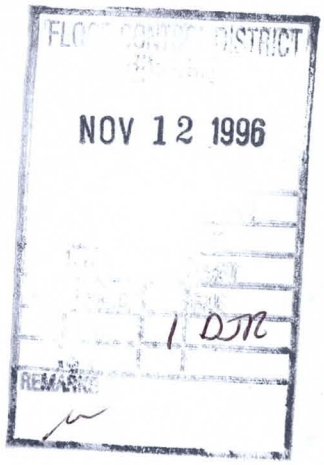

CITY OF TEMPE, ARIZONA
PUBLIC WORKS DEPARTMENT
DIVISION OF ENGINEERING

Contract Documents

for

RIO SALADO TOWN LAKE CUTOFF WALL CONSTRUCTION

PROJECT NO. 946523D

CITY COUNCIL MEMBERS

Mayor - Neil Giuliano

Linda Spears

Dennis Cahill

P. Ben Arredondo

Joseph P. Spracale

Joseph Lewis

Carol E. Smith

1996

SPECIAL NOTICE

BIDS SHALL BE SUBMITTED IN A SEALED ENVELOPE. THE OUTSIDE LOWER RIGHT HAND CORNER SHALL BE MARKED:

BID OF _____, CONTRACTOR,

FOR: **RIO SALADO TOWN LAKE CUTOFF WALL CONSTRUCTION**
PROJECT NO. 946523D

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CITY OF TEMPE, ARIZONA
PUBLIC WORKS DEPARTMENT
DIVISION OF ENGINEERING

NOTICE TO CONTRACTORS

RIO SALADO TOWN LAKE CUT-OFF WALL CONSTRUCTION

PROJECT NO. 946523D

SEALED BIDS will be received by the City of Tempe, Arizona, Public Works Administration, City Hall West Garden Level, 31 East 5th Street, Tempe, Arizona 85281, until 10:30 a.m. November 5, 1996. At that time, bids will be opened and publicly read aloud in the Public Works Conference Room. Bids received after the time specified will be returned unopened.

The proposed work shall consist of installation of **356,000 SF OF SOIL BENTONITE CUT-OFF WALLS AND 27,800 SF OF CEMENT-BENTONITE CUT-OFF WALLS AROUND THE PARAMETER OF THE SALT RIVER FOR LAKE INFILTRATION CONTROL** together with associated work and shall be accomplished in accordance with the "Maricopa Association of Governments Uniform Standard Specifications and Standard Details for Public Works Construction", and "The City of Tempe Supplements thereto" except as otherwise set forth in the Contract Documents. **ONLY PREQUALIFIED CONTRACTORS MAY SUBMIT BIDS FOR THIS PROJECT. CONTRACTORS SUBMITTING A BID WHO HAVE NOT BEEN PREQUALIFIED WILL HAVE THEIR BIDS RETURNED UNOPENED AND UNREAD.**

A bid guarantee acceptable to the City of Tempe in the amount of 10% of the proposal shall be submitted with the proposal. Personal or individual surety bonds are not acceptable. The City requires all bonding companies and liability and excess insurance carriers to have a rating of "A-" or better as listed in the most recent "Best Key Rating Guide (Property and Casualty)" published by A.M. Best Company.

A set of plans, specifications and other contract documents may be purchased from the City Engineering Division (350-8200) upon payment of fifty dollars ($50.00) or checked out for a ten (10) day review period upon deposit of fifty dollars ($50.00).

Work shall not start until after the date of issuance of Notice to Proceed and shall be completed within four-hundred twenty (420) calendar days thereafter. See construction sequencing in the Special Provisions.

The City of Tempe reserves the right to reject any and all bids and to waive any informality in the bids received. Award will be made or bids rejected within thirty (30) days after bid opening.

"NOTICE: THIS CONTRACT CONTAINS AN EXCLUSIVE AND MANDATORY PARTNERING AND AN ALTERNATIVE DISPUTE RESOLUTION PROCESS FOR THE EFFICIENT AND EXPEDITIOUS RESOLUTION OF ALL CLAIMS WHICH MAY ARISE FROM THIS CONTRACT AND OTHER CONTRACTS CONTAINING THESE PROVISIONS FOR THE PROJECT."

Judith Greenberg
Public Works Director

GENERAL PROVISIONS

SPECIFICATIONS

All work done under this contract shall be accomplished in accordance with the Maricopa Association of Governments Uniform Standard Specifications and Standard Details for Public Works Construction and the City of Tempe Supplement thereto except as modified in these Special Provisions.

In the event of any conflict between these Project Specifications and the requirements of the above referenced specifications, codes and regulations, these Project Specifications shall prevail. All bids to receive considerations shall be made in accordance with the General Conditions of the Standard Specifications as set forth hereinafter.

SECURING DOCUMENTS

Copies of specifications, special provisions, and other proposed contract documents are on file in the office of the City Engineer, City Hall, 31 East Fifth Street, Tempe, Arizona, and are open for public inspection. A set of such documents may be obtained from the City Engineer, upon payment of fifty dollars ($50.00), which payment will not be returned. In addition, a set is available to be checked out for a period of ten (10) days upon deposit of fifty dollars ($50.00). If the plans and specifications are returned in the original condition (without marks or alterations) and are returned within the specified ten (10) day period, the deposit will be returned. If either of these conditions are not met, the deposit will not be returned but will instead be kept as payment.

INTERPRETATIONS OF DRAWING AND DOCUMENTS

If any person submitting a bid for the proposed contract is in doubt as to the true meaning of part of the specifications or other contract documents, or finds discrepancies in, or omissions from the specifications, he may submit to the Tempe City Engineer a written request for an interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery. Any interpretations or corrections of the proposed documents will be made by Addendum duly issued, and a copy of each addendum will be mailed or delivered to each person receiving a set of such documents. The City of Tempe will not be responsible for any other explanation or interpretations of the documents.

ADDENDA

Addenda issued during the time of bidding shall be attached to and made a part of the contract documents.

BID SECURITY

Each proposal shall be accompanied by a certified check, cashier's check, or bid bond acceptable to the City in an amount equal to at least ten per cent (10%) of the proposal, payable without condition to the City as a guarantee that the bidder, if awarded the contract, will promptly execute such a contract in accordance with the proposal and in manner and form required by the Contract Documents. Each bid bond shall be executed by a surety company or companies duly authorized to do business in the state and all bond documents shall be executed pursuant to the requirements of Arizona Revised Statutes. The bid security of the two lowest bidders will be retained until the contract is executed or other disposition is made thereof. The bid security of all bidders except the two lowest will be returned promptly after the award of contract.

PROPOSAL

Bids shall be properly executed upon the proposal form attached to and made a part of the contract documents, with items properly filled out. The signature of all persons signing shall be in longhand. The completed forms shall be without interlineations, alterations, or erasures. In case of an error in the extension of unit prices and the totals, the unit price shall govern.

Bids shall not contain any recapitulations of the work to be done. Alternative proposals will not be considered except as called for. No oral, telegraphic, or telephonic proposals or modifications will be considered.

IRREGULAR BIDS

Proposals may be considered irregular and may be rejected if any of the unit prices quoted in the bidding schedule are unbalanced, either above or below the amount of a reasonable bid price, to the potential detriment of the City.

AWARD OF CONTRACT

A contract will be awarded or bids rejected within 30 days after bid opening.

INSURANCE AND BOND RATING REQUIREMENTS

Personal or individual bonds are not acceptable.

Bonding companies and Liability and Excess insurance carriers shall be "Best Rated A-" or better as currently listed in the most recent "Best's Key Rating Guide (Property/Casualty)" published by the A.M. Best Company. This requirement does not apply to the Workmen's Compensation/Employers Liability portion on the Certificate of Insurance.

Each such bond SHALL be executed by a surety company or companies duly licensed to do business in the State of Arizona. 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, and the bonds shall have attached thereto a certified copy of Power of Attorney of the signing official.

INSURANCE REQUIREMENTS

The Contractor's attention is directed to Section 103.6 of the Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction and all such required insurance policies shall additionally provide full coverage of indemnity to the City as set forth below including an increase in the minimum limits to $5,000,000.00 combined single limit coverage. The proof of insurance shall be submitted to the City Engineer prior to execution of contract. Builders Risk Insurance shall be provided as applicable, in accordance with Section 103.6C.

BONDS REQUIRED

Bonds in the following amounts will be required at the time of executing the formal contract and must meet the requirements of Arizona Revised Statutes Title 34, Chapter 2:

1. Performance bond, one hundred percent (100%) of the contract price.
2. Payment bond, one hundred percent (100%) of the contract price.

EXECUTION OF CONTRACT AND BONDS

The form of the contract, which the successful bidder, as Contractor, will be required to execute and the form of bonds which he will be required to furnish, are included in the contract documents and should be carefully examined by the bidder. The successful bidder will be required to execute the bonds and the standard form of contract in three (3) original counterparts within ten (10) days after formal notice of award of contract. Failure to execute a contract and file satisfactory contract bonds as provided herein within 10 calendar days after the date of Notice of Award, shall be just cause for the cancellation of the award and the forfeiture of the bid security which shall become the property of the City of Tempe, not as penalty, but in liquidation of damages sustained. Award may then be made to the next lower responsible bidder or the work may be re-advertised as the City of Tempe may decide.

LICENSES

The Contractor must carry the appropriate State of Arizona contractor's license for the proposed work at the time of the bid. If the low bidder does not have the appropriate license, the City reserves the right to reject their bid and award it to the lowest bidder who has the appropriate license.

Prior to execution of the contract documents, the low bidder must possess a valid City of Tempe Transaction Privilege License and shall provide the Permit Number of such for validation.

EXAMINATION OF PREMISES

The Contractor shall visit the site of the project and shall fully acquaint himself with the conditions as they exist, so that he may fully understand the facility, difficulties and restrictions attending the execution of the work.

Bidders shall also thoroughly examine and be familiar with the specifications and other contract documents. The failure of the Contractor to obtain, receive or examine any addenda to the proposed contract documents, or to visit the site and acquaint himself with the conditions there existing, shall in no way relieve him from any obligation with respect to his proposal.

By submitting a proposal, the Contractor agrees that he has examined the site, specifications and other contract documents and accepts, without recourse, all site conditions and the proposed contract documents.

HAUL PERMIT

In any operation where more than one-tenth of an acre of surface area is disturbed and/or when unpaved onsite haul roads are used, the Contractor will obtain a Maricopa County Earth Moving Permit as required under Rule 200 of the Maricopa County Division of Air Pollution Control Requirements. This permit will require that a Control Plan to mitigate dust and tracking problems be submitted to the County for approval prior to issuance of the Earth Moving Permit. The Control Plan should be submitted to the City of Tempe for review prior to County submittal to ensure that all elements of the planned operation are covered. Please contact the Maricopa County Division of Air Pollution Control at 506-6700 for additional details.

In addition, all Contractors hauling fill or excavation materials where the haul exceeds 5000 cubic yards or when the duration of the haul is more than 10 working days are required to obtain a hauling permit before the hauling operation begins. Prior to receiving a hauling permit, the Contractor must submit the required certificate of insurance, a plan showing the proposed haul routes and a complete schedule of his hauling operation to the City of Tempe Transportation Division. Prior to submittal, the Contractor should contact Engineering Services for complete details.

INDEMNITY

To the fullest extent permitted by laws and regulation, the Contractor shall indemnify and hold harmless the City, its engineer, architect, their employees and agents, from and against all losses and expenses, direct, indirect or consequential, and all claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description brought or recovered against them by any reason of any act, omission, negligence or claimed negligence of the City, its engineer, architect, their employees and agents, other than for loss or damage resulting from the sole negligence of the City, its engineer, architect, their employees and agents, arising from the work, completed work, or product under this contract.

In any and all claims against the City or any of its agents, or employees by any employee of contractor, subcontractor, or any person or organization directly or indirectly employed by any of them to perform or furnish any of the work under the contract or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the City or any person or organization under workers' or workman's compensation acts, disability benefit acts or other employee benefit acts.

PLANS TO THE SUCCESSFUL BIDDER

The successful bidder may obtain (7) sets of Specifications for this project from the office of the City Engineer, at no cost.

If he desires more than seven (7) sets, he shall be required to pay the reproduction cost of fifty dollars ($50.00) each.

START AND COMPLETION OF WORK

Work shall start as soon as practical after the starting date specified in the Notice to Proceed and shall be completed within four-hundred twenty (420) calendar days thereafter.

CONTRACTOR'S CONSTRUCTION SCHEDULE

Within ten (10) days after execution of the contract, the Contractor shall furnish the City Engineer a proposed Construction Progress Schedule, in the form of a Ghant Chart or Critical Path Method (CPM) diagram, indicating dates of commencement and completion of all major activities required in the contract. During construction, the Contractor shall maintain and revise the construction schedule to reflect changes or conditions encountered in the construction work.

CONTRACTOR'S REPRESENTATIVE

The Contractor shall at all times be present at the work in person or represented by a foreman or other properly designated agent. Instructions and information given by the Engineer to the Contractor's foreman or agent on the work shall be considered as having been given to the Contractor.

NON-DISCRIMINATION

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 hereinafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Contracting officer setting forth the provisions of the Non-Discrimination clause.

RELOCATION OF UTILITIES

Except as otherwise provided in the plans or project specifications, all utilities in conflict with the new work will be relocated by the owner thereof.

MISCELLANEOUS REMOVAL AND RELOCATIONS

Miscellaneous removals and relocations shall be construed to mean the removal of all unsuitable materials whether designated or implied by the plans and specifications, and shall include but not be limited to the removal of such items as pipes, concrete, asphalt, block, brick, rock, metal, etc. of every nature and description, unless such items are specifically designated in a separate bid item. Also, certain items require temporary removal and reinstallation such as mail box stands, sign posts, survey monument frames and covers, etc., and are included in this category.

EXCESS MATERIALS

Excess or unsuitable material, broken asphaltic concrete and broken portland cement concrete shall be disposed of by the Contractor. The Contractor shall, prior to commencement of the work, submit a letter to the City Engineer stating the location of disposal site(s) for all excess material and certifying that he has obtained the property owner's permission for the disposal of all surplus material.

ENVIRONMENTAL REQUIREMENTS

The Contractor shall comply with all Federal, State, and Municipal regulations, laws, and policies relating to air, ground water quality, and water conservation. In addition, the following requirements are applicable for City construction projects.

1. Non-pick up sweepers will not be allowed except as required to make joints during chip sealing operations.

2. Water flooding of trenches with potable water will not be permitted.

3. All paints applied by sprayers shall be of a water-based type.

4. Provisions shall be made to prevent the discharge of construction silt, mud, and debris into City storm drains or streets.

5. Spills of oil, gas, chemical, or any other hazardous materials must be reported and removed by approved procedures. Mitigation measures shall be taken to prevent contamination of construction storage sites.

6. Concrete waste must be disposed of in an approved location and at least 25 feet from established landscaping.

7. City of Tempe refuse roll-off containers shall be used on City projects.

8. Hazardous wastes shall not be discharged into the City's sanitary sewers or storm drainage system. All waste products shall be disposed of in accordance with applicable regulations.

9. The discovery of archeological ruins or artifacts must be reported immediately, and excavation shall not resume in the identified area until approved by the Engineer.

10. The Contractor shall take whatever steps, procedures, or means to prevent abnormal, material spillage, or tracking conditions due to his construction operations in connection with the Contract. The dust control measures shall be maintained at all times during construction of the project, to the satisfaction of the City Engineer, in accordance with Rule 200 of the "Maricopa County Health Department Air Pollution Control Regulations", which require that an Earth Moving Permit be issued and a Control Plan be approved prior to commencement of work. Contact the County at 506-6700 for details.

11. The Contractor shall comply with all applicable Federal Regulations concerning NPDES permits for storm discharges from construction sites.

No additional payment will be made for compliance with the above items.

In addition to the above, the use of new products made with reclaimed material and that meet project specifications, are encouraged.

CLEAN-UP

The Contractor shall, upon completion of the work, remove all temporary construction facilities, debris, and unused materials provided for in the work, and put the work site of the work and public right-of-way in a neat and clean condition. No special payment will be made for this item.

APPROXIMATE QUANTITIES

It is expressly understood and agreed by the parties hereto that the quantities of the various classes of work to be done and material to be furnished under this Contract, which have been estimated, as stated in the Proposal, are only approximate and are to be used solely for the purpose of comparing, on a consistent basis, the proposals offered for the work under this Contract; and the Contractor further agrees that the City of Tempe will not be held responsible if any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work as estimated and the work actually done. If any error, omission, or misstatement is found to occur in the estimated quantities, the same shall not invalidate this Contract or release the Contractor from the execution and completion of the

whole or any part of the work in accordance with the specifications and the plans herein mentioned, and for the prices herein agreed upon and fixed therefore, or excuse him from any of the obligations or liabilities hereunder, or entitle him to any damages or compensation except as may be provided for in this Contract.

MISCELLANEOUS WORK AND ALLOWANCES

The following items will be included in the work with no direct payment allowed. Payment shall be included in the payment for other items for which direct payment is made.

1. Contractor's expenses for but not limited to mobilization, job site office, storage facilities, traffic control and public safety devices, sanitary facilities, utilities and telephone.
2. Cleanup including day to day cleanup.
3. Notification to residents adjacent to this project prior to start of construction which would affect them.
4. Water required for compaction or dust control.
5. Miscellaneous removals and relocations not otherwise specified in the Technical Provisions.
6. Power pole bracing.
7. Removal of trees twelve inches (12") or less in diameter.
8. Removal, relocation and/or modification of existing walls and fences.
9. Trimming of trees and bushes.
10. Replacement of plant material and repair of irrigation equipment to meet or exceed conditions existing prior to Contractor beginning work.

SUPERVISION BY CONTRACTOR

The Contractor will supervise and direct the work. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The Contractor will employ and maintain on the work a qualified supervisor or superintendent who shall have been designated in writing by the Contractor as the Contractor's representative at the site. The supervisor shall have full authority to act on behalf of the Contractor and all communications given to the supervisor shall be as binding as if given to the Contractor. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the work.

PROTECTION OF FINISHED OR PARTIALLY FINISHED WORK

The Contractor shall properly guard and protect all finished or partially finished work, and shall be responsible for the same until that phase is completed and accepted by the City Engineer. Estimate or partial payment of work so completed shall not release the Contractor from such responsibility but he shall turn over the entire work in full accordance with these specifications before final payment can be made.

SURVEY CONTROL POINTS

Existing survey markers (brass caps, hand holes or iron pipes) shall be protected by the Contractor or removed and replaced under the direct supervision of the City Surveyor or his authorized representatives. Lot corners shall not be disturbed without knowledge and consent of the property owner and only after such corner has been properly referenced for replacement.

CONSTRUCTION STAKING

Construction staking will be provided by the City of Tempe or their designated representative in accordance with Section 105.8 of the MAG Specifications unless otherwise provided for in whole or in part in the Special Provisions.

Replacement of construction stakes that have been knocked out due to Contractor's work or lack of work, weather condition, traffic, or vandalism will be at the Contractor's expense.

AUTHORITY OF THE CITY ENGINEER APPOINTED REPRESENTATIVE

The Engineer shall act as the City Engineer's designated representative during the construction period. He shall advise on questions concerning coordination with the City of Tempe, public safety, and quality and acceptability of materials and work performed. The Engineer or his assigned inspector shall interpret the intent of the Contract Plans, Specifications, and Technical Provisions in an unbiased manner. The Engineer or his assigned inspector shall be present on the site at times during construction to monitor the work and to maintain records for contract management. The Engineer shall promptly make decisions relative to the interpretation of the contract document so as to minimize delays in construction. The Engineer will not be responsible for directing construction, control, techniques, sequence, or procedures, or for directing job safety.

SHOP DRAWINGS, SCHEDULES & SAMPLES

In time for each to serve its proper purpose and function, the Contractor shall submit to the Engineer such schedules, reports, drawings, lists, literature samples, instruction, directions, and guarantees as are specified or reasonably required for construction, operation, and maintenance of the facilities to be built and/or furnished under this Contract.

Shop drawings and data shall be submitted to the Engineer in such number of copies as will allow him to retain four (4) copies of each submittal. The submittal shall clearly indicate the specific area of the Contract Documents for which the submittal is made. The additional copies received by him will be returned to the Contractor's representative at the job site. The Engineer's notations of the action which he has taken will be noted on one (1) of these returned copies.

The above drawings, lists, prints, samples, and other data shall become a part of the Contract and a copy of the same shall be kept with the jobsite Contract Documents, and the fabrications furnished shall be in conformance with the same. However, the Engineer's review of the above drawings, lists, prints, specifications, samples, or other data shall in no way release the Contractor from his responsibility for the proper fulfillment of the requirements of this Contract nor for fulfilling the purpose of the installation nor from his liability to replace the same, should it prove defective or fail to meet the specified requirements.

BLUE STAKE

The Contractor is required to notify Blue Stake (263-1100) prior to the excavation of any material in accordance with ARS 40-360.22. The Contractor shall directly contact the City for marking of electrical for traffic signals, sprinkler and irrigation facilities.

SALT RIVER PROJECT CONSTRUCTION CLEARANCE AGREEMENT

Salt River Project requires all contractors who will be working on their facilities to sign a standard form "Construction Clearance Agreement" prior to issuance of a license. This agreement sets forth the requirements to complete the proposed work in an allotted time frame or to pay full costs for others to complete. It also obligates the contractor to comply with all applicable federal, state, and local laws, rules, regulations, and ordinances including, but not limited to, the new OSHA Permit Required Confined Space rules. The contractor is responsible for executing a "Construction Clearance Agreement" with Salt River Project, if required, and furnishing a copy to the City of Tempe prior to proceeding with any construction on Salt River Project facilities.

QUALITY CONTROL

All material shall be new and of the specified quality and equal to the accepted samples, if samples have been submitted. All work shall be done and completed in a thorough, workmanlike manner, notwithstanding any omission from these Contract Documents; and it shall be the duty of the Contractor to call the Engineer's attention to apparent errors or omissions and request instruction before proceeding with the work. The Engineer may, by appropriate instruction, correct errors and supply omissions, which instructions shall be as binding upon the Contractor as though contained in the original contract documents.

At the option of the Engineer, materials to be supplied under this Contract will be tested and/or inspected either at their place of origin or at the site of the work. The Contractor shall give the Engineer written notification well in advance of actual readiness of materials to be tested and/or inspected at point of origin. Satisfactory tests and inspections at the point of origin shall not be construed as a final acceptance of the material nor shall it preclude retesting or reinspection at the site of the work.

CHANGE ORDERS

In the event that significant changes in the scope of the work, and/or changes in the quantities due to contingencies of construction becomes necessary, such changes shall be made in accordance with Section 104 of General Conditions in the MAG 1979 Uniform Standard Specifications.

INSPECTION

The Contractor is responsible for complying with the specifications and is hereby forewarned that final approval of any work will not be given until the entire project is completed and accepted.

NOTIFICATION OF PROPERTY OWNERS

All property owners that may be affected by the proposed construction activities shall be notified of scope and duration of the construction activities by the Contractor prior to start of construction.

ACCESS

Access shall be maintained to adjacent businesses at all times during construction. Where property has more than one point of access, no more than one access shall be restricted or closed at any one time. Access to adjacent private driveways shall be maintained during all non-working hours.

PROTECTION OF EXISTING FACILITIES

The Contractor is to protect all existing facilities during construction. Utility poles that may be affected by the construction activities shall be protected and/or braced by the Contractor. The Contractor shall notify the appropriate Utility Company or agency of any construction that may affect their facilities and state the course of action which will be taken to protect same.

UNDERGROUND UTILITIES

Underground utilities indicated on the plans are in accordance with maps furnished by the City of Tempe and by each utility company. The locations are only approximate and require verification prior to construction as per Tempe requirements for underground street crossings and potholing.

HINDRANCES AND DELAYS

A. Except as provided in paragraph B, no charge shall be made by the Contractor for hindrances or delays from any cause during the progress of any portion of the work embraced in this contract; but such delays, if due to no fault or neglect of the Contractor, shall entitle the Contractor to a time extension sufficient to compensate for the delays. The amount of the delay shall be determined by the Engineer provided the Contractor gives the Engineer immediate notice in writing of the cause of such delay.

B. The parties agree to negotiate for the recovery of damages related to expenses incurred by the Contractor for a delay under the following circumstances:

   1. If the City is solely responsible for the delay which is unreasonable under the circumstances, and

   2. Which delay was not within the contemplation of the parties to the contract at the time the contract was entered into, and

   3. The Contractor can show the impact of the delay on the critical path of the construction activity as indicated in an approved CPM schedule.

The maximum compensation for an unreasonable or unforeseen delay shall not exceed the daily amount specified for liquidated damages as based on the original contract amount.

This section shall not be construed to void any provisions of this contract which require notice of delays, provides for arbitration or other procedure for settlement or provides for liquidated damages.

SUBSIDIARY WORK

All work called for in the specifications and/or shown on the drawings shall be performed by the Contractor and unless a specific bid item is provided for the work, then such portion of the work will be considered subsidiary to other work for which payment is provided.

AS-BUILT DRAWINGS

The Contractor shall provide accurate data and field notes as construction progresses, for preparation of the "As-built" drawings by the Engineer. Final payment for the project will not be given until all such information is submitted.

FINAL ACCEPTANCE & GUARANTEE

"Final Acceptance" shall mean a written final acceptance of the work. The City Engineer shall make the final acceptance promptly after the work has been completed in accordance with the contract documents and after inspection is made. The work performed under this contract shall be guaranteed for a period of one year from the date of final acceptance.

SPECIAL PROVISIONS

A. Add the following sections to the General Provisions:

DEFINITION OF OWNER AND ENGINEER

The term OWNER used in the construction documents refers to the City of Tempe.

The term DESIGN ENGINEER used in the construction documents refers to CH2M HILL.

The term ENGINEER and RESIDENT ENGINEER used in the construction documents refers to PARSONS BRINCKERHOFF CONSTRUCTION SERVICES.

STAGING AREAS

CONTRACTOR shall be responsible for repair or replacement at its own expense of any equipment or materials damaged or destroyed due to flood events or other occurrences within the river, or the staging areas as shown on Drawing D-G-2.

PERMITS

OWNER will obtain and pay only for the following construction permits and licenses:

US COE Section 404 Permit
US EPA National Pollution Discharge Elimination System Permit
Arizona Department of Environmental Quality Water Quality Certification
Arizona Department of Water Resources Dam Safety
Arizona Department of Water Resources Recovery Well Permit
Arizona Department of Transportation Permit
Flood Control District of Maricopa County
City of Tempe Building Permit
Union Pacific Railroad Company
Arizona Public Service
Salt River Project

A copy of each permit is attached in the Appendix. CONTRACTOR shall examine the permits and shall conform to the requirements contained therein, including the purchase of additional Bonds or insurance as specified therein, and such requirements are hereby made a part of these Contract Documents as fully and completely as though the same were set forth herein. Failure to examine the permits will not relieve CONTRACTOR from compliance with the requirements stated therein.

The successful bidder will be required to obtain all other necessary permits and comply with all provisions of said permits. There will be no charge to CONTRACTOR for the necessary City of Tempe permits and inspections.

REPORTS

In preparation of the Drawings and Specifications, DESIGN ENGINEER has prepared the following reports of explorations and tests of subsurface conditions:

1. Report dated December 1994 prepared by CH2M HILL entitled "Geotechnical/ Hydrogeological Data Report for the Rio Salado Town Lake Project."
2. Report dated January 1996 prepared by CH2M HILL entitled "Addendum No. 1 to Geotechnical/Hydrogeological Data Report for the Rio Salado Town Lake Project."
3. Report dated February 1996 prepared by CH2M HILL entitled "Geotechnical/ Hydrogeological Design Report - Rio Salado Town Lake Project."

A copy of these reports are available for review at the office of City of Tempe Engineering during regular business hours.

These reports and drawings are not part of the Contract Documents. CONTRACTOR is not entitled to rely upon other information and data utilized by DESIGN ENGINEER in the preparation of Drawings and Specifications.

OTHER WORK

Other work anticipated to be performed at the site by others prior to, during, and in sequence with the scheduled performance of the Work under these Contract Documents as described in Section 01040, COORDINATION.

Should CONTRACTOR cause damage to the work or property of any separate contractor at the site, or should any claim arising out of or resulting from CONTRACTOR's performance of the Work at the site be made by any separate contractor against CONTRACTOR, OWNER, DESIGN ENGINEER, or RESIDENT ENGINEER or any other person, CONTRACTOR shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by mediation, arbitration, or at law.

CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold OWNER, DESIGN ENGINEER, and RESIDENT ENGINEER and the officers, directors, employees, agents, and other consultants of each and any of them harmless from and against all claims, costs, losses and damages, (including, but not limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising directly, indirectly or consequentially out of or resulting from any action, legal or equitable, brought by a separate contractor against OWNER, DESIGN ENGINEER, or RESIDENT ENGINEER or the officers, directors, employees, agents, or other consultants of each and any of them to the extent based on a claim caused by, arising out of, or resulting from CONTRACTOR's performance of the Work.

Should a separate contractor cause damage to the Work or property of CONTRACTOR or should the performance of work by any separate contractor at the site give rise to any other claim, CONTRACTOR shall not institute any action, legal or equitable, against OWNER, DESIGN ENGINEER, or RESIDENT ENGINEER or the officers, directors, employees, agents, or other consultants of each and any of them or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any mediator or arbitrator which seeks to impose liability on or to recover damages from OWNER, DESIGN ENGINEER, or RESIDENT ENGINEER or the officers, directors, employees, agents, or other consultants of each and any of them on account of any such damage or claim.

If CONTRACTOR is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor and OWNER and CONTRACTOR are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, CONTRACTOR may make a claim for an extension of time. An extension of the Contract Times shall be CONTRACTOR's exclusive remedy with respect to OWNER, DESIGN ENGINEER, or RESIDENT ENGINEER or the officers, directors, employees, agents, or other consultants of each and any of them for any delay, disruption, interference or hindrance caused by any separate contractor. This article does not prevent recovery from OWNER, DESIGN ENGINEER, or RESIDENT ENGINEER or the officers, directors, employees, agents, or other consultants of each and any of them for activities that are their respective responsibilities.

ASBESTOS, PCBs, PETROLEUM, HAZARDOUS WASTE, OR RADIOACTIVE MATERIAL

CONTRACTOR shall not be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material uncovered or revealed at the site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. Relevant and applicable regulations of federal, state, and local governments will be used to describe "substantial danger." OWNER will not be responsible for any such materials brought to the site by CONTRACTOR, Subcontractors, Suppliers or anyone else for whom CONTRACTOR is responsible.

CONTRACTOR shall immediately: (i) stop all Work in connection with such hazardous condition and in any area affected thereby (except in an emergency) and (ii) notify OWNER and RESIDENT ENGINEER (and thereafter confirm such notice in writing). OWNER shall promptly consult with RESIDENT ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such hazardous condition or take corrective action, if any. CONTRACTOR shall not be required to resume Work in connection with such hazardous condition or in any such affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR special written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (ii) specifying any special conditions under which such Work may be

resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of such Work stoppage or such special conditions under which Work is agreed by CONTRACTOR to be resumed, either party may make a claim.

If after receipt of such special written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order such portion of the Work that is in connection with such hazardous condition or in such affected area to be deleted from the Work. OWNER may reasonably have such deleted portion of the Work performed by OWNER's own forces or others in order that Work for the full Project is completed in a timely and efficient manner

NO DAMAGE FOR DELAY DUE TO FLOODING

It is understood and agreed that CONTRACTOR has considered in its proposal all the risk due to flooding and unavailability of the Work site associated with working in the Salt River and that no additional compensation will be allowed for any delays or inconvenience due to unavailability of the Work site resulting from flooding or stormwater flow in said river. If delays are encountered due to flooding and unavailability of the Work site due to water in the river, the Contract Time will be adjusted in accordance with Section 108.7 of MAG.

SUBLETTING OF CONTRACT

This section to include all Work performed under this contract, CONTRACTOR/Bidder shall perform with his own organization Work amounting to not less than 60 percent of the total cost. Subcontractor list will be a required submittal. 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 OWNER. Subcontracts shall be in accordance with Paragraph 108.2 of the MAG Specifications.

BIDDER QUALIFICATIONS

Contractor licensed in Arizona having successfully constructed not less than one similar facility in scope, nature, quantity, and cost within the preceding 5 years. Provide references for each project constructed within the past 5 years, including name and contact information. Submit all statements of qualification in a separate package, as attachment to bid forms.

ACTUAL DAMAGES

The Work specified in this Contract embraces an important segment of construction necessary to complete the Rio Salado Town Lake project. Any delay in the completion of this Contract will materially delay the overall completion of the Rio Salado Town Lake project, thereby causing great inconvenience to the public, added cost of engineering and supervision, and other tangible and intangible losses. Therefore, if the Work authorized by this Contract shall remain incomplete after the time specified in the Contract Documents for completion of the Work or after any authorized extension of such stipulated time, the CONTRACTOR shall be liable to the OWNER for the cost of actual damages caused by said

delay. Actual damages shall be determined at time of assessment and shall cover all losses and expenses incurred by the OWNER in conjunction with the failure of the CONTRACTOR to complete the Contract Work on time.

OWNER may withhold from CONTRACTOR the amount of $1,500 per day that the Contract is not completed on schedule (change orders issued will extend original scheduled deadline), as presumptive damages for delay by CONTRACTOR. OWNER shall promptly pay to CONTRACTOR all presumptive damages which exceed actual damages which have been finally determined through the partnering process or the Alternate Dispute Resolution process set forth in this Contract together with 10 percent per annum interest thereon from the date withheld.

Actual damages include, but are not limited to the following items:

1. Damages awarded to other Rio Salado construction contractors resulting from Contract interference or delay caused by the failure of this Contract to be completed on time.

2. Engineering cost associated with delayed contract completion including, but not limited to, inspection, survey layout, materials testing, and contract administration.

3. Loss of anticipated revenues for use of the lake and lake facilities.

4. Other costs that are identified as being directly related to the impact of failure to complete this Contract within the specified Contract time.

5. Cost of financing the Project.

PARTNERING

The foundation and development of a partnering relationship with the CONTRACTOR is a goal of the OWNER. The partnering relationship is to be structured to draw on the strength of each organization and to identify and achieve reciprocal goals. Partnering objectives include efficient and effective contract performance, completion of contract work within budget, on schedule, and in accordance with the Drawings and Specifications.

The partnering relationship shall be bilateral in makeup. An initial formal partnering workshop shall be scheduled after the award of the contract, but prior to the Notice to Proceed. The workshop shall be facilitated by a third party competent in the fundamentals of partnering, who is mutually acceptable to the CONTRACTOR and OWNER. In order to effectively develop the desired partnering relationships, the CONTRACTOR shall encourage attendance by any and all of its project subcontractors. Joint informal partnering meetings, scheduled on 3-month (quarterly) intervals, shall be undertaken throughout the term of the construction contract to strengthen and maintain the initial partnering concepts. The quarterly partnering meetings shall be scheduled to immediately follow the weekly construction progress meeting and shall be at 3-month intervals beginning the third month following the

month in which the construction Notice to Proceed is issued. The agenda of the joint quarterly meetings shall be structured to include review of potential conflicts or upcoming claims, as wall as to review, discuss, and solidify personal relationships between the various participants. Should the OWNER determine that there is need to strengthen the partnering relations, one or more follow-up workshops shall be scheduled. The cost of such workshops shall be shared as set forth in this Specification.

A fundamental aspect of partnering and a key goal of the development of the partnering relationship is dispute resolution in a timely, professional, and nonadversarial manner. In the event that the OWNER determines, in its sole discretion, that a dispute cannot be resolved by this partnering process, the City Engineer shall notify the Neutral Evaluator and all disputes shall be resolved pursuant to the Alternative Dispute Resolution provisions of this contract.

Payment for partnering will be shared equally between the CONTRACTOR and the OWNER. Payment shall include rental costs of the meeting room or other facilities utilized to host the partnering session(s); salary cost of the facilitator, lunch meals for those in attendance, printing, copying, word processing, and other costs incidental to preparing and distributing written materials in preparation of or forthcoming from partnering sessions. Salary cost of participants - except facilitator - is excluded from cost sharing as defined herein.

The CONTRACTOR shall make arrangements for the meeting room and other facilities necessary to conduct the partnering session(s) and shall front all costs including facilitator salary. The OWNER will reimburse the CONTRACTOR for the OWNER's share of partnering costs based on invoices or other documents supporting claimed expenditure. All such documentation shall be subject to review and approval by the OWNER. The OWNER reserves the right to reject, reduce, or otherwise modify claimed cost reimbursement to conform with the cost reimbursement as defined herein.

The CONTRACTOR and OWNER shall submit to the partnering process set forth herein any dispute which arises from the interpretation, work, or directions given under this contract within 5 days that the dispute is or should have been discovered by either party.

ALTERNATIVE DISPUTE RESOLUTION

Scope

Notwithstanding anything to the contrary provided elsewhere in the Contract documents, the alternative dispute resolution (ADR) process provided for herein shall be the exclusive means for resolution of claims or disputes arising under, relating to or touching upon the Contract, the interpretation thereof or the performance or breach by any party thereto, including, but not limited to, original claims or disputes asserted as cross claims, counterclaims, third party claims or claims for indemnity or subrogation, in any threatened or ongoing litigation or arbitration with third parties, if such disputes involve parties to contracts containing this ADR provision.

Neutral Evaluator, Arbitrators

The OWNER has selected High-Point Rendel (Charles Dahill) as a Neutral Evaluator to serve as set forth in this ADR process. The OWNER and CONTRACTOR shall each select an arbitrator of their choice within 15 days of the date of execution of this Contract to serve as set forth in this ADR process. Each arbitrator selected shall be a member of the State Bar of the State of Arizona, and shall be experienced in the field of construction law. Neither the arbitrator nor the arbitrator's firm shall have presently, or in the past, represented any party to the arbitration.

Neutral Evaluation Process

If the parties have been unable to resolve the disputes pursuant to the Partnering Agreement the following neutral evaluation process shall be used to resolve any such disputes:

1. Notification of Dispute: The City Engineer shall promptly notify the Neutral Evaluator in writing of the existence of a dispute.

2. Nonbinding Information Hearing: The Neutral Evaluator shall schedule a nonbinding informal hearing of the matter to be held within 7 days from receipt of notification of the existence of a dispute. The Neutral Evaluator may conduct the hearing in such manner as deems appropriate and shall notify each party to attend the hearing and present evidence they believe will resolve the dispute. The Neutral Evaluator is not bound by the rules of evidence in admitting evidence in the hearing and may limit the length of the hearing, witnesses or evidence introduced to the extent that he deems same to be relevant and efficient. Each party to the dispute shall be notified by the Neutral Evaluator that they shall submit a written outline of the issues and evidence intended to be introduced at the hearing and propose resolution of the dispute to the Neutral Evaluator before the hearing commences. Arbitrators shall not participate in such informal hearing or proceedings process.

3. Nonbinding Decision: The Neutral Evaluator shall render a nonbinding written decision as soon as possible, but not later than 5 days after the hearing.

Binding Arbitration Procedure

If the neutral evaluation procedure is unsuccessful, the following binding arbitration procedure shall serve as the exclusive method to resolve such a dispute. If any party chooses not to accept the decision of the Neutral Evaluator, such party shall notify the Neutral Evaluator in writing within 3 business days of receipt of the Neutral Evaluator's decision of a request for arbitration. The party requesting arbitration shall post a cash bond with the Neutral Evaluator in the amount of $5,000, or a greater amount as determined by the Neutral Evaluator, that will defray the cost of the arbitration as set forth in paragraph 13, Fees and Cost, and the proceeds from said bond shall be allocated in accordance with said paragraph by the Arbitration Panel.

1. Arbitration Panel: The Arbitration Panel shall consist of the arbitrator selected by the parties involved in the dispute, (i.e., OWNER's arbitrator, CONTRACTOR's arbitrator, or any other CONTRACTOR's arbitrator who has a contract with the OWNER which contains this ADR provision and is a party to the dispute), and the foregoing arbitrators shall select a neutral arbitrator as set forth herein. The Neutral Evaluator shall participate in the proceedings and in the deliberations but shall not be entitled to vote.

2. Selection of Neutral Arbitrator: The selected arbitrators shall choose additional arbitrator(s) (one additional arbitrator or two additional arbitrators as needed to ensure that the arbitration panel will consist of an odd number of arbitrators), within 5 days of receipt of notification of a dispute from the Neutral Evaluator. The Neutral Arbitrator(s) shall have the same qualifications as those of the arbitrators set forth in the Neutral Evaluator, Arbitrators paragraph. In the event that the selected arbitrators cannot agree on additional Neutral Arbitrators as set forth above, the Neutral Evaluator shall select the additional arbitrator(s).

3. Expedited Hearing: The parties have structured this procedure with the goal of providing for the prompt and efficient resolution of all disputes falling within the preview of this ADR process. To that end, any party can petition the Neutral Evaluator to set an expedited hearing if circumstances justify it. The Neutral Evalulator shall contact the selected Arbitration Panel and arrange for scheduling of the arbitration at the earliest possible date. In any event, the hearing of any dispute not expedited will commence as soon as practical, but in no event later than 20 days after notification of request for arbitration having been submitted. This deadline can be extended only with the consent of all the parties to the dispute, or by decision of the Arbitration Panel upon a showing of emergency circumstances.

4. Procedure: The Neutral Evaluator shall act as Chairman of the Arbitration Panel and will conduct the hearing that will resolve disputes in a prompt, cost efficient manner giving due regard to the rights of all parties. Each party shall supply to the

Arbitration Panel a written prehearing statement which shall contain a brief statement of the nature of the claim or defense, a list of witnesses and exhibits, a brief description of the subject matter of the testimony of each witness who will be called to testify, and an estimate as to the length of time that will be required for the arbitration hearing. The Arbitration Panel may review and consider the Neutral Evaluator's decision. The Chairman shall determine the nature and scope of discovery, if any, and the manner of presentation of relevant evidence consistent with the deadlines provided herein, and the parties' objective that disputes be resolved in a prompt and efficient manner. No discovery may be had of privileged materials or information. The Chairman upon proper application shall issue such orders as may be necessary and permissible under law to protect confidential, proprietary or sensitive materials or information from public disclosure or other misuse. Any party may make application to the Maricopa County Superior Court to have a protective order entered as may be appropriate to conform to such orders of the Chairman.

