the top of the trench.

Provide a full-time attendant during periods of shutdown, weekends and holidays, to monitor the levels of bentonite slurry in the excavated trench(es). Provide individual having the knowledge and ability to maintain the levels of slurry in the trench(es).

Immediately notify the Owner in the event of a slurry loss, however minor, and be prepared to initiate slurry loss response measures. Implement slurry loss response measures in accordance with approved slurry loss response plan. Prevent contamination of any watercourse in accordance with the Supplementary General Conditions and Special Provisions.

If all response to a uncontrolled slurry loss fail, a meeting of all interested parties shall be promptly convened to discuss possible methods to contain the slurry loss.

Dilution of slurry by surface waters shall be prevented. The quality of the slurry shall be maintained at all times.

SUBSECTION 606.4.6.1 Emergency Backfilling:

In the event of rising reservoir water surfaces during storm or flood events, the Contractor shall be prepared to implement emergency backfilling procedures. When the water surface reaches an elevation 2 feet below the top of any open trench (excavation supported only by bentonite slurry) and the reservoir water is rising, the Owner reserves the right to direct the Contractor to implement emergency backfilling procedures in accordance with approved emergency backfilling plan. If so directed by the Owner, the Contractor shall continuously backfill those portions of the open trench affected by the rising water surface until the trench is completely filled in accordance with approved emergency backfilling plan. Such actions will preclude the following of the trench, dilution of the slurry, and subsequent (potential) trench instability and embankment failure.

Following retreat of the reservoir waters, re-excavate the trench in accordance with this section and approved emergency backfilling plan.

SUBSECTION 606.4.7 Trench Failure:

In the event of excessive movement of trench wall or complete failure of the trench, immediately stop all construction activities in the vicinity of the movement/failure and notify the Owner. Re-survey guide walls and measurement points on upstream edge of existing dam crest for a minimum of 200 feet to either side of movement/failure. Such surveys as well as visual observations of the dam embankment will be used by the Owner to determine whether the integrity of the existing embankment was compromised by such movement/failure.

If the dam embankment was involved in the trench failure as determined by the Owner, details of the required repairs to be performed by the Contractor will be provided at that time by the Owner.

In the event of failure of the trench walls (not involving dam embankment) prior to completion of backfilling, backfill and re-excavate the trench in accordance with this section. Take corrective action to prevent further trench failures.

Re-excavation, cleanup, restoration, and repair of any damage due to any trench failures as result of Contractor actions (or inaction, as the case may be) shall be performed by the Contractor at no cost to the Owner.

SUBSECTION 606.4.8 Cleaning Trench:

Upon completion of excavation, completely remove any loose material or cuttings from the bottom of the trench with the excavation tools or other suitable means such as air lifts. All cleaning equipment shall be operated in a manner as to prevent removal of materials from and damage to the filter cake on the walls of the trench.

If the density of the slurry in the trench exceeds the specified limits or becomes unworkable, remove the heavy slurry from the trench by airlift pump, clamshell, reverse circulation pump, or other methods approved by the Owner or remove the excess solids from the slurry by screening or centrifugal-type desander.

Clean the trench bottom not more than 1 hour prior to placement of S-C-B backfill in that portion of the trench bottom. If placement is delayed such that more than 1 hour has passed since the trench was cleaned, re-sound trench bottom in accordance with Subsection 606.4.4-C and clean trench bottom as required. Continue soundings as required until backfill placement in the panel has begun.

SUBSECTION 606.4.9 Trench Quality:

Monitor the trench in accordance with the approved trench quality plan.

Monitor all of the excavated panels for verticality. Provide to the Owner all verticality-monitoring data in the form of centerline profiles at the trench ends from the top to the bottom of each trench.

Make measurements at a minimum vertical distance between horizontal readings of at least 20 feet if a mechanical method is employed, and at minimum 10 feet of vertical distance if an electronic or sonic-logging device is used.

Additional verticality profiles may be required of the Contractor in the event of a vertical deviation greater than 1 percent of trench depth.

If the trench quality is unacceptable, the Contractor shall be responsible for providing a satisfactory solution. An unacceptable trench is defined as an excavation which does not meet the requirements specified in this section, or which would not provide for at least a 36-inch joint contact between panels after backfill placement, or a trench where the slurry continues to settle or where the slurry subsides during the backfill placement. The last two items would indicate a slurry or backfill loss which would necessitate a break in the backfill placement operation or would indicate a trench which may inhibit the continuous placing of backfill.

SUBSECTION 606.4.10 Excavated Materials Disposal:

Disposed of excavated materials in accordance with approved excavated material disposal plan.

Prevent excess slurry, which may drain from the haul trucks, from spilling in areas outside the planned disposal areas or the working platform. Dispose of any material which does spill or leak by and at the Contractor's expense.

Under no circumstances will the Contractor be allowed to stockpile material, obtained in wall excavation, on either the workpads or within 30 feet of an open trench. At all times, when an excavating machine is operating, provide suitable equipment present on the work platform in a position to receive and remove the excavated material for disposal.

SUBSECTION 606.4.11 S-C-B Backfill:

Batching and placement of S-C-B backfill should be similar to that of plastic concrete, along with similar construction problems.

It is important that the S-C-B backfill have high workability and fluidity so that fresh S-C-B backfill fed through tremie pipes will readily flow into S-C-B already placed and force the previous placed S-C-B upward. The S-C-B backfill specified gradation and consistency (slump) are such that the mixture should be workable yet not subject to segregation. Fluidity and workability can be enhanced by use of rounded backfill particles larger than the U.S. Standard No. 4 sieve.

As with any concrete batching operation, uniformity in the grading of the processed soil along with uniform (and stable) moisture conditions in the processed soil are key to adequately controlling consistency at the plant.

SUBSECTION 606.5 INSPECTION AND TESTING:

SUBSECTION 606.5.1 Bentonite Slurry:

SUBSECTION 606.5.1.1 Bentonite Powder:

Sample and test the bentonite powder to determine its compliance with API specification 13A, sections 4 and 7.

SUBSECTION 606.5.1.2 Slurry Testing:

Provide a suitable slurry sampling instrument which allows sampling of the slurry at any depth in the trench.

Sample and test slurry for excavation, during trenching, and prior to trench backfilling as follows:

SUBSECTION 606.5.1.3 Slurry for Excavation:

Sample and test slurry introduced to trench a minimum of once per working shift to determine compliance with property values provided in Subsection 606.2.1-B.

Sample and test the slurry planned for use in the trench excavation immediately after mixing and prior to introduction into the excavated trench, or prior to transferring slurry from one panel to another panel.

SUBSECTION 606.5.1.4 Bentonite Slurry During Trench Excavation:

Sample and test slurry in the trench to determine its compliance with requirements of Subsection 606.2.1-C. Test slurry from the trench excavation for all properties listed in Subsection 606.2.1-C, except gel strength. Sample and test bentonite slurry from each trench under excavation as follows:

- A) At a minimum of two times per calendar day and at least 8 hours between tests while trench is open and supported by slurry.
- B) At least once per working shift.

SUBSECTION 606.5.1.5 Bentonite Slurry Just Prior to Backfill Placement:

Sample and test slurry a maximum of 1 hour prior to placement to determine its compliance with requirements of Subsection 606.2.1-D.

SUBSECTION 606.5.2 Test Results:

Keep records of the test results and submit a report of results of tests for slurry to be used under this contract. Certify that testing procedures conform with the requirements of these specifications. No bentonite shall be used until notice of acceptance from the Owner. Promptly remove bentonite in powder or slurry form not meeting specifications requirements from the site of work.

SUBSECTION 606.5.3 QA Testing:

Make testing equipment and facilities available for Owner use for quality assurance testing.

SUBSECTION 606.5.4 Soil-Cement-Bentonite Mix:

S-C-B backfill mix quantities, proportions of all additives utilized, and placement locations into the wall shall be recorded by the Contractor. Any adjustments in the mix shall also be recorded and reported as part of the required daily report in accordance with Subsection 606.4.1.12-A.

SUBSECTION 606.6 QUALITY CONTROL:

The Contractor shall establish and maintain quality control for the work specified in this section to ensure compliance with contract requirements. The Contractor shall be responsible for project quality control records. Observations, measurements, and tests described in these specifications shall be performed for quality control. All quality control records, testing procedures, observation data, and measurements shall be submitted to the Contracting Officer.

SUBSECTION 606.6.1 S-C-B Backfill Trial Design Mix and Testing:

Prior to installation of the backfill, the Contractor shall prepare and test trial mixes of proposed backfill. The testing shall demonstrate the adequacy of the proposed backfill mix design prior to proceeding with installation of the cutoff or tie-in walls.

The trial mixes shall be fabricated in accordance with these specifications. The materials used to fabricate the test specimens shall be those proposed for use in construction including processed soil (from either commercial or on-site sources), bentonite, cement, pozzolan, water, admixtures, and other materials, if any. Trial mixes should be made using soils which will represent the range of materials expected to be encountered or used along the entire extent of the project. The performance criteria shall include hydraulic conductivity (permeability) and compressive strength in accordance with the parameters and methods described in this section.

The intent of the backfill trial mix testing is to evaluate the suitability of the proposed materials, evaluate the overall effectiveness of the S-C-B backfill, and to establish an initial design mix prior to installation.

The Contractor's test results, including moisture content; density; mix proportions; gradation; 3, 7, 14, and 28-day permeability; 7, 14, and 28-day compressive strength; proposed initial backfill design mix; and a discussion of the testing program demonstrating the suitability of the backfill mix proposed for initial use in installation of the wall shall be submitted to the Contracting Officer prior to the start of the cutoff or tie-in wall installation.

Then from the mix design submitted, the Contractor shall make 6-inch diameter by twelve-inch long test cylinders and submit results of density and compressive strength tests from their cylinders of 7, 14, and 28 day breaks. Upon fabrication, a minimum of eight (8) duplicate samples of the proposed initial mix design shall be furnished to the Contracting Officer.

Additional information that the Contractor shall submit shall include the date of the mix, the place and time of collection of samples of all ingredients used in the mix, and the breakdown in proportions of all ingredients used in the mix. The Contractor shall also submit any additional proposed modifications to the laboratory mix to make to improve workability and facilitate construction. The Contracting Officer may direct that additional laboratory mix design testing be performed to evaluate the effect of the proposed modifications.

SUBSECTION 606.6.2 Wall Measurements:

The Contractor shall make width measurements of the cutoff walls every 10 feet along the respective wall centerlines using devices approved by the Contracting Officer. The width of the wall shall be measured throughout the entire depth of wall (top to bottom). The length of wall installed each day or lesser increment thereof shall be measured. Based upon these measurements, the volume of backfill shall be computed. This computed volume shall be adjusted as needed, for pre-trenches, berms, spoil build-up on working surface and the slurry disposed of as spoil. The spoil build-up on working surface and the slurry disposed of as spoil. The adjusted volume of backfill shall be compared to the volume of backfill materials delivered to the wall. These measurements, along with trench and backfill soundings shall be used to chart backfill placement operations as required in subparagraph 2.4.6.2 below.

Coordinate the location of wall measurements with the required excavation soundings specified in Subsection 606.4.5.3.

SUBSECTION 606.6.3 Backfill Sampling and Measurement:

The quantity and source of each ingredient used at the slurry plant, backfill mixing plant, and in the backfill shall be recorded each day or lesser increment thereof. During the mixing, batching and placement operations, the following properties shall be recorded at the minimum: viscosity; slurry density; number of batches mixed; and volume pumped. When flow meters are used to control mixtures, the quantity used for each mixing sequence shall be recorded.

SUBSECTION 606.6.3.1 Bentonite, Water, and Wash Water:

Quality control of bentonite, water, and wash water shall be in accordance with Subsections 606.7.1, 606.7.2 and 606.7.3, respectively.

SUBSECTION 606.6.3.2 Bulk Sampling:

S-C-B backfill shall be (bulk) sampled a minimum of once every 200 cubic yards placed and at least twice per shift of work during which backfill is batched and placed. The backfill shall be sampled as it is being placed into the trench, at locations and in a manner approved by the Contracting Officer. The samples shall be cured and used for unit weight determination and compressive strength testing. At the time the samples are being obtained, the Contractor will also record the temperature of the backfill and perform slump tests in accordance with ASTM C 143.

Plastic molds shall be used to cast a minimum of six-inch (6) diameter by twelve-inch long cylindrical test specimens from each bulk sample. The wet samples shall be poured into the molds and rodded or vibrated to remove

trapped air pockets and then sealed. The specimens shall be stored in a constant temperature between 65 degrees and 80 degrees F, damp environment until tested or until otherwise directed by the Contracting Officer.

The Contractor shall submit 3 backfill specimens (appropriately labeled) from each bulk sample to the Contracting Officer. The remaining three specimens from each bulk sample shall be transported to an independent laboratory for testing.

SUBSECTION 606.6.4 Backfill Testing:

SUBSECTION 606.6.4.1 Compressive Strength Testing:

Three sample test specimens from each bulk sample, one after curing for seven (7) days, and one after curing for at least fourteen (14) days and one after curing for twenty-eight (28) days as directed by the Contracting Officer shall be subjected to an unconfined compressive strength test in accordance with ASTM D 4832.

Additional testing may be required, as directed by the Contracting Officer. The need for such additional testing will be determined based, at least in part, on the results of the bulk sample testing.

SUBSECTION 606.6.4.2 Permeability Testing:

Permeability testing may be required as directed by the Contracting Officer.

The permeability test parameters are as follows:

- A) Average Effective Confining Stress: 50 psi
- B) Hydraulic Gradient: 20
- C) Permeate: local water
- D) Backpressure: sufficient to ensure a Skempton's pore pressure "B" parameter greater than or equal to 0.95.

The permeability tests shall be continued until inflow-outflow measurements or flat-rates demonstrate that steady state seepage conditions are evident.

SUBSECTION 606.6.5 Records:

Records shall be maintained by the Contractor for all testing, measurements, and inspections performed to ascertain that the wall construction meets the specifications. Required reports, records, and documentation shall be furnished to the Owner as provided in Subsection 606.4.1.12. The Contractor's required records for S-C-B backfill are outlined below.

SUBSECTION 606.6.5.1 As-Built Plan and Profile:

An updated (as-built) plan and profile of the cutoff wall and tie-in walls shall be continuously maintained by the Contractor and submitted as part of the required weekly report in accordance with Subsection 606.4.1.12-A.

SUBSECTION 606.6.5.2 Backfill Placement Chart:

For each panel placement operation, fill out a plot or chart during placement operation to monitor the volume of backfill introduced to the trench compared as determined by sounding. On the plot shall be a line showing estimated volume of backfill vs. depth of backfill based on a neatline volume using the average depth, length, and thickness of the trench. The Contractor will then plot a line portraying the actual volume of the trench vs. depth, based on the trench profile determined at the end of trench excavation by depth soundings and wall measurements. During placement, points shall be plotted indicating the actual volume of backfill introduced by tremie pipe into the trench versus the depth of the fill. This plot shall be administered, input, and stored in a personal computer which has the

capability of plotting in real-time. A copy of the plot representing the completed panel shall be submitted as part of the required daily report in accordance with Subsection 606.4.1.12.

SUBSECTION 606.6.5.3 Results:

The results of all Contractor construction quality control testing required in these specifications, including water quality tests, slurry tests, wall backfill tests, and wall width, depth and length measurements shall be submitted as part of the required daily report in accordance with Subsection 606.4.1.12-A. The Contractor shall furnish records of all observations, measurements, and tests performed, identified with the location and time of testing. Measurements and/or observations shall be furnished within 24 hours of being recorded. Records of test results shall be furnished no later than 48 hours after the tests were made, or as otherwise directed by the Owner. The Contractor's independent laboratory shall have multiple triaxial type permeability cells sufficient in number to keep current with the rate of sampling.

SUBSECTION 606.6.5.4 Soil-Cement-Bentonite Mix:

S-C-B backfill mix quantities, proportions of all additives utilized, and placement locations into the wall shall be recorded by the Contractor. Any adjustments in the mix shall also be recorded and reported as part of the required daily report in accordance with Subsection 606.4.1.12-A.

SUBSECTION 606.6.5.5 Daily Construction Log:

The Contractor shall maintain a construction log of daily activities which shall include delays encountered during construction, causes of delays, locations of affected areas, extent of delays, and corrective actions taken, if any. The log shall also record unusual conditions or problems encountered, and the dispositions made. The details of the daily activities shall be submitted as part of the required daily report in accordance with Subsection 606.4.1.12-A.

SUBSECTION 606.6.7 Other Testing:

Gradation analyses of processed soil prior to mixing with cement and bentonite slurry will be determined by the Owner's representative in accordance with ASTM C 117 and ASTM C 136.

SUBSECTION 606.7 QUALITY ASSURANCE:

The Owner's representative will perform quality assurance testing on the bentonite slurry and S-C-B backfill. This materials testing will in no way relieve the Contractor of the responsibility of performing tests necessary to meet the construction requirements. All routine testing procedures being conducted by the Contractor shall be available for inspection by the Owner at any time.

SUBSECTION 606.7.1 Bentonite:

Each truckload of bentonite delivered to the site shall be sampled in accordance with Section 8 of API Spec 13A. The samples shall be tested in accordance with the procedures of Section 3 of API Spec 13A.

SUBSECTION 606.7.2 Water:

Prior to the start of construction, the source of water to be mixed with the bentonite shall be tested for pH, hardness, sulfates, and oil, organic, etc. Subsequent to the start of construction testing shall be conducted once a month. Tests shall conform with the requirements of API Code RF 13B.

SUBSECTION 606.7.3 Wash Water:

Any wash water pumped from the slurry plant to the cutoff wall shall be monitored. The wash water shall be properly disposed of. The wash water shall not be allowed to dilute the backfill, nor shall it be allowed to spill off the working surfaces and run into the reservoir waters.

SUBSECTION 606.7.4 Contractor:

The Contractor shall have satisfactory experience and competence in slurry wall construction in for dams. The Contractor shall have sufficient competent personnel to carry out the operations specified and such personnel shall have experience in this type of construction.

SUBSECTION 606.7.5 Mud Engineer:

Provide approved mud engineer(s) to direct and supervise the preparation and maintenance of the slurry and ensure slurry quality by control of the composition, density, mixing, placing, drainage, testing, and all other aspects of slurry supply. The mud engineer shall be physically on-site at all times during slurry trench construction.

SUBSECTION 606.7.6 Slurry Trench Specialist:

Provide approved, full-time, on-site slurry trench specialist(s) to direct and supervise all aspects of the slurry trench construction including excavation; alignment of trench excavation; penetration into formation; verticality; cleaning; sampling; backfill selection, mixing, and placement; testing; and all other required operations. The slurry trench specialist shall be physically on-site at all times during slurry trench construction. The specialist shall also be responsible for providing up to date slurry trench information and reports to the Owner.

SUBSECTION 606.8 QUALITY VERIFICATION:

SUBSECTION 606.8.1 Panel Quality Verification:

Provide verification of the following panel quality categories:

- A) The final dimensions of a wall panel are at least 2.5 feet in wall thickness, and have been keyed into bedrock to the specified depths.
- B) The verticality, measured at the centerline, is as specified in Subsection 606.4.5.2.
- C) The joint contact between panels is continuous and not less than 36 inches.
- D) The backfill properties are as specified in this section and the backfill placement has resulted in a homogeneous, impervious panel, devoid of inclusions of trapped slurry, pervious seams, and other similar defects which would "impede or negate the designed intent" of the wall.

SUBSECTION 606.8.2 Substandard Panel:

Any panel which does not meet the quality assurance criteria set forth in these specifications shall be considered "substandard" and shall be subject to excavation and replacement at the discretion of the Contracting Officer. The following additional criteria shall be used for substandard panel determination:

- A) On the "backfill placement chart" as discussed in Subsection 606.5.2, a large change in slope of the volume introduced vs. depth as compared to the neatline volume and the actual volume from the trench profile indicates either a sidewall sloughing into and contaminating the backfill or a fracturing-type blowout causing settlement of the backfill and possibly slurry contamination. Any anomalies found in plotting the actual backfill placed in the trench will be evaluated by the Contracting Officer to determine if a problem exists and if excavation of the backfill is required.
- B) If the backfill operation is halted for a period longer than the initial setting time (see Section 730) the Contractor shall remove or excavate all of the backfill.
- C) If for any reason the level of the backfill settles more than 1 foot during placement operations or at anytime after that all of the backfill shall be immediately excavated from the trench by the Contractor.

- D) Unacceptable backfill or wall construction revealed by test pits, drilling, permeability testing and any subsequent borings and testing.

Panel quality and as-built data shall be submitted to the Owner as required in Subsection 606.4.1.12.

If, in the opinion of the Owner, data reveal unacceptable backfill, place, as soon as practical, as many borings as is necessary to delineate the area(s) in question.

All installed non-complying material shall be removed and replaced by the Contractor and at the Contractor's expense.

SUBSECTION 606.9 CLEANUP:

The Contractor shall continually clean up slurry, wastes, debris, and leftover material resulting from the S-C-B backfill construction process.

After completion of the soil-cement-bentonite wall, restore the workpads and/or working surfaces to approximate original grades in preparation of construction of upstream blanket as shown on the drawings and in accordance with Section 211.

SUBSECTION 606.10 MEASUREMENT:

This work shall be measured in square feet of complete-in-place cutoff wall between the limits shown by the specified lines, grades, and cross-sections shown on the Plans. The Contractor shall compute the area of the cutoff wall constructed based on the required trench depths multiplied by the length of the trench. Any portion of the trench erroneously excavated by the Contractor in excess of the required depth shall be excluded from the area calculations.

SUBSECTION 606.11 PAYMENT:

This work shall be paid for at the contract unit prices per square foot for cutoff wall construction as set forth in the bid schedule under Item 606-1. Such payment shall constitute full reimbursement for performing all work and for furnishing all equipment, labor, and materials necessary to complete the cutoff wall construction. Such payment shall also constitute full reimbursement for S-C-B backfill. Any waste of backfill by the Contractor doing the handling, mixing, placing, etc., operations shall be at the Contractor's expense. The cost of delineation and removal of all substandard and unacceptable materials and workmanship shall be borne by the Contractor.

The cost of the cutoff wall construction includes all costs of guidewalls, trench excavation, support, cleaning, and other items of work required by this section for the cutoff wall in the applicable unit price per square foot bid in schedules for constructing cutoff wall.

BID ITEM 606-1 CUTOFF WALL CONSTRUCTION

End of Section

SECTION 612 STEEL PIPE CONSTRUCTION

(Add this section to the MAG Uniform Standard Specifications.)

SUBSECTION 612.1 DESCRIPTION:

The construction of all steel pipes including 6-inch outlet works vent pipes and 48-inch outlet pipe elbows shall conform to applicable standard specifications and details, except as otherwise required on the plans or as modified in the special provisions.

SUBSECTION 612.2 GENERAL:

All pipe shall be delivered, handled and installed in accordance with the manufacturer's recommendations and/or applicable provisions of AWWA standards for installation of the various steel pipes specified, insofar as such recommendations and provisions are not in variance with the standard specifications and details.

SUBSECTION 612.3 MATERIALS:

All steel pipe shall be of the classes shown on the plans or as specified below.

- A) The 6-inch diameter outlet works vent pipes shall be schedule 40 carbon steel pipe.
- B) The 48-inch diameter outlet pipe elbows shall be carbon steel with a minimum standard wall thickness.

Steel pipe materials shall be in accordance with ASTM A53 Grade B pipe and with Section 759 of these Special Provisions. Where any material requirements listed in the various references are in conflict, the more stringent requirement shall be followed.

SUBSECTION 612.4 CONSTRUCTION METHODS:

Steel pipe shall be installed in accordance with the applicable provisions of AWWA standards.

Trench excavation, pipe placement and backfill operations associated with the principal spillway vent pipe shall be completed to ensure a thoroughly compacted trench to the satisfaction of the Engineer.

With the exception of the principal spillway vent pipe, all steel pipe used for this project shall be concrete encased as shown on the Plans, and therefore the Contractor shall take all necessary precautions to prevent pipe uplift or displacement during concrete placement activities.

Every precaution shall be taken to prevent foreign matter from entering the pipe while it is being placed. At all times when the pipe laying is not in progress, the open ends of the pipe shall be closed by a water tight plug or other means approved by the Engineer.

SUBSECTION 612.5 POLYETHYLENE CORROSION PROTECTION:

SUBSECTION 612.5.1 General: Where called for in the plans and specifications or directed by the Engineer, pipe, valves and fittings not encased in concrete shall be protected from corrosion by encasement in a polyethylene protective wrapping referred to hereafter as polywrap. Although not intended to be a completely air and water tight enclosure the polywrap shall provide a continuous barrier between the pipe and surrounding bedding and backfill.

SUBSECTION 612.5.2 Materials: The polywrap shall be of virgin polyethylene, net less than 8 mils in thickness, formed into tubes or sheets as may be required. Naturally pigmented material may be used where exposure to ultra violet light will be less than 48 hours. Otherwise the material shall be pigmented with 2 to 2 1/2 percent of well dispersed carbon black with stabilizers.

The polywrap shall be secured as specified below with 2 inches wide pressure sensitive plastic tape not less than 10 mils thick. Tape shall be Scotchrap No. 50, Polyken No. 900, Tapecoat CT, Johns-Manville No. V-10 Trantex, or approved equal.

SUBSECTION 612.5.3 Installation: The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections. With the pipe suspended from the center the tube shall be slipped over the end of the pipe and bunched up between the point of support and the pipe end. After the pipe is coupled to the adjacent pipe the pipe shall be lowered to the trench bottom and the supporting sling removed from the center of the pipe. The pipe shall then be raised to allow the tube to be slipped along the full length of the barrel with enough left at each end to overlap the adjoining pipe about 1 foot.

Pull the bunched-up polywrap from the preceding length of pipe, slip it over the end of the new length of pipe, and secure in place with one circumferential turn of tape plus enough overlap to assure firm adhesion. Then slip the end of the polywrap from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Tape it in place.

The loose wrapping on the barrel of the pipe shall be pulled snugly around the barrel of the pipe, and excess material folded over the top of the pipe and the folds held in place by means of short strips of adhesive tape, at about 3 foot intervals along the pipe.

Repair any rips, punctures or other damage to the tube with the adhesive tape or pieces of tube material secured with tape.

Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.

SUBSECTION 612.6 COUPLINGS, JOINTS, GASKETS AND FLANGES:

A) Joints: The joints and fitting shall conform to Sections 759.

B) Bolts and Nuts:

1. For pipe 12 inches and smaller: Bolts and nuts for use in field connections or for connecting fittings shall be carbon steel equivalent to ASTM A-307, Grade B, with cadmium plating in accordance with ASTM B-766, except that the minimum thickness of the plating shall be .00020 inches. Cadmium plated bolts shall have Class 2A threads and the nuts used with them shall have Class 2B threads. All bolt diameters shall normally be 1/8 inch smaller than the bolt hole diameter. High strength, heat treated cast iron tee-head bolts with hexagon nuts, all in accordance with the strength requirements of AWWA C-111, may be used in lieu of the cadmium plated bolts and nuts for jointing mechanical joint cast iron or ductile iron pipe and fittings only.
2. For pipe 16 inches and larger: All bolts and nuts on flanges for valves and flexible couplings shall be carbon steel equivalent to ASTM A-307, Grade B. Bolt diameters shall normally be 1/8 inch smaller than the bolt hole diameters.

These bolted joints shall be protected as follows: Following installation and before backfilling, all couplings, steel flanges, bolts, nuts, anchor bolts and rods, bolting of all flanged valves, and all exposed steel shall be protected from corrosion by either of the two methods outlined below at the Contractor's option.

- A) Below ground installations shall be coated with NO-OX-ID "A" with a film of not less than 1/32 inch thick and then coated with cement mortar not less than 1 inch thickness before backfilling. Cement mortar shall be composed of 1 part cement, ASTM C-150, Type II, low alkali, to 3 parts sand. Before application of the cement mortar coating the area to be protected shall be covered with a layer of 2 x 2 inch No. 14 gage welded wire fabric, firmly wired in place.
- B) Below ground installations shall be protected by the application of hot coal-tar enamel. The coal-tar enamel shall be in accordance with AWWA C-203 and shall be applied to the top part of the pipe or fittings

by daubers for at least 2 coats for a total minimum thickness of 1/16 inch. The coal-tar for under side of the pipe flanges or fittings shall be applied by the pan or cocoon method as described below and in AWWA Manual M-11, Steel Pipe.

Pan Method: The coating pan is securely anchored in place on the underside of the pipe and straddling the connection to be coated. The pan shall be wide enough so that the entire connection will be coated.

Hot coal-tar enamel is poured into the pan, from one side only, until the pan is completely filled. The drain plug or valve, is then opened and the excess coal-tar drained out. The pan can then be removed. Details of the coating pan and corresponding dimensions are given in AWWA Manual M-11.

The upper portion of the connection, and all remaining exposed steel pipe, will then be coated by the use of a dauber. The coal-tar coating shall be applied in at least 2 coats for a minimum thickness of 1/16 inch. The daubers and method of application conform to AWWA C-203. No thinning will be allowed.

Cocoon Method: The cocoon is formed by placing glass fiber cloth or roofing paper, of the proper width, around the underside of the connection and adjacent exposed steel pipe. The edges of the cocoon shall be securely fastened to the pipe. Backfill is lightly placed to the spring line, and the top of the cocoon is opened and laid back on the filled area and hot coal-tar enamel poured, from one side only, until the cocoon is completely filled. The loose backfill prevents rupture of the cocoon. The upper portion of the connection and remaining exposed steel pipe shall be coated as above.

- D) Gaskets: Except as otherwise provided, all gaskets for pipe lines shall be one piece full faced gaskets from one-ply cloth inserted SBR rubber material. Gaskets for flanges 20 inches and smaller shall be from 1/16 inch thick material. Gaskets for flanges 24 inches and larger shall be from 1/8 inch thick material. Gasket material shall be J-M 109 as manufactured by Johns-Manville Corporation or an approved equal. Physical characteristics of the rubber compound shall meet ASTM D-2000, Class 4AA805A13.
- E) Flanges: Cast iron flanges shall conform to AWWA C-110 as to material, diameter, thickness, drilling, etc. Steel flanges shall be ring or hub type, and shall conform to AWWA C-207, Class D. All flanges shall be drilled and have flange diameters and bolt circles conforming to AWWA C-110, except bolt holes will be 1/8 inch larger than the bolts given for the various sizes. All bolts shall be as specified above and all flanges shall have a flat facing.

SUBSECTION 612.7 MEASUREMENT:

Measurement of all pipe shall be of the linear feet of pipe installed, measured along the centerline of the pipe to the nearest 0.1 foot.

SUBSECTION 612.8 PAYMENT:

Payment will be made at the unit price bid per linear foot of each type and size of pipe called for in the proposal. Such payment shall be compensation in full for furnishing and installing the pipe and fittings, specials, adapters, etc., complete in place, as called for on the plans and/or on the standard details, and shall include all costs of excavation, removal of obstructions, shoring and bracing, bedding, backfilling, compaction, maintenance of traffic, testing, disinfecting, connections to existing lines or works, and all work not specifically covered in other pay items.

BID ITEM 612-1 6-INCH STEEL PIPE

BID ITEM 612-2 48-INCH STEEL ELBOW

End of Section

SECTION 618 OUTLET PIPE CONSTRUCTION

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 618.1 DESCRIPTION:

This section covers the construction of the outlet pipes used to convey water from the principal spillway and from the two (2) sluice gated outlets.

SUBSECTION 618.2 MATERIALS:

The reinforced concrete cylinder pipe, specials, joints, gaskets, and testing shall be according to Section 735, except as specified below or as modified by Special Provisions.

- A) Specials: Pipe specials such as closure pieces, wyes, tees, and bends shall be provided as indicated on the Plans, and such specials shall be made equal in strength, diameter, and other physical characteristics to the standard straight pipe lengths by the use of extra concrete, extra reinforcing, or steel items. Drawings of specials shall be submitted to the Engineer for approval before their fabrication.
- B) Rubber Gasket Joints: When rubber gasket pipe is used, the joint shall be sealed with a continuous ring gasket made of a special composition rubber of such size and cross section as to fill completely the recess provided for it. The gasket shall be the sole element depended upon to make the joint watertight, and shall have smooth surfaces, free from pits, blisters, porosity, and other imperfections. The rubber compound shall contain not less than 60% by volume of first grade synthetic rubber.
- C) The remainder of the compound shall consist of pulverized fillers free from rubber substitutes, reclaimed rubber and deleterious substances. The compound shall meet the following physical requirements when tested in accordance with appropriate ASTM Specifications:
 - 1. Tensile Strength of the compound shall be at least 2,100 psi ASTM D-412.
 - 2. Elongation at Rupture shall be at least 400%, ASTM D-412.
 - 3. Shore Durometer
 - 4. Cold Flow: The percentage shall not exceed 20. The determination shall be made in accordance with Method B ASTM D-395, with the following exception. The disc shall be ½ thick and the diameter shall be that of the rubber gasket. The gaskets shall not be exposed to direct sunlight for a time greater than needed to accomplish normal installation.
 - 5. Specific Gravity shall be consistent within +0.05 and shall be between 0.95 and 1.45. ASTM D-297.

SUBSECTION 618.3 CONSTRUCTION METHODS:

The soil cement outlet works foundation shall be constructed to the lines and grades as shown on the Plans. The outlet pipes concrete foundations shall be either formed or cast in place with the appropriate reinforcement and tie-down anchoring as shown on the Plans. The outlet pipes shall be joined and shimmed in accordance with manufacturer's recommended procedures for reinforced concrete cylinder pipe installation.

The laying of the pipe shall commence at the lowest point, with the spigot ends pointing in the direction of the flow. Each pipe shall be laid firmly and true to line and grade, in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden off-sets of the flowline. Any adjustment to line and grade shall be made by scraping away or filling in under the body of the pipe, never by wedging or blocking under the pipe ends.

Variation from prescribed alignment and grade shall not exceed 0.10 foot and the rate of departure from or return to established grade or alignment shall be no more than 1 inch in 10 feet of pipe line unless otherwise approved by the

Engineer. For closures and deflection angles greater than 10 degrees, joints shall be made by use of a bend, specially manufactured fitting, or by a concrete collar, per standard details.

Pipe shall be of the type, class and size shown on the Plans or in the Special Provisions.

SUBSECTION 618.4 MEASUREMENT:

Measurement for payment shall be per linear feet of pipe laid as measured along the pipe axis.

SUBSECTION 618.5 PAYMENT:

Payment shall be made on the basis of the price bid per linear foot, to the nearest foot for the size and type of pipe, and shall be compensation in full for furnishing and installing the type of pipe as specified and as shown on the Plans including removal of obstructions, excavation, installation, testing, joint materials, joining, collars, and field closures.

BID ITEM 618-1 RCCP OUTLET PIPES

End of Section

SECTION 701 ROCK, GRAVEL, AND SAND MATERIALS

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 701.1 GENERAL:

The following specifications set forth the requirements for crushed rock, gravel, sand, and quarry stone. Samplings and sieve analysis shall be performed in accordance with ASTM D-75 and ASTM C-136. Sand equivalents shall be determined in accordance with AASHTO T-176. The liquid limit and plasticity index shall be determined in accordance with AASHTO T-89 and T-90.

SUBSECTION 701.2 CRUSHED ROCK AND GRAVEL:

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.

SUBSECTION 701.2.1 Crushed Rock:

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.

SUBSECTION 701.2.2 Gravel:

Material designated herein as gravel shall be composed entirely of particles that are either fully or partially rounded and water-worn. 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.

SUBSECTION 701.3 SAND:

Sand shall be fine granular material produced by the crushing of rock or gravel or naturally produced by disintegration of rock and shall be sufficiently free of organic material, mica, loam, clay, and other deleterious substances to be thoroughly suitable for the purpose for which it is intended.

SUBSECTION 701.3.1 Sand for Portland Cement Concrete, Mortar and Plaster:

It shall be thoroughly and uniformly washed and shall be entirely free from oil and deleterious substances.

The average value of sand equivalent determined on 3 successive samples shall not be less than 70. No individual sample shall have a sand equivalent less than 65.

The size and grading of sand to be used in cement concrete, mortar, and plaster shall be such as to conform to the requirements specified as follows:

Concrete:	ASTM C-33
Mortar:	ASTM C-144
Plaster:	ASTM C-35

SUBSECTION 701.3.2 Coarse Aggregate for Portland Cement Concrete:

Coarse aggregate shall conform to ASTM C-33 grading size No. 467, 57, 67, and 7.

SUBSECTION 701.3.3 Aggregate for Masonry Grout:

The size and grading of the fine or coarse aggregate to be used in masonry grout shall conform to ASTM C-404.

SUBSECTION 701.3.4 Coarse Aggregate Apron Material:

The coarse aggregate apron material shall conform to ASTM C-33 grading size No. 357.

SUBSECTION 701.3.5 Graded Filter:

The graded filter shall conform to ASTM C-33 grading size No. _____.

SUBSECTION 701.3.6 Drain Rock:

The drain rock material shall conform to ASTM C-33 grading size No. 5.

SUBSECTION 701.3.7 Drain Sand:

The drain sand material shall conform to ASTM C-33 Fine Aggregate.

SUBSECTION 701.4 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 701.5 PAYMENT:

No payment will be made separately for rock, gravel, and sand materials. The Contractor shall receive payment in accordance with Section 211. Costs associated with procuring commercial materials are considered incidental to the work in Section 211.

End of Section

SECTION 702 BASE MATERIALS

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 702.1 GENERAL:

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

- A) Crushed Aggregate.
- B) Processed Natural Material.
- C) Processed Steel Slag.
- D) Decomposed Granite.

When base material without further qualification is specified, the Contractor shall supply crushed aggregate. 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.

SUBSECTION 702.2 CRUSHED AGGREGATE:

Crushed aggregate shall consist of crushed rock or crushed gravel or a combination thereof as defined in Section 701.

SUBSECTION 702.2.1 Soundness:

The percentage of wear of crushed aggregate to be used as base will be determined as in Section 701, except that Grading B of ASTM C-131 shall be used. The percentage of wear of the material shall not exceed 40 after 500 revolutions.

SUBSECTION 702.2.2. Grading:

The aggregate shall be well graded when tested in accordance with ASTM C-136 and CI 17. The percentage composition by weight shall be within the ranges specified in Table 702-1.

Sieve Sizes (Square Openings)	Percentage by Weight Passing Sieve
	Aggregate Base Material
1 1/4"	100
No. 4	38-65
No. 8	25-60
No. 30	10-40
No. 200	3-12

SUBSECTION 702.2.3 Plasticity Index:

Unless otherwise noted, the Plasticity Index as tested in accordance with AASHTO T-146 Method A (Wet Preparation), T-89 and T-90 shall not be more than 5.

SUBSECTION 702.3 PROCESSED NATURAL MATERIAL:

SUBSECTION 702.3.1 General:

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 or disintegrated pieces, alkali, adobe, vegetable matter, loam, or other deleterious substances.

SUBSECTION 702.3.2 Physical Requirements:

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

- A) Percentage of Wear: When tested in accordance with ASTM C-131, the percentage of wear shall not exceed 40 percent after 500 revolutions.
- B) Plasticity Index: When tested in accordance with AASHTO T-146 Method A (Wet Preparation), T-89 and T-90, the plasticity index shall not be more than 5.
- C) Liquid Limit: When tested in accordance with AASHTO T-89, the liquid limit shall not be more than 25.

SUBSECTION 702.3.3 Crushed Material:

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

SUBSECTION 702.3.4 Grading:

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

SUBSECTION 702.4 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 702.5 PAYMENT:

No payment will be made separately for base materials. The Contractor shall receive payment in accordance with Section 310. Costs associated with procuring commercial materials are considered incidental to the work in Section 310.

End of Section

SECTION 703 RIPRAP

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 703.1 STONE:

Stone riprap shall be sound and durable, free from seams and coatings, and of such characteristics that it will not disintegrate when subjected to the action of water. Loss by abrasion shall not exceed the limits specified in Section 701.

Stone shall be of shapes which will form a stable protection structure of the required depth. Angular shapes obtained through crushing or fracturing shall be used. Flat or needle shapes will not be acceptable unless the thickness of the piece is more than one-third (1/3) the length.

Waste concrete and non-angular materials shall **not** be used.

SUBSECTION 703.2 SIZE OF STONE:

Riprap stone shall be as large as can be conveniently placed in a layer of 24-inch thickness as shown on the Plans. The stones, excepting small stones and spalls used to chink interstices, shall have a gradation as shown on Table I on Drawing D3.1 of the Plans.

The specific gravity of the stone shall be at least 2.64 (or specific weight 165 pcf).

SUBSECTION 703.3 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 703.4 PAYMENT:

No payment will be made separately for riprap materials. The Contractor shall receive payment in accordance with Section 220. Costs associated with procuring commercial materials are considered incidental to the work in Section 220.

End of Section

SECTION 725 PORTLAND CEMENT CONCRETE

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 725.1 GENERAL:

Portland Cement concrete shall be composed of Portland Cement or Portland Pozzolan cement, Pozzolonic Materials, fine and coarse aggregates, water, and, if provided for or allowed, certain admixtures.

All of the materials used for concrete shall be in accordance with these specifications and requirements for the particular material as provided herein.

Weighing and metering devices used for the purpose of proportioning materials shall fulfill requirements as to accuracy and tolerance prescribed by the Weights and Measures Division of the State of Arizona and shall be sealed and certified in accordance with the procedures established by this agency. This certification shall not be over 12 months old and shall be renewed whenever required by the Engineer. When portable plants are set up at a new or temporary location, the scales and scale assembly shall be inspected and certificate issued regardless of the date when the scales were last tested. The Engineer may require the Contractor to run a quick scale check at any time with certified weights furnished by the Contractor and order the scale recertified if necessary.

Class of Concrete	Min. Cement Content Lbs. Per Cu Yard	Minimum Compressive Strength (1)	
		At 14 Days psi	At 28 Days psi
A	520	2400	3000
C	420	1600	2000

Note: (1) As tested in accordance with ASTM C-39. Maximum slump 5 inches when tested in accordance with ASTM C-143.

Class A concrete shall be used for concrete structures, either reinforced or non-reinforced. Class C concrete shall be used for basin and diversion structure cutoff walls.

SUBSECTION 725.2 PORTLAND CEMENT:

Cement to be used or furnished under this specification shall be Portland Cement, conforming with the requirements of ASTM C-150, Type II, low alkali, or Portland Pozzolan Cement, conforming with the requirements of ASTM C-595, Type IP (MS), low alkali, except when another type including high early strength is specified in the special provisions or shown on the Plans. Type V cement (ASTM C-150) shall be specified in the special provisions for use in concrete which will be exposed to contact with soils or waters containing water soluble sulfates (as SO_4) in concentration greater than 0.20% by weight of soil or 1500 PPM in solutions. Pozzolonic materials shall not be used as a directly added ingredient in concrete in combination with Portland Pozzolan Cement.

Cement shall be sampled and tested as prescribed in applicable ASTM specifications. The Contractor shall obtain and deliver to the Engineer a certification of compliance signed by the cement manufacturer, identifying the cement and stating that the cement delivered to the batching site complies with those specifications. When requested by the Engineer, the Contractor shall furnish him with 3 copies of said certification. The cost of furnishing tested cement shall be considered as included in the contract bid price and no additional allowance will be made therefore.

When suitable facilities, as recommended by the Concrete Plant Manufacturer's Bureau, and approved by the Engineer, are available for handling and weighing bulk cement, such facilities shall be used. Otherwise the cement shall be delivered in original unopened sacks that have been filled at the mill and bear the name or brand of the manufacturer. The type of cement, and the weight of cement contained in each sack, shall be plainly marked thereon.

Cement shall be stored in such manner as to permit ready access for the purpose of inspection and identification, and so as to be suitably protected against damage by contamination or moisture. Should any lot of bulk cement be delivered to the site show evidence of contamination, the Engineer may require that such lot be removed from the site.

A cement shall not be mixed with any other brand or type unless written permission has first been obtained from the Engineer. All cement used in the manufacture of concrete for any individual structure shall be of the same brand unless otherwise approved by the Engineer.

SUBSECTION 725.2.1 Pozzolonic Materials:

Pozzolonic materials to be used in concrete or furnished under this specification shall conform to the requirements of ASTM C-618.

If an approved pozzolonic material is used, 15 percent by weight of the Table 725-1 minimum Portland Cement requirements shall be replaced. The replacement ratio shall be 1.2 pounds of Pozzolan per pound of replaced Portland Cement. If the class of concrete is not from Table 725-1, the amount of Pozzolonic material used will be 17.5 percent of the combined weight of Pozzolonic material and Portland Cement.

Pozzolans shall be sampled and tested as prescribed in ASTM C-618 and ASTM C-311. The Contractor shall obtain and deliver to the Engineer a certification of compliance signed by the Pozzolan supplier identifying the Pozzolan and stating the Pozzolan delivered to the batching site complies with applicable Specifications. The cost of furnishing tested Pozzolan shall be considered as included in the contract bid price and no additional allowance will be made therefore.

Pozzolan material shall be handled and stored in the same manner as Portland Cement. When facilities for handling bulk Pozzolan are not available, the Pozzolan shall be delivered in original unopened sacks bearing the name and brand of the supplier, the type and source of the Pozzolan, and the weight contained in each sack plainly marked thereon.

A Pozzolan shall not be mixed with any other brand or type unless written permission has first been obtained from the Engineer. All Pozzolan used in the manufacture of concrete for any individual structure shall be of the same type, and from the same source unless otherwise approved by the Engineer.

SUBSECTION 725.3 AGGREGATES:

Aggregates shall be crushed rock or gravel, or a combination thereof, and sand conforming to the requirements prescribed in Section 701. Prior to the delivery of the aggregates, the Contractor will be required to furnish samples for testing, and shall notify the Engineer as to when and where they will be available. Thereafter, additional required samples shall be furnished at the expense of the Contractor, but the cost of testing and making the grading analysis will be borne by the Contracting Agency. Samples shall be taken by the Engineer or in the presence of the Engineer.

No method which may cause the segregation, degradation or the combining of materials of different grading shall be used.

SUBSECTION 725.4 AGGREGATE GRADING:

Aggregates for each batch of concrete to be prepared shall be combined from materials separately stored in the various sizes and gradations as prescribed in Section 701. The relative proportions of each aggregate used will be as required to meet the provisions of this specification and will be the responsibility of the Contractor.

Except where the amount of concrete for any one job is 10 cubic yards or less, various sizes of both coarse and fine aggregate shall be proportioned by weight unless permission to do otherwise has first been obtained from the Engineer. Aggregates that are proportioned by volume shall be measured in containers of known capacity. Regardless of the method employed, either by weight or volume, each individually stored size of aggregate shall be proportioned separately, but not necessarily weighed individually.

The maximum size of the aggregate shall not be larger than one-fifth of the narrowest dimension between forms of the members for which the concrete is to be used, or larger than 3/4 of the minimum clear spacing between reinforcing bars.

SUBSECTION 725.5 WATER:

The amount of water shall be varied in accordance with the percentage of free moisture in the material and the requirements of the workability of the aggregate.