5. Hearing Days: To effectuate the parties' goals, the hearing once commenced, will proceed from business day to business day until concluded, absent a showing of emergency circumstances.

6. Award: The Arbitration Panel shall, within 10 days from the conclusion of any hearing, issue its award. The award shall include an allocation of fees and costs pursuant to the Binding Arbitration Procedure paragraph herein. Any award providing for deferred payment shall include interest at the rate of 10 percent per annum. The award is to be rendered in accordance with the Contract and the law of the State of Arizona.

7. Scope of Award: The Arbitration Panel shall be without authority to award punitive damages, and any such punitive damage award shall be void. The Arbitration Panel shall also be without authority to issue an award against any individual party in excess of $2,000,000, exclusive of interest, arbitration fees, costs, and attorney's fees. If an award is made against any individual party in excess of $100,000, exclusive of interest, arbitration fees, costs, and attorneys' fees, it must be supported by written findings of fact, conclusions of law and statement as to how damages were calculated.

8. Jurisdiction: The Arbitration Panel shall not be bound for jurisdictional purposes by the amount asserted in any party's claim, but shall conduct a preliminary hearing into the question of jurisdiction upon application of any party at the earliest convenient time, but not later than the commencement of the arbitration hearing.

9. Entry of Judgment: Any party can make application to the Maricopa County Superior Court for confirmation of any award and for entry of judgment on it.

10. Severance and Joinder: To reduce the possibility of inconsistent adjudications, the Neutral Evaluator or the Arbitration Panel, may at the request of any party, join and/or sever parties, and/or claims arising under other contracts containing this ADR provision, and the Neutral Evaluator, (Chairman) may, on his own authority, join or sever parties and/or claims subject to this ADR process as they deem necessary for a just resolution of the dispute, consistent with the parties' goal of the prompt and efficient resolution of disputes. Nothing herein shall create the right by any party to assert claims against another party not recognized under the substantive law applicable to the dispute. Neither the Neutral Evaluator or the Arbitration Panel are authorized to join to the proceeding parties not in privity with the OWNER.

11. Appeal: Any party may appeal errors of law by the Arbitration Panel if, but only if, the errors arise in an award in excess of $100,000; the exercise by the Chairman or Arbitration Panel of any powers contrary to or inconsistent with the Contract; or any of the grounds provided in A.R.S. 12-1512. Appeals shall be to the Maricopa County Superior Court within 15 days of entry of the award. The standard of review in such cases shall be that applicable to the consideration of a motion for judgment notwithstanding the verdict, and the Maricopa County Superior Court shall have the authority to confirm, vacate, modify or remand an award appealed under this section.

12. Uniform Arbitration Act: Except as otherwise provided herein, binding arbitration pursued under this provision shall be governed by the Uniform Arbitration Act as enacted in Arizona in A.R. S. 12-1501, et. seq.

13. Fees and Costs: Each party shall bear its own fees and costs in connection with any informal hearing before the Neutral Evaluator. All fees and costs associated with any arbitration before the Arbitration Panel, including without limitation and the Arbitration Panelists' fees, and the prevailing party's attorneys' fees, expert witness fees and costs, will be paid by the nonprevailing party, except as provided for herein. The determination of prevailing and nonprevailing parties, and the appropriate allocation of fees and costs, will be included in the award by the Arbitration Panel. Fees for the Neutral Evaluator shall be a project cost.

14. Confidentiality: Any proceeding initiated under ADR shall be deemed confidential to the maximum extent allowed by Arizona law and no party shall make any disclosures related to the disputed matter or the outcome of any proceeding except to the extent required to seek interim equitable relief or to enforce an agreement reached or an award made hereunder.

15. Equitable Litigation: Notwithstanding any other provision of ADR to the contrary, any party can petition the Maricopa County Superior Court for interim equitable relief as necessary to preserve the status quo and prevent immediate and irreparable harm to a party or to the Project pending resolution of a dispute pursuant to ADR provided for herein. No court may order any permanent injunctive relief except as may be necessary to enforce an order or award entered by the Arbitration Panel. The fees and costs incurred in connection with any such equitable proceeding shall be determined and assessed in ADR.

16. Change Order: Any award in favor of the CONTRACTOR against the OWNER or in favor of the OWNER against the CONTRACTOR shall be reduced to a Change Order and executed by the parties in accordance with the award and the provisions of General and Special Conditions to this Construction Contract.

17. Merger and Bar: Any claim asserted pursuant to this ADR process shall be deemed to include all claims, demands, and requests for compensation for costs and losses or other relief, including the extension of Contract Time which reasonably should or could have been brought against any party that was or could have been brought into this ADR process. The Arbitration Panel shall apply legal principles commonly known as merger and bar to deny any claim or claims against any party regarding which claim or claims recovery has been sought or should have been sought in a previously adjudicated claim for an alleged cost, loss, breach, error, or omission

B. Modify the following sections within the General Provisions:

SPECIFICATIONS

Replace the first paragraph of this section within the General Provisions with the following:

All Work done under this contract shall be accomplished in accordance with these Project Specifications supplemented by the Maricopa Association of Governments (MAG) Uniform Standard Specifications and Standard Details for Public Works Construction and the City of Tempe Supplement, including 1995 revisions.

INSURANCE REQUIREMENTS

Add the following to this section within the General Provisions:

Include the following as additional insureds:

OWNER: City of Tempe
DESIGN ENGINEER: CH2M HILL
RESIDENT ENGINEER: PARSONS BRINCKERHOFF CONSTRUCTION SERVICES

INDEMNITY

Replace the first paragraph under this section in the General Provisions with the following:

> To the fullest extent permitted by laws and regulation, CONTRACTOR shall indemnify and hold harmless OWNER, DESIGN ENGINEER, RESIDENT ENGINEER, their employees and agents from and against all losses and expenses, direct, indirect, or consequential, and all claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description brought or recovered against them by any reason of any act, omission, negligence, or claimed negligence of OWNER, DESIGN ENGINEER, RESIDENT ENGINEER, their employees and agents, other than for loss or damage resulting from the sole negligence of the OWNER, DESIGN ENGINEER, RESIDENT ENGINEER, their employees, and agents, arising from the Work, completed Work, or product under this contract.

CONTRACTOR'S CONSTRUCTION SCHEDULE

Delete this section in the General Provisions and refer to Section 01310, PROGRESS SCHEDULES.

MISCELLANEOUS WORK AND ALLOWANCES

Replace Item No. 1 of this section in the General Provisions with the following:

1. CONTRACTOR's expenses for, but not limited to, mobilization, jobsite office, storage facilities, traffic control and public safety devices, sanitary facilities, utilities, and telephone, unless specifically allowed in the Contract Documents.

SHOP DRAWINGS, SCHEDULES, AND SAMPLES

Delete the second paragraph of this section in the General Provisions and refer to Section 01300, SUBMITTALS.

QUALITY CONTROL

Add the following to this section within the General Provisions:

> Tests required by Contract Documents to be performed by CONTRACTOR and that require test certificates be submitted to OWNER or RESIDENT ENGINEER for acceptance shall be made by an independent testing laboratory or agency licensed or certified in accordance with Laws and Regulations and applicable state and local statutes. In the event state license or certification is not required, testing laboratories or agencies shall meet the following applicable requirements:
>
> 1. "Recommended Requirements for Independent Laboratory Qualification" published by the American Council of Independent Laboratories.

2. Basic requirements of ASTM E329, "Standard of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction" as applicable.

3. Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards or accepted values of natural physical constants.

FINAL ACCEPTANCE & GUARANTEE

Add the following:

Prior to requesting a certificate of final acceptance, and allowing occupancy of the facilities, CONTRACTOR shall provide an inspection by a state industrial representative or a federal or state (OSHA) representative qualified in the construction type being inspected, to determine that the facilities provided are in compliance with the state and federal safety requirements. Signed copies of the inspection reports shall be submitted to RESIDENT ENGINEER for OWNER's files. Violations or deficiencies noted therein shall be resolved by CONTRACTOR prior to occupancy of the facilities and before final payment will be made.

CITY OF TEMPE

TEMPE, ARIZONA

TECHNICAL SPECIFICATIONS

for the construction of the

RIO SALADO TOWN LAKE

PROJECT NO. 946523-D

CUTOFF WALL CONSTRUCTION

****

****

CH2M HILL

Tempe, Arizona

November 1996

Project No. 111253.09

Copy No._____

CONTENTS

END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.1 RIO SALADO TOWN LAKE PROJECT

A. The City of Tempe, Arizona's, Rio Salado Town Lake Project is an urban redevelopment project focused on the construction of a 200-acre recreational lake in the normally dry Salt River bed. Water flows in the river channel in response to flood events. Water may also occur in the river due to localized storm events or incidental releases into the storm drain system.

B. The 2-mile long lake will be formed by impounding water using air-inflatable rubber dams. The depth of the lake will vary from 6 feet at the upstream end to 19 feet at the downstream end. During seasonal flooding, the dams will be lowered to allow flood waters to pass downstream. When flooding stops, the dams will be raised to impound water for the lake once again. When fully deflated, the dams must pass the 100-year peak flood flows of 215,000 cfs and must also pass the peak sediment volume of 230,000 tons per day during the 100-year event. It is expected that the dam will be fully deflated during about 10 percent of the flood events.

C. The downstream dam will consist of a 16-foot high rubber dam on a 3-foot high sill and will control the water level in the lake. A smaller 6-foot high dam at the upstream end will capture local river discharges, creating a wetlands-type riparian enhancement zone while reducing the flow of pollutants into the lake.

D. Infiltration from the lake will be controlled by a combination of cutoff walls and controlled extraction/recovery wells. Infiltration from the downstream (western) portion of the lake will be controlled using cutoff walls along the lake boundary. Approximately 10 recovery wells will be used along the upstream (eastern) portion to collect and pump back to the lake an estimated 40 million gallons per day of infiltrated water.

E. A reliable source of water is required as makeup water for losses due to evaporation. Facilities provided include new connections to the Salt River Project canal system for delivery to the lake. Water for the initial filling of the lake and for monitoring the lake water level will be conveyed through a new 48-inch pipeline. This pipeline provides a connection between the existing SRP Lateral 2-4.6 and the existing 66-inch storm drain which empties into the lake.

F. A stormwater management system will be constructed to improve the water quality in the lake by reducing the inflow of potential pollutants and contaminants. Stormwater diversions will capture and bypass the "first flush" from several major stormwater discharges to a point either upstream or downstream of the lake. In addition, detention areas will be provided to

reduce the potential for spills from the Red Mountain Freeway entering the lake.

G. The Rio Salado Town Lake Project is divided into the following four schedules:

1. Schedule A: Pipe and Well Systems.
2. Schedule B: Dam Facilities.
3. Schedule C: Shoreline Improvements.
4. Schedule D: Cutoff Wall Construction.

1.2 WORK COVERED BY THESE CONTRACT DOCUMENTS (SCHEDULE D):

A. The completed Work covered by these Contract Documents will provide OWNER with the soil-bentonite and cement-bentonite cutoff walls for the purpose of controlling infiltration from the downstream portion of the Town Lake. The completed Work Includes:

1. Northshore soil-bentonite cutoff wall.
2. Southshore soil-bentonite cutoff wall.
3. Downstream dam cement-bentonite cutoff wall.
4. Armor protection layer.

1.3 WORK NOT COVERED BY THESE CONTRACT DOCUMENTS

A. Schedule A: Pipe and Well Systems.

B. Schedule B: Dam Facilities.

C. Schedule C: Shoreline Improvements.

1.4 PROVISIONS FOR FUTURE WORK

A. Provisions for future construction are as shown.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01025
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 ADMINISTRATIVE SUBMITTALS

A. Schedule of Values: Submit schedule on CONTRACTOR's standard form.

B. Application for Payment.

C. Final Application for Payment.

1.2 SCHEDULE OF VALUES

A. Prepare a separate schedule of values for each schedule of Work under the Agreement.

B. Lump Sum Work:

1. Reflect schedule of values format included in conformed Bid Form, specified allowances, alternates, and equipment selected by OWNER, as applicable.
2. List Bonds and insurance premiums, mobilization, demobilization, facility startup, and contract closeout separately.
3. Break down by Division 2 through 16 with appropriate subdivision of each Specification for each of the Project facilities.

C. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.

D. Each pay item reflecting a schedule of values shall be subject to a review and approval of RESIDENT ENGINEER. An unbalanced or front-end loaded schedule will not be acceptable.

E. Summation of the complete schedule of values representing all Work shall equal the Contract Price.

F. Submit schedule of values on 3.5-inch, 1.44mb diskettes, in a spreadsheet format compatible with the latest version of Excel.

1.3 APPLICATION FOR PAYMENT

A. RESIDENT ENGINEER shall prepare both monthly and final contract progress payments and submit to OWNER for approval. Payment shall be based on data received from CONTRACTOR, subject to evaluation and concurrence of RESIDENT ENGINEER.

B. CONTRACTOR shall transmit application for payment to RESIDENT ENGINEER on a draft Application for Payment Form provided by OWNER.

C. Attach one Schedule of Value form with each draft application for payment for each lump sum item of Work and include a request for payment of materials and equipment on hand as applicable. Execute certification by authorized officer of CONTRACTOR.

D. Preparation:

1. Round values to nearest dollar.
2. List each Change Order and Written Amendment executed prior to date of submission as separate line item. Totals to equal those shown on the Transmittal Summary Form for each schedule as applicable.
3. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as applicable, a listing of materials on hand for each schedule as applicable, and such supporting data as may be requested by RESIDENT ENGINEER.

1.4 MEASUREMENT – GENERAL

A. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and specifications as specified in National Institute of Standards and Technology, Handbook 44.

B. Whenever pay quantities of material are determined by weight, the material shall be weighed on scales furnished by CONTRACTOR and certified accurate by the state agency responsible. A weight or load slip shall be obtained from the weigher and delivered to RESIDENT ENGINEER at the point of delivery of the material.

C. If material is shipped by rail, the car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.

D. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by RESIDENT ENGINEER. Each vehicle shall bear a plainly legible identification mark.

E. Quantities Based on Profile Elevations: Existing ground profiles shown on Drawings were taken from a topographic map drawn with contour intervals of 1 foot with supplementary spot elevations to the nearest half foot.

F. Quantities will be based on ground profiles surveys made by OWNER to confirm accuracy of elevations shown.

G. Units of measure shown on the Bid Form shall be as follows unless specified otherwise.

Item	Method of Measurement
CY	Cubic Yard – Field Measure by RESIDENT ENGINEER within the limits specified or shown

Item	Method of Measurement
EA	Each–Field Count by RESIDENT ENGINEER
HR	Hour
LF	Linear Foot–Field Measure by RESIDENT ENGINEER
LS	Lump Sum–Unit is one; no measurement will be made
SF	Square Foot
SY	Square Yard

1.5 PAYMENT

A. General: Progress payments will be made monthly on the date established at the preconstruction meeting.

B. Payment for Lump Sum Work covers all Work specified or shown within the limits or Specifications, or as described as follows:

1. Item No. 1, Mobilization/Demobilization, Diversion and Care of Water, and Miscellaneous Items: CONTRACTOR shall be compensated for one-time mobilization/demobilization of CONTRACTOR's personnel, equipment, supplies, incidentals, establishment of offices, building and other facilities required for the performance of the Work under this contract. Also included in this item is the diversion and care of water and demolition of existing facilities, and all Work for the Project with the exception of those items specifically listed as either lump sum or unit price items. Payment for mobilization/demobilization will be made at the contract lump sum price shown in the Bid Schedule for Bid Item 1, Mobilization/Demobilization. Payment shall be made in equal one-third portions. The first one-third shall be paid with CONTRACTOR's first monthly progress payment. The second one-third shall be paid when the total payment to CONTRACTOR for the bid items under this contract, exclusive of payment for mobilization/demobilization, equals one-half of the total bid amount. The remaining one-third shall be paid as part of the final contract payment due CONTRACTOR. If CONTRACTOR performs a second mobilization/demobilization of personnel, material, and/or equipment at the ENGINEER's expressed written request, CONTRACTOR shall be compensated for such expense at CONTRACTOR's actual cost. CONTRACTOR shall provide all documentation requested by RESIDENT ENGINEER in support of said cost.

C. Payment for unit price items covers all Work necessary to furnish and install the following items:

1. Item No. 2, Soil Bentonite Wall: Includes all excavation, slurry, backfill material processing, imported fine soil, surveying, and CONTRACTOR's quality control. Payment for the soil bentonite

wall shall be paid on a square foot of wall area (length times depth) basis and based on measurements from the surveyed existing ground surface at the wall centerline with the depth measured every 25 feet by sounding. The sounding and measurements will be done jointly by CONTRACTOR and RESIDENT ENGINEER.

2. Item No. 3, Cement-Bentonite Wall: Includes all excavation, slurry, backfill material processing, imported fine soil, drilling, surveying, and CONTRACTOR quality control. Payment for the soil bentonite wall shall be paid on a square foot of wall area (length times depth) basis and based on measurements from the surveyed existing ground surface at the wall centerline with depth measured every 25 feet by sounding. The sounding will be done jointly by CONTRACTOR and RESIDENT ENGINEER.
3. Item No. 4, Cement: Includes all cement used on the Project minus any waste. Payment for the cement shall be paid on a per ton basis, measured to the nearest 1/10 of a ton.
4. Item No. 5, Bentonite: Includes all bentonite used on the Project minus any waste. Payment for the bentonite shall be paid on a per ton basis.
5. Item No. 6, Armor Stone Layer: Includes all excavation of the armor area, processing and importing the armor stone, processing or importing the gravel bedding, or protective layer, supply and installation of the geosynthetic clay lining and completion of the armor stone layer. Payment for the armor stone layer shall be paid based on a square foot area. The area will be measured from 11-1/2 feet beyond the centerline of the cutoff wall to the intersection of the cement-stabilized alluvium with the existing channel bottom. The distance will be measured every 100 feet.
6. Item No. 7, Rock Excavation: Includes all labor and equipment required for rock and grade control structure No. 4CSA excavation required for construction. Does not include geologic bedrock excavation at the bottom of the trench or preparation of the CSA to receive the CCL. Payment will be made at the contract unit price bid per cubic yard of rock and CSA excavated.
7. Item No. 8, Drilling and Coring: Includes all labor, materials, and equipment to drive through the alluvium and core into the geologic bedrock at the downstream dam cement/bentonite cutoff wall. Payment will be made on the contract unit price bid per foot of boring drilled and cored.

1.6 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for following:

1. Loading, hauling, and disposing of rejected material.
2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
3. Rejected loads of material, including material rejected after it has been placed by reason of failure of CONTRACTOR to conform to provisions of Contract Documents.
4. Material not unloaded from transporting vehicle.
5. Defective Work not accepted by OWNER.
6. Material remaining on hand after completion of Work.

1.7 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings or preliminary operation and maintenance manuals are acceptable to RESIDENT ENGINEER.

B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to CONTRACTOR unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01040
COORDINATION

PART 1 GENERAL

1.1 SUBMITTALS

A. Photographs and other records of examination.

1.2 PARTNERING

A. OWNER and CONTRACTOR will have a partnering relationship as described in the Special Provisions. In addition, other utilities, agencies, and contractors will be included in the partnering process.

1.3 OTHER WORK

A. Coordination of OWNER's Work by Others: Reference the General Conditions for coordination of OWNER's work by others, if any, and coordinate CONTRACTOR's Work with OWNER or OWNER's designated coordinator.

B. Other work is anticipated to be performed at site by others prior to, during, and in sequence with scheduled performance of Work under these Contract Documents as follows:

C. Public Utilities and Agencies:

1. Water:
   a. Salt River Project: Tom Sands, telephone number: 602/236-2371.
   b. Work to be performed by SRP:
      1) Provide new turnout and flowmeter on existing canal on northside of lake to provide makeup water and filling water to Town Lake.
      2) Provide flowmeter at existing turnout structure on southside of Lake to provide makeup water and filling water to Town Lake.
   c. Work to be Performed by CONTRACTOR: Coordinate CONTRACTOR's Work with SRP.
   d. OWNER will be responsible for payment of any direct charges of SRP.
2. Power:
   a. Agency and Contact Person: Arizona Public Service, Vicki Reynolds, telephone number: 602/493-4433.
   b. Work to be performed by APS:
      1) Incoming underground power cables, materials, installation, termination, and connections to all facilities.
      2) Transformers supplying main electric service to the facility.
      3) Metering facilities, except as indicated.

4) Work to be perfomed by APS should be complete prior to award of this contract.

c. Work to be performed by CONTRACTOR:
1) Coordinate CONTRACTOR's Work with APS.
2) Incoming power trench, and backfill, and duct system.
3) Transformer site preparation and pad(s).
4) As indicated.
5) Perform Work in accordance with APS requirements and codes.

d. OWNER will be responsible for payment of direct charges of APS.

D. Agencies:

1. Flood Control District of Marciopa County (FCDMC):
a. OWNER will obtain a license from the FCDMC prior to any work which impacts the levees or other flood control features.
b. OWNER will notify the FCDMC at least 48 hours prior to any construction activities which require disturbing the levee CSA or gabions. This will allow the FCDMC inspector to be onsite for inspection purposes.
c. OWNER will not backfill over any levee gabions that may be distributed as part of construction without first having the gabions inspected by the FCDMC. Any damage to the gabions shall be repaired by CONTRACTOR to the satisfaction of the FCDMC.
d. OWNER will not place backfill or concrete against the levee CSA without first having the CSA inspected by the FCDMC. Any damage to the CSA shall be repaired by CONTRACTOR to the satisfaction of the FCDMC.
e. CONTRACTOR shall allow inspection by FCDMC representatives to the activities specified above.

2. Department of Water Resources (DWR):
a. OWNER will obtain a license to operate the dam from DWR prior to filling of the lake.
b. CONTRACTOR shall allow inspection by DWR Dam Safety representative to all activities related to this Project.
c. OWNER will notify DWR at least 48 hours prior to any construction activities requiring their inspection and approval.

E. Other Contractors:

1. Schedule A: Pipe and Well Systems (contractor unknown).
a. Storm drains.
b. Source water supply.
c. Recovery wells and pipe.

2. Schedule B: Dam Facilities (contractor unknown).
a. Upstream and downstream dam.
b. Upstream and downstream dam control buildings.

3. Schedule C: Shoreline Improvements (contractor unknown).
a. Northshore and shoreline improvements.
b. Southshore shoreline improvements.

4. North Bank Bike Path (contractor unknown):

a. Bike path between SPTC railroad bridge and Rural Road on northshore.

5. The work by these other contractors will be conducted concurrently with this contract.
6. Work to be performed by CONTRACTOR:
   a. Coordinate CONTRACTOR's Work with work of other contractor, particularly at the following locations:
      1) North or South shoreline improvements.
      2) Downstream dam foundation and cutoff walls.
      3) Modifications to existing storm drain outfalls.

1.4 UTILITIES

A. Coordinate Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during Work.

1. Salt River Project Electricity Company:
   a. Contact Person: Jim Frescholtz.
   b. Telephone: 602/236-8476.
2. U.S. West Telephone Company:
   a. Contact Person: Bruce Bartlett.
   b. Telephone: 602/831-4753.
3. City of Tempe Water Department:
   a. Contact Person: Don Hawkes.
   b. Telephone: 602/350-2660.
4. City of Tempe Public Works Department:
   a. Contact Person: Howard Hargis.
   b. Telephone: 602/350-8200.
5. Telephone Company: AT&T.
   a. Contact Person: Blue Stake.
   b. Telephone: 602/263-1100, or
   c. Contact Person: Cable Hazard Center.
   d. Telephone: 1-800-252-1133.
6. Telephone Company: MCI
   a. Contact Person: Blue Stake.
   b. Telephone: 602/263-1100, or
   c. Contact Person: Fiber Security Department.
   d. Telephone: 1-800-782-5348.
7. Cable TV Company: Cox Cable
   a. Contact Person: Shawn Hawkins
   b. Telephone: 602/352-5860, Extension 159._
8. Gas Company: Southwest Gas.
   a. Contact Person: Howard Warren.
   b. Telephone: 602/484-5235 or 602/271-4277.
9. Water Department: City of Phoenix Water Department:
   a. Contact Person: 24-hour Emergency.
   b. Telephone: 602/261-8000.
10. Nitrogen Company: Air Products.
    a. Contact Person: Paul Sansoucy.
    b. Telephone: 602/899-7700.
11. Electricity Company: Arizona Public Service.
    a. Contact Person: Vicki Reynolds.

b. Telephone: 602/493-4433.

12. Flood Control: Flood Control District of Maricopa County.
    a. Contact Person: Fred Fuller.
    b. Telephone: 602/506-1501 or 602/506-4728.

B. Railroad(s) serving the area at or near site:

1. Railroad: Union Pacific Railroad.
    a. Office Address: Denver, CO.

1.5 PROJECT MEETINGS

A. General:

1. RESIDENT ENGINEER: Schedule physical arrangements for meetings throughout progress of Work, prepare meeting agenda with OWNER and CONTRACTOR input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within 5 days after each meeting to participants and parties affected by meeting decisions.
2. Representatives of OWNER, CONTRACTOR, and Subcontractors shall attend meetings, as needed.

B. Preconstruction Conference:

1. CONTRACTOR shall be prepared to discuss the following subjects, as a minimum:
    a. Required schedules.
    b. Status of Bonds and insurance.
    c. Sequencing of critical path work items.
    d. Project changes and clarification procedures.
    e. Use of site, access, office and storage areas, security and temporary facilities.
    f. Major product delivery and priorities.
    g. CONTRACTOR's safety plan and representative.
2. Attendees may include but not be limited to:
    a. OWNER's representatives.
    b. CONTRACTOR's office representative.
    c. CONTRACTOR's resident superintendent.
    d. CONTRACTOR's quality control representative.
    e. Subcontractors' representatives whom CONTRACTOR may desire or RESIDENT ENGINEER may request to attend.
    f. RESIDENT ENGINEER's representatives.
    g. Others as appropriate.
    h. Progress payment procedures.

C. Preliminary Schedules Acceptability Review Meeting: As set forth in the General Conditions.

D. Progress Meetings:

1. RESIDENT ENGINEER will schedule regular progress meetings at site, conducted weekly to review Work progress, progress schedule, Shop Drawing and Sample submissions schedule, Application for Payment, contract modifications, and other matters needing discussion and resolution.
2. Attendees will include:
   a. OWNER's representative(s), as appropriate.
   b. CONTRACTOR, Subcontractors, and Suppliers, as appropriate.
   c. RESIDENT ENGINEER's representative(s).
   d. Flood Control District's representative(s).
   e. Department of Water Resources Dam Safety, Safety Section representatives.
   f. Others as appropriate.

E. Quality Control and Coordination Meeting(s):

1. Scheduled by RESIDENT ENGINEER on regular basis and as necessary to review test and inspection reports, and other matters relating to quality control of Work and work of other contractors.
2. Attendees will include CONTRACTOR, CONTRACTOR's designated quality control representative, selected Subcontractors and Suppliers, contractors responsible for other construction schedules, and RESIDENT ENGINEER's representatives.

F. Preinstallation Meetings:

1. When required in individual Specification sections, convene at site prior to commencing Work of that section.
2. Require attendance of entities directly affecting, or affected by, Work of that section.
3. Notify RESIDENT ENGINEER 4 days in advance of meeting date.
4. Provide suggested agenda to RESIDENT ENGINEER to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

G. Other Meetings: In accordance with Contract Documents and as may be required by OWNER and RESIDENT ENGINEER.

1.6 SEQUENCE OF WORK

A. Certain work, sequence, order, and direction is specified in Section 01310, PROGRESS SCHEDULES, Article SCHEDULE RESPONSIBILITIES. Compliance with this section is required to integrate the multiple construction activities scheduled to occur in this area. CONTRACTOR's construction schedule must conform to the requirements set forth in Section 01310, PROGRESS SCHEDULES, Article SCHEDULE RESPONSIBILITIES and the master Rio Salado Town Lake schedule shown in Exhibit A to Section 01310, PROGRESS SCHEDULES.

B. Construct Work in stages to allow for OWNER's uninterrupted operation during construction. Coordinate construction schedule and operation with the OWNER.

C. Be responsible for bypass facilities and temporary connections required to maintain OWNER's operations. Sequences other than those specified will be considered by RESIDENT ENGINEER, provided they afford equivalent continuity of operations.

D. Power outages will be considered upon 48 hours written request to OWNER and RESIDENT ENGINEER. Describe the reason, anticipated length of time, and areas affected by the outage in its written request. Provide temporary provisions for continuous power supply to critical existing facility components if requested by OWNER and RESIDENT ENGINEER.

E. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of OWNER's operations.

F. Coordinate proposed Work with the RESIDENT ENGINEER and facility operations personnel before effecting unit shutdowns. Under no circumstances cease Work at the end of a normal working day if such actions may inadvertently cause a cessation of any facility operating process, in which case, remain onsite until necessary repairs are complete.

G. Do not close lines, open valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after approval of OWNER and RESIDENT ENGINEER. Such actions will be considered by OWNER and RESIDENT ENGINEER upon 48 hours written notice to RESIDENT ENGINEER.

1.7 ADJACENT FACILITIES AND PROPERTIES

A. Examination:

1. After Effective Date of the Agreement and before Work at site is started, CONTRACTOR, RESIDENT ENGINEER, and affected property owners and utility owners shall make thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which might be damaged by construction operations. Periodic reexamination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.
2. Record observations for signature of RESIDENT ENGINEER and CONTRACTOR.

B. Documentation:

1. Submit two copies of photographs or other records documenting examination for RESIDENT ENGINEER's signature. RESIDENT ENGINEER will review, sign, and return one record copy of every observation document and photograph to CONTRACTOR to be kept on file in CONTRACTOR's field office as site records.

2. These observations and photographs are intended for use as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of CONTRACTOR's operations, and are for protection of adjacent property owners, CONTRACTOR, and OWNER.

1.8 OWNER FACILITIES

A. Operation and Shutdown of Existing Facilities:

1. Continuous operation of OWNER's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.
2. Conduct Work outside regular working hours on prior written consent of OWNER to meet Project schedule and avoid undesirable conditions.
3. Do not proceed with Work affecting a facility's operation without obtaining OWNER's advance approval of the need for and duration of such Work.
4. Provide 7 days advance request for approval to OWNER of need to shut down a process or facility.

B. Relocation of Existing Facilities:

1. During construction, it is expected that minor relocations of Work will be necessary.
2. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other necessary items.
3. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
4. Perform relocations to minimize downtime of existing facilities.
5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by RESIDENT ENGINEER.

1.9 PHYSICAL CONDITIONS

A. Exercise reasonable care to verify locations of existing subsurface structures and Underground Facilities.

B. Thoroughly check immediate and adjacent areas subject to excavation by visual examination (and by electronic metal and pipe detection equipment, as necessary) for indications of subsurface structures and Underground Facilities.

C. Make exploratory excavations where existing Underground Facilities or structures may potentially conflict with proposed Underground Facilities or structures. Conduct exploratory excavations in presence of RESIDENT ENGINEER and sufficiently ahead of construction to avoid possible delays to CONTRACTOR's Work.

1.10 REFERENCE POINTS AND SURVEYS

A. Dimensions for lines and elevations for grades of structures, appurtenances, and utilities are indicated on Drawings, together with other pertinent information required for laying out Work. If conditions vary from those indicated, notify RESIDENT ENGINEER immediately, who will make minor adjustments required.

B. Any existing survey points or other control markers destroyed without proper authorization will be replaced by owner of the survey points or control markers at the CONTRACTOR's expense.

C. CONTRACTOR's Responsibilities:

1. Locate and protect reference points prior to starting site preparation.
2. Notify RESIDENT ENGINEER at least 3 working days in advance of time when grade and line to be provided by others will be needed.
3. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
4. In event of discrepancy in data or staking provided by RESIDENT ENGINEER, request clarification before proceeding with Work.
5. Preserve and leave undisturbed control staking until RESIDENT ENGINEER has completed checks it deems necessary.
6. Re-establish reference points resulting from destruction by CONTRACTOR's operations.
7. Provide competent employee(s), tools, stakes, and other equipment and materials as RESIDENT ENGINEER may require to:
   a. Check layout, survey, and measurement Work performed by others.
   b. Measure quantities for payment purposes.
8. Cooperate with RESIDENT ENGINEER so that checking and measuring may be accomplished with least interference to CONTRACTOR's operations.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 CUTTING, FITTING, AND PATCHING

A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.

B. Obtain prior written authorization of RESIDENT ENGINEER before commencing Work to cut or otherwise alter:

1. Structural or reinforcing steel, structural columns or beams, elevated slabs, trusses, or any other structural member.
2. Weather- or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Work of others.

C. Refinish surfaces to provide an even finish.

1. Refinish continuous surfaces to nearest intersection.
2. Refinish entire assemblies.
3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and Work is evident in finished surfaces.

D. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown.

E. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use best recommended practice of manufacturer or appropriate trade association.

F. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.

G. Remove specimens of installed Work for testing when requested by RESIDENT ENGINEER.

END OF SECTION

SECTION 01092
ABBREVIATIONS

PART 1 GENERAL

1.1 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES

A. Reference to standards and specifications of technical societies and reporting and resolving discrepancies associated therewith shall be as provided herein and in the individual Specification sections.

B. Work specified by reference to the published standard or specification of a government agency, technical association, trade association, professional society or institute, testing agency, or other organization shall meet the requirements or surpass the minimum standards of quality for materials and workmanship established by the designated standard or specification.

C. Where so specified, products or workmanship shall also meet or exceed the additional prescriptive or performance requirements included within the Contract Documents to establish a higher or more stringent standard of quality than that required by the referenced standard.

D. Where two or more standards are specified to establish quality, the product and workmanship shall meet or exceed the requirements of the most stringent.

E. Where both a standard and a brand name are specified for a product in the Contract Documents, the proprietary product named shall meet or exceed the requirements of the specified reference standard.

F. Copies of standards and specifications of technical societies:

1. Copies of applicable referenced standards have not been bound in these Contract Documents.
2. Where copies of standards are needed by the CONTRACTOR, obtain a copy or copies directly from the publication source and maintain in an orderly manner at the site as Work site records, available to the CONTRACTOR's personnel, Subcontractors, OWNER, and RESIDENT ENGINEER.

1.2 ABBREVIATIONS

A. Abbreviations for trade organizations and government agencies: Following is a list of construction industry organizations and government agencies to which references may be made in the Contract Documents, with abbreviations used.

1.	AA	Aluminum Association
2.	AABC	Associated Air Balance Council
3.	AAMA	American Architectural Manufacturers Association

4.	AASHTO	American Association of State Highway and Transportation Officials
5.	ACI	American Concrete Institute
6.	AFBMA	Anti-Friction Bearing Manufacturers' Association
7.	AGA	American Gas Association
8.	AGMA	American Gear Manufacturers' Association
9.	AI	Asphalt Institute
10.	AISC	American Institute of Steel Construction
11.	AISI	American Iron and Steel Institute
12.	AITC	American Institute of Timber Construction
13.	ALS	American Lumber Standards
14.	AMA	Acoustical Materials Association
15.	AMCA	Air Movement and Control Association
16.	ANSI	American National Standards Institute
17.	APA	American Plywood Association
18.	API	American Petroleum Institute
19.	APWA	American Public Works Association
20.	AREA	American Railway Engineering Association
21.	ARI	Air Conditioning and Refrigeration Institute
22.	ASA	American Standards Association
23.	ASAE	American Society of Agricultural Engineers
24.	ASCE	American Society of Civil Engineers
25.	ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
26.	ASNT	American Society for Nondestructive Testing
27.	ASME	American Society of Mechanical Engineers
28.	ASTM	American Society for Testing and Materials
29.	AWI	Architectural WoodWork Institute
30.	AWPA	American Wood Preservers' Association
31.	AWPB	American Wood Preservers Bureau
32.	AWPI	American Wood Preservers' Institute
33.	AWS	American Welding Society
34.	AWWA	American Water Works Association
35.	BHMA	Builders Hardware Manufacturers' Association
36.	CBMA	Certified Ballast Manufacturers' Association
37.	CDA	Copper Development Association
38.	CGA	Compressed Gas Association
39.	CIPRI	Cast Iron Pipe Research Institute
40.	CISPI	Cast Iron Soil Pipe Institute
41.	CMAA	Crane Manufacturers' Association of America
42.	CRSI	Concrete Reinforcing Steel Institute
43.	CS	Commercial Standard
44.	CSA	Canadian Standards Association
45.	CSI	Construction Specifications Institute
46.	CTSS	Caltrans Standard Specification
47.	EJCDC	Engineers Joint Contract Documents' Committee
48.	ETL	Engineering Test Laboratories
49.	FCC	Federal Communications Commission
50.	FEMA	Federal Emergency Management Agency
51.	FGMA	Flat Glass Marketing Association
52.	FM	Factory Mutual
53.	Fed. Spec.	Federal Specifications
54.	FS	Federal Specification

55.	GA	Gypsum Association
56.	HI	Hydraulic Institute
57.	HMI	Hoist Manufacturers' Institute
58.	ICBO	International Conference of Building Officials
59.	ICEA	Insulated Cable Engineers' Association
60.	IEEE	Institute of Electrical and Electronics Engineers, Inc.
61.	IES	Illuminating Engineering Society
62.	IFI	Industrial Fasteners Institute
63.	ISA	Instrument Society of America
64.	ISO	Insurance Service Office
65.	JIC	Joint Industry Conferences of Hydraulic Manufacturers
66.	MAG	Maricopa Association of Governments, Uniform Standard Specifications and Details for Public Works Construction
67.	MIA	Marble Institute of America
68.	Mil. Sp. or MIL	Military Specification
69.	MS	Military Specifications
70.	MMA	Monorail Manufacturers' Association
71.	NAAMM	National Association of Architectural Metal Manufacturers
72.	NACE	National Association of Corrosion Engineers
73.	NBHA	National Builders' Hardware Association
74.	NEC	National Electrical Code
75.	NECA	National Electrical Contractor's Association
76.	NEMA	National Electrical Manufacturers' Association
77.	NESC	National Electric Safety Code
78.	NFPA	National Fire Protection Association
79.	NHLA	National Hardwood Lumber Association
80.	NHPMA	Northern Hardwood and Pine Manufacturer's Association
81.	NLMA	National Lumber Manufacturers' Association
82.	NRCA	National Roofing Contractors Association
83.	NSF	National Sanitation Foundation Testing Laboratory
84.	NSPE	National Society of Professional Engineers
85.	NTMA	National Terrazzo and Mosaic Association
86.	NWWDA	National Wood Window and Door Association
87.	OECI	Overhead Electrical Crane Institute
88.	OSHA	Occupational Safety and Health Act (both Federal and State)
89.	PCI	Prestressed Concrete Institute
90.	PEI	Porcelain Enamel Institute
91.	PPI	Plastic Pipe Institute
92.	PS	Product Standards Section–U.S. Department of Commerce
93.	RMA	Rubber Manufacturers' Association
94.	SAE	Society of Automotive Engineers
95.	SCPRF	Structural Clay Products Research Foundation
96.	SDI	Steel Deck Institute
97.	SDI	Steel Door Institute
98.	SIGMA	Sealed Insulating Glass Manufacturing Association
99.	SJI	Steel Joist Institute

100.	SMACNA	Sheet Metal and Air Conditioning Contractors National Association
101.	SPI	Society of the Plastics Industry
102.	SSPC	Steel Structures Painting Council
103.	SWI	Steel Window Institute
104.	TEMA	Tubular Exchanger Manufacturers' Association
105.	TCA	Tile Council of America
106.	UBC	Uniform Building Code
107.	UFC	Uniform Fire Code
108.	UL	Underwriters Laboratories Inc.
109.	UMC	Uniform Mechanical Code
110.	US	U.S. Bureau of Standards
111.	USBR	Bureau of Reclamation
112.	WCLIB	West Coast Lumber Inspection Bureau
113.	WWPA	Western Wood Products Association

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.1 GENERAL

A. Inquiries: Direct to RESIDENT ENGINEER regarding procedure, purpose, or extent of Submittal.

B. Timeliness: Schedule and make submissions in accordance with requirements of individual Specification sections and in such sequence as to cause no delay in Work or in work of other contractors.

C. Identification of Submittals:

1. Complete, sign, and transmit with each Submittal package, one Transmittal of CONTRACTOR's Submittal Form.
2. Identify each Submittal with the following numbering and tracking system:
   a. Sequentially number each Submittal.
   b. Resubmission of a Submittal will have original number with sequential alphabetic suffix.
3. Format: Orderly, indexed with labeled tab dividers.
4. Show date of submission.
5. Show Project title and OWNER's contract identification and contract number.
6. Show names of CONTRACTOR, Subcontractor or Supplier, and manufacturer as appropriate.
7. Identify, as applicable, Contract Document section and paragraph to which Submittal applies.
8. Identify Submittal type; submit only one type in each Submittal package.
9. Identify and indicate each deviation or variation from Contract Documents.

D. Resubmissions: Clearly identify each correction or change made.

E. Incomplete Submittal Submissions:

1. RESIDENT ENGINEER will return the entire Submittal for CONTRACTOR's revision/correction and resubmission.
2. Submittals which do not clearly bear CONTRACTOR's specific written indication of CONTRACTOR review and approval of Submittal or which are transmitted with an unsigned or uncertified submission form or as may otherwise be required will be returned to CONTRACTOR unreviewed.

F. Nonspecified Submissions: Submissions not required under these Contract Documents and not shown on submissions will not be reviewed and will be returned to CONTRACTOR.

G. RESIDENT ENGINEER's Review: RESIDENT ENGINEER will act upon CONTRACTOR's Submittal and transmit response to CONTRACTOR not later than 30 days after receipt, unless otherwise specified. Resubmittals will be subject to the same review time.