The equipment for measuring and supplying the water in the mixer shall be so constructed and arranged that the amount of water to be added to the mixture can be measured, in gallons or by weight, positively and that the predetermined quantity of water required can be discharged rapidly in one operation into the mixing drum without dribbling. Tanks or other equipment for measuring and discharging water into the mixer shall be sufficiently accurate that the amount of water delivered to the mixer for any batch shall not vary more than 1 percent from the required quantity. Adequate means for determining and checking the accuracy of the equipment shall be provided and made available to the Engineer at all times.

The water used for mixing with concrete shall be potable and free from oil, vegetable matter and other deleterious substances, and shall conform to the following requirements:

Water for prestressed concrete shall not contain chlorides calculated as sodium chloride in excess of 1,000 parts per million nor sulphates calculated as sodium sulphate in excess of 1,000 parts per million nor any sulphates calculated as sulphate in excess of 1,000 parts per million. Water shall not contain an amount of impurities that will cause a change in the time of setting of Portland Cement of more than 25 percent nor a reduction in the compressive strength of Portland Cement mortar of more than 5 percent compared to results obtained with distilled water.

SUBSECTION 725.6 ADMIXTURES:

Admixtures of any type, except as otherwise specified, shall not be used unless written authorization has been obtained from the Engineer.

If an air-entraining agent is authorized, the amount used will be limited to the extent that the amount of entrained air by volume shall not be more than 6 percent. Air-entraining agents complying with or ASTM C-260 will be permitted as long as strength requirements are met. Any admixture shall be measured accurately by mechanical means into each batch by equipment and in a method approved by the Engineer. Any admixtures used shall be included in the bid price for that item.

SUBSECTION 725.7 PROPORTIONING:

All proportioning equipment shall comply with the standards of the Concrete Plant Manufacturer's Bureau and the certification requirements of the Arizona Rock Products Association. The proportioning shall consist of combining the specified sizes of aggregates, each stored in a separate bin with cement, Pozzolanic materials, and water as herein provided. Weigh hoppers shall be charged from bins located directly over the weigh hoppers or from conveyor belts. When conveyor belts are used, there shall be a separate belt for each size of aggregate.

Bulk cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the batch ingredients are released for discharge. The cement hopper shall be attached to a separate scale for individual weighing.

All Pozzolan that is to be incorporated into the concrete as a separate ingredient shall be weighed. When the cement scales are used for weighing both cement and Pozzolan, the cement shall be weighed first. If separate scales are provided, they shall be accurate to ± 0.3 percent of the scale capacity.

Scales utilized in the proportioning device may be of the springless dial-type or of the multiple-beam type.

If the dial-type scale is used, the dial shall be of such size and so arranged that it may be read easily from the operating platform.

If the multiple beam-type scale is used, the scales shall be provided with an indicator operated by the main beam, which will give positive visible evidence of over or under weight. The indicator shall be so designed that it will operate during the addition of the last 400 pounds of any weighing. The over travel of the indicator hand shall be at least one-third (1/3) of the loading travel. Indicators shall be enclosed against moisture and dust.

Weighing equipment shall be as recommended by the Concrete Plant Manufacturer's Bureau and be insulated against vibration or movement of other operating equipment in the plant. When the entire plant is running, the scale reading at cutoff shall not vary from the weight designated by the Engineer more than 1 percent for cement, Pozzolan or Cement Pozzolan, 1 1/2 percent for any size of aggregate, nor 1 percent for the total aggregate in any batch. When proportioned at a central mixing plant there shall be an approved moisture meter, accurate within 1/2 percent, installed to indicate the moisture in the fine aggregate.

A concrete mix design carrying the producer's designated mix number of the concrete being furnished under these Specifications shall be submitted to the Contracting Agency at least once each year. In the event there is any change in the source of material, another mix design shall be submitted.

SUBSECTION 725.8 MIXING:

Machine mixing will be required in all cases other than those in which it would obviously prove to be impractical; in which latter event hand mixing will be permitted, only to the extent necessary. Regardless of the method employed, mixing shall be commenced as soon as possible after the cement is placed in contact with the aggregates.

The temperature of materials as charged in the mixer shall be such that the temperature of the mixed concrete at the time it is placed in final position does not exceed 90°F. When the atmospheric temperature at the time of placing concrete is less than 40°F, the temperature of the concrete, as placed, shall not be less than 60°F.

All concrete mixers shall be of such design and construction, and so operated, as to provide a thoroughly and properly mixed concrete in which the ingredients are uniformly distributed.

SUBSECTION 725.8.1 Paving and Stationary Mixers:

Paving and stationary mixers shall comply with the standards of the Concrete Plant Manufacturer's Bureau and the certification requirements of the Arizona Rock Products Association. They shall be equipped with an accurate automatic timing device so designed and constructed as to lock the discharge lever before aggregate, cement and Pozzolan enter the drum, and release such lever only after the specified mixing time has elapsed. The regulation of the setting of said device shall be under the supervision of the Engineer. Water control equipment as described in this specification shall also be provided with each concrete mixer.

Mixers shall be maintained in proper and serviceable working condition, and any part or portion thereof that is out of order, or becomes worn to such extent as to detrimentally affect the quality of mixing, shall be promptly repaired or replaced.

The proper proportions of aggregate, cement, Pozzolan and water for each batch of concrete shall be placed in the mixer, and shall be mixed for a period of not less than 50 seconds after all such materials are in the drum. The rotating speed at which the mixer shall be operated shall conform to that recommended by the manufacturer.

The total volume of materials mixed in any one batch shall neither exceed the water level capacity of the mixer nor the manufacturer's catalog rated capacity of the mixer.

SUBSECTION 725.8.2 Transit Mixers:

Transit mixers shall be high quality equipment and meet the requirements of the Truck Mixer Manufacturer's Bureau and the certification requirements of the Arizona Rock Products Association. Ready mix concrete shall comply with ASTM C-94 except as herein specified.

The total elapsed time between the addition of water at the batch plant and depositing the complete mix shall not exceed 90 minutes. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates, installed by the manufacturer, on which is plainly marked the capacity of the drum in terms of the volume of mixed concrete and the speed of rotation for the agitating and mixing speeds of the mixing drum or blades.

Each mixer shall have an identification number painted on the truck in such a location that it can be easily read from the batching platform.

The total volume of materials introduced into the mixer for mixing purposes shall not exceed the manufacturer's guaranteed mixing capacity. If the concrete so mixed does not meet the uniformity requirements of this section, the amount of materials charged into the mixer shall be reduced.

The rotation speed at which the mixer shall be operated shall conform to that recommended by the manufacturer.

The total volume of materials mixed in any one batch shall neither exceed the water level capacity of the mixer nor the manufacturer's catalog rated capacity of the mixer.

Each batch of concrete placed in the mixer shall be mixed for not less than 70 nor more than 100 revolutions of the drum or blades, at the speed designated by the manufacturer of the equipment as mixing speed. Additional mixing shall be at the agitating speed designated by the manufacturer of the equipment. The revolving of the drum shall be continuous until the concrete is completely emptied from the drum. Before any portion of the materials for any batch of concrete is placed therein, the drum of the mixer shall be completely emptied of the previously mixed batch.

At the time of delivery to the jobsite, the Engineer shall be provided with a legible weighmaster's certificate (delivery ticket) which shall contain the following information;

- Date and Truck Number.
- Name of the Supplier.
- Name of the Contractor.
- Specific designation of job (name and location).
- Number of cubic yards in the batch.
- Type of cement.
- Type of Pozzolan, if any.
- Time the transit mixer is loaded.
- Amount of water added at the jobsite at request of receiver, and his signature or initials.
- Suppliers' mix design code number.
- Type and amount of admixture, if any.
- Serial number of the ticket.

The type, capacity and manner of operation of the mixing and transporting equipment for ready-mix concrete shall conform to the current Standards for Operation of Truck Mixers and Agitators of the National Ready-Mixed Concrete Association and the Truck Mixer and Agitators Standards of the Truck Mixer Manufacturer's Bureau. Water shall not be added to the batch during transit. Additional water may be added at the point of discharge to adjust slump providing the slump after such water addition does not exceed the maximum allowed by these Specifications and that water so added is mixed into the batch for a minimum of 30 additional revolutions at mixing speed. Loss of cement mortar during discharge which in the opinion of the Engineer would be of sufficient amount to affect the homogeneity of the concrete will be cause for rejection of the load. The Contractor shall be responsible for all concrete to which water is added at the jobsite.

SUBSECTION 725.8.3 Hand Mixed Concrete:

Hand mixed concrete shall be prepared on a watertight level platform in batches of not to exceed one-third (1/3) cubic yard each. Hand mix concrete requires prior approval from the Engineer. The required amount of coarse aggregate shall first be spread on the platform in an even and uniform layer, over which the proper proportion of fine aggregate shall then be likewise spread. The combined depth of both such layers shall not be greater than one foot. The required quantity of cement shall then be evenly distributed over the fine aggregate; following which the entire batch shall be turned with shovels at least twice before the water is added. The proper amount of water shall then be uniformly sprinkled or sprayed over the batch, which shall thereafter be returned with shovels not less than 3 times before being removed from the platform.

SUBSECTION 725.8.4 Drybatched Unmixed Concrete:

Should the Contractor elect to use drybatched unmixed concrete, an accurate automatic batch weight recorder shall be provided to record the quantities of cement, aggregate and water batched into the containers; the weight of cement shall be recorded on either a separate charge from the aggregate or on the same chart using a separate needle. The recorder shall produce an autographic readable record on a visible chart of the weights of each of the materials batched. After batching, the needle on the chart shall return to zero. The chart scale along the ordinate shall be such that the major portion of the chart is used to record the total weights of the aggregates and water, and the cement. The date of batching, the container number and the batching certificate number shall be recorded on the recorder chart at the time of batching. The recorder charts, or copies thereof, shall become the property of the Contracting Agency and shall be submitted upon request.

All drybatched unmixed concrete delivered to the jobsite shall be stored in containers so constructed that the cement cannot commingle with the water and aggregate within the container. Any admixture added in powder form shall be added to the cement; or if added in liquid form, it shall be added to the water.

The contents of the container shall be discharged into a mixer at the job site. Following discharge of the first container into the mixer, the mixer shall be operated at mixing speeds during the discharge of the remaining containers. After the contents of the last container have been discharged into the mixer, the concrete shall be mixed as specified in this specification for transit mixers, and drum or turbine type mixers.

Any spillage of cement, aggregate, water or admixture during the filling, transporting, or the discharging of the container, shall be cause for rejection of the container or the contents of the mixer if any portion of the rejected container is discharged into the mixer.

SUBSECTION 725.9 LOADING AND TRANSPORTATION OF MATERIALS AND MIXED CONCRETE:

The compartments of trucks or other equipment used for the purpose of transporting proportioned aggregates, bulk cement or mixed concrete, shall be sufficiently high and tight, and otherwise suitably constructed and adequately protected, to prevent loss or leakage of the contents thereof during transit or charging.

SUBSECTION 725.10 TESTS:

Concrete specimens for compression tests will be taken in the field by a representative of the Engineer in accordance with ASTM C-172 and C-31, except at noted hereinafter.

Concrete samples shall be taken from the approximate middle 50 percent of the batch in an uninterrupted stream from the chute directly into the wheelbarrow or similar equipment. Where excessive slump is suspected, a controlling slump test may be made from any portion of the batch, except for the approximate 5 percent on each end of the discharge. If excessive slump is verified, at any time, the remainder of the load shall be rejected and removed from the project and a set of cylinders for compressive strength shall be taken from the batch, if any concrete from the batch was placed. The rate of discharge of the batch shall be regulated by the rate of revolutions of the drum and not by the size of the gate opening. Specimens for compression tests shall be stored in the field in accordance with methods approved by the Contracting Agency and protected from vibration and other disturbances, for a minimum of 28 hours and maximum of 76 hours. A maximum storage period would be involved only where weekends or

holidays are involved. Cylinders stored in the field for the maximum period shall have the same validity as cylinders that have been stored overnight and brought in the following day.

Not less than 4 cylinder specimens will be made for each 50 cubic yards of each class of concrete with a minimum of 4 specimens for each class placed or not less than 4 test specimens for each half-day's pour, whichever results in the greater number of tests. All test specimens shall be molded and cured in accordance with ASTM C-31. Specimens will be tested in a laboratory designated by the Engineer in accordance with ASTM C-39 at the expense of the Contracting Agency.

Two cylinders (test specimens) shall be laboratory tested at 7 days. Two cylinders shall be laboratory tested at 28-days.

Additional specimens may be collected at the Engineer's discretion for low strengths have been detected on previous pours, early breaks (less than 7 days), or to have an extra specimen after two are broken at 28-days (held for 60 days beyond).

SUBSECTION 725.11 ACCEPTANCE:

Compressive strength results for all specimens that meets or exceeds the minimum requirements at the 28-day break will be acceptable concrete by the Engineer. All compressive strength test results shall be reported immediately to the Engineer. Quality control charts shall kept by the Engineer for individual strength tests, moving average for strength, and moving average for range for each mixture. The charts shall be similar to those found in ACI 214.

If this strength does not meet the 7-day requirement, the Contractor shall schedule and pay for two cores to be taken, on the 29th day, from the area of concrete represented by the cylinders. The Engineer shall be present when the coring is accomplished or additional cores will be required.

If the 28-day cylinder test does not meet the minimum 28-day compressive strength requirement, the cores will be tested in accordance with ASTM C-42 in a laboratory designated by the Contracting Agency. If the cores meet or exceed the minimum 28-day strength, the concrete will be accepted by the Contracting Agency.

If the strength of the 28-day cylinders and the strength of the cores as calculated in accordance with ASTM C-42 are deficient, the Contractor shall remove all of the concrete represented by the failing test specimens with the exception that if the Contractor believes that the deficient concrete was confined to a single batch, he may immediately cut a minimum of 4 additional cores, two on either side of the affected batch. The cores would be compared with the minimum specified compressive strength, for the purpose of defining the confines of the deficient concrete. All coring done to establish this premise would be at the expense of the Contractor. Evaluation of the cores shall be by the Engineer, or by a substitute agent designated by the Contracting Agency, and his decision shall be final. All concrete failing to meet this requirement as evidenced by tests of either standard cylinder or drilled core specimens shall be rejected, removed and replaced by the Contractor at the Contractor's expense.

Fills shall not be placed against structural concrete until the concrete has been in place for at least 7 days or until the concrete has attained a strength of not less than 2,500 psi, whichever occurs first. At the Contractor's option, additional cylinders and strength tests may be performed to obtain early (3 to 5 days) breaks.

SUBSECTION 725.12 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 725.13 PAYMENT:

No payment will be made separately for concrete materials. The Contractor shall receive payment in accordance with Section 505. Costs associated with procuring commercial materials are considered incidental to the work in Section 505.

End of Section

SECTION 726 CONCRETE CURING MATERIALS

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 726.1 GENERAL:

Curing materials shall consist of waterproof paper, polyethylene film or liquid membrane forming compounds which, when applied to fresh concrete, will inhibit moisture loss and reduce temperature rise during the curing period. All curing materials and methods shall be approved by the Engineer prior to use. Wet coverings such as burlap, cotton mats, or other moisture-retaining fabrics also may be used, or may be required by special provisions.

SUBSECTION 726.2 MATERIALS:

- A) Waterproof paper, or polyethylene film, shall conform to AASHTO M-171.
- B) Type 1 liquid membrane-forming compounds shall conform to AASHTO M-148.
- C) Burlap cloth made from jute or kenaf shall conform to AASHTO M-182.

SUBSECTION 726.3 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 726.4 PAYMENT:

No payment will be made separately for concrete curing materials. The Contractor shall receive payment in accordance with Section 505. Costs associated with procuring commercial materials are considered incidental to the work in Section 505.

End of Section

SECTION 727 STEEL REINFORCEMENT

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 727.1 GENERAL:

The following specifications set forth the requirements for bar reinforcement, wire reinforcement, and wire mesh reinforcement. The reinforcement shall conform accurately to the dimensions and details indicated on the plans or otherwise prescribed and before being placed in any concrete work, shall be thoroughly cleaned of all loose rust, mill scale, mortar, oil, dirt, or coating of any character, which would be likely to destroy, reduce, or impair its proper binding with the concrete.

No reinforcing steel will be accepted under this specification until it has been approved by the Engineer. When required by the Engineer, the Contractor or supplier shall furnish a spot sample taken on the project and notify the Engineer as to when and where they will be available. Such samples shall be furnished at the expense of the Contractor or supplier, but the cost of any testing that may be required will be borne by the Contracting Agency. Samples shall only be taken in the presence of the Engineer. The Contractor shall furnish 3 certified mill test reports or certificates of compliance for each heat or size of steel, which can be clearly identified with the lot. When such information has been furnished, placing of the steel will not be held up until results of spot samples have been received. Unless otherwise specified, all reinforcing steel bars shall be deformed intermediate grade 60 billet steel conforming with ASTM A-615 and the shapes shall conform with ASTM B-670.

In testing bar reinforcement, only the theoretical cross-sectional area will be used in all computations.

Bending of steel shall conform to the requirements of ACI-318.

The various grades of steel shall not be used interchangeably in structures.

SUBSECTION 727.2 WIRE REINFORCEMENT:

Wire reinforcement shall in all respects fulfill requirements prescribed in ASTM A-82.

SUBSECTION 727.3 WIRE MESH REINFORCEMENT:

Mesh reinforcements shall conform to ASTM A-185. The gage of the wire and the dimension of the mesh will be specified in the special provisions or shown on the plans. The wire mesh reinforcement shall be so constructed as to retain its original shape and form during necessary handling. The effective cross-sectional area of the metal shall be equal to that specified or indicated on the plans.

SUBSECTION 727.4 WIRE TIES:

Wire for ties shall be black, annealed, not lighter than 16 gage.

SUBSECTION 727.5 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 727.6 PAYMENT:

No payment will be made separately steel reinforcement materials. The Contractor shall receive payment in accordance with Section 505. Costs associated with procuring commercial materials are considered incidental to the work in Section 505.

End of Section

SECTION 730 SOIL-CEMENT-BENTONITE

(Add this section to the MAG Uniform Standard Specifications.)

SUBSECTION 730.1 GENERAL:

Soil-Cement-Bentonite (S-C-B) backfill material is a mixture of soil, Portland cement, bentonite clay, and water that shall be used as backfill for the cutoff walls beneath the FRZ portion of the dam.

SUBSECTION 730.1.1 References:

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A) AMERICAN PETROLEUM INSTITUTE (API)

1. API Specification 13A – Specification for Drilling Fluid Materials.
2. API Specification 13B-1/ISO 10414-1 – Recommended Practice for Field Testing Water Based Drilling Fluids Petroleum and natural gas industries-Field testing of drilling fluids – Part 1 – Water Based Fluids (Modified).

B) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1. ASTM C 117 Test Method for Material Finer than 75- μ m (No. 200) sieve in Mineral Aggregates by Washing
2. ASTM C 136 Method for Sieve Analysis of Fine and Coarse Aggregates
3. ASTM C 143 Test Method for Slump of Hydraulic Cement Concrete
4. ASTM C 150 Specification for Portland Cement
5. ASTM D 427 Shrinkage Factors of Soils
6. ASTM C 494 Chemical Admixtures for Concrete
7. ASTM C 1017 Chemical Admixtures for Use in Producing Flowing Concrete
8. ASTM D 806 Cement Content of Soil-Cement Mixtures
9. ASTM D 1140 Amount of Materials in Soils Finer Than the No. 200 Sieve
10. ASTM D 1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10-Pound Rammer and 18-inch Drop
11. ASTM D 2216 Laboratory Determination of Water Content of Soil, Rock, and Soil-Aggregate Mixtures
12. ASTM D 2217 Wet Preparation of Soil Samples for Particle-Size, Analysis and Determination of Soil Constants
13. ASTM D 2487 Classification of Soils for Engineering Purposes
14. ASTM D 2901 Cement Content of Freshly Mixed Soil-Cement

- 15. ASTM D 4380 Density of Bentonitic Slurries
- 16. ASTM D 4832 Preparation and Testing of Soil-Cement Slurry Test Cylinders
- 17. ASTM D 5084 Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

SUBSECTION 730.1.2 Definitions:

Refer to Section 606, Vertical Cutoff Wall Construction, for other related definitions.

A) Soil-Cement-Bentonite Backfill (or S-C-B Backfill)

- 1. A specified, low strength, homogeneous mixture of processed soil, cement, and hydrated bentonite slurry used as backfill in a vertical-walled trench excavated below grade by slurry trench construction methods, which sets up or hardens to form a semi-rigid, impervious wall. S-C-B backfill is essentially a very low strength plastic concrete.

B) Initial Setting Time

- 1. Initial setting time is defined as the time from initial batching to that time when the S-C-B backfill no longer produces free liquid when a vibrator is immersed in the batch.

C) Unacceptable (Backfill, Wall, or Other)

- 1. The term "unacceptable," when used as an adjective, in these specifications means that the subject (noun being modified) contains conditions that will impede or negate the designed intent (e.g., "Unacceptable backfill" is backfill that contains conditions that will impede or negate the designed intent of the cutoff wall or tie-in walls, which are to serve as positive impervious barriers that will both resist fracturing due to high differential pressures across the wall and internal erosion should any cracks develop).

SUBSECTION 730.2 DELIVERY, STORAGE, AND HANDLING:

Handle, load, haul, and place processed soil material for manufacture of soil-cement-bentonite backfill and the soil-cement-bentonite backfill itself to minimize segregation. Handling should be such that will ensure that the various materials shall not become contaminated with soil or vegetative matter.

Stockpiling of processed soil at the site will be permitted, provided that pads shall be cleared of all vegetation and stripped prior to stockpiling.

SUBSECTION 730.3 MATERIALS:

The requirements for the materials to be utilized in the cutoff and tie-in walls are as follows:

SUBSECTION 730.3.1 Cement:

Cement shall be Portland cement meeting the requirements of ASTM C 150 for Type II cement and shall conform to requirements set for cement in Section 725.

SUBSECTION 730.3.2 Pozzolan:

Pozzolan, if used, shall meet the requirements of ASTM C 618 for class F and shall conform to requirements set for pozzolan in Section 725.

SUBSECTION 730.3.3 Bentonite:

The bentonite shall conform to requirements set for bentonite in Section 606.

SUBSECTION 730.3.4 Admixtures (or Additives):

In the event the Contractor proposes the use of any additional chemical admixture, such as retarders or water-reducers, it shall be subject to the approval of the Contracting Officer and the Contractor shall have on file a written statement as to the use of any such admixture, its effect on the slurry or backfill mixture, its long-term stability, and its effect on the environment.

SUBSECTION 730.3.5 Water:

Water shall be clean, fresh, and free from excessive amounts of dissolved salts, oil, acid, alkali, organic matter, or other deleterious substances that may adversely affect the properties of the slurry or backfill. The Contractor shall supply all the required water. The Contractor is responsible for changes in the water chemistry and its effect on the desired material properties.

SUBSECTION 730.3.6 Bentonite Slurry:

Slurry shall consist of a stable, fully hydrated, colloidal suspension of bentonite in water and shall be controlled in accordance with the most current API Standard 13B "Standard Procedure for Field Testing Drilling Fluid."

SUBSECTION 730.3.7 Processed Soil:

Provide soils obtained from on-site material, processed, blended, and/or otherwise manufactured to meet the requirements of this section; or from commercial sources in the vicinity; or manufactured from combinations of the on-site materials and commercial sources. Provide soil that is free from roots, organic matter, peat, diatomaceous earth, or other deleterious materials. Do not use soil containing organic matter in excess of 2 percent by weight. Provide the processed soils thoroughly mixed and reasonably well graded between the following gradation limits:

Screen Size (U.S. Standard)	Percent Passing, by dry weight
1-1/2 inches	100
3/8 inch	70 to 100
No. 4	50 to 90
No. 8	40 to 75
No. 16	35 to 62
No. 30	28 to 53
No. 50	22 to 43
No. 200	10 to 25*

*Does not include cement or bentonite

If crushed material is used together with natural soil, the crushed material shall be blended uniformly with the natural material by routing both together through the classifying screens. Backfill particles larger than the U. S. Standard No. 4 size shall have no more than 30 percent particles with a maximum to minimum dimension of 3 to 1.