H. Schedule Delays:

1. No adjustment of Contract Times or Price will be allowed due to RESIDENT ENGINEER's review of Submittals, unless all of the following criteria are met:
   a. CONTRACTOR has notified RESIDENT ENGINEER in writing that timely review of Submittal in question is critical to progress of Work, and has received RESIDENT ENGINEER's written acceptance to reflect such on current accepted submissions and progress schedule. Written agreement by RESIDENT ENGINEER to reduce Submittal review time will be made only for unusual and CONTRACTOR-justified reasons. Acceptance of a progress schedule containing Submittal review times less than specified or less than agreed to in writing by RESIDENT ENGINEER will not constitute RESIDENT ENGINEER's acceptance of the review times.
   b. RESIDENT ENGINEER has failed to review and return first submission of a Submittal within agreed time indicated on current accepted schedule of submissions or, if no time is indicated thereon, within 30 days after receipt.
   c. CONTRACTOR demonstrates that delay in progress of Work is directly attributable to RESIDENT ENGINEER's failure to return Submittal within time indicated and accepted by RESIDENT ENGINEER.
2. No adjustment of Contract Times or Price will be allowed due to delays in progress of Work caused by rejection and subsequent resubmission of Submittals, including multiple resubmissions.

1.2 SHOP DRAWINGS AND SAMPLES

A. Copies:

1. Shop Drawings and Product Data: Seven.
2. Samples: Three, unless otherwise specified in individual Specification sections.

B. General: Submit to RESIDENT ENGINEER as required by individual Specification sections. RESIDENT ENGINEER will distribute to DESIGN ENGINEER for review.

C. Identify and Indicate:

1. Pertinent Drawing sheet(s) and detail number(s), products, units and assemblies, and system or equipment identification or tag numbers.
2. Critical field dimensions and relationships to other critical features of Work.
3. Samples: Source, location, date taken, and by whom.
4. Each deviation or variation from Contract Documents.

D. Design Data: When specified, provide Project-specific information as required and as necessary to clearly show calculations, dimensions, logic and assumptions, and referenced standards and codes upon which design is based.

E. Foreign Manufacturers: When proposed, include following additional information:

1. Names and addresses of at least two companies closest to Project that maintain technical service representatives.
2. Complete inventory of spare parts and accessories for each piece of equipment.

F. Preparation:

1. Format: Whenever possible, schedule for and combine Shop Drawings and Samples required for submission in each Specification section or division into a single Submittal package. Also combine product data for like items into a single Submittal package.
2. Present in a clear and thorough manner and of sufficient detail to show kind, size, arrangement, and function of components, materials, and devices and compliance with Contract Documents. Identify details by reference to sheet and detail, and schedule or room numbers shown on Drawings.
3. Reproducible Copy:
   a. Preferred Minimum Sheet Size: 8-1/2- by 11-inch and 11- by 17-inch pages, suitable for photocopying.
   b. Larger than 11- by 17-Inch Sheets: 22-inch by 34-inch preferred, mylar or sepias suitable for copying in a blueprint machine.
4. Piping Systems: Drawn to scale.
5. Product Data: Clearly mark each copy to identify pertinent products or models and show performance characteristics and capacities, dimensions and clearances required, wiring or piping diagrams and controls, and external connections, anchorages, and supports required.
6. Equipment and Component Titles: Identical to title shown on Drawings.
7. Manufacturer's standard schematic drawings and diagrams as follows:
   a. Modify to delete information that is not applicable to Work.
   b. Supplement standard information to provide information specifically applicable to Work.

G. Shop Drawing Disposition: DESIGN ENGINEER will review, mark, and stamp as appropriate and submit copies to RESIDENT ENGINEER. RESIDENT ENGINEER will distribute marked-up copies as noted:

1. Approved as Submitted (for incorporation in Work):
   a. One copy furnished OWNER.
   b. One copy retained in DESIGN ENGINEER's file.
   c. One copy retained in RESIDENT ENGINEER's file.
   d. Remaining copies returned to CONTRACTOR appropriately annotated.

e. CONTRACTOR may begin to implement activities to incorporate specific product(s) or Work covered by Submittal.

2. Approved as Noted (for incorporation in Work):
   a. One copy furnished OWNER.
   b. One copy retained in DESIGN ENGINEER's file.
   c. One copy retained in RESIDENT ENGINEER's file.
   d. Remaining copies returned to CONTRACTOR appropriately annotated.
   e. CONTRACTOR may begin to implement activities to incorporate product(s) or Work covered by Submittal, in accordance with ENGINEER's notations.
3. Disapproved:
   a. One copy furnished OWNER.
   b. One copy retained in DESIGN ENGINEER's file.
   c. One copy retained in RESIDENT ENGINEER's file.
   d. Remaining copies returned to CONTRACTOR appropriately annotated.
   e. CONTRACTOR shall make corrections or develop replacement and resubmit (in same manner and quantity as specified for original submission).
   f. Submittal is not approved.
4. Incomplete:
   a. One copy furnished OWNER.
   b. One copy retained in DESIGN ENGINEER's file.
   c. One copy retained in RESIDENT ENGINEER's file.
   d. Remaining copies returned to CONTRACTOR appropriately annotated.
   e. CONTRACTOR shall complete and resubmit or submit missing portions.
   f. Submittal is not approved.

H. Sample Disposition: Same as Shop Drawing disposition; samples will not be returned.

1.3 ADMINISTRATIVE SUBMITTALS

A. Copies: Submit six.

B. Description: Submittals that are not Shop Drawings or Samples, or that do not reflect quality of product or method of construction. May include, but not limited to those Submittals identified below.

C. Applications for Payment: Meet requirements of Section 01025, MEASUREMENT AND PAYMENT.

D. Progress Reports and Quantity Charts: As may be required in Section 01310, PROGRESS SCHEDULES.

E. Schedules:

1. Progress Schedule(s): Meet the requirements of Section 01310, PROGRESS SCHEDULES.

2. Schedule of Values: Meet requirements of Section 01025, MEASUREMENT AND PAYMENT.
3. Schedule of Submittal Submissions:
   a. Prepare and submit, preliminary list of submissions grouped by Contract Document article/paragraph number or Specification section number, with identification, numbering and tracking system as specified under Paragraph Identification of Submittals and as approved by RESIDENT ENGINEER.
   b. Include only the following required submissions:
      1) Shop Drawings and Samples.
      2) Training plans.
      3) Test procedures.
      4) Operation and maintenance manuals.
      5) Record documents.
      6) Specifically required certificates, warranties, and service agreements.
   c. Coordinate with progress schedule and prepare submissions to show for each Submittal, at a minimum, the following:
      1) Estimated submission date to RESIDENT ENGINEER.
      2) Specifically requested and clearly identified RESIDENT ENGINEER review time if shorter than that set forth herein, with justification for such request and critical dates Submittals will be needed from RESIDENT ENGINEER.
      3) For first 6-month period from the date the Contract Times commence or following any update or adjustment of the submissions, the estimated submission date shall be week, month, and year; for submissions beyond 6-month time period, show closest month and year.
   d. Submit to RESIDENT ENGINEER monthly (i) updated list if changes have occurred, otherwise submit a written communication confirming existing list, and (ii) adjusted submissions reflecting submission activity planned for forthcoming 6-month time period and beyond. Coordinate with progress schedule updates.

F. Training Materials: Meet the requirements of Section 01640, MANUFACTURERS' SERVICES.

G. Submittals Required by Laws, Regulations, and Governing Agencies:

1. Submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
2. Transmit to RESIDENT ENGINEER for OWNER's records one copy of correspondence and transmittals (to include enclosures and attachments) between CONTRACTOR and governing agency.

H. Disposition: RESIDENT ENGINEER will review, stamp, and indicate requirements for resubmission or acceptance on Submittal as follows:

1. Accepted:
   a. Schedules: Acceptance will indicate that schedules provide for the orderly progression of the Work to completion within any

specified milestones and the Contract Times, but such acceptance will neither impose on RESIDENT ENGINEER responsibility for the sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor.

b. Acceptance of other Administrative Submittals will indicate that Submittal conforms to intent of Contract Documents as to form and substance.

c. CONTRACTOR may proceed to perform Submittal related Work.

d. One copy furnished OWNER.

e. One copy retained in RESIDENT ENGINEER's file.

f. Remaining copies returned to CONTRACTOR appropriately annotated.

2. Rejected as Noted:

a. One copy retained in RESIDENT ENGINEER's file.

b. Remaining copies returned to CONTRACTOR appropriately annotated.

c. CONTRACTOR shall revise/correct or develop replacement and resubmit.

1.4 QUALITY CONTROL SUBMITTALS

A. Copies: Submit seven.

B. Certificates:

1. Manufacturer's Certificate of Compliance:

a. When specified in individual Specification sections or where products are specified to a recognized standard or code, submit prior to shipment of product or material to the site.

b. DESIGN ENGINEER may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.

c. Signed by product manufacturer certifying that materials, manufacture, and product specified conforms to or exceeds specified requirements and intent for which product will be used. Submit supporting reference data, affidavits, and certifications as appropriate.

d. May reflect recent or previous test results on material or product, but must be acceptable to DESIGN ENGINEER.

2. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in the individual Specification sections.

3. Manufacturer's Certificate of Proper Installation: As required in Section 01640, MANUFACTURERS' SERVICES. Coordinate with Section 01650, FACILITY STARTUP.

C. Operation and Maintenance Manual: As required in Section 01430, OPERATION AND MAINTENANCE DATA.

D. Statements of Qualification: Evidence of qualification, certification, or registration. As required in these Contract Documents to verify

qualifications of professional land surveyors, engineers, materials testing laboratories, specialty Subcontractors, trades, specialists, consultants, installers, and other professionals.

E. Field Samples: Provide as required by individual Specifications and as may be required by RESIDENT ENGINEER during progress of Work.

F. Written Test Reports of Each Test and Inspection: As a minimum, include the following:

1. Date of test and date issued, Project title and number, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.
2. Date and time of sampling or inspection and record of temperature and weather conditions.
3. Identification of product and Specification section, location of Sample, test or inspection in the Project, type of inspection or test with referenced standard or code, certified results of test.
4. Compliance with Contract Documents, and identifying corrective action necessary to bring materials and equipment into compliance.
5. Provide an interpretation of test results, when requested by RESIDENT ENGINEER.

G. Disposition: DESIGN ENGINEER will review, mark, and stamp as appropriate and submit copies to RESIDENT ENGINEER. RESIDENT ENGINEER will distribute marked-up copies as noted:

1. Accepted:
   a. Acceptance will indicate that Submittal conforms to intent of Contract Documents as to form and substance.
   b. CONTRACTOR may proceed to perform Submittal related Work.
   c. One copy furnished OWNER.
   d. One copy retained in DESIGN ENGINEER's file.
   e. One copy retained in RESIDENT ENGINEER's file.
   f. Remaining copies returned to CONTRACTOR appropriately annotated.
2. Rejected as Noted:
   a. One copy retained in DESIGN ENGINEER's file.
   b. One copy retained in RESIDENT ENGINEER's file.
   c. Remaining copies returned to CONTRACTOR appropriately annotated.
   d. CONTRACTOR shall revise/correct or develop replacement and resubmit.

1.5 CONTRACT CLOSEOUT SUBMITTALS

A. General: In accordance with Section 01700, CONTRACT CLOSEOUT.

B. Disposition: RESIDENT ENGINEER will review, stamp, and indicate requirements for resubmission or acceptance on Submittal as follows:

1. Accepted:
   a. Acceptance will indicate that Submittal conforms to intent of Contract Documents as to form and substance.
   b. CONTRACTOR may proceed to perform Submittal related Work.
   c. One copy furnished OWNER.
   d. One copy retained in RESIDENT ENGINEER's file.
   e. Remaining copies returned to CONTRACTOR appropriately annotated.
2. Rejected as Noted:
   a. One copy retained in RESIDENT ENGINEER's file.
   b. Remaining copies returned to CONTRACTOR appropriately annotated.
   c. CONTRACTOR shall revise/correct or develop replacement and resubmit.

1.6 SUPPLEMENTS

A. The supplements listed below, following "END OF SECTION", are part of this Specification.

1. Forms: Transmittal of CONTRACTOR's Submittal

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

CH2M HILL **TRANSMITTAL OF CONTRACTOR'S SUBMITTAL**
(ATTACH TO EACH SUBMITTAL)

DATE: _____

TO: _____

_____

_____

_____

_____

Submittal No.: _____

☐ New Submittal ☐ Resubmittal

Previous Submittal No.: _____

Project: _____

Project No.: _____

Specification Section No.: _____

(Cover only one section with each transmittal)

FROM: _____
Contractor

_____

_____

_____

Schedule Date of Submittal:

_____

SUBMITTAL TYPE: ☐ Shop Drawing ☐ Administrative ☐ Sample
☐ Quality Control ☐ Contract Closeout ☐ "Or-Equal"/Substitute

The following items are hereby submitted:

Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)	Spec. Para. No.	Drawing or Brochure Number	Contains Variation to Contract	
				No	Yes

CONTRACTOR hereby certifies that (i) CONTRACTOR has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By: _____
CONTRACTOR (Authorized Signature)

SECTION 01310
PROGRESS SCHEDULES

PART 1 GENERAL

1.1 SUBMITTALS

A. Submit with Each Progress Schedule Submission:

1. CONTRACTOR's certification that progress schedule submission is the actual schedule being utilized for execution of the Work and certification by all Subcontractors with 5 percent or more of Work that they concur with CONTRACTOR's progress schedule submission.
2. Four Legible Copies of the Progress Schedule: For each computer generated schedule submission.
3. Disk file compatible with Primavera Project Planner (P3).

B. Preliminary Progress Schedule: Submit within 10 days of award. No progress payment shall be made to CONTRACTOR until the schedules are submitted and acceptable to RESIDENT ENGINEER. Schedule shall comply with the requirements of MAG paragraph 108.4.

C. Progress Schedule: Submit adjusted schedule or confirm validity of current schedule with each monthly Application for Payment, and at such other times as necessary to reflect: (i) progress of Work to within 5 working days prior to submission; (ii) changes in Work scope and activities modified since submission; (iii) delays in Submittals or resubmittals, deliveries, or Work; (iv) adjusted or modified sequences of Work; (v) other identifiable changes; and (vi) revised projections of progress and completion. Schedule shall comply with the requirements of MAG paragraph 108.4.

D. Narrative Progress Report: Submit with each monthly submission of progress schedule.

E. Precedent to final payment, provide four copies of any Critical Path Method (CPM) type schedule utilized with certification that said schedule represents correctly the way the Work was performed.

F. Progress quantity chart(s).

1.2 SCHEDULE RESPONSIBILITIES

A. Project is divided into several prime contracts with each contract awarded separately. OWNER's Construction Manager will be responsible for developing and maintaining a master progress schedule utilizing individual progress schedules prepared by each contractor as submitted to RESIDENT ENGINEER under this section.

B. CONTRACTOR's construction schedule must conform to the prescribed work in the sequence shown on the Rio Salado Town Lake Coordination

Schedule (Exhibit A), and specified notes therein. Certain work and progress direction is specified.

C. Upon review and acceptance, RESIDENT ENGINEER will transmit one hard copy and one diskette copy, Primavera Project Planner (P3), each for all contractors' schedules to OWNER's Construction Manager. Within 5 days of receipt, OWNER's Construction Manager shall prepare and transmit to RESIDENT ENGINEER one hard copy of master progress schedule for each designated contractor and one hard copy for RESIDENT ENGINEER.

D. Where CONTRACTOR is referred to in the singular, it shall refer to each of separate contractors as applicable.

1.3 PROGRESS OF THE WORK

A. If CONTRACTOR fails to complete activity by its latest scheduled completion date and this failure may extend Contract Times (or Milestones), CONTRACTOR shall, within 7 days of such failure, submit a written statement as to how CONTRACTOR intends to correct nonperformance and return to the acceptable current progress schedule. Actions by CONTRACTOR to complete Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.

B. OWNER may order CONTRACTOR to increase plant, equipment, labor force or working hours if CONTRACTOR fails to: (i) complete a critical scheduled activity by its latest Milestone completion date, or (ii) satisfactorily execute Work as necessary to prevent delay to the overall completion of the Project.

1.4 PRELIMINARY PROGRESS SCHEDULE

A. As a minimum, submit two bar charts or preliminary network analysis diagrams as follows:

1. 90-Day Plan: Show major initial activities including, but not limited to, mobilization, permits, submittals for early product procurement and long lead time items, initial site work, and other activities anticipated in the first 90-day period of the Contract Time.
2. Project Overview Plan: Show major components of the Work and the sequence relations between major components and subdivisions of major components. The chart shall indicate the relationship and time frames in which the various facilities will be made substantially complete and placed into service in accordance with the Project Milestones. Sufficient detail shall be included for the identification of subdivisions of major components into such activities as:
   a. Excavation.
   b. Foundation subgrade preparation.
   c. Foundation concrete.
   d. Completion of all structural concrete.
   e. Major mechanical Work.
   f. Major electrical Work.

g. Instrumentation and control Work.
h. Other important work for each major facility within the overall Work scope.

B. Planned durations and start dates shall be indicated for each Work item subdivision. Each major component and subdivision component shall be accurately plotted on time scale sheets not to exceed 11 inches by 17 inches in size. Not more than four sheets shall be employed to represent this overview information.

C. The preliminary progress schedule, when accepted by the RESIDENT ENGINEER, will be the initially acceptable schedule.

1.5 PROGRESS SCHEDULE

A. General:

1. Schedule(s) shall reflect Work logic sequences, restraints, delivery windows, review times, Contract Times, and Milestones set forth in the Agreement and Section 01040, COORDINATION, and shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.
2. The schedule requirement herein is the minimum required. CONTRACTOR may prepare a more sophisticated schedule if such will aid CONTRACTOR in execution and timely completion of Work.
3. Base schedule on standard 5-day Work week.
4. When bar chart or network analysis schedules are specified, use Primavera Project Planner (P3) latest version or a compatible and approved software.
5. Adjust or confirm schedules on a monthly basis.
6. Float time is a Project resource available to both parties to meet contract Milestones and Contract Times.
7. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float-suppression techniques shall be shared to proportionate benefit of OWNER and CONTRACTOR.
8. Pursuant to above float-sharing requirement, no time extensions will be granted nor delay damages paid until a delay occurs which (i) impacts Project's critical path, (ii) consumes available float or contingency time, and (iii) extends Work beyond contract completion date.
9. If CONTRACTOR provides an accepted schedule with an early completion date, OWNER reserves the right to reduce Contract Times to match the early completion date by issuing a deductive Change Order at no change in Contract Price.

B. Format:

1. Comprehensive computer generated Network Analysis Diagram schedule using CPM, generally as outlined in Associated General Contractors of America (AGC) publication "The Use of CPM in Construction – A Manual for General Contractors and the Construction

Industry," latest edition, prepared on reproducible paper, not larger than 30 inches by 42 inches.

a. Submit within 45 days after the Contract Times start to run.
b. Show complete interdependence and sequence of construction and Project-related activities reasonably required to complete the Work, identifying Work of separate stages and other logically grouped activities, and clearly identify critical path of activities.
c. Include at a Minimum: Subcontract Work; major and other equipment and critical product design, fabrication, testing, delivery and installation times including required lead time for OWNER-furnished products, move-in and other preliminary activities, Project closeout and cleanup, Substantial Completion dates, Submittals that may impact critical path, and system/ subsystem/component testing, facility startup, and training activities that may impact critical path.
d. Develop subschedules to further define critical portions of the Work, i.e., Process Instrumentation and Control System/ Subsystems.
e. Indicate dates for early- and late-start, early- and late-finish, float and duration.
f. No activity duration, exclusive of those for Submittals review and product fabrication/delivery, shall be less than 1 day nor more than 15 working days, unless otherwise approved by RESIDENT ENGINEER.
g. Activity duration for Submittals review shall not be less than review time specified unless clearly identified and prior written acceptance has been obtained from RESIDENT ENGINEER.
h. Monthly Schedule Submissions: Include overall percent complete, projected and actual; and percent completion progress for each listed activity.
i. The estimated cost to perform each Work activity shall be noted for each activity in the network on a tabular listing. The sum of the costs assigned to all activities shall equal the Contract Price. No activity costs shall be assigned to Submittals or Submittal reviews. An unbalanced or front-end loaded schedule will not be acceptable. The accepted cost loaded progress schedule shall constitute the schedule of values specified in Section 01025, MEASUREMENT AND PAYMENT.

1.6 NARRATIVE PROGRESS REPORT

A. Include, as a minimum:

1. Summary of Work completed during the past period between Narrative Progress Reports.
2. Work planned during the next period.
3. Explanation of differences between summary of Work completed and Work planned in previously submitted Narrative Progress Report.
4. Current and anticipated delaying factors and their estimated impact on other activities and completion Milestones.
5. Corrective action taken or proposed.

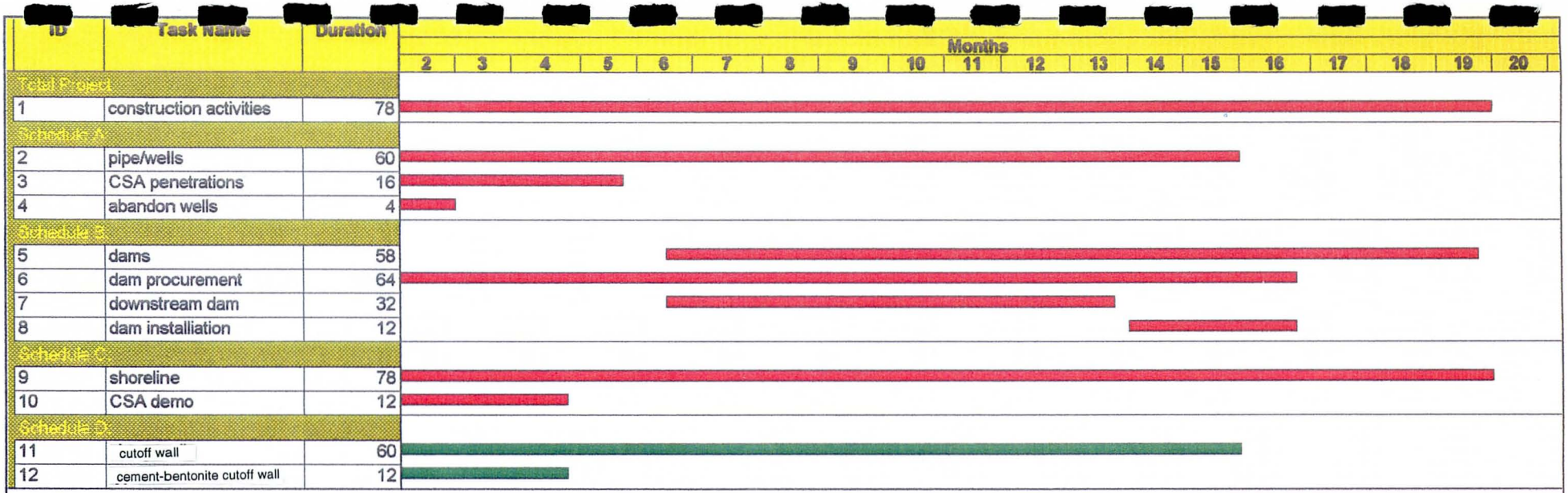
1.7 CLAIMS FOR ADJUSTMENT OF CONTRACT TIMES

A. Where RESIDENT ENGINEER has not yet rendered formal decision on CONTRACTOR's claim for adjustment of Contract Times, and parties are unable to agree as to amount of adjustment to be reflected in progress schedule, CONTRACTOR shall reflect that amount of time adjustment in progress schedule as RESIDENT ENGINEER may accept as appropriate for the interim. It is understood and agreed that such interim acceptance by RESIDENT ENGINEER will not be binding and will be made only for purpose of continuing to schedule Work, until such time as formal decision as to an adjustment, if any, of the Contract Times acceptable to the RESIDENT ENGINEER has been rendered. CONTRACTOR shall revise progress schedule prepared thereafter in accordance with RESIDENT ENGINEER's formal decision.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION



1. General construction schedule is shown for coordination and reference.

2. All durations and end points shown are critical in order to coordinate work to occur in adjacent areas. Failure to complete specified work within the time allocated will subject contract to damages, due to consequential conflict with other scheduled activities, according to the specification for liquidated damage. (See specification index).

3. Other schedule "D" work may be performed concurrently.

4. Soil bentonite cutoff wall construction to proceed east to west.

5. Schedule permits concurrent construction on both sides of river.

Project Start 30DEC96 Project Finish 22JUN98 Data Date 30DEC96 Plot Date 06SEP96 (c) Primavera Systems, Inc.	Early Bar Progress Bar Critical Activity	RSTL	Parsons Brinckerhoff C. S. Rio Salado Town Lake Construction Coordination Schedule D	Sheet 1 of 1

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SUBMITTALS

A. Administrative Submittals: Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.

B. Shop Drawings:

1. Temporary Utility Submittals:
   a. Electric power supply and distribution plans.
   b. Water supply and distribution plans.
   c. Drainage plans.
2. Temporary Construction Submittals:
   a. Access Roads: Routes, cross-sections, and drainage facilities.
   b. Parking area plans.
   c. Storage yard and storage building plans, including gravel surfaced area.
   d. Fencing and protective barrier locations and details.
   e. Staging area location plan.
   f. Traffic Routing Plans: As specified herein, and proposed revisions thereto.
   g. Plan for maintenance of existing plant operations.
3. Temporary Control Submittals:
   a. Noise control plan.
   b. Plan for disposal of waste materials and intended haul routes.

1.2 MOBILIZATION

A. Mobilization shall include, but not be limited to, these principal items:

1. Obtaining required permits.
2. Moving CONTRACTOR's plant and equipment required for first month operations onto site.
3. Installing temporary construction power, wiring, and lighting facilities.
4. Providing onsite communication facilities, including telephones, fax machine, and mailing address.
5. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
6. Arranging for and erection of CONTRACTOR's work and storage yard.
7. Posting OSHA required notices and establishing safety programs and procedures.
8. Having the CONTRACTOR's superintendent at the site full time.

9. Maintain complete field file of Shop Drawings, posted Contract Documents, and other files of field operations including provisions for maintaining "As recorded Drawings."
10. Removing field office from site upon acceptance of the entire work by OWNER.

B. Use area designated for CONTRACTOR's temporary facilities as shown as the staging area on Drawings.

1.3 CONTRACTOR'S USE OF PREMISES

A. Lands furnished by OWNER upon which CONTRACTOR shall perform the Work are as shown in the Drawings.

B. Rights-of-way and easements for access to such lands furnished by OWNER have been acquired. One copy of each easement will be furnished to CONTRACTOR.

1. The Flood Control District of Maricopa County (FCDMC) maintains flood control maintenance easements within the river channel. The typical northern limit of the easement is 15 feet from the leading edge of the existing north channel levee and the typical southern limit is 15 feet from the leading edge of the existing south channel levee.
2. CONTRACTOR is responsible for confining its construction equipment within the limits of the FCDMC easement except where specifically shown on the Drawings.

1.4 PERMITS

A. Permits, Licenses, or Approvals: Obtain in accordance with the General Provisions and as otherwise may be provided in the Special Provisions and retain onsite.

1.5 PROTECTION OF WORK AND PROPERTY

A. Safety Representative: CONTRACTOR shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

B. Comply with OWNER's safety rules.

C. Keep OWNER informed of serious accidents on the site and related claims.

D. Use of Explosives: No blasting or use of explosives will be allowed on the site.

E. During the performance of the Work, CONTRACTOR is responsible for adapting its means, methods, techniques, sequences and procedures of construction to allow OWNER to maintain operation at the existing level of facility production and consistent with applicable permit requirements, and Laws and Regulations. In performing such Work and in cooperating with

the OWNER to maintain operations, it may be necessary for the CONTRACTOR to plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items which will be included within the Contract Price.

1.6 VEHICULAR TRAFFIC

A. Traffic Routing Plan: Show sequences of construction affecting the use of roadways, time required for each phase of the Work, provisions for decking over excavations and phasing of operations to provide necessary access, and plans for signing, barricading, and striping to provide passages for pedestrians and vehicles.

PART 2 PRODUCTS

2.1 RESIDENT ENGINEER'S FIELD OFFICES

A. To be provided by OWNER.

2.2 PROJECT SIGN

A. Provide and maintain an 8-foot wide by 4-foot high sign constructed of 3/4-inch exterior high density overlaid plywood. Sign shall bear the name of Project, OWNER, CONTRACTOR, DESIGN ENGINEER, RESIDENT ENGINEER, and other participating agencies. Lettering shall be blue applied on a white background by an experienced sign painter. Paint shall be exterior type enamel. The information to be included will be provided by the OWNER.

PART 3 EXECUTION

3.1 TEMPORARY UTILITIES

A. Power:

1. Electric power will be available at or near the site. Determine the type and amount available and make arrangements for obtaining temporary electric power service, metering equipment, and pay all costs for the electric power used during the contract period, except for portions of the Work designated in writing by the RESIDENT ENGINEER as substantially complete.
2. Cost of electric power used in performance and acceptance testing will be borne by CONTRACTOR.

B. Lighting: Provide temporary lighting at least to meet all applicable safety requirements to allow erection, application or installation of materials and equipment, and observation or inspection of the Work.

C. Heating, Cooling, and Ventilating:

1. Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions

for the installation of materials, and to protect materials, equipment, and finishes from damage due to temperature or humidity.

2. Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
3. Pay all costs of installation, maintenance, operation, removal, and fuel consumed.
4. Provide portable unit heaters, complete with controls, oil- or gas-fired, and suitably vented to outside as required for protection of health and property.
5. If permanent natural gas piping is used for temporary heating units, do not modify or reroute gas piping without approval of utility company. Provide separate gas metering as required by utility.

D. Water:

1. No construction or potable water is available at the site. CONTRACTOR shall make arrangements for and bear all costs of providing water required for construction and potable purposes during construction.
2. Hydrant Water:
   a. Water may be available from hydrants in the Project vicinity. Secure written permission for connection and use from the water department and meet requirements for use. Notify fire department before obtaining water from fire hydrants.
   b. Use only special hydrant-operating wrenches to open hydrants. Make certain that hydrant valve is open full, since cracking the valve causes damage to the hydrant. Repair damaged hydrants and notify the appropriate agency as quickly as possible. Hydrants shall be completely accessible to the fire department at all times.
   c. Include costs to connect and transport water to construction areas in the Contract Price.

E. Sanitary and Personnel Facilities: Provide and maintain facilities for CONTRACTOR's employees, Subcontractors, and all other onsite employer's employees. Service, clean, and maintain facilities and enclosures.

F. Telephone Service: Arrange and provide onsite telephone service for CONTRACTOR's use during construction. Pay all costs of installation and monthly bills.

G. Fire Protection: Furnish and maintain on the site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241).

3.2 PROTECTION OF WORK AND PROPERTY

A. General:

1. Perform Work within rights-of-way and easements in a systematic manner that minimizes inconvenience to property owners and the public.
2. Maintain in continuous service all existing gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and all other utilities encountered along the line of work, unless other arrangements satisfactory to owners of said utilities have been made.
3. Where completion of Work requires temporary or permanent removal and/or relocation of an existing utility, coordinate all activities with owner of said utility and perform all work to their satisfaction.
4. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
5. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
6. In areas where the CONTRACTOR's operations are adjacent to or near a utility such as gas, telephone, television, electric power, water, sewer, or irrigation system and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection thereof have been made by the CONTRACTOR.
7. Notify property owners and utility offices which may be affected by the construction operation at least 2 days in advance.
   a. Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to the CONTRACTOR's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
8. Do not impair operation of existing sewer systems. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures. Maintain original site drainage wherever possible.

B. Barricades and Lights:

1. Provide as necessary to prevent unauthorized entry to construction areas and affected roads, streets, and alleyways, inside and outside of fenced area, and as required to ensure public safety and the safety of CONTRACTOR's employees, other employer's employees, and others who may be affected by the Work.
2. Provide to protect existing facilities and adjacent properties from potential damage.
3. Locate to enable access by facility operators and property owners.
4. Protect streets, roads, highways, and other public thoroughfares that are closed to traffic by effective barricades with acceptable warning signs.

5. Locate barricades at the nearest intersecting public thoroughfare on each side of the blocked section.

C. Signs and Equipment:

1. Conform to requirements of the manual published by the Arizona Department of Transportation and the City of Tempe Traffic Control and Barricade Manual.
2. Use to alert general public of construction hazards, which would include surface irregularities, unramped walkways, grade changes, and trenches or excavations in roadways and in other public access areas.

D. Tree and Plantings:

1. Protect from damage and preserve trees, shrubs, and other plants outside the limits of the Work and within the limits of the Work which are designated on the Drawings to remain undisturbed.
   a. Where practical, tunnel beneath trees when on or near the line of trench.
   b. Employ hand excavation as necessary to prevent tree injury.
   c. Do not stockpile materials or permit traffic within drip lines of trees.
   d. Provide and maintain temporary barricades around trees.
   e. Water vegetation as necessary to maintain health.
   f. Cover temporarily exposed roots with wet burlap, and keep the burlap moist until soil is replaced around the roots.
   g. No trees, except those specifically shown on Drawings to be removed, shall be removed without written approval of the RESIDENT ENGINEER.
   h. Dispose of removed trees in a legal manner off the site.
2. The balling and burlapping of trees indicated for replacement shall conform to the recommended specifications set forth in the American Standards for Nursery Stock, published by American Association of Nurserymen. All balls shall be firm and intact and made-balls will not be accepted. Handle ball and burlap trees by the ball and not by the top.
3. In the event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.
4. Replace each plant that dies as a result of construction activities.

E. Existing Structures: Where CONTRACTOR contemplates removal of small structures such as signposts, and culverts that interfere with CONTRACTOR's operations, obtain approval of property owner and RESIDENT ENGINEER. Replace those removed in a condition equal to or better than original.

F. Waterways: Keep ditches, culverts, and natural drainages continuously free of construction materials and debris.

G. Dewatering: Construct, maintain, and operate cofferdams, channels, flume drains, sumps, pumps, or other temporary diversion and protection works. Furnish materials required, install, maintain, and operate necessary pumping and other equipment for the environmentally safe removal and disposal of water from the various parts of the Work. Maintain the foundations and parts of the Work free from water.

3.3 TEMPORARY CONTROLS

A. Air Pollution Control:

1. Minimize air pollution from construction operations in accordance with the General Provisions.
2. Burning: Of waste materials, rubbish, or other debris will not be permitted on or adjacent to the site.
3. Conduct operations of dumping rock and of carrying rock away in trucks to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in the construction area a dust-preventive treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.
4. Provide and maintain temporary dust-tight partitions, bulkheads, or other protective devices during construction to permit normal operation of existing facilities. Construct partitions of plywood, insulating board, plastic sheets, or similar material. Construct partitions in such a manner that dust and dirt from demolition and cutting will not enter other parts of existing building or facilities. Remove temporary partitions as soon as the need no longer exists.

B. Noise Control:

1. Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.
2. Noise Control Plans: Proposed plan to mitigate construction noise impacts and to comply with noise control ordinances including method of construction, equipment to be used, and acoustical treatments.

C. Water Pollution Control:

1. Divert sanitary sewage and nonstorm waste flow interfering with construction and requiring diversion to sanitary sewers. Do not cause or permit action to occur which would cause an overflow to an existing waterway.
2. Prior to commencing excavation and construction, obtain OWNER's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and stormwater flow, including dewatering pump discharges.
3. Comply with procedures outlined in U.S. Environmental Protection Agency manuals entitled, "Guidelines for Erosion and Sedimentation Control Planning" and "Implementation, Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity," and "Erosion and Sediment Control—Surface Mining in Eastern United States."

4. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.
5. CONTRACTOR shall comply with the requirements of the Arizona Department of Environmental Quality State Water Quality Certification provided in the Appendix.

D. Damage to New Work:

1. CONTRACTOR shall protect all new Work and Work in progress from stormwater inflow into Salt River Channel from any and all underground storm drain pipes which outfall into the river at or upstream of the worksite location-worksite location being defined as the limits of the lake area. CONTRACTOR shall construct provide, maintain, and operate any and all temporary facilities necessary to control erosion and sediment associated with the stormwater flow in and throughout the aforementioned storm drain systems.
2. CONTRACTOR shall also be responsible for protecting, or insuring against damage to new Work and Work in progress for stormwater flows in Salt River Channel and in Indian Bend Wash due to storm runoff or upstream water releases. CONTRACTOR shall be responsible for any and all loss or damage to new Work or Work in progress caused by flows originating upstream in the Salt River Channel or in Indian Bend Wash.
3. CONTRACTOR shall be required to obtain and maintain Builder Risk and Business Interruption insurance for the full term of the construction contract. Required insurance coverage shall include cost of replacing falsework, re-excavating worksite, and other actual damages to Work associated with this contract and shall also include home office or field office expenses and other expenses related to extended general conditions incurred by CONTRACTOR in conjunction with construction downtime due to unavailability of worksite resulting from sustained flows in the river channel.

3.4 STORAGE YARDS AND BUILDINGS

A. Coordinate requirements with Section 01600, MATERIAL AND EQUIPMENT.

B. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.

C. Temporary Storage Buildings:

1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
3. Store combustible materials (paints, solvents, fuels, etc.) in a well-ventilated and remote building meeting safety standards.

3.5 ACCESS ROADS

A. Access to the construction areas is possible using the river bed and the existing access roads that parallel both lake shores and are located at the top of the cement stabilized alluvium (CSA) and at the top of the levee. There are several existing ramps located on both sides of the lake that connect each of the access roads with the river bed. During flood releases, the river bed may not be available as an access route. In addition, construction activities as a result of the work by other contractors (Schedules A, B, and C) may result in one or more of the access roads being unavailable for extended (up to 3 months) period of time. CONTRACTOR is responsible for constructing any other required access roads within the easements, rights-of-way, or Project limits, as shown. Alignments for new routes must be approved by RESIDENT ENGINEER.

B. The existing bike paths will be closed to bike traffic throughout the construction period except the bike path on the north side of the river between Scottsdale Road and the Indian Bend Wash drop structure shall remain open unless construction operations make a temporary closure necessary. Closures shall be reviewed and approved by the City prior to implementation. CONTRACTOR shall not use the existing bike paths as access roads or operate any heavy equipment on the bike paths. CONTRACTOR shall not stockpile on top of any existing bike path. CONTRACTOR shall be responsible for protection of all bike paths from damage at all construction traffic crossings with fill material or other means in accordance with COT standards.

C. CONTRACTOR shall provide a haul plan in accordance with the Special Provisions.

D. Maintain drainage ways. Install and maintain culverts to allow water to flow beneath access roads. Provide corrosion-resistant culvert pipe of adequate strength to resist construction loads.

E. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.

F. Maintain road grade and crown to eliminate potholes, rutting, and other irregularities that restrict access.

G. Coordinate with RESIDENT ENGINEER detours and other operations affecting traffic and access. Provide at least 72 hours' notice to RESIDENT ENGINEER of operations that will alter access to the site.

H. Upon completion of construction, restore ground surface disturbed by access road construction to original grade. Replace damaged or broken culverts with new culvert pipe of same diameter and material.

3.6 PARKING AREAS

A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, OWNER's operations, or construction operations.

B. Provide parking facilities for personnel working on the Project.

3.7 VEHICULAR TRAFFIC

A. All traffic control shall be in accordance with the City of Tempe Traffic Control and Barricade Manual, latest edition. All traffic control plans shall be reviewed by the City Transportation Division.

B. Comply with Laws and Regulations regarding closing or restricting the use of public streets or highways. No public or private road shall be closed, except by written permission of the proper authority. Assure the least possible obstruction to traffic and normal commercial pursuits.

C. Conduct Work to interfere as little as possible with public travel, whether vehicular, bicycle, or pedestrian.

D. Whenever it is necessary to cross, close, or obstruct roads, driveways, bike paths, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.

E. In making street crossings, do not block more than one-half the street at a time. Whenever possible, widen the shoulder on the opposite side to facilitate traffic flow. Provide temporary surfacing on shoulders as necessary.

F. Maintain top of backfilled trenches before they are paved, to allow normal vehicular traffic to pass over. Provide temporary access driveways where required. Cleanup operations shall follow immediately behind backfilling.

G. When flaggers and guards are required by regulation or when deemed necessary for safety, furnish them with approved orange wearing apparel and other regulation traffic control devices.

H. Notify the fire department and police department before closing street or portion thereof. Notify said departments when streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, without written permission from the fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access. Furnish CONTRACTOR's night emergency telephone numbers to the police department. All street closures must be approved by the City of Tempe Transportation Division.

I. Temporary Bridges:

1. Construct temporary bridges at all points where maintenance of traffic across pipeline construction is necessary.
2. Make bridges over bike paths, public streets, roads, and highways acceptable to the authority having jurisdiction thereover.
3. Bridges erected over private roads and driveways shall be adequate for the service to which they will be subjected.
4. Provide substantial guardrails and suitably protected approaches.
5. Provide bicycle and foot bridges not less than 6 feet wide with handrails and uprights of dressed lumber.
6. Maintain bridges in place as long as the conditions of the Work require their use for safety of the public, except that when necessary for the proper prosecution of the Work in the immediate vicinity of a bridge, the bridge may be relocated or temporarily removed for such period as the RESIDENT ENGINEER may permit.

J. Coordination: Coordinate traffic routing with that of others working in the same or adjacent areas.

3.8 CLEANING DURING CONSTRUCTION

A. In accordance with the General Provisions, as may be specified in Specification sections, and as required herein.

B. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, sweep all floors (basins, tunnels, platforms, walkways, roof surfaces), and pick up all debris and dispose.

C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least at weekly intervals, dispose of such waste materials, debris, and rubbish offsite.

D. At least weekly, brush sweep the entry drive and roadways, and all other streets and walkways affected by Work and where adjacent to Work.

END OF SECTION

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 DEFINITIONS

A. Products:

1. New items for incorporation in the Work, whether purchased by CONTRACTOR or OWNER for the Project, or taken from previously purchased stock and may also include existing materials or components required for reuse.
2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change the meaning of such other terms used in the Contract Documents as those terms are self-explanatory and have well recognized meanings in the construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.2 DESIGN REQUIREMENTS

A. Provide systems, equipment, and components, including supports and anchorages, in accordance with the provisions of the latest edition of Uniform Building Code (UBC).

1. Wind: 80 mph, with Exposure C condition and an importance factor of 1.0.
2. Seismic: Zone 2B importance factor of 1, unless specified otherwise.