Processed soil, as delivered to the mixing plant shall have uniform and stable moisture content. Variations of moisture shall not exceed 1 percent in 30 minutes.

Acceptance of the processed soil by the Contracting Officer will be determined by testing of processed soil material in stockpiles on-site prior to being mixed with bentonite slurry and cement.

Soil material introduced into the mixing unit shall contain no clay balls larger than 1-1/2 inch in size. It may be necessary to screen the soil on a 1-1/2 inch screen prior to introducing the soil into the mixer in order to remove such clay balls.

SUBSECTION 730.3.7.1 Material Sources for Processed Soil:

On-site sources of material for use in the manufacture of processed soil for backfill include borrow area A. Use of materials excavated from the vertical trenches in the manufacture of the processed soil is at the Contractor's option if the gradation requirements are met.

A commercial source of material for use in the manufacture of backfill in the vicinity of the project is:

West Valley Sand and Gravel

Other sources may also be available and may be used at Contractor's option.

SUBSECTION 730.3.8 S-C-B Backfill:

SUBSECTION 730.3.8.1 Composition:

Soil-cement-bentonite backfill placed in the slurry trench shall be proportioned so that the mixture is cohesive, resists, segregation, and flows readily. It is anticipated, based on laboratory mixture proportion studies, that the starting mix proportions will be approximately:

- A) 6 percent (+2 percent) , by dry weight, cement, or cement plus pozzolan.
- B) 1.0 percent (+0.5 percent), by dry weight, bentonite (resulting from use of bentonite slurry consisting of 5 percent dry weight of bentonite to weight of water)

The net water-cement plus bentonite ratio of the S-C-B backfill, exclusive of water absorbed by the processed soil, shall not exceed 3, by weight.

Draft results of laboratory mixture proportion studies for the S-C-B backfill are included in the Geotechnical Report.

SUBSECTION 730.3.8.2 Strength:

The compressive strength of the S-C-B backfill shall meet the following requirements:

- A) Eighty (80) percent of test cylinders shall exceed a compressive strength at 28 days of 300 pounds per square inch.
- B) The average compressive strength at 28 days of any six consecutive test cylinders shall exceed 300 pounds per square inch.

SUBSECTION 730.3.8.3 Permeability:

The permeability of the S-C-B backfill shall meet the following requirements:

- A) Eighty (80) percent of test cylinders at 28 days shall have a permeability equal to or less than 1×10^{-6} centimeters per second.
- B) The average permeability at 28 days of any six consecutive test cylinders shall be equal to or less than 1×10^{-6} centimeters per second.

SUBSECTION 730.3.8.4 Backfill Mix Design:

The backfill mix will be designed and adjusted by the Contractor to achieve the required fresh and hardened backfill properties for placement of the S-C-B backfill in the wall. The proportions may be adjusted by the Government during the progress of the work whenever the need for such adjustment is indicated by results of testing of the S-C-B backfill.

The initial design mix for the wall backfill shall be selected based upon target requirements and advance testing as specified herein. Modifications to the initial design mix shall be made only after they can be justified by test results on representative trial mixtures, guided by other data and only with the approval of the Contracting Officer. The initial design mix and subsequent design mixes shall have the same material sources and manufacturers as the actual mix. The processed soil to be mixed with the slurry shall be obtained from representative locations in the stockpile and contain representative proportions of each screen size, including representative moisture content. Laboratory mixing methods shall be representative of field mixing methods.

The initial setting time should be adjusted by the Contractor to be at least as long as (if not several hours longer than) the anticipated time required for backfill placement operations for the intended panel.

SUBSECTION 730.3.9 Material Storage Facilities:

The Contractor shall provide all necessary materials, equipment and personnel to store cement, bentonite and other additives under conditions to prevent moisture or other contaminants from mixing with the materials prior to use in the slurry plant and/or batch plant.

SUBSECTION 730.3.10 Environment Protection:

The raw materials and other supplies used in the construction of the cutoff and tie-in walls and any spoil disposed of within the project limits shall be non-hazardous.

SUBSECTION 730.4 PROPORTIONING AND MIXING:

The processed soil, cement, and hydrated bentonite slurry shall be accurately measured and conveyed into the mixer in the proportionate amounts necessary to meet the specified requirements. All ingredients shall be mixed for at least 30 seconds or longer as may be necessary to ensure a thorough, uniform, and intimate mix of the soil, cement, and slurry, and until the resulting mixture is homogeneous and uniform in appearance.

When mixing is completed, the backfill mix shall have a minimum slump of 7 inches and a maximum slump of 10 inches, as tested in accordance with ASTM C 143, and be workable for placement by the tremie method.

Do not add dry bentonite powder to the backfill.

Backfill shall be mixed prior to placement in the approved trench panels. Mixing of backfill in the trench will not be permitted.

Wastewater and slurry from backfill production shall be treated, as required, and disposed of at an Owner approved location.

SUBSECTION 730.5 TRANSPORTING AND PLACING:

Do not place S-C-B backfill in the slurry trench panels until the panel has been approved for placement in accordance with Section 606. Begin placement of backfill within 1 hour of completion of trench cleaning and approval. If placement is delayed such that more than 1 hour has passed since the trench was cleaned, re-sound trench bottom in accordance with Subsection 606.4.5.3 and clean trench bottom as required. Continue sounding trench bottom and clean trench, as required, until backfill placement in the panel has begun.

Provide soil-cement-bentonite backfill to the trench for placement that has a slump of 7 to 9 inches. The slump requirements shall apply both immediately after mixing and immediately prior to placement in the trench. Any loads that are excessively dry or excessively wet for any reason, as determined by the Contracting Officer will be rejected. The Contractor shall protect the backfill mixture with covers.

The soil-cement-bentonite mixture shall be transported from the mixing plant and placed in the panel within 90 minutes after introduction of slurry and cement into the mixer. Backfill more than 60 minutes old, as measured from the time the material leaves the mixer until the same material is placed in the panel, shall be rejected.

The backfill shall be placed in the slurry filled trench by tremie methods, in such a manner that the backfill displaces the slurry from the bottom. The procedure shall prevent free fall of backfill through the slurry, entrapment of the bentonite slurry, and mixing of backfill with slurry. Do not drop the backfill material into the trench or push it from the sides of the trench.

Placement shall begin at the bottom of the trench and proceed upwards as the trench fills. The backfill shall be placed through metal hoppers and leakproof tremie pipes. A positive backfill head shall be maintained throughout the pour.

The tremie pipe(s) shall be lowered to the bottom of the excavation so that the pipe does not strike the walls of the trench. The purpose of this is to prevent plugging of the pipe with material gouged from the wall. If the tremie pipe strikes the wall, it shall immediately be removed, cleared if necessary, and reinserted.

Lift the tremie pipe a maximum of 6 inches to allow slurry to escape. Add backfill slowly to force the go-devil downward. Once the go-devil reaches the mouth of the tremie pipe, lift the pipe a maximum of 12 inches to allow the go-devil to escape. Allow backfill to flow out and develop a mound around the mouth of the tremie pipe to establish a seal. Do not interrupt backfill placement at this time to prevent slurry from entering the tremie pipe and to ensure that the seal is established. The remainder of the placement shall occur as fresh backfill is injected into the mass of existing backfill. Take care to ensure that pipe embedment into the backfill is maintained at a minimum of 10 feet.

If more than one tremie pipe is used on any given placement, introduce backfill simultaneously to prevent the tremie pipes from being pushed out of vertical from pressures of backfill coming from other tremie pipes. Exact embedment depths depend upon placement rates and setting time of the backfill and height of the residual column of backfill in the tremie pipe.

Make all vertical movements of the pipe slowly and carefully to prevent loss of seal. If loss of seal occurs, halt placement immediately. Remove the pipe, install a closure device satisfactory to the Contracting Officer at the end of the tremie pipe, reinsert the tremie pipe into the fluid backfill, and restart backfill as described above. To prevent washing backfill in place, do not restart a go-devil after loss of seal.

The placing of the backfill shall proceed continuously and without interruption to produce a monolithic panel without horizontal construction joints. Only vertical construction joints (at ends of panels) will be permitted in the cutoff wall backfill, unless otherwise specifically approved by the Contracting Officer.

Place backfill as continuously as possible. Provide backfill having an initial set time of greater than 60 minutes. Interruptions of 60 minutes are allowable without any special restarting procedures. Where interruptions are between 60 minutes and the initial setting time of the backfill, remove the tremie pipe, reseal the tremie pipe, and restart the backfill placement. Where there are interruptions of a duration greater than the initial setting time of the backfill, treat the backfill as a construction joint as discussed below. Initial setting time must be greater than the anticipated length of time to completely backfill a panel.

If a break in placement results in a planned or unplanned horizontal construction joint, clean the backfill surface to remove contaminated backfill prior to resuming placement.

Clear tremie pipe blockages which occur during placement to prevent loss of seal. If a blockage occurs, quickly raise (6 inches to 2 feet) the tremie pipe and then lower in an attempt to dislodge the blockage. Closely monitor the depth

of pipe embedment during all such attempts. If the blockage cannot be cleared readily, remove, clear, reseal, and restart the tremie pipe.

Monitor the level of the backfill in the trench throughout placement with the use of an approved sounding device. These soundings shall be recorded and used as input for charting the backfill placement operation as required in Subsection 606.6.5.2. Note and monitor the final level of the backfill after the placing operation is complete to detect any settlement which would indicate a sidewall leak or blowout.

As backfill is tremied into the trench, any slurry displaced as a result shall be removed from the trench without any overflow occurring from the top of the trench.

No mixing or placing of the backfill shall be performed with air temperature is below 32 degrees F or in the opinion of the Contracting Officer, the climate or weather conditions are such that they may be or may become detrimental to the wall construction or may effect the accuracy of the quality control testing.

SUBSECTION 730.6 PROTECTING AND CURING SURFACES OF S-C-B BACKFILL:

Following completion of backfilling, the top of the completed wall shall be checked for free water or surface depressions. Any free water or other undesirable materials shall be removed, and the trench shall be filled with backfill to the top of working grade. The top of the wall shall be protected against frost, when temperatures are expected to drop below 35 degrees F, and to prevent drying while curing.

All backfill surfaces shall be cured and/or protected by moist earth covering and shall be kept wet until the earth cover is applied, after which time the earth covering shall be kept moist until the backfill surface has been subjected to a total curing time of 7 days following placement of the backfill.

Except at locations to be used for haul ramps, the protective earth covering shall have a minimum thickness of 6 inches. No equipment travel will be allowed directly on the completed backfill or on the protective covering of moist earth, except tracked equipment used to spread the protective covering, until the in-place S-C-B backfill has achieved a minimum strength of 100 pounds per square inch. Portions of the wall which are to be used for haul ramps shall be protected by a layer of earth at least 2 feet thick, to preclude any damage to the wall by hauling equipment. Any damage resulting to the top of the wall from equipment travel adjacent to or across the top of the completed wall shall be repaired at the expense of and by the Contractor.

All haul ramps and moist earth cover shall be removed prior to beginning earthfill placement operations performed, but only after the backfill has cured and the in-place S-C-B backfill has achieved a minimum strength of 300 pounds per square inch.

End of Section

SECTION 735 REINFORCED CONCRETE CYLINDER PIPE

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 735.1 GENERAL:

These Specifications cover reinforced concrete cylinder pipe and related structures intended to be used for the principal spillway and outlet works.

The size, type and D-load of the reinforced concrete cylinder pipe to be furnished shall be as shown on the Plans, or as specified under the item of work for the project of which the pipe is a part and shall be for pipe installed by the open-cut method of construction.

Whatever struts or other protective methods proved necessary to furnish and install the pipe to meet the limitation of cracks as specified herein, shall be provided and maintained throughout pipe handling and transportation.

Reinforced concrete cylinder pipe shall be manufactured and tested in conformance with the requirements of ASTM C-76, except as modified herein.

SUBSECTION 735.3 CURVES, BENDS AND CLOSURES:

Horizontal and vertical long-radius curves shall be formed by bevel adapters or by beveling the straight pipe joint. The bevel of the pipe shall not exceed 5 degrees and the total angular deflection, for beveled pipe, shall not exceed 10 degrees. Small angular changes may be made with straight pipe provided that the joint opening does not exceed 3/4 inch. Short radius curves and closures shall be formed with fabricated specials; however, the angular deflection of any segment of the fabricated section shall not exceed 10 degrees.

All curves and bends shall be constructed in such a manner as to provide a continuous steel cylinder.

SUBSECTION 735.4 MATERIALS:

Except when otherwise permitted by the Engineer, no materials other than water, Portland Cement, Pozzolanic materials, mineral aggregates and steel shall be used in the manufacturing of the pipe, conforming to ASTM C-76, with the following exceptions:

- A) Portland Cement: Portland Cement shall comply with ASTM C-150, Type II, low alkali. The pipe manufacturer shall supply a cement mill certificate in triplicate for each load of cement delivered, showing the specification, type, chemical analysis, and quantity. In lieu of the above, on stockpiled pipe the manufacturer shall certify that the type of cement used meets this specification. The pipe manufacturer shall also certify in writing that the cement content of the concrete complies with the Specifications as to yield per cubic yard of concrete poured.
- B) Pozzolanic Materials: Pozzolanic materials shall conform to Subsection 725.2.1 and ASTM C-618. If an approved Pozzolanic material is used, 17.5 percent of the combined weight of Pozzolanic materials and Portland Cement shall be Pozzolanic materials.
- C) Mixture: The proportion of Portland Cement or combination of Portland Cement and Pozzolanic material in the mixture shall not be less than 564 lbs. per cubic yard of concrete.
- D) Concrete Admixtures: The pipe manufacturer shall certify in writing that no calcium chloride or admixture containing calcium chloride has been used in the manufacture of the pipe. Other admixtures may be used if approved by the Engineer. The pipe manufacturer shall certify to the brand and chemical content of such admixtures used.
- E) Steel Reinforcement: The pipe manufacturer shall supply 3 copies of mill certificates showing heat numbers, chemical analysis, and physical tests on reinforcing steel. In lieu of the above, on stockpiled

pipe the manufacturer shall certify that the type of steel used meets this specification. The number of steel wraps shall not be less than 5 percent below that shown on the shop drawing for any one pipe.

- F) Rubber Gaskets shall comply with Section 765.

SUBSECTION 735.5 MANUFACTURER'S QUALIFICATIONS AND EQUIPMENT REQUIREMENTS:

The manufacturer shall be competent to manufacture the type, size and quality of pipe; in addition, the manufacturer shall have satisfactory curing and storage facilities, and satisfactory financial resources.

Calibration of Cement and Aggregate Scales: The pipe manufacturer shall make whatever alterations are necessary to his equipment to enable the Contracting Agency's Sealer or State Inspector of Weights and Measures to check, calibrate, and seal the aggregate and cement scales used in the pipe production.

SUBSECTION 735.6 CURING OF PIPE:

- A) Steam Curing: The manufacturer shall provide adequate steam plant, piping, enclosures, and other facilities for curing the pipe. The enclosures shall be such that the temperature is maintained continuously between 110 and 150°F.
- B) Curing of the pipe shall not commence until the concrete has attained its initial set, but in any event not sooner than 1 hour nor later than 8 hours after placing of the concrete. Rate of rise of temperature shall not exceed 30° per hour.
- C) Water Curing: The pipe shall be kept moist during daylight hours. The pipe, including the ends, shall be covered with burlap for the first 3 days, except that, if the pipe is kept constantly and completely wet with fog sprays during the daylight hours, the burlap covering may be omitted. If the manufacturer fails to proceed immediately with the required water curing he shall seal the surfaces of the concrete, except joint surfaces that are to be grouted, with an approved, white pigmented sealing compound in accordance with Section 726.

SUBSECTION 735.7 TESTS AND ACCEPTANCE:

- A) Basis of Acceptance: The basis of acceptance for the reinforced concrete cylinder pipe shall be in accordance with ASTM C-76 by the method stated in the special provision and as amended herein. However, the purchaser may at his option, make concrete cylinder tests for the purpose of determining release dates for shipment of the pipe and for his information in regard to general quality of the concrete.
- B) Segregation of Material: The slump of the concrete mix shall not exceed 4 inches so as to preclude excessive segregation of the materials used and shall be proportioned so that the result shall be a homogeneous concrete mixture of such quality that the pipe will conform to the tests and design requirements of these Specifications.
- C) A pipe has failed the D-load test when the opening crack exceeds .01 inch for a distance of 1 foot when measured at close intervals. These measurements are taken within the 1 foot measured span only when the crack line is more or less parallel to the axis of the pipe, as it is obvious that where the crack deviates substantially from parallel, and approaches a direction normal to the axis, that the edges of the crack tend to slip past each other, instead of opening up under load. The intent of the test is to measure the crack opening under stress.
- D) Porous or honeycomb concrete areas 6 inches or less in diameter may be removed and repaired. Pipe having defects or repairs greater than 6 inches in diameter will not be accepted.
- E) Any crack exceeding 1 foot in length that goes completely through the pipe is not considered acceptable whether repaired or not, except that a single end crack that does not exceed the depth of the joint as measured from the end to the inside shoulder is acceptable.

- F) Any crack that is .01 inch in width for one-sixteenth inch in depth or deeper, for a length of 1 foot or more and continues as a hairline crack down to the reinforcing steel for over 1/2 the length of the pipe, is not considered acceptable whether repaired or not.
- G) A single continuous hairline crack which does not extend to the reinforcing steel and not in excess of .01 inch in width for a distance of 1 foot is acceptable without repair. This type of crack longer than 1 foot shall be repaired.
- H) Repairs shall be made by filling the defect with epoxy under pressure or by chipping out a V-section to the full depth of the defect and repairing with an approved patching compound. The composition of the patching compound shall be furnished to the Engineer for approval.
- I) The words regarding acceptability and repair ability in the above paragraphs shall also apply when the crack occurs after loading of the pipe in the trench with backfill. Cracks wider than .01 inch shall be assumed to indicate overstress of the steel. In such case, the defective portion of the installation shall be replaced or repaired in a manner acceptable to the Engineer. After structural repairs are completed, the remaining cracks shall be filled as required above. All corrective measures shall be at the expense of the Contractor.
- J) Blisters: All pipe joints having blisters involving less than 1/4 the interior surface area shall be repaired by removing all loose material and exposing all hollow area and replacing with fresh concrete properly bonded, with an acceptable bonding agent, and curing the repair with membrane coating. Blisters with larger areas are not considered to be repairable or acceptable.
- K) Painting of pipe, or portion of pipe, with grout to cover defects, minor or major, will not be permitted until approved by the Engineer.
- L) Where the modified or special design method, under ASTM C-76 is elected, acceptance on the basis of material tests and inspection of manufactured pipe for defects and imperfections shall be as stated in ASTM C-76, and as amended herein. However, one joint of each size and D-load shall be selected by the Engineer for test purposes, and shall be tested for strength by the 3 edge bearing method, ASTM C-497, with the results being used for confirmation of the submitted design for this D-load. If the pipe section tested fails in compression or shear before reaching the D-load specified, the test shall be considered a failure. Additional sections of the same diameter size and class shall be tested as specified above until the load requirements are met for the D-load strength. This test procedure shall be accomplished only once per manufacture regardless of the number of contractors he supplies. Placing of reinforcing steel in the test section of pipe to control shear cracks will not be permitted.

Requirements regarding defects shall be the same as stated above for standard pipe.

Concrete test requirements specified under compression tests of ASTM C-76 shall be amended in part to read as follows: "The average of any 5 consecutive strength tests of the laboratory-cured specimens shall be equal to or greater than the specified strength set forth in Tables III, IV, or V, and not more than 20 percent of the strength tests shall have values less than the specified strength. If more than 20 percent have values less than the specified strength, the lot represented shall be considered to be defective and not acceptable. In no case shall any cylinder tested fall below 80 percent of the specified design strength. If any one cylinder falls below 80 percent of the specified design strength, then the entire production represented by that cylinder will not be accepted for purchase by the Contracting Agency unless the Contractor can demonstrate by coring to the satisfaction of the Engineer, that the cylinder in question is not representative of the entire production, or is representative of only a portion of the entire production."

During the fabrication of the pipe, concrete cylinders shall be made from a representative sample of the concrete. Concrete cylinders and slump tests shall be made by the Engineer or under his direct supervision. A set of cylinders shall consist of three. A minimum of one set shall be made for each day's production.

In vibrated and spun pipe, where the slump of the concrete approaches 0, the cylinders shall be made as follows:

Fill the cylinder can in 3 equal layers. Each layer shall be vibrated and assisted by rodding or other mechanical contrivance simultaneously until the moisture comes to the surface. Care shall be taken that the material is not overvibrated which will cause segregation. When the moisture rises to the surface of the third layer, it is struck off and leveled. The cap is put on the cylinder and it is marked for identification. It shall then be steam cured in the same manner as the pipe, at the conclusion of which the cylinders shall be brought into the laboratory for standard moist curing until the prescribed time for the compressive test.

The cylinders shall be made according to ASTM C-31 where the pipe is manufactured with concrete that has enough slump for the material to be hand-rodded. For reinforced concrete pipe made by the centrifugal method, the manufacturer may substitute centrifugally cast test cylinders for standard test cylinders. Centrifugally cast cylinders shall be made in accordance with AWWA C302 and cured in the same manner as normal test cylinders, except that the net area of the hollow cylinder will be used to determine the compressive strength.

SUBSECTION 735.8 DOWNGRADING OF PIPE:

For the purpose of these Specifications, downgrade pipe shall be defined as pipe, which is to be used under loads less than that for which they have been designed.

SUBSECTION 735.9 ACCEPTANCE MARK:

The Engineer may, at the place of manufacturer, indicate his acceptance of the pipe for delivery to the job by marking the pipe with the Contracting Agency's mark. Such acceptance, however, shall not be considered a final acceptance.

If the pipe is subsequently rejected, the mark placed thereon by the Engineer shall be defaced.

SUBSECTION 735.10 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 735.11 PAYMENT:

No payment will be made separately for reinforced concrete cylinder pipe. The Contractor shall receive payment in accordance with Section 618. Costs associated with procuring commercial materials are considered incidental to the work in Section 618.

End of Section

SECTION 759 STEEL PIPE

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 759.1 GENERAL:

These specifications apply to Steel pipe intended for the 6-inch diameter outlet work vent pipes and 48-inch diameter outlet pipe elbows. Steel pipe is specified as follows:

Steel pipe shall be designed, manufactured and tested in accordance with AWWA C-200.

Steel pipe and fittings may be furnished in pipe diameters of six (6) inches and larger.

Pipe shall be designed by the methods described in AWWA C-200 and AWWA Manual M11, to resist the internal pressures and external loading conditions designated on the approved plans or in the project specifications.

Trench excavation, backfilling and compaction shall be in accordance with Section 612 unless otherwise specified in the plans and specifications. For Steel Pipe with a flexible coating the backfill pipe zone material shall consist of Granular Material, maximum 3/4 inch size.