1.3 SUBMITTALS

A. Administrative Submittals:

1. List of all proposed substitute or "or-equal" items/methods.
2. Schedule of factory tests required by Contract Documents. Identify tests for which RESIDENT ENGINEER's presence has been specified.

B. Quality Control Submittals:

1. Factory Tests: As specified in the individual Specifications.
   a. Procedures: Preliminary outlines.
      1) Final Accepted Procedures: Prior to start of factory testing.
   b. Test Documentation: Results of successful testing, including certification of procedures and results.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Altitude: Provide materials and equipment suitable for installation and operation under rated conditions at 1,175 feet above sea level.

1.5 PREPARATION FOR SHIPMENT

A. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and CONTRACTOR, equipment number, and approximate weight. Include complete packing lists and bills of materials with each shipment.

B. Factory Test Results: Reviewed and accepted by RESIDENT ENGINEER before product shipment as required in individual Specification sections.

1.6 DELIVERY AND INSPECTION

A. Deliver products in accordance with the accepted current progress schedule and coordinate to avoid conflict with Work and conditions at the site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.

B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label date of manufacture and shelf life, where applicable. Include UL labels on products so specified.

C. Unload products in accordance with manufacturer's instructions for unloading, or as specified. Record the receipt of products at the site. Inspect for completeness and evidence of damage during shipment.

D. Remove damaged products from the site and expedite delivery of identical new undamaged products and remedy incomplete or lost products to provide that specified, so as not to delay the progress of the Work.

1.7 HANDLING, STORAGE, AND PROTECTION

A. Handle products in accordance with the manufacturer's written instructions, and in a manner to prevent damage. Store products, upon delivery, in accordance with manufacturer's instructions, with labels intact and legible, in approved storage yards or sheds provided in accordance with Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by OWNER.

B. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered but not installed in the Work.

C. Store finished products that are ready for installation in dry and well ventilated areas. Do not subject to extreme changes in temperature or humidity.

D. Hazardous Materials: Prevent contamination of personnel, the storage building, and the site. Meet the requirements of the product specifications, codes, and manufacturer's instructions.

1.8 SUBSTITUTE AND "OR-EQUAL" PRODUCTS

A. Meet the requirements of the General Provisions, the Specification sections, and as set forth herein.

B. Listing of proposed substitute or "or-equal" items or methods.

1. With consideration of the additional evaluation time necessary for RESIDENT ENGINEER's review of such items, indicate for each item the review status (either substitute or "or-equal") and estimated submission date.
2. CONTRACTOR, in indicating the review status of the proposed item, acknowledges that the time shown for RESIDENT ENGINEER's review on the current accepted schedule is sufficient only to allow RESIDENT ENGINEER to accomplish review for the status indicated and not sufficient to perform both a review for "or-equal" status and a subsequent review for substitute status on the same product.
3. RESIDENT ENGINEER may return unreviewed those submissions (i) not shown on the current accepted schedule, (ii) for which the review status differs from that indicated on the accepted list unless previously approved in writing by RESIDENT ENGINEER, (iii) not in accordance with paragraph 6.7 of the General Conditions and as specified herein, (iv) which are incomplete, or (v) which are uncertified, in which case CONTRACTOR shall provide the specified product.

C. Submit six copies of proposed substitute or "or-equal" item/method, to include all supporting data to allow RESIDENT ENGINEER's review. Complete, sign, and transmit with each proposed substitute or "or-equal" item/method submission.

D. Disposition of "Or-Equal" Item: In accordance with Article SHOP DRAWINGS in Section 01300, SUBMITTALS, or in accordance with following paragraph.

E. Disposition of Substitute Item/Method:

1. Accepted: RESIDENT ENGINEER will evidence such acceptance by recommendation of a Change Order for CONTRACTOR and OWNER execution. Such Change Order will accompany RESIDENT ENGINEER's evaluation and acceptance of CONTRACTOR's proposed substitute.
2. Rejected:
   a. One copy retained by RESIDENT ENGINEER.

b. One copy returned to CONTRACTOR with a commentary by RESIDENT ENGINEER.
c. Remaining copies will be destroyed.
d. CONTRACTOR shall provide item specified in Contract Documents.

1.9 DEPARTMENT OF WATER RESOURCES

A. Formal signatory approval by Arizona Department of Water Resources Flood Warning and Dam Safety Section may be required for significant design changes.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide manufacturer's standard materials suitable for service conditions unless otherwise specified in the individual Specifications.

B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.

C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, and manufacturer's services and implement same or similar process instrumentation and control functions in same or similar manner.

D. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.

2.2 FABRICATION AND MANUFACTURE

A. General:

1. Manufacture parts to U.S.A. standard sizes and gauges.
2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
3. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
4. Modify standard products as necessary to meet performance Specifications.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage which necessitates procurement of new products will be considered delays within CONTRACTOR's control.

END OF SECTION

SECTION 01650
FACILITY STARTUP

PART 1 GENERAL

1.1 DEFINITIONS

A. Reference Section 01640, MANUFACTURERS' SERVICES.

B. Facility Startup: Includes putting Project in operating order, cleaning, adjusting and balancing equipment, initial operation (startup) of equipment item, operating equipment, starting systems, operation of systems, testing of equipment and systems, and demonstration and verification of the completed facility as a unit.

C. Functional Test: A test or tests in the presence of the DESIGN ENGINEER, RESIDENT ENGINEER, and OWNER to demonstrate that the installed equipment or system meets manufacturer's installation and adjustment requirements and other requirements specified including, but not limited to, noise, vibration, alignment, speed, proper electrical and mechanical connections, thrust restraint, proper rotation, and initial servicing.

D. Performance Test: A test performed in the presence of the DESIGN ENGINEER, RESIDENT ENGINEER, and OWNER and after any required functional test specified, to demonstrate and confirm that the equipment and/or system meets the specified performance requirements.

E. Significant Interruption: May include any of the following events:

1. Failure of CONTRACTOR to maintain qualified onsite startup personnel as scheduled
2. Failure to meet specified performance for more than 2 consecutive hours.
3. Failure of any critical equipment unit, system, or subsystem that is not satisfactorily corrected within 5 hours after failure.
4. Failure of noncritical unit, system, or subsystem that is not satisfactorily corrected within 8 hours after failure.
5. As may be determined by DESIGN ENGINEER.

F. Startup Test Period:

1. Startup of the entire facility or any portion thereof includes coordinated operation of the facilities by the CONTRACTOR, Subcontractors, OWNER operating personnel, and manufacturer's representatives for equipment items and systems after all required functional tests have been completed and those performance tests deemed necessary for the safe operation of the entire facility have been completed.
2. Startup of the entire facility or any portion thereof shall be considered complete when, in the opinion of DESIGN ENGINEER, the facility

or designated portion has operated in the manner intended for 5 continuous days without significant interruption. This period is in addition to any training, functional, or performance test periods specified elsewhere. A significant interruption will require the startup then in progress to be stopped and restarted after corrections are made.

G. System: The overall process, or a portion thereof, that performs a specific function. A system may consist of two or more subsystems as well as two or more types of equipment. Examples of systems on this Project are as follows:

1. Recovery wells.
2. Instrumentation and control system(s).

1.2 SUBMITTALS

A. Administrative Submittals:

1. Functional and performance test schedules and plan for equipment, units, and systems at least 14 days prior to start of related testing. Include test plan, procedures, and log format.
2. Schedule and plan of facility startup activities at least 21 days prior to commencement.

B. Quality Control Submittals:

1. Manufacturer's Certificate of Proper Installation as required.
2. Test Reports: Functional and performance testing, in format acceptable to DESIGN ENGINEER and certification of functional and performance test for each piece of equipment or system specified.
3. Certifications of Calibration: Testing equipment.

1.3 CONTRACTOR FACILITY STARTUP RESPONSIBILITIES

A. General:

1. Perform Work for tests specified.
2. Demonstrate proper installation, adjustment, function, performance, and operation of equipment, systems, control devices, and required interfaces individually and in conjunction with process instrumentation and control system.

1.4 OWNER/DESIGN ENGINEER FACILITY STARTUP RESPONSIBILITIES

A. General:

1. Review CONTRACTOR's test plan and schedule.
2. Witness each functional or performance test.
3. Coordinate other plant operations, if necessary, to facilitate CONTRACTOR's tests.
4. Provide water, power, chemicals, and other items as required for testing, unless otherwise indicated.

B. Startup Test Period:

1. Operate process units and devices, with support of CONTRACTOR.
2. Provide sampling, labor, and materials as required and provide laboratory analyses.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 TESTING PREPARATION

A. General:

1. Complete Work associated with the unit and related processes before testing, including related manufacturer's representative services.
2. Furnish qualified manufacturer's representatives when required to assist in testing.
3. Utilize the Manufacturer's Certificate of Proper Installation Form from Section 01640, MANUFACTURERS' SERVICES, supplemented as necessary, to document functional and performance procedures, results, problems, and conclusions.
4. Schedule and attend pretest (functional and performance) meetings related to test schedule, plan of test, materials, chemicals, and liquids required, facilities' operations interface, DESIGN ENGINEER and OWNER involvement.
5. Designate and furnish one or more persons to be responsible for coordinating and expediting CONTRACTOR's facility startup duties. The person or persons shall be present during facility startup meetings and shall be available at all times during the facility startup period.
6. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required to conduct testing.

B. Cleaning and Checking: Prior to starting functional testing:

1. Calibrate testing equipment for accurate results.
2. Inspect and clean equipment, devices, connected piping, and structures so they are free of foreign material.
3. Lubricate equipment in accordance with manufacturer's instructions.
4. Turn rotating equipment by hand and check motor-driven equipment for correct rotation.
5. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
6. Check power supply to electric-powered equipment for correct voltage.
7. Adjust clearances and torques.
8. Test piping for leaks.
9. Balance HVAC systems, measuring airflow (cfm) static pressure, and component pressure losses. Furnish typed report documenting results of balancing.
10. Obtain completion of applicable portions of Manufacturer's Certificate of Proper Installation in accordance with Section 01640, MANUFACTURERS' SERVICES.

C. Ready-to-test determination will be by DESIGN ENGINEER based at least on the following:

1. Notification by CONTRACTOR of equipment and system readiness for testing.
2. Acceptable testing plan.
3. Acceptable Operation and Maintenance Manuals.
4. Receipt of Manufacturer's Certificate of Proper Installation, if specified.
5. Adequate completion of Work adjacent to, or interfacing with, equipment to be tested.
6. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
7. Equipment and electrical tagging complete.
8. All spare parts and special tools delivered to OWNER.

3.2 FUNCTIONAL TESTING

A. General:

1. Begin testing at a time mutually agreed upon by the OWNER, DESIGN ENGINEER, manufacturer's representative(s), and CONTRACTOR.
2. Notify in writing OWNER, DESIGN ENGINEER, and manufacturer's representative at least 10 days prior to scheduled date of functional tests.
3. Separate items of equipment demonstrated to function properly during subsystem testing may require no further functional test if documentation of subsystem testing is acceptable to DESIGN ENGINEER.
4. Conduct functional test until each individual component item or system has achieved 1 continuous hour of satisfactory operation. Demonstrate all operational features and controls function during this period while in automatic modes.
5. If, in DESIGN ENGINEER's opinion, each system meets the functional requirements specified, such system will be accepted as conforming for purposes of advancing to performance testing phase, if required. If, in DESIGN ENGINEER's opinion, functional test results do not meet requirements specified, the systems will be considered as nonconforming.
6. Performance testing shall not commence until the equipment or system meets functional tests specified.

3.3 PERFORMANCE TESTING

A. General:

1. Begin testing at time mutually agreed upon by the OWNER, DESIGN ENGINEER, manufacturers' representative(s), and CONTRACTOR, as appropriate.
   a. DESIGN ENGINEER will be present during test.
   b. Notify DESIGN ENGINEER and OWNER at least 14 days prior to scheduled date of test.

2. Follow approved testing plan and detailed procedures specified.
3. Source and type of fluid, gas, or solid for testing shall be as specified.
4. Unless otherwise indicated, furnish all labor, materials, and supplies for conducting the test and taking all samples and performance measurements.
5. Prepare performance test report summarizing test method. Include test logs, pertinent calculations, and certification of performance.

3.4 STARTUP TEST PERIOD

A. Test Reports: As applicable to the equipment furnished, certify in writing that:

1. Necessary hydraulic structures, piping systems, and valves have been successfully tested,
2. Equipment systems and subsystems have been checked for proper installation, started, and successfully tested to indicate that they are operational,
3. Systems and subsystems are capable of performing their intended functions,
4. Facilities are ready for intended operation.

B. Attend planning meetings and arrange for attendants by key major equipment manufacturer representatives as required by the Contract Documents.

C. Designate and furnish one or more persons to be responsible for coordinating and expediting CONTRACTOR's facility startup duties.

D. When facility startup has commenced, schedule remaining Work so as not to interfere with or delay the completion of facility startup. Support the facility startup activities with adequate staff to prevent delays and process upsets. This staff shall include, but not be limited to, major equipment and system manufacturers' representatives, Subcontractors, electricians, instrumentation personnel, millwrights, pipefitters and plumbers.

E. Supply and coordinate specified manufacturer's facility startup services.

F. Make adjustments, repairs, and corrections necessary to complete facility startup.

G. After the facility is operating, complete the testing of those items of equipment, systems, and subsystems which could not be or were not adequately or successfully tested prior to startup test period.

3.5 PARTIAL UTILIZATION

A. After successful performance testing of a particular equipment type or system, OWNER may elect to start up a portion of the equipment or system for continuous operation. Such operation will not interfere with testing of other equipment and systems that may still be underway, and shall not preclude the need to startup that portion operated in combination with the rest of the facility when testing is completed.

3.6 CONTINUOUS OPERATIONS

A. OWNER will accept equipment and systems as substantially complete and ready for continuous operation only after successful facility startup is completed and documented, and reports submitted, and manufacturers' services completed for training of OWNER's personnel.

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SUBMITTALS

A. Quality Control Submittals: Written procedures for maintaining and markup of record documents.

B. Contract Closeout Submittals: Submit prior to application for final payment.

1. Record Documents.
2. Approved Shop Drawings and Samples.
3. Special Bonds, Special Warranties, and Service Agreements.
4. Consent of Surety to Final Payment.
5. Releases or Waivers of Liens and Claims.
6. Releases from Agreements.
7. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01025, MEASUREMENT AND PAYMENT.
8. Spare Parts and Special Tools: As required by individual specification sections.

1.2 RECORD DOCUMENTS

A. Quality Assurance:

1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
2. Accuracy of Records:
   a. Coordinate changes within record documents, making legible and accurate entries on each page of Specifications and each sheet of Drawings and other documents where such entry is required to show change.
   b. Purpose of Project record documents is to document factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.
3. Make entries within 24 hours after receipt of information that a change in Work has occurred.
4. Prior to submitting each request for progress payment, request RESIDENT ENGINEER's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a referral by RESIDENT ENGINEER to recommend the whole or any part of the CONTRACTOR's Application for Payment, either partial or final.

1.3 RELEASES FROM AGREEMENTS

A. Furnish OWNER written releases from property owners or public agencies where side agreements or special easements have been made, or where CONTRACTOR's operations have not been kept within the OWNER's construction right-of-way.

B. In the event CONTRACTOR is unable to secure written releases, inform the OWNER of the reasons:

1. OWNER or its representatives will examine the site, and OWNER will direct CONTRACTOR to complete Work that may be necessary to satisfy terms of the easement.
2. Should CONTRACTOR refuse to perform this Work, OWNER reserves the right to have it done by separate contract and deduct the cost of same from the Contract Price, or require the CONTRACTOR to furnish a satisfactory Bond in a sum to cover legal claims for damages.
3. When OWNER is satisfied that Work has been completed in agreement with the Contract Documents and terms of easements, the right is reserved to waive the requirement for written release if: (i) CONTRACTOR's failure to obtain such statement is due to the grantor's refusal to sign, and this refusal is not based upon any legitimate claims that CONTRACTOR has failed to fulfill the terms of the easement, or (ii) CONTRACTOR is unable to contact or has had undue hardship in contacting the grantor.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 MAINTENANCE OF RECORD DOCUMENTS

A. General:

1. Promptly following commencement of Contract Times, secure from RESIDENT ENGINEER at no cost to CONTRACTOR, one complete set of Contract Documents. Drawings will be full size.
2. Delete RESIDENT ENGINEER title block and seal from all documents.
3. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
4. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

B. Preservation:

1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make documents and Samples available at all times for observation by RESIDENT ENGINEER.

C. Making Entries on Drawings:

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
   a. Color Coding:
      1) Green when showing information deleted from Drawings.
      2) Red when showing information added to Drawings.
      3) Blue and circled in blue to show notes.
2. Date entries.
3. Call attention to entry by "cloud" drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including, but not limited to:
   a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
   b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
   c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
   d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
   e. Changes made by Addenda Change Order, Written Amendment, and RESIDENT ENGINEER's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
   a. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.
   b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum," "exposed," and the like).
   c. Make identification so descriptive that it may be related reliably to Specifications.
6. Specifications: Legibly mark and record for each product the description of actual product installed if differs from that specified, including:
   a. Manufacturer, trade name, and catalog model number of each product and item of equipment actually installed.

3.2 FINAL CLEANING

A. Immediately prior to CONTRACTOR's notice of completion, clean entire site or parts thereof, as applicable.

1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to OWNER and RESIDENT ENGINEER.

2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
4. Broom clean exterior paved driveways and parking areas.
5. Hose clean sidewalks, loading areas, and others contiguous with principal structures.
6. Rake clean all other surfaces.
7. Leave water courses, gutters, and ditches open and clean.

B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

END OF SECTION

SECTION 02100
SITE PREPARATION

PART 1 GENERAL

1.1 DEFINITIONS

A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.

B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.

C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2 inches caliper to a depth of 12 inches below subgrade.

D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.

E. Stripping: Removal of topsoil remaining after applicable scalping is completed.

F. Project Limits: Areas, as shown or specified, within which Work is to be performed.

1.2 SCHEDULING AND SEQUENCING

A. Prepare site only after adequate erosion and sediment controls are in place.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 GENERAL

A. Clear, grub, and strip areas actually needed for waste disposal, borrow, or site improvements within limits shown or specified.

B. Do not injure or deface vegetation that is not designated for removal.

3.2 LIMITS

A. As follows, but not to extend beyond Project limits.

1. Excavation: 5 feet beyond top of cut slopes.
2. Fill:
   a. Clearing and Grubbing: 5 feet beyond toe of permanent fill.
   b. Stripping: 2 feet beyond toe of permanent fill.
3. Waste Disposal:
   a. Clearing: 5 feet beyond perimeter.
   b. Scalping and Stripping: Not required.

c. Grubbing: Around perimeter as necessary for neat finished appearance.

4. Structures: 15 feet outside of new structures.
5. Roadways: Clearing and grubbing 30 feet from roadway shoulders.
6. Other Areas: As shown.

B. Remove rubbish, trash, and junk from entire area within Project limits.

3.3 DISPOSAL

A. Clearing and Grubbing Debris: Dispose of debris offsite.

B. Scalpings: As specified for clearing and grubbing debris.

C. Strippings:

1. Dispose of strippings that are unsuitable for topsoil or that exceed quantity required for topsoil in waste disposal areas shown or approved by ENGINEER.
2. Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

END OF SECTION

SECTION 02140
DIVERSION AND CARE OF WATER

PART 1 GENERAL

1.1 WORK INCLUDED

A. This section covers the Work necessary for removal of water from Work areas, diversion of river flow, and handling and removal of all other water during the entire construction period, complete.

1.2 GENERAL

A. The worksite is in the channel of the Salt River. This river is normally dry with flows during wet weather or river releases. Coordinate Work with Salt River Project in accordance with the Special Provisions.

1.3 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of this section.

B. Weather Monitoring and Flood Warning Plan: Flood warning and weather advisory services are available through the Salt River Project, Flood Control District of Maricopa County, Arizona Department of Water Resources, and the National Weather Service. CONTRACTOR shall be responsible for coordinating with these and other appropriate agencies on a regular and timely basis to obtain available flood warning information for the Salt River and Indian Bend Wash. CONTRACTOR shall prepare a weather monitoring and flood warning plan for approval by the City prior to initiating activities within the Salt River floodplain.

C. Diversion Plan: A water diversion and control plan shall be prepared which addresses the diversion of water in and under the Salt River around construction areas. Design of the diversion plan is the sole responsibility of CONTRACTOR. Prior to beginning any Work, and within 45 days after award of contract, CONTRACTOR shall submit a Certificate of Design for the Diversion Plan with the seal of CONTRACTOR's Engineer. This plan shall show proposed method for the diversion and care of water during construction. The diversion plan shall be designed, stamped, signed, and certified by an independent professional consulting engineer, registered in the State of Arizona. CONTRACTOR's Engineer shall certify on a monthly basis that the diversion is constructed, operated, and maintained substantially in accordance with the design. System monthly certification shall be submitted on the 5th of each month.

D. Handling and Removal Plan: A water handling and removal plan shall be prepared which addresses the handling and removal of water from all sources that may impact construction. The Plan shall include descriptions of proposed groundwater and surface water control facilities including, but

not limited to, equipment; methods; standby equipment and power supply; pollution control facilities; discharge locations to be utilized; and provisions for immediate temporary water supply as required by this section. Drawings shall show locations, dimensions, and relationships of elements of each system. Design calculations shall be provided demonstrating adequacy of proposed dewatering systems and components. If the system is modified during installation or operation, revise or amend and resubmit Water Control Plan. Design of the water handling and removal plan is the sole responsibility of CONTRACTOR. Water shall be removed so Work can be performed in the dry as specified.

E. Prior to beginning any Work on handling and removal of water from excavations and foundations, CONTRACTOR shall submit a Certificate of Design for the Handling and Removal Plan with the seal of CONTRACTOR's Engineer. The plan shall show proposed method for removal and disposal of water from excavations and foundations. The handling and removal plan shall be designed, stamped, signed, and certified by an independent professional consulting engineer registered in the State of Arizona. CONTRACTOR's Engineer shall certify on a monthly basis that the handling and removal of water is constructed, operated, and maintained substantially in accordance with the design. Monthly certification shall be submitted by the 5th of each month.

F. Administrative Submittals:

1. Well permits.
2. Water discharge permits if required.

G. Quality Control Submittals:

1. Water Level Elevations Observed in Observation Wells: Submit same day measured.
2. Settlement Benchmark Elevations: Submit weekly record.

1.4 CODES, ORDINANCES, AND STATUTES: A contractor shall familiarize themselves with, and comply with, all applicable, codes, ordinances, statutes, and bear sole responsibility for the penalties imposed for noncompliance. CONTRACTOR shall allow 6 weeks to have the diversion plan reviewed by the RESIDENT ENGINEER and State and local agencies, and shall include the time for this review in his construction schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 MANAGEMENT OF RIVER FLOWS

A. CONTRACTOR shall construct and maintain all specified and necessary cutoffs, cofferdams, channels, flumes, drains, sumps, pumps, and/or other temporary diversion and protection works necessary for diversion and care of all water to properly accomplish Work.

B. CONTRACTOR shall conform to the regulations of the local, state, and federal agencies pertaining to passing the natural flow of the Salt River through the construction site and for measures required to do Work on the existing levees.

C. Gap in the Facilities: If CONTRACTOR creates a gap in the facilities for the purpose of diversion of the river, the gap shall be constructed and filled as specified.

3.2 PASSING WATER OVER COMPLETED FACILITIES

A. Temporarily passing water over completed portions of the facilities will be permitted, provided that completed Work is protected from erosion with riprap, and further protected from erosion and contamination in a manner approved by CONTRACTOR's Engineer. Facilities over which flow has temporarily passed shall be cleaned up, contaminated material removed and facilities repaired and suitably prepared to receive the phase of Work.

3.3 DEWATERING SYSTEMS

A. Provide, operate, and maintain dewatering systems of sufficient size and capacity to permit excavation and subsequent construction of armor layer in dry, and to lower and maintain groundwater level a minimum of 2 feet below the lowest point of excavation. Continuously maintain excavations free of water, regardless of source, until backfilled to final grade. Prevent premature hydration of the geosynthetic clay lining.

B. Design and Operate Dewatering Systems:

1. To prevent settlement of ground as water is removed.
2. To avoid inducing settlement or damage to existing facilities, completed Work, or adjacent property.
3. To relieve artesian pressures and resultant uplift of excavation bottom.

C. Provide sufficient redundancy in each system to keep excavation free of water in event of component failure.

D. Provide 100 percent emergency power backup with automatic startup and switchover in event of electrical power failure.

E. Provide supplemental ditches and sumps only as necessary to collect water from local seeps. Do not use ditches and sumps as primary means of dewatering.

3.4 CLEANUP

A. After having served their purpose, all materials placed for temporary diversion and protection shall remain the property of CONTRACTOR and shall be removed from the site. Remove all cofferdams or other temporary diversion and protective so as not to interfere in any way with the operation or usefulness of the river channel. Remove, level, and grade all cofferdams or other temporary diversion and protective works constructed and not a

part of the permanent facilities to the extent necessary to prevent obstruction in any degree whatever the flow of water in conformance with the Plans.

3.5 SETTLEMENT

A. Monitoring Dewatering-Induced Settlement: Establish monuments for monitoring settlement at locations selected by RESIDENT ENGINEER. Monitor vertical movement of each settlement monument, relative to remote benchmark selected by RESIDENT ENGINEER, at frequency stated in CONTRACTOR's Dewatering Plan.

3.6 DISPOSAL OF WATER

A. Treat water collected by dewatering operations, as required by regulatory agencies, prior to discharge.

B. Discharge water as required by discharge permit and in manner that will not cause erosion or flooding, or otherwise damage existing facilities, completed Work, or adjacent property.

C. Remove solids from treatment facilities and perform other maintenance of treatment facilities as necessary to maintain their efficiency.

3.7 PROTECTION OF PROPERTY

A. Make assessment of potential for dewatering induced settlement. Provide and operate devices or systems including but not limited to reinjection wells, and infiltration trenches and cutoff walls necessary to prevent damage to existing facilities, completed Work, and adjacent property.

B. Securely support existing facilities, completed Work, and adjacent property vulnerable to settlement due to dewatering operations. Support shall include, but not be limited to, bracing, underpinning, or compaction grouting.

3.8 RESPONSIBILITY OF CONTRACTOR

A. CONTRACTOR shall be responsible for and shall repair at his expense any damage to the foundations, structures, or any other part of the work caused by natural floods, water, or failure of any part of the diversion or protective works. In the event the construction area is flooded, clean up and repair the damage and dry out or remove material in embankments deemed too wet or contaminated for proper fill material by RESIDENT ENGINEER, all at CONTRACTOR's expense. CONTRACTOR shall be responsible for, and shall repair at his expense, any damage to areas adjacent to or downstream of the construction site caused by failure of any part of the diversion or protective work. CONTRACTOR shall inspect, monitor, and repair cofferdam and other diversion works to maintain them in safe condition.

3.9 HANDLING AND REMOVAL OF WATER

A. CONTRACTOR shall furnish, install, maintain, and operate all necessary sumps, drains, ditches, pumps, equipment, and other facilities for removal of water from the various parts of the Work and maintain excavations and embankments free from water as necessary for constructing each part of the Work in the dry.

B. Removal of Water from Excavations and Fill Areas:

1. Drain or otherwise positively dewater borrow areas, embankment areas, armor layer excavations, and other areas as necessary to permit satisfactory construction at all times. Where the armor layer excavation extends below the water table, dewatering shall be accomplished in a manner that will prevent loss of fines from the foundation, will maintain stability of the excavated slopes and bottom of the excavation, and will result in all construction operations being performed in the dry. The use of sufficient number of properly screened sumps, wells, or other equivalent methods will be necessary for dewatering.

END OF SECTION

SECTION 02205
EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Work required to excavate for armor stone layer, excess fill against CSA bank protection, and removal of CSA at Grade Control Structure No. 4, complete.

1.2 DEFINITIONS

A. Common Excavation: Removal of material not classified as rock excavation.

B. Rock Excavation:

1. General: Removal of solid material which by actual demonstration cannot, in RESIDENT ENGINEER's opinion, be reasonably loosened or ripped by single-tooth, hydraulically operated ripper mounted on crawler tractor in good condition and rated at minimum 410 flywheel horsepower; and which must be systematically drilled and blasted or broken by power-operated hammer, hydraulic rock breaker, expansive compounds, or other similar means prior to removal.
2. Trench: Removal of solid material which by actual demonstration cannot, in RESIDENT ENGINEER's opinion, be reasonably excavated with minimum 195-hp backhoe in good condition and equipped with manufacturer's standard boom, two rippers, and rock points or similar approved equipment; and which must be systematically drilled and blasted or broken by power-operated hammer, hydraulic rock breaker, expansive compounds, or other similar means prior to removal.
3. Term "rock excavation" indicates removal of solid material, as specified above, and does not necessarily correspond to "rock" as implied by names of geologic formations.
4. Removal of boulders larger than 1/2 cubic yard will be classified as rock excavation, breaking them apart with power-operated hammer, hydraulic rock breaker, expansive compounds, or other similar means is both necessary and actually used for their removal.

1.3 SUBMITTALS

A. Shop Drawings:

1. Excavation Plan, Detailing:
   a. Proposed locations of stockpiled excavated material.
   b. Proposed onsite and offsite spoil disposal sites.
   c. Reclamation of onsite spoil disposal areas.
   d. Plan for disposal of bentonite slurry.

1.4 QUALITY ASSURANCE

A. Provide adequate survey control to avoid unauthorized overexcavation.

1.5 WEATHER LIMITATIONS

A. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

1.6 SEQUENCING AND SCHEDULING

A. Soil-Bentonite Cutoff Wall: Complete applicable Work as specified in Section 02401, SOIL-BENTONITE CUTOFF WALL, prior to initiating excavation for armor layer. Begin excavation for armor layer no sooner than 3 weeks after the applicable cutoff wall within the vicinity has been completely backfilled.

B. Complete removal of excess fill against CSA bank protection above river channel elevation prior to construction of the soil-bentonite wall in the vicinity.

C. Dewatering: Conform to applicable requirements of Section 02140, DIVERSION AND CARE OF WATER, prior to initiating excavation.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 GENERAL

A. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Excavate to within tolerance of plus or minus 0.1 foot except where dimensions or grades are shown or specified as maximum or minimum. Allow for working space, granular base, protective gravel, GCL, and similar items, wherever applicable.

B. Do not overexcavate without written authorization of RESIDENT ENGINEER.

C. Remove or protect obstructions as shown and as specified in Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS, Article PROTECTION OF WORK AND PROPERTY.

3.2 CLASSIFIED EXCAVATION

A. Excavation is classified; see Article DEFINITIONS for classifications. Notify RESIDENT ENGINEER whenever rock is encountered.

B. Before beginning rock excavation, comply with following requirements:

1. Remove overlying material as common excavation and expose rock surface for examination by RESIDENT ENGINEER.

2. Demonstrate that removal of remaining material classifies as rock excavation unless waived by RESIDENT ENGINEER.
3. Assist RESIDENT ENGINEER with measurement and documentation of rock excavation.

3.3 STOCKPILING EXCAVATED MATERIAL

A. Stockpile excavated material that is suitable for use as fill or backfill until material is needed.

B. Post signs indicating proposed use of material stockpiled. Post signs that are readable from all directions of approach to each stockpile. Signs should be clearly worded and readable by equipment operators from their normal seated position.

C. Confine stockpiles to within easements, rights-of-way, and approved work areas. Do not obstruct roads or streets.

D. Do not stockpile excavated material adjacent to trenches and other excavations unless excavation sideslopes and excavation support systems are designed, constructed, and maintained for stockpile loads.

E. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce excessive settlement.

3.4 DISPOSAL OF SPOIL

A. Dispose of excavated materials, which are unsuitable or not needed for fill or backfill, in designated fill disposal areas.

B. Dispose of excess bentonite and soil-bentonite or cement-bentonite backfill in accordance with Section 02401, SOIL-BENTONITE CUTOFF WALL, and Section 02402, CEMENT-BENTONITE CUTOFF WALL.

END OF SECTION

SECTION 02215
SUBGRADE PREPARATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Work necessary to prepare subgrade for placement of armor stone and bedding material, complete.

1.2 DEFINITIONS

A. Optimum Moisture Content: As defined in Section 02220, FILL AND BACKFILL.

B. Prepared Ground Surface: Ground surface after completion of clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and scarification and compaction of subgrade.

C. Relative Compaction: As defined in Section 02220, FILL AND BACKFILL.

D. Subgrade: Layer of existing soil after completion of clearing, grubbing, scalping of topsoil prior to placement of fill, roadway structure or base for floor slab.

1.3 QUALITY ASSURANCE

A. Notify RESIDENT ENGINEER when subgrade is ready for compaction or whenever compaction is resumed after a period of extended inactivity.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 GENERAL

A. Keep subgrade free of water, debris, and foreign matter during compaction.

B. Bring subgrade to proper grade and cross-section.

C. Do not use sections of prepared ground surface as haul roads. Protect prepared subgrade from traffic.

D. Maintain prepared ground surface in finished condition until the bedding gravel is placed.

3.2 COMPACTION

A. Under Armor Layer Bedding Material: Compact the subgrade to a firm and unyielding condition using a minimum of at least one complete pass with a vibratory compactor capable of providing at least 20,000 feet-pounds of compactive energy.

3.3 CORRECTION

A. Soft or Loose Subgrade:

1. Adjust moisture content and recompact, or
2. Over excavate as specified in Section 02205, EXCAVATION, and replace with suitable material from the excavation, as specified in Section 02220, FILL AND BACKFILL.

B. Unsuitable Material: Over excavate as specified in Section 02205, EXCAVATION, and replace with suitable material from the excavation, as specified in Section 02220, FILL AND BACKFILL.

END OF SECTION

SECTION 02220
FILL AND BACKFILL

PART 1 GENERAL

1.1 DEFINITIONS

A. Relative Compaction:

1. Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D698.
2. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by RESIDENT ENGINEER.

B. Optimum Moisture Content:

1. Determined in accordance with ASTM Standard specified to determine maximum dry density for relative compaction.
2. Determine field moisture content on basis of fraction passing 3/4-inch sieve.

C. Prepared Ground Surface: Ground surface after completion of required demolition, clearing and grubbing, removal of temporary cutoff wall cap, excavation to grade, and subgrade preparation.

D. Completed Course: A course or layer that is ready for next layer or next phase of Work.

E. Lift: Loose (uncompacted) layer of material.

F. Geosynthetics: Geotextiles, geogrids, geomembranes or geocomposite clay linings.

G. Well-Graded:

1. A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
2. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
3. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

H. Borrow Material: Material from required excavations or from designated borrow areas on or near site.

I. Selected Backfill Material: Materials available onsite that RESIDENT ENGINEER determines to be suitable for specific use.

J. Imported Material: Materials obtained from sources offsite, suitable for specified use.

K. Standard Specifications: When referenced in this section, shall mean Maricopa Association of Government Standard Specifications.

1.2 SUBMITTALS

A. Samples: Imported material taken at source.

B. Quality Control Submittals: Certified test results from independent testing agency.

1.3 QUALITY ASSURANCE

A. Notify RESIDENT ENGINEER when:

1. When any area is ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.
2. Soft or loose subgrade materials are encountered wherever site fill is to be placed.
3. Fill material appears to be deviating from Specifications.

1.4 SEQUENCING AND SCHEDULING

A. Complete applicable Work specified in Section 02205, EXCAVATION, Section 02215, SUBGRADE PREPARATION, Section 02401, SOIL-BENTONITE CUTOFF WALL, and Section 02402, CEMENT-BENTONITE CUTOFF WALL, prior to placing fill or backfill.

B. Do not place granular bedding material until after subgrade has been prepared as specified in Section 02215, SUBGRADE PREPARATION.

PART 2 PRODUCTS

2.1 SOURCE QUALITY CONTROL

A. Gradation Tests:

1. As necessary to locate acceptable sources of imported material.
2. During production of select backfill and imported material, test as follows:
   a. Bedding and Protective Gravel: One test for 100 cubic yards, minimum of three.
   b. Armor Stone: One test for every 1,000 cubic yards, minimum of three.

B. Samples: Collected in accordance with ASTM D75:

1. During production of select backfill and imported material, provide Samples as follows:
   a. Bedding and Protective Gravel: One sample per 100 cubic yards, minimum of two.

b. Armor Stone: One sample per 1,000 cubic yards, minimum of two.

2. Clearly mark to show source of material and intended use.

2.2 BEDDING AND PROTECTIVE GRAVEL

A. Imported Material or Processed Select Backfill Meeting the Following Requirements:

1. 1-inch minus crushed gravel or crushed rock.
2. Free from dirt, clay balls, and organic material.
3. Well-Graded from coarse to fine and containing sufficient fines to bind material when compacted, but with maximum 8 percent by weight passing No. 200 sieve.

2.3 WATER FOR MOISTURE CONDITIONING

A. Free of hazardous or toxic contaminates, or contaminants deleterious to proper compaction.

2.4 ARMOR STONE

A. Imported material or processed select backfill meeting the following requirements:

1. Hard durable rock, well graded, conforming to the following gradation:

Size	Percent Passing by Weight
36-inch	80 - 100
24-inch	75 - 90
18-inch	60 - 80
12-inch	40 - 60
6-inch	0 - 10

2. Armor stone shall be free of roots, organic matter, trash, debris, clay balls, and other deleterious material.
3. Minimum dimensions of rock shall not be less than one-third maximum dimensions.
4. Additional Requirements for Imported Armor Stone:
   a. Abrasion Resistance: Maximum 35 percent wear as determined in accordance with ASTM C535.
   b. Soundness: Maximum 10 percent loss as determined in accordance with ASTM D5240 or crushed and tested in accordance with ASTM C88.

PART 3 EXECUTION

3.1 GENERAL

A. Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials.

B. Place and spread fill and backfill materials in horizontal lifts of uniform thickness, in a manner that avoids segregation, and compact each lift to specified densities prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water.

C. During filling and backfilling, keep level of fill and backfill around each structure and buried tank even.

D. Do not place fill or backfill, if fill or backfill material is frozen, or if surface upon which fill or backfill is to be placed is frozen.

E. Tolerances:

1. Final Lines and Grades: Within a tolerance of 0.1 foot unless dimensions or grades are shown or specified otherwise.
2. Grade to establish and maintain slopes and drainage as shown. Reverse slopes are not permitted.

F. Settlement: Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.

3.2 GRAVEL BEDDING

A. Place initial 6-inch lift of gravel bedding on prepared subgrade.

B. Moisture condition bedding to be within 3 percent of optimum moisture content as determined by ASTM D698.

C. Compact with a minimum of three complete coverage passes with a vibratory compactor capable of providing a minimum of 20,000 ft-lbs of compactive energy.

D. Add additional material and compact as above to meet minimum 4-inch compacted lift thickness shown.

3.3 GRAVEL PROTECTIVE LAYER

A. After placing GCL in accordance with Section 02247, GEOSYNTHETIC CLAY LINING, place additional protective gravel layer as shown.

B. Place material with low plus ground pressure (D-5 or lighter) tracked machine. Avoid sharp turns that may damage the GCL.

C. Dump material onto previously placed material and push into place, then compact as specified for gravel bedding.

D. No trucks or other vehicles are permitted on the gravel protective layer above the GCL.

3.4 PLACING ARMOR STONE

A. General:

1. Begin construction of armor layer no sooner than 3 weeks after the cutoff wall section in question has been completely backfilled.
2. Place armor stone in maximum 20-inch lifts.
3. Place fill with sufficient care so as not to damage GCL.
4. Place fill only by back dumping and spreading only.
5. Dump fill only on previously placed fill.
6. While operating equipment, avoid sharp turns, sudden starts or stops that could damage geosynthetics.
7. Comply with all requirements of Section 02247, GEOSYNTHETIC CLAY LINING.

B. Hauling: Operate hauling equipment on minimum of 3 feet of cover.

C. Spreading:

1. Spreading equipment shall be track mounted, low ground pressure, D-8 or lighter.
2. Operate spreading equipment on minimum of 20 inches of armor stone over geosynthetics.
3. Spread fill in same direction as seamed overlaps to avoid separation of seams and joints. Spread armor stone from the river side toward the CSA as to not damage the GCL.
4. Flatten wrinkles of geosynthetics and geotextiles in direction of spreading. Correct wrinkles in geotextiles as specified in Section 02247, GEOSYNTHETIC CLAY LINING.
5. Maintain proper overlap of seamed geosynthetics.
6. Avoid overstressing geosynthetics and seams.

D. Compaction: Compact each lift with minimum of three complete cover areas by a crawler mounted tractor with a weight not less than 80,000 pounds. A coverage consists of the vehicle treads contacting the entire surface area traveling at a speed no faster than 3 mph.

E. Work armor stone as necessary to distribute it and eliminate detrimental voids. Avoid overworking or long pushes that result in segregation of particle sizes.

F. Geosynthetic Damage:

1. Mark punctures, tears, or other damage to geosynthetics, so repairs may be made.
2. Clear overlying fill as necessary to repair damage.

3. Repairs to geosynthetics shall be made by respective installers as specified in Section 02247, GEOSYNTHETIC CLAY LINING.

3.5 REPLACING OVEREXCAVATED MATERIAL

A. Replace excavation carried below grade lines shown or established by RESIDENT ENGINEER as follows:

1. At Soil-Bentonite Cutoff Wall: Repair as specified in Section 02401, SOIL-BENTONITE CUTOFF WALL.
2. Beneath Bedding Gravel: Replace with compacted alluvium.

END OF SECTION

SECTION 02247
GEOSYNTHETIC CLAY LINING (GCL)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section covers the Work necessary to furnish and install geosynthetic clay lining (GCL) complete.

B. GCL shall consist of a layer of domestic, natural, high swelling sodium bentonite clay encapsulated between two geotextiles. GCL shall be manufactured in a manner that holds the sodium bentonite clay between the geotextiles in a stable, uniform thickness that does not shift or become dislodged during handling.