SUBSECTION 759.2 LINING AND COATING OPTIONS:

- A) Cement mortar lining and cement mortar coating shall be in accordance with AWWA C-205.
- B) Polyurethane coatings for interior and exterior of steel pipe shall be in accordance with AWWA C-222: The MDFT shall be 20 mils. on the interior lining and 25 mils. on the exterior coating.
- C) Polyethylene tape coating shall be in accordance with AWWA C-214. The total thickness of the tape coating shall be minimum 50 mils for pipe up to 54 inches diameter and minimum 80 mils for pipe 54 inches diameter and larger.
- D) Liquid-Epoxy coating systems for the interior and exterior of steel water pipelines shall be in accordance with AWWA C210. Interior lining will be applied in one or two coats MDFT of 16 mils.

SUBSECTION 759.3 MANUFACTURE:

The contractor shall submit material information and details of special fittings to the Engineer for review and approval.

When specified in the project specifications, the manufacturer shall furnish all samples, test reports, test specimens and perform tests as provided in AWWA C-200 or AWWA manual M11.

Standard pipe shall be furnished with rolled-groove bell and spigot rubber gasket joints. Restrained joints shall be lap-welded slip joints with the bell formed by cold formed expanded dies.

Unless otherwise specified, fabricated steel pipe shall be manufactured in uniform lengths to fit the pipeline alignment shown on the plans, subject to a maximum length of 40 feet. For Steel Pipe with flexible coatings the pipe length may be 60 foot maximum, subject to the Manufacturer's recommendations. Shorter lengths may be furnished to facilitate special conditions.

The Contractor shall submit an affidavit of compliance from the manufacturer that the pipe and fittings furnished comply with all applicable provisions of AWWA C-200 or AWWA Manual M11.

End of Section

SECTION 765 RUBBER GASKETS FOR CONCRETE PIPE

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 765.1 GENERAL:

The joints of concrete pipe shall be O-ring rubber gasket joints conforming to ASTM C-361 except the composition and properties of the rubber gaskets shall be as follows:

All rubber gaskets shall be extruded or molded and cured in such a manner as to be dense, homogeneous, and free from porosity and other imperfections. The tolerance for any diameter measured at any cross section shall be \pm one thirty-second inch. All gaskets shall be manufactured from a synthetic rubber compound in which the elastomer is chloroprene (ASTM-SAE Designation Type SC) exclusively. Said compound shall contain not less than 50 percent by volume of neoprene, shall contain no deleterious substances, and shall conform to Table 765-1.

Physical Properties	Value	Method of Test
Tensile strength, Min. psi	1500	ASTM D-412
Elongation at break, Min. %	425	ASTM D-412
Shore durometer hardness, Type A. ⁽¹⁾	40-60	ASTM D-2240
Compression set, Max. % of original deflection ⁽²⁾	20	ASTM D-395
Accelerated aging, tensile strength, %, ⁽³⁾	80	ASTM D-572
Max. increase over original shore durometer value after accelerated aging.	8	ASTM D-2240
Specific Gravity	0.95-1.45 \pm 0.05	ASTM D-297

⁽¹⁾ Pipe manufacturer shall select value suitable to type of joint.

⁽²⁾ Use Method B, except disc shall be $\frac{1}{8}$ inch long section of rubber gasket stock.

⁽³⁾ Percent of tensile strength, after aging by the oxygen-pressure chamber (96 hours, $158 \pm 1.8^\circ\text{F}$. 300 ± 15 psi), of the tensile strength before aging.

It is the intent of these Specifications that the gasket container shall be a preformed rectangular groove so constructed that when two pipes are joined together the rubber gasket shall be compressed and for all practical purposes substantially fill and be largely confined within the rectangular groove.

The Contractor shall submit for approval details of the shape and size of the gaskets he proposes to furnish. The Contractor shall submit certified test results in triplicate showing the physical properties of the materials used in the manufacturer of gaskets.

SUBSECTION 765.2 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 765.3 PAYMENT:

No payment will be made separately for rubber gaskets. The Contractor shall receive payment in accordance with Section 618. Costs associated with procuring commercial materials are considered incidental to the work in Section 618.

End of Section

**SECTION 770 STRUCTURAL AND RIVET STEEL, RIVETS, BOLTS, PINS,
AND ANCHOR BOLTS**

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 770.1 GENERAL:

All steel, unless otherwise designated on the Plans or in the special provisions, shall conform to the requirements of ASTM A-36.

Report of Tests: Before fabrication, the Contractor shall furnish to the Engineer a certified mill report in triplicate, for each identifiable melt of steel or iron from which the material is to be fabricated. The report shall include the chemical and physical tests required by the ASTM Specifications.

Additional Tests: The Contracting Agency reserves the right to require and to make additional mill and laboratory tests. The number of such additional tests will be limited as follows, except that in the case of failure of the material to comply with the ASTM requirements, more tests will be made:

Structural steel, one complete test for each heat or each 10 tons of identifiable stock. Rivets, one complete test for each size. Bolts, one complete test for each lot.

Identifiable stock is material for which authentic records of the chemical and physical properties are available.

Test specimens shall be furnished, cut, and machined in accordance with the ASTM specification, for the material to be tested, as referred to herein. Test specimens shall be furnished and machined by the Contractor at no additional cost to the Contracting Agency.

Mill Tolerances: Rolling and cutting tolerances, permissible variations in weight and dimensions, defects and imperfections shall not exceed the limits for structural steel contained in ASTM A-6.

Stock Material: When the Contractor proposes to use material already in stock, he shall notify the Engineer of such intention at least 10 days in advance of beginning fabrication, to permit sampling and testing.

SUBSECTION 770.2 STRUCTURAL STEEL:

Stock Materials: The Contractor shall select the material he wishes to use from stock. The Contractor shall furnish three certified mill reports for each of the heat numbers. Two samples shall be taken by a representative of the Engineer from each heat number, one for the tension test and one for the coldbend test. If the heat numbers cannot be identified, the representative of the Engineer shall select random test specimens from the unidentifiable heats. The number of such test specimens shall be at the discretion of the Engineer. The cost of all tests on stock material shall be borne by the Contractor.

High Strength Low-Alloy Structural Steel: The material shall conform to the requirements of ASTM A-242, A572/A-572M, A-606, A-607 or A-653 Grades C, D, or E as specified in the special provisions.

Copper Bearing Structural Steel: Copper bearing structural steel shall conform to the requirements of ASTM A-36, A570, A-61 1, or A-653 as specified in the special provisions.

SUBSECTION 770.3 RIVETS:

Stock Material: Rivets taken from identifiable stock shall be accepted by the Engineer in accordance with this specification.

Rivets from unidentifiable stock, for which authentic records of the chemical and physical properties are not available, shall not be used except where shown on the Plans or when approved by the Engineer.

High-Strength Structural Rivet Steel: The material shall conform to the requirements of ASTM A-502.

Structural Rivet Steel: The material shall conform to the requirements of ASTM A-502, except that the test specimen shall be bent upon itself when performing the bend test.

SUBSECTION 770.4 BOLTS:

Unfinished Bolts: The bolts shall have square heads and square nuts unless otherwise specified. The bolts shall be long enough to extend entirely through the nut but not more than 1/4 inch beyond. Washers shall not be furnished unless specified.

Steel bolts shall conform to the requirements of ASTM A-307, except that steel manufactured by the acid Bessemer process shall not be used.

High Strength Bolts: High strength bolts shall conform to the provisions of the specification for the design, fabrication and erection of structural steel for buildings of the AISC.

SUBSECTION 770.5 ANCHOR BOLTS:

Anchor bolts shall be manufactured from steel conforming to ASTM A-36 or A-307.

SUBSECTION 770.6 MILD-STEEL FORGINGS FOR STRUCTURAL PURPOSES:

Steel forgings shall be made from steel of forging quality and shall conform to the requirements of ASTM A-668. They shall be Class C forgings with a maximum carbon content of 0.35 percent and shall be given a thorough annealing. The metal shall have a minimum Brinell hardness number of 130, and a maximum of 190, when tested in accordance with ASTM E-10.

SUBSECTION 770.7 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 770.8 PAYMENT:

No payment will be made separately for the items covered by this section. The Contractor shall receive payment in accordance with Section 516. Costs associated with procuring commercial materials are considered incidental to the work in Section 516.

End of Section

SECTION 776 MASONRY MORTAR AND GROUT

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 776.1 GENERAL:

Masonry mortar and grout shall consist of a mixture of cementitious material and aggregate to which sufficient water has been added to bring the resulting mixture to the desired consistency.

Table 776-1 and 776-2 indicates the average compressive strength obtained when the cementitious material, aggregate, and water (the required amount to provide a flow of 110 ± 5 percent) are combined in the proportion shown in Table 776-3 and 776-4.

The mortar or grout to be used will be designated by class in the special provisions and the correct proportions of cementitious materials and aggregate will be combined with the minimum amount of water to provide a workable mixture.

Retempering of the mortar or grout will not be a standard practice and the Engineer's approval will be required for any exception.

TABLES 776-1 AND 776-2			
MASONRY MORTAR AND GROUT COMPRESSIVE STRENGTH			
Table 776-1 Masonry Mortar		Table 776-2 Grout	
Type	Compressive Strength 28 Days (psi)	Type	Compressive Strength 28 Days (psi)
A	5500	Fine Grout	2500
B	5000	Coarse Grout	2500
C	4000		
D	3000		
M	2500		
S	1800		
TABLE 776-3			
MASONRY MORTAR PROPORTIONS BY VOLUME			
Type	Portland Cement	Hydrated Lime	Aggregate ASTM C-144
A	1	0	1
B	1	0	1 1/2
C	1	0	2
D	1	0	2 1/2
M	1	1/4	2 1/4 to 3
1	1	1/2	2 1/4 to 3

*Masonry cement type S may be substituted for the cementitious material. Prior approval of the Engineer is required.

**TABLE 776-4
GROUT FOR REINFORCED MASONRY PROPORTIONS BY VOLUME FOR FIELD
BATCHING**

Type	Portland Cement	Fine Aggregate (ASTM C-404)	Coarse Aggregate (ASTM C-404)
Fine	1	2 1/4 to 3	0
Grout	1	2 1/2	1 to 2

SUBSECTION 776.2 PORTLAND CEMENT:

The cement used shall conform with Section 725. For volumetric proportioning an unopened sack of cement weighing 94 pounds shall be considered as having a 1 cubic foot volume.

In proportioning the cement, it shall be measured loose, without shaking or compacting, in measuring devices of known capacity.

SUBSECTION 776.3 AGGREGATE:

The aggregate used shall conform with Section 701. It shall be approved by the Engineer prior to being utilized on the job. Any change of course will require additional approval or this neglect will be considered as sufficient cause for rejection of work.

In proportioning the aggregate, it shall be measured damp, loose without shaking or compacting, in measuring devices of known capacity.

SUBSECTION 776.4 MASONRY CEMENT:

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.

SUBSECTION 776.5 HYDRATED LIME:

Hydrated lime used shall conform to ASTM C-207, Type S.

SUBSECTION 776.6 WATER:

The water used shall conform to section 725.

SUBSECTION 776.7 ADMIXTURES:

Admixtures, unless prescribed in the special provisions, will not be used without prior approval of the Engineer.

SUBSECTION 776.8 TESTS:

SUBSECTION 776.8.1 Mortar:

If in the opinion of the Engineer there is sufficient cause to question the quality of the mortar being utilized, random field test in accordance with ASTM C-780 Annex A-1 and A-6 will be performed. For this area, the penetration of the cone penetrometer correlating to a flow of 110 ± 5 percent is 40 ± 3 mm.

SUBSECTION 776.8.2 Grout:

If required, tests shall be performed in accordance with Uniform Building Code Standard No. 24-23 Section 24.2301.

End of Section

SECTION 790 PAINT MATERIALS

(Replace this section of the MAG Uniform Standard Specifications with the following.)

SUBSECTION 790.1 GENERAL:

Paint shall be homogeneous, free of contaminants, and of a consistency suitable for the intended use. Finished paint shall be well-ground and the pigment shall be properly dispersed in the vehicle according to the requirements of the paint; and this dispersion shall be of such nature that the pigment does not settle appreciably, does not cake or thicken in the container, or become granular or curdled. Paint and paint materials shall be delivered to the job site in new, unopened air-tight containers appropriately identified with the manufacturer's name, date of manufacture, type of paint or paint material, specifications paint number, and lot or batch number. The container shall have a formula label.

No paint shall be used until at least 7 days have elapsed from the date of manufacture. Paint containing lead shall comply with Subsection 107.5.2.

SUBSECTION 790.2 PROPRIETARY BRANDS:

For the purpose of this specification, proprietary brands of paint and paint materials shall be construed to mean paint or paint materials conforming to the requirements of this specification and produced for distribution and consumption through regular wholesale and retail outlets. Whenever paint or paint materials are designated on the plans or special provision by a manufacturer's name or catalog reference, any proprietary brand of equal quality will be permitted, subject to the approval of the Engineer. Information required by the Engineer as proof of the comparative quality shall be furnished by the Contractor.

SUBSECTION 790.3 PAINT COATS:

The first coat of paint applied to an unpainted surface shall be called the prime coat. The paint applied to field connections, welds, rivets, and all damaged or defectively painted or rusty areas on a prime coated surface shall be called a touch-up coat. The paint applied over the prime coat and touch-up coat shall be called the second coat. The final coat of paint shall be called the finish coat.

SUBSECTION 790.4 MATERIALS:

Materials shall conform in all respects to the requirements of references specifications indicated for such material.

Upon request of the Engineer, the Contractor shall furnish a certification from the manufacturer that the material conforms with this specification.

(A) Vehicles:	Specifications:
Raw Linseed Oil	ASTM D-234
Boiled Linseed Oil	ASTM D-260
Water-Resistant Spar Varnish	Navy Department Specification 52V20
Alkyd Resin	TT-R-266C
Driers	ASTM D-600, Class A or Class B, as applicable
Thinners:	
Xylene	TT-X-916B, Grade A
Turpentine (shall be used in	ASTM D- 13, Gum Spirits
	paints used for timber)
Petroleum Spirits (Mineral Spirits)	ASTM D-235
(B) Pigments	Specifications:
Carbonblack	TT-P-343 Form 1, Class B
Lampblack	ASTM D-209
Red Lead	ASTM D-83

Titanium Dioxide, Non-extended	ASTM D-476, Type 11, Class II
Titanium Dioxide, Extended (Titanium Calcium, Rutile)	ASTM D-476
Titanium Dioxide	TT-P422B, Type III, Class A
White Lead Basic Carbonate	ASTM D-81
Zinc Yellow (Zinc Chromate)	ASTM D478, Type II
Zinc Oxide	ASTM D-79
Iron Blue	TT-P-385
Iron Oxide, Yellow	TT-P-458A
Iron Oxide, Orange	ASTM D-3721, D-3722, D-3724
Hansa Yellow G	MIL-H-10330
Organic Green Gold	Dupont YT 562-D or equal, specific gravity 161 ±0.05
Chromium Oxide, Green Graphite	TT-P-347

Graphite shall be natural amorphous material (American product) which shall contain not less than 35 percent nor more than 45 percent graphite carbon. The remainder shall be insoluble siliceous material containing a total of not more than 5 percent calcium and magnesium carbonate and sulfate. The pigment shall be ground to such a fineness that not less than 97 percent shall pass a No. 325 sieve. The graphite paste shall be made by grinding the pigment in pure raw linseed oil in the following proportions:

Amphorus Graphite	68.0 percent
Linseed Oil	32.0 percent

(C) Inert Materials:	Specifications:
Diatomaceous Silica	ASTM D-604, Type A
Magnesium Silicate	ASTM D-605

SUBSECTION 790.5 MIXED PAINTS:

All mixed paints shall, in general, be machine-mixed and shall consist of the pigment of the required fineness and composition, ground to the desired paste consistency in pure raw or boiled linseed oil, to which shall be added the remainder of the vehicle to make paint conforming to the required formula as herein specified.

Paint, which has hardened and thickened in the container such that it cannot be readily broken up to a smooth uniform paint of good brushing consistency, shall not be used.

All materials used in mixed paints shall conform to the requirements as herein specified. The paint shall be made to satisfactory workable consistency conforming to one of the following formulas for paint as required on the plans or in the special provisions. All percentages shown are by weight.

Any of the following paints, which are too thick to have a satisfactory workable consistency, shall be thinned with a suitable thinner from the group of thinners herein specified. In no case shall gasoline be used as a thinner.

<u>Paint Number</u>	<u>Type</u>
1-A	Red Lead – Linseed Oil
1-B	Red Lead – Alkyd Resin
1-D	Zinc Chromate
4	Dull Black
5	Jet Black
6	Black – For Timber Primer Only
7	White – For Timber Primer Only
8	White
9	Light Gray
10	Aluminum
11	White Enamel
15	Zinc

SUBSECTION 790.6 MEASUREMENT:

No measurement for payment is required for this section.

SUBSECTION 790.7 PAYMENT:

No payment will be made separately for painting materials. The Contractor shall receive payment in accordance with Section 530. Costs associated with procuring commercial materials are considered incidental to the work in Section 530.

End of Section

SECTION 796 INSTRUMENTATION

(Add this section to the MAG Uniform Standard Specifications.)

To be completed at a later date.





"To the best of my professional knowledge, judgment, and belief, this document meets applicable NRCS standards."

**CONSTRUCTION QUALITY ASSURANCE
QUALITY CONTROL PLAN
(90% SUBMITTAL)**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONTRACT FCD 2004C017

**WHITE TANKS FLOOD RETARDING STRUCTURE NO. 3
REHABILITATION PROJECT**

PCN 470.04.30

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CONTRACT FCD 2004C017
WHITE TANKS FRS NO. 3
REHABILITATION PROJECT**

CONSTRUCTION QUALITY ASSURANCE QUALITY CONTROL PLAN

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1.0 INTRODUCTION

This Construction Quality Assurance Quality Control (QA/QC) Plan applies to the provision of Construction Quality Assurance (CQA) and Construction Quality Control (CQC) services for the procurement and construction of components of the White Tanks FRS No. 3 Rehabilitation Project.

1.1 PLAN PURPOSE

The purpose of this QA/QC Plan is to provide a project-specific technical guide to the Owner, the Owner's representatives, and Contractor to ensure a quality project, defensible documentation, and conformance with the plans and Special Provisions. This Construction QA/QC Plan has been prepared on behalf of the Flood Control District of Maricopa County, the operator of White Tanks FRS No. 3 located in west Phoenix, near the White Tanks Mountains. This Construction QA/QC Plan has been prepared by URS Corporation as part of the White Tanks FRS No. 3 Rehabilitation Project.

1.2 SCOPE OF THIS DOCUMENT

This Construction QA/QC Plan address the CQA and CQC of the construction work associated with this project. Assurance in the quality expected on this project and conformance with the approved plans and Special Provisions relies upon the execution of this Construction QA/QC Plan, specifically the field monitoring and documentation of the activities. This Construction QA/QC Plan therefore outlines in detail the CQA and CQC procedures that are provided and shall be considered in conjunction with the project contract, plans and Special Provisions. The construction activities requiring CQA and CQC procedures in this document include:

- Meetings
- Measurement and Payment Verification
- Site Visits and Observations
- Earthwork
- Soil Cement
- Soil-Cement-Bentonite (SCB) Cutoff Wall Backfill
- Reinforced Concrete Cylinder Pipe

- Concrete

Any conflict between the requirements of this document and the approved plans and Special Provisions shall be reported to the Engineer of Record, for clarification or adjudication, as required. In general, however, the requirements of the Special Provisions shall prevail.

1.3 DEFINITION OF QUALITY CONTROL VERSUS QUALITY ASSURANCE

There is often considerable confusion between the definition of quality control and quality assurance. This document refers to the provision of quality control and quality assurance for various components of the project:

- **Quality Control (QC)** refers to those actions taken by all parties involved in the construction, including the Contractor, those parties charged with procurement and installation of manufactured materials, and the placement and compaction of the soil materials, which provide a means to determine and sometimes quantify the characteristics of the product. The results of a quality control program are compared to the Special Provisions or other contractual or regulatory requirements. During each aspect of the handling of these materials, quality control is provided by the manufacturer, fabricator, or installer of materials, or the supplier and earthworks contractor for the soils, to ensure that the materials and workmanship conform to the plans and Special Provisions. Quality control responsibility is retained by the Contractor, suppliers, and manufacturers because these entities have the most direct control over qualifications of personnel, specialized experience or expertise, choice in type and quantity of equipment, scheduling, sequencing and workmanship that all factor in to the quality of the finished project.
- **Quality Assurance (QA)** is a planned and systematic pattern of all means and actions intended to provide adequate confidence that the materials and procedures conform to the plans and Special Provisions, and any applicable regulatory requirements. Quality assurance can be provided by the Owner, or its designated representative, which often is an independent consulting, engineering or construction management firm. Although quality assurance is as important during all phases of the project, construction quality assurance is often in association with those actions taken in relation to the installation of the geosynthetics materials, installation of structural concrete, and the placement and compaction of the soils materials. Quality assurance is a critical component of a project because field conditions are the most variable and the most difficult to control and documentation is being recognized as invaluable to Owners and regulatory agencies.

2.0 PARTIES TO THE WORK AND RESPONSIBILITIES

The successful completion of the production and installation of the White Tanks FRS No. 3 Rehabilitation Project is dependent on the interaction and cooperation of many parties. The following parties are represented in the project.

- **CQA Director.** The CQA Director for this project is URS Corporation of Phoenix, Arizona.
- **General/Earthwork Contractor.** The General/Earthwork Contractor (Contractor) is responsible for the mass earthworks, development of final slopes, placement of filter/drain sand, placement of riprap, placement of geotextile, placement and compaction of structural fill, fabrication and placement of trash racks and other metallic components, placement of soil-cement and controlled low strength material, placement of basin outlet pipe, and construction of concrete headwalls. Testing types and frequencies for CQC earthwork testing are estimated in Table 1. The actual test selection and frequency of testing will be at the discretion of the CQA Director and CQA Construction Manager based on field conditions and construction sequence.
- **Subcontractors.** The Subcontractor is retained directly by the Contractor and is likely responsible for specialty work such as surveying, fencing, concrete, commercial sand and rock suppliers, etc.
- **Geosynthetics Manufacturer.** The Manufacturer(s) of the geotextile filter fabric.
- **CQA Consultant.** The CQA Consultant is responsible for the monitoring and documentation of the construction activities of the General/Earthworks Contractor, and CQA laboratory and field testing. The Owner will retain the CQA Consultant.
- **CQA Construction Manager.** The CQA Construction Manager, will be a designated employee of the Owner or consultant retained by the Owner, responsible for overseeing the CQA Consultant and participates in the monitoring and documentation of the activities of the Contractor on a full-time basis.
- **Construction Materials Testing Laboratory.** The Construction Materials Testing Laboratory is a party, independent of the General/Earthwork Contractor, responsible for the CQC laboratory and field testing, and reporting to verify the conformance to the Special Provisions. The Contractor will retain the Construction Materials Testing Laboratory.

- **Owner.** The Owner, as used and defined for this document, is the Flood Control District of Maricopa County (District). The District is the local sponsor for this rehabilitation project and operates and maintains White Tanks FRS No. 3 in accordance with an existing agreement with the Federal sponsor for the project, the Natural Resources Conservation Service (NRCS). The NRCS is the Federal sponsor for the rehabilitation of White Tanks FRS No. 3.
- **Responsible Regulatory Agencies.** The state regulatory agency for the design and construction of the White Tanks FRS No. 3 Rehabilitation Project is the Arizona Department of Water Resources (ADWR). The Federal regulatory agency is NRCS.

2.1 CQA TEAM

The CQA Team shall consist of the following.