1.2 QUALITY ASSURANCE QUALIFICATION

A. Submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the materials. The mill certificate or affidavit shall attest that GCL materials meet the chemical, physical, and manufacturing requirements stated in this Specification. Materials shall be the end products of one manufacturer in order to achieve standardization for performance, replacement, and maintenance.

1.3 DEFINITIONS

A. GCL: A flexible panel made of a layer of domestic, natural, high swelling sodium bentonite clay (montmorillonite) encapsulated between two geotextiles.

B. Geotextile: A woven or nonwoven permeable man-made textile used with geotechnical engineering-related materials.

C. Minimum Average Roll Value (MinARV): Minimum of a series of average roll values representative of the product furnished.

D. Maximum Average Roll Value (MaxARV): Maximum of a series of average roll values representative of the product furnished.

E. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.

1.4 SUBMITTALS

A. Complete material specifications including typical montmorillonite content by weight, typical moisture content, and water absorption by ASTM E946, Test Method for Water Absorption of Bentonite by Porous Plate Method.

B. Description of methods used to join the panel edges which will provide a seam that performs as effectively as the panels.

C. Listing of all exceptions to the requirements specified herein.

D. Factory test results of materials certified by the manufacturer as being similar. In addition, submit the manufacturer's certification that material furnished is similar and of the same formulation as that for which the test results are submitted.

E. Layout and installation drawings and procedures for carrying out the work.

F. On request, submit a sample of 2 square yards of the material from each shipment for verification and testing.

G. Complete description for handling and storage of the GCL and associated products including, but not limited to, methods of unloading, inspection, covered storage on pallets or in an enclosed storage facility, and recording the quantity and lot numbers for each package.

PART 2 PRODUCTS

2.1 GEOSYNTHETIC CLAY LINING

A. Panels of bentonite and encapsulating geotextiles manufactured to perform as a continuous lining. Panels shall contain 1 pound per square foot of high swelling sodium bentonite clay measured at a moisture content of 12 percent, or equivalent weight at other moisture content.

B. The active ingredient shall be a high quality natural sodium bentonite without chemical resistance enhancers or polymers. The bentonite shall be 92 percent typical montmorillonite content by weight when tested with x-ray diffraction methods. The bentonite shall have a minimum volumetric increase of 900 percent when tested in accordance with ASTM E946, Test Method for Water Absorption by Porous Plate Method, and the ability for 2 grams of material, mechanically reduced to pass a U.S. No. 100 sieve, to swell in water to an apparent volume of 16 ml when added slowly to 100 ml of water.

C. The GCL shall be manufactured so that the bentonite shall be continuously contained throughout the GCL and to support the geotextiles so that no displacement of the bentonite occurs when the material is unrolled, moved, cut, torn, or punctured. Any adhesive used shall be inert, nontoxic, and water soluble. GCL materials made without the use of adhesives shall be stabilized to contain the granular bentonite by a process such as needle-punching through the top and bottom layers of geotextile and the bentonite.

D. The encapsulating geotextile materials shall protect the bentonite and be sufficiently porous to allow bentonite flow-through to create a positive bentonite-to-bentonite seal at the seams.

E. Prior to packaging the finished product, the manufacturer shall inspect each roll over the entire surface area by using a strong light source on one side of the panel and observing the other side for zones of inadequate bentonite distribution or by using other reliable methods to detect deficiencies in the uniformity of the bentonite distribution. Deficient rolls shall be rejected.

F. Each roll shall be labeled with the length, width, and weight, along with the lot number and date of manufacture.

G. The GCL shall be CLAYMAX(R) as manufactured by Clem Environmental Corp., Chicago, IL; or BENTOMAT(R) as manufactured by Colloid Environmental Technologies Co. (CETCO), Arlington Heights, IL; or Bentofix as manufactured by Albarrie Naue Ltd., Barrie, Ontario, Canada; and shall meet the following requirements:

Property	Requirement	Test Method
Mass (Weight), lb/sq yd, MinARV	9.5	ASTM D3776
Thickness, in., plus or minus 0.03 in., MinARV	0.25	ASTM D1777
Bentonite Content, lb/sq ft at 12% moisture content, MinARV	0.9	ASTM D3776
Wide Width Tensile Strength, lb/in.-width, Tested Dry, MinARV	40	ASTM D4595
Puncture Strength, lb, Tested Dry, MinARV	60	ASTM D4833
Grab Strength, lb/in.-width, Tested Dry, MinARV	90	ASTM D4632
Grab Elongation, %, Tested Dry, MaxARV	15	ASTM D4632
Angle of Friction, Degrees Apparent Cohesion, lb/sq ft, MinARV Slip-Plane Interface Strength Within Hydrated Bentonite Layer	12 500	ASTM D3080, Modified
Permeability with Water under 400 lb/sq ft Normal Load, cm/sec, MaxARV	$1x10^{-9}$	ASTM D5084
Finished GCL Roll Width, Feet, MinARV	12	Linear Measurement
Finished GCL Roll Length, Feet, MinARV	100	Linear Measurement

2.2 BENTONITE SEALING COMPOUND

A. Bentonite sealing compound in powder or granular form shall be the same product used in the manufacture of the GCL materials.

B. The sealing compounds shall be applied to seal around all penetrations and structures shown on the Drawings and under repair patches. The manufacturer shall recommend the minimum amount of sealing compound to use in each instance in order to effect an adequate seal.

C. The sealing compound shall be furnished by the manufacturer of the GCL product furnished for this project.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

A. Inspect GCL materials delivered to the project site for damage. Inventory by quantity, lot number, panel size, and weight. Provide copy of inventory to RESIDENT ENGINEER.

B. Store GCL in a dry, protected facility or in a protected area on pallets off the ground and covered with a heavy, waterproof membrane that allows the free flow of air between the membrane and the materials.

C. Each day remove from storage only the rolls of material that are to be installed on that particular day. Stored GCL materials shall be kept under protective cover at all times. Protect the integrity of the GCL materials at all times during the course of the project. Replace materials that are damaged or contaminated with dust, dirt, or excess moisture at the CONTRACTOR's sole expense.

3.2 SUBGRADE PREPARATION

A. The surface on which the GCL is to be installed shall be prepared in accordance with Section 02200, FILL AND BACKFILL, and as indicated on the Drawings.

B. Prepared the surface of the CSA to receive the GCL by first power washing the surface to remove all loose CSA, soil, and rocks. After power washing, smooth the surface by applying a gunite or other sand cement mixture with a minimum 7-day compressive strength of 750 psi to the CSA surface. The CSA should not be exposed in the area where the GCL will be placed. This material can be applied by hand or pneumatic methods. The finish surface should be free of rough undulations that would prevent the GCL from coming firmly in contact. Any irregularities greater than 2 inches in a 2-foot area should be repaired.

C. The surface on which the GCL is to be placed shall be maintained in a firm, clean, dry, and smooth condition during GCL installation.

3.3 PLACEMENT OF GEOSYNTHETIC CLAY LINING

A. Place the GCL surface on the underlying soil with the surface of the GCL in contact with the soil as recommended by the manufacturer. Place all subsequent panels in the same manner.

B. The GCL panels shall not be dragged over the surface, except for slight adjustments as may be necessary for obtaining the correct overlap of panels. The rolled-up panels shall not be allowed to unroll unrestrained down any slope.

C. The panels shall be placed to provide an overlap of 6 to 9 inches on longitudinal seams and 24 inches on transverse seams. No lap seams parallel to the slope shall be allowed on slopes steeper than 7H:1V.

D. The GCL panels shall not be installed in standing water or while it is raining or when rain may begin before the panels can be covered with protective gravel and armor stone or temporary plastic cover and protected. The GCL shall be "dry" when installed and "dry" when the protective gravel and armor stone are installed over it.

E. The GCL shall be free of tension or stress upon completion of the installation. The GCL shall be laid smooth without creases or wrinkles and without stretching the material to fit an area.

F. The geomembrane cover material shall be placed over the GCL during the same day as the placement of the GCL or if potential rain or other events require protection of the GCL. Only those GCL panels that can be anchored and covered the same day shall be unwrapped and placed in position.

3.4 SEAMING GCL PANELS

A. Overlap marks 6 and 9 inches from the panel edge shall be marked longitudinally on the GCL to assist in obtaining the proper overlap.

B. Prior to lapping, remove all dirt, gravel, or other debris from the overlap area. Apply 1/4 pound of sealing compound per lineal foot of seam. Lap areas that have been contaminated by soil and/or sand shall receive additional bentonite sealant in the amount of 1/4 pound per lineal foot evenly spread across the longitudinal seam area.

C. Seam overlap on slopes less than 7H:1V shall be shingled so that the direction of flow is from the top panel onto the bottom panel. On slopes steeper than 7H:1V the panels shall be placed with the long dimension (length) continuous from the crest to the toe and the upper end anchored in a trench with soil backfill.

D. The installer shall provide compensation for shrinkage when ambient temperatures are greater than 85 degrees F and the humidity is low, as shrinkage may occur soon after placement when no confining soil cover over the geomembrane is placed. To compensate, as a minimum, the longitudinal overlap should be increased to 12 inches and the transverse overlap should be increased to 36 inches. Severe conditions with temperatures much greater than 85 degrees F may require an even greater overlap to be determined by the CONTRACTOR and accepted by the RESIDENT ENGINEER.

3.5 PATCHING AND REPAIRS

A. Irregular shapes, cuts, or tears in installed GCL shall be overlapped with an additional layer of GCL material a minimum of 12 inches in all directions from the defect on all patches. Patch seams parallel to the slope shall be secured with nontoxic, water soluble adhesive as accepted by the manufacturer and the RESIDENT ENGINEER. Patches and repairs shall not be allowed on slopes greater than 7H:1V. Complete panels shall be removed and replaced with undamaged panels when damage is extensive as determined by the superintendent and the RESIDENT ENGINEER.

3.6 PLACEMENT OF OVERLYING MATERIALS ON GEOSYNTHETIC CLAY LINING

A. The GCL shall be covered as it is installed in accordance with Section 02220, FILL AND BACKFILL, as the GCL installation is accepted for cover by the installation superintendent and the RESIDENT ENGINEER. The intent of the Specification is to cover the GCL as it is installed without getting more than two panel widths or 24 feet beyond the cover system over the GCL material. In any event, the GCL is to be completely covered and protected at the end of each shift or workday. The CONTRACTOR shall be fully responsible to protect the GCL from damage, shrinkage, or prehydration and shall replace all affected materials at the CONTRACTOR's sole expense.

B. To prevent premature hydration or shrinkage in hot weather, only the amount of GCL that can be anchored, inspected, repaired, and covered in the same day shall be installed.

C. Any leading edge or panels of GCL left uncovered shall be protected with a heavy, waterproof membrane or tarp which is adequately secured and protected with sandbags or other ballast.

D. Equipment used to installed the armor stone materials shall not operate directly on the GCL.

E. The GCL shall be placed in such a manner that the armor stone is pushed across the seams from the upper panel to the lower panel. The cover materials shall not be pushed between the seam overlap which will jeopardize the seal of the lap seam and allow a leakage pathway.

F. Equipment placing cover soil shall push the soil in front, traveling on a minimum thickness of 6 inches of previously installed protective gravel or 12 inches of armor stone and never directly on the GCL. No sudden or sharp turns or rapid acceleration or deceleration shall occur while the equipment is operating over the GCL material.

END OF SECTION

SECTION 02401
SOIL-BENTONITE CUTOFF WALL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Work necessary for construction of the soil-bentonite cutoff wall, complete.

1.2 DEFINITIONS

A. Slurry Method of Excavation: Excavation of a vertical-walled trench in the soil and rock while at the same time keeping the trench filled with a specified bentonite slurry. The basic purpose of the slurry is to support the walls of the trench.

B. Slurry Trench: A trench excavated in the ground by the slurry method of excavation.

C. Soil-Bentonite Cutoff Wall: A continuous low-permeability water barrier formed by backfilling a slurry trench with the specified soil-bentonite mixture.

D. Heading: Any continuous section of slurry trench which is being excavated at one end and/or backfilled at the other end.

E. Working Surface: The ground surface elevation adjacent to the top of the slurry trench during excavation of the slurry trench.

F. Groundwater Level: The piezometric level of the groundwater as determined from piezometers installed in the alluvium in the vicinity of the slurry trench.

G. Well-Graded: Well-graded as used in this section defines a mixture of particle sizes that have no specific concentration or deficiency of one or more sizes. Well-graded is used to help define a material that, when placed in the slurry trench, produces a relatively impermeable material free from detrimental voids.

H. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D698. Corrections for oversize material may be applied to either the as-compacted field dry density of the maximum dry density or the maximum dry density, as determined by RESIDENT ENGINEER.

I. Optimum Moisture Content: Optimum moisture content shall be determined ASTM D698. Field moisture content shall be determined on the basis of the fraction passing the 3/4-inch sieve.

J. Ravelling: Loss of ground from the trench walls not caused by equipment operation that results in widening of the trench beyond the specified width.

K. API: American Petroleum Institute.

L. API RP: API Recommended Practice.

M. Unclassified Excavation: Removal of all material encountered regardless of the geologic formation, degree of induration, hardness, or other property.

N. Fines: Material passing the U.S. Standard No. 200 sieve, when tested in accordance with ASTM C117.

O. GCL: Geosynthetic clay layer. As specified in Section 02247, GEOSYNTHETIC CLAY LINING.

P. Geologic Bedrock: Natural, indurated geologic formations underlying the loose, uncemented river alluvium. Geologic bedrock includes materials such as granite, sandstone, and conglomerate occurring in ledges or layers. The term does not include boulders or other particles contained within the alluvium.

1.3 QUALIFICATIONS FOR SOIL-BENTONITE CUTOFF WALL CONSTRUCTION

A. CONTRACTOR shall be experienced in soil-bentonite cutoff wall construction, and shall have sufficient competent personnel experienced in this type of construction and able to carry out the operations specified. CONTRACTOR shall have experience in previous successful projects of soil-bentonite cutoff walls using specialized slurry trench construction equipment to depths of 50 feet or greater, and with excavation in rock. Also, a slurry trench and soil-bentonite cutoff wall specialist shall be employed by CONTRACTOR to control the composition, mixing, placing, cleaning, and maintaining of the slurry and soil-bentonite backfill.

B. The slurry trench and soil-bentonite cutoff wall specialist shall be an engineer or engineering technician who has had proven and successful experience with 50-foot deep slurry trench construction, using specialized slurry trench construction equipment, and who is knowledgeable and experienced with all facets of the construction including, but not limited to:

1. The use, testing, and control of bentonite as a slurry.
2. The proper mixing methods employed to mix the slurry and backfill materials.
3. Excavation and backfill operations.
4. A thorough knowledge of construction equipment and testing requirements needed for slurry trench construction.

1.4 SUBMITTALS

A. Certification, test results, and samples for all imported material, including bentonite.

B. Catalog and manufacturer's data sheets for slurry trench excavating equipment, slurry mixing and placing equipment, and compaction equipment.

C. Plan for mixing slurry and delivery of slurry to trench.

D. Plan for mixing and placing backfill.

E. Test results for design mix of soil-bentonite backfill including permeability, slump, moisture content and grain size distribution.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide all labor, materials, and equipment necessary to accomplish the work specified in this section.

2.2 HYDRAULIC EXCAVATOR FOR TRENCH EXCAVATION

A. As a minimum, the hydraulic excavator shall have a rated output horsepower not less than 400. The hydraulic excavator shall be maintained in good working condition throughout the Work and shall be equipped with a rock excavation bucket and teeth whenever excavation into geologic bedrock is being performed or attempted. At other times, use bucket chosen by CONTRACTOR.

2.3 CUTOFF TRENCH BACKFILL

A. The backfill mix shall be designed by CONTRACTOR. The mixed backfill shall meet the following requirements:

1. Hydraulic conductivity shall not exceed 1 x 10^{-6} cm/sec when tested in accordance with ASTM D5084. As an option, CONTRACTOR may use a similar size fixed ring setup. The hydraulic gradient shall not exceed 10.
2. Backfill shall be a mix of the following materials, as specified in this section, in the proportions determined by CONTRACTOR's mix design:
   a. Select backfill.
   b. Imported fine-grained material.
   c. Bentonite.
   d. Slurry.
3. Submit a mix design report prepared under the supervision of and sealed by a professional engineer licensed in the State of Arizona, with at least 5 years of experience in slurry wall design and construction. The mix design report shall show the results of various tests at varying proportions of the above materials, and varying bentonite contents, so as to identify an appropriate mix to achieve the hydraulic conductivity specified. Initial and intermediate hydraulic conductivity testing may be conducted in fixed-wall permeameters. Final testing to verify the mix hydraulic conductivity for the proposed mix design shall be accomplished in strict accordance with ASTM D5084.
4. RESIDENT ENGINEER reserves the right to increase the amount of bentonite to be added to the mixed backfill up to 3 percentage points over the amount recommended in the mix design report.

2.4 BENTONITE

A. Pulverized or powdered premium grade natural sodium cation bentonite, conforming to the requirements of the standards of API Specification 13A, with a minimum yield of 90 barrels per ton when tested in accordance with API RP 13B. Protect bentonite from moisture and contamination in transit and in storage at the site.

2.5 ADMIXTURES

A. The use of any admixture, or of any plugging or bridging agent, will not be permitted without prior written authorization from RESIDENT ENGINEER.

2.6 SELECT BACKFILL

A. This material is not available onsite and must be either manufactured by processing onsite material mixed with imported fines, or imported.

B. Excavated and processed or imported material, free from roots, organic matter, trash, debris, rocks larger than 3 inches, and other deleterious materials. Select backfill shall conform to the following washed sieve gradation when tested in accordance with ASTM C117 and C136:

Sieve Size	Percent Passing by Weight
3-inch	100
1-inch	80 - 100
1/2-inch	65 - 98
No. 4	50 - 90
No. 40	15 - 50
No. 200	5 - 30

C. To the extent possible, obtain from required excavation. If additional select backfill is required to accomplish the Work, import material of equivalent quality, at CONTRACTOR's option. No additional payment will be made if CONTRACTOR elects to import material.

2.7 EXCESS EXCAVATION

A. All excavated material that does not meet the requirements for SELECT BACKFILL.

2.8 ARMOR STONE

A. Conform to requirements of Section 02220, FILL AND BACKFILL.

2.9 IMPORTED FINE-GRAINED MATERIAL

A. Friable, nonindurated natural earth material with at least 50 percent passing the No. 200 sieve when tested in accordance with ASTM D1140 as

modified herein. Determination of the percent passing the No. 200 sieve shall not use dispersing agents, the ASTM D1140 mixer, or other mechanical mixers, and the soil shall be broken down using only manual agitation. Furthermore, the soil shall be soaked no more than 12 hours before washing.

B. When tested in accordance with ASTM D4318, the Atterberg limits of imported material shall conform to the following:

1. Liquid Limit: 25 to 55.
2. Plasticity Index: 10 to 30.

C. To the extent possible, obtain the imported fine-grained material at a low moisture content so that it behaves as a dry material. Protect imported fine-grained material from moisture and contamination both in transmit and in storage at the site.

2.10 GEOSYNTHETIC CLAY LINING

A. Conform to requirements for geotextile in Section 02247, GEOSYNTHETIC CLAY LININGS.

2.11 SLURRY

A. The slurry for supporting the sides of the trench and for mixing with the backfill shall consist of a stable colloidal suspension of bentonite in water. Design the slurry such that it has the density, viscosity, and filtrate loss necessary to maintain the stability of the excavated trench, subject to the requirements in the following paragraphs.

B. The in-trench slurry shall meet the following as determined in accordance with API RP 13B:

1. Viscosity: Minimum of 40 sec. Marsh.
2. Filtrate Loss: Maximum of 25 cubic centimeters.
3. Density of Slurry Sampled: At least 15 pcf lighter than the soil-bentonite backfill when sampled within 5 feet of trench bottom.

2.12 WATER

A. Use only potable water to form the slurry and soil-bentonite backfill.

B. Availability of construction and potable water, as specified in Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

2.13 IMPORTED MATERIAL ACCEPTANCE

A. Other than bentonite, all processed or imported materials specified in this section are subject to the following requirements:

1. All tests necessary for CONTRACTOR to establish a processing method and/or to locate an acceptable source of imported material

shall be made by CONTRACTOR. Certification that the material conforms to the Specification requirements along with copies of the test results from a qualified commercial testing laboratory shall be submitted to RESIDENT ENGINEER for approval at least 10 days before the material is required for use. All samples shall be furnished by CONTRACTOR at CONTRACTOR's sole expense. Samples shall be representative and be clearly marked to show the source of the material and the intended use on the project. Sampling of the source shall be done by CONTRACTOR in accordance with ASTM D75. Notify RESIDENT ENGINEER at least 24 hours prior to sampling. RESIDENT ENGINEER may, at RESIDENT ENGINEER's option, observe the sampling procedures. Tentative acceptance of the source shall be based on an inspection of the source by RESIDENT ENGINEER and/or the certified test results submitted by CONTRACTOR to RESIDENT ENGINEER, at RESIDENT ENGINEER's discretion. No processed materials shall be manufactured or imported materials shall be delivered to the site until the proposed source and materials tests have been tentatively accepted in writing by RESIDENT ENGINEER. Final acceptance will be based on tests made on samples of material taken from CONTRACTOR's onsite stockpile. All testing for final acceptance shall be performed by RESIDENT ENGINEER.

2. Tests by CONTRACTOR shall be made on samples taken at the place of production prior to stockpiling shipment. Tests shall be as specified for the material in question. Samples of the finished product for testing shall be taken from each 500 cu yd of material or more often as determined by RESIDENT ENGINEER, if variation in gradation is occurring, or if the material appears to depart from the Specifications. Test results shall be presented in writing to RESIDENT ENGINEER within 48 hours after sampling.
3. If tests conducted by CONTRACTOR or RESIDENT ENGINEER indicate that the material does not meet Specification requirements, material placement shall terminate until corrective measures are taken. Material that does not conform to the Specification requirements and that has been placed in the Work shall be removed and replaced at CONTRACTOR's sole expense. Sampling and testing performed by CONTRACTOR shall be done at CONTRACTOR's sole expense.

2.14 BENTONITE ACCEPTANCE

A. Submit to RESIDENT ENGINEER certification from the manufacturer that the bentonite conforms with API Specification 13A and these Specifications prior to placing orders.

B. Submit samples of bentonite to RESIDENT ENGINEER for tentative acceptance prior to placing orders. Samples shall be representative and clearly marked to show the source of the material and the intended use on the project. Final acceptance of bentonite shall be based on tests made on samples of bentonite taken from CONTRACTOR's onsite bentonite storage facilities. All testing for final acceptance will be performed by RESIDENT ENGINEER.

2.15 EQUIPMENT

A. All equipment shall be maintained and operated in strict accordance with the manufacturer's instructions and recommendations. All equipment shall be free of fluid leaks which discharge substances onto the ground or into the trench. Immediately repair or remove from the site all broken or leaky lines, hoses, valves, pistons, pipes, tanks, and other equipment components. Equipment shall be maintained in such condition that it will deliver the manufacturer's rated output. If inadequate quantity or quality of production is obtained, provide larger and/or different equipment.

B. Slurry Trench Excavating Equipment: Equipment for excavating the slurry trench shall consist of either a hydraulic backhoe, a trenching machine adopted for slurry trench construction, a special mechanical slurry trench clamshell, or other specialized equipment for slurry trench construction. The buckets used in the equipment shall not be perforated and shall be made to minimize the ravelling of the sides of the trench and to maintain the width of the trench. The equipment shall be capable of excavating the minimum required trench width in a single pass of the excavating tool.

C. Slurry Mixing and Placing Equipment: The slurry plant shall include a high-speed colloidal mixer, or other equipment that achieves complete dispersion of the bentonite particles and produces a stable colloidal suspension of bentonite and water. The plant shall be capable of providing a continuous supply of slurry to the slurry trench during excavation. Provide all necessary sumps, pumps, hoses, valves, supply lines, mixers, tools, and all other items necessary to adequately supply slurry for the Work.

D. Slurry Storage Facilities: If necessary to provide time for complete hydration of the bentonite in the slurry, provide storage tanks or construct storage ponds to store freshly mixed slurry. Storage facilities shall be configured so as to allow continuous low-speed circulation of the stored slurry. Storage ponds may not be constructed inside the area confined by the soil-bentonite cutoff wall.

E. Backfill Mixing and Placing Equipment: Equipment for mixing and placing soil-bentonite backfill shall be a suitable type of earthmoving or grading equipment, such as bulldozers, end loaders, disk harrows, or blade graders; or use other suitable equipment capable of achieving thorough and complete mixing. Equipment for placing the backfill into the start of any trench where the end slope is steeper then 2 vertical to 1 horizontal shall consist of a crawler crane with clamshell bucket. In addition, placing of the backfill at any point may require the use of probe rods.

F. Moisture Control Equipment: Equipment for applying water shall be of a type and quality adequate for the Work, shall not leak, and shall be equipped with a distributor bar or other approved device to assure uniform application. Equipment for mixing and drying out material shall consist of blades, discs, or other approved equipment.

2.16 QUALITY CONTROL EQUIPMENT

A. CONTRACTOR's Equipment: Provide all equipment necessary for CONTRACTOR's quality control testing. Minimum quality control testing by CONTRACTOR is specified hereinafter. Provide any additional equipment necessary for any additional testing CONTRACTOR elects to do. All equipment shall be maintained in good working order, and shall meet the requirements of the applicable test standards cited herein.

B. Equipment for Use of RESIDENT ENGINEER: Provide the following equipment for use by RESIDENT ENGINEER during the Work. Equipment shall be furnished to RESIDENT ENGINEER not less than 5 working days prior to initial slurry mixing for the project. All equipment shall be in good working order, and shall be maintained in good working order by CONTRACTOR at his own expense. RESIDENT ENGINEER will take ordinary and reasonable care of CONTRACTOR-furnished equipment, and will return all such equipment to CONTRACTOR at the completion of the work in the condition received, less normal wear and tear inherent to the work. Provide the expendable supplies listed in quantities shown. CONTRACTOR-furnished expendable supplies not used in quality control testing of the work will be returned to CONTRACTOR at the completion of the work. Additional or other expendable supplies will be purchased by RESIDENT ENGINEER.

Item No.	Item	Quantity	Expendable Supplies
1.	Marsh Funnel Set (API RP 13B)	1	None
2.	Mud Balance (API RP 13B)	1	None
3.	Slurry Sampler, capable of obtaining 1 U.S. quart or more of slurry from any given depth in the trench or from the slurry storage facilities, with necessary rods, poles, etc.	1	None
4.	Filter press for low temperature test, 100 psi maximum pressure, compressed gas pressurization system, with necessary gas cylinders, regulator, etc. (API RP 13B)	1	Compressed gas sufficient for 100 tests; filter paper conforming to API RP 13B for 100 tests
5.	Filter press for low temperature test, 100 psi maximum pressure, no pressurization system required (API RP 13B)	4	None
6.	Trench depth measuring device of appropriate length for the work, with knots or projecting markers at 5-foot vertical intervals	1 per heading	None

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavation is unclassified. Complete all excavation regardless of the type, nature, or condition of the materials encountered. Make own estimate of the kind and extent of the various materials to be excavated in order to accomplish the work.

B. Perform slurry trench excavation in a manner which maximizes production of SELECT BACKFILL to the extent practical.

3.2 EXCAVATION SAFETY

A. CONTRACTOR shall be solely responsible for making the excavation in a safe manner. Provide appropriate measures to retain excavation side slopes, to prevent slope failures, and to ensure that persons at or near the excavation are protected.

3.3 DEPTH OF EXCAVATION

A. Excavate to the depths as shown or as determined in the field by RESIDENT ENGINEER.

B. In general, the depth of the trench shall be determined as follows:

1. Where the Drawings show the trench penetrating into the top of geologic bedrock (Stations 13+09 to approximately 55+00, and Stations 203+50.5 to approximately 247+75), the specified hydraulic excavator shall be used to excavate into the top of geologic bedrock up to 2 feet, after removal of the alluvium. Excavation shall continue through the alluvium and into top of geologic bedrock until no practical progress is being achieved. For the purposes of this section, "no practical progress" means that five excavating passes of the excavator bucket bearing on the trench bottom in geologic bedrock produces only small amounts of rock particles. At this point, the reach of trench being excavated shall be cleaned by back-dragging the excavator bucket on the trench bottom by moving the excavator along the trench centerline while holding the bucket on the trench bottom. None of this excavation of alluvium or geologic bedrock work shall constitute "rock excavation."
2. The cleanup shall be satisfactory when the backdragging cleaning pass produces no significant volume of material, whether alluvial or geologic bedrock. If satisfactory cleanup is not achieved, continue excavation and cleaning passes either until it is achieved or until the penetration into geologic bedrock shown is achieved.
3. Use metal pole or rod with a steel point to probe the bottom of the trench and verify the trench bottom cleanliness. Allow RESIDENT ENGINEER to use the probe rod to verify that the cleanup is satisfactory.
4. Where the Drawings show the trench bottom not extending into bedrock (Stations 55+00 [approximately] to 66+50, and Stations 247+45 [approximately] to 257+50), excavate the trench to

the depth shown. If geologic bedrock is encountered at an elevation higher than the trench bottom shown, complete the trench on top of the geologic bedrock as specified in the preceding paragraph.

C. The locations where geologic bedrock is anticipated are shown on the slurry trench profiles. Descriptions of the geologic bedrock materials are provided in the supplementary information referred to in the Special Provisions.

3.4 TOLERANCES

A. Alignment of the cutoff wall shall be within 1 foot of alignment shown. Requests for greater variations shall be submitted to RESIDENT ENGINEER for review at least 2 weeks prior to excavation in the area of the proposed change.

B. The wall shall be plumb within 3 degrees of vertical.

3.5 LIMITS OF EXCAVATION

A. Excavation carried below the grade line shown or established by RESIDENT ENGINEER shall be backfilled as specified for the remainder of the trench. Correct all overexcavated areas at CONTRACTOR's sole expense.

3.6 EXCESS EXCAVATION DISPOSAL

A. Dispose of all excess excavation in the excess fill disposal areas shown, or as directed by RESIDENT ENGINEER.

B. Dispose of excess soil-bentonite backfill and slurry offsite in accordance with all local, state, and federal requirements. Dispose of this material shall be at the CONTRACTOR's sole expense.

3.7 CONSTRUCTION PAD

A. In areas where the surface and near-surface soils are too coarse, open graded or otherwise inadequate to form the top of the slurry trench, or where groundwater is too close to the surface for trench stability, where there is inadequate width on which to work, or where necessary to permit grade changes, or where elected by CONTRACTOR, build a construction pad as necessary to complete the slurry trench. The dimensions and details of the construction pad shall be determined by CONTRACTOR. All construction pad work other than at required grade changes shall be at CONTRACTOR's option.

B. After backfilling of the slurry wall in any area is complete, the construction pad shall be removed. At CONTRACTOR's option, soil material may be salvaged and used for soil-bentonite backfill if it is free of slurry, vegetation, trash, debris, and deleterious materials and conforms to the requirements for either IMPORTED FINE-GRAINED MATERIAL or SELECT BACKFILL after salvaging and stockpiling. All excess material

not used in the soil-bentonite backfill shall be placed in the excess disposal areas.

3.8 SLURRY MIXING

A. Produce slurry by gradually adding dry bentonite to potable water and thoroughly mixing until a complete dispersion of bentonite is achieved. The resulting slurry shall have a bentonite content adequate to produce the slurry properties specified herein before introduction into the trench.

B. After mixing, allow the slurry to hydrate completely before being introduced to the trench excavation. This may be accomplished by maintaining high speed circulation until hydration is complete, or by storing the slurry in a tank or pond with a low speed circulation system. The slurry shall be stored under essentially constant circulation until used. Circulation may cease overnight or on weekends when the addition of slurry to the trench is not necessary.

C. Hydration will be considered to be complete when filtrate loss and viscosity reaches the specified limits, and when filtrate loss and viscosity is stable when measured one or more hours apart, as determined by RESIDENT ENGINEER.

D. Newly mixed slurry that is not completely hydrated shall be segregated from hydrated slurry, and shall not be commingled with other slurry.

E. All slurry shall be batched or continuously mixed. No slurry shall be mixed in the trench.

F. Hydrated slurry shall have the specified properties before being delivered to the trench. Hydrated slurry shall not be thinned by the addition of water or otherwise altered before being introduced into the trench.

G. CONTRACTOR's full-time slurry trench specialist shall regularly test and control the mixing and placing of the slurry in order to maintain the specified properties of the slurry. Submit a plan to RESIDENT ENGINEER for mixing the slurry and delivery to the trench.

3.9 SLURRY TRENCH EXCAVATION

A. The working surface for the slurry trench shall be located at the existing river bed elevations, except where higher elevations are necessary for stability or construction access, and such higher grades are authorized in writing by RESIDENT ENGINEER. Higher grades constructed by CONTRACTOR for his own convenience will not be paid for.

B. Excavate the slurry trench using the slurry method of excavation. Excavate to the depth as hereinbefore specified. Excavate to full depth at the starting point, then carry the trench excavation along the trench alignment at the full depth shown or as determined by the RESIDENT ENGINEER. The walls of the trench shall be essentially vertical.

C. The toe of the slope of the trench excavation shall not precede the toe of the backfill slope by more than 120 feet, nor by less than 20 feet. The slurry trench cutoff shall be constructed in a continuous process during each normal work day without voluntary interruption until it is complete.

D. Construction surcharges including, but not limited to, excavated material, slurry mixing operations, backfill mixing operations, excavating equipment, and pumping equipment, shall be kept away from the trench. Only equipment required for excavation and backfilling shall be allowed adjacent to the trench.

E. Provide stabilizing measures to prevent ravelling at the top of the trench. This might include, but is not limited to, placing a compacted soil cap on the ground surface in the vicinity of the slurry trench. The stabilizing method used shall be reviewed by RESIDENT ENGINEER prior to use.

F. Introduce slurry into the trench at the time excavation begins. Maintain the level of the slurry in the open trench at all times at least 3 feet above the groundwater level and not more than 1 foot below the working surface. Prevent dilution of slurry by surface waters. Maintain slurry at all times in the specified condition. To achieve this end, the slurry may require operations such as recirculation through shaker screens or cyclone-type desanders, or other techniques.

G. Material excavated from the slurry trench that is suitable for processing into select backfill or armor stone as hereinbefore specified shall be stockpiled for subsequent processing. Other material excavated from the slurry trench shall be placed in the designated disposal areas. Excavate in a manner that avoids unnecessary mixing of suitable material with unsuitable material, and maximizes the amount of select backfill produced. It is anticipated that the alluvial materials will require processing to produce material suitable for use as select backfill. Geologic bedrock material will not produce material suitable for use as select backfill.

H. If for some reason it is necessary for any portion of the cutoff wall shown as one continuous segment to be constructed in more than one continuous segment, some re-excavation of the previously constructed cutoff wall will be necessary. This re-excavation shall consist of soil-bentonite backfill removal 10 feet perpendicular to the slope of the backfill for the full depth of the cutoff wall. That portion of the cutoff wall that is removed or overlapped shall be reconstructed at CONTRACTOR's own expense, unless RESIDENT ENGINEER or OWNER has requested in writing that the cutoff wall be constructed in more than one continuous segment.

I. A minimum overlap length of 5 feet beyond the point of intersection throughout the entire trench depth shall be made at all corners not constructed at a radius to obtain the continuous full depth throughout the entire length of each side of the trench. The overlap length will not be included in the measurement of area of completed cutoff wall for payment.

3.10 BACKFILL TRENCH IN CASE OF HIGH WATER

A. In the event of a flood or prolonged precipitation where the groundwater level rises within 3 feet of the top of the working surface, RESIDENT ENGINEER may require CONTRACTOR to stop excavation and to begin continuous operations to either dike around the open trenches and raise the slurry level, to lower the groundwater in the vicinity of the trench by use of wells or well points, or to fill all or part of the open trench with soil-bentonite backfill mixed and placed as specified in SLURRY TRENCH BACKFILL.

3.11 TRENCH BOTTOM CLEANING AND SAMPLING

A. Sand, gravel, cobble, and sediment that settles out of the slurry or falls to the bottom of the trench shall be removed by a clamshell, an airlift pump, or other suitable equipment whenever material is settling to the bottom of the trench. The clamshell, airlift pump, or other equipment shall be operated in a manner that prevents removal of material from the walls of the trench.

B. When excavation in any portion of the trench is complete, check the continuity of the trench by passing the excavating tool or a probe rod completely through the entire portion of the trench just completed. Coordinate such checking with RESIDENT ENGINEER so that RESIDENT ENGINEER may witness the checking.

C. After the trench bottom has been cleaned just prior to backfilling, take at least one sample of the native material in the trench bottom every 25 feet along the length of the slurry wall. Samples shall be obtained using a split-spoon sampler (ASTM D1586), a clamshell bucket, or backhoe bucket. Split-spoon samples shall have a minimum length of 3 inches. Provide 1 pint glass jars for all samples, clearly mark sample location and date, and store samples in a neat and orderly manner until completion of the Project. After examining these samples, RESIDENT ENGINEER will either accept termination of the excavation at the elevations sampled, or require additional excavation. If additional excavation is required, then additional samples shall be furnished by CONTRACTOR using the same procedures.

D. Backfill each portion of the trench that has been cleaned and accepted by RESIDENT ENGINEER as soon as practicable, but in no case more than 24 hours after RESIDENT ENGINEER's acceptance.

3.12 BACKFILLING

A. General: Do not begin backfilling any portion of the trench until such portion has been cleaned, sampled, depth measured, and accepted by RESIDENT ENGINEER.

B. Mixing:

1. Mixing shall generally be accomplished in the following stages:
   a. Thoroughly mix dry bentonite with imported fine-grained material.

b. Thoroughly mix the bentonite-soil mix from Step "a" with select backfill.
c. Sluice the bentonite-soil-select backfill mix from Step "b" with slurry. Either slurry from the trench or from the slurry holding facilities may be used. Sluicing with water is prohibited.
d. Thoroughly mix the backfill by windrowing, disking, bulldozing, harrowing, blading, pugmill, batch plant, rotavator, or other suitable means.

2. The method of proportioning backfill components and mixing the backfill shall be determined by CONTRACTOR. The method used must meet the following criteria:
   a. The quantities and percentages of all backfill components shall be easily and accurately measurable by both CONTRACTOR and RESIDENT ENGINEER.
   b. The imported fine-grained material shall be broken down such it is thoroughly dispersed in the backfill.
   c. The moisture content of the backfill shall be increased only with the addition of bentonite slurry. Either slurry from the trench or the slurry holding facilities may be used. The use of water is prohibited.
   d. Thoroughly mix the backfill by windrowing, disking, bulldozing, harrowing, blading, pugmill, batch plant, rotovator, or other suitable means.
   e. All backfill components shall be thoroughly dispersed and the backfill shall be homogeneous and shall have the properties specified herein.
3. Submit to RESIDENT ENGINEER at least 2 weeks prior to mixing and placing backfill, the backfill mixing plan. The plan shall contain as a minimum the general layout of the mixing area, the sequence of placement of backfill components into the mixing area, procedures to be used to verify that the proper proportions of each component are included, and the methods and equipment to be used to mix and place the backfill. RESIDENT ENGINEER must agree on the plan and on the mixing locations.
4. The methods of mixing the backfill shall be demonstrated to RESIDENT ENGINEER at least 1 week prior to mixing any backfill for cutoff wall construction. The demonstration shall use the same methods, equipment, and personnel proposed for the cutoff wall. The demonstration shall mix a minimum of 50 cubic yards of backfill. The cost of the demonstration is considered incidental to the work and shall be included as part of the applicable unit price or lump sum bids for cutoff wall construction. Backfill mixed for the demonstration may be reused and placed in the trench if the backfill meets the specifications at the time of placement.
5. RESIDENT ENGINEER will make the determination on the acceptability of the backfill mixing procedures. If RESIDENT ENGINEER determines that the methods proposed are not sufficient to ensure the proper proportions, hydration, and dispersion of backfill components, CONTRACTOR shall change methods and repeat the demonstration at CONTRACTOR's sole expense.
6. The proportions of materials for each step shall be based on CONTRACTOR's mix design adjustable for field conditions.

7. Mix backfill at a moisture content to produce a mix having the consistency and appearance of wet concrete. The slump of the mixture, when measured in accordance with ASTM C143, shall generally be from 3 to 6 inches. Mix backfill into a homogeneous mass, free from large lumps or pockets of fines, sand, or gravel, or stones larger than 3 inches in their largest dimension.
8. Divert excess slurry that drains away from the mixing operation back into the trench. Confine all mixing operations to the limits indicated on the backfill mixing plan. During mixing operations, prevent excavation of material beneath mixing area and commingling of such material with the backfill being mixed.

C. Placing:

1. Place backfill so that no pockets of slurry are present in the completed soil-bentonite cutoff wall. Backfill continuously from the beginning of the heading in the direction of the excavation to the end of the heading. Placing operations shall proceed in such fashion that the top of the backfill below the surface of the slurry shall follow a reasonably smooth grade and shall not have hollows that may trap pockets of slurry during subsequent backfilling. Rod the face of the backfill below the surface of the slurry as necessary to prevent hollows or trapped pockets of slurry.
2. Do not drop backfill, or deposit it in any manner that may cause segregation. Free-dropping of backfill material through the slurry is prohibited.
3. Place initial portion of backfill for each heading by one of the following methods:
   a. Lowering it to the bottom of the trench with a clamshell bucket. Place backfill with a clamshell bucket until the surface of the backfill rises above the surface of the slurry trench at the starting end of the trench.
   b. Alternatively, excavate a slope no steeper than 2 vertical to 1 horizontal starting at the beginning of the heading. Place initial portion of backfill above the slurry and allow it to slide down the slope.
4. In areas where different headings or different ends of one heading interface, excavate at least 5 feet into previously placed backfill for the full depth of the cutoff wall to assure continuous full depth. Replace with soil-bentonite backfill as specified herein. The re-excavation and replacement of backfill at heading interfaces will not be included in the measurement of area of completed cutoff wall for payment.
5. Place additional backfill by using a bulldozer in such manner that the backfill enters the trench by sliding down the forward face of the previously placed backfill. To accomplish this, the bulldozer operator shall pile sufficient backfill on the edge of the existing backfill to cause a sliding action down the face of the existing backfill.

3.13 MAINTENANCE OF TOP OF CUTOFF WALL

A. After backfill of any portion of the trench is complete, maintain the backfill in an undamaged condition and at an elevation at least 18 inches above the

top of the cutoff wall final grade until construction of the protective fill. Portions of the backfill intended to remain that dry, crack, desiccate, or are damaged in any other way shall be corrected by removing all desiccated or otherwise unacceptable backfill to a depth acceptable to RESIDENT ENGINEER and immediately placing of fresh backfill on the excavated surface to the final cutoff wall grade.

3.14 PROTECTIVE FILL AT A TOP OF CUTOFF WALL

A. Protective fill at the top of the cutoff wall consists of the bedding gravel, the GCL, and the armor stone.

B. Do not begin construction of protective fill sooner than 3 weeks after the cutoff wall segment in question has been completely backfilled. Then excavate in accordance with Section 02205, EXCAVATION, as necessary to remove the extra backfill placed on top of the trench to protect the backfill from drying, and other material as necessary to achieve the lines and grades shown. Excavate the top of the trench deeper if necessary to remove dried, desiccated, or otherwise unacceptable material. Excavations below the trench finish elevation shown shall be replaced with fresh soil-bentonite backfill at CONTRACTOR's sole expense.

C. Place gravel bedding and armor stone as specified in Section 02220, FILL AND BACKFILL. Place GCL as specified in Section 02247, GEOSYNTHETIC CLAY LINING (GLC). In addition, conform to the following requirements:

1. Sequence operations such that drying of the top of the exposed trench backfill is minimized. Sprinkle the top of the trench backfill as necessary to prevent crack formation. In no case shall the top of the trench backfill remain exposed for more than 24 hours prior to covering with GCL.
2. Cover the GCL with the initial lift of armor stone within 24 hours of placing the GCL.

3.15 CLEANUP

A. After completion of backfilling operations, all remaining excavated material and slurry shall be removed from the ground surface in the construction area including the mixing areas. The slurry and excess excavated materials shall be disposed of as specified herein. RESIDENT ENGINEER will be the sole judge of satisfactory cleanup, and cleanup shall be performed until accepted by RESIDENT ENGINEER.

3.16 QUALITY CONTROL SAMPLING AND TESTING

A. Perform the sampling and control testing specified below, according to the methods specified below, and at the frequencies specified below. Sampling and testing shall be performed by personnel experienced in the type of test required. Samples shall be representative of the overall volume of material from which the sample is taken. Equipment for sampling and testing shall be in good condition. Equipment shall be set up for onsite testing and tests shall be performed onsite unless otherwise specified or accepted in writing

by RESIDENT ENGINEER. Tests shall be performed daily manner and the results submitted in writing to RESIDENT ENGINEER within 12 hours of completion of test. Test results shall become the property of OWNER. CONTRACTOR shall be responsible for representative, quality, and accurate sampling and testing. Mathematical calculations shall be checked by someone other than the person performing the original calculations.

Material	Sampling And Testing	Frequency
Select Backfill - As Processed	Samples from stockpile after processing Percent passing No. 200 Grain size distribution	Every 500 cu yd
Slurry - As mixed	Sampled immediately before entering trench Unit weight Moisture content Viscosity Filtrate loss	Every 100,000 gal.
Slurry - In-Trench	Sampled from random depths (record depth) Unit weight Viscosity Filtrate loss Percent passing No. 200	Twice daily
Slurry - In-Trench Immediately Prior to Backfill	Sampled within 5 feet of base Unit weight Viscosity	Every 100 LF
Imported Fines Fine-Grained Material	Samples as delivered to site Percent passing No. 200 Atterberg limits Moisture content	Every 500 cu yd
Backfill - Immediately Prior to Placing in Trench	Random sample Percent passing No. 200 Grain size distribution Moisture content Slump Unit weight Permeability	Every 500 cu yd 8 along wall as directed by RESIDENT ENGINEER

B. Tests shall conform to the following standards:

Test	Standard
Percent passing No. 200 sieve	ASTM D1140
Grain size distribution	ASTM C136
Unit weight of slurry	API RP 13B
Moisture content	ASTM D2216

Viscosity, Marsh-sec	API RP 13B
Filtrate loss	API RP 13B
Atterberg limits	ASTM D4318
Slump	ASTM C143
Unit weight of backfill	ASTM C138
Bentonite content of slurry	API RP 13B
Permeability	Same as used for the mix design

C. RESIDENT ENGINEER may sample and test independently of CONTRACTOR. RESIDENT ENGINEER's work will be in addition to that specified and shall not relieve CONTRACTOR of any testing responsibilities.

D. Whenever tests conducted by CONTRACTOR or RESIDENT ENGINEER indicate material or workmanship not in accordance with the Contract Documents, Work shall be halted and the cause of the discrepancy shall be identified. Work not in accordance with the Contract Documents shall be removed, replaced, repaired, or otherwise corrected so as to conform to these Contract Documents.

E. Sampling and testing performed by CONTRACTOR, work necessary to identify the cause of any nonconformance, and remedial work necessary because of construction not in accordance with the Contract Documents shall be at CONTRACTOR's sole expense.

END OF SECTION

SECTION 02402
CEMENT-BENTONITE CUTOFF WALL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Work necessary for construction of the cement-bentonite cutoff wall, complete.

1.2 DEFINITIONS

A. Slurry Method of Excavation: Excavation of a vertical-walled trench in the soil and rock while at the same time keeping the trench filled with a specified bentonite slurry. The basic purpose of the slurry is to support the walls of the trench.

B. Slurry Trench: A trench excavated in the ground by the slurry method of excavation.

C. Cement-Bentonite Cutoff Wall: A continuous low-strength, low-permeability water barrier formed by backfilling a slurry trench with the specified cement- soil-bentonite mixture.

D. Heading: Any continuous section of slurry trench which is being excavated at one end and/or backfilled at the other end.

E. Working Surface: The ground surface elevation adjacent to the top of the slurry trench during excavation of the slurry trench.

F. Groundwater Level: The piezometric level of the groundwater as determined from piezometers installed in the alluvium in the vicinity of the slurry trench.

G. Well-Graded: Well-graded as used in this section defines a mixture of particle sizes that have no specific concentration or deficiency of one or more sizes. Well-graded is used to help define a material that, when placed in the slurry trench, produces a relatively impermeable material free from detrimental voids.

H. Ravelling: Loss of ground from the trench walls not caused by equipment operation that results in widening of the trench beyond the specified width.

I. API: American Petroleum Institute.

J. API RP: API Recommended Practice.

K. Unclassified Excavation: Removal of all material encountered regardless of the geologic formation, degree of induration, hardness, or other property.

L. Fines: Material passing the U.S. Standard No. 200 sieve, when tested in accordance with ASTM C117.

M. GCL: Geosynthetic clay layer. As specified in Section 02247, GEOSYNTHETIC CLAY LINING.

N. Geologic Bedrock: Natural, indurated geologic formations underlying the loose, uncemented river alluvium. Geologic bedrock includes materials such as granite, sandstone, and conglomerate occurring in ledges or layers. The term does not include boulders or other particles contained within the alluvium.

1.3 QUALIFICATIONS FOR CEMENT-BENTONITE CUTOFF WALL CONSTRUCTION

A. CONTRACTOR shall be experienced in cement-bentonite cutoff wall construction, and shall have sufficient competent personnel experienced in this type of construction and able to carry out the operations specified. CONTRACTOR shall have experience in previous successful projects of cement-bentonite cutoff walls using specialized slurry trench construction equipment to depths of 50 feet or greater, and with excavation in rock. Also, a slurry trench and cement-bentonite cutoff wall specialist shall be employed by CONTRACTOR to control the composition, mixing, placing, cleaning, and maintaining of the slurry and cement-bentonite backfill.

B. The slurry trench and cement-bentonite cutoff wall specialist shall be an engineer or engineering technician who has had proven and successful experience with 50-foot deep slurry trench construction, using specialized slurry trench construction equipment, and who is knowledgeable and experienced with all facets of the construction including, but not limited to:

1. The use, testing, and control of bentonite as a slurry.
2. The proper mixing methods employed to mix the slurry and backfill materials.
3. Excavation and backfill operations.
4. A thorough knowledge of construction equipment and testing requirements needed for slurry trench construction.

1.4 SUBMITTALS

A. Certification, test results, and samples for all imported material, including bentonite.

B. Catalog and manufacturer's data sheets for slurry trench excavating equipment, slurry mixing and placing equipment, and compaction equipment.

C. Plan for mixing slurry and delivery of slurry to trench.

D. Plan for mixing and placing cement-bentonite backfill.

E. Test results for design mix of cement-bentonite backfill including permeability, slump, moisture content and grain size distribution.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide all labor, materials, and equipment necessary to accomplish the work specified in this section.

2.2 HYDRAULIC EXCAVATION FOR TRENCH EXCAVATOR

A. As a minimum, the hydraulic excavator shall have a rated output horsepower not less than 400. The hydraulic excavator shall be maintained in good working condition throughout the Work, and shall be equipped with a rock excavation bucket and teeth whenever excavation into geologic bedrock is being performed or attempted. At other times, use bucket chosen by CONTRACTOR.

2.3 CUTOFF TRENCH BACKFILL

A. The backfill mix shall be designed by CONTRACTOR. The mixed backfill shall meet the following requirements:

1. Hydraulic conductivity shall not exceed 1.0 (10^{-6}) cm/sec when tested in accordance with ASTM D5084. As an option, CONTRACTOR may use a similar size fixed-ring setup. The hydraulic gradient shall not exceed 10. Compressive strength between 10 and 50 psi at 28 days. Wall strength shall be sufficient for the upper 5 feet of wall to stand unsupported without damage.
2. Backfill shall be a mix of the following materials, as specified in this section, in the proportions determined by CONTRACTOR's mix design:
   a. Select backfill.
   b. Imported fine-grained material.
   c. Bentonite.
   d. Slurry.
   e. Cement.
3. Submit a mix design report prepared under the supervision of and sealed by a professional engineer licensed in the State of Arizona, with at least 5 years of experience in slurry wall design and construction. The mix design report shall show the results of various tests at varying proportions of the above materials, and varying bentonite contents, so as to identify an appropriate mix to achieve the hydraulic conductivity specified. Initial and intermediate hydraulic conductivity testing may be conducted in fixed-wall permeameters. Final testing to verify the mix hydraulic conductivity for the proposed mix design shall be accomplished in strict accordance with ASTM D5084.
4. RESIDENT ENGINEER reserves the right to increase the amount of bentonite and cement to be added to the mixed backfill up to 3 percentage points over the amount recommended in the mix design report.

2.4 BENTONITE

A. Pulverized or powdered premium grade natural sodium cation bentonite, conforming to the requirements of the standards of API Specification 13A, with a minimum yield of 90 barrels per ton when tested in accordance with API RP 13B. Protect bentonite from moisture and contamination in transit and in storage at the site.

2.5 CEMENT

A. General: Cement shall be furnished in bulk except that cement for finishing and patching may be packaged. The source of cement shall consistently supply material with similar chemical and physical properties. The sources of cement shall not be changed from those submitted at the time of bid without written approval by ENGINEER.

B. Portland Cement: Portland cement shall be Type II cement and shall meet the requirements of ASTM C150, including Table 1 and Table 2.

C. Cement Sources: Each shipment of cement shall be accompanied by a certified delivery slip or mill certificate of compliance showing results of physical and chemical tests along with Specification requirements. No cement shall be used until written notice has been given by the RESIDENT ENGINEER that test results are satisfactory. In the event of failure, the cement may be resampled and tested at the request of the CONTRACTOR and at the CONTRACTOR's expense.

2.6 ADMIXTURES

A. The use of any admixture, or of any plugging or bridging agent, will not be permitted without prior written authorization from ENGINEER.

2.7 SELECT BACKFILL

A. This material is not available onsite and must be either manufactured by processing onsite material mixed with imported fines, or imported.

B. Excavated and processed or imported material, free from roots, organic matter, trash, debris, rocks larger than 3 inches, and other deleterious materials. Select backfill shall conform to the following washed sieve gradation when tested in accordance with ASTM C117 and C136:

Sieve Size	Percent Passing by Weight
3 inch	100
1 inch	80 - 100
1/2 inch	65 - 98
No. 4	50 - 90
No. 40	15 - 50
No. 200	5 - 30

C. To the extent possible, obtain from required excavation. If additional select backfill is required to accomplish the Work, import material of equivalent quality, at CONTRACTOR's option. No additional payment will be made if CONTRACTOR elects to import material.

2.8 EXCESS EXCAVATION

A. All excavated material that does not meet the requirements for SELECT BACKFILL.

2.9 IMPORTED FINE-GRAINED MATERIAL

A. Friable, nonindurated natural earth material with at least 50 percent passing the No. 200 sieve when tested in accordance with ASTM D1140 as modified herein. Determination of the percent passing the No. 200 sieve shall not use dispersing agents, the ASTM D1140 mixer, or other mechanical mixers, and the soil shall be broken down using only manual agitation. Furthermore, the soil shall be soaked no more than 12 hours before washing.

B. When tested in accordance with ASTM D4318, the Atterberg limits of imported material shall conform to the following:

1. Liquid Limit: 25 to 55.
2. Plasticity Index: 10 to 30.

C. To the extent possible, obtain the imported fine-grained material at a low moisture content so that it behaves as a dry material. Protect imported fine-grained material from moisture and contamination both in transmit and in storage at the site.

2.10 SLURRY

A. The slurry for supporting the sides of the trench and for mixing with the backfill shall consist of a stable colloidal suspension of bentonite in water. Design the slurry such that it has the density, viscosity, and filtrate loss necessary to maintain the stability of the excavated trench, subject to the requirements in the following paragraphs.

B. The in-trench slurry shall meet the following as determined in accordance with API RP 13B:

1. Viscosity: Minimum of 40 sec. Marsh.
2. Filtrate Loss: Maximum of 25 cubic centimeters.
3. Density of Slurry Sampled: At least 15 pcf lighter than the cement-bentonite backfill when sampled within 5 feet of trench bottom.

2.11 WATER

A. Use only potable water to form the slurry and cement-bentonite backfill.

B. Potable water will be provided by OWNER, as specified in Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

2.12 PROCESSED OR IMPORTED MATERIAL ACCEPTANCE

A. Other than bentonite, all processed or imported materials specified in this section are subject to the following requirements:

1. All tests necessary for CONTRACTOR to establish a processing method and/or to locate an acceptable source of imported material shall be made by CONTRACTOR. Certification that the material conforms to the Specification requirements along with copies of the test results from a qualified commercial testing laboratory shall be submitted to RESIDENT ENGINEER for approval at least 10 days before the material is required for use. All samples shall be furnished by CONTRACTOR at CONTRACTOR's sole expense. Samples shall be representative and be clearly marked to show the source of the material and the intended use on the project. Sampling of the source shall be done by CONTRACTOR in accordance with ASTM D75. Notify RESIDENT ENGINEER at least 24 hours prior to sampling. RESIDENT ENGINEER may, at RESIDENT ENGINEER's option, observe the sampling procedures. Tentative acceptance of the source shall be based on an inspection of the source by RESIDENT ENGINEER and/or the certified test results submitted by CONTRACTOR to RESIDENT ENGINEER, at RESIDENT ENGINEER's discretion. No processed materials shall be manufactured or imported materials shall be delivered to the site until the proposed source and materials tests have been tentatively accepted in writing by RESIDENT ENGINEER. Final acceptance will be based on tests made on samples of material taken from CONTRACTOR's on-site stockpile. All testing for final acceptance shall be performed by RESIDENT ENGINEER.
2. Tests by CONTRACTOR shall be made on samples taken at the place of production prior to stockpiling shipment. Tests shall be as specified for the material in question. Samples of the finished product for testing shall be taken from each 100 cubic yards of material or more often as determined by RESIDENT ENGINEER, if variation in gradation is occurring, or if the material appears to depart from the Specifications. Test results shall be presented in writing to RESIDENT ENGINEER within 48 hours after sampling.
3. If tests conducted by CONTRACTOR or RESIDENT ENGINEER indicate that the material does not meet Specification requirements, material placement shall terminate until corrective measures are taken. Material that does not conform to the Specification requirements and that has been placed in the Work shall be removed and replaced at CONTRACTOR's sole expense. Sampling and testing performed by CONTRACTOR shall be done at CONTRACTOR's sole expense.

2.13 BENTONITE ACCEPTANCE

A. Submit to RESIDENT ENGINEER certification from the manufacturer that the bentonite conforms with API Specification 13A and these Specifications prior to placing orders.

B. Submit samples of bentonite to RESIDENT ENGINEER for tentative acceptance prior to placing orders. Samples shall be representative and

clearly marked to show the source of the material and the intended use on the Project. Final acceptance of bentonite shall be based on tests made on samples of bentonite taken from CONTRACTOR's onsite bentonite storage facilities. All testing for final acceptance will be performed by RESIDENT ENGINEER.

2.14 EQUIPMENT

A. All equipment shall be maintained and operated in strict accordance with the manufacturer's instructions and recommendations. All equipment shall be free of fluid leaks which discharge substances onto the ground or into the trench. Immediately repair or remove from the site all broken or leaky lines, hoses, valves, pistons, pipes, tanks, and other equipment components. Equipment shall be maintained in such condition that it will deliver the manufacturer's rated output. If inadequate quantity or quality of production is obtained, provide larger and/or different equipment.

B. Slurry Trench Excavating Equipment: Equipment for excavating the slurry trench shall consist of either a hydraulic backhoe, a trenching machine adopted for slurry trench construction, a special mechanical slurry trench clamshell, or other specialized equipment for slurry trench construction. The buckets used in the equipment shall not be perforated and shall be made to minimize the ravelling of the sides of the trench and to maintain the width of the trench. The equipment shall be capable of excavating the minimum required trench width in a single pass of the excavating tool through all soil and up to 5 feet into bedrock.

C. Slurry Mixing and Placing Equipment: The slurry plant shall include a high-speed colloidal mixer, or other equipment that achieves complete dispersion of the bentonite particles and produces a stable colloidal suspension of bentonite and water. The plant shall be capable of providing a continuous supply of slurry to the slurry trench during excavation. Provide all necessary sumps, pumps, hoses, valves, supply lines, mixers, tools, and all other items necessary to adequately supply slurry for the Work.

D. Slurry Storage Facilities: If necessary to provide time for complete hydration of the bentonite in the slurry, provide storage tanks or construct storage ponds to store freshly mixed slurry. Storage facilities shall be configured so as to allow continuous low-speed circulation of the stored slurry. Storage ponds may not be constructed inside the area confined by the cement-bentonite cutoff wall.

E. Backfill Mixing and Placing Equipment: Equipment for mixing and placing cement-bentonite backfill shall be a suitable type capable of producing a homogenous mixture of backfill materials meeting the Specifications. CONTRACTOR shall submit a mixing plan to RESIDENT ENGINEER describing equipment and methods for placing the backfill. CONTRACTOR shall obtain RESIDENT ENGINEER's approval prior to starting excavation. Equipment for placing the backfill into the start of any trench where the end slope is steeper then 2 vertical to 1 horizontal shall consist of a crawler crane with clamshell bucket. In addition, placing of the backfill at any point may require the use of probe rods.

F. Moisture Control Equipment: Equipment for applying water shall be of a type and quality adequate for the Work, shall not leak, and shall be equipped with a distributor bar or other approved device to assure uniform application. Equipment for mixing and drying out material shall consist of blades, discs, or other approved equipment.

2.15 QUALITY CONTROL EQUIPMENT

A. CONTRACTOR's Equipment: Provide all equipment necessary for CONTRACTOR's quality control testing. Minimum quality control testing by CONTRACTOR is specified hereinafter. Provide any additional equipment necessary for any additional testing CONTRACTOR elects to do. All equipment shall be maintained in good working order, and shall meet the requirements of the applicable test standards cited herein.

B. Equipment for Use of RESIDENT ENGINEER: Provide the following equipment for use by RESIDENT ENGINEER during the Work. Equipment shall be furnished to RESIDENT ENGINEER not less than 5 working days prior to initial slurry mixing for the project. All equipment shall be in good working order, and shall be maintained in good working order by CONTRACTOR at his own expense. RESIDENT ENGINEER will take ordinary and reasonable care of CONTRACTOR-furnished equipment, and will return all such equipment to CONTRACTOR at the completion of the work in the condition received, less normal wear and tear inherent to the work. Provide the expendable supplies listed in quantities shown. CONTRACTOR-furnished expendable supplies not used in quality control testing of the work will be returned to CONTRACTOR at the completion of the work. Additional or other expendable supplies will be purchased by RESIDENT ENGINEER.

Item No.	Item	Quantity	Expendable Supplies
1.	Marsh Funnel Set (API RP 13B)	1	None
2.	Mud Balance (API RP 13B)	1	None
3.	Slurry Sampler, capable of obtaining 1 U.S. quart or more of slurry from any given depth in the trench or from the slurry storage facilities, with necessary rods, poles, etc.	1	None
4.	Filter press for low temperature test, 100 psi maximum pressure, compressed gas pressurization system, with necessary gas cylinders, regulator, etc. (API RP 13B)	1	Compressed gas sufficient for 100 tests; filter paper conforming to API RP 13B for 100 tests
5.	Filter press for low temperature test, 100 psi maximum pressure, no pressurization system required (API RP 13B)	4	None

Item No.	Item	Quantity	Expendable Supplies
6.	Trench depth measuring device of appropriate length for the work, with knots or projecting markers at 5-foot vertical intervals	1 per heading	None

PART 3 EXECUTION

3.1 EXCAVATION–GENERAL

A. Excavation is unclassified. Complete all excavation regardless of the type, nature, or condition of the materials encountered. Make own estimate of the kind and extent of the various materials to be excavated in order to accomplish the Work. Some rock excavation will be required.

B. Excavation of the cement stabilized alluvium at Grade Control Structure No. 4 as specified in Section 02205, EXCAVATION.

3.2 EXCAVATION SAFETY

A. CONTRACTOR shall be solely responsible for making the excavation in a safe manner. Provide appropriate measures to retain excavation side slopes, to prevent slope failures, and to ensure that persons at or near the excavation are protected.

3.3 DEPTH OF EXCAVATION

A. Excavate to the depths as shown or as determined in the field by RESIDENT ENGINEER.

B. In general, the depth of the trench shall be determined as follows:

1. Where the Drawings show the trench penetrating into the top of geologic bedrock, the specified hydraulic excavator shall be used to excavate into the top of bedrock up to 5 feet, after removal of the alluvium. If any 10-foot horizontal reach of the trench bottom cannot be advanced to this depth within 1 hour of continuous excavation operations, the trench bottom shall be cleaned of loose material and shall be completed at the elevation so achieved. Use metal pole or rod with a steel point to probe the bottom of the trench and verify the trench bottom cleanliness. Allow RESIDENT ENGINEER to use the probe rod to verify that the cleanup is satisfactory. Satisfactory cleanup of the bottom means that no discrete particle of movable material can be felt with the probe rod when manually manipulated from the top of the trench. This Work shall not constitute rock excavation.
2. Where the Drawings show the trench bottom not extending into bedrock, excavate the trench to the depth shown. If geologic bedrock is encountered at an elevation higher than the trench bottom shown, complete the trench into of the geologic bedrock as specified in the preceding paragraph.

C. The locations where geologic bedrock is anticipated are shown on the slurry trench profiles. Descriptions of the geologic bedrock materials are provided in the supplementary information referred to in the Special Provisions.

3.4 TOLERANCES

A. Alignment of the cutoff wall shall be within 1 foot of alignment shown. Requests for greater variations shall be submitted to RESIDENT ENGINEER for review at least 2 weeks prior to excavation in the area of the proposed change.

B. The wall shall be plumb within 3 degrees of vertical.

3.5 LIMITS OF EXCAVATION

A. Excavation carried below the grade line shown or established by the RESIDENT ENGINEER shall be backfilled as specified for the remainder of the trench. Correct all overexcavated areas at CONTRACTOR's sole expense.

3.6 EXCESS EXCAVATION DISPOSAL

A. Dispose of all excess excavation in the excess fill disposal areas shown, or as directed by Resident Project Representative.

B. Dispose of excess cement-bentonite offsite in accordance with all local, state, and federal requirements. Dispose of this material shall be at CONTRACTOR's sole expense.

3.7 CONSTRUCTION PAD

A. In areas where the surface and near-surface soils are inadequate to form the top of the slurry trench, or where groundwater is too close to the surface for trench stability, or where there is inadequate width on which to work, or where necessary to permit grade changes, or where elected by CONTRACTOR, build a construction pad as necessary to complete the slurry trench. The dimensions and details of the construction pad shall be determined by CONTRACTOR. All construction pad work shall be at CONTRACTOR's option.

B. After backfilling of the slurry wall in any area is complete, the construction pad shall be removed. All excess material not used in the cement-bentonite backfill shall be placed in the excess disposal areas.

3.8 SLURRY MIXING

A. Produce slurry by gradually adding dry bentonite to potable water and thoroughly mixing until a complete dispersion of bentonite is achieved. The resulting slurry shall have a bentonite content adequate to produce the slurry properties specified herein before introduction into the trench.

B. After mixing, allow the slurry to hydrate completely before being introduced to the trench excavation. This may be accomplished by maintaining high speed circulation until hydration is complete, or by storing the slurry in a tank or pond with a low speed circulation system. The slurry shall be stored under essentially constant circulation until used. Circulation may cease overnight or on weekends when the addition of slurry to the trench is not necessary.

C. Hydration will be considered to be complete when filtrate loss and viscosity reaches the specified limits, and when filtrate loss and viscosity is stable when measured one or more hours apart, as determined by RESIDENT ENGINEER.

D. Newly mixed slurry that is not completely hydrated shall be segregated from hydrated slurry, and shall not be commingled with other slurry.

E. All slurry shall be batched or continuously mixed. No slurry shall be mixed in the trench.

F. Hydrated slurry shall have the specified properties before being delivered to the trench. Hydrated slurry shall not be thinned by the addition of water or otherwise altered before being introduced into the trench.

G. CONTRACTOR's full-time slurry trench specialist shall regularly test and control the mixing and placing of the slurry in order to maintain the specified properties of the slurry. Submit a plan to RESIDENT ENGINEER for mixing the slurry and delivery to the trench.

3.9 SLURRY TRENCH EXCAVATION

A. The working surface for the cutoff trench shall be located at the existing river bed elevation of the bottom of the adjacent slab, except where higher elevations are necessary for stability or construction access, and such higher grades are authorized in writing by RESIDENT ENGINEER. Higher grades constructed by CONTRACTOR for his own convenience will not be paid for.

B. Excavate the cutoff trench using the slurry method of excavation. Excavate to the depth as hereinbefore specified. Excavate to full depth at the starting point, then carry the trench excavation along the trench alignment at the full depth shown or as determined by RESIDENT ENGINEER. The walls of the trench shall be essentially vertical.

C. The toe of the slope of the trench excavation shall not precede the toe of the backfill slope by more than 120 feet, nor by less than 20 feet. The slurry trench cutoff shall be constructed in a continuous process during each normal work day without voluntary interruption until it is complete.

D. Construction surcharges including, but not limited to, excavated material, slurry mixing operations, backfill mixing operations, excavating equipment, and pumping equipment, shall be kept away from the trench. Only equipment required for excavation and backfilling shall be allowed adjacent to the trench.

E. Provide stabilizing measures to prevent ravelling at the top of the trench. This might include, but is not limited to, placing a compacted soil cap on the ground surface in the vicinity of the slurry trench. The stabilizing method used shall be reviewed by RESIDENT ENGINEER prior to use.

F. Introduce slurry into the trench at the time excavation begins. Maintain the level of the slurry in the open trench at all times at least 3 feet above the groundwater level and not more than 1 foot below the working surface. Prevent dilution of slurry by surface waters. Maintain slurry at all times in the specified condition. To achieve this end, the slurry may require operations such as recirculation through shaker screens or cyclone-type desanders, or other techniques.

G. If it is necessary for any portion of the cutoff wall shown as one continuous segment to be constructed in more than one continuous segment, re-excavation of the previously constructed cutoff wall will be necessary. This re-excavation shall consist of cement-bentonite backfill removal 10 feet perpendicular to the slope of the backfill for the full depth of the cutoff wall. That portion of the cutoff wall that is removed or overlapped shall be reconstructed at CONTRACTOR's own expense, unless RESIDENT ENGINEER or OWNER has requested in writing that the cutoff wall be constructed in more than one continuous segment.

H. Where right angle corners are shown, the CONTRACTOR shall excavate the entire trench system while filling with bentonite slurry. The backfill shall be placed in a single pass unless approved by RESIDENT ENGINEER.

3.10 BACKFILL TRENCH IN CASE OF HIGH WATER

A. In the event of a flood or prolonged precipitation where the groundwater level rises within 3 feet of the top of the working surface, RESIDENT ENGINEER may require CONTRACTOR to stop excavation and to begin continuous operations to either dike around the open trenches and raise the slurry level, to lower the groundwater in the vicinity of the trench by use of wells or well points.

3.11 TRENCH BOTTOM CLEANING AND SAMPLING

A. Sand and sediment that settles out of the slurry or falls to the bottom of the trench shall be removed by a clamshell, an airlift pump, or other suitable equipment whenever material is settling to the bottom of the trench. The clamshell, airlift pump, or other equipment shall be operated in a manner that prevents removal of material from the walls of the trench. Material removed from the trench shall be placed in the excess excavation disposal area.

B. When excavation in any portion of the trench is complete, check the continuity of the trench by passing the excavating tool or a probe rod completely through the entire portion of the trench just completed. Coordinate such checking with RESIDENT ENGINEER so that RESIDENT ENGINEER may witness the checking.

C. After the trench bottom has been cleaned, just prior to backfilling, take at least one sample of the native material in the trench bottom every 25 feet along the length of the slurry wall. Samples shall be obtained using a split-spoon sampler (ASTM D1586), a clamshell bucket, or backhoe bucket. Split-spoon samples shall have a minimum length of 3 inches. Provide 1 pint glass jars for all samples, clearly mark sample location and date, and store samples in a neat and orderly manner until completion of the Project. After examining these samples, ENGINEER will either accept termination of the excavation at the elevations sampled, or require additional excavation. If additional excavation is required, then additional samples shall be furnished by CONTRACTOR using the same procedures.

D. Backfill each portion of the trench that has been cleaned and accepted by ENGINEER as soon as practicable, but in no case more than 24 hours after ENGINEER's acceptance.

3.12 BACKFILLING

A. General: Do not begin backfilling any portion of the trench until such portion has been cleaned, sampled, depth measured, and accepted by RESIDENT ENGINEER.

B. Mixing:

1. Mixing shall generally be accomplished in the following stages:
   a. Thoroughly mix dry bentonite and cement with imported fine-grained material.
   b. Thoroughly mix the cement-bentonite-soil mix from Step "a" with select backfill.
   c. Sluice the cement-bentonite-soil-select backfill mix from Step "b" with slurry. Either slurry from the trench or from the slurry holding facilities may be used. Sluicing with water is prohibited.
   d. Thoroughly mix the backfill by windrowing, disking, bulldozing, harrowing, blading, pugmill, batch plant, rotavator, or other suitable means approved by RESIDENT ENGINEER.
2. The method of proportioning backfill components and mixing the backfill shall be determined by CONTRACTOR. The method used must meet the following criteria:
   a. The quantities and percentages of all backfill components shall be easily and accurately measurable by both CONTRACTOR and RESIDENT ENGINEER.
   b. The imported fine-grained material shall be broken down such that it is thoroughly dispersed in the backfill.
   c. The moisture content of the backfill shall be increased only with the addition of bentonite slurry. Either slurry from the trench or the slurry holding facilities may be used. The use of water is prohibited.
   d. Thoroughly mix the backfill by windrowing, disking, bulldozing, harrowing, blading, pugmill, batch plant, rotovator, or other approved means.

e. All backfill components shall be thoroughly dispersed and the backfill shall be homogeneous and shall have the properties specified herein.

3. Submit to RESIDENT ENGINEER at least 2 weeks prior to mixing and placing backfill, the backfill mixing plan. The plan shall contain as a minimum the general layout of the mixing area, the sequence of placement of backfill components into the mixing area, procedures to be used to verify that the proper proportions of each component are included, and the methods and equipment to be used to mix and place the backfill. RESIDENT ENGINEER must approve the plan and the mixing locations.
4. The methods of mixing the backfill shall be demonstrated to RESIDENT ENGINEER at least 1 week prior to mixing any backfill for cutoff wall construction. The demonstration shall use the same methods, equipment, and personnel proposed for the cutoff wall. The demonstration shall mix a minimum of 25 cubic yards of backfill. Backfill mixed for the demonstration may not be reused and placed in the trench.
5. RESIDENT ENGINEER will make the determination on the acceptability of the backfill mixing procedures. If RESIDENT ENGINEER determines that the methods proposed are not sufficient to ensure the proper proportions, hydration, and dispersion of backfill components, CONTRACTOR shall change methods and repeat the demonstration at CONTRACTOR's sole expense.
6. The proportions of materials for each step shall be based on CONTRACTOR's mix design adjustable for field conditions.
7. Mix backfill at a moisture content to produce a mix having the consistency and appearance of wet concrete. The slump of the mixture, when measured in accordance with ASTM C143, shall generally be from 3 to 6 inches. Mix backfill into a homogeneous mass, free from large lumps or pockets of fines, sand, or gravel, or stones larger than 3 inches in their largest dimension.
8. Divert excess slurry that drains away from the mixing operation back into the trench. Confine all mixing operations to the limits indicated on the backfill mixing plan. During mixing operations, prevent excavation of material beneath mixing area and commingling of such material with the backfill being mixed.

C. Placing:

1. Place backfill so that no pockets of slurry are present in the completed cement-bentonite cutoff wall. Backfill continuously from the beginning of the heading in the direction of the excavation to the end of the heading. Placing operations shall proceed in such fashion that the top of the backfill below the surface of the slurry shall follow a reasonably smooth grade and shall not have hollows that may trap pockets of slurry during subsequent backfilling. Rod the face of the backfill below the surface of the slurry as necessary to prevent hollows or trapped pockets of slurry.
2. Do not drop backfill, or deposit it in any manner that may cause segregation. Free-dropping of backfill material through the slurry is prohibited.

3. Place initial portion of backfill for each heading by one of the following methods:
   a. Lowering it to the bottom of the trench with a clamshell bucket. Place backfill with a clamshell bucket until the surface of the backfill rises above the surface of the slurry trench at the starting end of the trench.
   b. Alternatively, excavate a slope no steeper than 2 vertical to 1 horizontal starting at the beginning of the heading. Place initial portion of backfill above the slurry and allow it to slide down the slope.
   c. Pumping slurry backfill using tremie methods.

3.13 MAINTENANCE OF TOP OF CUTOFF WALL

A. After backfill of any portion of the trench is complete, maintain the backfill in an undamaged condition and at an elevation at least 18 inches above the top of the cutoff wall final grade until construction of the adjacent cement-bentonite fill. Portions of the backfill intended to remain that dry, crack, desiccate, or are damaged in any other way shall be corrected by removing all desiccated or otherwise unacceptable backfill to a depth acceptable to RESIDENT ENGINEER and immediately placing of fresh backfill on the excavated surface to the final cutoff wall grade.

3.14 CLEANUP

A. After completion of backfilling operations, all remaining excavated material, backfill, and slurry shall be removed from the ground surface in the construction area including the mixing areas. The slurry backfill and excess excavated materials shall be disposed of as specified herein. RESIDENT ENGINEER shall be the sole judge of satisfactory cleanup, and cleanup shall be performed until accepted by RESIDENT ENGINEER.

3.15 QUALITY CONTROL SAMPLING AND TESTING

A. Perform the sampling and control testing specified below, according to the methods specified below, and at the frequencies specified below. Sampling and testing shall be performed by personnel experienced in the type of test required. Samples shall be representative of the overall volume of material from which the sample is taken. Equipment for sampling and testing shall be in good condition. Equipment shall be set up for onsite testing and tests shall be performed onsite unless otherwise specified or accepted in writing by RESIDENT ENGINEER. Tests shall be performed in daily and the results submitted in writing to RESIDENT ENGINEER within 12 hours of test completion. Test results shall become the property of OWNER. CONTRACTOR shall be responsible for representative, quality, and accurate sampling and testing. Mathematical calculations shall be checked by someone other than the person performing the original calculations.

Material	Sampling And Testing	Frequency
Select Backfill - As Processed	Samples from stockpiles (record depth) Percent passing No. 200 Grain size distribution	Every 100 cu yd
Slurry - As mixed	Sampled immediately before entering trench Unit weight Moisture content Viscosity Filtrate loss	Every 10,000 gal.
Slurry - In-Trench	Sampled from random depths (record depth) Unit weight Viscosity Filtrate loss Percent passing No. 200	Twice daily
Slurry - In-Trench Immediately Prior to Backfill	Sampled within 5 feet of base Unit weight Viscosity	Every 100 LF
Imported Fines Fine-Grained Material	Samples as delivered to site Percent passing No. 200 Atterberg limits Moisture content	Every 100 cu yd
Backfill - Immediately Prior to Placing in Trench	Random sample Percent passing No. 200 Grain size distribution Moisture content Slump Unit weight Permeability Compressive strength	Every 100 cu yd

B. Tests shall conform to the following standards:

Test	Standard
Percent passing No. 200 sieve	ASTM D1140
Grain size distribution	ASTM C136
Unit weight of slurry	API RP 13B
Moisture content	ASTM D2216
Viscosity, Marsh-sec	API RP 13B
Filtrate loss	API RP 13B
Atterberg limits	ASTM D4318
Slump	ASTM C143
Unit weight of backfill	ASTM C138
Bentonite content of slurry	API RP 13B

Permeability	Same as for mix design
Compressive strength	ASTM C39

C. RESIDENT ENGINEER may sample and test independently of CONTRACTOR. RESIDENT ENGINEER's work will be in addition to that specified and shall not relieve CONTRACTOR of any testing responsibilities.

D. Whenever tests conducted by CONTRACTOR or RESIDENT ENGINEER indicate material or workmanship not in accordance with the Contract Documents, work shall be halted and the cause of the discrepancy shall be identified. Work not in accordance with the Contract Documents shall be removed, replaced, repaired, or otherwise corrected so as to conform to these Contract Documents.

E. Sampling and testing performed by CONTRACTOR, Work necessary to identify the cause of any nonconformance, and remedial work necessary because of construction not in accordance with the Contract Documents shall be at CONTRACTOR's sole expense.

END OF SECTION

SECTION 02330
DRILLING AND CORING

PART 1 GENERAL

1.1 WORK INCLUDED

A. This section specifies work, materials and equipment for drilling and coring work for exploration holes along downstream dam cement-bentonite cut off wall, complete.

1.2 GENERAL

A. CONTRACTOR's work under this section shall include: All work necessary to perform the drilling of exploration holes through the alluvium, coring a minimum of 10 feet into the underlying geologic bedrock and the backfilling of the borings with cement grout.

B. The RESIDENT ENGINEER will be present during the drilling and coring operations to log the soils and rock recovered.

1.3 SUBMITTALS

A. The CONTRACTOR shall submit to the RESIDENT ENGINEER a description of the proposed methods and equipment used in the work; including drilling and coring equipment, core barrels, and grouting methods.

PART 2 PRODUCTS

2.1 GENERAL

A. All equipment shall be in good operating condition and operated and maintained in strict accordance with manufacturer's recommendations.

2.2 EQUIPMENT, DRILLING

A. Casing advance air circulation, rotosonic, or mud rotery drilling rig capable of drilling a minimum 4-inch diameter hole through the overlying alluvium. Provide tools, bits and all other necessary equipment required to complete the work.

2.3 EQUIPMENT, CORING

A. The drill rig shall be suitable equipped for coring.

B. The CONTRACTOR shall use only H or N-series split-innertube core barrels, capable of recovering core samples not less than 2.4-inches in diameter. Each sampler shall be capable of recovering a minimum 5-foot length of cored sample.

C. The drill rod shall be H or N-series or equal. All drill rod shall be straight.

D. Temporary casing shall be HW casing with flush joints.

E. If mud is used as a drilling fluid in the alluvium material, provide temporary casing as necessary to stablize the hole so coring can proceed once rock is encountered. Water shall be used as the drilling fluid to remove cuttings from the hole below the alluvuim.

2.4 CEMENT GROUT

A. The grout shall consist of a neat cement slurry. Portland cement must conform to ASTM C150 Type I or II. Proportion one bag of cement to not more than 5 gallons of water. The density of the slurry mixture for tremie grouting shall be monitored and recorded prior to placement using a standard mud balance supplied by the CONTRACTOR.

PART 3 EXECUTION

3.1 GENERAL

A. All drilling, coring and grouting operations shall be carried out with the RESIDENT ENGINEER's approval and, when requested, in the presence of the RESIDENT ENGINEER. Notify the RESIDENT ENGINEER at least 24 hours in advance of the start of drilling and coring operations.

B. The Contractor shall provide at all times an experienced, competent driller during operations on the site.

3.2 DRILLING

A. The CONTRACTOR shall take necessary precautions to prevent contaminated water, hydraulic fluid, or other substancesfrom entering the borehole, either through the opening or by seepage through the ground surface around the borehole.

B. The drilling shall proceed through the alluvuim and stop once the geologic bedrock is encountered. The CONTRACTOR shall provide the RESIDENT ENGINEER with a acceptable method of determining when bedrock is encountered compatable with the drilling method used.

3.3 CORING

A. Coring shall be performed in accordance with ASTM 2113. Every reasonable effort shall be made to attain maximum core recovery by controlling the speed of the drill, the drilling pressure, the amount of water pressure and the length of run.

B. Individual core runs lengths shall not exceed 5 feet. At any suspicion of blockage of core in the barrel, stop coring and remove the inner barrel from the hole. Do not permit the core to grind. Adjust the length of core runs to provide space for any core left in the hole at the end of the previous

run. Validate the footage of core lost by open end rod checks when requested by the RESIDENT ENGINEER.

C. The CONTRACTOR shall inform the RESIDENT ENGINEER of any changes in the core resistance, drilling fluid losses, rod jerks, or any other unusual occurrences.