- **CQA Director.** The CQA Director shall be the Engineer of Record identified on the ADWR application and shall be a registered professional engineer (P.E.) in the state of Arizona responsible for certifying completion of construction in accordance with the approved project plans and Special Provisions. The CQA Director will be kept apprised of field progress and decisions and will periodically visit the site to review the operations and progress of the CQA Program.
- **CQA Construction Manager.** The CQA Construction Manager, demonstrating experience in construction and field oversight, will be involved on a full-time basis in construction oversight and provide liaison activities between the Contractor, CQA Consultant, and CQA Director. The CQA Construction Manager will provide construction management insight and guidance as needed to the CQA Team in the field on a daily basis, and assist with quantity verification and scheduling.
- **CQA Project Engineer.** The CQA Project Engineer, who is intimately knowledgeable with the design calculations and design intent, will interface in the field with the CQA Construction Manager to provide technical guidance. The CQA Project Engineer will be employed by and work under the direct supervision of the CQA Director.
- **CQA Field Representative.** The CQA Field Representative is the representative of the CQA Consultant. The CQA Field Representative liaisons directly with the CQA Construction Manager and will coordinate with CQA Technicians on site.

- **CQA Field Technicians.** The CQA Field Technicians, employed by the CQA Consultant, perform CQA laboratory and field testing, and reporting. CQA Field Technicians may be used on an on-call, as-needed basis.

The specific functions and responsibilities of these personnel are presented in the following sections.

2.1.1 CQA Director

The CQA Director will provide technical direction to the CQA Construction Manager and CQA Field Engineer. In particular, the CQA Director will conduct the following:

- Review the Construction QA/QC Plan, design, plans and Special Provisions for the project.
- Co-administer the CQA Program with the CQA Construction Manager, including supervision of the CQA Project Engineer.
- Review progress with the CQA Construction Manager and CQA Project Engineer.
- Participate in progress meetings.
- Periodically visit the site to review progress of the CQA Program.
- Review and approve any proposals for changes to the design, plans or Special Provisions that may be necessitated by field conditions.
- Receive and review the CQA Final Report.

2.1.2 CQA Construction Manager

The CQA Construction Manager is involved in the office and fieldwork and will conduct the following:

- Review the Construction QA/QC Plan, design, plans and Special Provisions for the project.
- Co-administer the CQA Program with the CQA Director, including the supervision of the CQA Field Representative and CQA Field Technician.
- Attend Pre-Bid and Pre-Construction conferences.
- Attend periodic progress meetings and conduct site visits.
- Scheduling of CQA Team activities.

- Review daily field reports, and results of field and laboratory testing from the CQA Field Representative and CQA Field Technicians for conformance and acceptability.
- Collect, collate and review the documentation provided by the Contractors and their suppliers of the materials to be used on the project.
- Observe and verify by review of data made available by the Contractor that construction is performed to the depths, lines and grades as indicated on the plans.
- Review the schedule and progress and provide recommendations for corrective actions, if any.
- Observe construction procedures and, with the CQA Project Engineer, ensure that the intent of design is being met.
- Assist in resolving potential issues that may come up, including, but not limited to, schedules, non-conformance to plans and Special Provisions, methods, equipment, payment and sequencing.
- Prepare a weekly summary report that outlines progress, problems and resolutions.
- Assist with punch list development and final inspections.
- Assist with preparing the CQA Final Report.

2.1.3 CQA Project Engineer

The CQA Project Engineer will be an integral part of the team both in the office and field by conducting the following:

- Review the Construction QA/QC Plan, design, plans and Special Provisions for the project.
- Inspect and approve foundation excavations for the dam foundation, and coordinate approval by ADWR and NRCS of the foundation surface prior to the installation of the cutoff walls, placement of soil-cement and/or placement of fill materials.
- Review the documentation provided by the Contractors and their suppliers of the materials to be used on the project.
- Receives and reviews daily and weekly reports, and provides final review of laboratory and field test data.
- Attend progress meetings (as necessary).

- Conduct routine site visits.
- Provide design clarification in general.
- Provide technical direction on critical start-up activities.
- Review any proposals for changes to the design, plans or Special Provisions that may be necessitated by field conditions.
- Assist with final acceptance of CQA Final Report.

2.1.4 CQA Field Representative

The CQA Field Representative is the representative of the CQA Consultant. The CQA Field Representative will conduct the following:

- Serve as the representative of the CQA Consultant and supervise all other CQA Field Technicians.
- Review the Construction QA/QC Plan, plans and Special Provisions for the project, and ensures that all CQA Field Technicians are fully informed of and qualified for the requirements of the work.
- Assign the daily responsibilities of all CQA Field Technicians, to ensure that all relevant activities of the Contractor are monitored and documented.
- Be responsible for the submittal of daily field reports (notes) to the CQA Consultant Manager and CQA Project Engineer documenting the activities of the Contractor for each day worked.
- Attend all progress meetings as required plus any activity-specific meetings necessary to review the installation of a critical component and/or CQA activities.
- Report on both a verbal basis, and through periodic submittal of the daily CQA reports, to the CQA Construction Manager and CQA Project Engineer to ensure that any problems are identified and communicated to all parties of the project on a timely basis.
- Prepare the CQA Final Report.

2.1.5 CQA Field Technicians

One or more CQA Field Technicians will be assigned to the project on an on-call basis to ensure that the activities of the Earthworks Contractor are adequately tested and documented. The CQA

Field Technician will be available full-time whenever earthwork, soil cement, SCB backfill, reinforced concrete cylinder pipe (RCCP), or concrete materials are placed. The activities to be monitored and duties to be carried out within the scope of the overall CQA Program include:

- Schedule, observe, perform and/or report construction materials testing.
- Select sample locations for CQA testing of all soils, soil-cement and S-C-B in accordance with the frequencies and test requirements specified, forwards these samples to the laboratory.
- Examination of all soils delivered to the site and collection of samples for laboratory testing for conformance to the Special Provisions. Testing type and frequency is estimated in Table 2; however, the actual test selection and frequency of testing will be at the discretion of the CQA Construction Manager and CQA Project Engineer based on field conditions and construction sequence.
- Testing, monitoring and documenting the placement, backfilling and compaction of all earthwork components and material types, as stipulated in Table 2. Testing will include field moisture determinations and field compaction density by nuclear methods and by sand cone methods.
- Prepare daily field reports (notes) documenting the activities of the Contractor for each day worked.

3.0 MEETINGS

Meetings of all parties are required at various times during the project based on the following objectives:

- Establish work schedules.
- Review Progress.
- Resolve problems.
- Generally maintain good lines of communication.

3.1 PRECONSTRUCTION MEETING

The Pre-construction Meeting is held in advance of the start of construction, to introduce all parties, and resolve any particular issues prior to the commencement of work, and to establish the requirements for construction quality assurance. The CQA Construction Manager will conduct the pre-construction meeting.

The following is a typical agenda for a pre-construction meeting:

- Use of site by Contractor and Owner.
- Owner's contract or site requirements.
- Construction facilities and temporary controls provided by the Contractor.
- Survey layout.
- Security protocols.
- Housekeeping procedures.
- Public relations and confidentiality protocols.
- Inspections required.
- CQA and CQC of major or critical activities in the project and a methodology.
- Proposed schedules and sequence of activities.
- Identification of the responsibilities project team.
- The timing and distribution of project correspondence.

- Establish the lines of authority and communication.
- Health and safety.

The Pre-construction Meeting may also be concluded with a site walk-around to determine the status of activities, and re-discuss items during the meeting (if necessary).

This meeting shall be documented by the Contractor and minutes prepared and circulated to all present, plus any other interested parties, for approval and/or revision.

3.2 PROGRESS MEETINGS

Periodic progress meetings shall be held on a schedule to be determined by the CQA Construction Manager and the CQA Project Engineer in order to review the status of the schedule, problems, and measures for resolution of problems. These meetings shall be documented, as required, and the decisions reached promulgated to all affected parties.

Areas of concern and potential future problems shall also be outlined, and addressed at the next planned Progress Meeting, unless of sufficient importance or urgency as to warrant an *ad hoc* meeting.

The following is a typical agenda for a progress/weekly meeting:

- Review minutes of previous meetings.
- Review work progress.
- Field observations, problems, and decisions.
- Identification of problems that impede planned progress.
- Review submittals schedule and status of submittals.
- Review health and safety concerns and issues.
- Revisions to progress schedule.
- Corrective measures to regain projected schedules.
- Planned progress during succeeding work period.
- Coordination of projected progress.
- Effect of proposed changes on progress schedule and coordination.
- Potential change conditions or review of change order submittals.

4.0 MEASUREMENT AND PAYMENT VERIFICATION

Based on the final contract documents and bid schedule, the quantities are verified in the field using total count of items or survey of in-place volumes. Measurement calculation shall be initiated in the field by the CQA Construction Manager and supported by a registered land surveyor licensed in the State of Arizona, as required. The calculations are reviewed or checked by a second method to assess reasonableness. Estimated pay measurements will be reported, and any discrepancies will be explained.

4.1 PAYMENT REVIEW AND APPROVAL

Upon request of the Owner, the CQA Project Engineer will review Contractor pay requests to render an opinion of progress and equitable request amount. The review is to include a written analysis discussing the major pay items and any discrepancy or suggested revision. Finally, the CQA Construction Manager is to provide conclusions and recommendations for approval or rejection.

5.0 SITE VISITS AND GENERAL OBSERVATIONS

The CQA Project Engineer and CQA Construction Manager shall conduct joint site visits, to ensure that all outstanding issues are resolved on a timely basis, and to review personally the progress and methodology of the Contractor and Subcontractor. The schedule of these site visits will be determined by project demands. The CQA Construction Manager shall monitor all phases of construction on a full-time basis, and ensure that in his absence another CQA Team member is present during all phases of construction. In addition, the CQA Director will make site visits when a problem arises which cannot be easily resolved or which impacts the design of the facility. In that regard, the CQA Director should make periodic site visits in order to review the progress and any aspects of the project that are particularly critical to the performance of the project.

5.1 GENERAL OBSERVATIONS

The CQA Construction Manager shall conduct the following observations:

- Contractor's daily activities.
- Subcontractor's daily activities.
- Surveyor's activities.
- Excavation limits.
- Borrow excavation and stockpiling.
- Moisture conditioning.
- Coarse aggregate apron, graded filter, drain rock, and drain sand material placement.
- Structural fill placement.
- Soil cement placement.
- SCB placement.
- Pipe placement.
- Geotextile filter fabric placement.
- Riprap placement.
- Concrete structures.
- Sluice gate and appurtenances installation.

- As-built survey data collection.
- Construction materials testing.

6.0 EARTHWORK

The earthwork, on-site soil fills and engineered fills associated with the White Tanks FRS No. 3 Rehabilitation Project will consist of a variety of materials. The CQA and CQC of these materials are presented in the following subsections.

6.1 SOILS TESTING

6.1.1 Laboratory Soils Testing

Laboratory testing of the soils materials to be used at the site shall be carried out for the purpose of materials selection prior to construction and for materials quality control and evaluation during construction operations. Laboratory testing will include CQC testing by the Construction Materials Testing Laboratory and CQA testing by the CQA Consultant.

6.1.2 Laboratory Conformance and Quality Control Testing

Prior to the commencement of construction, the Construction Materials Testing Laboratory (CQC testing) and the CQA Consultant (CQA testing) will complete conformance testing associated with the selection of suitable materials for use on the project. The CQA Project Engineer, the CQA Construction Manager, and the CQA Consultant will evaluate the results of conformance testing

Tests are to be carried out to provide and ensure that the source of the materials does not vary significantly or adversely from one area of the source to another and that the properties that are required in the Special Provisions are met. The frequency and need for a given test is shown in Table 1 for the Contractor's Construction Materials Testing Laboratory, and in Table 2 for the CQA Consultant.

Laboratory testing of foundation subgrade, on-site fills and engineered fills must be completed prior to material placement. If any test yields results outside of the specified range, the CQA Director must review and approve the test results before material placement. If the materials are outside of the specified range, a field change may be considered.

6.1.3 Laboratory Testing Frequency

The frequency of testing required during the selection process for soil materials is a function of the quantity of each soil type required, in addition to the existing documentation of the source. In general, however, testing shall be conducted in accordance with the requirements of the project

Special Provisions, and, at the minimum frequencies as shown in Tables 1 and 2 for each test procedure.

It should be noted that, in all cases, at least one test will be completed, regardless of the quantity of materials placed and compacted, where relevant. The CQA Consultant shall review all laboratory test results and forward a summary of all testing to the designated CQA Construction Manager, CQA Project Engineer, and the Contractor.

The CQA Consultant and the Contractor's Construction Materials Testing Laboratory shall coordinate the following laboratory testing:

- Moisture-density relation testing in accordance with ASTM D698.
- Moisture content in accordance with ASTM D4643.
- Sieve analysis in accordance with ASTM 422.

6.1.4 Field Soils Testing

The CQA Consultant shall be responsible for providing field *in situ* testing of the soils after placement and compaction, to determine their as-compacted properties and confirm conformance with the Special Provisions. The CQA Consultant and the Contractor's Construction Materials Testing Laboratory shall complete field CQA and CQC testing, respectively, as a component of the Construction QA/QC Program. The principal *in situ* testing carried out is the field determination of density and moisture content.

The CQA Consultant and the Contractor's Construction Materials Testing Laboratory shall conduct the following field soils testing activities:

- Nuclear in-place density relation testing using a gauge in accordance with ASTM D2922 and D3017.
- In place density testing using the sand cone method in accordance with ASTM 1556.
- Relative density determinations in accordance with ASTM Methods D4253 and D4254.

6.2 CONTRACTOR'S MATERIAL SUBMITTALS

The CQA Construction Manager and the CQA Project Engineer shall conduct the following activities regarding the Contractor's materials submittals:

- Log the receipt of the Contractor's submittals and correspondence.
- Review submittals for schedules.
- Review quality control plan.
- Review submittals for geotextile filter fabric.
- Review submittals for import riprap materials.
- Review submittals for import coarse aggregate apron, graded filter, drain rock, and drain sand materials.
- Review submittals for import untreated base materials.
- Review submittals for landfill and disposal documentation, if required.
- Review submittals for measurement and pay requests.
- Review submittals for as-built data.
- Review the results of all CQC testing completed by the Contractor's Construction Materials Testing Laboratory.

6.3 EXCAVATIONS

The CQA Construction Manager and CQA Project Engineer shall conduct the following prior to and during excavation:

- Verify the excavation limits are established and agreed upon.
- Verify clearing, grubbing, and stripping has been conducted as necessary.
- Verify the excavations are conducted to the limits and thickness required as shown on the drawings.
- Observe and verify unsuitable material (i.e. concrete, shotcrete, oversize rock) does not get commingled with structural fill that may be reused.

6.4 COARSE AGGREGATE APRON AND GRADED FILTER MATERIALS

The CQA Construction Manager shall conduct the following prior to and during placement of the coarse aggregate apron material and graded filter:

- Verify the subgrade is prepared and ready to receive sand and aggregate, and that the same have been reviewed and approved by the CQA Project Engineer, ADWR, and NRCS.
- Observe the placement per project Special Provisions.
- Observe the compaction by method, equipment, and effort that may be necessary to achieve the desired results in the project Special Provisions.
- Observe and verify the field density based on relative compaction determinations.
- Verify the sand and aggregate is placed to the limits and thickness required as shown on the plans.
- Observe sand and aggregate placement is not adversely affected or damaged during placement of fill materials.

6.5 DRAIN ROCK AND DRAIN SAND MATERIALS

The CQA Construction Manager shall conduct the following prior to and during placement of the drain rock and drain sand:

- Verify the subgrade is prepared and ready to receive sand and aggregate, and that the same have been reviewed and approved by the CQA Project Engineer, ADWR, and NRCS.
- Observe the placement per project Special Provisions.
- Verify the sand and aggregate is placed to the limits and thickness required as shown on the plans.
- Observe sand and aggregate placement is not adversely affected or damaged during placement of fill materials.

6.6 GEOTEXTILE FILTER FABRIC AND RIPRAP

The CQA Construction Manager shall conduct the following prior to and during placement of geotextile filter fabric and riprap:

- Verify the subgrade is prepared and ready to receive fabric.
- Observe the deployment per manufacturer's recommendations and project Special Provisions.

- Verify the material is placed to the limits required as shown on the drawings.
- Verify overlap dimensions are achieved.
- Observe material is anchored properly to resist uplifting due to wind and sliding during riprap placement.
- Observe riprap placement and verify that material does not move or is damaged.
- Observe riprap placement and verify that the material is placed in accordance with the specifications.

7.0 SOIL CEMENT AND SCB

7.1 SOIL-CEMENT

The CQA Construction Manager shall conduct the following prior to and during placement of soil-cement.

- Verify foundation areas have been prepared per project Special Provisions are prepared and ready to receive soil-cement, and that same have been reviewed and approved by the CQA Project Engineer, ADWR, and NRCS.
- Observe construction of stockpiles of aggregate for use in soil-cement production, and verify the stockpiled material per project Special Provisions.
- Observe production of the soil-cement, including mixing and equipment used.
- Observe the placement per project Special Provisions.
- Observe the compaction by method, equipment, and number of passes that may be necessary to achieve the desired results in the project Special Provisions.
- Observe and verify the field density based on relative compaction determinations.
- Verify the soil-cement is placed to the limits and thickness required as shown on the drawings.
- Monitor placement of the soil-cement.
- Verify the in-place properties (density and compressive strength) per project Special Provisions. The CQA Construction Manager shall coordinate CQC sampling, field testing, and laboratory testing with the Contractor's Construction Materials Testing Laboratory in accordance with the quality control program specified in the Special Provisions and as summarized below:

Test	Frequency
Temperature	1/Shift
Moisture Content	1/Each Four Hours
Soil-Cement Compressive Strength	1 Set/500 CY
Density	1/500 CY

7.2 SOIL-CEMENT-BENTONITE MATERIAL (S-C-B)

The CQA Construction Manager shall conduct the following prior to and during S-C-B placement:

- Verify subgrade and trenches are ready to receive S-C-B and that same have been reviewed and approved by the CQA Project Engineer and ADWR.
- Monitor placement of the S-C-B.
- Observe construction of stockpiles of aggregate for use in S-C-B production, and verify the stockpiled material per project Special Provisions.
- Observe production of the S-C-B, including mixing and equipment used.
- Observe the placement per project Special Provisions.
- Observe the compaction by method, equipment, and number of passes that may be necessary to achieve the desired results in the project Special Provisions.
- Verify the S-C-B is placed to the limits and thickness required as shown on the drawings.
- Monitor placement of the S-C-B.

7.3 CONTRACTOR'S MATERIAL SUBMITTALS

The CQA Construction Manager and the CQA Project Engineer shall conduct the following activities regarding the Contractor's materials submittals:

- Log the receipt of the Contractor's submittals and correspondence.
- Review submittals for schedules.
- Review quality control plan.
- Review submittals for soil cement materials.
- Review submittals for cement materials.
- Review submittals for bentonite materials.
- Review submittals for SCB materials.
- Review submittals for landfill and disposal documentation, if required.
- Review submittals for measurement and pay requests.

- Review submittals for as-built data.
- Review the results of all CQC testing completed by the Contractor's Construction Materials Testing Laboratory.

8.0 REINFORCED CONCRETE CYLINDER PIPE (RCCP)

The CQA Construction Manager shall ensure the manufacturer submits the appropriate certifications for all pipe and fitting materials for the application of this project.

8.1 SHIPPING, HANDLING, AND STORAGE

The CQA Construction Manager shall be on-site at the time of receipt of material and observe off-loading procedures. The following verifications shall be made:

- Pipe and fitting material complies with specification requirements.
- Pipe and fitting material to be off-loaded is not damaged before or during off-loading operations.
- The pipe materials are placed out of the traffic so that damage does not occur.
- Inappropriate equipment and procedures such as forklifts used with separation 2 by 4 boards.
- The pipe ends are kept clean and free of soil and debris during handling and storage.
- The pipe is inspected for possible damage within one hour of installation.

8.2 PIPE INSTALLATION

The CQA Construction Manager shall monitor the installation of pipe at all times to the greatest extent possible. The CQA Construction Manager shall ensure that in his absence the CQA Project Engineer is present during pipe placement, joining and backfilling.

The CQA Construction Manager shall observe several activities that may be occurring simultaneously, including, but not limited to, the following:

- Verify the area to receive pipe is marked and the alignment and grade is correct.
- Verify the foundation is ready to receive RCCP pipe, and has been reviewed and approved by the CQA Project Engineer, ADWR, and NRCS as required prior to placement of pipe.
- Upon observation and complete inspection of the installed pipe, the placement of the concrete encasement shall be monitored.

8.3 CONTRACTOR'S MATERIAL SUBMITTALS

The CQA Construction Manager and the CQA Project Engineer shall conduct the following activities regarding the Contractor's materials submittals:

- Log the receipt of the Contractor's submittals and correspondence.
- Review submittals for schedules.
- Review quality control plan.
- Review submittals for RCCP materials.
- Review submittals for rubber gasket materials.
- Review submittals for concrete materials.
- Review submittals for landfill and disposal documentation, if required.
- Review submittals for measurement and pay requests.
- Review submittals for as-built data.

9.0 CONCRETE STRUCTURES

The CQA Consultant shall perform sampling, laboratory testing, observation, and monitoring for forms, reinforcement steel, and cast-in-place concrete headwall construction activities.

9.1 CONCRETE TESTING

Conformance testing of cast-in-place concrete will be conducted and evaluated by the CQA Project Engineer, CQA Construction Manager and the CQA Consultant during construction.

9.1.1 Testing Frequency

The CQA Construction Manager shall coordinate CQA sampling, field testing and laboratory testing at the following frequency:

Test	Frequency
Slump	1/9 CY
Concrete Compressive Strength	1 Set/ 18 CY

9.1.2 Field Sampling

Sampling shall be conducted of fresh concrete.

9.1.3 Field Testing

The CQA Consultant shall be responsible for providing field sampling and testing of fresh concrete and mortar to determine their as delivered properties and confirm conformance with the Special Provisions.

The CQA Consultant shall conduct concrete field sampling and slump testing in accordance with ASTM C143.

9.1.4 Laboratory Testing

Conformance testing of the concrete materials to be used at the site shall be carried out for the purpose of materials quality control and evaluation during construction.

- The CQA Consultant shall conduct laboratory concrete compressive strength testing in accordance with ASTM C39.

9.2 Forms

The CQA Construction Manager shall conduct the following prior to and during installation of forms:

- Verify subgrade is ready to received concrete, limits of excavation in accordance of drawings, elevation of subgrade and compaction of subgrade.
- Observe forms are installed to limits, lines, elevations and depths required.
- Observe forms are supported and braced to prevent blowout or movement.
- Observe forms have the appropriate form liners in place.

9.3 Steel Reinforcement

The CQA Construction Manager shall conduct the following prior to and during installation of steel reinforcement:

- Observe rebar size, length, spacing, clearance and placement.
- Observe "J" bolt imbed size, length, spacing and placement.

9.4 Cast-In-Place Concrete

The CQA Construction Manager shall conduct the following prior to and during installation of forms:

- Verify the forms, reinforcement steel and "J" bolt imbeds are ready to receive concrete.
- Verify forms and reinforcement steel has been inspected and approved by ADWR and NRCS, as required, prior to concrete placement.
- Verify material submittal for concrete mix has been reviewed and approved.
- Verify the CQA Field Technician is ready to sample and test fresh concrete mix.
- Observe sampling testing of fresh concrete for slump and cylinders.
- Observe pour, placement, consolidation, screening and finishing of fresh cast-in-place concrete.
- Observe position/placement of reinforcement steel and "J" bolt imbeds.

- Observe raking surface to receive additional concrete.
- Observe bonding agent is used on surface to receive additional concrete.