D. Temporary case the hole as required to start the hole, prevent collapse of the hole, or seal off zones of excessive drilling fluid loss.

E. The CONTRACTOR shall dismantle the core barrel with the barrel horizontal, and remove the split inner-tube carefully. Assist the RESIDENT ENGINEER with the dismantling of the split inner-tube and logging of the core.

3.4 GROUTING

A. At the completion of the coring, plug the hole from the bottom to the surface by tremmie grouting with cement grout.

3.5 RECORD KEEPING

A. Accurate records of the drilling, coring and grouting operations shall be kept by the CONTRACTOR and furnished to the RESIDENT ENGINEER within 1 working day of performance of the work. Record shall include as a minimum: Hole location and depth, depth to geologic bedrock, depth of coring, log of hole drilled, grout mix, grout volume and density. Records kept by the RESIDENT ENGINEER shall not relieve the CONTRACTOR of this requirement.

3.6 CLEANUP

A. During drilling, coring and grouting work, provide for adequate disposal of all waste material, drill cuttings, grout, and water.

END OF SECTION

APPENDIX

US COE Section 404 Permit

US EPA National Pollution Discharge Elimination System Permit

Arizona Department of Environmental Quality State Water Quality Certification

Arizona Department of Water Resources Dam Safety (Not Included)

Arizona Department of Water Resources Recovery Well Permit

Arizona Department of Transportation Permit (Not Included)

Flood Control District of Maricopa County (Not Included)

City of Tempe Building Permit (Not Included)

Union Pacific Railroad Company (Not Included)

Arizona Public Service

Salt River Project (Not Included)

DEPARTMENT OF THE ARMY PERMIT

Permittee:

City of Tempe
City Engineer's Office
Mr. Howard Hargis
P.O. Box 5002
Tempe, Arizona 85280

Permit Number: 94-40904-00-CJL

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 construct the City of Tempe's 200 acre Rio Salado Town Lake as shown on the attached drawings. Activities within the waters of the United States include construction of an upstream and downstream air-inflatable rubber dam, foundations, energy dissipating structures, slurry wall installations, channel grading, material storage during construction, and a stormwater detention/riparian area.

Project Location: In the Salt River between Priest Drive and McClintock Drive, at (Sections 14, 15, and 16, T1N, R4E), Tempe, Maricopa County, Arizona.

Permit Conditions

General Conditions:

1. The time limit for completing the authorized activity ends on April 22, 1998. 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.

Howard C. Hargis 4/21/95

(PERMITTEE) (DATE)

Assistant City Engineer

Howard C. Hargis, P.E., Assistant City Engineer

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

Diane K. Noda 4 May 1995

Diane K. Noda (DATE)

Acting Chief, Regulatory Branch

(for the District Engineer)

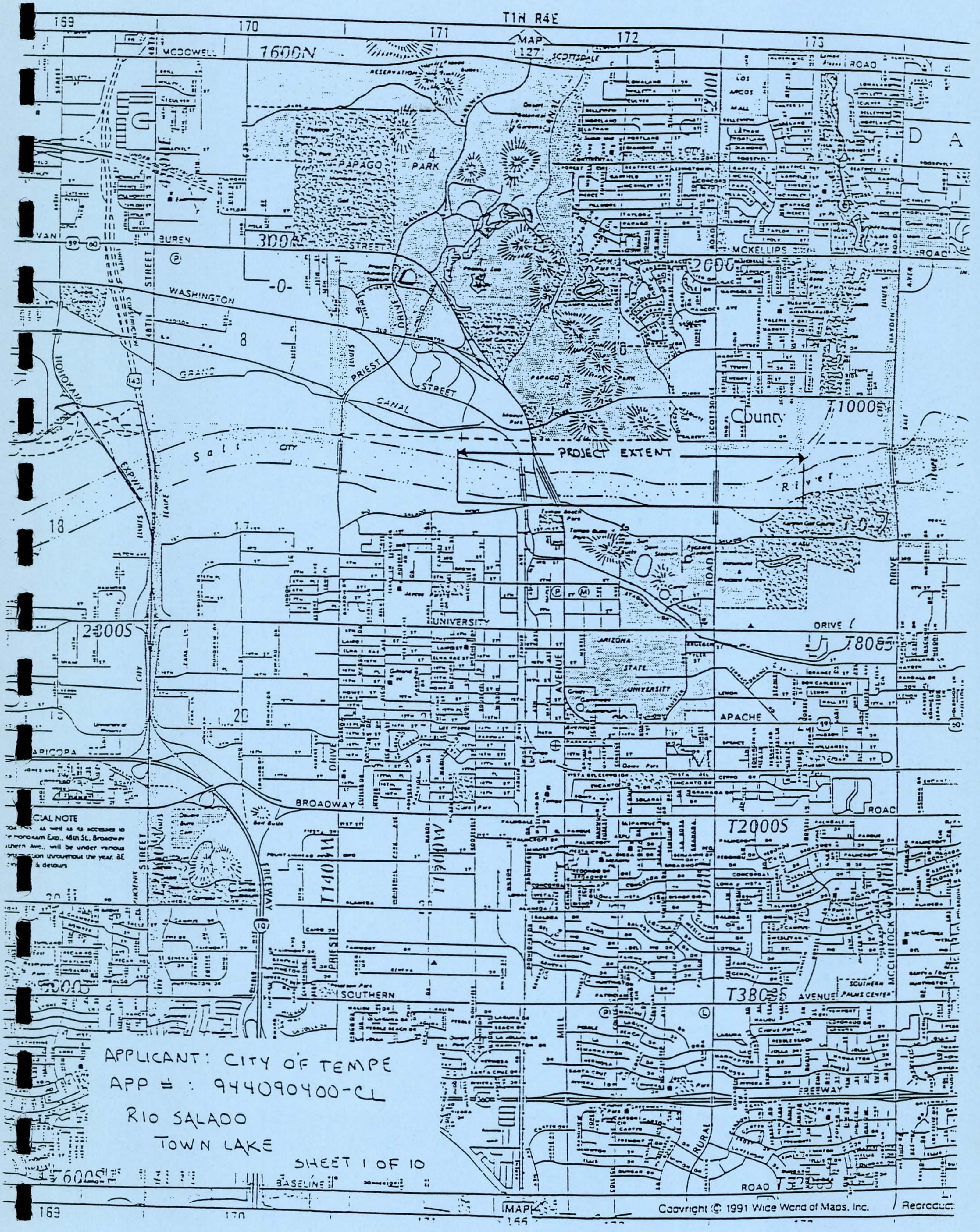
When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

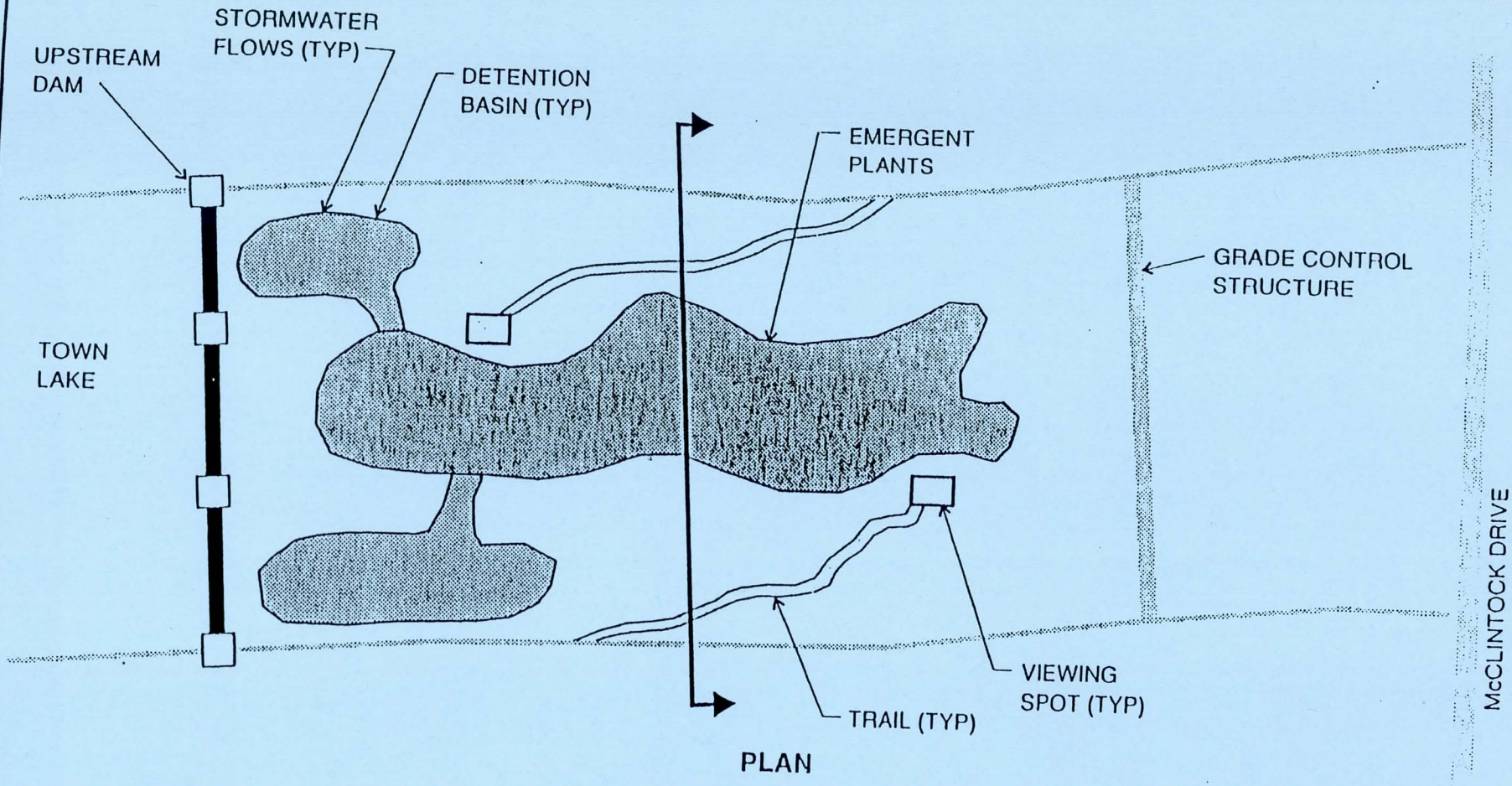
_____ _____

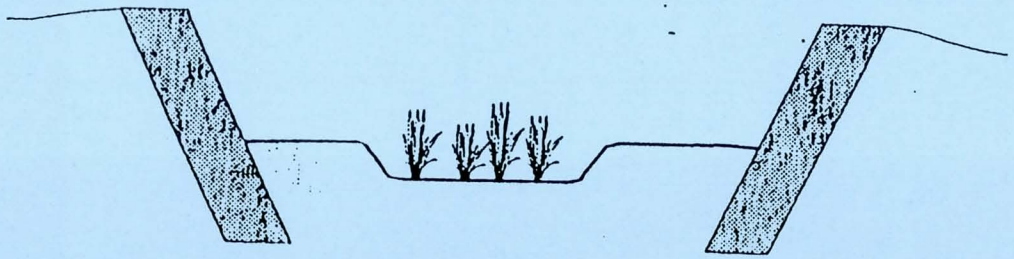
(TRANSFEREE) (DATE)

SPECIAL CONDITIONS
PERMIT NO. 94-40904-00-CJL

1. The permittee shall abide by the terms and conditions of the attached letter of water quality certification issued by the Arizona Department of Environmental Quality on March 13, 1995.


T1N R4E
MAP 127
MCDOWELL
SCOTTSDALE
ROAD
PAPAGO PARK
VAN BUREN
STREET
MCKELLIPS
ROAD
WASHINGTON
PRIEST DRIVE
GRAND CANAL
Salt River
PROJECT EXTENT
County
UNIVERSITY
DRIVE
ARIZONA STATE UNIVERSITY
APACHE
BROADWAY
ROAD
SOUTHERN
AVENUE
MILL
RURAL
MCCLINTOCK
HAYDEN
SCOTTSDALE
FREEWAY
BASELINE
ROAD
MAP 166
APPLICANT: CITY OF TEMPE
APP #: 944090400-CL
RIO SALADO
TOWN LAKE
SHEET 1 OF 10
Copyright © 1991 Wide World of Maps, Inc.





SECTION

APPL: CITY OF TEMPE
APPL #: 9440909 00-CL
SHEET 3 OF 10

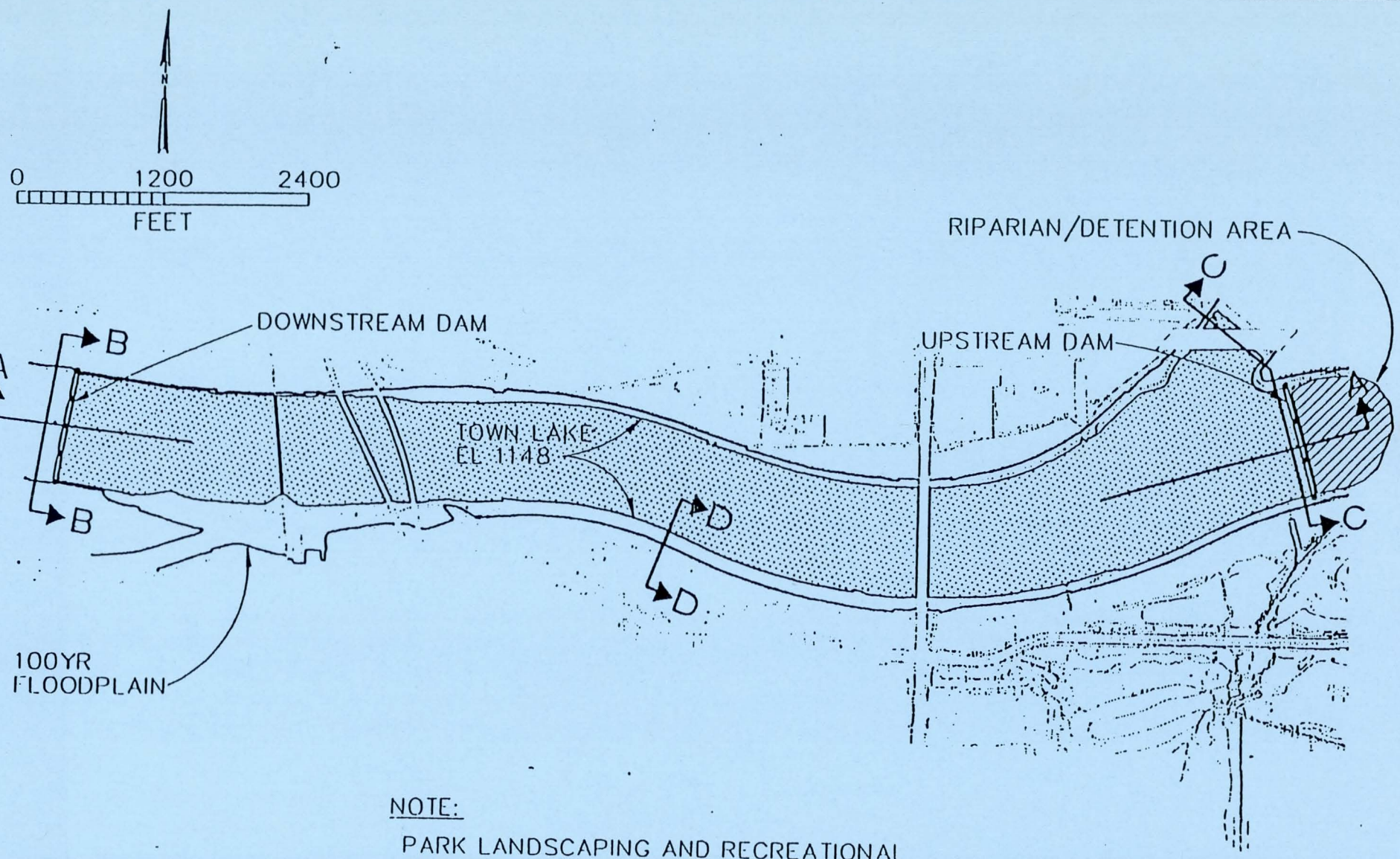
RIPARIAN/DETENTION AREA

Rio Salado COE 404
Permit Application

CRM HILL

06 17 94

05-19-94



NOTE:

PARK LANDSCAPING AND RECREATIONAL AREAS WILL BE CREATED AROUND THE PERIMETER OF THE LAKE.

APPL: CITY OF TEMPE
APPL #: 944090400-CL

SHEET 5 OF 10

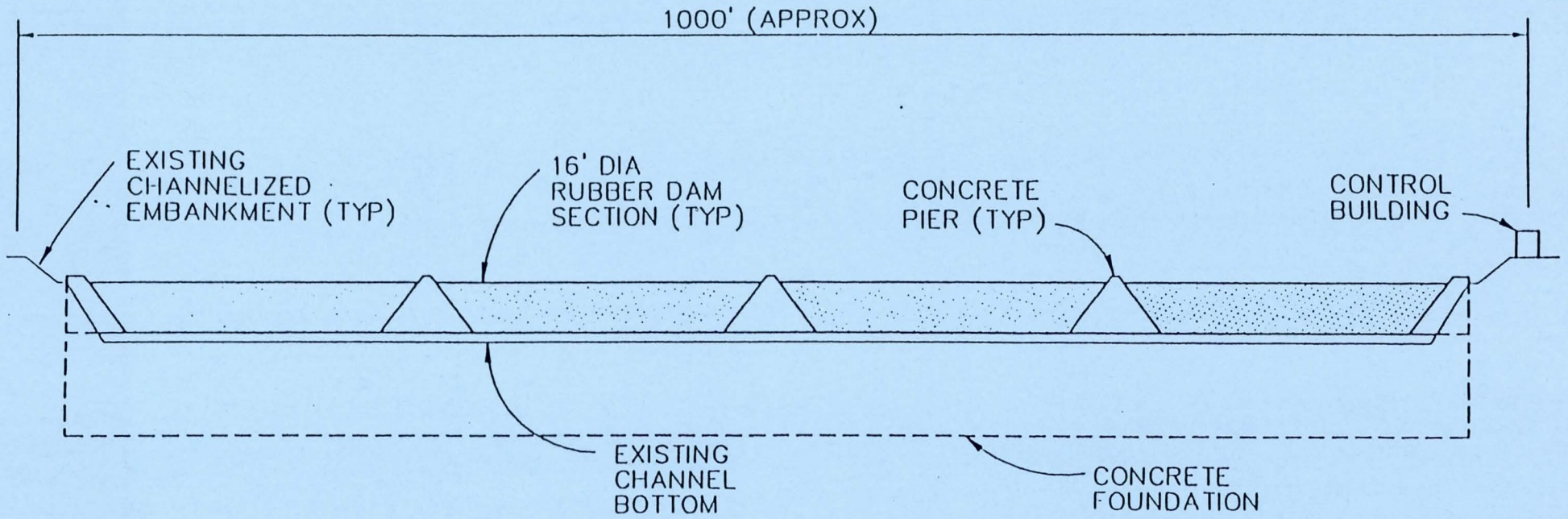
TOWN LAKE PLAN

RIO SALADO COE 404
PERMIT APPLICATION

CH2MHILL

D:\USR2\PROJECTS\3696303.DWG

05-18-91



APPL: CITY OF TEMPE
APPL #: 9440904OO-CL

SHEET 1 OF 10

SECTION B-B

RIO SALADO COE 404
PERMIT APPLICATION

CH2MHILL

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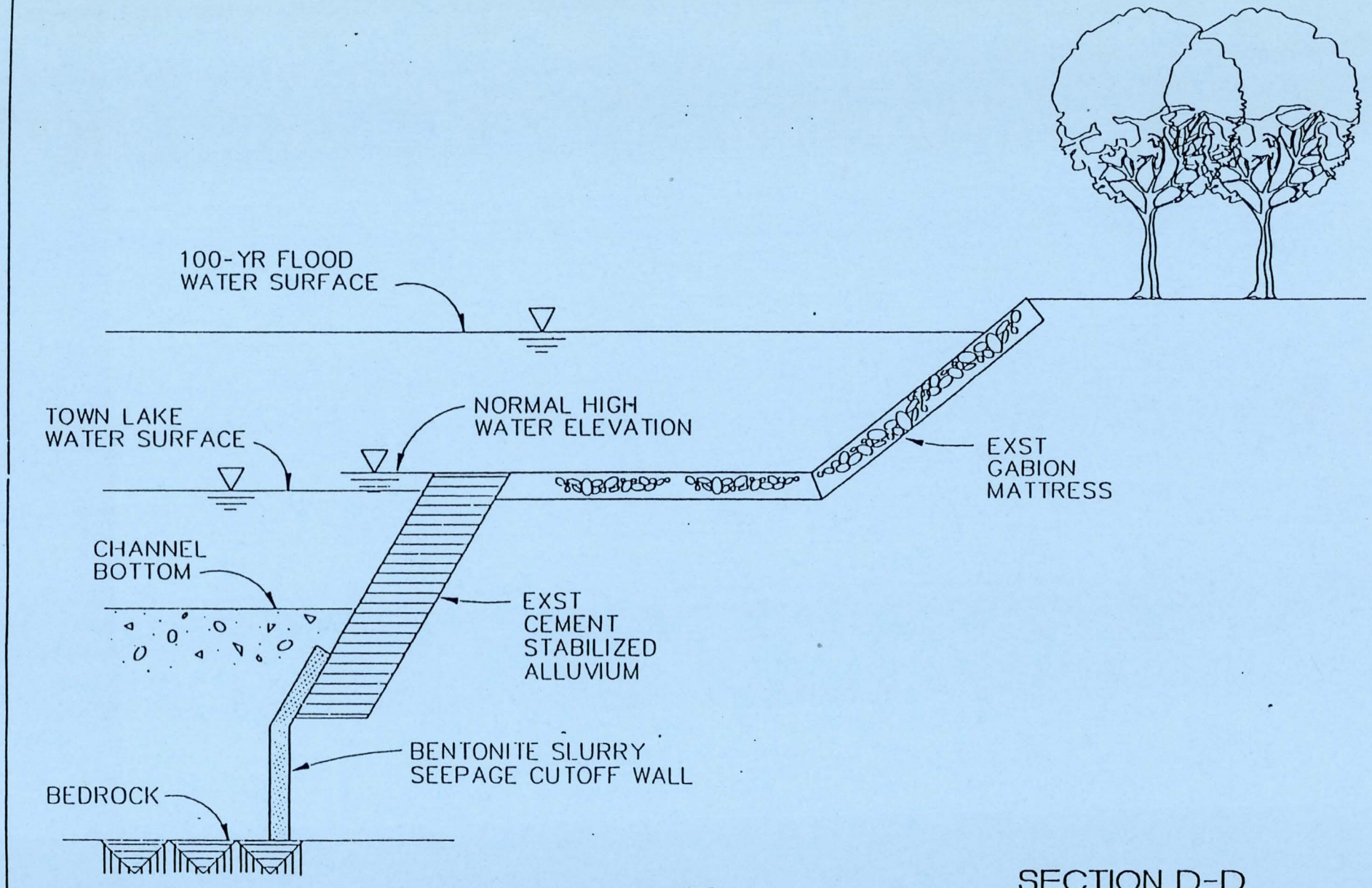
06 17-94



APPL: CITY OF TEMPE
APPL #: 9440904 00-CL

SHEET 9 OF 10

SECTION D-D

RIO SALADO COE 404
PERMIT APPLICATION

CH2MHILL

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STORM WATER POLLUTION PREVENTION PLAN AND N.P.D.E.S. PERMIT SPECIAL PROVISIONS

This project is subject to National Pollutant Discharge Elimination System (N.P.D.E.S.) requirements under the E.P.A. General Permit for Arizona. Under provisions of that permit, the contractor shall be designated as permittee, and shall be responsible for providing necessary material and for taking appropriate measures to assure removal of at least 80 percent of the additional sediment generated in storm water runoff from the project (relative to pre-project sediment levels), and for completing the following documents:

- Storm Water Pollution Prevention Plan (S.W.P.P.P.) for the project, including certification of compliance form.
- Notice of Intent (N.O.I.) to be covered by N.P.D.E.S. General Permit for Arizona, including certification of signature.
- Notice of Termination (N.O.T.) of coverage under N.P.D.E.S. General Permit (upon project completion).

All subcontractors shall comply with all N.P.D.E.S. requirements under the supervision of the General Contractor, and shall submit a completed, signed sub-contractor certification form, thereby designating themselves as co-permittees. A draft framework for the S.W.P.P.P. is enclosed in this Project Specification Book. Contingency bid items likely to be necessary to carry out the S.W.P.P.P. are included in the bid proposal. The contractor will be expected to review this framework S.W.P.P.P. and update/revise it as necessary throughout the construction of the project, in order to assure compliance with the E.P.A. permit requirements. Revisions to the S.W.P.P.P. requiring use of these contingency bid items, or any other additional costs, shall be subject to approval by the City prior to implementation. The finalized S.W.P.P.P. shall be kept on the project site at all times, and shall be retained by permittee for three years following project completion.

The unit prices bid for the proposal items shall include all material, labor, and other incidental costs relating to the provision, installation, and maintenance of that bid item during project construction. Such incidental costs shall include contractor costs in order to assure proper operation of the pollution-control devices installed, including all maintenance, cleaning, and disposal costs associated with clean-up and repair following storm events or other runoff or releases on the project. No additional payment will be made for these incidental costs.

The contractor shall submit completed signed N.O.I. forms prior to the project preconstruction conference to the following addresses: U.S. E.P.A. Storm Water Notice of Intent, P.O. Box 1215, Newington, VA 22122 and ADEQ-Storm Water Coordinator, P.O. Box 600, Phoenix, AZ 85001. Copies shall be transmitted to the City's construction project manager, as provided on the N.O.I. form, at the time of the preconstruction meeting. The Contractor shall prepare a final SWPPP and submit it at the preconstruction meeting for discussion and approval.

Failure by the contractor (or any of its appropriate subcontractors) to submit the N.O.I. forms within this time frame (or to promptly make revisions to those forms as requested by the City) which prevents submittal of the forms to E.P.A. within the mandated deadline of 48 hours prior to start of construction will result in delay of the start of construction. The contractor will not be entitled to any claim for additional compensation for additional costs resulting from such a delay in the construction start date. The N.O.I. shall be posted on the construction site along with the S.W.P.P.P.

It is the permittee's responsibility to perform inspections of all storm water pollution control devices on the project on a monthly basis, and following each rainfall of 0.50 inches or more. The contractor is responsible for maintaining those devices in proper working order, including cleaning and/or repair. No separate payment will be made for such inspections, cleaning, or repair.

All S.W.P.P.P. reports required under this contract shall be available to the public in accordance with the requirements of Section 308 (b) of the Clean Water Act. The contractor as a permittee of construction activities with storm water discharges covered by the Arizona General Permit shall make plans available to the public upon request through the E.P.A.

No condition of the Arizona General Permit as well as the S.W.P.P.P. shall release the contractor from any responsibilities or requirements under other environmental statutes or regulations.

Upon total project completion, acceptance, and de-mobilization, the contractor shall submit its completed, signed N.O.T. form to the E.P.A. Storm Water Notice of Termination, P. O. Box 1185, Newington, VA 22122, with copies to the same agencies who received copies of the N.O.I., thereby terminating all N.P.D.E.S. permit coverage for the project.

Necessary forms for the N.O.I., and the draft S.W.P.P.P. are contained in this booklet. Additional forms will be available through the City's Construction Project Manager and Inspector.

WQMS-301.210-944090400-CL

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Fife Symington, Governor Edward Z. Fox, Director

March 13, 1995

Mr. Howard Hargis
City of Tempe
City Engineers Office
P.O.Box 5002
Tempe, AZ 85280

RE: To Construct Rio Salado's Town Lake and Associated Facilities in the Salt River Between Priest Drive and McClintock Drive in the City of Tempe, Maricopa County, Arizona - PUBLIC NOTICE NO. 944090400-CL.

Dear Mr. Hargis:

The Arizona Department of Environmental Quality (ADEQ) staff has reviewed the referenced Public Notice and other information for State Water Quality Certification pursuant to Sections 401 and 404 of the Federal Clean Water Act. Information appearing in Section A describes the project. Information listed in Section B were used as the basis for this State Certification. Our technical review has determined that no negative impacts will occur to the chemical, physical or biological integrity of the Salt River when the Conditions shown below in Section C are adhered to during construction and post construction activities.

A. PROJECT DESCRIPTION

1. The Tempe Town Lake will be formed by the construction of two inflatable dams in the Salt River. A six foot high dam will be placed upstream of the Indian Bend Wash confluence with the Salt River and a 16 foot high dam will be placed ½ mile upstream of Priest Drive. The lake will be two miles long and cover 200 surface acres.

2. Ancillary facilities consist of: boat slips, a City Park, operations building, bike paths, hiking trails, lighting, docks, streets, plantings of trees and shrubs, pump house, public art, water features, parking and picnic areas and other facilities designed to appeal to the public.

B. BASIS FOR CONDITIONAL STATE 401 WATER QUALITY CERTIFICATION

1. State of Arizona, Water Quality Standards for Navigable Waters, Arizona Administrative Code (A.A.C.) Title 18, Chapter 11, Article 1.

2. Arizona Department of Environmental Quality Policy for Protecting Water Quality During Facility Construction, adopted December 21, 1994.

3. Final Report and Recommendations of the Governor's Riparian Habitat Task Force, Executive Order 89-16, dated October 1990, and Executive Order No. 91-6 dated February 14, 1991.

4. A letter dated May 2, 1994 to Ed Swanson from Steve Neilson of the City of Tempe inviting Ed to a Pre-application meeting at the COE office on May 19, 1994.

5. On May 19, 1994 a meeting was held to introduce the Tempe Town Lake project at the COE office in Phoenix. The meeting was attended by representatives of the COE, ADEQ, USFWS, AGF, the City of Tempe and the consultant, CH2M Hill.

6. U.S. Army Corps of Engineers (COE) Public Notice No. 944090400-CL dated September 1, 1994 and received by ADEQ on December 8, 1994.

7. Completed ADEQ form 404-033 dated November 14, 1994 and received by ADEQ on November 16, 1994 from Steve Walker of CH2M Hill (CH2M) including the following items:

   a. Five pages of technical data relating to water quality issues.

   b. A two page report dated September 22, 1994 from George Cotton concerning Salt River Sedimentation.

   c. Twenty 11 X 14 inch drawings of the project.

   d. Eighteen pages of drawings and explanations of the project.

   e. A one page letter dated June 20, 1994 to Steve Neilson from Wayne Palsma concerning the applicability of an NPDES Permit for the Town Lake.

   f. A one page letter dated August 4, 1994 to Steve Neilson from James Du Bois concerning the applicability of an Aquifer Protection Permit.

8. A six page alternatives analysis dated August 30, 1994 to Cindy Lester (COE) from Rich Randall (CH2M).

9. A letter dated December 14, 1994 to Rich Hill (CH2M) from Jim Matt requesting clarification on 14 items concerning the Town Lake.

10. A letter dated January 9, 1995 to James Matt from Steve Walker (CH2M) responding to the December 14, 1994 letter in Item B.9.

11. A letter dated January 12, 1995 from James Matt to Rich Randall requesting clarification on nine items concerning the town lake.

12. A letter dated February 14, 1995 to James Matt from Steve Walker responding to the questions in Item B.11.

13. A meeting at ADEQ on February 27, 1995 attended by Howard Hargis of the City of Tempe, Steve Walker of CH2M Hill and Jim Matt of ADEQ. This meeting was primarily concerned with a discussion of the sampling plan.

14. Letter dated March 13, 1995 from Tom Trent, Clean Lakes Coordinator to Jim Matt discussing the sampling parameters for the Tempe Town Lake.

C. CONDITIONS FOR STATE 401 WATER QUALITY CERTIFICATION

This State Water Quality Certification is issued by the Arizona Department of Environmental Quality 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 to this Section 404 Permit issued by the U.S. Army Corps of Engineers. These conditions are enforceable by the U.S. Environmental Protection Agency. 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.

1. Other permits or approvals may be required by Maricopa County, the Arizona Department of Environmental Quality (ADEQ), or the U.S. Environmental Protection Agency if the overall project includes a potable water supply, Stormwater management, wastewater reuse facilities, or wastewater collection/holding/treatment/ disposal facilities.

2. No disposal of construction or demolition wastes, wastewater, contaminated water or any other potential pollutant is authorized by this State 401 Water Quality Certification by ADEQ, except as expressly provided in the Section 404 Permit.

3. This Certification is only for the project described in Section A and is valid for a period of 30 months from the date signed by the Director of the Water Quality Division. If project construction has not started by this deadline, the applicant must notify ADEQ, Attention Surface Water Quality Certification, Water Quality Division, 3033 North Central Avenue, 5th Floor, Phoenix, Arizona 85012. ADEQ will then have the option of extending, modifying or denying this Certification.

4. The applicant must provide a copy of these State 401 Water Quality Certification Conditions to all appropriate contractors and subcontractors. The applicant must also post a copy of these conditions in a weather resistant location at the construction site where it may be seen by the workers.

5. There can be no substantive changes/modifications in the project plans and analyses identified in Sections A and B or the implementation of those plans which might affect surface water quality. If a substantive change/modification is desired, notice and supporting information must be submitted to ADEQ for review. ADEQ will then modify this Certification to include the changes/modifications, provided that Water Quality Standards for Navigable Waters (A.A.C. Title 18, Chapter 11, Article 1) will be achieved. Failure of the operator to promptly notify ADEQ of any proposed substantive changes/modifications could result in a revocation of this Certification. Correspondence to ADEQ must be addressed per Condition C.3, above.

6. When this project is physically commenced at the construction site, ADEQ must be notified by the applicant or his designee within seven days of the start date. When this notification is made, please provide the start date and the names and phone numbers of the prime contractor and a contact person. ADEQ may conduct inspections to determine compliance with A.A.C. Title 18, Chapter 11, Article 1. When the project is complete ADEQ must be similarly notified. Notification must be addressed to ADEQ per Condition C.3, above.

7. Runoff and seepage from roadways, embankments, and other alterations of the natural environment must not cause a violation of A.A.C. Title 18, Chapter 11, Article 1.

8. All off-site material sources for the project must have valid and current permits under the Federal Clean Water Act [Sections 402 (NPDES) and 404] and the State Aquifer Protection Program, where necessary. Facilities and activities not covered by individual permits under these programs are not exempt from the duty to comply with water quality standards, and will be subject to compliance action if violation is documented. Other permits pertaining to air quality may be required for material sources and are the responsibility of the applicant or his agent(s).

9. Water for dust suppression, if used, must not contain contaminants that could violate ADEQ water quality standards for surface waters or aquifers.

e. Sampling for Total Petroleum Hydrocarbons (TPH) will be conducted monthly at the same locations as the nutrient and metals samples.

f. Sampling for metals will commence at monthly intervals after the lake has been filled. Metals and nutrients may be sampled at the same time and location. A pattern should soon be apparent and the sampling frequency reduced. The enclosed page titled "Inorganic Chemistry Test Sets" show the list of metals to be sampled for originaly under the column "SURFACE WATER-ALL INORGANICS".

g. An important parameter for judging the health of a lake is the presence of chlorophyll. During the summer months when fecal coloform is being sampled, chlorophyll a, b, c and pheophytin a shall be sampled for at the same time and locations.

This is the initial sampling program for the Tempe Town Lake. Sample results will be sent to ADEQ at the address shown in Item C.3 above. The sampling program will be modified as sample results are received and reviewed. Mr. Howard Hargis, the applicant, will be notified when it is necessary to implement a change in the sample plan.

Construction procedures must be consistent with the Arizona Department of Environmental Quality Policy for Protecting Water Quality During Facility Construction. The specific procedures for preventing water pollution indicated in ADEQ policy statements #1 through #13, together with Conditions C.1 through C.18, listed above, should ensure compliance with water quality standards. Subject to the above Project Description, Basis and Conditions of Certification, this letter certifies that the proposed project of the City of Tempe in the Salt River Channel complies with existing navigable water quality standards. If you have any questions about this Letter of Certification, please call James Matt (602) 207-4502. Thank you for your cooperation and efforts to protect our natural environment.

Sincerely,

Authorized ADEQ Signature _____ Date _____

Kimberly W. MacEachern, Director
Water Division

Enclosuer.

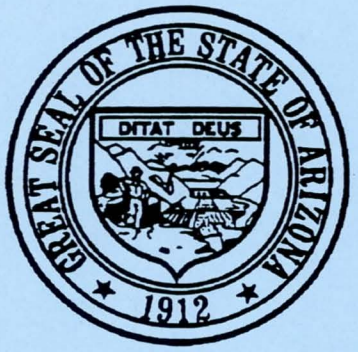
KWM:JRM:jrm

cc: James Romero, EPA Region 9
Corps of Engineers Regulatory Branch - Phoenix
Larry Rielly, AGFD
Sam Spiller, USFWS

JRM#9/Tempe.404

INORGANIC CHEMISTRY TEST SETS

	SDW ALL INORGANIC	PRIMARY STANDARDS	SECONDARY STANDARDS	SURFACE WATER-ALL INORGANICS	SURFACE WATER NUTRIENTS	P.P. METALS	DISS. METALS	TOTAL RECOV. METALS	MAJOR CATIONS/ ANIONS
TO USE, CHECK:	ABOVE BLOCKS ONLY					INDIVIDUAL TESTS REQUIRED			
ALKALINITY, TOTAL	X		X	X					X
ALKALINITY, PHENOL	X		X	X					X
AMMONIA					X				
CHLORIDE	X		X	X					X
CONDUCTIVITY	X		X	X					
FLUORIDE	X	X		X					X
HARDNESS	X		X	X					X
NO2 NO3 TOTAL	X	X		X	X				X
NITRITE					X				
PHOSPHORCUS					X				
TKN					X				
pH	X		X	X					X
SULFATE	X		X	X					X
TDS	X		X	X					X
TSS				X					
TURBIDITY		X		X					
Ag (Silver)	X	X		X		X	X	X	
As (Arsenic)	X	X		X		X	X	X	
B (Boron)				X					
Ba (Barium)	X	X		X			X	X	
Be (Beryllium)						X			
Cd (Cadmium)	X	X		X		X	X	X	
Ca (Calcium)	X		X	X					X
Cr (Chromium)	X	X		X		X	X	X	
Cu (Copper)	X		X	X		X	X	X	
Fe (Iron)	X		X	X				X	X
K (Potassium)				X					X
Hg (Mercury)	X	X		X		X	X	X	
Mg (Magnesium)	X		X	X					X
Mn (Manganese)	X		X	X				X	
Na (Sodium)	X		X	X					X
Ni (Nickel)						X			
Pb (Lead)	X	X		X		X	X	X	
Se (Selenium)	X	X		X		X	X		
Sb (Antimony)						X			
Tl (Thallium)						X			
Zn (Zinc)	X		X	X		X	X	X	



ARIZONA DEPARTMENT OF WATER RESOURCES

RECOVERY WELL PERMIT

PERMIT NO. 74-547332

STATE OF ARIZONA)
) ss.
County of Maricopa)

This is to certify that I have examined Application No. 74-547332 for a recovery well permit. I have determined that the application meets the requirements of Title 45, Chapter 3.1, Article 3, Arizona Revised Statutes. The Department hereby grants the applicant authority to operate the recovery wells subject to the following limitations and conditions:

Permit Limitations

Applicant:

City of Tempe
P.O. Box 5002
Tempe, Arizona 85280

Permitted recovery well(s):

Well Registration Number	Location of Well	Design Pump Capacity (GPM)	Well Depth (Feet)	Casing Diameter (Inches)	Maximum Annual Recovery (Acre Feet)
55-551601	SE¼NE¼NE¼ Sec.15 T1N R4E	3200	140	24	51.6
55-551602	SW¼NW¼NW¼ Sec.14 T1N R4E	3200	160	24	51.6
55-551603	SE¼NW¼NW¼ Sec.14 T1N R4E	3200	155	24	51.6
55-551604	NW¼NE¼NW¼ Sec.14 T1N R4E	3200	155	24	51.6
55-551605	NE¼NW¼NE¼ Sec.14 T1N R4E	3200	135	24	51.6
55-551606	NW¼SW¼NE¼ Sec.14 T1N R4E	3200	140	24	51.6
55-551607	NE¼SE¼NW¼ Sec.14 T1N R4E	3200	160	24	51.6
55-551608	SW¼SE¼NW¼ Sec.14 T1N R4E	3200	160	24	51.6
55-551609	SW¼SW¼NW¼ Sec.14 T1N R4E	3200	160	24	51.6
55-551610	SE¼SE¼NE¼ Sec.15 T1N R4E	3200	150	24	51.6

Recovery wells are subject to the operating plans of Facility Permit Numbers 71-516371, 71-551762, and 72-533659, and are subject to the conditions of Water Storage Permit Numbers 73-516371.7000, 73-551761, and 73-533659.

Recovered water will be used for: The beneficial municipal use of the permittee including but not limited to maintaining the Town Lake water levels and/or delivery for uses within the municipal water system.

Legal description of the land on which recovered water will be used: Parts of Sections 14, 15 and 16 of Township 1 North Range 4 East GSRB&M.

Permit Conditions

1. In accordance with A.R.S. § 45-875.01.(D), an annual report shall be submitted no later than March 31 following the end of each completed annual reporting permit. The first annual reporting period shall be from the date of this permit through December 31, 1996. Subsequent annual reporting periods shall be January 1 through December 31.

2. The annual report shall include the following information:

   a. The well registration number and location of the wells used to recover stored water.

   b. The quantity of water recovered from each well as measured in a manner consistent with the requirements and specifications for water measuring devices adopted pursuant to A.R.S. § 45-604.

   c. For all stored water recovered each year, report the Water Storage Permit Number(s) from which the water storage originated, the amount of recovery (in acre feet) attributed to each Water Storage Permit, and the source of water originally stored pursuant to each Water Storage Permit.

3. Recovery from each of the Well Registration Numbers referenced above shall not exceed the specified annual volume limit of 51.6 acre feet.

WITNESS my hand and seal of office this 8th day of August, 1996.

Herb Dishlip, Assistant Director

Tel xxx/xxx-xxxx
Fax xxx/xxx-xxxx
e-mail: xxxxxxxx@apsc.com
http://www.apsc.com

Mail Station xxxx
P.O. Box 53933
Phoenix, AZ 85072-3933

August 29, 1996

Mr. Howard Hargis
Assistant City Engineer
City of Tempe
P.O. Box 5002
Tempe, AZ 85280

RE: SOUTH BANK INTERCEPTOR STORMWATER DIVERSION PIPELINE ENCROACHMENT AGREEMENT

Dear Mr. Hargis:

Enclosed is your copy of the fully executed Encroachment Agreement for the above referenced project.

If you have any questions regarding this matter, please call me on 371-7031.

Sincerely,

Barbara H. Cowdery

Barbara H. Cowdery
Land Agent
SI Land Services

Enclosure

ENCROACHMENT PERMIT
AND INDEMNIFICATION AGREEMENT

This Encroachment Permit and Indemnification Agreement (the "Agreement") is entered into this 29th day of August, 1996, by and between City of Tempe, an Arizona municipal corporation ("Tempe") and Arizona Public Service Company, an Arizona corporation ("APS").

RECITALS:

A. APS is the owner a Right of Way Easement recorded in Docket 4380, Pages 152-158, and a Utility Easement recorded in Docket 7695, Page 359 Maricopa County Records referred to herein as the ("Easements").

B. APS presently has transmission lines along with appurtenant fixtures and equipment within the Easements (the "Lines").

C. Tempe wishes to encroach upon the Easements by constructing and maintaining the South Bank Interceptor Stormwater Diversion Pipeline within the Easements as shown on Exhibit "A" attached hereto and by this reference incorporated herein (the "Pipeline").

D. APS is willing to allow said encroachment upon the terms and conditions contained herein.

PROMISES AND COVENANTS:

NOW, THEREFORE , in consideration of the foregoing recitals and in further consideration of the following covenants, promises, and provisions, the parties hereby agree as follows:

1. APS hereby authorizes Tempe, at Tempe's sole cost and expense, to install the Pipeline in the locations as shown on Exhibit "A" attached hereto and by this reference incorporated herein.

2. No vehicle over 14 foot in height shall be parked within the Easements for the contractor staging area shown on Dwg. Nos. A-G-6 and A-G-7 attached hereto.

3. No vehicles shall be refueled within the Easements.

4. No flammable or hazardous materials shall be stored within the Easements.

5. Tempe shall obtain independent permission to cross the Easements from the underlying landowner and any other easement holders.

6. Only clean sand and gravel shall be deposited in the designated waste disposal area shown on Dwg. A-G-7 and the material shall be leveled and compacted to avoid restricting APS' access in the Easements. Extreme care must be used when despositing material in the vicinity of tower foundations to avoid damaging these foundations.

7. The final elevation of the waste disposal area shall be no greater than the top of the foundation concrete for the towers located approximately in the center of this area.

8. APS shall not be liable for damage to Tempe's facilities located within the Easements as a result of APS operation and maintenance of the Lines.

9. At all times during the construction and maintenance of the Pipeline within the Easements, Tempe shall comply with all applicable laws, ordinances, rules, regulations, and safety requirements, including but not limited to the Arizona Revised Statutes, the Occupational Safety and Health Standards for General Industry (29 C.F.R. Part 1910), and the National Electrical Safety Code.

10. Tempe shall indemnify, hold harmless, and waive all claims against APS, its employees, agents, and representatives, for any and all claims, demands, suits, losses, costs, and damages of every kind and description, including any attorneys' fees or litigation expenses, on account of loss of, or damage to, any property or for injury to, or death of, any person caused by, arising out of, or contributed to, in whole or in part, by reason of the location, construction, operation, use, maintenance, repair or removal of the Pipeline, or equipment or vehicles within the Easement; provided, however, that this indemnification, waiver and release shall not extend to active negligence or willful misconduct of APS.

11. Tempe further hereby indemnifies APS against loss of revenue if Tempe, its employees, agents, or representatives during construction, maintenance, use, or removal of the Pipe in any way damage the Lines or APS' towers or equipment located within the Easements; provided, however, that this indemnity shall not extend to active negligence or willful misconduct of APS.

12. Tempe acknowledges that APS has provided it with general electric and magnetic field-related information for its consideration and use prior to execution of this Agreement.

13. This Agreement shall not limit or restrict APS' rights granted under the Easement, including the right to add or remove electric facilities in the Easements. Tempe shall not interfere with APS' use of the Easement or APS' business conducted thereon.

IN WITNESS WHEREOF, the parties have executed this Agreement on the day and year first above written.

CITY OF TEMPE

By Howard A Darrow

Its Assistant City Engineer

ARIZONA PUBLIC SERVICE COMPANY
an Arizona corporation

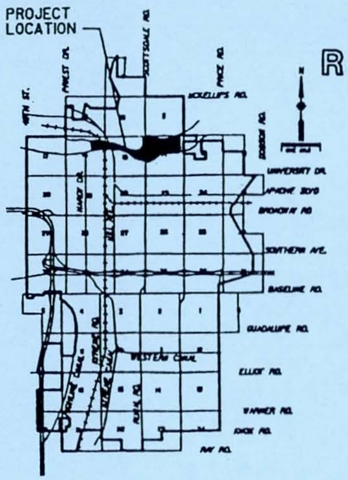
By Michael A Chatt

Its Acting Group Leader

Exhibit "A"

CITY OF TEMPE
PUBLIC WORKS DEPARTMENT
DIVISION OF ENGINEERING

RIO SALADO TOWN LAKE - PROJECT NO. 946523-A
SCHEDULE A - PIPE AND WELL SYSTEMS



MAYOR
NEIL G. GIULIANO

CITY COUNCIL
LINDA SPEARS
DENNIS J. CAHILL
P. BEN ARREDONDO
JOSEPH LEWIS
JOSEPH P. SPRACALE
CAROL E. SMITH

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UTILITY INFORMATION

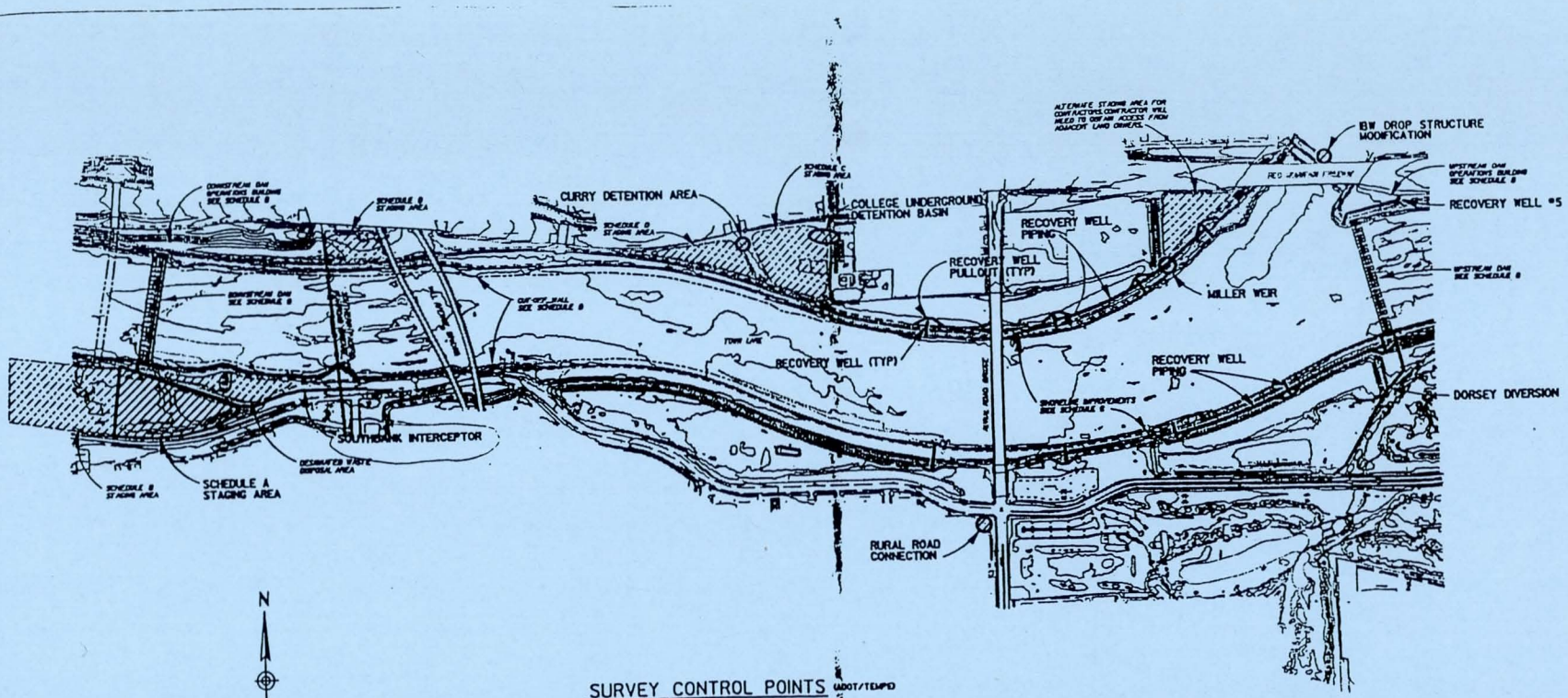
MCI	DATE
AT & T	DATE
US WEST	DATE
ARIZONA PUBLIC SERVICE CO.	DATE
AIR PRODUCTS	DATE
SALT RIVER PROJECT-WATER	DATE
SALT RIVER PROJECT-POWER	DATE
EL PASO NATURAL GAS CO.	DATE
SOUTHWEST GAS CORP.	DATE
DIMENSION CABLE	DATE

APPROVED

CITY ENGINEER	DATE

DEPT. OF ENVIRONMENTAL MGMT.

3696a001.dgn
4 FEB 1996



SURVEY CONTROL POINTS (ADOT/TEMPE)

NO	N	E	ELEV	DESCRIPTION
174	283837.0774	297359.7527	967.70	B.C. IN HANDWELL AT CENTERLINE SCOTTSDALE RD 200'+ N. INTERSECTION OF 1ST ST 9'EM OF HANDWELL PANEL PT1
517	284516.7080	292858.4872	848.72	½" REBAR FLUSH W/ GROUND 50'+ OF N. FENCE TEMPE BEACH PARK, 200'+ W. OF OLD MILL BRIDGE
527	284314.7598	294798.2298	861.90	½" REBAR FLUSH W/ GROUND IN ACCESS ROAD S. BANK OF IRRIGATION CANAL NEAR S. BORDER PAPAGO PARK, 8'PANEL PT1
1	285893.95	290632.19		½" REBAR FLUSH W/ GROUND IN UPPER LEVEE
2	284819.86	290470.18		½" REBAR FLUSH W/ GROUND IN UPPER LEVEE
3	286000.00	300250.00		½" REBAR FLUSH W/ GROUND IN UPPER LEVEE
4	284887.93	300545.25		½" REBAR FLUSH W/ GROUND IN LOWER ACCESS ROAD

ALL COORDINATES SHOWN ARE PROJECT DATUM GROUND COORDINATES

THE COORDINATES ARE REDUCED BY 200,000 IN THE E DIRECTION AND 600,000 IN THE N DIRECTION, FROM ADOT COORDINATES

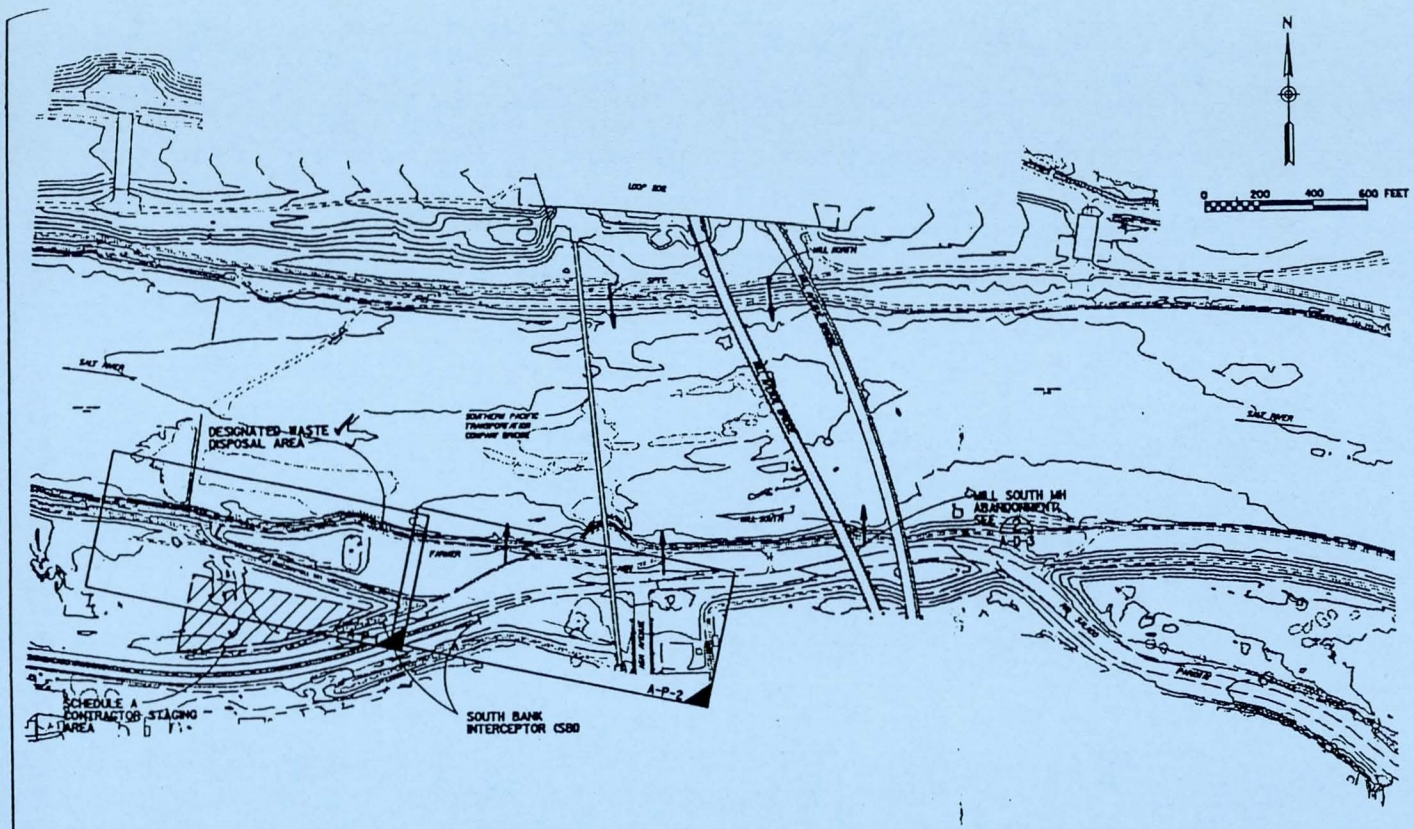
263-1100
CALL BLUE STAKE

DEPARTMENT OF PUBLIC WORKS
CITY OF TEMPE
DIVISION OF ENGINEERING
P.O. BOX 5002 TEMPE, ARIZONA 85280

SURVEYED	DESCRIPTION: SCHEDULE A GENERAL	DATE: APRIL 1996
DESIGNED REF		PROJECT NO. 946523A
DRAWN REF	OVERALL PROJECT PLAN	SHEET 6 OF X
CHECKED CHP		DWG NO. A-G-6
SCALE 1"=400'		

PRELIMINARY 90% REVIEW

3696tpl2.dgn
12-FEB-1996



LEGEND:

EXISTING STORM DRAINS TO BE MODIFIED, SEE A-D-3

SHEET WINDOW AREA

DRAWING NO.

A-P-3

LOWER RIGHT HAND CORNER

CONSTRUCTION NOTES

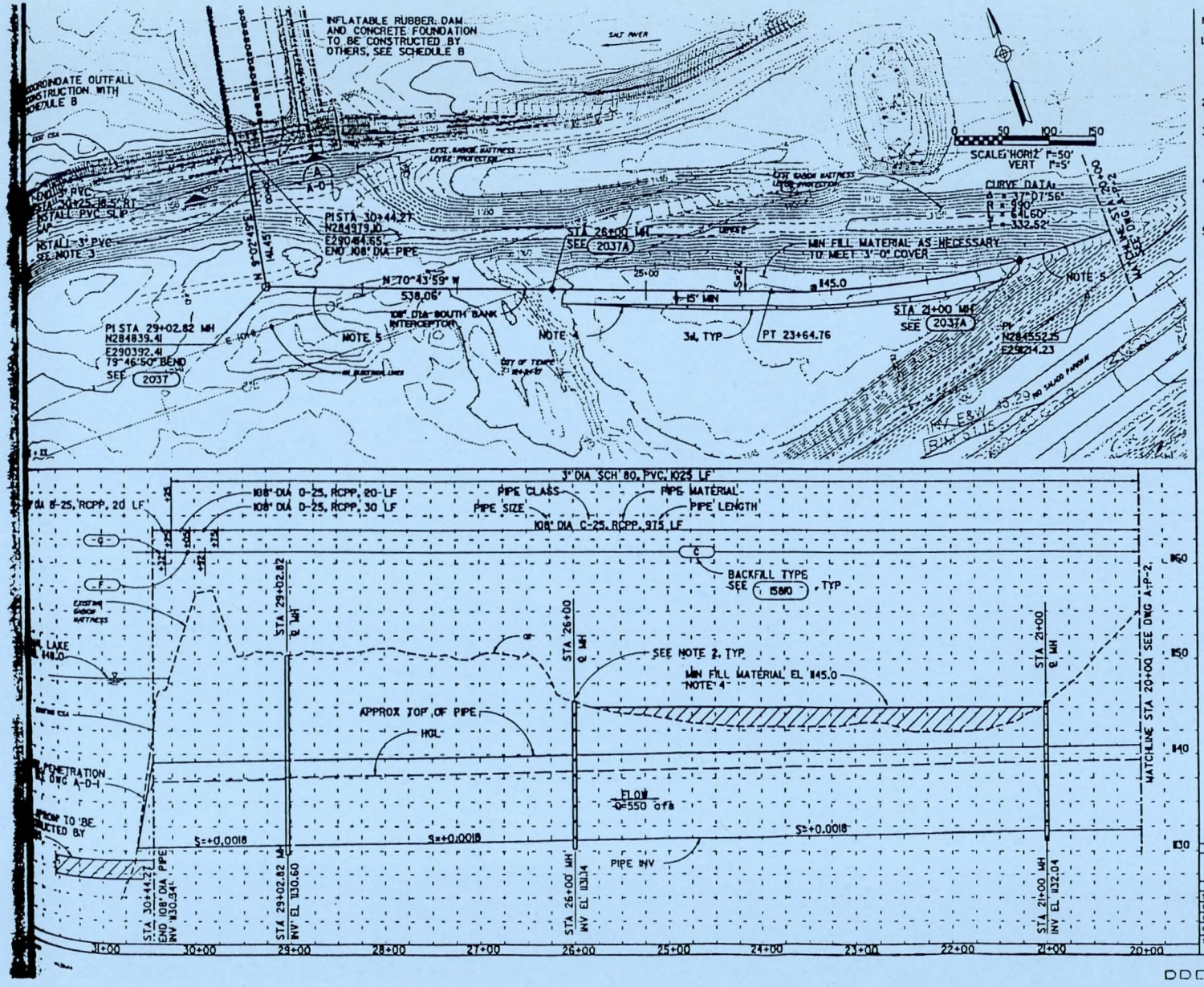
263-1100
ARIZONA BLUE STAKE, INC.
BLUE STAKE, INC.

DEPARTMENT OF PUBLIC WORKS
CITY OF TEMPE
DIVISION OF ENGINEERING
P.O. BOX 5002 TEMPE, ARIZONA 85280

SURVEYED: E	DESCRIPTION: SCHEDULE A GENERAL	DATE: APRIL 1996
DESIGNED: E	STORMWATER DIVERSION PLAN WEST	PROJECT NO. 9465231
DRAWN: E		SHEET X OF X
CHECKED: E		DWG NO. A-G-7
SCALE: 1"=200'		

3696a001.dgn
14-FEB-1996

PRELIMINARY 90% REVIEW



NOTES:

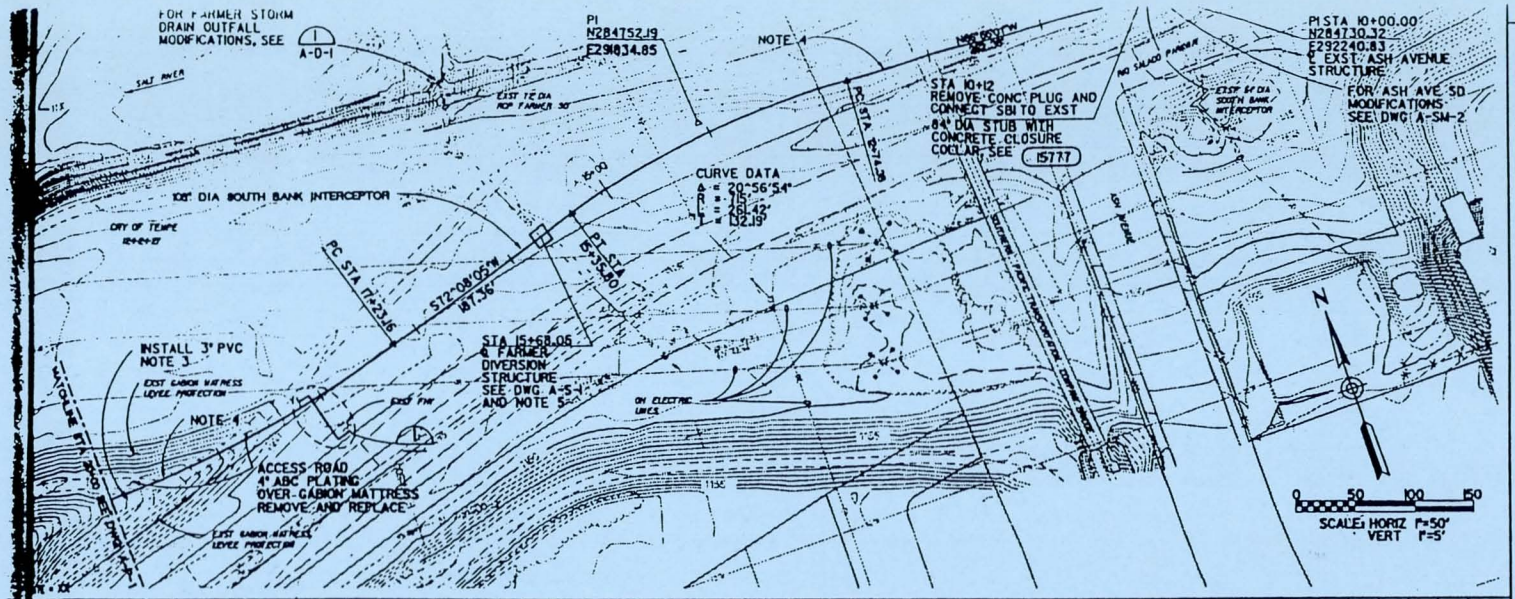
1. EXCAVATE TEST PITS OR BORINGS ALONG CENTERLINE OF SBI ALIGNMENT AT 50' INTERVALS FROM STA 15+50 TO STA 29+00 PRIOR TO EXCAVATING TRENCH. REFER TO SPECIFICATIONS FOR DETAILS OF TEST PIT OR BORING REQUIREMENTS.
2. TOP OF MH RISERS SHALL MATCH THE FINISHED GRADE ALONG THE PIPELINE ALIGNMENT.
3. 3" PVC WATER LINE SHALL BE PLACED IN THE SAME TRENCH AS THE 108" SBI FROM STA 18+10 TO STA 30+25. REFER TO THE PIPE BACKFILL DETAIL ON DWG A-0-8
4. RECENT GRADING ACTIVITIES MAY HAVE ALTERED GROUND SURFACE ELEVATIONS IN THIS AREA. CONTRACTOR SHALL FIELD VERIFY GROUND SURFACE ELEVATIONS.
5. LIMIT EQUIPMENT TRAFFIC OVER NEW PIPELINE FACILITIES TO HS20 LOADS. CONTRACTOR SHALL SUBMIT ACCESS PLANS FOR EQUIPMENT THAT EXCEEDS HS20 LOADS. ✓

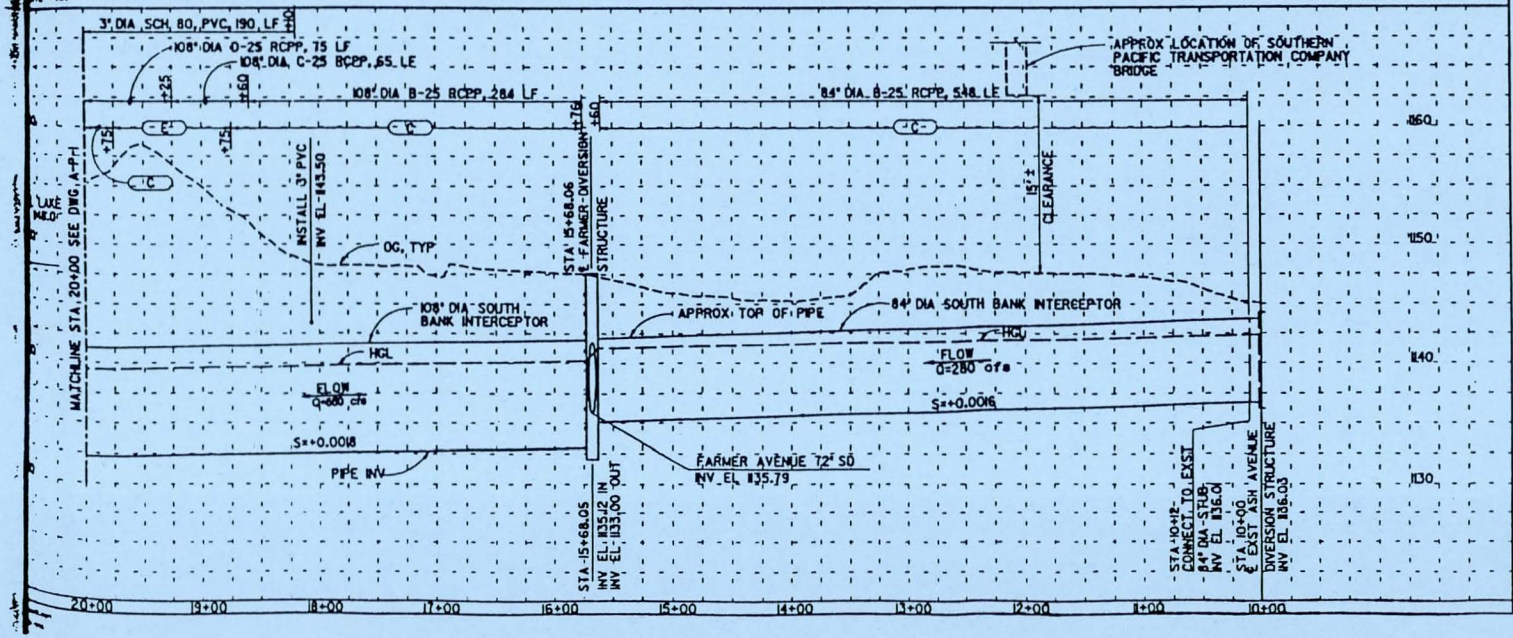
263-1100
CALL ONE CALL

DEPARTMENT OF PUBLIC WORKS
CITY OF TEMPE
DIVISION OF ENGINEERING
P.O. BOX 5002 TEMPE, ARIZONA 85280

SURVEYED: X	DESCRIPTION: SCHEDULE A CIVIL	DATE: APRIL 1996
DESIGNED: X	SOUTH BANK INTERCEPTOR PLAN AND PROFILE	PROJECT NO. 946523A
DRAWN: [illegible]		SHEET X OF X
CHECKED: X		DWG NO. A-P-1
SCALE: 1"=50'		

PRELIMINARY [illegible]

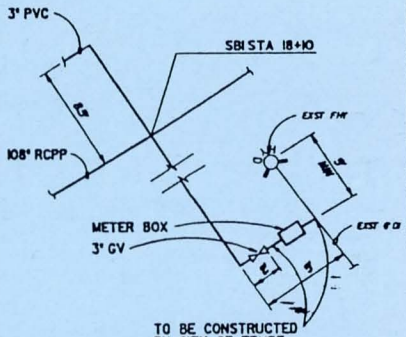




CONSTRUCTION NOTES

NOTES:

1. EXISTING FARMER SD AND ASH AVE SD SHALL REMAIN IN-SERVICE UNTIL SCHEDULES A AND B ARE SUBSTANTIALLY COMPLETE.
2. EXCAVATE TEST PITS OR BORINGS ALONG CENTERLINE OF SBI ALIGNMENT AT 50' INTERVALS FROM STA 15+50 TO STA 29+00 PRIOR TO EXCAVATING TRENCH. REFER TO SPECIFICATIONS FOR DETAILS OF TEST PIT OR BORING REQUIREMENTS.
3. 3" PVC WATER LINE SHALL BE PLACED IN THE SAME TRENCH AS THE 108" SBI FROM STA 18+10 TO STA 30+25. REFER TO THE PIPE BACKFILL DETAIL ON DWG A-D-8.
4. LIMIT EQUIPMENT TRAFFIC OVER NEW PIPELINE FACILITIES TO HS20 LOADS. CONTRACTOR SHALL SUBMIT ACCESS PLANS FOR EQUIPMENT THAT EXCEEDS HS20 LOADS.
5. LOCATION OF EXST 72" SD IS APPROXIMATE BASED ON THE BEST AVAILABLE RECORDS. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION PRIOR TO MATERIALS PURCHASE.



DETAIL
NTS

DEPARTMENT OF PUBLIC WORKS
CITY OF TEMPE
DIVISION OF ENGINEERING
P.O. BOX 5002 TEMPE, ARIZONA 85280

SURVEYED X	DESCRIPTION SCHEDULE A CIVIL	DATE APRIL 1996
DESIGNED X	SOUTH BANK INTERCEPTOR PLAN AND PROFILE	PROJECT NO. 946523A
DRAWN R.E.A.		SHEET X OF X
CHECKED X		DWG NO. A-P-2
SCALE 1"=50'		

PROPOSAL

Place: Tempe, Arizona

Date: _____

Mayor and City Council
City of Tempe
Tempe, Arizona 85281

In compliance with your invitation for bids and all conditions of the Contract

Documents, the _____,

a corporation organized under the laws of the State of _____,

a partnership consisting of _____,

or individual trading as _____,

of the City of _____, hereby proposes and agrees to furnish any and all plant, materials, labor, construction equipment, service and transportation (all applicable taxes included) of the **RIO SALADO TOWN LAKE CUT-OFF WALL CONSTRUCTION (PROJECT NO. 946523D)** and to install the material therein for the Owner in a good and workmanlike and substantial manner and to the satisfaction of the Owner, or their properly authorized agents and strictly pursuant to and in conformity with the Contract Documents and other documents that may be made by the Owner or their properly authorized agents, as provided herein, at the following prices:

SCHEDULE D BID LIST

The following are the bid items for Schedule D:

Item	Description	Quan.	Unit	Unit Price	Extended Total Amount
1.	Mobilization/Demobilization, Diversion and Care of Water and Miscellaneous Items	1	LS	$	$
2.	Soil Bentonite Wall	356,000	SF	$	$
3.	Cement Bentonite Wall	27,800	SF	$	$
4.	Cement	200	TON	$	$
5.	Bentonite	5,000	TON	$	$
6.	Armor Stone Layer and Lining	588,000	SF	$	$
7.	Rock Excavation	100	CY	$	$
8.	Drilling and Coring	345	LF	$	$
TOTAL OF EXTENDED AMOUNT				$	$

The undersigned hereby declares that he has visited the site and has carefully examined the Contract Documents related to the work covered by the above bid.

The Undersigned understands that the City of Tempe reserves the right to award a contract or to reject all bids and to waive any informalities in any bid, deemed to be in the best interests of the City.

"NOTICE: THIS CONTRACT CONTAINS AN EXCLUSIVE AND MANDATORY PARTNERING AND AN ALTERNATIVE DISPUTE RESOLUTION PROCESS FOR THE EFFICIENT AND EXPEDITIOUS RESOLUTION OF ALL CLAIMS WHICH MAY ARISE FROM THIS CONTRACT AND OTHER CONTRACTS CONTAINING THESE PROVISIONS FOR THE PROJECT."

Performance shall not start until after receiving the Notice to Proceed, and the Project will be completed within four-hundred twenty (420) consecutive calendar days after receiving the Notice to Proceed.

The Undersigned hereby acknowledges receipt of the following Addenda:

_____ and his bid has been adjusted to reflect any changes.

Respectfully submitted,

_____
(Name) (Signature)

_____
(Title)

_____
Contractor's License No.

_____
Federal I.D. No./Social Security No.

ATTEST:

_____
(Name)

_____
(Title)

(Corporate Seal)

_____
Witness: If Bidder is an Individual

_____
(Company Name)

Address:_____

_____

Phone: _____

BIDDERS PROJECT REFERENCES

All bidders shall list at least three (3) projects, if possible, similar in scope to this project, that they have completed. Show references in the space provided below (or attached separate sheet):

Job Title/Description	Contracting Agency	Phone No./Contact Person

LIST OF SUBCONTRACTORS

In accordance with the provisions of Section 108.2 of the "Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction", the bidder shall provide the information listed below regarding proposed subcontractors. Failure to provide complete and accurate information may disqualify the bid.

Subcontractor Name	Address	Type of Work	% of Total Contract

CONTRACT

THIS AGREEMENT, made and entered into this _____ day of _____, 1996, by and between the City of Tempe, a Municipal Corporation, organized and existing under and by virtue of the laws of the State of Arizona, party of the First Part, hereinafter designated the **OWNER**, and_____, of the City of _____ County of _____, and State of _____, party of the Second Part, hereinafter designated as the **CONTRACTOR**:

WITNESSETH: That said Contractor, for and in consideration of the sum to be paid him by said Owner, in the manner, amount and at the time hereinafter provided in the "Proposal" and of the other covenants and agreements herein contained, and under the penalties expressed in the bonds hereto attached, hereby agrees, for himself, his heirs, administrators, successors, and assigns as follows:

ARTICLE I - SCOPE OF THE WORK: The Contractor shall furnish any and all plant, materials, labor, construction equipment, services and transportation (all applicable taxes included) required for performing all work for the installation of the

RIO SALADO TOWN LAKE CUT-OFF WALL CONSTRUCTION
PROJECT NO. 946523D

for the sum of _____ ($_____), and to construct the same and install the material therein for the Owner, in a good and workmanlike and substantial manner and to the satisfaction of the Owner or his properly authorized agents and strictly pursuant to and in conformity with the Specifications and Plans for the above referenced project(s) and other documents that may be made by the Owner through the Engineer or his properly authorized agents, as provided herein.

ARTICLE II - CONTRACT DOCUMENTS: The "Notice to Contractor", "Special Provisions", "Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction", as amended by the City of Tempe, "Proposal", "Plans", together with "Bid Security", "Performance Bonds", "Payment Bond", and Addenda thereto, if any.

ARTICLE III - TIME OF COMPLETION: The Contractor further covenants and agrees at his own proper cost and expense, to do all work and furnish all plant, materials, labor, construction equipment, services and transportation for performing all of the work for the construction of said improvements and to construct the same and install the material therein, as called for by this Agreement free and clear in all claims, liens, and charges whatsoever, in the manner and under the conditions specified within the time stated in the Proposal.

IN WITNESS WHEREOF, three (3) identical counterparts of this Contract, each of which shall be for all purposes, be deemed an original thereof, have been duly executed by the parties hereinabove named, on the date and year first herein written.

CITY OF TEMPE
a Municipal Corporation

_____
Name

_____
Title

ATTEST:

_____
Authorized Officer

_____
Official Title

(Corporate Seal)

APPROVED AS TO FORM:

_____
City Attorney

CONTRACTOR:

_____
Party of the Second Part

_____
Name

_____
Title

City of Tempe Transaction Privilege
License Permit No.

_____

ATTEST:

_____
Name

_____
Title

(Corporate Seal)

_____
Witness: If Contractor is an Individual

STATUTORY PERFORMANCE BOND PURSUANT TO TITLE 34,
CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES
(Penalty of this bond must be 100% of the Contract amount)

KNOW ALL MEN BY THESE PRESENTS:

That, _____(hereinafter called the Principal), as Principal and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____, (hereinafter called the Surety), are held and firmly bound unto _____ (hereinafter called the Obligee) in the amount of _____ Dollars ($_____), for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____ day of _____, 19___, to complete Project No. 946523D which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extension thereof, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being hereby waived; then the above obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2, of the Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions of said Title, Chapter and Article, to the extent as if it were copied at length herein.

The prevailing party or any party which recovers judgment on this bond shall be entitled to such reasonable attorney's fees as may be fixed by the Court or a judge thereof.

Witness our hands this _____ day of _____, 19 _____.

_____

PRINCIPAL SEAL

BY:_____

**

_____

SURETY SEAL

BY:_____

_____

AGENCY ADDRESS

Surety hereby acknowledges they are licensed to do business in the State of Arizona

STATUTORY PAYMENT BOND PURSUANT TO TITLE 34,
CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES
(Penalty of this bond must be 100% of the Contract amount)

KNOW ALL MEN BY THESE PRESENTS:

That, _____(hereinafter called the Principal), as Principal and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____, (hereinafter called the Surety), as held and firmly bound unto_____ (hereinafter called the Obligee) in the amount of _____ Dollars ($_____), for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____ day of _____, 19___, to complete Project No. 946523D which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall promptly pay all moneys due to all persons supplying labor of materials to him or his subcontractors in the prosecution of the work provided for in said contract, then this obligation shall be void, otherwise to remain in full force and effect;

PROVIDED, HOWEVER, that this bond having been required of the said Principal in order to comply with the provision of Title 34, Chapter 2, Article 2, of the Arizona Revised Statutes, all rights and remedies on this bond shall inure solely to such persons and shall be determined in accordance with the provisions, conditions and limitations of said Title, Chapter and Article, to the same extent as if it were copied at length herein.

The prevailing party or any party which recovers judgment on this bond shall be entitled to such reasonable attorney's fees as may be fixed by the Court or a judge thereof.

Witness our hands this _____ day of _____, 19 ____.

_____

PRINCIPAL SEAL

BY:_____

**

_____

SURETY SEAL

BY:_____

_____

AGENCY ADDRESS

Surety hereby acknowledges they are licensed to do business in the State of Arizona

CITY OF TEMPE

CERTIFICATE OF INSURANCE

CITY OF TEMPE PROJECT NO. 946523D

The _____ certifies that the listed insurance policies have been issued on behalf of

Name of Insured: _____
Address of Insured: _____

It is further certified that the **City of Tempe** has been named as additional insured as is required under said contract and that the independent contractor's insurance is primary as to any claims resulting from the contract.

Required Insurance	Company(s) Name	Policy Number	Expiration Date	Minimum Limits Required
WORKERS COMPENSATION				Statutory
GENERAL LIABILITY:				
Comprehensive Form				$5,000,000.00 per occurrence Bodily Injury
Premises/ Operations				$1,000,000.00 per occurrence Property Damage
Products/ Completed Operations				
Contractual				
Broad Form Property Damage				
Independent Contractors				
AUTOMOBILE LIABILITY:				
Owned/Non-Owned				Same as above
PROPERTY COVERAGE				See below

When the project includes construction of a new or modification of an existing building, property insurance shall be secured covering **Fire, Extended Coverage and Vandalism and Malicious Mischief** in an amount equal to the Contract amount less costs for any foundation, underground utilities and/or landscaping. The **CITY OF TEMPE** shall be named as additional insured.

Liability Policy Includes Coverage for:

1) A. Damage caused by blasting.
   B. Damaged caused by collapse or structural injury.
   C. Damage to underground utilities.

2) Liability assumed in construction agreements and other types of contracts or agreements in effect in connection with insured operations.

3) All owned, hired or non-owned automotive equipment used in connection with the insured operation.

_____It is agreed that none of these policies will be canceled or changed so as to affect this certificate until ten (10) days after written notice of such cancellation or change has been delivered to the **City of Tempe**.

It is further agreed that:

1) These policies shall not expire until all work has been completed and the project has been accepted by the **City of Tempe**. (If a policy does expire during the life of the **Contract**, a renewal **Certificate** of the required coverage must be sent to the **City of Tempe** not less than five (5) days prior to expiration date.)

This certificate is not valid unless countersigned by an authorized representative of the **Insurance Company**.

DATE: _____ COUNTERSIGNED BY _____

NAME

_____

SIGNATURE

_____

ADDRESS

_____

TELEPHONE NUMBER

CITY OF TEMPE
TEMPE, ARIZONA
DEPARTMENT OF PUBLIC WORKS

CONTRACTOR'S AFFIDAVIT
REGARDING
SETTLEMENT OF CLAIMS

_____, Arizona

Date _____

PROJECT: **RIO SALADO TOWN LAKE CUT-OFF WALL CONSTRUCTION, PROJECT NO. 946523D**

To the City of Tempe, Arizona

Gentlemen:

This is to certify that all lawful claims for materials, rental of equipment and labor used in connection with the construction of the above project, whether by subcontractor or claimant in person, have been duly discharged.

The undersigned, for the consideration of $_____, as set out in the final pay estimate, as full and complete payment under the terms of the contract, hereby waives and relinquishes any and all further claims or right of lien under, in connection with, or as a result of the above described project against the City of Tempe. The undersigned further agrees to indemnify and save harmless the City of Tempe against any and all liens, claims of liens, suits, actions, damages, charges and expenses whatsoever, which said City may suffer arising out of the failure of the undersigned to pay for all labor performances and materials furnished for the performance of said installation.

Signed and dated at _____, this _____ day of _____, 19____.

_____
Contractor

By:_____

STATE OF ARIZONA)
) SS
COUNTY OF MARICOPA)

The foregoing instrument was subscribed and sworn to me before this _____ day of _____, 19_____.

_____
Notary Public

_____
My Commission Expires