9.5 CONTRACTOR'S MATERIAL SUBMITTALS

The CQA Construction Manager and the CQA Project Engineer shall conduct the following activities regarding the Contractor's materials submittals:

- Log the receipt of the Contractor's submittals and correspondence.
- Review submittals for schedules.
- Review quality control plan.
- Review submittals for concrete materials.
- Review submittals for reinforcement materials.
- Review submittals for anchor materials.
- Review submittals for landfill and disposal documentation, if required.
- Review submittals for measurement and pay requests.
- Review submittals for as-built data.
- Review the results of all CQC testing completed by the Contractor's Construction Materials Testing Laboratory.

10.0 FIELD DOCUMENTATION

10.1 DAILY FIELD REPORTS

The CQA Construction Manager shall document in daily field reports following:

- Name
- Company name
- Date
- Start time and ending time
- Weather
- Job reference number
- Contractor or subcontractor onsite
- Major equipment onsite and/or used (or list)
- Page number
- Visitors to the site
- Activities performed that consumed the day
- Activities performed started or restarted that day
- Activities performed started or completed critical to the project
- Reference attached test results, sketches, etc

10.2 LOG FORMS

The CQA Construction Manager shall collect and maintain the following log forms:

- Soil sample collection and laboratory chain-of-custody
- Soil density results
- Concrete/mortar test results
- Contractor submittals
- Photographs
- Daily field reports
- Record of conversation

10.3 PHOTOGRAPHS

The CQA Construction Manager shall document the following project activities using photographs:

- Existing conditions
- Progress of key activities at the various steps or phases of implementation
- Areas or items that are planned to be buried and not expected to be seen
- Completed components of work as project progress
- Completed project from various views (taken in last few days of work)

Photos are developed in duplicate to provide the Engineer of Record a full set of photo documentation.

11.0 CQA FINAL REPORT

Upon completion of the project, the CQA Consultant will prepare the CQA Final Report. This report will be the final record of the CQA and CQC information for the site. In general, the report shall include all submittal items discussed in this Construction QA/QC Plan. This shall include, at a minimum:

- The pipe manufacturer's certification and warranty documents.
- Field notes from the installation procedure, including such information as weather and unusual circumstances.
- Summary tables of results for soils.
- The geotextile filter fabric manufacturer's data.
- Compilation of copies of photo documentation.
- Field notes during construction and installation.
- The results of all soils testing, including both *in situ* field testing and laboratory testing in an appendix.
- The results of all soil-cement testing, including both *in situ* field testing and laboratory testing in an appendix.
- The results of all SCB testing, including manufacturer's data and laboratory testing in an appendix.

The CQA Final Report shall also provide a narrative description, in general, of the site's construction, noting all unusual occurrences encountered (i.e., failed test results, extreme weather, etc.). The CQA Final Report shall be provided to the CQA Director for review and approval shortly after the completion of work. The CQA Director will then incorporate the CQA Final Report as part of the Construction Completion Documentation, which the Owner is required to send to ADWR within 90 days of construction completion.

TABLES

TABLE 1
MINIMUM CQC EARTHWORK TESTING REQUIRED BY CONTRACTOR

Test Methods		Frequency of Tests				
Reference	Description	Aggregate Base	Structural Fill	Coarse Aggregate Apron and Graded Filter	Soil Cement	Drain Rock and Drain Sand
ASTM D422	Laboratory Test for particle size	1/1000 cy per material or change of material source	1/500 cy per material or change of material source	1/20 cy	1/1000 cy per material or change of material source	1 Total
ASTM D698	Laboratory Test for compaction-standard	1/1000 cy per material or change of material source	1/500 cy per material or change of material source	1 (see Special Provisions for modified test procedure)	1/1000 cy per material or change of material source	N/A
ASTM D4643	Laboratory Test for moisture content (oven-dry)	1/10 nuclear tests	1/10 nuclear tests	1/10 nuclear tests	1/10 nuclear tests per material or change of material source	N/A
ASTM D4318	Atterberg limits	1/1000 cy per material or change of material source	1/500 cy per material or change of material source	1/25 cy	1/1000 cy	N/A
ASTM D1556	Field Test for In-place density by sand cone method	1/10 nuclear tests	1/10 nuclear tests	1/10 nuclear tests	1/10 nuclear tests	N/A
ASTM D2922	Field Test for In-place density by nuclear gauge	1/every other lift or 1/1000 cy	2/lift or 1/500 cy	1/lift	2/lift or 1/500 cy	N/A
ASTM D3017	Field test for moisture content	As needed – to be verified by other field test methods	As needed – to be verified by other field test methods	As needed – to be verified by other field test methods	As needed – to be verified by other field test methods	N/A

1. The frequency of testing presented in this table is based on the minimum testing required. Final frequency and quantity of tests per method per material will be at the discretion of the CQA Project Engineer and CQA Construction Manager.
2. At any time the material and/or source changes, additional laboratory testing may be required at the discretion of the CQA Project Engineer and CQA Construction Manager.

TABLE 2
MINIMUM CQA EARTHWORK TESTING REQUIRED BY OWNER

Test Methods		Frequency of Tests				
Reference	Description	Aggregate Base	Structural Fill	Sand Mat and Filter/Drain Sand	Soil Cement	Drain Rock and Drain Sand
ASTM D422	Laboratory Test for particle size	1/1000 cy per material or change of material source	1/500 cy per material or change of material source	1/20 cy	1/1000 cy per material or change of material source	1 Total
ASTM D698	Laboratory Test for compaction-standard	1/1000 cy per material or change of material source	1/500 cy per material or change of material source	1 (see Special Provisions for modified test procedure)	1/1000 cy per material or change of material source	N/A
ASTM D4643	Laboratory Test for moisture content (oven-dry)	1/10 nuclear tests	1/10 nuclear tests	1/10 nuclear tests	1/10 nuclear tests	N/A
ASTM D4318	Atterberg limits	1/1000 cy per material or change of material source	1/500 cy per material or change of material source	1/25 cy	1/1000 cy per material or change of material source	N/A
ASTM D1556	Field Test for In-place density by sand cone method	1/10 nuclear tests	1/10 nuclear tests	1/10 nuclear tests	1/10 nuclear tests	N/A
ASTM D2922	Field Test for In-place density by nuclear gauge	1/every other lift or 1/1000 cy	2/lift or 1/500 cy	1/lift	2/lift or 1/500 cy	N/A
ASTM D3017	Field test for moisture content	As needed – to be verified by other field test methods	As needed – to be verified by other field test methods	As needed – to be verified by other field test methods	As needed – to be verified by other field test methods	N/A

1. The frequency of testing presented in this table is based on the minimum testing required. Final frequency and quantity of tests per method per material will be at the discretion of the CQA Project Engineer and CQA Construction Manager.
2. At any time the material and/or source changes, additional laboratory testing may be required at the discretion of the CQA Project Engineer and CQA Construction Manager.

TABLE 3
ESTIMATED MATERIAL QUANTITIES

Material	Estimated Quantity
Graded Filter	
Coarse Aggregate Apron	
Drain Rock	
Drain Sand	
Structural Fill	
Common Fill	
Soil Cement	
Soil-Cement-Bentonite	
Geotextile Fabric	
Riprap (Zone 1)	
Riprap (Zone 2)	
Aggregate Base	
RCCP	
Reinforced Concrete	



DEPARTMENT OF THE ARMY PERMIT

RECEIVED

MAY 12 2004

Regulatory Branch
Los Angeles Office

Permittee:

Mr. Robert B. Stevens
Flood Control District Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

Permit Number: 2004-00476-SDM

Issuing Office: Los Angeles District

Note: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: To modify the existing White Tanks FRS #3 by constructing a modified dam including cutoffs for fissure control and a new upstream dam face to upgrade the existing dam to current regulatory standards as shown on the attached drawings.

Project Location: In the White Tanks Flood Retarding Structure (FRS) #3 (tributary to the Gila River) at (Sections 4, 5, 8 and 9, T2N, R2W), Maricopa County, Arizona.

Permit Conditions

General Conditions:

1. The time limit for completing the authorized activity ends on **April 30, 2009**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in

conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification from this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of your permit.

Special Conditions: See attached sheet.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

- () Section 10 of the River and Harbor Act of 1899 (33 U.S.C. 403).
- () Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).
- (X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

2. Limits of this authorization.

- a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.
- b. This permit does not grant any property rights or exclusive privileges.

- c. This permit does not authorize any injury to the property or rights of others.
- d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

- a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
- b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or behalf of the United States in the public interest.
- c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
- d. Design or construction deficiencies associated with the permitted work.
- e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

- a. You fail to comply with the terms and conditions of this permit.
- b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).
- c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measure ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the

cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give you favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

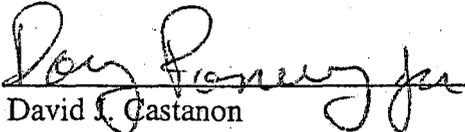


Timothy S. Phillips, P.E.
Acting Chief Engineer & General Manager

5/10/04

(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.



David J. Castanon
Acting Chief, Regulatory Branch
(for the District Engineer)

5/10/2004

(DATE)

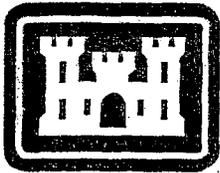
When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE)

(DATE)

SPECIAL CONDITIONS
PERMIT NO. 2004-00476-SDM

- a) The permittee shall comply with all requirements and conditions in the state water quality certification that the Arizona Department of Environmental Quality signed on March 15, 2004. This certification demonstrates that the permittee has complied with Section 401(a) of the Clean Water Act. A copy of this letter is attached.
- b) The permittee shall comply with the terms and conditions of the "Mitigation Plan for White Tanks FRS #3 Dam Rehabilitation Project," January 27, 2004, copy attached. Planting should be complete by **June 30, 2005**. The permittee shall provide a report documenting the planting with maps and photographs to the Corps by **September 30, 2005**. Thereafter, annual reports will be due to the Corps by September 30, for 5 years, or until success criteria have been achieved.
- c) Should previously unknown historic or archaeological remains be discovered while accomplishing activities authorized by this permit, the permittee shall immediately cease work in the area of discovery and this office shall be immediately notified to ensure compliance with General Condition 3 of this individual permit. The permittee is restricted from entering any archaeological site on or adjacent to the project area.
- d) The permittee shall include a copy of this permit in all contracts awarded to contractors or subcontractors for work in or adjacent to waters of the U.S., mitigation areas, or open space areas. The intent of this special condition is that the permittee shall make all appropriate contractors aware of the terms and conditions of this permit. Additionally a copy of this permit shall be available at the construction site at all times.



PUBLIC NOTICE

**US Army Corps
of Engineers®**

APPLICATION FOR PERMIT

Public Notice/Application No.: 2004-00476-SDM
Comment Period: March 3, 2004 through April 1, 2004

Applicant

Flood Control District Maricopa County
Robert B. Stevens
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-4073

Location

In the White Tanks Flood Retarding Structure (FRS) #3 (tributary to the Gila River) at (Sections 4, 5, 8 and 9, T2N, R2W), Maricopa County, Arizona. (Hydrologic Unit Code 15070102)

Activity

To modify the existing White Tanks FRS #3 by constructing a modified dam including cutoffs for fissure control and a new upstream dam face to upgrade the existing dam to current regulatory standards. For more information, see page 3 of this notice and attached drawings.

Interested parties are hereby notified that an application has been received for a Department of the Army permit for the activity described herein and shown on the attached drawing(s). Interested parties are invited to provide their views on the proposed work, which will become a part of the record and will be considered in the decision. This permit application will be issued or denied under Section 404 of the Clean Water Act (33 U.S.C. 1344).

Comments can be e-mailed to sallie.mcguire@usace.army.mil or mailed to:

U. S. Army Corps of Engineers
ATTENTION: Regulatory Branch (2004-00476-SDM)
3636 North Central Avenue, Suite 900
Phoenix, Arizona 85012-1939

Evaluation Factors

The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof. Factors that will be considered include conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people. In addition, if the proposal would discharge dredged or fill material, the evaluation of the activity will include application of the EPA Guidelines (40 CFR 230) as required by Section 404 (b)(1) of the Clean Water Act.

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Preliminary Review of Selected Factors

EIS Determination- A preliminary determination has been made that an environmental impact statement is not required for the proposed work.

Water Quality- The applicant will be required to obtain water quality certification, under Section 401 of the Clean Water Act, from the Arizona Department of Environmental Quality and/or the U.S. Environmental Protection Agency. For any proposed activity on Tribal land that is subject to Section 404 jurisdiction, the applicant will be required to obtain water quality certification from the U.S. Environmental Protection Agency. For any proposed activity on land other than Tribal land that is subject to Section 404 jurisdiction, the applicant will be required to obtain water quality certification from the Arizona Department of Environmental Quality. Section 401 of the Clean Water Act requires that any applicant for an individual Section 404 permit provide proof of water quality certification to the Corps of Engineers.

Cultural Resources- The latest version of the National Register of Historic Places has been consulted and this site is not listed. This review constitutes the extent of cultural resources investigations by the District Engineer, and he is otherwise unaware of the presence of such resources.

Endangered Species- Preliminary determinations indicate that the proposed activity would not affect federally-listed endangered or threatened species, or their critical habitat. Therefore, formal consultation under Section 7 of the Endangered Species Act does not appear to be required at this time.

Public Hearing- Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearing shall state with particularity the reasons for holding a public hearing.

Proposed Activity for Which a Permit is Required

The project includes the construction of a modified dam including cutoffs for fissure control and a new upstream dam face to upgrade the existing dam to current regulatory standards. Material used for construction of the dam will be excavated from borrow areas upstream. The dam extension, which will modify the embankment cracking zone and the earth fissure zone, will impact approximately 8.3 acres of waters of the United States. Habitat within this area consists of low density shrubs and grasses. The upstream dam extension will be composed of two different sections. One section will be a soil cement structure blended into the existing landscape with fill dirt and vegetation. The second section includes an increase in the height of the current dam with onsite fill material over a geotextile and sand filter that will be blended into the landscape with vegetation. Two borrow areas will be used to obtain material in which to mix soil cement that will be used for the dam extension. The borrow areas will impact approximately 3.2 acres of waters of the U.S., where habitat consists of low density shrubs and grasses.

Total impacts from the project are proposed to be 11.5 acres of waters of the U.S.; the total area of waters of the U.S. within the project area is 60 acres. The proposed project area encompasses approximately 150 acres.

Additional Project Information

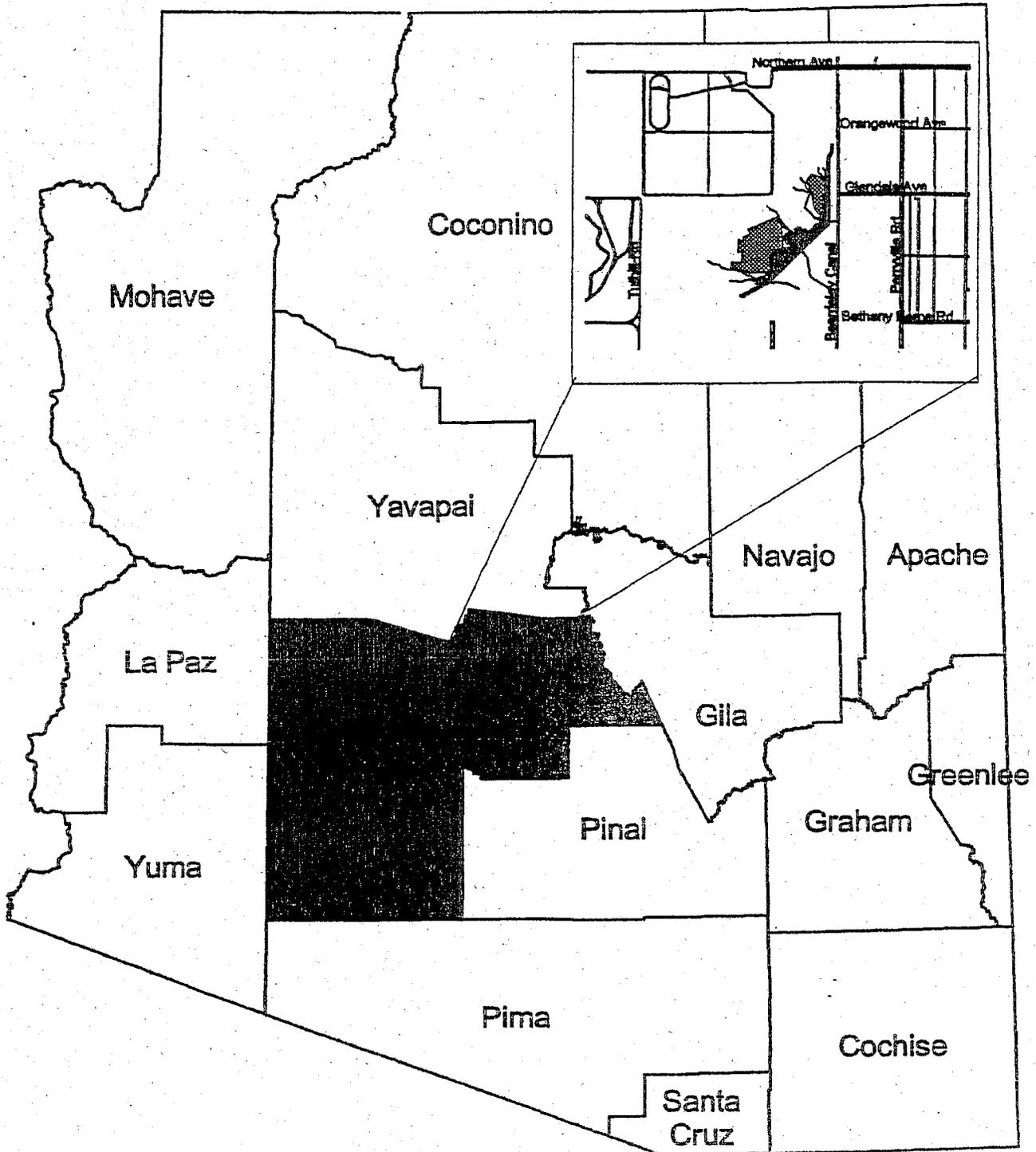
The purpose of the proposed project is to rehabilitate or replace the White Tanks FRS #3 with flood control facilities that provide continued flood protection to areas currently benefited by the existing structure. The basic project purpose is flood control, which is not water dependent. The FRS was constructed in 1954 to provide flood protection for Interstate 10, the City of Goodyear, unincorporated county land and other infrastructure downstream. Due to severe embankment cracking resulting from desiccation and differential settlement, extensive repairs to White Tanks FRS #3 were completed in 1982. Further monitoring of the dam and other studies resulted in the modifications proposed within this public notice.

Proposed Special Conditions

To be developed.

For additional information please call Sallie D. McGuire at (602) 640-5385 x 221. This public notice is issued by the Chief, Regulatory Branch.

Project Location in Arizona



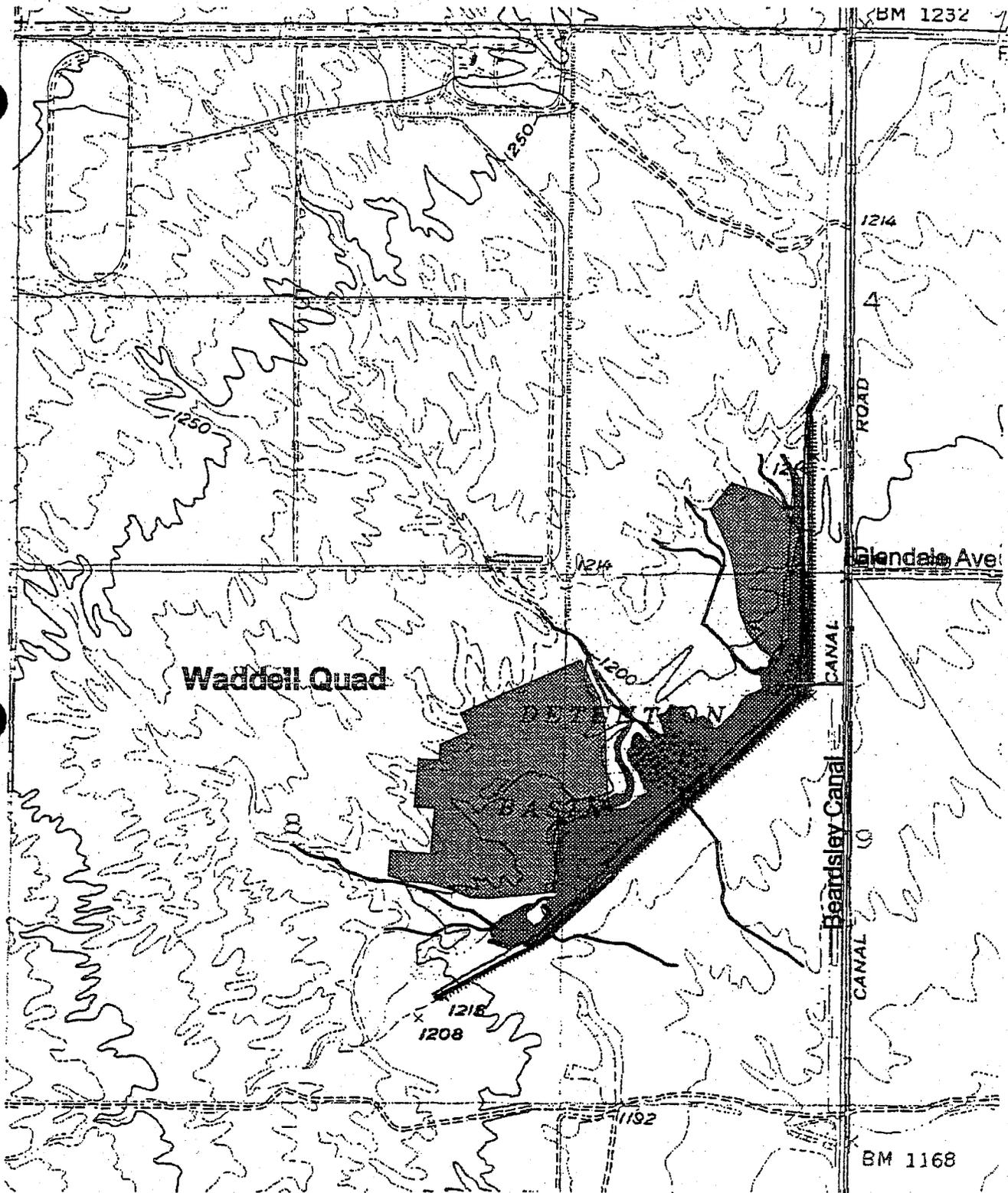
404 Jurisdictional Impacts for White Tanks FRS #3
Flood Control District of Maricopa County
February 2004

Public Notice #2004-00476-SDM
Figure 1 of 3



Not to Scale
For Location Only

404 Jurisdictional Impacts for White Tanks #3 FRS



-  Proposed Dam
-  Street Centerlines
-  Borrow Pits
-  Section 404 Jurisdictional Delineation



0 2000 Feet



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

RECEIVED

MAR 24 2004

REGULATORY BRANCH
PHOENIX FIELD OFFICE

Applicant: Flood Control District of Maricopa County
Attn: Mr. Michael S. Ellegood, P.E.
Chief Engineer and General Manager
2801 West Duraño Street
Phoenix, Arizona 85009-6399

Subject: CWA 401 Water Quality Certification, State of Arizona for the Flood Control District of Maricopa County: White Tanks Flood Retarding Structure # 3 Modification Project, (Sections 4, 8 and 9, T2N, R2W), Maricopa County, Arizona, Army Corps of Engineers Public Notice No. 2004-00476-SDM

Dear Mr. Ellegood:

The Arizona Department of Environmental Quality (ADEQ), Water Quality Division has reviewed information concerning the White Tanks Flood Retarding Structure #3 Modification Project submitted for water quality certification pursuant to Section 401 of the federal Clean Water Act. Section A of this certification describes the activities to be certified. The references listed in Section B were used as the basis for certification. Section C lists the Approval Conditions.

ADEQ's review has determined that when the applicant adheres to the Conditions in Section C, the certified activities should comply with State surface water quality standards. Subject to these conditions, this letter certifies that the activities associated with the White Tanks Flood Retarding Structure (FRS) #3 Modification Project should not have a negative impact to the chemical, physical or biological integrity of unnamed jurisdictional ephemeral waters of the U.S. (WUS).

A. Description Of Activities To Be Certified

1. The White Tanks FRS #3 is located east of the White Tank Mountains, near Bethany Home Road and Jackrabbit Trail, and east of the Beardsley Canal. The dam is 7,700 feet long and 27 feet high. The structure was originally constructed by the Soil Conservation Service (now the Natural Resource Conservation Service) in 1954 to provide flood protection for a portion of interstate 10, the City of Goodyear, unincorporated portions of Maricopa County, Perryville Prison and other infrastructure downstream (White Tanks #3 FRS).

Currently, the dam is operated and maintained by the Flood Control District of Maricopa County (FCDMC). The embankment was constructed using material excavated from the reservoir of the dam. Three gated corrugated metal pipes (CMPs) through the embankment serve as the principal outlets from the reservoir.

Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ 86004
(928) 779-0313

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ 85701
(520) 628-6733

Due to severe embankment cracking resulting from dessication and differential settlement, extensive repairs to White Tanks FRS #3 were completed in 1982. In 1990, the Arizona Department of Water Resources examined the dam and determined that it did not meet Arizona's dam safety requirements.

2. The purpose of the project is to modify the existing White Tanks FRS #3 by constructing a modified dam that provides continued flood protection to areas currently benefited by the existing structure, and upgrade the dam to current regulatory standards. Activities include the construction of a modified dam including cutoffs for fissure control and a new upstream dam face. Material for use in the construction of the modified dam and cutoffs will be excavated from borrow areas upstream of the dam. The proposed activities will impact a total of 11.5 acres of unnamed ephemeral WUS. Approximately 8.3 acres for construction of the modified dam, and 3.2 acres of impact resulting from the excavation of two borrow areas.
3. Approximately 900,000 cubic yards of soil cement and on-site fill material will be utilized for construction of the dam modification, and approximately 100,000 cy of on-site fill material will be placed downstream of the dam for aesthetic enhancement.
4. Impacts within the area upstream of the dam will be hydroseeded with a native plant seed mix.

B. Basis For Conditional State 401 Water Quality Certification

1. State of Arizona Water Quality Standards for Surface Water, Arizona Administrative Code (A.A.C.) Title 18, Chapter 11, Section 108, Narrative Water Quality Standards, Section 109 Numeric Water Quality Standards, Appendix A. Designated Uses include: **Aquatic and Wildlife ephemeral (A&We) and Partial Body Contact (PBC)** (A.A.C. R-18-11-105).
2. ADEQ Water Quality Division Form 404-015 CWA 401 Certification Application signed February 12, 2004, and received by ADEQ on February 23, 2004, from Mr. Michael S. Ellegood, P.E. representing the FCDMC. Additional documents submitted with the application include the following:
 - a. Applicant's response to Arizona Water Quality Policy for Protecting Water Quality During Facility Construction.
 - b. Aerial photos, maps and design drawings.
2. U.S. Army Corps of Engineers Public Notice/Application No. 2004-00476-SDM, comment period March 3, 2004 through April 1, 2004, downloaded from the LA District website on March 3, 2004.

C. Conditions For State 401 Water Quality Certification

This State Water Quality Certification is issued by ADEQ under the authority of Section 401(a) of the federal Clean Water Act (33 U.S.C. § 1251 et seq.). The conditions listed below apply the Section 404 Permit issued by the U.S. Army Corps of Engineers (ACOE). The Permittee shall follow these conditions in developing the project permitted under ACOE 404 Permit No. 2004-00476-SDM. These conditions are enforceable by the U.S. Environmental Protection Agency and the ACOE. Civil penalties up to a maximum of \$25,000 per day of violation may be levied if these certification conditions are violated. Criminal penalties may also be levied if a person knowingly violates any provision of the federal Clean Water Act. The following conditions are in addition to the special conditions developed by the ACOE for 404 Permit No. 2004-00476-SDM.

1. General Conditions

- a. This Certification is for the activities described in Section A to allow for the maximum impact of 11.5 acres to unnamed ephemeral washes for the construction of the White Tanks FRS #3 modification. The certification is valid for the same period as the ACOE 404 Permit. If substantive changes are made in the proposed project or if construction has not been started by the time specified in the ACOE 404 Permit, the applicant shall notify as follows:

**Arizona Department of Environmental Quality
Water Quality Division
Surface Water Permits Unit
Attention Surface Water Quality 401 Certification
ADEQ 401/404 File No. 9832
1110 West Washington Street (5415B-3)
Phoenix, Arizona 85007**

ADEQ will then have the option of extending, modifying or denying this Certification.

- b. The FCDMC shall provide a copy of these State 401 Water Quality Certification Conditions to all appropriate contractors and subcontractors. The applicant shall also post a copy of these conditions at a conspicuous water resistant location at the construction site.
- c. This certification is void if the construction is not consistent with the activities described in Section A.
- d. The FCDMC is responsible for the construction and maintenance of the project and any adverse cumulative impacts that it may cause.

2. Necessary Permits

The FCDMC is responsible for obtaining all other permits certifications and licenses that may be required by federal, state or local authorities. Other approvals include, but are not limited to: construction activities (AZPDES Stormwater Permit), use of reclaimed wastewater for dust control or irrigation (Reclaimed Water Permit), or dewatering of construction sites to a surface water body (AZPDES Process Wastewater Permit).

3. Erosion Protection Measures

- a. Erosion control and/or bank protection features (e.g., silt fences, straw bales, riprap, or mulching) shall be used, where appropriate, to minimize channel or bank erosion and soil loss. These features shall be maintained, as necessary, during pre-construction and construction periods. Denuded areas shall be revegetated as soon as possible with native plants and seed.
- b. Temporary erosion and sediment control measures shall be installed before construction and pre-construction practices, and shall be maintained as necessary during construction and post-construction periods.
- c. If construction operations are likely to create an erosion problem, operations shall cease until the problem is resolved or until reasonable control measures have been undertaken.

4. Chemicals and Materials Handling

- a. The FCDMC shall use designated areas for chemical and petroleum storage, solid waste containment, and equipment washing. These designated areas shall all be located outside the 100-year floodplain of unnamed ephemeral WUS.
- b. The FCDMC shall have a spill containment plan to ensure that pollutants are contained, removed and properly disposed of. In addition, equipment maintenance shall be performed at an upland site away from unnamed ephemeral WUS.

4. Contaminated Soils and Materials

- a. The FCDMC is responsible for ensuring construction material and/or fill placed within the ordinary high water mark (OHWM) of unnamed ephemeral WUS is free from substances (including fines that may be associated with rip-rap material) that can cause or contribute to pollution of a surface water.

- b. Debris (such as soil, silt, sand, rubbish, cement, oil, or petroleum products, organic material, tires or batteries) derived from construction activities shall not be deposited at any site where it may be washed into unnamed ephemeral WUS and shall be properly disposed of after completion of the project.
- c. If water is used for dust suppression, it shall not contain contaminants that could violate Surface Water Quality Standards.

5. Runoff

Runoff and seepage from the flood retarding structure, berms and other alterations of the natural environment shall not cause a violation of Surface Water Quality Standards.

6. Conditions Related to Flow Events

- a. Access roadways, staging areas and temporary material stockpiles shall be designed to allow normal storm flows to pass unimpeded. There shall be no significant alteration of hydraulic conditions of upstream waters as a result of temporary constructed features.
- b. Work shall be performed during low water conditions when the area is naturally dewatered. When there is flow within the construction area, construction activity shall cease and construction equipment relocated outside of unnamed ephemeral WUS.

8. Construction Related Activities

- a. Activities shall be conducted and monitored to ensure that pollution from channel excavation, berm construction and equipment maintenance and washing does not drain into unnamed ephemeral WUS.
- b. Silt laden or turbid water resulting from construction activity shall be settled, filtered or otherwise treated prior to discharge to ensure no violation of water quality standards.
- c. After completion of construction, the work area and all disturbed areas along the bank and streambed shall be restored to an environmentally acceptable condition. All construction residues, equipment and non-native materials shall be removed from and properly disposed of outside of the OHWM of unnamed ephemeral WUS.

4. Standard Issues

Any discharge occurring as a result of activities certified for the White Tanks FRS #3 Modification project shall not cause a violation of Surface Water Quality Standards. Applicability of this condition is as defined in section R-18-11-102 of A.A.C. Title 18, Chapter 11, Article 1 - Water Quality Standards for Surface Water.

ADEQ CWA 401 Water Quality Certification of these activities to operate under the terms of the ACOE Individual 404 Permit does not affect or modify in any way the obligation or liability of any person for any damages, injury, or loss, resulting from an impacted area discharge. The department may modify or withdraw its determination if the information relied upon is inaccurate or not implemented as proposed. If, in the future, the Department determines that the terms and conditions of the Certification have been violated, or discharges from the activities have caused or contributed to a violation of surface water quality standards, the Director may revoke the Certification. This certification is not intended to waive any other federal, state or local laws.

Thank you for your cooperation and efforts to protect our finite and precious water resources.

Sincerely,

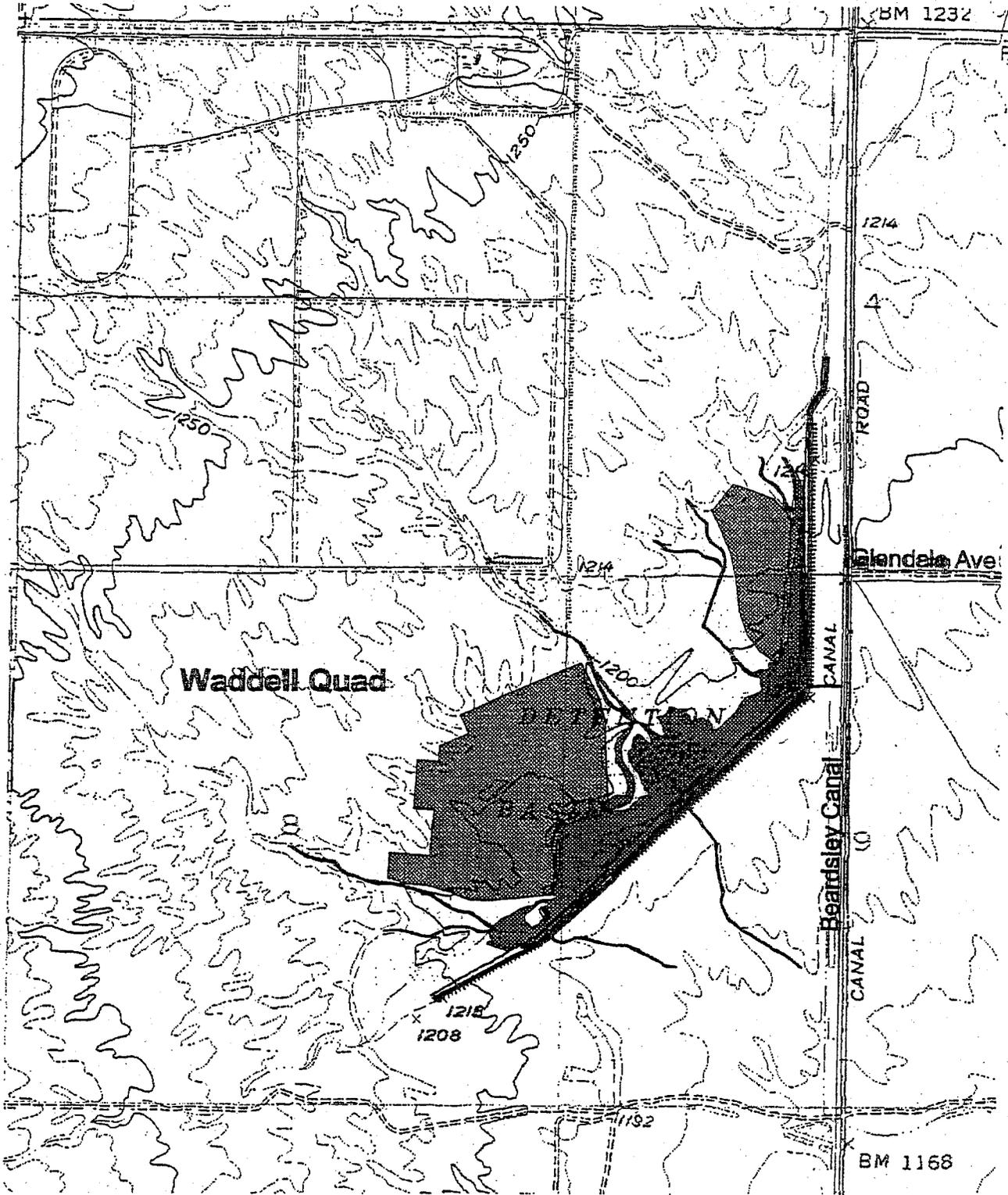
Authorized ADEQ Signature:

Michele Robertson 3-15-04
Michele Robertson, R.G. Date
Water Permits Section Manager
Water Quality Division

Enclosures: Vicinity Map (1 page)

cc: Flood Control District of Maricopa County
U.S. Army Corps of Engineers, Regulatory Branch
USEPA, Wetlands Regulatory Office

404 Jurisdictional Impacts for White Tanks #3 FRS



-  Proposed Dam
-  Street Centerlines
-  Borrow Pits
-  Section 404 Jurisdictional Delineation



0 2000 Feet

Appendix F

Mitigation Plan – Flood Control District of Maricopa County, 2004

Mitigation Plan for White Tanks FRS #3 Dam Rehabilitation Project
Developed By Flood Control District of Maricopa County

Date: January 27, 2004

EVALUATION AND PROPOSED MITIGATION PLAN

1.0 Project Background

The Flood Control District Of Maricopa County (District) is planning to construct the White Tanks FRS #3 dam modification project in Phoenix, Arizona. Impacts to waters of the US will include the dam extension and the two borrow areas.

Approximately 11.5 acres of the wus will be impacted from construction of the project. The dam is located in Section 4, 5, 8 and 9 of Township 2 North, Range 2 West of the baseline and meridian in Maricopa County. Impacts within the reservoir and the borrow areas will require a Clean Water Act Section 404 permit prior to construction of this project.

2.0 Habitat Evaluation and Impacts to the Waters of the U.S.

A habitat evaluation was conducted to determine the density, diversity, and structural components of the vegetation within the designated waters of the US. A total of 11.5 acres of WUS will be impacted from the dam extension and excavation of the borrow areas. A description of each of the impact areas is provided below:

Dam modification- Areas immediately upstream of the dam or the former borrow area represent a disturbed and low value habitat containing shrubs and grasses with some trees. The area is sparsely vegetated and contains low structural diversity resulting in a small number of species. Therefore, the habitat quality for the impoundment area has been designated as low value. Approximately 8.27 acres of wus will be disturbed by the dam modification.

Borrow Area A is located upstream at the southwestern portion of the site. It is primarily barren land which has been disturbed by earlier earthmoving activities by the former owners, Case Equipment Company. The area ranges from scarce shrubs in the western portion of the site to a moderate habitat along the eastern edge of the

property. Typical desert habitat in the area includes velvet mesquite (*Prosopis velutina*), blue paloverde (*Cercidium floridum*), foothills paloverde (*Cercidium microphyllum*), acacia (*Acacia greggii*), ironwood (*Olneya tesota*), Creosote bush (*Larrea Tridentata*) and white brittle bush (*Encelia farinose*). Approximately 1.55 acres of moderate value habitat within wus will be disturbed from the borrow area.

Borrow Area B is a pie shaped property located to the northeast of the dam. Only a small portion of the site impinges on the low value habitat within the wus or flood pool. The remaining portion consist of low to moderate value habitat adjacent to some of the unnamed washes in the area. Approximately 1.69 acres of low value habitat will be disturbed by the borrow activities. See Table 1 for description of impacts within wus.

Table One: Summary of Impacts to Waters of the United States

Impacted Area	Acreage	Habitat Quality
Dam Extension	8.27	Low
Borrow Area A	1.55	Low to moderate
Borrow Area B	1.69	Low
Total	11.5	Low to Moderate

The objective of compensatory mitigation is to replace the functions and values of the habitat that will be impacted from the dam rehabilitation. Typically, the acreages of lost habitat is mitigated with a one-to-one replacement ratio to support the same habitat types and functions (i.e., in-kind mitigation). Given the minimum impacts to low value habitat within wus, the impacted areas will be hydroseeded to replace vegetation removed during project construction.

3.1 Proposed Mitigation for disturbances to WUS

There is a total of 11.5 acres of low to moderate value habitat which will be impacted by the project. Approximately 8.27 acres of low value habitat will be permanently impacted due to the extension of the dam. The remaining 3.23 acres of impact is within the borrow areas and will be reclaimed using hydroseed.

3.1.1 Location

Permanent impacts from the dam extension will be replaced in the barren areas of the flood pool using a hydroseed mix of grasses and shrubs. Temporary impacts of the project will be replaced in the borrow areas using a hydroseed mix of desert plants and trees.

3.1.2 Species and Planting Design

The District will hydroseed the proposed borrow areas with the native desert species of the area including velvet mesquite (*Prosopis velutina*), blue paloverde (*Cercidium floridum*), foothills paloverde (*Cercidium microphyllum*), acacia (*Acacia greggii*), ironwood (*Olneya tesota*), Creosote bush (*Larrea Tridentata*) and white brittle bush (*Encelia farinose*). See Table 1. for proposed native seed mix.

Table 1. Proposed Native Seed Mix

Common Name	Scientific Name	Pounds of Pure Live Seed/Acre
Velvet mesquite	<i>Prosopis velutina</i>	2.0
blue paloverde	<i>Cercidium floridum</i>	2.0
Foothills paloverde	<i>Cercidium microphyllum</i>	3.0
Acacia	<i>Acacia greggii</i>	2.0
Ironwood	<i>Olneya tesota</i>	2.0
Creosote bush	<i>Larrea Tridentata</i>	2.5
White brittle bush	<i>Encelia farinose</i>	3.0
	Total	20.5

¹Species may be substituted with an ecologically similar native species if the seed are not available. The District will receive approval on any plant substitutions from the Army Corps of Engineers prior to the mitigation plan implementation

Areas within the impoundment disturbed by the dam extension will be mitigated with a hydroseed mix of native forbs, grasses and plants. See Table 2 for list of plants and native seed mix

Table 2. Proposed Native Seed Mix

Common Name	Scientific Name	Pounds of Pure Live Seed/Acre
Brittle Bush	<i>Encelia farinosa</i>	2.0
Desert Cassia	<i>Cassia covesii</i>	2.0
Globe Mallow	<i>Sphaeralcea ambigua</i>	3.0
Indian Wheat	<i>Plantago insularis</i>	2.0
Purple Three-Awn	<i>Aristida purpurea</i>	2.0
Arabian Grass	<i>Schismus barbatus</i>	2.5
Triangle Bursage	<i>Ambrosia deltoidea</i>	3.0
	Total	16.5

¹Species may be substituted with an ecologically similar native species if the seed are not available. The District will receive approval on any plant substitutions from the Army Corps of Engineers prior to the mitigation plan implementation.

3.1.3 Site Preparation, Plant Material, and Maintenance

The vegetation will be seeded during the fall (mid-October) after completion of the construction. To improve success in the seeded areas, the compacted ground will be scarified and graded to promote passive water collection and to improve the soil moisture.

Maintenance will consist of monitoring the health of the vegetation and maintaining the property. Undesirable weedy species, such as salt cedar and tumbleweed, will be removed. The site will only be mowed to remove undesirable species. Similarly, the trees will be allowed to grow naturally and remain un-pruned.

Monitoring and Measure of Success of the Mitigation Site

Temporary study plots will be established in the borrow areas and impoundment following the hydroseeding. The study plots will be approximately 1/20th acre and be used to record quantitative measurements to document the progress of the plant growth throughout the five years. The District will qualitatively evaluate the health of the vegetation and visit the site once each month for the first year after planting (Table 3). The percent of vegetation coverage will also be evaluated. If an area more than 200 square feet has no vegetation after the first year, the area will be re-hydroseeded. After the first year, the site will be inspected on a quarterly basis.

The District's mitigation goal is to have low quality wildlife habitat within five years. At the end of the fifth year, two measurements including percent of vegetation coverage and species composition will be completed. The mitigation site will have 30% vegetation coverage including no less than 20% from the shrubs and trees. The District will measure and document the percent of vegetative cover using aerial photos, photo points, and field inspections of the study plots. Additionally, the district will conduct field inspections to evaluate the species composition after five years and ensure that at least 30% of the vegetation that is contributing to the vegetative cover are the species that were originally planted and not exotics or other undesirable species.

3.2 Long-term Management Plan

The reseeded areas will be secured from trespassing and potential vandalism to the site. Following plant establishment, passive recreational uses by the public (e.g., walking, birding, etc.) may be permitted by the District.

Table 3. Proposed Monitoring Schedule¹

Time Period	Frequency	Task
Immediately after seeding	First 6 months	<ol style="list-style-type: none"> 1. Establish study plots and photo points. 2. Document density and types of plants.
First Year	Every 6 months	<ol style="list-style-type: none"> 1. Visually evaluate the health of the vegetation. Initiate watering from water truck if needed. 2. Monitor the recruitment and growth of undesirable plant species. Remove if necessary.
At the end of First Year	One time	<ol style="list-style-type: none"> 1. Reapply hydroseed on areas where more than 200 square feet is bare ground.
Year Two through Year Five	Once per quarter	<ol style="list-style-type: none"> 1. Visually evaluate the health of the reseeded vegetation. Adjust the watering schedule if necessary. 2. Monitor the recruitment and growth of undesirable plant species. Remove if necessary.
At the end of the Fifth Year	Once	<ol style="list-style-type: none"> 1. Using field measurements of the study plots and aerial photographs for the entire site, determine the percent vegetation cover for ground cover, shrubs, and trees. 2. Determine the percentage of the vegetation cover that can be attributed to the mitigation efforts compared to nuisance or exotic vegetation.

¹ The frequency of the monitoring schedule is subject to change and may increase if necessary or decrease if appropriate.





Bolin Laboratories Inc.

17631 N. 25th Avenue • Phoenix, Arizona 85023
 (602) 942 8220 • FAX (602) 942 1050

Maricopa County Flood Control
 Environmental Branch
 2801 West Durango
 Phoenix, AZ 85009
 Attn: Dave Gardner

Received: 10/23/98
 Reported: 0/00/00
 Invoice No: 000000

Project Name: White Tanks #3

PARAMETER	METHOD	RESULTS	UNITS	PQL	DATE ANALYZED
Matrix: Solid					
Sample No: 9810-07581-001					Time Sampled: 12:50
Sample ID: WT-3 29 + 00					Date Sampled: 10/23/1998
Asbestos	PLM	10		% Chrysotile	10/26/98
Matrix: Solid					
Sample No: 9810-07581-002					Time Sampled: 12:50
Sample ID: WT-3 46 + 00					Date Sampled: 10/23/1998
Asbestos	PLM	10		% Chrysotile	10/26/98
Matrix: Solid					
Sample No: 9810-07581-003					Time Sampled: 12:50
Sample ID: WT-3 63 + 80					Date Sampled: 10/23/1998
Asbestos	PLM	10		% Chrysotile	10/26/98

Asbestos performed by Legend Technical Services, St. Paul MN, #AZ0557.
 Other Material: < 1% cell, 88% non, < 1% glass

Authorized Signatory
 ADHS License No.: AZ0004